

AQUARIST & PONDKEEPER



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TROPICAL • COLDWATER • MARINE • DISCUS
KOI • PONDS • PLANTS • REPTILES & AMPHIBIANS



The Better Fishkeeping Magazine

COVER PICTURE

Golden pheasant killifish (*Callopanchax occidentalis*) Largo Blue.

COVER PHOTOGRAPH: AREND VAN DEN NIEUWENHUIZEN

GOLDEN PHEASANT KILLIFISH (*Callopanchax occidentalis*)

This species is found in the forests and savannas of Sierra Leone where there are various different colour forms depending upon where they are collected. Even in the same population you may have two different colour morphs.

It is one of the larger, deeper bodied killifish species reaching about 3.5 inches in captivity. Males have larger dorsal and anal fins. They are also much more beautiful than females as they have blue and red fins and markings on their body. Females are a drab brown colour with a darker throat colour during spawning.

Whilst not a particularly aggressive fish, males will squabble amongst themselves and are hard on their females. For this reason it is best to keep 1 male and several females together. Other fish can be kept with them but they may nip the fins of slow moving or long finned fish.

Callopanchax occidentalis is a substrate spawner which lays its eggs approximately half an inch below the substrate. The eggs take about two to three months to hatch and the youngsters will eat newly hatched Brine shrimp and Micro worms as soon as they are free swimming. They grow very quickly and are sexually mature in only eight months and rarely live much longer than 12 months even in captivity.

About killifish in general

Killifish must number as some of the most beautiful fish in the world and yet they are rarely kept by aquarists. Part of the problem is that they are thought of as difficult or delicate fish to keep but the main reason is lack of availability. Very few shops stock these fish so the opportunity to buy them is just not there for most aquarists. The way around this is to join a specialist society like the British Killifish Association (see the advert in our classified section) and attend one of their events or order fish from another member. There are several people who advertise spare stock in the society magazine.

Availability is only part of the problem, what about them being difficult or delicate fish to

keep in captivity? In reality, apart from needing soft, neutral to slightly acidic water, they are fairly easy to maintain in captivity. Many species will accept flake or other commercial foods but, even those which are reluctant to take these processed foods, will gobble up frozen Blood worm, Mysis shrimps, etc. White worms can also be cultured for them and of course other live foods such as Daphnia can be fed.

Their aquarium should have plenty of plant cover in it and gentle filtration in the form of a bubble-up sponge filter. Internal power filters which create strong water currents are not appreciated and should be avoided. Partial water changes should be performed every week with water of the correct pH and hardness. In many areas rainwater is perfectly safe to use once it has been filtered through activated carbon. In soft water areas of the country tapwater will be ideal. One piece of equipment no killifish keeper should be without is a pH tester. This can be either an electronic one (much more expensive to buy but cheaper in the long run) or chemical reagents.

A little about killifish names

Killifish names have been through so many changes over the years that aquarists are often left wondering just which is the current name for their fish. The fish pictured here will be found in some literature as *Roloffia occidentalis*, however, *Roloffia* has been dismissed by International Commission on Zoological Nomenclature and is no longer a valid genus.

You may also find it listed as *Aphyosemion occidentalis* (even in some of the very latest publications) but this has been superseded by *Callopanchax occidentalis* which is its current name. With such constant change in the scientific world it is tempting to fall back on common names but even these are by no means universal. This species is known as the Golden pheasant killifish or Red Aphyosemion depending upon which book you look in but it will very rarely be seen under either name in the hobby or in the few shops which do stock this fish.



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EDITORIAL

Welcome to the new century and a new look to A&P's editorial. Here I am in the body of the magazine rather than tucked away in a narrow strip on page 3. Part of the move was necessitated by my publisher, marketing manager and sales team all thinking you would want to see what A&P's editor looks like. For that they needed a photograph, which I have duly supplied and a little more room, so that you can see me properly. I hope they are satisfied with the result — I certainly am.

Since this is a time when everyone traditionally takes a good hard look at themselves (even more so this year with the start of a new century), we thought it was time that we found out what A&P readers want to see in the magazine. Since A&P has always been closely linked with the organised hobby we felt it was a good idea to include a few questions about this subject as well and, most important of all, we want to find out more about our readers themselves. This way we can tailor the magazine to your needs, rather than just putting together a magazine we think you would like. To do this we are including a short survey with this issue. All you have to do is tick a box or two to answer each question — simplicity in itself. If you don't want to tear out a page of your magazine just photocopy the form and return the photocopy to us.

As with all surveys they are only accurate if lots of people reply to them, so we have joined forces with SeaMe.com to offer a little incentive. The first four surveys drawn "out of the hat" on March 1 will receive an Eheim External Professional 2222 Filter. With a RRP of £144.53 each that amounts to over £575 worth of prizes to be won! Not so much a "little incentive" as a big fat juicy one!

Some of you will have noticed just how late A&P has been arriving on the shelves over the last month or so. We can at last reveal the reason for this gradual slide back in publication dates — A&P is going four-weekly during this millennium year. Since this means the magazine will hit the shelves several days before the start of the month, here are the first few dates: March issue, February 29; April issue, March 28; May issue, April 25; June issue, May 23.

Future dates will be included in the monthly planner so you will always know when to look for your favourite aquatic magazine in the

newsagents. Of course a better solution is to subscribe and you will be sure of receiving your copy hot off the press. Your local aquarium shop can also obtain copies of A&P for their customers direct from us now. All they need do is phone 01233 500070 and we will set things in motion. That way you can pick up your copy of A&P at the same time as visiting your favourite aquarium shop.

Until next month, Happy New Century.

D. Lambert

DEREK LAMBERT EDITOR

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By BOB & VAL DAVIES

- A police officer in the USA who is a keen reptile keeper provides temporary care for reptiles that come into police hands for various reasons. One of these, a Green Iguana, accompanies him on patrol in the back of the car dressed in a motor cycle helmet and black leather police jacket complete with a police badge and tiny handcuffs. The "rookie cop" is evidently a great draw for children who are then given green safety leaflets.

- Advice in an Australian health and

safety guide advises animal handlers not to place any part of the body in a crocodile's mouth and not to sit on its back.

- St Patrick's Day in the small American town of San Patricio is celebrated with various games involving Rattlesnakes. These include Rattlesnake races — any contestant who is bitten is disqualified.

- Research by Italian and Australian biologists seems to prove that toads are right-handed. Evidently when paper is stuck to their heads they tend to scrape it off with their right hand. Others, when turned over use the right hand to turn back to the normal position.

- Way back in 1995 the world record for spending time in a cage with venomous snakes was broken by two Chinese women. The previous record of ten days spent among 200 snakes was topped by the new one of 12 days with 888 snakes. Not all the snakes were venomous but 150 harmless specimens, eaten by the Cobras on the first night, were replaced. One of the women was bitten by a small Cobra on the first day but "removed the poison and took Chinese herbal medicine to prevent harmful effects". As far as we know a new record has not been set since.

THE THINGS PEOPLE DO!

FISHTALES BY TOKES & SCHOFIELD

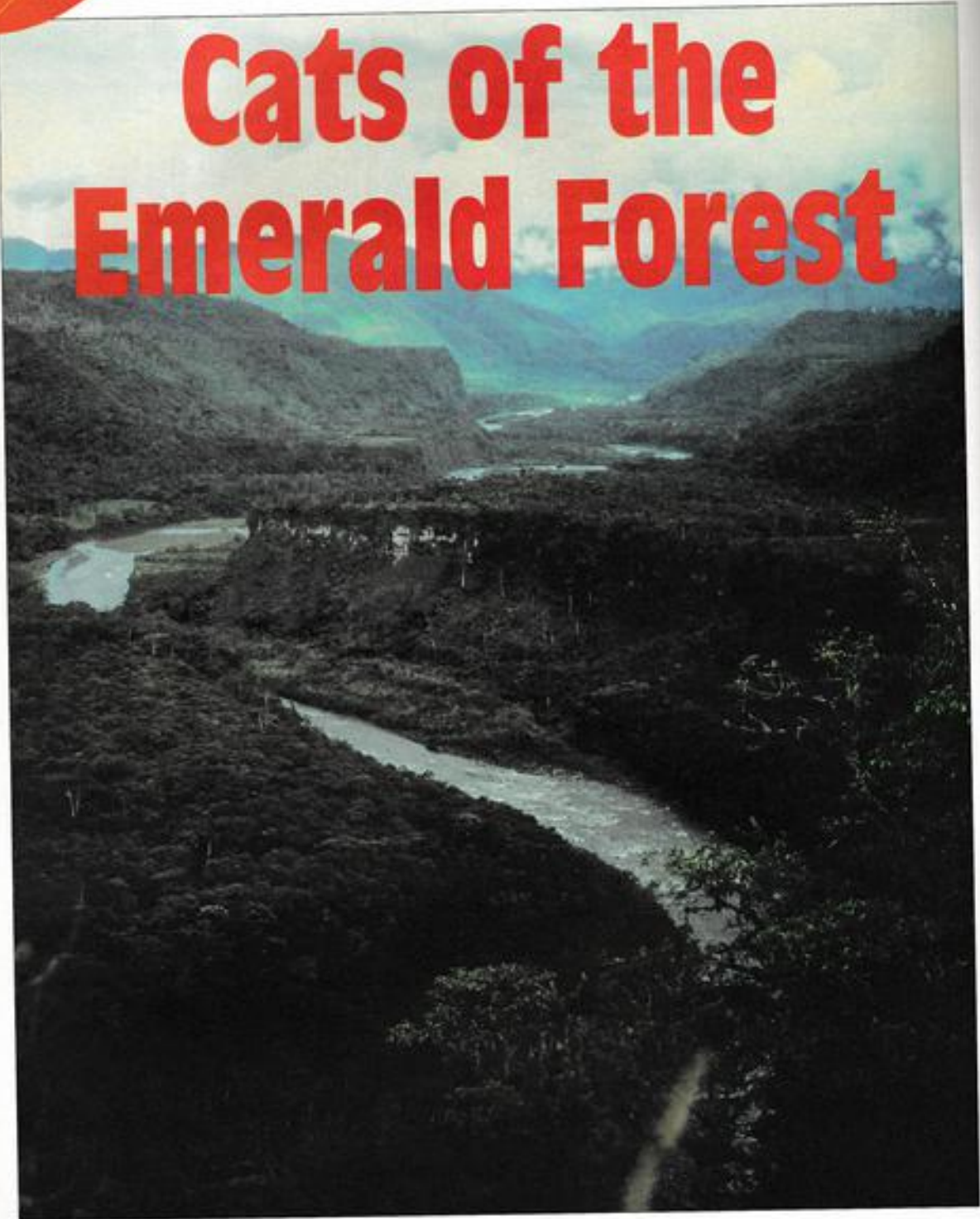


TROPICAL

By PETER A. LEWIS

PHOTOGRAPHS: PETER A. LEWIS UNLESS OTHERWISE STATED

Cats of the Emerald Forest





far left This beautiful river in Ecuador is home to *Brochis*.

PHOTOGRAPH
DAVID D. SANDS

left *Brochis splendens* juveniles are sometimes mistakenly seen for sale as high priced "Bronze Corydoras".

PHOTOGRAPH
DAVID D. SANDS

below *Brochis splendens*. Much of the older aquarium literature will feature this species as *B. coeruleus*. In fact, if my memory serves me right, the fish was known by this synonym until the early 1980s.



I have been keeping tropical fishes in my home for over 30 years and I cannot remember a time when I did not have at least one "Emerald Cat" in one of my many tanks. I shall forever carry fond memories of *Brochis splendens*, as it was this species of catfish that gave me my first "Best in Show" award in 1972 at the Bath, Somerset show. When I emigrated to the United States in 1980 the first catfish I purchased were 12 specimens of *B. splendens*, advertised as "Emerald Corydoras" and on sale at \$2.95 each (about £1.50). Four of these cats are still alive today in spite of my having moved twice in the intervening 20 years. In my latest fish room at my new home in Glendale I have these four originals

housed in a 125 gallon tank along with several species of *Botia* and a few *Corydoras* that I have yet to identify but that I bought as "Iridescent Corydoras".

The genus *Brochis* found entirely in South America, belonging to the family Callichthyidae, was established by Cope in 1872. There are currently three members of the genus, known to science: *B. splendens*, *B. britskii* and *B. multiradiatus*. Each is an armoured catfish, closely resembling the *Corydoras* genus to such an extent that juvenile *Brochis* are often mistakenly seen for sale as "Bronze Corydoras". The most distinguishing feature that differentiates all members of the genus *Brochis*

BROCHIS CATFISH

from the genus *Corydoras* is the ray count of the dorsal fin. All *Brochis* have between 11 and 17 soft dorsal rays whereas *Corydoras* only feature seven to eight soft rays in this fin, further the body of *Brochis* is deeper than that of *Corydoras*.

Each species is distinctly armoured, its body having no scales but being protected by clearly visible, interlocking sheets of bone under their skin. All have three pairs of barbels, two maxillary and one mandibular.

Living in waters almost devoid of dissolved oxygen

Consistent with other members of the family Callichthyidae all *Brochis* have developed their respiratory function to an extent that allows them to live in waters almost devoid of dissolved oxygen. The catfish quickly darting to the surface of the water to gulp down a mouthful of air which it then swallows evidences this rather unique adaptation known as "intestinal respiration". As this bubble of air passes through the catfish's digestive tract the blood enriched walls of the intestine actually adsorb oxygen from this air, enabling the fish to supplement the oxygen that is adsorbed through its gills in a more conventional manner.

In fact if any member of the family Callichthyidae is prevented from reaching the air above the water's of its home the catfish will die. An oil slick across the waters of their home would result in widespread death and destruction of such armoured cats. Collectors fishing the Amazon and its tributaries talk of how it looks as if rain is falling on the waters surface when shoals of *Brochis*, numbering several hundred catfishes, all surface at the same time to gulp down air.

Typical of all members of the family Callichthyidae the barbels of these catfish are delicate and will deteriorate to thin, skinny whiskers if the fish are kept over a substrate that is rough and sharp. Since the fish's barbels are in actuality an external "tongue", *Brochis* rely upon their barbels being able to taste food in the dark as they forage amongst the substrate of the aquarium. Smooth, pea sized gravel is almost mandatory to the successful maintenance of these fishes in a captive environment. Once the barbels have been damaged and worn they never seem to grow back to their full glory despite any attempts to reverse the damage. I have often been asked during talks I have given over the years why catfish appear to stop growing once their barbels have worn down. The answer is simple, they are starving, catfish with reduced barbels are unable to find food in a darkened aquarium to the same extent they would with complete barbels.

My practice has always been to leave half the bottom of my catfish tanks without any gravel and to place generous amounts of waterlogged wood in this bare area. Further I will always feed the fish in this area late in the

evening prior to "lights out" such that the cats become accustomed to foraging and finding food in this region where security is provided by the bog wood and the floor is almost bare.

Feeding is absolutely no problem since *Brochis* are truly omnivorous eating almost anything that arrives on the floor of the aquarium. As a routine my specimens are fed flaked foods, to include those enriched with vegetable matter, frozen Brine Shrimp, *Daphnia* and freeze-dried Krill. The fact that I have kept the same specimens alive in a captive environment for almost 20 years attest to their suitability as an aquarium fish and their robust nature.

Each of the three species discussed will flourish in a tropical tank where the temperature is maintained in the range of 25 to 30°C in slightly acidic water where the pH ranges from 6.0 to 7.4. The aquarium water should be kept clean and well filtered, even though *B. multiradiatus* has been found in heavily silted waterways, water changes being made as a routine every three weeks. During one summer in Ohio, when night time temperatures rarely fell below 25°C, I placed 12 *B. splendens* outside on my deck in a 100 gallon plastic tank in an attempt to get them to breed.

During this four month period the catfish were fed an exclusive diet of earthworms and *Daphnia* along with any natural foods such as mosquito



right *Brochis britskii* was the most recent of the known *Brochis* to be identified and was named in honour of Dr Britski of the Sao Paulo Museum of Zoology.

PHOTOGRAPH M.P. & C. PIEDOIR

larvae that happened from Nature. Whilst they did not breed I did retrieve 12 excellent looking, highly coloured specimens at the end of the summer which were placed back into my fish room aquariums.

Brochis splendens (Castelnau, 1855)

Synonyms: *Lichtys splendens*, *Corydoras taiposh*, *C. semisculatus*, *Colobochthys splendens*, *Holpostrum splendens*, *Chaenothorax bicarinatus*, *Brochis diporus*, *B. coeruleus*.

Much of the older aquarium literature will feature *B. splendens* as *B. coeruleus*. In fact, if my memory serves me right, the fish was known by this synonym until the early 1980's. This catfish, when mature, is a brilliant emerald green colour across most of its sides with a light brown to pink belly. The largest specimens are most likely to be females and seldom grow to standard lengths exceeding 7.5cm. This is the most common of the *Brochis* genus available within our hobby, hundreds of thousands are collected and exported for sale from Brazil, Peru and Ecuador each year from such localities as Iquitos, and the Rivers Tocantins, Ambyacu and Napo. The type locality is the upper Amazon in the region of the River Tocantins and Caoceres in Mato Grosso. *B. splendens* has 10 to 12 soft rays in its dorsal fin. Juveniles show some colour in their dorsal fin that disappears with age, all other fins are clear.

Personally I have kept this species in water ranging from a pH of at low of 5.8 to a high of 8.2, however, the catfish does appear to prefer

water on the slightly acid side of neutral. All my catfish tanks contain waterlogged wood to which I have attached Java Fern, *Microsorium pteropus*. Equally they appear to thrive in captivity alongside other species of *Brochis* or *Corydoras* and most definitely do not like to be housed with aggressive fishes such as the larger cichlids or larger South American cats that grow to a size in excess of 15cm. Single specimens in a community tank never appear content and are constantly shying away from the more active fish in the tank.

Brochis multiradiatus (Orces-Villagomez, 1960)

Synonym: *Chaenothorax multiradiatus*.

An inhabitant of the Rivers Madeira and Ugarape of Brazil, the Rivers Ucayali, Pachitea and Many of Peru and Lagartococha of Ecuador, *B. multiradiatus* is possibly the easiest of *Brochis* to identify. The dorsal is very distinctive, having 17 soft rays, making the fin very long based and an obvious feature and leading to the specific name of "many rays". Equally the nose of *B. multiradiatus* is considerably longer than that of the other two species, a feature that has led to this catfish being given the common name of "Hog-nose" catfish in some circles. Mature specimens will reach 10cm standard length. Again the body of this fish is a highly attractive green colour, very often dark green. Truly an "Emerald Catfish". Initially made available within the hobby in 1974, I first saw three specimens for sale in an aquarium shop in San Francisco in 1994 and bought them all, in spite of the problems in getting them back to my home in Cincinnati after the conference I was attending ended. In an aquarium together with *B. splendens* the differences in dorsal and nose appearance become so obvious one wonders why there was any argument as to the uniqueness of *B. multiradiatus* when it was first discovered.

The specimens I maintained thrived in captivity and seemed to be more active in foraging deeper into the aquarium substrate than was *B. splendens*. A food item that seemed especially important to *B. multiradiatus* was well cleaned Tubifex worms which were extracted from even the deepest sections of the gravel in my aquarium and which lived for scant seconds when placed in the part of the tank devoid of gravel.

Brochis britskii (Nijssen & Isbrucker 1993)

The most recent of the known *Brochis* to be identified, *B. britskii*, a fish carrying a patronymic specific name to honour Dr Britski of the Sao Paulo Museum of Zoology. Heiko Bleher collected the type specimens during a collecting expedition in 1984 to Brazil's Mato Grosso and River Guapore. *B. britskii* is also found in the River Paraguay system around Pocone and Miranda.

Possibly the largest of the three species *B. britskii* grows to a standard length in excess of 10 to 12cm. In common with *B. multiradiatus*, *B. britskii* has a long based dorsal fin with 15 to 18 soft rays but lacks the long snout. Key to the identification of this species is the unique ventral head shield, easily visible when the fish is turned upside down and clearly illustrated in the book by David Sands, *Catfishes of the World*, Volume 1, page 206. As to body colour, that of *B. britskii* is very similar to the two previously described species, being essentially dark green across the sides and distinctly pink in the belly region. All fins are clear.



BROCHIS CATFISH



left: *Brochis multiradiatus*. An inhabitant of the Rivers Madeira and Ugarape of Brazil, the Rivers Ucayali, Pachitea and Nany of Peru and Lagartococha of Ecuador, *B. multiradiatus* is possibly the easiest of *Brochis* to identify.

Breeding *Brochis* species

The accounts of any of the three known species breeding in captivity are few and far between. Personally I have had *B. splendens* lay eggs and seen the spawning ritual but I have never been successful in hatching the eggs or rearing fry. By all accounts the genus breeds in exactly the same manner as do *Corydoras* sp. The key appears to be having a reverse harem where the female is courted by several males at once and stimulated to produce eggs which she carefully deposits amongst rocks and broad leaved plants in the aquarium. The ritual for *Corydoras* is for the gravid female to clean a spot on a rock or leaf, take sperm into her mouth which she obtains from the vent of an adjacent male then immediately deposit the sperm on the previously cleaned spot.

Next the female will lay two to three eggs onto this spot where the sperm of the male has been deposited, being careful to ensure that these adhesive eggs are pressed firmly onto this chosen area. This ritual continues in what can best be described as a breeding frenzy with as many as three or four males becoming involved with the active female, busily fastening small clumps of eggs around the tank. As many as 150 to 200 eggs are laid over a period of two to three hours after which time the frenzy subsides and all participants relax and rest or slowly forage the bottom of the tank in search of food.

I have actually witnessed the spawning frenzy, an act so intense that the males following the female were white with sperm across their ventral region. The eggs were deposited over two hours and the ritual took place in a 125 gallon aquarium within three hours of a 25 per cent water change. Sadly the eggs were eaten by the loaches in the tank and I have never since been able to find the trigger that set the spawning in motion. I have not, however, given up trying. My next fish room, currently in the planning stage, will be built with the aim of providing natural light to the captive community. Hopefully natural light is one key and, when the correct lighting rhythm occurs my *B. splendens* will once again spawn.

In the meantime I have tried the tricks and triggers that have been

made known to me through acquaintances in the hobby. Such tricks include changing half the water in the tank for water that is as much as 20 degrees cooler, simulating a rain shower of colder water. Draining the aquarium down to a depth of 8cm and leaving it like this for a week prior to gradually replenishing the water over a few days, simulating a period of drought and then flood.

Holding off on water changes for five or six weeks, allowing the tank water to evaporate without replacement and the water to become progressively fouler then topping up the tank with fresh rain water. And finally, conditioning the catfish on such a rich diet as Brine Shrimp, chopped earthworms, de-veined beef heart and live pond foods such as *Daphnia* and Ghost larvae. None of these worked for me, although each has proven to be a trigger to spark the spawning of *Corydoras* by my friends in the hobby.

Bottom line, I enjoy keeping *Brochis* sp. in my tanks and I continue my search for *B. britskii* to add to my collection and will not give up in my attempts to breed the genus. My next approach will be to add a dozen youngsters to the 20-year-old specimens I have in my tanks as soon as my next fish room is completed and see if the introduction of "new blood" will initiate the spawning urge.

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DAVE GARRETT examines some of the fascinating Marine Gobies:
PHOTOGRAPHS: MAX GIBBS

Gorgeous GOBIES

You rarely hear anyone sing the praises of Gobies, they are often passed by and completely ignored in dealers' tanks. They may attract such comments as 'dull' or 'boring' when compared to the eye catching splendour of the Angels and Butterflies, or the vivid and bizarre coloration of some of the Triggers and Surgeons, or even the cuteness of the Boxfish and Puffers. I suppose when compared to such competition they do seem to be rather a come down. However, if you are a beginner, on a limited budget, have limited space, or are planning to keep invertebrates, many of the attractive fish mentioned above are no longer an option. A closer look at the Gobies will reveal colour, character, strange relationships, hardiness and cheapness — overall not a bad list of attributes.

Occurrence

The Gobies are a vast family of fish that have a widespread distribution throughout the world's tropical and temperate waters. They also have an extremely diverse range of habitats, varying from freshwater, through coastal waters, to mangrove and salt water environments. Indeed if you are looking for something out of the ordinary then the November 1999 issue of *A&P* carried a fascinating article by Dr Peter Miller concerning the habits of the amphibious Mudskipper Gobies from coastal and mangrove waters. However, as with all my articles I am afraid I will be sticking strictly to the marine species, although I can point our freshwater friends towards an *A&P* article covering freshwater Gobies written by Kathy Jankings in the May 1997 issue.

Behaviour

Gobies are found from a variety of locations varying from the coral reef to muddy shallows. They are carnivorous fish that feed on small shrimps and other planktonic organisms. Having little in the way of defence mechanisms and being poor swimmers they will not stray far from their favourite refuge. Unfortunately for the aquarist some species are quite short lived.

Gobies exhibit some very interesting natural traits that are also seen in captivity, in particular cleaning duties for other fish and symbiotic relationships with Pistol shrimps.

Similarity to Blennies

Despite being very similar and often confused with Blennies they have distinguishing characteristics. The pelvic fins of Gobies are fused to



form a disc which is used to cling to any convenient 'perches'. Blennies show a similar perching behaviour but this is accomplished through the extension of the rays of their pelvic fins.

Breeding

Spawning occurs in burrows or secluded areas and the eggs are guarded by the male. Several species have spawned in captivity and the fry of some species such as the Neon Goby (*Gobiosoma oceanops*) have been raised successfully by hobbyists as well as commercial breeders.

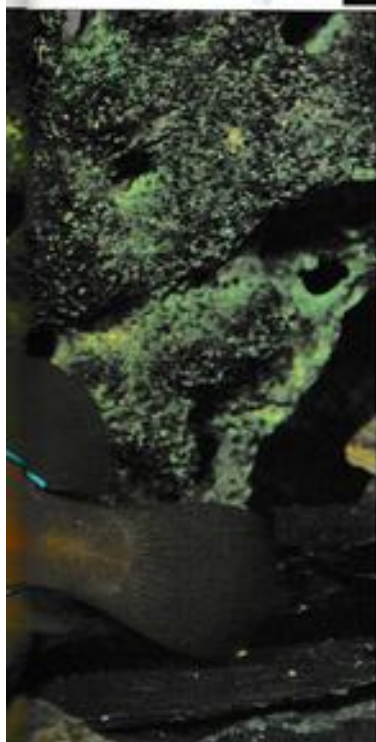
Whilst sexing a Neon Goby is difficult pairing does occur spontaneously. The males colour will darken before he begins to court the female and spawning occurs in a cave or sheltered area with the eggs hatching after seven to 12 days. The fry feed on planktonic organisms and in the aquarium these can be supplied by rotifers before the fry move on to newly hatched brine shrimp.

Aggression

Whilst Gobies are generally peaceful in captivity, this does not always apply to members of their own species. Their aggression can be out of all proportion to the size of the species, as can be seen with the Neon Goby where, unless they are a true pair, fish as small as an inch each will not co-exist, even in a large 80 to 100 gallon tank.

Bear in mind some Gobies are very small and/or fairly timid and will

right Here a Pistol Shrimp can be seen living with a Goby in the wild. This picture was taken off Mabul Island, Sabah, Malaysia.



above Lemon Gobies (*Gobiodon citrinus*) are a small Indo-Pacific species which are very peaceful towards other fish but will not tolerate their own species unless as a true pair.

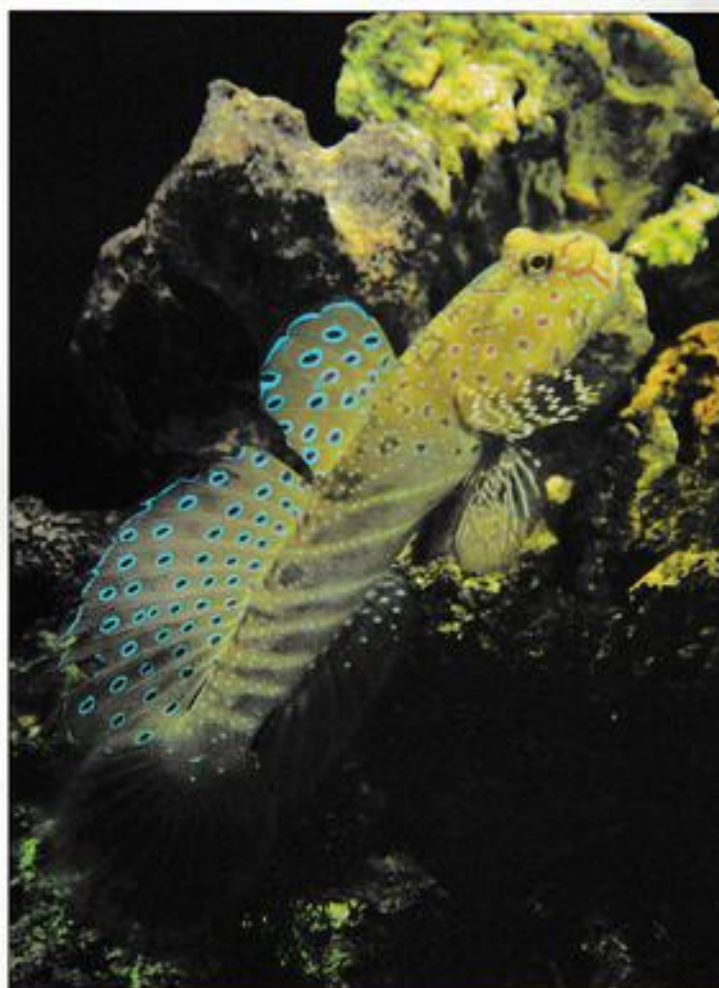
right Gobies of the Genera *Ambyeleotris* and *Cryptocentrus* live in symbiotic harmony with the Alpheidae or Pistol Shrimps. The great thing for aquarists is that this behaviour can be seen in captivity. This fish is *Cryptocentrus leptocephalus*.

need to establish themselves early on in an aquarium's life, before more boisterous fish are added. Their small size also means that a predatory fish would not have to be very large in order to make a meal of them.

Commonly available species

NEON GOBY (*Gobiosoma oceanops*)

I once kept what I was told was a pair of these fish in a 150 gallon aquarium. Once added to such a large aquarium, complete with it's fair quantity of rock-work, they were impossible to catch, leading to a rather unfortunate outcome. Despite having 12 cubic feet of water each to accommodate their tiny one inch bodies, one of them was still not satisfied



GORGEOUS GOBIES



above The Neon Goby hails from the western Pacific and is easily catered for in the aquarium where it will thrive on a diet of planktonic organisms and small crustaceans.

right Catalina Goby (*Lythrypnus dalli*) are a beautifully coloured, Caribbean species, tolerating its own kind and making an excellent addition to an invertebrate aquarium.

with its territory and mercilessly harassed and finally battered the other one to an untimely death.

The survivor was a real Jekyll and Hyde as it showed no other aggressive tendencies whatsoever and settled down to become a charming fish, offering cleaning services to all and sundry. It was so small that it actually

took up residence within the gill chamber of a large eight-inch Porcupine Puffer. I swear this is true and the Puffer would often swim by with just the head of the Goby sticking out from its gill cover!

The Neon Goby hails from the Western Pacific and is easily catered for in the aquarium where it will thrive on a diet of planktonic organisms and small crustaceans. Such a diet can easily be provided in captivity from the varied range of commercially available frozen food. Unfortunately, the species is very short lived and you can only expect a life-span of a couple of years.

The species has been bred very successfully on a commercial level and has also seen success at the hobbyist level. Breeding these fish, and in particular raising the fry, provides a real challenge for the advanced marine enthusiast.



Partner Gobies

Some species of Goby earn this strange name by their symbiotic partnership with some species of shrimps. The Goby will share the same burrow as the shrimp. The fish will peer out of the burrow whilst the shrimp goes about the task of maintaining the burrow through it's constant excavating. The shrimp never strays from the side of the Goby and when the eagle-eyed fish spots trouble and retreats into the burrow the shrimp immediately follows.

Debelius (see reference) explains the behaviour at some length using as examples the Gobies of the Genera *Ambyeleotris* and *Cryptocentrus* with the Alpheidae or Pistol Shrimps. The great thing for aquarists is that this behaviour can be seen in captivity, once again decrying the 'boring Gobies' tag.

Master diggers

There is a group of Gobies that are referred to as Sleeper Gobies (if we must have a common name then 'Shovel Gobies' would be more apt). The two species of this group regularly seen for sale are the Orange Spotted Goby (*Valenciennesa puellaris*) and the Blue Cheek Goby (*Valenciennesa strigata*). Again we have fish with fascinating behaviour and, in the case of the Blue Cheek, quite startling colours. Both of these species will show constant sand sifting activity as they dig and burrow for food particles within the sand grains. The fish take large mouthfuls of sand and then filter it through their gills in an attempt to sift out food such as tiny crustaceans. Both these species will form pairs and will spawn inside their burrows or bolt holes, such behaviour often being seen in captivity. A friend of mine had a pair of Sleeper Gobies that regularly disappeared down the uplifts of his undergravel filter for days at a time, presumably to spawn.

Tiny additions

Some species of Gobies represent the smallest fish seen for sale within the hobby, rarely reaching much over one inch in length. Their diets are the same as their larger cousins, i.e., crustaceans and plank-

tonic organisms, but in a smaller size. Unfortunately, these species seem to be short lived in captivity with a life-span of around two years.

One benefit of these tiny species is that such a small body weight is going to exert a proportionally small bio load on the aquarium hence they are ideal inhabitants for the smallest of tanks.

CATALINA GOBY (*Lophrygnus daffi*)

A beautifully coloured, Caribbean species, tolerating its own kind and making an excellent addition to an invertebrate aquarium. The male can be identified by its longer dorsal fin spine and the species has spawned successfully in captivity.

LEMON GOBY (*Gobiodon citrinus*) and YELLOW GOBY (*Gobiodon okinawa*)

These two small Indo-Pacific species are very similar in size and aquarium behaviour. They are very peaceful towards other fish but will not tolerate their own species unless as a true pair. They are ideal, easy to feed additions to an invertebrate community.

Summary

I said at the very start of this article that the Gobies do not deserve the boring tag they seem to have attracted and I feel the particularly interesting quirks of some of them prove this. Gobies also have the advantage of serving a wide range of hobbyists, being hardy enough for the rank beginner whilst providing a serious challenge to even the most experienced aquarist should they relish the prospect of breeding and raising them.

Finally, for added interest they are diverse enough to provide classic examples of symbiotic relationships and cleaning duties should you not want to try Clowns and Anemones or the notoriously difficult Cleaner Wrasse.

Reference for Partner Gobies

Fishes for the Invertebrate Aquarium, by Helmut Debelius. Originally published in 1986 by Edition Kernen of Germany and distributed in the UK by Tropical Marine Centre. ISBN No. 3-87401-052-X. I believe a later edition is available.



left The Blue Cheek Goby (*Valenciennesa strigata*) has both fascinating behaviour and quite startling colours.

News Desk ... News Desk

BREAKTHROUGH IN FISH DISEASE MYSTERY WHICH HAS SIGNIFICANCE FOR FISH FARMERS WORLDWIDE

Scientists at Imperial College, London, and the University of Reading, have identified the origin of a mysterious disease responsible for a high death rate of fish in freshwater farms, according to work published in December in the journal *Parasitology*.

Fish farming has become a cheap and efficient means of producing large quantities of certain types of fish. However the concentration of large numbers of fish in fish farms brings problems, not least the enhancement of the spread of disease.

In recent years fish farming has been used extensively for raising Rainbow trout and Salmon. The disease known as Proliferative Kidney Disease (PKD) was hardly known at the beginning of the century but has developed into a serious problem in farming these fish in Europe and North America. The infection appears regularly in late spring or early summer, when a parasite infects the kidneys and spleen causing the fish immune cells to multiply out of control, destroying these organs and resulting in anaemia, bloating, discoloration and death.

Mortality can be extremely high and sometimes entire fish stocks can be wiped out. This can result in significant economic loss from the 15,000 tonnes of trout produced annually by the fish farming industry in the UK worth £25 million.

It has been known since the 1950s that a microscopic parasite is the cause of the disease. In the 1980s it was shown that the organism belongs to a group known as Myxozoa but, because it does not develop to its final form in fish, it has not been possible to identify it further. Thus, it has been referred to as PKX, 'X' signifying the 'unknown' cause of proliferation in kidney. It has been widely believed that PKX completes its normal development in another host and research groups in the UK, continental Europe and North America have searched for this host without success until now.

Professor Elizabeth Canning and Dr Cort Anderson at Imperial College and their colleague Dr

Beth Okamura at Reading, supported by the Natural Environmental Research Council, have now made the surprising discovery that an obscure group of freshwater organisms, known as bryozoans or 'moss animals' harbour the infective stages of PKX(2).

They first used the new tools of molecular biology, by which they showed identical genetic material (DNA) of PKX in the bryozoans and Rainbow trout, thus identifying bryozoans as the mystery hosts. Professor Canning said: "Since then, we have observed the actual parasite in bryozoans, studied its development and named it *Tetrahymena bryozoaformis*, the name reflecting the names of the bryozoan and salmon hosts." Also, in collaboration with scientists Steve Feist and Matt Longshaw at the MAFS Centre for the Environment, Fisheries and Aquaculture Science, Weymouth, final proof of the discovery was obtained when the infection was transmitted experimentally from bryozoans to Rainbow trout which subsequently developed the disease.

The discovery has far-reaching implications for fish farming. For the first time the natural source of infection has been identified. This raises the possibility that infection can be controlled. Although elimination of bryozoans in rivers is not likely to be possible or environmentally desirable a reduction in bryozoan abundance could be achieved. Regular removal of bryozoans growing near the water input of fish farms might reduce the incidence or severity of the disease. However, a vaccine based on infective stages released from bryozoans perhaps offers the best long term hope of control by preventing infection from becoming established.

Reference

The research is reported in the article 'Molecular data implicate bryozoans as hosts for PKX (Pylum Myxozoa) and identify a clade of bryozoan parasites within the Myxozoa', by C. L. Anderson, E. U. Canning and B. Okamura, published in the peer reviewed journal, *Parasitology*, No. 119 Issue 6, 1 December 1999.

OBITUARY

Jefferson Challands
(1946-1999)

Back in mists of time, around about 1972, I received a long, rambling letter from Newton Aycliffe, a town I had never heard of, from an aquarist called Jeff Challands who was interested in buying some young mbuna. And thus began a close and treasured friendship which suddenly and unexpectedly ended on September 8, 1999.

Jeff had, in fact, been ill for many years following an operation for cancer when he was only in his early thirties. It was thought that the radiotherapy had caused damage to his spine, and he was told that he would be in a wheelchair by the time he was 40; yet in the event he was 52 before that finally became necessary. But no-one had any idea that anything life-threatening was wrong. It was, perhaps, typical of the man that he didn't tell anyone, even his closest friends, that his health had been declining even more over the past few months, so that the dreadful news was even more of a shock to everyone when it came.

Despite his continuing illness over the years, Jeff remained a very active fishkeeper, mainly with cichlids, but with more than a passing interest in catfishes as well, and spent many hours down in his 'shed' at the bottom of the garden. But it is for his other aquaristic activities that he will be best remembered.

No-one who ever attended a BCA auction could ever forget the auctioneer, even if they had no idea who he was. The combination of volume, banter, and occasional ribaldry were unique, and his skill at eliciting the last penny from buyers was of constant benefit to BCA coffers. Not surprisingly his services were in great demand — and willingly given — to local clubs as well.

He served on the BCA committee for many years, initially as Editor, and subsequently as Chairman. I am sure none of the other Editors, past or present, will mind if I say I think he was far and away the best the BCA has had in its 28 odd years of existence. Initially he produced the newsletter, *Cichlidae*, and information pamphlets on an ancient typewriter which eventu-



above Jeff Challands at a BCA auction.

ally gave up the ghost under the strain; then, when the utterly ruthless Treasurer refused to buy him a new one, and insisted the BCA should modernise and obtain a PC with wordprocessing software, he threw himself into modern technology with his usual gusto, and ended up offering advice to others on computers as well as cichlids. In much the same way, as his mobility became more restricted, he learnt to drive and bought a car.

His other great love was cichlid literature, and although his formal education was limited, you would never have thought it to hear him discuss the intricacies of the latest taxonomy. He had a vast library of books and scientific papers, all meticulously catalogued, and was unofficial librarian to the BCA, allowing its members to consult him for any information they required. He was on friendly terms with many of the world's most distinguished cichlid taxonomists — not to mention countless ordinary aquarists in the UK and overseas.

Many people have described Jeff as a rough diamond, and there is much truth to the epithet. It was invariably said with huge affection — I never came across anyone who didn't like him, and would add that he also had a heart of gold. Despite his poor health he was always willing to help others in any way he could. It was an honour and a privilege to be his friend for so many years.

We are all going to miss him terribly, and our sincerest sympathy goes to his widow, Tina ('Our Lass'), and the rest of his family.

MARY BAILEY



PHOTOGRAPH: IGGY TAVARES

Red New Guinea Rainbow (*Glossolepis incisus*)

By Iggy Tavares, PhD

Glossolepis incisus, the Red New Guinea Rainbow is endemic to Lake Sentani and the small surrounding creeks in Irian Jaya that many of us know as the divided island of New Guinea. Here it is found in large shoals and is apparently quite easy to catch. The water in the lake is clear and hard, with plenty of vegetation. The Red New Guinea Rainbow is an omnivore but is partial to any small insects that might fall into the water. These rainbows show strong sexual dimorphism, with adult males developing high backs and exhibiting intense red coloration splattered with gold coloured scales. Females and juveniles, on the other hand, are attractive olive brown fish that do not have the pronounced high back. Both sexes can reach a size of 15cm in ideal conditions.

These beautiful, large but timid Rainbows must be kept in a shoal of at least six to display their full potential, which means that they need a minimum of 1m long aquarium or larger. Here they could form a mixed community with one or two other shoals of medium sized Rainbows to form a stunning display. To reflect their natural habitat, the aquarium should be heavily planted along the back, which then demands good lighting for the plants, and also helps show off the Rainbows fabulous colours to their maximum. The water should be hard and alkaline and would benefit from some coral sand in the gravel. Large planted tanks benefit from outside canister filtration, as this does not disturb the plant roots. The Red New Guinea Rainbow takes flake food that should contain carotene for colour enhancement, but should also be offered some live food or frozen foods from time to time.

They need a large tank (1m) for spawning as the male could get aggressive with the females. Males and females are separated for a period of a week and then a male and two females are put together in a tank containing a spawning mop. Each female lays about fifty eggs a day during the spawning period. Mops should be replaced daily, with the egg confining mop being placed in another tank containing hard water. Eggs take about a week to hatch and the very small fry are difficult to raise. Once free swimming they should be started on infusoria or liquid fry food.

The beautiful Red New Guinea Rainbow can live up to five years in captivity if properly looked after and provides a colourful display in a well planted tank.

RED NEW GUINEA RAINBOW CV

FAMILY: Melanotaeniidae
 SCIENTIFIC NAME: *Glossolepis incisus*
 ORIGINS: Lake Sentani, Irian Jaya
 AQUARIUM TYPE: Large community tank
 FEEDING POSITION: Surface and mid-water
 SIZE: 15 cm
 TEMPERATURE: 75-80°F
 DIET: Flake, live and frozen foods



PHOTOGRAPH: IGGY TAVARES

Checker Barb (*Barbus oligolepis*)

By Iggy Tavares, PhD

Barbus oligolepis, the Checker Barb belongs to the Cypriniformes that include Barbs, Rasboras, Danios, Loaches, and goldfish. Mature male Checker Barbs, which rarely reach 5cm, only develop the full black reticulated pattern on their scales as they get older. Adult males also sport splendid red, unpaired fins edged in black. Females and young fish may only show a few black blotches and little colour in the fins. The Checker Barb comes from Sumatra and Indonesia where it is found in all sorts of biotopes including mountainous country streams where the water is soft, clear and well aerated as well as relatively cool.

The Checker Barb is an ideal inhabitant of the community tank setup for small Cyprinids. It is a peaceful fish, which prefers to be in a small shoal. Under such circumstances, males will be constantly displaying and sparring with each other without causing any damage. This type of activity helps to keep these small barbs in prime coloration. For a nice contrast in colour, other inhabitants could include shoals of Zebra danios, Harlequins or even Cherry barbs. A thickly planted, 1m long aquarium with open swimming spaces in the front provides an ideal home for the Checker Barb. The Checker barb adapts well to mildly alkaline water provided it is clean and well aerated and can tolerate temperatures as low as 20°C, although in a community tank a temperature range between 23-25°C should be fine. The Checker Barb will eat flake and other foods offered as well as any small live foods.

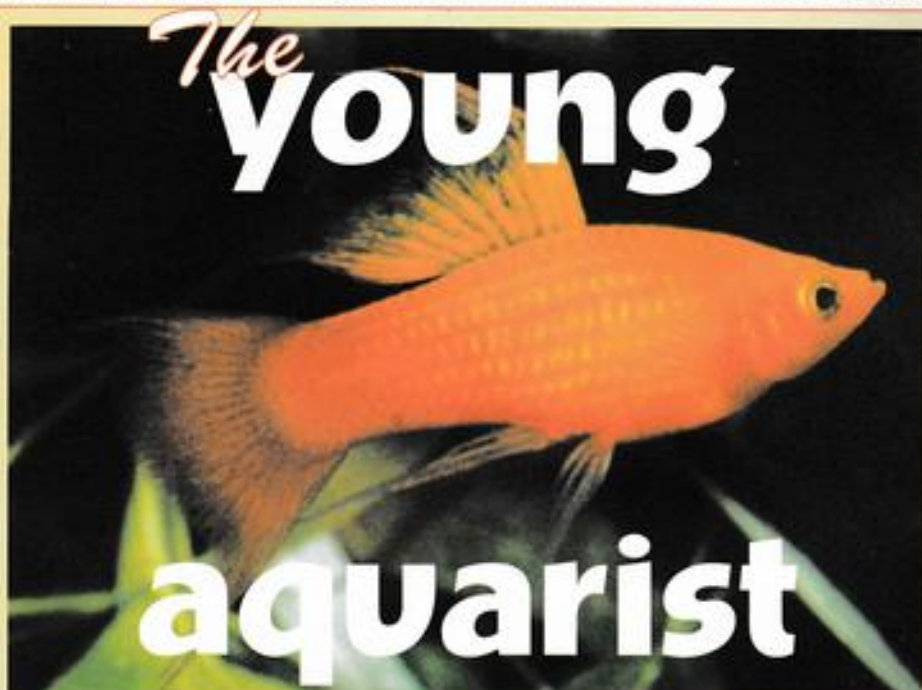
In the planted community aquarium, a male Checker Barb might be seen defending a clump of plants where he spawns with females usually first thing in the morning. However, they and all the other inhabitants of the tank will eat the eggs. A small spawning tank containing soft water can be set up with fine leaved plants for the eggs to be deposited. Gravid females are introduced to males who then lay their eggs in small batches in fine leaved plants. After spawning, the parents should be removed. The eggs hatch in one and a half to two days, but the fry should not be fed for another few days until they are free swimming, after which they are started on infusoria.

Checker barbs are a delightful little fish that is well worth having in a community. We have to get into the habit of buying these shoaling fish in half dozens rather than ones and twos, in order to get the full benefit of their beauty.

CHECKER BARB CV

FAMILY: Cyprinidae
 SPECIES: *Barbus oligolepis*
 ORIGINS: Sumatra and Indonesia
 AQUARIUM TYPE: 1m long community tank
 FEEDING POSITION: Surface and mid-water
 SIZE: 5 cm
 TEMPERATURE: 75-80°F
 DIET: Flake, live and frozen foods

Fish Profiles



This month I am going to focus on diet and feeding, for these are important aspects of good fishkeeping. Give your fish a good quality flake food, this will not necessarily be the cheapest but it does not have to be the dearest either. To begin with you should rotate several good brands to find out which your fish prefer. This also gives them variety in their diet which we all need, including your fish.

Most aquarists feed their fish first thing in the morning and again in the early evening to fit in with the time available to them. At warmer temperatures (upper 75°F) the fish eat more but the amount you give them has to be carefully controlled because overfeeding leads to pollution of the aquarium which could kill your fish. It is best to start with a small pinch and see how quickly the fish eat it.

All the food should be eaten in a few minutes. If this small portion is gobbled up very quickly, then increase to a slightly larger pinch at the next feed. You'll soon get it right, but never over-feed. Tablet food should be given to your catfish a couple of times a week, again a small portion depending on the number of catfish that you have.

Fish need to be given live food at least once a week. Daphnia (water fleas) is one of the best known and can be purchased from most aquarium outlets. This is usually available from Spring to Autumn. Frozen foods can be purchased in winter. We freeze down Daphnia

(which we have collected during the Summer) for use during the Winter. It is possible to introduce "nasties" when you collect your own live food and a safer, as well as very cheap, option are worms.

Grindal and White worm cultures can be purchased initially. You will find an advertisement for these in the Classifieds at the back of the magazine. Maybe you know someone already culturing them and they may be willing to sell you some or give them to you if you are as lucky as we were. These worms together with Micro worm and a bag of Daphnia once a week were our main source of live foods when we began keeping fish.

We have always found Grindal the easiest one to culture, this is a smaller version of White worm and is fed to the smaller fish. Small margarine tubs are ideal for this. Buy your starter culture and half fill a cleaned out margarine tub with moist potting compost. Take some worms from your starter culture and place in a hollow in the centre of the compost. Make a thick paste of ground up porridge mixed with water and feed to the worms on a teaspoon. Cover with a small piece of glass and prick a few small holes in the lid. Store at a temperature of about 74°F. Check frequently, the worms will collect under the glass and you can scrape them off into the tank. Make further cultures as required.

White worm is a little more temperamental and needs to be stored at a cooler temperature

about 55°F is ideal. We usually make ours up in a larger margarine tub and they take much longer to really get going. I should start with Grindal if I were you and see how it goes. If your fish are small this will be fine.

Chopped Earthworms are an excellent food, full of nutrients that your fish need. The best time to collect these is on a rainy evening after dark. One of our neighbours saw my son all tugged up in rainwear shining a torch around in the garden in the pouring rain on several occasions. I think she thought it was rather strange behaviour — but then she thinks us aquarists are crazy anyway. However, this is the best time to collect worms as all good aquarists and fishermen know!

Many beginners worry about leaving their fish without food when they go away on holiday — we have left them for a couple of weeks to no ill-effect — in fact, they're locked fitter for it. If you do your usual Hoover and water change about three days before you go and feed your fish as normal until you leave they should be fine. Lower the temperature just a couple of degrees as well, not more than this though. Do not allow a neighbour or kind friend (unless they are an experienced aquarist) to feed your fish while you are away.

The establishment of a good, regular feeding routine is a very important element of good fish-keeping and it will be seen in the lovely, healthy fish swimming around in your tank.

Many of you reading this column will be keeping fish already. Have you had any problems or experiences you want to share with other young aquarists through this column? Do you need help? Then you can write to me at: Pat's Young Aquarist Page, Inline Magazines Ltd., Suite 4, Invicta Business Centre, Orbital Park, Ashford, Kent TN24 0HB. All letters which enclose a stamped addressed envelope will receive a personal reply regardless of whether your letter is published.

Or you can also contact me directly by e-mail at: White.Shark@btinternet.com

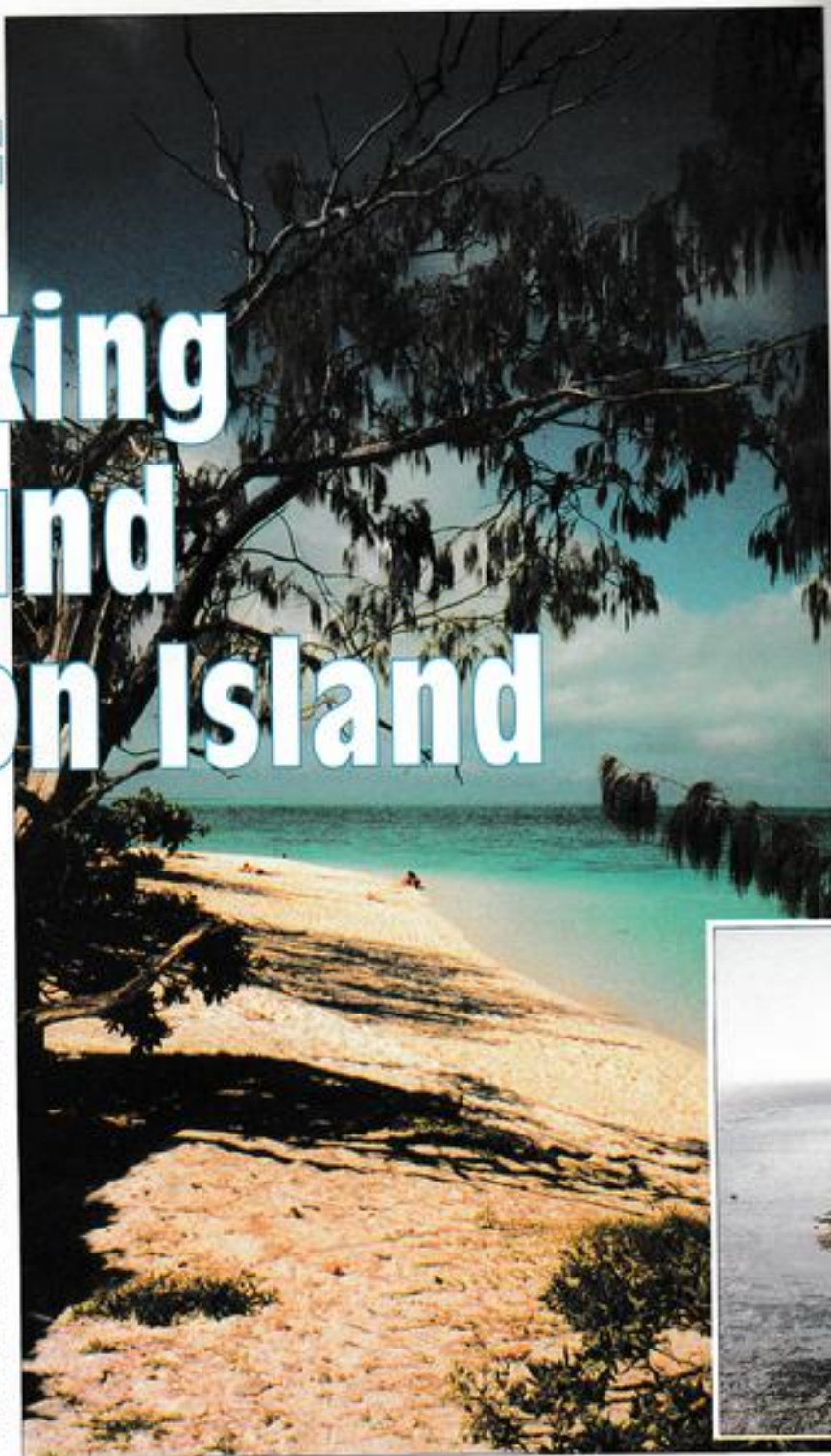
See you next time ... *Pat*

Reef Walking around Heron Island

Surely every serious marine enthusiast must dream of going to the Great Barrier Reef in Australia. So, when the opportunity to visit Heron Island, right at the southern end of the Great Barrier Reef arose, I seized it with both hands.

Heron Island, its reef and the neighbouring Wistari Reef are part of the Capricorn Group of reefs and islands which lie about 70km offshore from Gladstone on the Queensland coast. Heron Island is a coral cay. This is an island built up from coral debris which has accumulated in one spot by wind and wave action over the reef.

Heron Island began to form on the sheltered north west corner of Heron Reef more than four thousand years ago. To begin with it would have been little more than a sandbar but seeds washed ashore or brought by birds established plant life on the island and this helped to stabilise the cay.



left The beauty of Heron Island has to be seen to be believed.

below Heron Island, its reef and the neighbouring Wistari Reef are part of the Capricorn Group of reefs and islands which lie about 70km offshore from Gladstone on the Queensland coast.

right The most common Starfish are Blue Linckia (*Linckia laevigata*) and the Caledonian Sea Star (*Nardoa novaecealedoniae*). Most of the Blue Linckias seen were very large specimens, up to 30cm across and they are very easy to spot because of their bright colour.



Today, Heron Island is 1.7km in circumference, 42 acres in size and it supports a holiday resort, the Queensland University Research Station and is a nesting site for birds and turtles. The beauty of the coral cay is that it is a part of the reef itself so that at low tide you can walk right from the beach onto the reef. Indeed, the major activities for the visitor to Heron Island are reef walking at low tide and snorkelling and diving at other times. Visitors are strongly recommended to take a guided reef walk before venturing out on their own or at least to read one of the available leaflets. There are quite a number of harmful animals to be found on the reef which should not be picked up or touched, and it is obviously advisable to know what to look out for.

Tripping over coral can be painful

Compulsory attire for reef walkers are strong, protective shoes and wooden poles for balance. An optional extra is a large plastic viewing tube. All these items are freely available for visitor's use outside the Information Centre. A large jar of disinfectant is also available for those unfortunate enough to cut themselves in spite of all these precautionary measures. Tripping over Staghorn coral can be painful and cuts may fester if left untreated. The best time to begin reef walking is a half hour before low tide. The tide will turn about two and a half hours later so you have a maximum of three hours to explore the reef. It is a good idea to wear a watch. When the tide turns the water gets deeper at an alarm-

ingly fast rate and it is best not to be caught too far from the shore.

The first zone from the beach is known as the Inner Sandy Zone where the coral patches are well separated. Here the reef walker notices first the large numbers of *Aspidochirote aschotatus* lying on the sand. Sea cucumbers of this type possess numerous ventral tube feet for locomotion and have small, leaf shaped tentacles which gather sediment. Dendrochirote sea cucumbers have finely branched tentacles for trapping plankton and detritus suspended in the water. They are not very mobile and use their tube feet to find a good spot where they then tend to remain. Dendrochirote cucumbers are most commonly kept by aquarists, particularly *Pseudocochirus* species and these do not usually thrive in aquaria. Their *Aspidochirote* cousins would probably make more suitable aquarium inhabitants as they are good scavengers ingesting quantities of sand and sediment from which they extract any organic matter.

Many species, however, are not particularly attractive and some have the annoying habit of ejecting sticky threads from their anus when handled. Reef walkers are advised not to pick up the cucumber (*Holothuria leucoplotus*) which is commonly seen because these threads contain a toxic substance known as holothurin. If this substance gets into the eyes it can cause blindness. The common sea cucumber (*Holothuria fuscopilus*) is quite safe to pick up, however, and amuses young reef walkers by ejecting only a stream of water when handled.

There are many different species of sea cucumber to be found on the reef and the local guides have amusing names for them. The "Hot Dog" sea cucumber is black on top and red underneath and the "Licuice Alisort" cucumber is a very dark green with red tipped warts on the dorsal surface. However, perhaps the most interesting sea cucumber is the "Curry Fish" sea cucumber (*Stichopus variegatus*) so called because it is curry coloured and has a tiny, transparent Pearlfish (Carapidae family) living in its body.

Pearlfish may be parasitic

Not a great deal is known about the relationship between the Pearlfish and the Curry Fish cucumber although in the aquarium the fish has been seen to enter, tail first, through the anus of the cucumber. It is thought that the Pearlfish may be parasitic in that it feeds off the gut of the cucumber. However, the cucumber may merely provide a convenient shelter for this tiny fish. Pearlfish are found in other species of sea cucumber and also living with clams, sea urchins, tunicates and starfish.

Starfish, close relatives of the sea cucumber, can also be found around the Inner Sandy Zone. The most common are the Blue Linckia (*Linckia laevigata*) and the Caledonian Sea Star (*Nardoa novaecealedoniae*). Most of the Blue Linckias seen here are very large specimens, up to 30cm across and they are very easy to spot because of their bright colour.

Occasionally seen are the six armed Brown Linckia and also the Pin-



REEF WALKING AROUND HERON ISLAND

cushion Starfish (*Calcite noronhaiense*). The Piscushion Starfish comes in a variety of colours ranging from a dull, reddish brown to bright orange. Specimens found are usually about the size of a semi deflated football. This starfish is often found with its stomach everted over rather indeterminate matter on the sea bed, which suggests it feeds on detritus and micro-organisms. It is, however, also known to feed on coral polyps and so can damage the reef. It is never found in sufficiently large numbers, however, to be a serious problem, unlike the infamous Crown of Thorns starfish.

The tiny Turtle weed crab (*Cephalys rotundifrons*) can be found living in clumps of turtle weed which grow on rocks in this zone of the reef flat. This crab is so small that you must run your hand through a clump of weed to stand a chance of seeing it. Your guide on the reef walk is very proficient at producing crabs in this manner. It is, however, often not quite so easy when you try for yourself.

The Middle Coral Zone is easily recognised as the coral formations here are much larger and closer together. Quite a variety of hard corals can be found here but the most common are from the Acroporidae family. Many corals from this family are called Staghorn corals because of their shape. They, however, come in many other shapes too. Some are leaf like, some are bushy and others are plate like. The Acroporidae encompass more species than any other family of corals and they grow faster than most other corals, sometimes up to 20cm per year. They are the dominant corals on the reef and they are very hardy, many species regenerating from broken fragments. One can also see Brain and Golf-ball corals (Faviidae family) and Goniopora (Poritidae family). Goniopora is unusual because it remains expanded at all times even when it is touched. This may account for its popularity with aquarists, although it is notoriously difficult to keep in captivity. Of the soft corals the Leather Corals (*Sarcophyton* species) are most commonly seen.

Clams with beautifully coloured mantles

There are also a great number of large clams to be found in the Middle Coral Zone. The most common clam on the reef is *Tridacna maxima*



which grows up to 30cm. Some of these clams have beautifully coloured mantles. The shell is completely enclosed by the mantle except for two holes or siphons. One of these is the inhalant siphon that lets water into the shell and it is surrounded by a frill of sensory tentacles which check the clarity of the water. The other hole is the exhalant siphon. By closing its shell a powerful jet of water is expelled through this hole. Walking around this zone you are constantly aware of the popping sound made by these clams as they expel water. Shadows cast over the clams or the presence of reef walkers will usually be the cause of this. The Bering clam (*Tridacna crocea*) is also found in this zone. It is smaller than its relative, growing up to 15cm and is buried completely in coral rock with only the fluted edge of the shell exposed. Like its relative it is found in shallow water because the Zooxanthellae embedded in its mantle need strong light to survive.

Another bivalve found in this zone but this time living under rocks, is the File Shell (*Promastellum ripens*) This is a tiny creature growing only up to 4cm. It has a bright red mantle with long, sticky, retractile tentacles which continuously wave around. When disturbed it can move with surprising speed by rapidly opening and closing the valves of its shell.

Univalve shells can be quite difficult to find because most are nocturnal but one that is quite common is the Red Lipped Stromb (*Strombus romeri*). This creature is quite harmless but is sometimes mistaken for a cone shell which can be extremely dangerous. There are about 70 species of cone shells to be found on the Great Barrier Reef and the sting from some can be fatal. The large Geographer Cone (*Conus geographus*) for example, has been known to have killed at least 12 people, its barbed dart being able to penetrate wet suits and most gloves. Reef walkers are strongly advised, therefore, not to pick up any shell they can't positively identify. In addition, large shells have been found to harbour the small, but deadly, Blue Ringed Octopus (*Haploschlaera fasciata*).

Fish can be seen in this part of the reef flat, darting in and out from under the protection of the corals. Valentini Pufferfish (*Cantipuster valentini*) are very common, and the occasional Boxfish (*Ostracion tuberculatum*) can be seen. So too, can the odd Lionfish (*Scorpaenidae*) lurking under overhanging rock and coral and these must obviously not be touched or provoked. Our guide on one reef walk was quick enough to spot a lazy Epaulette shark (*Hemiscyllium ocellatum*) hovering near the sandy bottom and he managed to grab it and pick it up before it had a chance to escape. These are commonly seen by reef walkers and grow up to one metre long.

left There are a number of large clams to be found in the Middle Coral Zone. The most common clam on the reef is *Tridacna maxima* which grows up to 30cm.



left There are about 200 Loggerhead Turtles (*Caretta caretta*) found around the reef but all species of turtle here have been protected since 1968.

PHOTOGRAPH
M.P. & C. PEDNOR

below The Middle Coral Zone is home to a number of fish species including Valentini Pufferfish (*Canthigaster valentini*). Coral walkers can see these darting in and out from under the protection of the corals.

PHOTOGRAPH
MAX GIBBS

'Camp followers'

A greater variety of fish can be seen when snorkelling and diving or by taking a trip on the resort's semi submersible. Butterflyfish, Ratfish, Parrotfish and Moorish Idols are all quite common and the 'camp followers' which follow the semi submersible almost everywhere are shoals of Strawberry Hussars or Scarlet Sea Perch (*Lutjanus malabaricus*).

The last main zone of the reef flat is the Boulder Zone, where, because of wave action, coral life is quite small but reef walkers can turn over rocks and find Brittle Starfish, crabs and Abalones. Abalones appear as over sized snails. The Ass's Ear Abalone (*Haliotis aurina*) feeds on algae and its body is covered by a large, fleshy green mantle.

As well as the wildlife found on and around the reef there are also whales and turtles to be seen around Heron Island. Humpback Whales (*Megaptera novaeangliae*) migrate from Antarctica to the coastal waters of west and east Australia and Fiji to mate and give birth during winter and spring. About 1,200 whales migrate to the eastern coast of Australia and pods start to arrive at the southern end of the Great Barrier Reef in mid-June. Most whales will have left the Queensland coast by late October. Between these times they may be seen off Heron Island swimming in the channel that separates the Heron and Wistari Reefs.

Nesting turtles can be seen on Heron Island in the summer months but turtles can be seen at other times as they are tagged, weighed and measured by researchers from the University Research Station. The Green Turtle (*Chelonia mydas*) is the most common with more than 1000 found around the reef. There are also Loggerhead Turtles (*Caretta caretta*) of which there are only about 200. Occasionally found is the Hawkesbill Turtle (*Eretmochelys imbricata*) but these do not breed in the area. I witnessed one tur-

tle having its reproductive organs photographed by a small television camera which had been inserted into its lower abdomen. This was fairly distressing to watch but apparently did no harm to the turtle. Indeed, all turtles have been protected here since 1968.

Amazing variety of marine life

In my short stay on Heron Island I saw an amazing variety of marine life, but it is a bird lovers paradise too. Reef Herons scavenge for food at low tide and thousands of Black Noddys and Wedgetailed Shearwaters use the island as a nesting site in summer. Little wonder, then, that people are attracted to the island. In fact, around 18,000 people visit the island each year.



REEF WALKING AROUND HERON ISLAND



above Perhaps the most interesting sea cucumber is the "Curry Fish" sea cucumber (*Stichopus variegatus*), so called because it is curry coloured and has a tiny, transparent Pearlfish (*Carapidae* family) living in its body.

PHOTOGRAPH: MAX GIBBS

One might worry about the effect of tourism on the reefs fragile ecosystem but in 1975 the Australian government passed the Great Barrier Reef Marine Park Act. It established the Great Barrier Reef Marine Park and its aim was to prevent exploitation of the reef and to protect it. In addition, in 1981 the Great Barrier Reef joined the World Heritage List. The Heron and Wistari reef systems have now been designated a Marine National Park B Zone where no collecting of any kind is allowed but tourists are permitted to dive and explore the reef. As long as reef walkers and divers take care not to damage the reef in any way people will be able to enjoy the privilege of viewing fish and corals in their natural setting for a long time to come.



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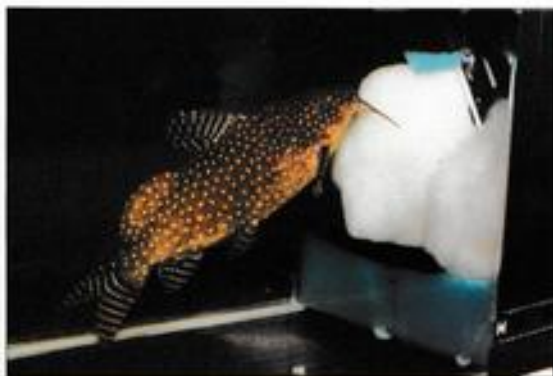
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British Aquarist Festival

Out & About



top of page This tableau has several aquascapes as well as furnished aquaria — plenty of ideas here for other aquarists to try at home.

middle A beautiful specimen of *Synodontis angelicus*. This exhibitor has fitted a home made filter in the tank to maintain water quality.

PHOTOGRAPH: KATHY JENNINGS

bottom If you wander through to the auction room at most shows you will find it full. This is where all the people are — busy buying and selling fish, talking about breeding fish and swapping ideas on fish husbandry.

This was the 48th British Aquarist Festival and for all that time A&P has been closely involved with this exhibition. This year was no exception and apart from free advertising and promotion of the exhibition in general, we also supported the Champion of Champions with various prizes.

Looking around the exhibition this year it was obvious some of the regular traders were not there. Most notable amongst the absentees were several live fish traders. To fill this gap Wharf Aquatics came in for the first time and the Federation of Northern Aquatic Societies put on their own fish sales stand. This contained a section for imported fish and a separate part for home bred fish which proved to be a remarkable success and helped boost income to the exhibition itself. More importantly the breeders section showed just how extensive fish breeding is in this country and what good quality fish are being produced.

On a sour note I have to say that some of the trade are definitely letting this and other hobby exhibitions down badly. Several of the trade stands would not be out of place at a car boot sale! Whilst they may have been selling off cheap lines or 'seconds' it would not have taken much effort to add to the exhibition by including a furnished aquaria, water feature or pond display on their stand. No wonder fewer people are attending fish exhibitions these days.

Moving on to the more positive aspects of the exhibition, looking round the tableaux (heated boxes containing show fish and furnished aquaria) it was obvious the high standard of previous years was being maintained. Anyone that took a close look at some of these exhibits would see excellent furnished aquaria from which they could gather lots of good ideas for their own tanks. The same applies to the fish on show, there were lots of species you hardly ever see in shops. This is often down to the shopkeeper not realising there is a market for them until somebody actually asks for them. The fish can be ordered in specially with a few extras just to see if other customers would be interested — they usually are because we all want something a little different from time to time.

Looking at the Champion of Champions classes, there were some absolutely stunning fish on display this year. It was not the standard of the fish themselves that I noticed first of all, however, but the excellent way most of them had been exhibited. Heater/stats in all the tropical tanks are of course essential at this time of year, but now many of the exhibitors are including aeration and even filtration in their show tanks as well. These additions are not needed for a one day show, but for an exhibition of this type where the fish will be in these tanks for four or more days it starts to become a major issue. Well done everyone!

Scottish International Open Show

The Scottish International Open Show was held a week after BAF and once again A&P were present for the festivities. Whilst not a well supported show the auction was packed out. This seems to be the way of things now, with bargains the order of the day rather than prizes. Whilst this may worry many in the organised hobby, who sit around in half empty show halls and wonder where all the people are, it is not really as worrying as all that. If they wander through to the auction room they would find it full. This is where all the people are — busy buying and selling fish, talking about breeding fish and swapping ideas on fish husbandry.

POND

MARC MACRAE explains why many pond filters fed by a bottom drain fail to function properly:

PHOTOGRAPH: GORDON WIGENS

POND FILTRATION?



A Tale of Good Intentions

I have often wondered why it is that so many things to do with fish keeping do not seem to be entirely logical. One that was recently a topic of conversation is the way many of us filter our ponds. So let me tell you a story!

Once upon a time a man wanted to keep some fish and so he dug a hole in the ground, filled it with water and away he went. However, come the following spring he needed to drain out the water to clean the pond and found it a real pain to have to bail it all out, so he thought: "Next time I build a pond I'll put in a drain at the bottom and then all I have to do is open a tap and away the water will go." Being upwardly mobile he soon moved, describing the pond as a "conservation area for displaced local wildlife" in his sale details.

The new house had a large garden and he decided to build a bigger and better pond but remembering his past misfortune installed a bottom drain this time. To his consternation he found that he still had amazing problems with everything growing he didn't want and everything dying he did want, so he went to a shop and they said: "Ah — you need a filter." On arriving home he realised that he would need a supply of water into his new toy. After some thought he realised that if he added a tee piece and a couple more taps to the bottom drain he could easily get the water from the pond into the filter and this is where it becomes of interest.

All biological filters work by adding oxygen to the products in the filter so the extremely lethal ammonia is reduced (has oxygen added) and becomes the fairly dangerous nitrite, and the nitrite is reduced and becomes the mildly annoying nitrate. The water, however, at the bottom of most ponds is torpid (hardly moving) and almost completely anaerobic

(devoid of oxygen) and yet this is the water that is so often fed into biological filters in ponds — no wonder there are problems!

Enormous underground filters

Some people have built enormous underground filters at vast cost to improve their water quality. Others have installed surface skimmers to take the water for filtration and these are good as long as the surface of the water is agitated sufficiently to allow gas exchange to take place — a fountain is excellent but many people like a flat calm surface.

So how do we overcome the problem? Well the simplest answer would seem to be to add one additional (and relatively) inexpensive piece of equipment. The water is taken from the pond, through a pre-filter to remove any particles that could damage the pump and then fed into the device, which is called a venturi. This reduces the bore of the pipework very quickly at a given point. If this change is engineered correctly a cavity appears in the water flow and a vacuum is created. If air is then introduced into this area it is forced into the water and lo and behold we now have nicely oxygenated water to feed our biological filter.

But going back to the beginning isn't it interesting to see how a series of well-intentioned steps can, without the necessary grasp of the theory, fail to produce the anticipated result.

far left This Koi pond has a venturi added to the filter system to help oxygenate the water.

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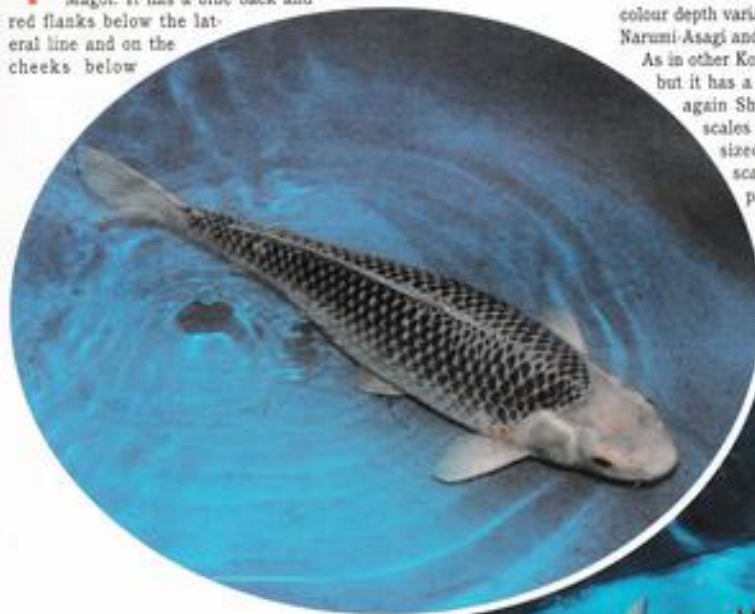
DAVID TWIGG unravels the mysteries of Koi varieties:

PHOTOGRAPHS: DAVID TWIGG

Koi Varieties *Part Five*

Asagi/Shusui

The Asagi is one of the oldest recorded forms of Nishikigoi and is a descendant of the Asagi Magoi. It has a blue back and red flanks below the lateral line and on the cheeks below



the eyes. The blue scales are edged with white to give the appearance of a net. The head should be light blue to white but very clear and without blemish while the base of the pectoral fins should also be coloured red.

There are several sub-varieties of Asagi but they are basically colour depth variations, i.e., light blue back is Miru-Asagi, mid blue is Narumi-Asagi and dark (almost black) coloration is Konjo-Asagi.

As in other Koi varieties there is a "scaleless" version of the Asagi but it has a name change as well: it becomes the Shusui. Once again Shusui should have a nice clean head and the blue scales (white edged) along the dorsal line should be evenly sized and well placed. It is important that the dorsal scales in front of the dorsal fin should be well balanced pairs of scales or single central scales.

Several sub-varieties are found such as the Hi-Shusui where the red (Hi) spreads up the body to the dorsal line and the Hana-Shusui where a line of red appears, on the blue, along both sides of the body between the lateral and dorsal lines.

In the UK the blue of both Asagi and Shusui tends to darken over time; in some cases to almost black, making what is otherwise a very attractive fish much less so.

GLOSSARY OF KOI-RELATED TERMS

| | |
|-------------|---|
| Hi | Red |
| Sumi | Black |
| Shiro | White |
| Kiwa | The trailing edge of pattern |
| Motoguro | Black coloration at base of pectoral fins |
| Sashi | The leading edge of pattern |
| Tsuno-sumi | Black marking on white skin |
| Kasane-sumi | Black marking on red skin |
| Matsuba | When the scale centre is dark it makes the pattern look like a pinecone |
| Kin | Silver scales |
| Gin | Gold scales |

above

Asagi showing good net pattern to scalation and nice clean head.

right A Hana-Shusui where pale blue can just be seen running along the dorsal line.



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STEVE PUNCHARD & GARY COWBURN answer some more questions about Discus keeping:

PHOTOGRAPH: MAX GIBBS

The Discus Pool



left A beautiful Cobalt Blue Discus.

Q Where should I locate my Discus aquarium?

A Contrary to common belief Discus are not shy, timid fish — only if you allow them to be. It is, therefore, important to consider the location of your Discus aquarium carefully before installing it and making sure you furnish it correctly.

When positioning your tank you will have to decide the advantages and disadvantages each location has to offer taking the following points into consideration:

- Ease of viewing, access for maintenance and power points.
- Care should be taken to avoid placing Discus in natural sunlight. Steer well clear of any position which receives direct sunlight for even part of the day.
- Avoid sudden loud noises or movements near the tank. This causes vibrations making the fish nervous and causing them to "crash around" the tank, which can lead to injury. Quiet corners are often a good choice, here they will be able to see everything going on in the room and you will be able to see them as well.
- Too much cover will make them shy.
- Check if the flooring will take the weight of the tank which will be several hundred pounds when full.

Q How do I heat my Discus aquarium and what temperature should the water be kept at?

A I prefer to use two heaters in my Discus tanks and wire them into separate circuits with different power points. In a 48 inch long x 24 inch high x 18 inch wide aquarium I would use a 300w heater as the main heater and a 200w as the reserve. The main heater is set a few degrees warmer than the reserve. Should one of the heaters stick on, neither is powerful enough to raise the temperature to dangerous levels, although Discus have been known to withstand temperatures of 100-110°F but only if there is a high oxygen content in the water.

I recommend the following guidelines concerning temperature:

- If buying small fish then 30°C (86°F) is best as this settles the fish in and helps them to start feeding quickly. The downside is that the plants don't do as well at this temperature. The addition of some plastic plants will create more cover.
- If buying fish four inches and above the temperature can be lowered to 28°C (82°F) minimum. This will help your plants, but if you intend to concentrate on the fish and breed them, then you should still keep them at 30°C (86°F). This is contrary to what you may find written in some literature but is based on personal experience which has shown warmer temperatures are a very important part of Discus keeping.

Q Do I need aeration in my aquarium?

A Discus thrive best in water which is well oxygenated so additional air should be supplied by airstones. These create a gentle upward water movement and slight noise which helps settle Discus and give them a sense of security. This is far better than using an internal power filter to send water around, as some people do. This causes a strong water current which constantly tires the fish and causes a lot of stress.

Since the water depth for Discus is greater than that in many aquarium fish set-ups it is important to buy a good quality pump which has the power to drive air down to the bottom of your tank. If this is positioned below the water level then you should fit non-return valves to prevent accidents. When choosing a pump select one which is a well known make of proven durability and quality rather than a cheaper model. This is an essential piece of equipment which your Discus's lives will depend on, so don't skimp.

Q What about filtration?

A I prefer undergravel filtration for my Discus display tanks. Since it is easy for these to become clogged and not operate at maximum efficiency a good maintenance routine is necessary. The gravel should be cleaned regularly by using a gravel cleaner or siphon tube to remove solid wastes and regular partial water changes are essential to your Discus's health.

In addition to this low tech form of filtration I add the latest technology of a fluidised bed filter. The fluidised bed gives a large area for filtration and can therefore react more quickly to ammonia and nitrite. These are what I use in my own growing on systems to filter up to 900 gallons capacity.

The fluidised bed filter works by a flow of water from the aquarium which passes through a fine silica sand. The silica sand is kept in suspension and has a very large surface area for bacteria to grow on so will process ammonia and nitrites very efficiently.

The main points to remember with this type of filter are:

- The water needs to be very well pre-filtered as we don't want any solids in the media. I use the under gravel as my pre-filter.
- The filter material, i.e., silica sand, will need to be topped up as and when required. This shouldn't be too often and only takes a few minutes.
- The filter needs to be easily accessible and can be placed under the aquarium, in the cabinet, or on the side or back, but I like to be able to see the filter easily and watch the flow of sand. My supplier of this type of filter recommends that the filter is blacked out to aid the function of bacteria so this is an advantage when placing the filter in the dark, under the aquarium.
- The size of the filter used depends partly upon personal choice. Smaller models than the one I will be using are available and there are a number of good quality filters on the market.

Q Are there alternative types of filtration for Discus?

A The external power filter is probably the most popular type of filter used and there are many different models to choose from. Again it is best to purchase the best model you can afford which is of high quality. They are usually placed under the aquarium, out of sight and need to have a pre-filter over the strainer and the filtered water is fed back into the aquarium by a spray bar, otherwise the inlet needs to be deflected to cut down the water flow a little. The "top of the range" models are very good but external filters are limited in how quickly they can mature and the speed that they can react to any sudden increases in ammonia or nitrite.

The internal power filter is usually placed in the corner of the aquarium and

the filter needs to be pre-filtered and the water fed back through a spray bar. Again the flow should be deflected as it is not good for the Discus to have a fast flow of water within the aquarium. This can be done by positioning the spray bar so that it sprays towards the back of the tank, reducing the water pressure. I don't use this type of filter generally, only to polish the water from time to time.

The trickle filter can sit above the aquarium or more commonly underneath. It is an excellent filter but in my opinion not ideal for display tanks due to evaporation losses and the smell produced. The feed pipes also need to be cleaned very regularly for them to run efficiently.

This type of filtration is excellent for larger systems and works better on systems and aquariums which are quite heavily stocked.

The chamber system is probably better for very large aquaria and can be placed either at the end or the back of the tank. This system works by firstly pre-filtering the water which is then passed through a series of chambers containing different types of media and then returned to the main tank. The chamber system can be easily concealed and when constructed properly it has to be one of the best filters available.

Q Can you keep Discus without any filtration?

A Some aquariums are kept with no mechanical filtration at all and this is known as the natural system. The natural system relies on plants and the biological makeup of the aquarium to maintain a natural balance but this system is NOT recommended for Discus.

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Some fish are just such wonderful characters that their memory remains with us for years. **GORDON DAVIS** recounts a tale of woe about one of his favourite fish:

PHOTOGRAPH: MAX GIBBS

Tears of a Clown



Several years ago, at the end of my "I must have one of those" phases, I came across several sad looking specimens in a local shop. They were Clown Knifefish (*Chitala ornata* at that time known as *Netopetrus chitala*). Without hesitation I had one bagged up.

On arrival back at home "Jack", as (he) was automatically named sank into the dense plants at the back of a four foot tank. This was home to a collection of medium sized Tetras, Barbs and Botia's.

Within several hours the pending search was cancelled as "Jack" popped his head out from behind a lump of bogwood, waving a fish's tail at me ... from his mouth, so much for my theory of a poor little knifefish! Within a few days another four foot tank was set up for him, but not before he had halved the population of the community tank, no doubt giving him a good start in life.

You are probably saying, at this early stage of my saga: "Should have known better"; "Should have done his homework"; "Should have known it will eventually be a 24 inch predator". Yes, guilty on all counts. I was aware of all the facts, but, "Jack" was only two inches, and his tank mates he dined on were almost as big as him! Lesson one, never underestimate a Clown knifefish!

Initially, his diet consisted of earthworms, bloodworms, fresh prawns,

above Clown Knifefish, *Chitala ornata*, are predators well able to eat very large fish when compared to their own body size.

and occasionally chicken straight off my Sunday dinner plate (much to everyone's disgust). By now four months had passed, and young Jack was eight inches long. He became fussy with his food and would only eat semi-frozen Lance fish. All attempts at starving him out of this habit failed, and I gave in to him after a three-week 'you'll eat when your hungry plan' failed.

In an attempt to fool him and his totally frozen Lance fish diet, I used to let them defrost, fill them with flake food, trout pellets, etc., then re-freeze them, hopefully supplementing his restricted food source.

Avoiding head to head confrontation

The next stage was 'Jack' sharing his accommodation with Large Angel fish, and a Redtailed black shark. In less than eight months he grew to 12 inches. The once bad tempered, Redtailed black shark now became quite the opposite, avoiding head to head confrontation with 'Jack' at all costs. The metallic silver sheen and black spots becoming more vivid as he grew, having 13 on one side and 14 on the other. These markings are, however, different on every fish.

Originally found in Thailand, Burma and Malaya, Clown Knife Fish prefer their water temperature at about 80°F. I have heard that in the wild they shoal in large numbers when small, the larger ones being more solitary and predatory. In the wild they are reputed to reach over three feet and it is said that they breed in a similar fashion to Cichlids. As far as I know they have not been bred in captivity in this country, but successful breeding has made them a common export from Singapore, some even being for sale in a 'golden' variety.

'Jack' at 11 months measured 16 inches, and only 'Reg' the Red-tailed black shark was kept with him, sort of a love-hate relationship ... as in I won't eat you if you hide all the while.

At this stage we played games with his food. I thought we were

friends, then one day while doing a spot of plant thinning, Jack grabbed hold of the end of my finger! It felt like it had been slammed in a door! He eventually did let go, after being out of water for almost a minute. I was left with a bloody finger and a different outlook on messing in the tank. I think, however, the incident was a mistake, and we continued our playing within a few days.

Jack's untimely departure

Now come the tears, I have never become so attached to a fish, before or since Jack's untimely departure. Firstly he became less playful, then came the loss of balance and ballast. I suspect that Jack had swim bladder problems, all attempts to find a cure failed, as they usually do.

I had to end his suffering.

But his ghost lives on, along with his reputation. He has set many new aquarists off on their voyage, impressing them enough to want to own a 'Jack' of their own.

For would-be owners, my advice is as follows: Temperature 80°F, no extremes in water quality or chemistry, good filtration (I recommend internal feeding overhead trickle filter), lots of plants, rooted and floating, keep the water level at least four inches from the cover glass to avoid damage when they go up for a gulp of air, and supply a varied diet with vitamin supplement. Be prepared to keep one on its own, as it may eat other tankmates!

Before 12 inches has been reached consider as a minimum aquarium size 6x2x2 feet. Better still, start your knifefish off in such a large aquarium, start off right and avoid the stress! You have been warned! As I advise with all potentially big fish 'if you can't accommodate it, don't buy it'.

Guess what? I have recently purchased a three inch baby Clown Knife-fish ... JACK 2?

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FREE: Tetra's Pond and Fishkeeping Information Centre provides a FREE service for all fish and pond keepers. For the Fish 'n' Tips Information Sheet entitled 'Water Pond Problems & How To Avoid Them', write to: Tetra Winter Ponds, PO Box 1624, Yatton, Bristol, BS49 5HY. Don't forget to include your own address! Alternatively, check out Tetra's advice pages on its web site at <http://www.tetra-fish.co.uk>

NEWS IN BRIEF ... NEWS IN BRIEF ...

Petsmart hit the headlines

BBC'S *Weekend Watchdog* programme recently ran an item of particular interest to aquarists. The report was on the states of fish tanks in Petsmart stores. They visited five stores and found a total of 18 dead fish. They also purchased 100 fish and 21 died within a week and a further 10 were diagnosed as grossly diseased.

For those of us who visit aquarium shops on a regular basis, finding a total of 18 dead fish in five different shops (probably numbering 300+ tanks in total and over 2,000 fish) would not be too startling. Obviously, in a well run establishment the corpses are removed within hours of death and any suspect tanks are placed under quarantine until the problem is solved, but overall the same results could be found in five independent aquarium shops were checked at random.

The question of what happened to the 100 fish which *Watchdog* purchased is another case in point where facts can be manipulated to make headlines. The first week after any new fish is purchased is always the most delicate period.

This is why A&P always recommends that fish are quarantined in separate accommodation for several weeks before being placed in their permanent set-up. It allows the new arrival time to recover from what has been a long and arduous journey from its place of birth (probably the other side of the world) and prevents the risk of disease being introduced to your community tank.

The fact that 21 of those 100 fish died and a further 10 were diseased seems a high rate of losses but you have to ask what conditions were they being kept in? Were they just placed in one tank and left to fend for themselves? Close observation, proper feeding and immediate medication may have prevented many of these losses — in other words, the tender loving care a real aquarist would give any new purchase.

There are dedicated staff in your local Petsmart store is fairly good in the aquatics department and I have never seen dead or dying fish being offered for sale there), but there are not enough of them.

Before being granted a pet trade licence each year the local authority should make sure at least two employees in these type of stores have professional qualifications in pet care. That way it would be possible to have someone on hand all the time to offer proper advice to the general public and see to the care and wellbeing of the animals themselves.

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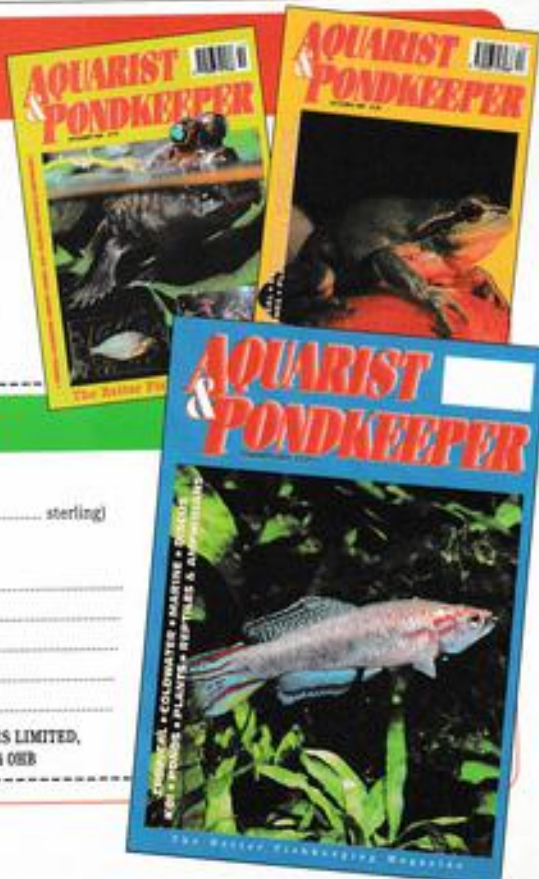
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AREND VAN DEN NIEUWENHUIZEN this month shares with *A&P* readers his experiences with the Bandula barb:

PHOTOGRAPHS: AREND VAN DEN NIEUWENHUIZEN

TRANSLATED BY: MARY BAILEY

PUNTIUS BANDULA

A recent Barb Introduction from Sri Lanka

Every aquarist is familiar with the Black ruby barb (*Puntius nigrofasciatus*) whose males are richly and brightly coloured. And the same very restricted habitat in Sri Lanka, the island off southern India formerly known as Ceylon, is also home to a very closely-related sibling species, even more splendid in its coloration.

Close to the village of Gummiplantage a small, nameless, stream meanders across the rice fields adjacent to the rubber plantation of the Palegama estate. It is fed by a number of springs in a small area of natural woodland lying 200m above sea level and within the plantation. It was here, at a locality whose precise designation is given as "Kegalle District: Minimaru Colonya, 7° 10' North, 80° 0' East", that in October 1989 Rohan Pethiyagoda caught a barb with which he was not familiar. Two years later he and Maurice Kottelat described this species as *Puntius bandula*. It is closely related to *P. nigrofasciatus* and *P. bimaculatus*.

Secretive in nature

Pethiyagoda found this barb in a stretch of stream some 500 metres long, behind the rice fields. Here grew dense clumps of a *Lagenandra* species: in the shallows, moreover, he noted beds of various *Cryptocoryne* species. The edges of the stream were muddy, while where the water flowed more rapidly along its bed, the bottom was sometimes covered with gravel as well as with stones of various sizes. The rubber trees growing on both banks ensured that little sunlight reached the stream.

The depth and breadth of the stream depend on the season; during the dry season the water depth varies between 10cm and a metre, and the breadth of the stream between 50cm and 5m. About 6km downstream of



the type locality the stream joins the Gurugoda Oya, a tributary of the Kelani.

The Bandula barb could not be seen from above the surface. It appears to avoid open spaces, remaining in water approximately 20cm deep, beneath leaf litter or among the *Lagenandra* growing emerse along the margins of the stream. Two-spot Barbs — also known in English as red-sided barbs (*Puntius bimaculatus*) — were caught in the same habitat. Pethiyagoda saw small groups of this species in open spaces in the stream. Other fishes caught in this biotope included *Puntius dorsalis*, *Chela labucu*, Giant danios (*Danio aequipinnatus*), *Rasbora daniconius*, *Lepidocephalichthys thermalis*, *Schistura notostigma*, and a Snakehead species (*Channa gachua*). With the exception of the piscivorous *Channa gachua*, all these species, plus the pretty Cuming's barb (*Puntius cumingi*), a relative of the Bandula barb, are well suited to being kept together, along with the latter, in a community aquarium.

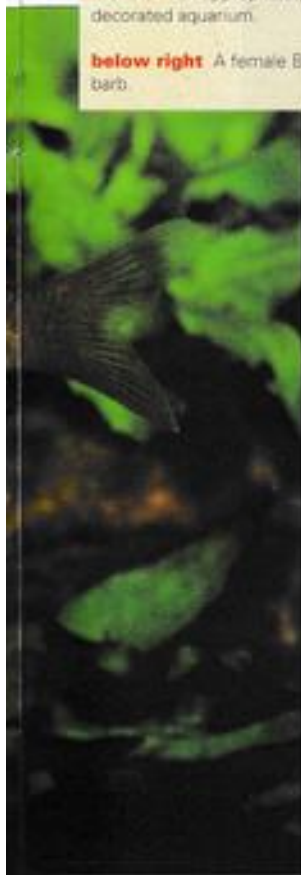
Not true shoaling fishes

The behaviour of *Puntius bandula* should be taken into account when setting up aquarium for it, and this involves providing as many well sep-

below This tank-bred male Bandula barb, reared in an all-glass aquarium, without plants and substrate, is quite undistinguished in its coloration.

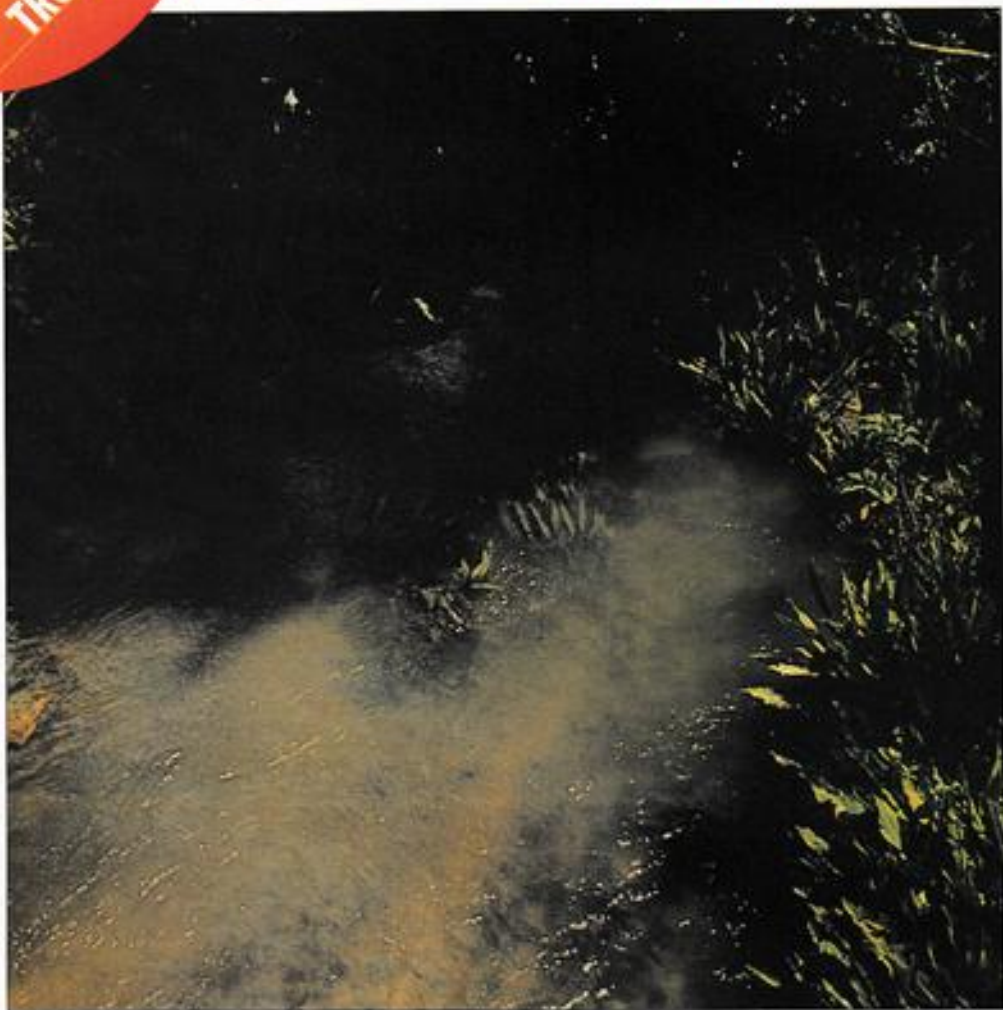
right The same male after three months in an appropriately decorated aquarium.

below right A female Bandula barb.



arated territories as possible. This can be achieved by doing away with the normal background planting along the rear of the tank, and instead creating a maze of small pieces of bogwood of varying height, here and there extending forwards for two thirds of the aquarium breadth. In my aquarium I also include Java fern and the small-leafed *Anubias barteri* var. *nano*; because both these plants are grown on the wood rather than in the substrate, the decor can be rearranged repeatedly without problem, until sufficient resting and hiding places of various

BANDULA BARBS



left In its natural habitat it appears to avoid open spaces, remaining in water approximately 20cm deep, beneath leaf litter or among the *Lagenandra* growing emerse along the margins of the stream.

dimensions have been created. Skilful arrangement of the wood and plants can also be used to arrive at a level of illumination suited to the requirements of the Bandula barb.

A dark substrate is equally important for the well-being of this species. The Bandula barb is a typical embodiment of the old aquarium rule "The lighter the substrate, the paler the fishes; the darker, the brighter." Beech or oak leaves might seem ideal, but are actually out of the question, partly because the barbs might hide under them, but chiefly because food might get between them, remain uneaten, and start to rot. A mixture of fine dark gravel and sand, with pieces of dark slate pressed into the substrate here and there will fulfil the same purpose and result in coloration as bright as that of the fishes in my photos.

As mentioned earlier, *Puntius bandula*, unlike its sibling species *P. nigrofasciatus*, is not a "sociable" fish. If four or five males are to be kept along with several females, then an aquarium with a bottom area of at least half a square metre (e.g., 100x50cm) is required. If two males find themselves too close together then their impressive threat display can be observed. Occasionally this may also involve fighting, which can result in injury if the aquarium is too small and incorrectly arranged. In the main, however, *Puntius bandula* is peaceful towards other fishes.

Rather soft and slight acid water will make successful maintenance

easier. Bandula barbs do exceptionally well in my tanks at a hardness of 5 dGH and a pH between 6.8 and 7.2. The temperature can be anywhere between 24 and 28°C, with the warmer end of the range encouraging intensity of coloration in the males. Feeding is problem-free; the diet should be composed of live and frozen foods, with some dried food as well.

Not so easy to breed

Unlike the exceptionally prolific black ruby barb, which has long been acclimated to aquarium conditions, *Puntius bandula* is not easy to breed. Wild caught fishes and early-generation tank bred fish need soft, slightly acidic water, with a temperature of at least 25°C, in order to breed. The fishes must be very well fed before breeding begins, as otherwise the pairs will eat many of their own and each other's eggs. Breeding behaviour is largely similar to that of the Black ruby barb.

A year's experience has shown that *Puntius bandula* is considerably less prolific where males and females are ill-matched. My friend Peter Beyer, a very experienced and successful breeder, who has bred this species successfully in the past, wrote to me to this effect: "... in soft water, with everything just so. It was just as you and your friend Ham-

mer said. If I got 30 fry then that was a lot. Despite the female being fat! I also found them very susceptible to Velvet disease (*Piscinoodinium*).

This made the approximately 100 fry produced by my aquarist friend Hammer, a professional breeder, look like a brilliant success. Luckily his fish and mine did not succumb to velvet. It was subsequently established that proper pair formation and muted lighting in the breeding aquarium are important in promoting a good brood size. And it subsequently proved possible to produce several hundred fry by using later tank-bred generations in a large aquarium and spawning them en masse.

Rearing the fry is not difficult, but in a bare all-glass aquarium the fry will remain colourless, and for this reason it is important to supplement the growing-on diet with a colour enhancing flake food containing paprika. (Editor's note: There are several of these on the market in the UK). Otherwise when they are transferred to a community aquarium there will be a wait of two or three months before the true splendour of their coloration becomes apparent.

Final remarks

Although *Puntius bandula* was not scientifically described until 1991, it was in fact known long before that. Thus, in 1983, I received a few Bandula barbs from my friend Dr Peter Beyer, the offspring of wild fishes which he had himself brought back from Sri Lanka. Five years later I was glancing through some old notes dating from 1981 and 1982 when I was reminded that at the suggestion of Rodney Jonklaas we had met up with Ranjith Bandula of the export company Seaking. And then I remembered that at that time Rodney had shown us, on my map, the locality for a "lovelier than normal *Puntius nigrofasciatus*", but unfortunately had failed to tell us that Mr Bandula was the discoverer of this fish and that it was found in only a short stretch of one particular stream. So we had missed seeing the very spot in the stream where *Puntius bandula* is found.

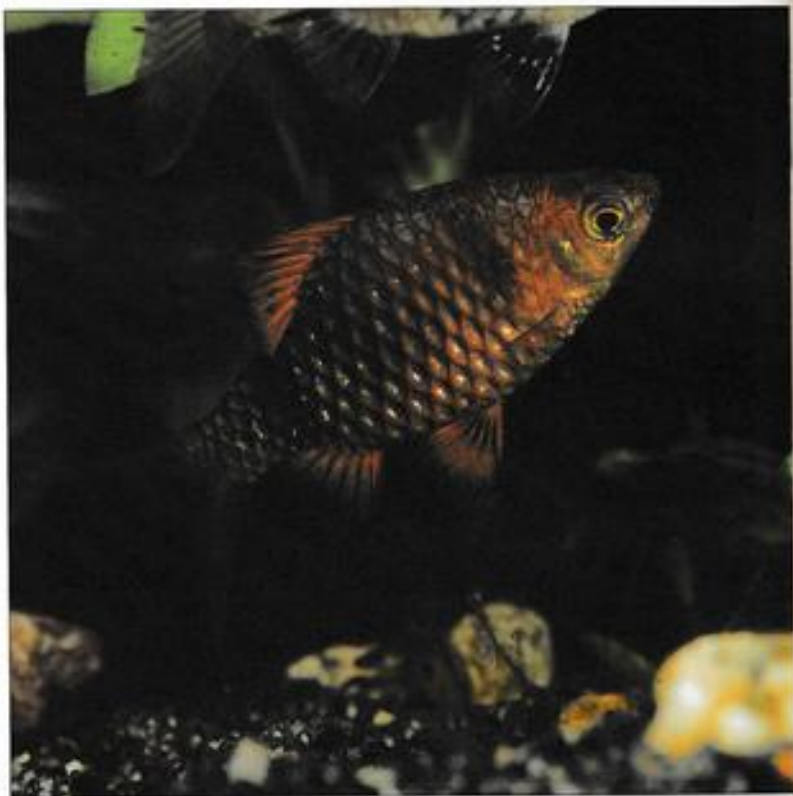
Rohan Pethiyagoda wrote to Peter Beyer that the distribution of this species was restricted to a section of stream just a few hundred metres long. Professor Rolf Geisler, armed with the exact locality details by Peter Beyer, was probably the most recent European visitor to the type locality. Unfortunately there were so many snakes there that he had to return without catching any Bandula barbs. Another opportunity missed ...

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Pethiyagoda, R. (1991). *Freshwater Fishes of Sri Lanka*. The Wildlife Heritage Trust of Sri Lanka, Colombo.

above right This red wild caught *P. cumingi* clearly evidences the close relationship of this species with *P. bandula*.

right The Two-spot barb also comes from the same habitat as *P. bandula*.





FROGS & FRIENDS



HERP FACT FILE: Geckos (Part Two)

TAILS

A wide variety of tail 'designs' and functions are found among geckos. The majority are long, round and tapering, short fat tails used to store fat reserves are common in desert species and can also be used to block a burrow against predators. The leaf-shaped tails of *Droplifus* assist camouflage and are also thought to act as a parachute or brake when jumping. In *Ptychocheilus*, the Flying geckos, the tail and sides of the body have uneven fringes of skin that serve similar functions — at rest the flaps are clamped to the branch aiding camouflage and reducing shadow. All geckos have an autotomous tail — this can be cast off if seized or simply startled. Regenerated tails are common and often reflect the amount of infighting among males. The wriggling cast-off tail is said to distract the attacker.

VOCALISATION

Geckos possess the ability to vocalise

although not all species can do this. Calls vary through chirping, croaking, clicking, squeaking to 'barking' — one genus is actually named 'Barking gecko'. Vocalisation is more common among nocturnal species as a means of communication. In diurnal species, visual signals (colour and body movements) are used to communicate — vocalisation is rudimentary, primarily used as a warning. The voice is also used in defence — most geckos can issue at least a hiss when molested — the large Leaf-tail (*Droplifus fimbriatus*) can produce a loud scream.

REPRODUCTION

Most geckos lay eggs, usually two but many small species may produce only one. A few species are livebearers — the New Caledonian Giant gecko (*Rhacodactylus trachyrhynchus*) and three genera of New Zealand geckos (*Heteropholis*, *Nothiurus*, *Hoplodactylus*). Two subfamilies produce soft-shelled (leathery) eggs, the others

hard-shelled eggs. Soft-shelled eggs are buried — hard-shelled eggs may be hidden in crevices or other secluded spots. Certain species roll the eggs on soil before they harden thus disguising them with particles. In some cases eggs are pressed onto a surface where they adhere. Females of large *Phelsuma* species have been seen lying on their back rolling the eggs to make them spherical and squeezing the two together before hiding them.

Mating is usually preceded by threat behaviour until a male recognises a receptive female. The process of recognition is not fully understood but scent is thought to be important. Visual signals and vocalisation also play a part but much remains to be discovered. In the wild communal laying sites occur among several species — numerous females will lay their eggs in the same spot — often as many as 100 or so eggs. It has been known for some time that incubation temperatures of Leopard gecko eggs determines the sex of hatchlings. This also applies to certain other reptiles and has now been proved to be true of certain other gecko species. It is thought that sex is determined by the temperature in the first one-third of the incubation period. In geckos higher temperatures tend to produce more males, lower temperatures more females. Fluctuating temperatures (between certain points) have produced an almost equal ratio. However deciding the exact dividing lines still needs more research.

To be continued



left *Stenodactylus* species. Note sand adhering to one of her newly laid eggs.

PHOTOGRAPH
BOB & VAL DAVIES

A 'WONDER OF NATURE' — METAMORPHOSIS

Most people are aware of the life cycle of the common frog from their early biology lessons but metamorphosis is a highly complex and fascinating phenomenon when studied closely. In tailed amphibians (newts and salamanders) the changes are relatively minor — the larvae are basically similar to adults in body shape and are carnivorous, feeding on small water organisms. By comparison metamorphosis in anurans is far more dramatic. They start life as limbless, fish-like, gill-breathing creatures equipped with a horny 'beak' and denticles (teeth) used for rasping vegetation. From this form they change into four-legged, air-breathing, carnivorous, mainly terrestrial animals which are completely different in appearance. There are some variations; a few species remain totally aquatic and retain their lateral line of sensory cells which normally disappears in tadpoles of other species but generally speaking a large number of anurans follow the 'typical' pattern.

Metamorphosis consists of a continuous reorganisation of cellular structure — some cells disappear or change. The external feathery gills soon disappear, they actually become enclosed in an opercular chamber which opens out via a spiracle (in some cases a pair of spiracles). Respiration by amphibian larvae may be branchial, cutaneous or pulmonary. In typical anuran tadpoles the lungs develop quite early and are increasingly used to gulp air at the surface particularly in warm or overcrowded conditions when the oxygen content is low. In some *Bufo* species and in stream-adapted species the lungs develop just prior to metamorphosis. *Bufo* tadpoles cannot gulp air and in low oxygen conditions they will swim near the surface using cutaneous respiration. Respiration in all amphibian larvae has not been fully studied — there may be other variations. Cutaneous respiration is retained (to varying degrees) in many amphibian species into adulthood.

General development and metamorphosis are controlled by hormones: prolactin from the pituitary gland and thyroxine from the thyroid. Other changes include the transformation of the long, coiled herbivorous gut into a shorter form able to cope with insects.

The horny lips and rasping denticles are last — just prior to and shortly after this



change feeding temporarily ceases. Changes to the skeleton and musculature are necessary to permit the new lifestyle. The hindlimbs appear first; the forelimbs just prior to metamorphosis. Limbs are non-functional for a short time but quickly strengthen and become functional even before the tail is resorbed. Tail resorption is accompanied by an accumulation of acidic hydrolases in the tissues — these are the main enzymes associated with tissue degeneration.

Many froglets leave the water with a substantial length of tail remaining. This tends to impede movement at first but rapidly disappears — froglets with a small nub of remaining tail can jump quite actively. During larval development and metamorphosis there is an ever-increasing organisation of cells in the dermis. This is particularly seen in the development of pigment cells (chromatophores) and mucus cells. Full adult coloration is not always complete at metamorphosis; sometimes taking days, even weeks to develop.

This is simply an outline of the major changes in a highly complex operation which, when studied deeply cannot but inspire wonder. One mind-boggling aspect is that this intricate process can take place in a short time. Time taken to metamorphose varies immensely according to species, temperature and food availability. Some tadpoles, particularly in cool climates may overwinter and metamorphose the following year. Others in hot, arid regions achieve complete development in a few days, driven on by the fleeting nature of their pools.

left White's Tree Frog; **above** Coming of age. Newly metamorphosed White's Tree Frog showing considerable larval tail.

PHOTOGRAPHS:
TOP OF PAGE BOB & VAL DAVIES
LEFT CHRIS SPENCER



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FEEDING FAILURE AND FORCED FEEDING

When a specimen refuses to feed it can be frustrating and upsetting for the keeper. In some cases there may be a perfectly good reason but in others environmental or medical factors could be involved. The former should be checked out first. Some points to check:

GENERAL

- Some specimens can sometimes take varying lengths of time to adapt to new surroundings.
- The animal may not be hungry — feeding intervals vary and can depend on the size or amount of the last meal. Generally small and growing animals feed more frequently. Insectivores feed more often than mammal eaters.
- Wild-caught specimens will be used to live food. Thawed items may have to be 'wriggled' to simulate movement.
- It is common for male snakes in breeding condition not to feed until after the breeding season.
- Snakes (especially) and lizards approaching the slough tend not to feed although some snakes have been known to accept food when 'milked up'. Sloughing in lizards is a quicker process than in snakes.
- Gravid females reduce their food intake as the young/eggs develop.
- Food — type, size, colour, smell and temperature of thawed items should be considered.
- Dehydration, thirsty reptiles will often refuse food. Creatures which lap rather than drink from a bowl do not always get enough moisture as their surroundings soon dry out.

ENVIRONMENTAL

- Day and night temperatures must be appropriate for the species. Low temperatures may be inhibiting digestion which can be harmful.
- Size and type of housing — possibly unsuitable.
- Time of feeding — crepuscular/nocturnal feeders should be fed late

evening. Thawed items may start to decompose quickly in warm conditions and will be refused.

- Some animals prefer to feed in a hide.
- Intimidation or bullying by cagemates even in facing vivaria may inhibit feeding.

MEDICAL

If the above factors check out correctly the animal is probably sick and apart from minor problems will need veterinary treatment although knowledgeable vets are not always easy to find. Reptiles and amphibians can suffer from a large number of illnesses not all of which manifest themselves externally. Heavy parasite infestation (internal and external) can inhibit feeding as can intestinal blockage if the animal has swallowed particles of substrate. Faulty diet, incorrect environmental parameters, too much handling, intimidation or anything that stresses the animal can depress the immune system thus inducing medical conditions — many organisms can inhabit a healthy reptile's body but multiply and become pathogenic when the immune system is depressed. Cleanliness and proper husbandry can prevent a lot of trouble.

Forced feeding is commonly used by many snake keepers when faced with a reluctant feeder. 'Assisted feeding' is often tried first — the snake's mouth is opened; a thawed mouse inserted and hopefully it is eaten. Forced feeding sounds and looks brutal but has often saved lives. It is similar to assisted feeding but the food is pushed further down the gullet until the normal swallowing reaction takes over. There are potential dangers if attempted by the unskilled.

First the reason for refusal should be checked — if it is a medical condition such as kidney problems or intestinal blockage then forced feeding could be fatal. Lips, teeth, jawbones or throat lining are easily damaged leading to infection. Another version is the use of a 'pinkie pump' — an instrument similar to a syringe which pumps macerated food down the throat. Usually used with hatchlings but in many cases too soon as hatchlings will often go for substantial periods before feeding. As long as they are producing faeces they are still using up the yolk which was previously absorbed.

A friend recently bought a Red-footed tortoise (*Geochelone carbonaria*) which was subsequently found to be anorexic — it would not feed and was dangerously underweight. Fortunately he knows an experienced vet who inserted a tube into the animal's throat and liquidised food was pumped down daily. This method plus antibiotic treatment saved the unfortunate creature which is now doing well. Feeding by stomach is by far the best method but should only be done under veterinary supervision. Other methods can be stressful for both animal and owner and should be used only as a last resort and then only under expert supervision. Food given by forced feeding should be smaller than normal, lubricating the tip of the food with tepid water to help passage down the gullet.



left Royal python starting to 'milk up' as shown by blue eye — will usually refuse food until slough is completed.

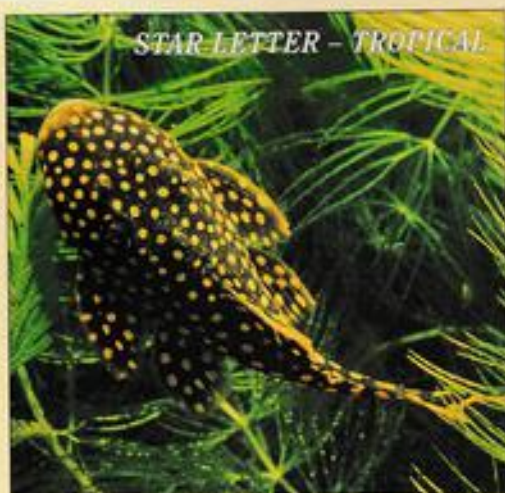
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STAR LETTER - TROPICAL

Like their better known cousins this new Anostirus species (L18) make excellent algae eaters.

PHOTOGRAPH: M.P. & C. PEDNOR

Q I was wondering about this problem I have in my tank. It contains quite a few plastic plants which are covered in thick algae. I remember reading in a magazine you could put them in a solution of disinfectant or something like that. I cannot quite remember exactly what to do, it does look unsightly but the fish are fine. I do have a *P. gibbiceps* in the tank but he/she does not appear to do an awful lot of grazing on the algae.

Allan Stewart,
 Ross-shire

A The first step is to obviously clean up the plastic plants that have become covered with algae. There is no need to use a disinfectant on them at all. Just warm salty water and a brush or new pot scourer. Once you have scrubbed off all the algae rinse them under the tap for a few minutes and they will be ready to go back in your tank. That will solve the visible problem,

but not the root cause of the problem. Algae like this is caused by too much light combined with too much plant food in your tank. If you test your water you will probably find a high level of nitrates in it. This is the end product of most aquarium filters and has to be removed by partial water changes every week (about 10 to 20 per cent) and having some live plants in the tank as well. Without doing this the nitrates will build up to the point where they are poisonous to your fish as well as encouraging algae to grow in the tank.

Whilst all Loricariids tend to be sold as algae eaters, it is a fact that many do not eat algae or only when they are very hungry. *Prerygoplichthys gibbiceps* is one of those species which really are not too interested in Algae. A better choice would be a few Bristlenose Catfish. These will clear most problem algae growths very quickly and will only grow to 10cm at most, rather than 50cm which is what *P. gibbiceps* may reach in captivity.

Q I have a question. Both Kent Webster and I have *Neoheterandria elegans* and both stopped dropping fry about six months ago. My stock originally came from his three years ago. His are kept in a constant new water flow, fed fresh brine shrimp and flake food. Mine are kept in a heavily vegetated, quiet tank with no filtration (relying on water

changes). Mine are fed frozen baby brine and frozen caterpillar worms. Any ideas?

By Internet from
 Hy Finkelstein

A This is a common problem with this species. It usually occurs when old females make up a significant part of the colony. I suspect they are

eating or at least killing any new born fry in the aquarium. The best way to prevent this happening is to remove large females from the colony and keep the average age and size down as much as possible. Since all you have left now

are large old females I would suggest isolating as many of them as possible in individual tanks with lots of plant cover. As soon as fry are spotted remove the mother and use the youngsters to found a new colony.



This page is generously supported by Algarde who are offering a Midi Therm Electronic Thermostat suitable for aquarium or vivarium use as a prize for the featured problem. The unit, with a 300 watt handling capacity, has two heater connections and a fully waterproof probe which senses water (or air) temperature and easy-to-follow instructions.



Neoheterandria elegans. Old females can turn cannibalistic so should be removed from colonies.

PHOTOGRAPH: DEREK LAMBERT

Making maintenance easy

Q I am prone to back problems and really should avoid lifting heavy weights around. Is there any way I can change water without lifting buckets of water about?

A This problem is one many fishkeepers are presented with and is actually very easily solved. You should purchase a small water pump and connect the outlet to a garden hose.

This will allow you to pump water directly out of your aquarium and into the drain without lifting a single bucket of water. To remove main siphon it into a bucket and then pump it out from there. There are several pumps on the market which will connect easily and perform well but the one I use in my fish room is a Maxi Jet 1000.

This has proven to be a good work horse in exceptional circumstances. (I move upwards of 500 gallons of water per week with one of these little pumps).

Tropical ... Tropical ... Tropical ... Tropical ... Tropical

Feathered predators

Q I have lost a few medium-sized Koi recently; they just disappeared from my pond. My neighbour tells me that an owl often sits on my house-roof and I wonder if this could be the culprit?

Rob Ellis, Birmingham

A Personally I had never heard of a European owl that takes fish, but the local Wildfowl Trust said they have heard that the Tawny owl has been known to take fish near the surface of the water but had never witnessed this for themselves. Talking to some of my neighbours at a local pub (a wonderful source of information in a small village like this) goldfish have been seen taken in numbers by a Tawny owl from one very large pond in the village.

I believe, however, your problem is much more likely to be a heron, these predatory birds become ever more venturesome into urban areas

(including city suburbs like yours) as their natural habitats are polluted or built-out of existence to make room for people.

A single heron can soon clear a whole housing estate of fish once it discovers fish ponds. Your only remedy may be to net your pond over completely, and if the net can be raised in the centre by being laid over a pole or plastic pipe laid across the pond to give a ridge-tent effect, this will be far more acceptable than one simply stretched flat to obscure vision beneath it when viewed from a distance.

Deep ponds, with straight sheer sides are rarely troubled by visiting herons who do not stand in water that is much more than two feet deep. There are also lots of bird scarers on the market now and many will deter all but the most determined of feathered predators.

I suppose we should think ourselves lucky that we don't live in the USA! Raccoons are a real pest there which will not only go fishing in your pond but can break into even the best netted and protected ponds. Intelligent, agile, strong and downright evil is how one American pondkeeper described them to me!

Koi ... Koi ... Koi ... Koi ... Koi ... Koi ... Koi ... Koi ... Koi

Skimmers, valves, water and fish

Q I will shortly be setting up a marine tank and would like to know the following: (i) Do I need a protein skimmer? (ii) Are anti-siphon one-way air valves necessary? (iii) How much and how often should I do partial water changes? (iv) Please can you suggest some good beginner's fish for me?

Paul McDonald, Guildford

A (i) Protein skimmers are considered an essential piece of equipment for successful marine keeping now. (ii) One-way air valves are a "must". This is especially true where air-pumps are mounted below water-level. (iii) Partial water changes are a difficult one to give a firm answer to, due to the enormous number of variable parameters involved, all of which determine the rate at which captive seawater deteriorates in quality. One determining factor will be the nitrate level. Once the nitrate content of your seawater exceeds 50 ppm for hardy species or 20 PPM for delicate species then it is time for a 25 per cent water change. Please note that, due to the incredibly high level of nitrate in many water boards tapwater these days, you may have to reduce the nitrate in your tapwater before making up the seawater. (iv) There are plenty of beginner's fishes to choose from. Any Damsel/fish, Clownfish, and Grouper or Trigger species (provided you avoid small and/or shy fishes as tankmates), the Chequered Angelfish (*Holocentrus xanthurus*), the Sunburst Butterfly (*Chaetodon kleinii*), the Moon Wrasse (*T. lunare*) and so on. However, please ask for more advice at your local aquarium shop before buying any fish for your aquarium and be guided by their advice. On one visit to my local aquarium shop, I observed the owner trying to give a customer good advice about several species of fish he

was considering buying. The problem was that this advice was being ignored because the shop owner was not telling the customer what he wanted to hear!

Quarantine — a must?

Q I have been told that a quarantine tank is absolutely essential. Is this correct?

Peter Smith, Edmonton

A Ideally every tropical marine aquarist should have a hospital/quarantine tank. The size should be in direct proportion to the size of the aquarist's main tank. In other words, if you've bought a 6ft x 2ft x 2ft display tank so that you can house a collection of larger Angelfish, Butterflies, Surgeons, Tangs, Lionfish, Wrasse, etc., then there's not much point in buying a 36in x 12in x 15in hospital/quarantine tank, UNLESS you intend buying all your large-growing species as babies and grow them on. The three most important points to remember about a Hospital/Quarantine aquarium are as follows:-

(i) The filter must be kept in a permanent state of bacterial maturity. It is useless turning off the filter between uses as this will kill all the bacteria off resulting in "new tank syndrome" every time you use the aquarium.

(ii) Partial water changes need to be done from time to time in order to keep the nitrate content of the seawater down to reasonable limits.

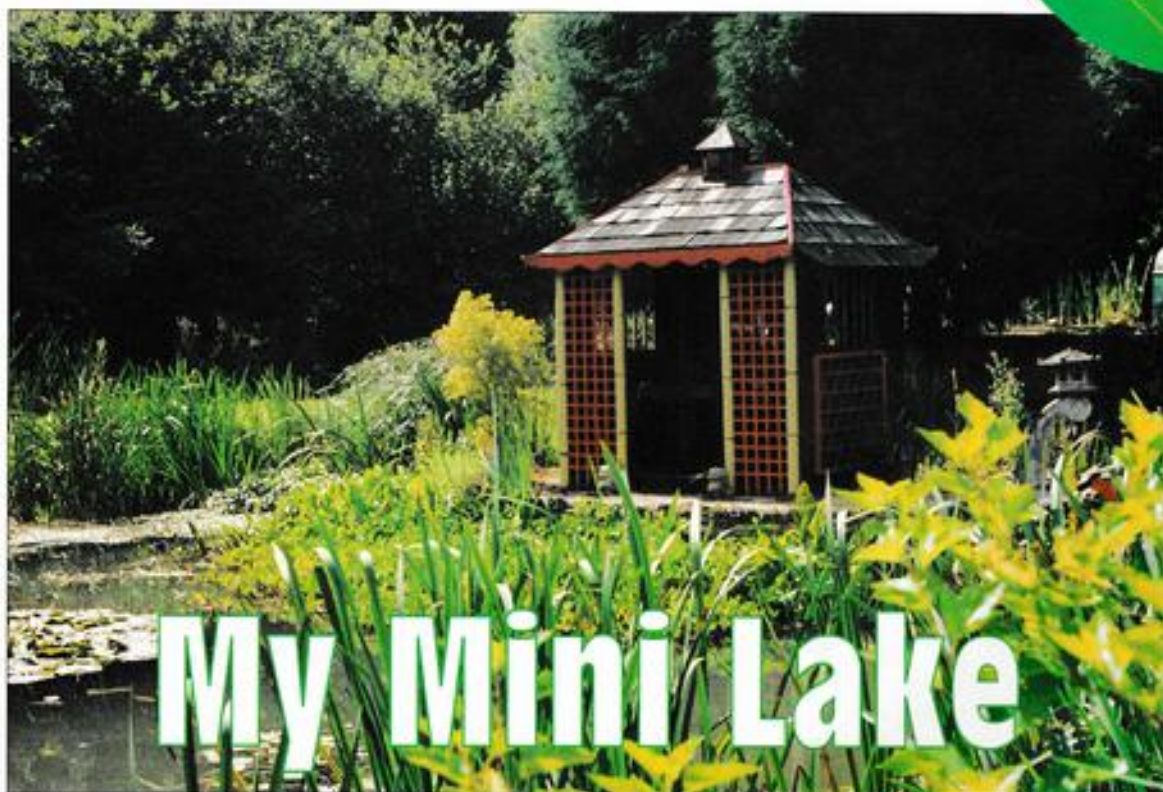
(iii) Keep your charcoal in a separate non-vital filter which can be turned off at anytime that medication becomes necessary. At its simplest and most sensible, this charcoal filter can be a cheap plastic air-operated box filter. At its most spectacularly unnecessary, it could be a huge electrically-operated power filter.

Marine ... Marine ... Marine ... Marine ... Marine

By **BARRY JAMES**

PHOTOGRAPHS: BARRY JAMES UNLESS OTHERWISE STATED

POND



My Mini Lake

I have always wanted a big pond. When I started the nursery some 30 years ago I inherited a one and a half acre field. The former owner in his wisdom had ploughed the lot. This resulted in the sprouting of millions of dormant seeds. Huge docks, thistles and varieties of wheat, oats and barley which had long ago disappeared from cultivation appeared like magic and grew to unimaginable proportions. It took me the next 15 years to landscape the garden. I planted countless shrubs and trees, dug and installed several ponds and waterfall systems and ended up totally knackered!

Time passed and with a new lease of energy I decided to tackle the "Big One". My garden was bordered by the River Churn, which arises at a place called "Seven Springs" in Gloucestershire. This place has a wall mounted plaque nearby, which states in Latin that: "This is the source of the Thames". The Churn officially becomes the Thames at Cricklade a few miles downstream. I decided to build a natural pool fed by the river. The Churn is one of the most unpolluted rivers in England and contains plenty of Brown trout and smaller coarse fish. The first task was to call in the plant hire people. It was a huge and messy task. The immediate subsoil consisted of large pieces of limestone underneath which was a couple of feet of red clay, a couple of feet of blue clay and finally pure sand and gravel.

above The top of the island was concreted to provide a level platform for the Japanese summerhouse. Bases were also laid down for the various oriental statuary such as pagodas, lanterns, Tsukubai, etc.

On one side I left an island, which stood some 10 feet from the bank. This was because my theme was a Japanese one and I wanted to install an oriental bridge, to span the gap.

Once down to the water table all hell broke loose as the machines got trapped in the morass, with one JCB having to be on hand to drag the other on to the bank. The amount of spoil was huge, but luckily we were able to accommodate most of it on site with only a few lorry-loads having to be transported to the tip. The whole area now resembled a scene from Dante's inferno. It was impossible to work on the site until dry weather prevailed.

I wore out a rotavator as I levelled and landscaped the banks and surrounding area. The next job was to build Cotswold stone walls to stabilise the banks of the island. The top was then concreted to provide a level platform for the Japanese summerhouse. Bases were also laid down for the various oriental statuary such as pagodas, lanterns, Tsukubai, etc. The company building the bridge and summerhouse delivered and installed them, presenting me with a gigantic bill as a parting gesture.

Prudently installed an outlet pipe

My reward for all this came when we opened the valve from the river and the water started to gush in. We had prudently installed an outlet pipe which discharged lower downstream. For the first month the water was bright red due to the clay deposits but gradually it started to clear. I now had the unenviable task of wading up to my armpits in order to plant the deep water aquatics, such as Water lilies, Nuphars and

right

Once down to the water table all hell broke loose as the machines got trapped in the morass, with one JCB having to be on hand to drag the other on to the bank.

below On one side I left an island, which stood some 10 feet from the bank. This was because my theme was a Japanese one and I wanted to install an oriental bridge, to span the gap.

MY MINI LAKE



Aponogetons. The submerged aquatics were simply prepared in lead weighted bunches and thrown in.

To complete the task the marginals and moisture loving herbaceous plants were put in followed by the shrubs and larger grasses such as the bamboos etc. Various other jobs such as installing the electricity to the island putting lamps into the lanterns and the judicious placement of a couple of huge Chinese pots, complete with Acers all took an inordinate amount of time.

Finally, with the addition of a few hundred Golden Orfe, Golden Rudd and Koi, the thing was complete. Over the years the principal problem was the build up of blue-green algae in the spring which developed due to the nutrients constantly coming in from the river. This only becomes a major problem during May when, due to the increasing warmth and sunlight the algae accumulates oxygen and floats to the surface in great masses. Later as the plants develop this problem disappears.

One mistake I did make was in planting a few sprigs of *Hydrocotyle verticillata*. This went completely berserk and soon covered over 50 per

cent of the surface. The rest became choked with *Nymphoides*. The only way of controlling these plants was a rake attached to a length of cord. We pulled out tons of these plants, which we piled up in heaps and later used as compost on the garden. Of the other plants only *Sporonium* has posed a real problem. This huge reed throws out runners like crazy and has to be constantly culled. All in all apart from the odd drought when the water level fell to dangerous levels the pool has been a great success.

A few years on, however, we had a major problem with an invasion of water voles. These rodents which I note with amusement are in danger of becoming extinct in the British Isles multiplied and became an absolute pest. They undermined the banks with their burrows, chewed through the roots of bamboos and other bankside plants, decimated irises, bogbean, and ferns by nibbling the stems and shoots and generally caused havoc. I did shoot the odd one, but they bred faster than I could kill them. I have contacted the nature conservation bodies, hoping that they can remove them to areas where they are wanted. Shooting these coddly creatures which bring back echoes of *Wind in the Willows* is not a pleasant task.

Even in the depths of winter I can imagine the time when massed herds of frogs and toads begin to gather for the annual spawning bonanza. This always signals the beginning of spring, with the promise of balmy days lazing on the island drinking long cool drinks, however, with driving sleet, powered by a northwesterly gale, one needs a vivid imagination!



left
Nymphaeoides sp.
 One mistake I did make was in planting *Nymphaeoides* (seen here growing wild in Kazakhstan). This went completely berserk and covered nearly 50 per cent of the lake's surface. The rest became choked with *Hydrocotyle verticillata*.

PHOTOGRAPH
 KEITH LAMBERT

Further adventures

A few years after the lake was complete, a friend of mine who rears coldwater fish found himself with an overproduction at the time of year when shifting them quickly was proving an impossibility. The indoor ponds were vastly overstocked and trouble was looming unless they could be moved into more spacious accommodation.

As my lake was under populated I volunteered to store the fish until the spring when they would be sold off. We put nearly 400 Koi ranging in size from six to 14 inches in the lake. The fish prospered but proved nigh impossible to catch, in spite of drag netting, because the net snagged on water lilies, etc. It was finally decided by the owner to employ a company to electro-line the pool.

A couple of weeks later a lorry rolled into the car park pulling a large trailer, on the back of which was a Japanese four-wheel motor bike. The lorry itself carried a huge fibreglass water tank, a ten feet long flat bottomed skiff, a couple of powerful generators, rolls of netting and a mass of paraphernalia, whose function I could only guess at.

The men set cheerfully to work and the equipment was soon assembled by the pool. The generator and ancillary gear was loaded into the boat which was then propelled in to the water by a man with a paddle. The generator hummed into life and the foreman fiddled with the controls on a gadget which reduced the voltage from 220/240 down to a mere 24 volts.

Two men equipped with electrified nets stood in the prow, and lowered their tools into the water. Suddenly a carp flew up from the depths, and swam crazily in circles. He was swiftly netted and transferred into a

waiting container. Fish after fish succumbed under the onslaught to their nervous systems, and were quickly captured.

Catch did not measure up to expectations

Round and round the pool they paddled poking the nets into patches of weed where the fish might be sheltering. Apart from the Koi, Golden Orfe, Golden Rudd, Sticklebacks, Minnows, Goldfish and even a couple of large Brown Trout were caught. However, the catch did not measure up to expectations. The foreman explained that the Orfe and Rudd were far more sensitive to the voltage used and could die if it was increased. He could not risk raising the current which would catch more Koi, because of the risk to the other fish.

Finally it was decided to net the pool by hand. Accordingly all the men were kitted in wet suits and waders and strode into the pool up to their chests in the freezing cold water. Painfully they dragged a huge lead weighted net across the whole expanse of the pool. This operation was repeated but it was now obvious that no more fish would be caught. The final total was a mere 64 fish although nearly 400 had been put in!

The reason was put down to heron attack as there are several in the valley who visit the pool regularly in the early hours of the morning. The Kingfishers of whom there are several could be exonerated as they only take the sticklebacks and minnows. Possibly the two large trout may have had a few, but would not have seriously accounted for the huge discrepancy. C'est la vie.



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ALEX STEPHENSON continues his four-part series on the ever popular Goldfish:

PHOTOGRAPHS: MAX GIBBS; GRAPHICS: ALEX STEPHENSON

Aspects of Goldfish

Part Three



right Veiltail. As far as finnage is concerned, the ultimate so far is probably the 'Veiltail'. Extensive finnage like this not only requires knowledge and patience to produce, it also needs loving care to maintain.

Double Tail Goldfish

Today there are supposed to be over 100 varieties of goldfish. Some would claim an even higher number. Whatever the actual figure, it is clear the majority of these varieties are double tailed.

All fishkeepers use the term 'double tail', even though 'anatomically' this is not quite correct. To explain this in simple terms — with a normal tail, fin rays start from both sides of the vertebrae and come together forming a single ray which is twice as strong. With a double tail, due to modification of the structure, these rays remain separate and

provide the framework for a divided caudal fin.

Although the term divided tail would be more correct, this term is already widely used by goldfish fanciers to describe a fully divided caudal fin where the upper lobes are properly separated. Those which are joined along the upper edge are often called 'webbed' tails, while those which have a single upper lobe and divided lower lobes are known as tritails. All these terms may not be technically correct but, they are so widely used and accepted, it is prudent to leave them alone.

Twintails, when they first appeared, must have caused great excitement among goldfish fanciers of the time. The historical study of goldfish development is a fascinating subject. Unfortunately, because early records are so few, many of the gaps have to be filled in by intelligent guesswork. It seems, however, that double tailed fish turned up in cultivated Chinese stocks before the year 1600 AD.

The simplest form of twintail has to be the Wakin. This fish, regarded as the most common variety in Japan, is only occasionally seen in Britain. I think this is unfortunate because, in addition to being attractive, it is a long bodied type and so should be hardy.

Apart from being a fine fish in its own right, the Wakin also appears to be the ancestor of all the double tailed varieties. Work on this subject by Dr Matsui, a respected authority, suggests this to be the case. Indeed, Wakin type fish can be produced in spawnings of many modern twintails.

The Wakin is not the only long bodied twintail, there are others but, these are seldom, if ever, seen in this country. One exception is the Jikin. Jikins have a similar body shape to the Wakin but the caudal fins point outwards at right angles to the line of the body. As if this wasn't difficult enough to produce, the Jikin is also a colour variety. Ideally, the colour of this fish should be white with red points. That is to say the body ought to be white with no markings, while all fins, plus tip of the nose, should be orange/red. Not much to ask is it? This is why breeding Jikins can break your heart.



above right Wakin. This fish appears to be the ancestor of all the double tailed varieties of Goldfish.

right Jikins have a similar body shape to the Wakin. However, the caudal fins point outwards at right angles to the line of the body. The Jikin is also a colour variety. Ideally, the colour should be white with red points.

Mary Bailey's Cutting Edge

PHOTOGRAPHS BY M.P. & C. FREDNOIR UNLESS OTHERWISE STATED

• The Editor's monthly look at new and rare fish which have become available to the hobby for the first time or have returned again after a long absence. Conservation issues and fish which are in need of long term captive breeding if they are to survive are also included.

This month Derek Lambert hands over the Cutting Edge to Mary Bailey.

A new genus for the *Pseudotropheus* ZEBRA complex from Lake Malawi

It has long been known to taxonomists that the genus *Pseudotropheus* is polyphyletic (= contains several different lines of descent) and hence should ultimately be split into a number of different genera, as all the members of a genus should be descended from a common ancestor. Because the type species of *Pseudotropheus* (the species which was used as the basis for the description of the genus) is *Px. williamsi*, a member of a small group little known to aquarists, this means that we are going to have to get used to some major changes in the names we use for a lot of familiar mbuna species.

As long ago as 1984 Meyer and Foerster suggested that a subgenus *Maplandia* should be erected (= created) for their new species *Pseudotropheus greshakei*, a close relative of *Px. zebra*, and in the same journal Dr Ethelwynn Trewavas, well known for her extensive work on Malawi, proposed a sub-genus *Tropheops* for *Px. tropheops* and its relatives. *Maplandia* has been in intermittent use among hobbyists since that time, and it was hitherto expected that when scientists came to examine *Pseudotropheus* with a view to splitting it up, *Maplandia* would become a full genus.

In 1997 the American ichthyologist Dr Jay Stauffer and his colleagues published a paper on the *Px. zebra* species complex, in which they defined a new genus for *Px. zebra* and its relatives; but, on examining the description of *Maplandia*, they discovered that there was no diagnosis of the sub-genus given (a diagnosis is a formal list of characteristics by which a taxon can be identified) and declared the name a "nomen nudum" (meaning "bare name", i.e., just a name with no proper description attached).

Now, they could have rectified the situation by providing the necessary diagnosis and using

Maplandia as the name for their new genus, but instead they decided to use a new name of their own, *Metriaclima* (pronounced met-ree-ah-lee-ma, and meaning "moderately sloped", referring to the upper head profile). And this is the name we must get used to for these fishes in the future. Doubtless *Pseudotropheus* will continue to be used in the hobby and the aquarium trade for some time, but the new name is likely to appear increasingly in the literature from now on.

It is perhaps unfortunate that Dr Stauffer did not take into account the fact that the prime "users" of these fishes, i.e., aquarists and the aquarium trade, were already familiar with *Maplandia*, such that use of that name would have led to an easier transition. It is even more regrettable that a German publisher of aquarium books (with English editions) has decided to confuse the issue even further by regarding *Maplandia* as the correct name and treating *Metriaclima* as a junior synonym. I have consulted a number of very senior ichthyologists on this point, and am left in no doubt that *Metriaclima* is the correct name.

Dr Trewavas's paper on *Tropheops* DOES, by contrast, contain a proper diagnosis, and there is no doubt that in due course this sub-genus will be raised to full generic status. In

fact a number of authors of aquarium literature are already suggesting this step should be taken. However, it is probably better not to jump the gun and to wait until the experts specify precisely which species belong to that group. It is, nevertheless, quite possible that the name may start to appear in the literature at any time. ★

The previously described species of *Metriaclima* (i.e., those formerly in *Pseudotropheus*) are as follows:

- *M. zebra* (the type species of the genus)
- *M. aurora*
- *M. barlowi* ("Yellow Zebra")
- *M. callainor* ("Cobalt Zebra")
- *M. elegans*
- *M. estherae* ("Red Zebra")
- *M. greshakei* ("Ice-Blue Zebra")
- *M. hypomelandi*
- *M. heteropictus*
- *M. livingstoni* (*M. lunaticola*, *M. purus* are probably synonyms)
- *M. lombardoi*
- *M. xanthonachus*

Stauffer et al do not include *M. faizilberli* (usually regarded as a member of the zebra group).

The new species are as follows (pronunciations, derivations (as given by the authors) and hobby names given where known, plus



right *Metriaclima lombardoi*

PHOTOGRAPH: MAX GBS

notes where appropriate):

M. melanocephalus (mell-a-brank-ee-on, "black fin"). Described from Mitande Rocks, Thumbi West Island. This species differs from the normal blue-top zebra (also found at Mitande) in having the black bars extending into the dorsal. There are no morphometric (counts and measurements) differences, and no other colour differences are mentioned. I agree with Ad Konings (1998a); Konings and Geerts (1999), an undisputed expert on these fishes in the aquarium and in the wild, that the idea that two species are involved is highly questionable — such extensions are variable within any population of *M. zebra*, may appear and disappear with mood, and in my experience both types may appear in the progeny of a single pair.

M. chrysomelas (cry-so-mal-oss, "gold-spotted"). Described from Mumbo Island, in the Lake Malawi National Park. Again Konings is dubious about this being a distinct species, regarding it as simply a habitat-dependent colour variation.

M. phaeos (fay-oss, "dusky"). Described from Cobué, Mozambique. Konings remarks that the colour described for males of this species corresponds to that of the species called "Shauri" found at Cobué, but female coloration does not match that of Shauri females, and perhaps the authors muddled up two sympatric species. The female coloration given matches that of female *M. aurora*, also found at Cobué. But if this problem can be sorted, this is probably a "good species".

M. cynusmarginatus (sigh-nee-uss-margin-ar-tuss, "blue-edged"). Described from (supposedly) Nkhotakota, a site where there are no rocks! Konings identifies this with "Zebra Benga", found to the south of the town, and regards it as a good species.

M. benetos (ben-ee-toss, "blue"). Described from, and said to be endemic to, Mazinzi Reef. Konings regards this as a light form of *M. zebra*, the coloration varying with habitat. He points out that similar variation is found at many sites, and that various intermediate forms also occur. So unless these forms are all different species, *M. benetos* is probably not a valid taxon.

M. mbenji (m-ben-gee-ee, "from Mbenji"). Endemic to the Mbenji Islands, and well-known to aquarists as the "Mbenji Zebra". Almost certainly a valid species, as quite distinct in size and coloration.

M. pyrsonotus (pyre-so-no-toss, "red-backed"). Described as endemic to the Maleri Islands.

M. emmitos (em-milt-oss, "red-tinged"). Described from Mpanga Rocks, Chilumba.

above right *Metriaclima aetherae*. This species was originally called the "Red Zebra".

right *Metriaclima zebra* is the type species of the new genus.

M. sonderacinus (sand-a-rass-ee-noss, "orange coloured"). Kanjedaa Island and Chimbo Bay, Mpanga Island and Nkudzi Bay.

M. thapsirogen (thap-sin-oh-gen, "yellow chin"). Collected only at Eccles Reef.

To you and me, and Konings, these four species are all better known as the "Red-Top Zebra", and they are distinguished from each other only by minor differences in the amount and shade of red in the dorsal and the barring, including whether or not the bars penetrate the dorsal fin. As in the case of *M. melanocephalus*, it is highly dubious whether this is a valid distinction — or, indeed, whether the colour of the dorsal is significant and a reason to differentiate red-tops from the "ordinary" blue-top zebra. The authors consider the latter to be distributed around much of the lake as a single species, so it is difficult to see their reasons for splitting up the similarly widespread red-topped forms.

In conclusion, while it is useful to have a start made on revising and splitting *Pseudotropheus* (and *Metriaclima* is undoubtedly a valid name and valid generic concept), the work on species appears to leave a

lot to be desired. From the average hobbyist's point of view *M. mbenji* is the only one of the new species likely to be of immediate significance, and this name should be used. It is easy enough to remember! *M. phaeos* and *M. cynusmarginatus* are also probably valid.

Further research, including genetic studies, may in due course clarify the situation as regards the others, and we will doubtless bring you updates as and when further information becomes available.

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TROPICAL

Last month we looked at BioPlast's Complete Aquarium System and Amazon habitat tank like the one illustrated ...

PHOTOGRAPH: MP. & C. PIEDNOIR

Creating an Amazon

A beautiful furnished aquarium is a joy to behold but many of us look at the pictures and think they require a huge amount of work and special equipment to be successful. In reality, a furnished aquarium can be created very quickly and with proper lighting will grow and mature into the beautiful centre piece an aquarium should always be. In the coming months we will be showing you a number of alternative styles of furnished aquaria, some with themes such as this one, whilst others are just lovely furnished tanks. All are designed to inspire you to make the most out of your aquarium.

Since many of our fish and plants originate in the Amazon basin this is one of the easiest of habitat tanks to put together. First though, we need to look at how the aquarium is going to be lighted as that is one of the most important factors in success with planted tanks. These days this has been made a whole lot easier because manufacturers produce a range of fluorescent bulbs specifically designed to grow plants or recre-

ate the sun's natural spectrum. Two of these will be required to light your tank adequately for most plants, but this will depend on the aquarium width and depth, so check with your supplier to make sure you have enough lighting.

Substrate an important aspect

A very important aspect of this type of aquarium (which is an aquatic garden as much as a home for the fish) is the substrate. Pure, freshly

below A typical Amazon set-up. This one contains Discus so will need to be kept at a warmer temperature than many Amazon communities.



promised we would give you a complete run down on what is needed to create an

Habitat Aquarium

cleaned gravel has no nutrients in it for plant growth. This changes as the aquarium matures and fish wastes build up in the gravel, but initially any plants put in this medium will be slow to grow and may fail altogether. To solve this problem you need a substrate which contains some nutrients which the plants can use immediately. Sterilised meadow loam is ideal for this or you can buy one of the special aqua soils available.

Cover your aquarium bottom with about one inch of this medium and then put the main substrate over the top to a depth of two inches at the front sloping up to three inches towards the rear. This means your substrate is a total of three inches deep at the front. Since most rivers in the Amazon have sandy substrates, sand probably makes the most convincing substrate for this type of aquarium, but a light coloured fine gravel can be used instead. Make sure you buy your sand from an aquarium shop and not a builder's merchant. It is more expensive but will be safe for aquarium use.

Next we need to look at other furnishings. Bogwood is a must for this type of setup. This natural substance comes in lots of different shapes and sizes. Take your time in choosing the pieces you want and try to find some which look as natural as possible. Sawed off ends can be difficult to hide so avoid any pieces which have obvious chunks missing from them. Ideally you will need about three different pieces rather than one large one. This will give you more flexibility when planting up the tank.

Rockwork can also be added but choose only one type of stone and make sure they are rounded in shape rather than jagged pieces of slate. Slate is excellent in many tank set-ups but for some reason always looks out of place in an Amazon tank.

Plant selection

Next order your plants. Most aquarium shops stock a range of plants on a regular basis but for a themed tank such as this you will need specific species or genera of plants rather than just the commonly found ones. This having been said, the range of plants available for this kind of setup is huge and you should not have any trouble tracking down most of what you need. Since the choice of plants is very personal, we have put together a suggested shopping list but feel free to chop and change as much as you want. Most good books will list the area each species comes from and you have a wide selection to choose from.

Echinodorus oeris, five plants; *Echinodorus tenellus*, 20 plants; *Hydrocotyle leucocephala*, 10 stems; *Cobomba aquatica*, 20 stems; *Cobomba plantensis*, 20 stems; *Heteranthera zosterifolia*, 20 stems; *Alternanthera reineckii* — Red, 20 stems; *Myriophyllum mattogrossense*, 20 stems; *Riccia fluitans*, one portion.

If you do have difficulty in obtaining a particular species of plant, or your local aquarium shop will not make the effort to buy in 'specials' for you at a reasonable price, you can always try one of the mail order plant companies. There are several who advertise regularly in A&P and these firms will go out of their way to provide you with the plants you need.

Once your plants arrive you can put the whole tank together. First of

all position your bogwood and rockwork. The two commonest mistakes people make with this is to place it symmetrically in the tank or clump it altogether in the middle. People do the same when taking photographs and the same rules should apply here. Aim to create a focal point about one third or two thirds of the way along the tank close to the rear. Everything should lead your eye to this point.

Next fill the aquarium with water of approximately the correct temperature. A hose connected to your mixer tap works well and with regular adjustments will allow you to obtain a temperature of 78°F. To avoid stirring up the substrate too much use a china bowl under the hose, a end and fill the tank slowly. A water conditioner should be added at the same time to knock out chloramines.

If you are in a hard water area you may want to use soft water rather than tap water. This is only needed if you plan to have very sensitive plants or fish in the aquarium but is not essential for those mentioned here. Rainwater can be collected and filtered through activated carbon before use. If you live in a highly industrialised area you could buy an RO unit and mix the water produced by this with your tapwater until you create the correct pH and hardness. Another alternative is to use peat to soften your tapwater. To do this you will need a large water container of the sort sold by garden centres. This is filled to within six inches of the top with tapwater and then peat is crumbled on top. Once this has become waterlogged and sunk to the bottom (usually this takes about seven to 10 days) test the water for pH and hardness. You are looking for values of about 6.5 pH and between 5 and 12 KH. If still above these values add more peat and check again. Once you have the water at the correct values it can be used to fill your tank.

Think carefully about plant positioning

Next start to position your plants. Think carefully about where you want each plant to grow. Obviously all the tall ones should be near the back and sides. Your focal point is probably the best place to position a group of Amazon Swords or red foliaged plants. Anything with red foliage is likely to need strong lighting so try to keep these directly under your tubes and give each stem a little more space. *Cobomba* requires strong lighting and several stems should be planted together to form a clump. To create a more natural effect, plant all species in clusters rather than individually.

Once you have finished you can switch on the heater, filter, and lights. Initially the water will be a little cloudy but this will soon clear. Leave the lights on for a couple of days to allow the plants to orientate themselves and keep a close watch on the temperature. After that the lights should be kept on for 12 hours a day, every day. A timer switch is a good idea to make sure this routine is adhered to.

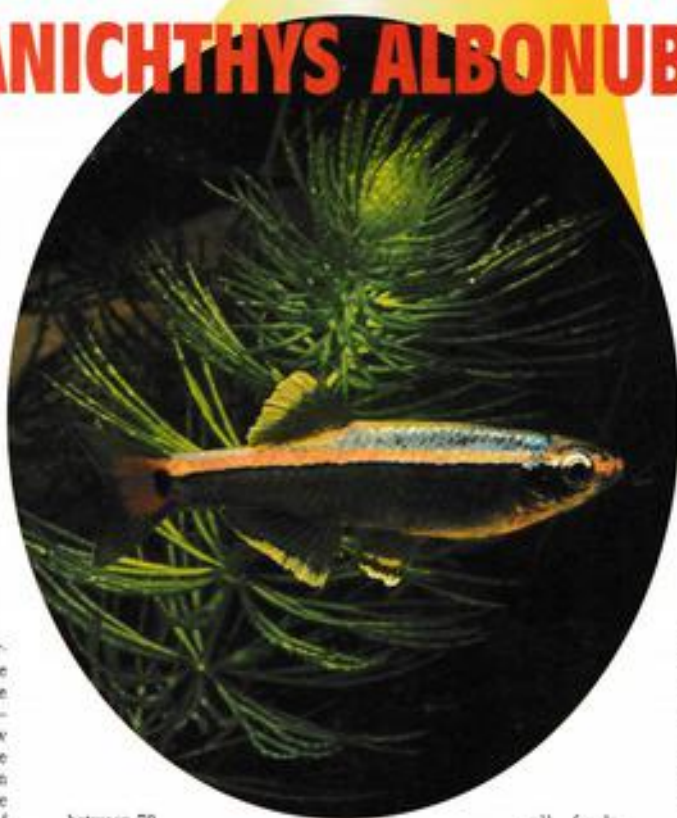
After two weeks you can think about adding fish. Once again the range of fish is huge and very personal. Next month we will look at some typical Amazon communities which would live happily in this kind of aquarium and explaining why it is so important to build your fish numbers up slowly.

The White Cloud Mountain Minnow (*TANICHTHYS ALBONUBES*)

The ever popular White Cloud Mountain Minnow was discovered by Tan Kam Fei who gave them to Lin Shu-Yen (the Director of a fisheries experimental station) for identification. He duly described them as a new species in 1932 and named the new genus in honour of Tan (*Tanichthys* — Tan's fish). It took another six years before they reached aquarists tanks in 1938 but have been popular aquarium fish ever since.

This species originally hailed from cool mountain streams in southern China (particularly those around White Cloud Mountain, hence the species name: *albonubes* — White Cloud) but has now become extinct in many of these habitats due to deforestation and soil erosion. Attempts are being made to protect some of its natural habitats now and captive populations are being maintained.

White Cloud Mountain Minnows belong to the Rasbocinae sub-family of Cyprinidae (Carp-like fish) and are very similar in behaviour to their close relatives the Rasboras. Whilst usually considered a tropical fish suitable for beginners, they actually require a cool well oxygenated aquarium and have a low tolerance of poor water quality, not the best combination of requirements for a beginner's fish! They do best when kept in a temperature range of



between 70-74°F and need good filtration which creates some water movement. If the aquarium is over-crowded then this species will be one of the first to suffer.

They like a well planted tank with plenty of swimming room towards the front and are naturally a shoaling fish, so are best kept in a group of six or more. These peaceful fish make ideal inmates for a small fish community where their constant movement will liven up the scene no end. For their colours to be seen at their best use a dark substrate in the aquarium. They eat

all foods which are small enough to fit in their mouths and are usually the first fish to reach any food when it is introduced to the aquarium.

Males are slimmer than females and tend to have brighter colours. Spawning usually takes place over a period of several weeks rather than all at once. The eggs are laid in plant thicket shortly after first light each morning and once mating is complete for that day, the pair will start to eat any they can find. For this reason the adults should be removed as soon after spawning as possi-

ble. It is possible to flock breed them, but only if the aquarium is heavily planted and the adults are very well fed at all times.

The eggs take up to two days to hatch with the fry becoming free swimming on the fourth day after spawning. They need Infusoria as a first food but will take newly hatched Brine shrimp or Micro worms by the second week. Once on to these foods they grow very quickly and can reach full size (4cm) in only four months. As youngsters the green line along their flanks glows as brightly as that of a Neon Tetra. This led to an alternative common name of 'Poor-man's Neon' for this fish. That was at a time when Neon tetras cost more than an average person's weekly wages!

A beautiful long finned form of this fish was bred by Canadian aquarist Edward Solly and became known as the Meteor Minnow. These were thought to have died out in the 1980s but have since been rediscovered in American aquarists tanks and can be found in shops from time to time. They are still a rare find in Europe and well worth tracking down, being just as long lived and hardy as the normal form.

PHOTOGRAPH: M.P. & C. PEDDOR