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COVER PICTURE

DAVE BEVAN

CONTENTS



Page 6

TROPICAL

- 6 BREEDING THE ROYAL FARLOWELLA** Peter Lewis has had more success than many aquarists with this challenging fish
- 38 A DIVE TO REMEMBER** Dave Tourle of the British Cichlid Association takes us under the waves of Lake Malawi
- 47 LIVEBEARERS OF THE EAST** Roy Osmint focuses on some of the most popular of all aquarium fish
- 67 SPOTLIGHT ON ... The Red Striped Killifish** (a perfect aquarium fish)

MARINE

- 20 DWARF ANGELS** This month Dave Garratt focuses on some of the most eye-catching marine fish in the hobby
- 44 SHOREWATCH SPECIAL** Marking a special event: World Oceans Day
- 58 LIFE IN THE OCEANS** Andrew Caine, BSc, continues his look at invertebrate life in the oceans

POND

- 43 WONDERFUL WATERLILIES** Michael Edwards has been to visit Wychwood Waterlilies in Hampshire
- 50 CREATING A WILDLIFE POND** Bob & Val Davies take a break from Frogs & Friends this month



Page 20

PLANTS

- 56 THE AQUA GARDENER** Plant expert Stephen Hook takes a look at some common aquatic plants

DISCUS

- 54 THE DISCUS POOL** This month Tony Sault is our guest Discus writer

KOI

- 11 KOI POND DESIGN** Peter Skinner of Black Knight continues his series on pond construction
- 16 KOI - A LIVING ART FORM** Koi judge Kate McGill continues her series on Koi appreciation
- 17 KOI CALENDAR** Reporting on the Koi scene

GENERAL

- 5 AQUAZOO COMPETITION** Easy to enter and great prizes!
- 36 FISH PROFILES** The Kuhli Loach and The Silver Shark
- 61 CUTTING EDGE** Our monthly look at rare fish and the shops that supply them
- 63 BUYER'S GUIDE/CLASSIFIED**

NEW! BLUE PAGES - Your Essential Guide to Fishkeeping

- 25 STEPPING STONES ... TO SUCCESS** Essential Questions and Answers
- 26 GREEN WATER AND BLANKETWEED** Ann Telford explains about two of the most hated problems pondkeepers face
- 28 SELECTING POND PUMPS** Helping you to make the right decision
- 31 THE YOUNG AQUARIST** Helping young fishkeepers become young aquarists
- 32 ASK A&P** Your queries solved here ... with a prize for the star letter!



Page 50

EDITORIAL

Welcome to the June issue of A&P. As you can see the front cover looks a little different this month. Our regular readers, who have been with us since before Inline Magazines took over will already know the magazine has been slowly evolving over the months but the one area which looks just the same as it has for many years is the front cover. That has now been restyled to give it a more modern 21st century look. I hope you like the new look (write in and let me know what you think) and didn't have too much trouble locating your favourite aquatic magazine.

Moving on to this month's articles we have an action packed magazine for you. Dave Tourle has been diving in Lake Malawi and opens a whole new world to Cichlid fanatics in the UK, while Dr Peter Lewis is sharing his experiences of breeding Sturisoma.

Marines are not forgotten with three features this month. Dave Garrett discusses Dwarf Angels, Andrew Caine continues his look at invertebrates and Andy Horton is down on the Sea Shore for World Oceans Day.

Coldwater fish are never left out in the cold in A&P, so Koi judge Kate McGill is back with another in her series on Koi — A Living Art Form, and we have the third in Peter Skinner series on pond construction. The last two months Peter has been headed up as a "Professional pond builder" which he was for many years. However, he now runs Black Knight Filter Brushes (check out the advert in this month's A&P).

Bob and Val Davies change their Frogs and Friends column (just for this month) into a feature on creating a wildlife pond. Thanks to the "Dimmock" factor, many new water features are being included in gardens now, but all too few of them are suitable for fish, frogs and amphibians. You can make use of these as breeding sites and new homes to replace the thousands of natural ponds which have been lost over recent years. Bob and Val give you a few pointers to help make these "amphibian friendly".

The Aquazoo competition is still here with a final chance to enter. The prizes really are well worth having and even if you have already entered once you can have another go this month. Just figure out what the three fish are in the photographs, then go to www.aquazoo.co.uk/competition and fill in the answers. From there you can move on to the rest of this very worthwhile site.

For those of you who wondered who won the SeaMe.com filters here is a list of winners: Graham Thompson, Bucks; J. Rigby, Merseyside; Peter Powell, York; J. Bedingfield, Norfolk.

Whilst on the subject of winners here is the list of winners from the Aquarian competition as well: Mr J. F. Millard, Rochford, Essex; Mrs E. Holden, Spalding, Lincolnshire; Mrs D. Harper, Banbury, Oxon; Mr T. H. Campbell, Fleetwood, Lancs; Mr and Mrs G. and J. Verrill, Poole, Dorset; Mr E. A. Burns, Belfast; Miss C. Savage, Worcestershire; Allan Stewart, Ross-shire, Scotland; Richard Soutar, Perth, Scotland; Tony Cotter, Nottingham.

Congratulations to you all and thanks to both these companies for supplying the prizes for these competitions.

Until next month ... Happy Fishkeeping!

D. Lambert

DEREK LAMBERT EDITOR

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AQUAZOO COMPETITION

Great prizes and easy to enter!

In this month's A&P you will find a competition insert from Aquazoo.

All you have to do to enter is find which three fish the photographs belong to (a careful look through this month's A&P will help), and then go to www.aquazoo.co.uk/competition.

By following the instructions there you will have a chance of winning one of these fantastic prizes



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TROPICAL

Breeding the 'Royal Farlowella' has always been something of a challenge but **PETER LEWIS** has had more success than many aquarists. This month he shares his experiences with A&P readers:

PHOTOGRAPHS: M.P. & C. PIEDNOIR UNLESS OTHERWISE STATED

Breeding the

'Royal Farlowella'

STURIOSOMA PANAMENSE

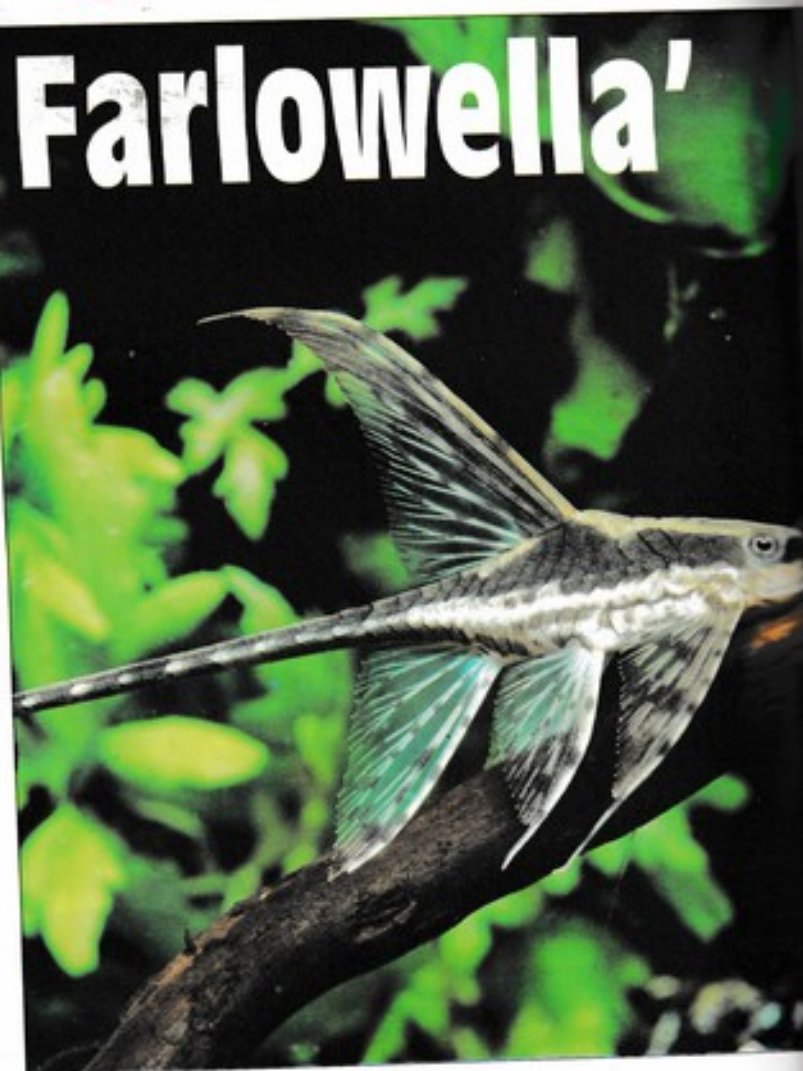
(Eigenmann & Eigenmann, 1889)

Over the last 30 years I have never found myself in a situation where I had aquaria in my home that did not contain at least one species of catfish, be it a *Corydoras*, some type of sucker-mouthed Loricarid or *Brochis* alongside the Cichlids and Loaches that have become my favourites.

I began keeping ornamental tropical fishes in the winter of 1966 while living in Blackpool, Lancashire. Apart from two years when I was 'on assignment' from ICI helping run a new site they had bought in Dighton, Massachusetts, I have always had at least 10 aquaria set up somewhere in my home. Whilst I have bred many of the fish belonging to the cichlid family that we maintain in our hobby I have not been fortunate enough to have similar success with catfish.

Tried with little encouragement

I have watched *Brochis splendens* deposit eggs throughout my tank and tried with little encouragement to get several species of *Corydoras* to spawn. I have only successfully spawned the Bristle nosed catfish, *Ancistrus dolichopterus* and *Sturiosoma panamense*. That is I have been able to raise fry to a 'saleable' size of only the latter two species. It is



my experiences with *Sturiosoma panamense* about which I would like to write in this article.

S. panamense is a catfish belonging to the family Loricariidae that can be generically classified as a 'Whip tail catfish' owing to its markedly tapering tail. In our shops we sometimes see this fish for sale as the 'Royal Farlowella' since this is the trade name originally given to



S. panamense when it first was offered for sale sometime in the mid 1970s. In nature *S. panamense* is found inhabiting the waters of the Rio Magdalena, Panama, where mature specimens have been collected as large as 20cm, standard length. *S. panamense* has also been classified as *Loricaria panamensis* and *Oxyglocaria panamensis*.

The genus *Sturisoma*, erected by Swainson in 1838, contains 15 recognised species of which six are imported on an irregular basis. As hobbyists we have access to *S. aureum*, *S. nigrorostrum*, *S. barbatum* and *S. panamense*, although I believe it is *S. aureum* that is sold through the trade on a regular basis. Closely related to members of the *Ferlowella* genus, there are many instances where immature *Sturisoma* are regarded as 'Twig Catfishes' akin to *Ferlowella*.

Once the specimens mature there is no doubt as to the identity since *Sturisoma* sp. grow far larger than *Ferlowella*, especially the Long-Nosed Whiptail catfish, *S. barbatum*, mature at 30cm, standard length.

The pair I obtained came from a dealer in St Louis and had been imported directly from the wild some 10 days earlier. I obtained three

fish, two females and one male, each between 10 to 13cm, standard length. Sex was easily determined with fish of this size since the male had obvious bristles on the posterior part of the snout and cheeks, alongside the mouth. The females, after being conditioned in my home aquarium, also showed a definite stoutness and depth to the body that was absent in the male. Home to the catfish became a well-planted tank 36 x 18 x 12 inches, approximately 150 litres, that contained several large, flat granite and slate rocks. A ceramic flower pot 'cave' and a profuse growth of Java Moss, *Vesicularia dubyana*, and algae.

Paid little attention to each other

The fish were fed on a diet of live *Daphnia*, finely chopped earthworms, well-cleaned Tubifid worms, sliced, pre-cooked green beans and

left Female *Sturisoma aureum*.

above Male *Sturisoma panamense*. Sex is easily determined with fish of this size since the male had obvious bristles on the posterior part of the snout and cheeks, alongside the mouth.

PHOTOGRAPHS: AREND VAN DEN NIEUWENHUIZEN

BREEDING THE 'ROYAL FARLOWELLA'



left A male *Sturisoma panamense* guarding eggs.

PHOTOGRAPH: PETER LEWIS

below A beautiful female *Sturisoma aureum*.



commercial dried foods. They paid little attention to each other for six to seven months during which time the male had grown to a length of 20cm whilst the females seemed to have hardly grown past 15cm. Both females were, however, noticeably more rotund being distinctly fatter than the larger male. Equally it appeared that the 'whiskers' of the male had become thicker and more numerous.

The first signs indicating that the fish were ready to spawn came with one of the females diligently cleaving an area some 30cm long by 12cm wide on one side of the large pieces of Welsh slate in the tank. Late in the evening of the second day after the slate cleaning ritual had been

observed one of the females began to lay fairly large eggs, 3-4mm diameter, in regular lines across the cleaned area of the slate.

Almost in cichlid fashion the male hung back behind the female until each row of eggs had been deposited after which time he followed the same path and fertilised the new laid eggs. Neither party seemed especially excited during this whole cycle and throughout the spawning ritual. The only urging witnessed was the male gently nudging the female around the area of her vent as if encouraging her to make another run and lay more eggs.

Once the eggs were laid and fertilised the male took over completely by assuming the role of guardian by taking up a brooding position over and across the eggs. Thus, in a fashion more like that of a pair of spawning cichlids, the male *S. panamense* protected the clutch of eggs from any intruding *Corydoras* or scavenging snails present in the aquarium.

Eggs were indeed fertile

Within three days after spawning it became apparent that the eggs were indeed fertile as small dark forms began to show in the eggs. After seven days the eggs turned very dark, almost black. On the eighth day after fertilisation the first fry began to hatch from the shells, each with a very prominent yolk sac. At the end of the tenth day every egg had hatched, all the fungused eggs having been removed by the attentive male earlier in the process. At one time a ball of fry was clearly visible as a tight, wriggling mass at the base of the slate.



above This male is guarding a clutch of eggs which have been laid on the front glass of the aquarium.

right Here the embryo's backbones can be seen developing inside the eggs.

During the entire hatching process neither of the two females paid any attention to the eggs. Defense and aeration of the eggs was left entirely to the male. However, once the hatching was complete, the male also ceased to provide any protection or exercise any parental care. Approximately 65 fry were evident around the base of the slate and amidst the gravel of the tank. When the *S. panamense* first spawned the young were left in the tank to fend for themselves and, despite supplementing the available food with infusoria, all but seven

died by the end of the second week after they became free swimming.

Fortunately, within six weeks, the same pair began their spawning cycle over again. This time the seven remaining young and the second, seemingly disinterested female *S. panamense* were removed from the tank. The ritual and sequence following this second spawning proceeded exactly as per the first event. This time however, the wriggling fry were moved to a 75 litre tank heavily planted with *Cryptocoryne* and *Vallisneria* containing an abundance of algae covered rocks and water from the tank in which they hatched. An infusoria culture started from crushed lettuce leaves was added to the rearing tank at the rate of 0.5 litres each day. Again the fry numbered in excess of 60 healthy looking young and this time the survival rate was much improved as over 30 made it through to a size at which they could be traded with fellow aquarists.

The key to this success was the fact that at about six weeks old the fry were introduced to a vegetable diet. Sliced, precooked French beans or par boiled green peas, after first removing the husks, were added fresh to the tank each morning before I went to work. Each evening, as I was working in the Fish Room I siphoned off any uneaten French beans and replaced the water with fresh, aged water at a temperature of 22-24°C.

Different methods of rearing

The pair has spawned on a regular basis almost every two months since they first spawned. Since the first and second spawning I have experimented with different methods of rearing each batch of fry. From this experience I can say that one way to maximise survival rate amongst the fry is to transfer them to a 50 litre tank containing clean, well-filtered water at 22-25°C and to feed them heavily on 'green bean induced' infusoria followed by



crushed garden peas. One of the photographs accompanying this article shows several fry at six weeks old enjoying a meal of sliced, precooked string beans. In fact I have theorised that, since wild *S. panamense* are used to rasping algae off rocks in their environment, all the fry are doing

TROPICAL



BREEDING THE 'ROYAL FARLOWELLA'

by swimming to the beans provided in their tank is doing what nature intended and looking for any edible matter deposited on rocks at the bottom of the river bed.

Throughout the period when the *S. panamense* were both being reared and spawned the pH of the water was maintained slightly acidic at 6.0 to 6.5, using well washed peat in an outside filter and present under the gravel of the tank as a growing medium for the live plants. The water was relatively soft, varying from 150 to 200ppm as calcium carbonate and the temperature averaged 22-25°C during the time when both spawning and rearing *S. panamense* was taking place. I am convinced, however, that the absolute key to anyone's success in spawning and rearing *S. panamense* is the water quality. It is essential that the water is not too deep, it must be clean and well filtered, free of any uneaten food or organic debris. Nowadays spawning of members of the family Loricariidae is fairly common. *S. panamense*, in my opinion, makes a good choice for the experienced aquarist who wants to try his or her hand at something different.

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Dr David Sands, *Catfishes of the World*, Volume 4, Dunure Publications, 1984, pages 128-131.
Hans A. Baensch and Dr Rüdiger Riehl, *Aquarium Atlas*, Volume 2, Tetra Press, 1993, WL 16821, pages 520-525.

right Youngsters sitting next to their proud father. It is difficult to believe such tiny fry will grow into such striking adults.

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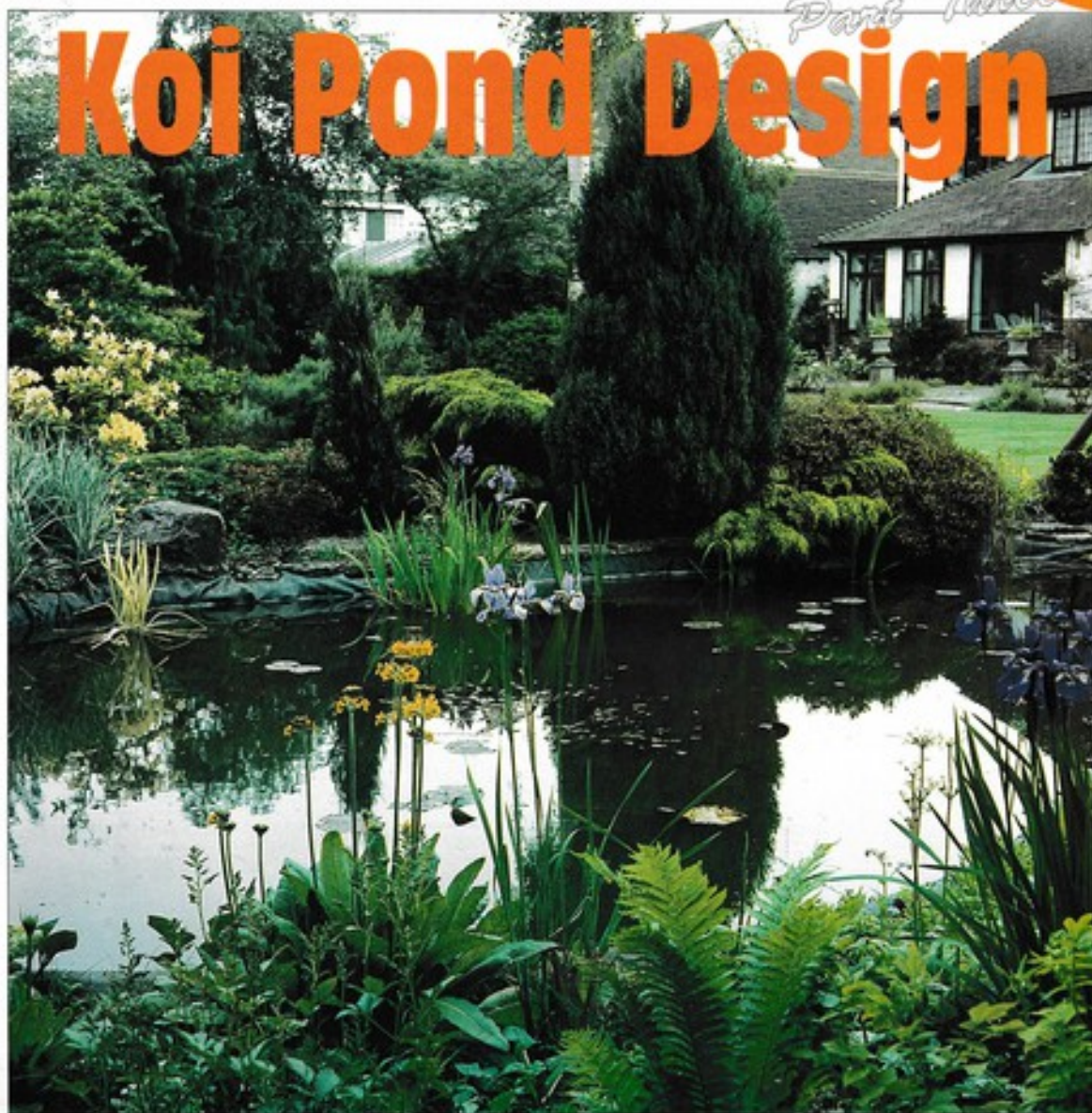
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PRICES CORRECT AT TIME OF GOING TO PRESS

PETER SKINNER of Black Knight continues his series on pond construction with a look at the range of materials ponds can be made from:

PHOTOGRAPHS: PETER SKINNER UNLESS OTHERWISE STATED

KOI



above Once established a liner pond like this will become the main focal point in any garden.

PHOTOGRAPH: GORDON WIGENS

The wide choice of construction materials for today's pond builder can be daunting for the amateur and the variety is expanding every year with new high-tech materials such as fibres, resins and plastics being introduced. Because the choice is so wide, it is vital that these materials are chosen with care because some are more suitable and cost effective than others.

Preformed ponds

Ready made pond mouldings have been available for many years now, but new manufacturing techniques are bringing the cost down and increasing the range of styles and sizes. The advantages of this type of pond construction methods are those of speed, simplicity, durability and

KOI POND DESIGN

a low risk of leakage.

In general though the main drawback is that there are very few of these that are suitable for accommodating Koi because most of them are too small. Some are as much as four feet deep which would normally be acceptable, except that if only a small area of the pond is this depth then the overall volume at depth to surface area ratio is not adequate. Unless a large proportion of the moulding is deeper than three feet, this type of pond is best avoided.

Liner ponds

Of all the various different methods of constructing a pond probably the most popular method of making the excavation watertight is to use a liner. In fact, for simplicity and speed of completion, this method takes some beating. To ensure that the liner lasts a long time, however, it is essential that it is installed properly.

Liners can be installed in both regular and irregular shaped ponds. If a flat sheet is used, the liner will only be able to accommodate the shape of the pond if it is folded or pleated which will be unsightly. These folds and pleats should point in the direction of water movement in order to minimise the amount of debris which will be trapped. This in turn will minimise the amount of interference with water flow.

Box liners

An alternative to using a flat sheet liner is having one tailor made to fit the pond (commonly known as box welded). This of course avoids the need to fold and pleat. The difficulty with this method is that the measurements supplied to the liner manufacturer have to be very accurate so that the liner fits exactly. If the liner is too large there will be wrinkles, if too small the liner will be under constant tension. The complexity of the pond design is also limited by the CAPABILITIES of the manufacturer. Most of these will only make simple shapes such as squares, rectangles and circles all with vertical sides.

Box welded liners appear to be very attractive at first but, in reality, the advantages can be negated by the requirement to make the pond walls vertical. To do this it will be necessary to support the walls with bricks, blocks or concrete. This in itself is expensive and, when the cost is added to that of the box welded liner, the total will be more than a block/render/coated pond but the quality of finish and durability may not compare favourably.

If you have a large dog, either avoid using a liner or ensure that the dog can never fall into the pond. This is because in its frantic attempts to escape it will shred the liner with its claws.

right Ready made pond mouldings have been available for many years now but new manufacturing techniques are bringing the cost down and increasing the range of styles and sizes. The advantages of this type of pond construction methods are those of speed, simplicity, durability and a low risk of leakage.

PHOTOGRAPH: GORDON WIGENS

Liner pond construction

The cheapest and quickest way of making a pond is to just dig a hole, put some underlay directly onto the dig, and then install the liner. Whilst being very quick and simple, this is only really practical for small and shallow ponds since the sides will have no support. A more practical method of construction should be chosen if the pond is to be deep, otherwise you are likely to experience subsidence at some time.

If a flat sheet liner is to be used the pond walls will have to be excavated with a slope of between 12 and 45° from the vertical. If the soil is very crumbly and is liable to collapse the latter angle will be necessary, but if the soil is firm any angle up to a minimum of 12° should be adequate to avoid collapse.

Ring beam

The top edge of the excavation will be the softest soil and it is at this point extra support is required. To provide this stiffening a concrete ring beam should be cast. If the pond is going to be dug by machine, it is better to install the ring beam once most of the earth has been removed, otherwise there is a risk that it could be broken or moved by the digger if a rock, root or any other strong object were to be protruding from under the ringbeam into the area being excavated.

The cross-sectional dimensions of the ring beam will be determined by the size of the pond; the larger the pond the greater the need for extra strength. The average would be about 10 inches (25cm) high and 12 inches (30cm) wide. The top of the ring beam needs to be set at a height which is suitable for the type of pond edging chosen. Once the earth has been excavated to accommodate the concrete, the face will need to be shuttered with plywood held in position by stakes driven into the earth.

Levels

Before the concrete is poured it is a good idea to place pegs in the side of the excavation at regular spacing around the perimeter which will indicate the maximum height to which the concrete should be poured. If any Venturis are to be installed it may be necessary to position pipes so that they will pass through the ring beam. Once the concrete has been



allowed to set, the shuttering can be removed and the earth walls trimmed to the final shape with a spade.

If the pond is going to be dug by hand, you have the opportunity to cast the ring beam in the ground before the hole is dug, thus alleviating the need for shuttering. The process is identical to that described above. The side of the trench facing the pond, however, needs to be dug very accurately and smoothly so that a reasonably smooth concrete face is offered to the inside of the pond once the excavation is complete. This will need to be improved by render later.

Pipework

When the ring beam is complete and the walls have been shaped accurately, this is the time to consider the installation of any pipework for drains or filter feeds. If either middle water feed(s) or a bottom drain(s) are going to be installed it will be necessary to do so without causing too much disturbance to the earth structure of the pond.

In the case of the bottom drain, a small hole will have to be made to accommodate the drain and then a trench will lead horizontally in the chosen direction until it meets the wall of the pond. A trench can be dug from outside the pond up to the outside edge of the ring beam. It is best to tunnel from both sides with a spade until the two trenches meet. When complete, the pipe can be installed and the trench backfilled and compacted. Make sure the tunnel and pond wall backfilling is particularly well compacted, otherwise subsidence could occur.

Preparation

When the drains are in place, the pond can be prepared to accept the liner. For convenience and speed, the whole excavation can be lined with proper underlay or an old carpet but this will only be successful if the earth is very smooth and there are no sharp stones. The pond can now be lined.

Rendering

An alternative to using underlay is to render the walls. First any deep irregularities should be packed with lean mix sharp sand and cement the day before, so that there are no craters or irregularities deeper than one inch (2.5cm) below finished level. Once this has been done the walls can be rendered with a mix of building sand and cement in the ratio of eight parts sand to one of cement. This rendering should average between 0.25 and 0.5 inches thick.

Two points must be observed here: the walls should be rendered soon after the excavation is complete, otherwise the earth will dry out and then the rendering will not stick as easily. It is not advisable to do the rendering in direct sun because if it dries too quickly the rendering will crack badly. If it is very sunny set up a tarpaulin overhead so that you have some shade.

The reason for using building sand instead of sharp sand for the rendering is that it is not required to have any structural strength as it is there merely for padding and shaping. If it does crack in future, it doesn't matter because it will not move anywhere nor will it offer a sharp edge to the liner. In fact this method is far superior to any underlay for protecting the liner.

Base

The base of the pond should now be covered with about two inches (5cm) to three inches (7.5cm) of building sand which should be compacted. Now check that the whole pond is free from sharp objects and the hole is ready to accept the liner.

Roots

One thing to be careful of though is the possible intrusion of roots. Whilst the above method of pond construction is very good it offers little



As soon as the pond has been filled to the brim, the edging can be completed. During this process it is likely that some building materials or earth may be dropped into the water, and there may be manufacturing residues from the pipework and liner which have passed into the water. Whilst most of these things may be harmless to your fish it is safer to drain the pond, clean it out and refill with fresh water.

KOI POND DESIGN

resistance to the force of roots. If you have some trees fairly close to the pond it is worth considering concrete or brick construction.

Lining

When you are ready to install the liner, it is better to have some extra help, particularly if the liner is large, because this will help minimise the need for dragging the liner into position which could result in damage to the membrane.

When the liner has been positioned roughly in the pond, a few gallons of warm water can be poured in. You can then get in the pond with bare feet to accurately position the liner. The warmth of the water will make the liner in the bottom more supple and it will be easier to remove any wrinkles, not to mention making the bare foot bit more bearable!

The base of the pond should be made as wrinkle-free as possible, and any pleats and folds should be made vertically around the sides. While this is being done, check again that there will be enough material to reach all sides of the pond comfortably and that the liner is placed tightly against the excavation at all points and is not under tension.

The water can now be removed and the connection made to the bottom drain. Filling can now begin but, as the level rises, it may be necessary to adjust the liner to minimise the wrinkles but also prevent it being placed under undue tension. When the level reaches one inch (2.5cm) below the wall connections they can be completed. This is necessary otherwise there is a chance of stretch marks radiating from these connections and the increased risk of the seal in the fitting being breached.

As soon as the pond has been filled to the brim, the edging can be completed. During this process it is likely that some building materials

or earth may be dropped into the water, and there may be manufacturing residues from the pipework and liner which have passed into the water. Whilst most of these things may be harmless to your fish, it is safer to drain the pond, clean it out and re-fill with fresh water.

If properly installed a good liner will last for many years, so it is worth taking special care whilst installing it and then look after it. If you ever need to walk on the liner then bare feet are a must. Be very careful when lowering objects such as submersible pumps into the water because some are quite heavy and have sharp edges.

When the time comes to choose a liner be very careful because the difference in price, quality, and guarantee periods is considerable. The very cheap liners are best avoided, unless you are setting up a temporary pond, because they will have a short lifespan. Only a few years ago butyl rubber liners were the only quality liners available. Modern technology, however, is producing materials that rival butyl in strength and longevity such as stabilised PVC, low density polyethylene, composite and other forms of rubber. Also remember that the thickest liner is not necessarily the strongest, also the thicker it is the more difficult it will be to lose the wrinkles. Shop around!

To calculate the size of liner you need, the easiest way is to get a long tape measure and lay it from the top of the pond at one edge, down the side, along the bottom, and up the other side. Read the measurement and add at least two feet. If you do this at the longest point of the pond and at the widest point you will have enough liner to line the pond and have some left over at the perimeter so that the edge can be trapped under rocks or coping stones.

When you are ready to install the liner, it is better to have some extra help, particularly if the liner is large, because this will help minimise the need for dragging the liner into position which could result in damage to the membrane.



KOI

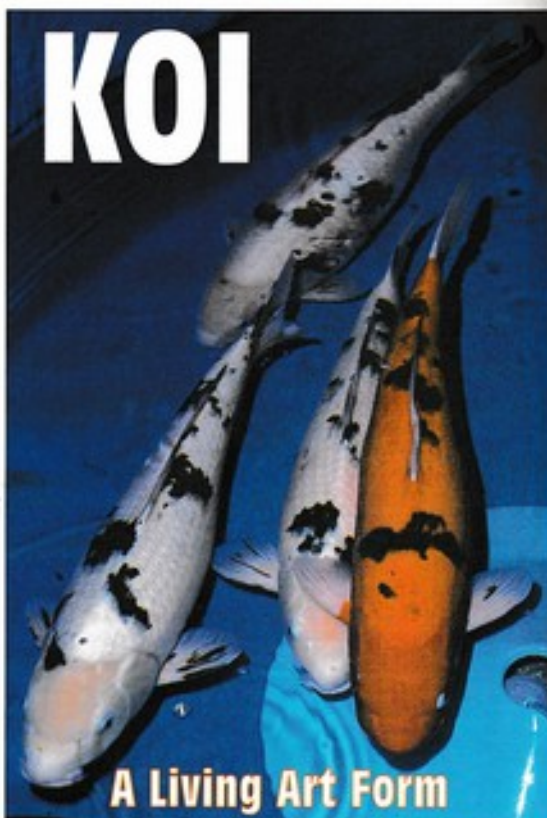
Koi judge **KATE MCGILL** continues her series on Koi Appreciation:

PHOTOGRAPH: A. & K. MCGILL

Although there are numerous guidelines for general comparative appreciation of Koi in structured terms, for example, desirable shape or conformation of the Koi, the quality of its skin, colour and pattern, the way in which the Koi swims, its alertness and grace, it is also valuable, and fascinating, to look at Koi as individuals. They are living art forms and, like any art, reveal more to the observer with time and study. This series will look at many different Koi, the "oddities" as well as the classics, hopefully bringing to the reader's attention specific points of interest and beauty. They may or may not appeal! Koi appreciation, as with any form of art, is a highly subjective study.

For our third Koi in this series, we present an interesting doitsu (or German scaled) Aka (red) Bekko, photographed alongside the more usually seen fully scaled Shiro (white) Bekko for comparison. Doitsu Koi have single rows of scales running along each lateral line and on either side of the dorsal fin, or may have no scales at all. Bekko are Koi with two colours, black (sumi) appearing on a base colour which may be white, red or yellow (Ki Bekko). Sumi in this variety is similar to that of Sanke (white Koi with red and black markings), in that it is generally confined to the back of the Koi, above the lateral line and rarely appears on the head. Fintage shows either no sumi, or stripes. Our Aka Bekko has a single, small stripe in one pectoral fin. Appearance of sumi in the fintage is thought to endorse stability of sumi on the body of both Bekko and Sanke.

Bekko are Koi which currently seem to be in decline. Few are seen at shows in the UK and they were only seen in small numbers at the 1998 All Japan show, where this photograph was taken. Bekko generally create a very different, lighter impression than the more striking and currently very popular Utsurimono which share the same coloration but with a very different style and quality. A good quality Bekko has a clear head, the colour of which should match that of the body as closely as



possible and neat, dense sumi markings in a balanced pattern along the Koi. On fully scaled modern Bekko, the leading edge of the sumi usually shows a deep blue insertion (sashi) which provides an additional three dimensional beauty to the pattern, clearly demonstrated by the Shiro Bekko in the photograph. The trailing edge of all sumi markings should be sharp (kiwa).

Comparing the doitsu Aka Bekko to the fully scaled Shiro Bekko reveals the difference that loss of that three dimensional element (provided by the scale insertion effect) can make to the impression which the Koi gives. The large saddle shaped sumi marking across the dorsal area, although attractive, lacks depth in comparison to those further along the back of the Koi which do involve scales. Additionally, the very deeply red head, in comparison to the lighter skin of the body, conveys a rather heavy impression and a lack of expressiveness when compared to the delicate appeal of a clean white head with the lovely light blue eyes characteristic to Bekko. Aka Bekko, particularly if they are of high quality, are interesting Koi and can be appreciated for their scarcity, but it seems likely that this particular combination of colour and pattern will rarely achieve the delicate elegance of the Shiro Bekko.

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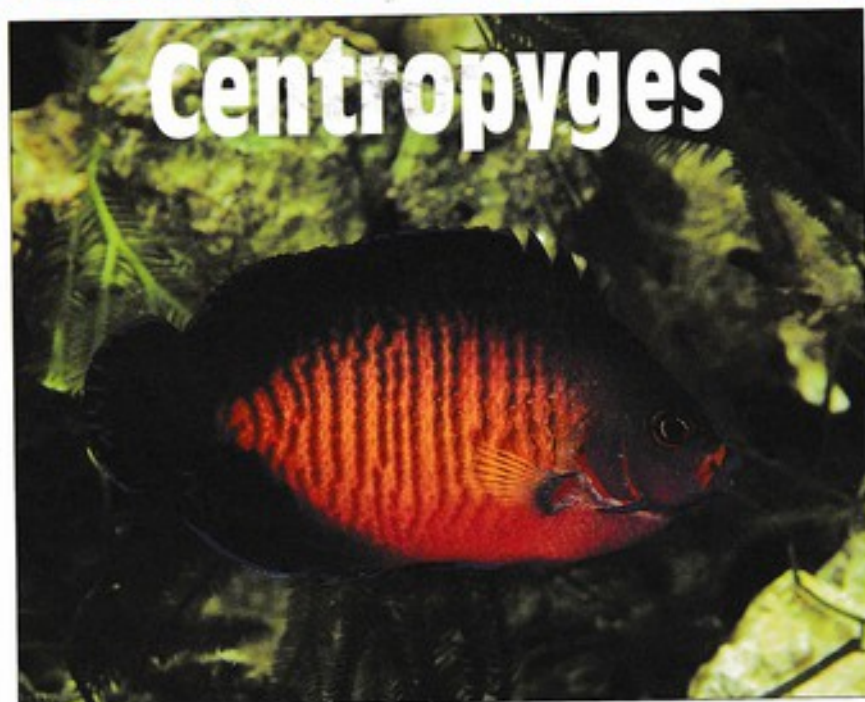
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This month **DAVE GARRATT** focuses on some of the most eye-catching marine fish in the hobby — Dwarf Angels:

PHOTOGRAPHS: MAX GIBBS

DWARF ANGELS



The Dwarf Angels along with their larger Angel counterparts belong to the Pomacanthidae Family, a Family that includes some of the most eye catching fish seen within the hobby. The sheer size of the larger Angels make them perhaps the most stunning of all marine fish, as the looks of an Emperor, Queen, Blue-Face or Majestic Angel will readily confirm. However, their much smaller cousins from the *Centropyge* genus give them a run for their money whilst having a major advantage when it comes to their hardness in captivity.

The *Centropyges* have a wide distribution throughout shallow coral reefs in tropical and temperate waters. Many species come from Indo-Pacific regions but species are regularly seen from many other locations, such as Central Pacific, Western Atlantic, Eastern Atlantic, Hawaii, Great Barrier Reef and the East African seaboard

Angel or Butterfly?

Outward appearances show much similarity between the Angels and the Butterflies (*Chaetodontidae* Family). Whilst Angelfish tend to have thick set bodies the most readily detectable distinction is the spine found on the gill cover of all Angelfish.

Natural behaviour

Centropyges, even in their natural habitat rarely exceed six inches and remain considerably smaller in captivity at approximately four inches. They are often found as pairs or in small groups with many pairs happy to share the same area of reef. These active fish constantly browse the reef, taking worms, crustaceans, sponges and algae, but despite this constant activity they always stay close to a bolt-hole.

Aquarium behaviour

This is where the Dwarf Angels score consistently when compared with their larger and altogether more difficult relatives. In many aspects, e.g., diet, size, compatibility and breeding potential, they represent a much better prospect than a large Angel does. They retain their active browsing nature in captivity and, coupled with their own claim to

above Coral Beauty's (*C. bispinosus*) are a shy species which can be particularly hardy and long lived in captivity.

eye catching good looks, and small manageable size, they present a graceful and colourful addition to any aquarium. The constant activity does mean, however, that despite their small size they will require reasonably sized living quarters.

They settle into their captive environment quickly and are not too demanding in their dietary requirements, readily accepting commercially available food. They will thrive on a varied diet of frozen and live brineshrimp, mysis, meat based foods (mussel, squid etc.) specialised "Angel" based marine diets and marine flake, supplemented with blanched lettuce and a good algae growth in their tank. This is in stark contrast to the larger Angels, many of which suffer through the want of a natural diet that is high in sponges and obviously unattainable in captivity.

Compatibility

The Dwarf Angels give very few compatibility problems and mated pairs will share a tank successfully, however they are not quite so accommodating when asked to share with other Dwarf Angels or fish of a similar size and/or colour. They are fine with larger Angels, and peaceful with other non-related or dissimilar fish. They are perfectly capable of looking after themselves should the need arise and it is this trait that makes them unsuitable for mixing with their own kind as the subsequent fighting would be brutal, prolonged and probably fatal. Generally they leave invertebrates in peace thus making them excellent additions to a mixed aquarium. They will constantly browse on the rock-work but will rarely bother coral polyps. However, as with most marine fish, they do not read their own press, occasionally one will become a nuisance and develop a liking for soft juicy coral polyps.

Reproduction

The Dwarf Angels spawn at dusk producing free floating or pelagic eggs. Sexual differences are often only discernible to the experienced eye but they can be sexed and mature pairs are occasionally seen for sale within the hobby. Many

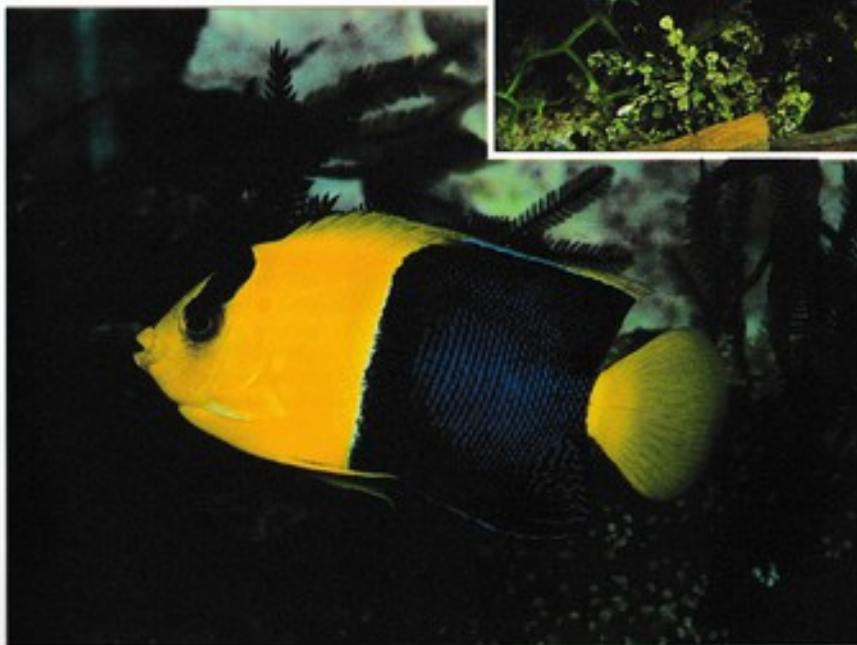
species have been spawned in captivity although it is only commercial concerns that have successfully raised the fry.

Hardiness in captivity

Providing water quality is high, and a varied diet given, then most species will remain disease free and develop into long lived inhabitants in a fish community or a mixed fish/invertebrate community. Once a



above Flame Angels (*C. ionculus*) have a hefty price tag but this does not stop them from topping the shopping list of many hobbyists looking for a Dwarf Angel.



left Bicolor or Oriole Angels (*C. bicolor*) are a truly beautiful Pacific species which is usually a well behaved fish although concerns have been raised on two counts: its occasional unsavoury habit of pecking at coral polyps and its less than hardy nature when compared to other members of the genus.

DWARF ANGELS



Lemonpeel Angels (*C. flavissimus*) need a diet predominantly algae based and are certainly not to be recommended for the beginner.

beginner has gained a little experience they should present no real problems although a mature tank with a diversity of micro-organisms and algae will be of enormous benefit to them. They will present even the most experienced aquarist with a very tough challenge if the possibility of captive breeding is considered.

Confusion reigns

The references quoted within this article illustrate the confusion that can occur when attempting to identify members of the *Centropyge* genus. The confusion is perhaps not surprising when one considers that colour variations are common within a single species, cross breeding with resultant hybrids occurs, the same common names have often been used for different species. The Coral Beauty species highlights this conundrum very well. Steene's book¹ shows no less than six colour variations for this species and Dr Moyer² mentions its "highly variable" nature and its confusion with other species. Geographical location plays a major role in the colour variations and Dr Moyer queries possible

preconceptions with supposedly endemic species. Finally, Dr Allen³ illustrates yet more confusion with photographs of hybrids resulting from the cross breeding of *C. vroliki* x *C. flavissimus* and *C. eibli* x *C. flavissimus*.

Available species

As a general guide, unless stated differently, the following species reach about five inches in their natural environment and are restricted to three to four inches in captivity. Diet, hardness and compatibility is also as mentioned in the main body of the text.

Centropyge ocellifera (African Pygmy or Fireball Angel)

A very small species reaching only three inches (rarely over two inches in captivity) in its natural habitat off the East African coast and the Indian Ocean where it is found in small groups. It is generally a very well behaved fish being ideally suited for the invertebrate aquarium. The species is very similar to a species found in the West Indies, *C. aurantonotus*, but this species is rarely found in the aquarium trade.

C. argi (Cherub or Purple Fireball Angel)

Another very small species barely reaching two inches in captivity and three inches in its natural state. Originally thought to be a rare species it was not named until 1951 but it is now known to be a deep-water fish found at depths of up to 100 feet. Another species that is generally well behaved, including when sharing a tank with invertebrates.

C. bicolor (Bicolor angel)

A truly beautiful Pacific species that ranges from Indonesia through the Great Barrier Reef to the Western Pacific but not as far as Hawaii. It is usually a well behaved fish although concerns have been raised on two counts: its occasional unsavoury habit of pecking at coral polyps and its less than hardy nature when compared to other members of the genus.

C. nigricans (Coral Beauty)

This shy species has a wide distribution throughout the Indo-Pacific region. If provided with plenty of safe retreats and a reasonably docile set of tank mates they can be particularly hardy and long lived.

C. eibli (Eibli's Angel)

According to Steene another relatively "new" Angel not being discovered until 1963 and then only from the Maldives. It was the 1970s before it was found anywhere else, it is now known throughout other Indo-Pacific locations. This is another species that can reward the dedicated hobbyist with a long tank life.

C. flavissimus (Lemonpeel Angel)

The diet of this Indo-Pacific species is predominantly algae based and perhaps it is the inability to adequately replicate this diet in the aquarium that has led to the fish being regarded as a difficult species. Certainly not to be recommended for the beginner.

C. fisheri (Fisher's Angel)

Although the name has been used for species from waters as far afield as Japan and Africa, the true *C. fisheri* is supposedly restricted to Hawaii. Dr Moyer uses this species when examining the question of preconceived notions when regarding any species as endemic to a region. The article has many references to the difficulty of Angel identification.

C. heraldi (Herald's Angel)

A species that is very similar to the Lemon peel, sharing the basic

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Eibli's Angel (*C. eibli*) is another "new" Angel not being discovered until 1983. This is another species that can reward the dedicated hobbyist with a long tank life.



yellow coloration but lacking the blue markings around the eye, lower lip and gill cover. The species hails from the same regions and also prefers the same algae based diet as the Lemon peel.

C. joviculus (Flame Angel)

The hefty price tag does not stop the Flame Angel from topping the shopping list of many hobbyists looking for a Dwarf Angel. Its vivid orange/red colour, contrasted with dark bars, lead to its consideration as the gem of the Centropyges. A few years ago you would have come across differing views as to the hardiness of this species but, today it is generally agreed that, given excellent water quality, the species is as hardy as any of the Dwarf Angels. The fish is found in small numbers throughout the Pacific with many specimens being imported from Hawaii.

C. potteri (Potter's Angel)

An important difference with this endemic Hawaiian species is its reputation as a difficult fish to keep, thanks mainly to a demanding diet. With so much choice within the Centropyges it may be wise to avoid this species.

C. resplendens (Resplendent Angel)

A small, peaceful Angel that will only reach two inches in captivity. The species has a restricted distribution being found exclusively around the Ascension Isles in the Central Atlantic. A well behaved species, it will even tolerate its own species and makes an excellent choice for the reef tank enthusiast.

C. sicben (Key Hole Angel)

A species that is not seen with any regularity in dealers' tanks and rarely covered by the usual literature sources. Personally I have no experience of this species, nor do I know anyone who has. Described by Steene as the largest

species of the *Centropyge* genus, reaching seven inches in its natural habitat, i.e., waters from the Philippines to Australia.

C. vrolikii (Pearl Scale Angel)

A Pacific species that, on first glance, resembles *C. eibli* but lacks the stripes of that species. The fact that it cannot match the subtle beauty of the Eibli's means that despite its hardy nature and suitability for captivity it is not a particularly popular species.

Conclusion

Dwarf Angels represent an excellent choice for hobbyists at all levels. They are hardy enough for anyone with a mature tank who is just graduating from the beginner stage, yet they also offer the challenge of captive breeding to the most advanced aquarist. They are generally peaceable and offer few compatibility problems in fish only communities, fish/invertebrate communities, or reef setups. They offer constant interest, striking

coloration and the possibility of a long-lived inhabitant of your tank.

REFERENCES

1. *Butterfly and Angelfish of the World*, Volume 1, Roger C. Steene. Published by Mergus, 1977.
2. *On the Blinding Nature of Experience*, Dr Jack T. Moyer, *Tropical Fish Hobbyist*, March 1989.
3. *Butterfly and Angelfish of the World*, Volume 2, Dr Gerald R. Allen. Published by Mergus, 1979.

Despite their age references 1 and 3 are still good general references for all Angelfish and Butterflies.

Key Hole Angels (*C. sicben*) is not seen with any regularity in dealers' tanks and rarely covered by the usual literature sources. It is described by Steene as the largest species of the *Centropyge* genus, reaching seven inches in its natural habitat.



Stepping Stones ...

to Success

PHOTOGRAPH: KEITH LAMBERT

Q What is the correct temperature for my fish?

A Freshwater tropicals, 70-80°F; Coldwater, 55-70°F; Marines, 75-79°F.

Again some delicate species have very specific requirements, so read up on them before you purchase.

Q Do I really need to filter my pond?

A Fish produce wastes in the form of ammonia which builds up in the water and could eventually reach poisonous levels. In a natural pond the number of fish will be fairly small so naturally occurring bacteria can break the ammonia down into nitrites and then different species of bacteria break that somewhat less toxic waste product down to nitrates. This pollutant is then used by plants as a food. This is called the nitrogen cycle and goes on in every aquatic environment.

The problem with relying on this natural system is that we tend to stock far more fish in a pond than there would be in a natural environment. They are also fed a great deal more. This means there are simply not enough bacteria living in the pond to cope with all the waste matter.

To overcome this problem you need to install a filter of some sort. These rely on three different processes to work: biological, chemical, and mechanical. Most filters incorporate several of these different methods of filtration but the most common and useful to a pond keeper is biological.

This form of filtration makes use of the natural nitrogen cycle but gives it a helping hand by providing ideal conditions for the nitrifying bacteria to live in. That means passing oxygenated pond water over something with a very large surface area. Special sponge pads are commonest, but brushes, balls, large pea gravel, etc., have been

employed for this purpose. As the water passes over these surfaces the bacteria living on them will break down the ammonia and nitrites.

Q How many fish can I keep?

A For freshwater aquaria it is safest to work on surface area rather than volume. We recommend 12 sq inches of surface area per one inch of adult fish. This means you must take into account how big your fish will grow to, not just how big they are when you buy them.

Marines require a different method of working out the number of fish you can house in an aquarium. You need to work on volume here and one inch of fish to every six gallons of water is a safe stocking level for a reef style aquarium. Fish only tanks can house more fish, but the exact level will depend on how good your filtration system is. Again you need to find out how big your fish grow to rather than just measure how big they are now.

Ponds are usually calculated on volume and for a filtered pond you can house an absolute maximum of 100 inches of fish per 1,000 gallons. It is vital to remember this only works when you calculate it on the final size of your fish — not the current size. A six inch Koi will grow to 24 inches long and increase its weight 50-fold. This can happen very quickly and often leads to ponds becoming over stocked with fatal results.

Q Why can't I add fish directly to a new aquarium or pond?

A When a new aquarium or pond is set up you should test for ammonia and nitrite every day. Initially you will see ammonia levels rise and then start to fall. Then nitrite levels will rise and fall. After this you can be sure your biological filters have developed a healthy colony of bacteria which will break down fish

wastes.

During this initial period the aquarium or pond should not house any fish. Once these two poisons have peaked and dropped back to safe levels again you can start putting a few fish into your aquarium or pond. No more than four to start with followed by a slow build up in numbers over a period of months. This way you will avoid sudden spikes in ammonia or nitrite levels which will harm your fish.

Once your aquarium has become established it is still important to check for ammonia and nitrite every two weeks or whenever the fish look ill. Most health problems can be traced back to poor water quality so it makes sense to look at this first.

Nitrates will build up over a period of time and will also need monitoring. In some areas of the UK aquarists have been reporting high nitrate levels in their tapwater. If this is the case in your area you will need to find a way of reducing these before you use tapwater for topping up. A vegetable filter works very well given enough time, alternatively you can buy a water purifier specifically designed to remove nitrates.

Q What is the correct pH range for my fish?

A Freshwater, pH 6.5-8; Marine, pH 8.2-8.4.

However, certain delicate fish and invertebrates have specific requirements, so check before you buy any animal.

Q Water changes — how much and how often?

A In freshwater aquaria you should change 10 to 20 per cent of the water weekly. If you live in a water area where chloramine is added to your tap water it is essential to add a water conditioner to the fresh water before use.

The ideal for marines is 20 per cent every two weeks. This will

reduce nitrates to a safe level and replenish the vital minerals and trace elements. Never change larger volumes of water than this, however, as large water changes in a marine aquarium may cause osmotic shock or other problems which will harm fish or invertebrates.

Pond fish also benefit from regular water changes but here it is rarely practical to change large volumes on a regular basis. Even so regular water changes should be carried out and ammonia, nitrite and nitrate levels monitored regularly or whenever the fish look in distress. With enough growing plants in the pond nitrate should be reduced naturally and providing your pond is not overstocked or over fed, ammonia and nitrite should always read zero in a mature set-up.

Q How should I light my aquarium?

A Correct lighting is vital for plants, corals and other invertebrates. All too often beginners buy set-ups which are not designed to do what they want to. Make sure you have lighting designed for plant growing and ask your local aquarium shop for advice on marines.

Q Are live plants essential in a freshwater aquarium?

A The simple answer is no, but they are beneficial and we strongly recommend you grow some in all but exceptional circumstances. The reason for this is that they remove nitrate from the water. This pollutant is the end product of normal aerobic filtration and whilst at low levels it is unlikely to kill your fish, it will still stress them which can lead to health problems.

Two other important aspects to consider are: (a) that they provide cover for your fish and create a more natural environment; (b) reduce the likelihood of algae becoming a problem.

Green water and Blanketweed are two of the most hated problems pondkeepers face. ANN TELFORD of AllClear Water Purifiers explains what they are:

PHOTOGRAPH: DAVE BEVAN

Green Water and Blanketweed

Part One

Admit to some people that your pond is full of green water and you could be faced with looks of sympathy or horror. Why? Sometimes green water is a good thing!

In Japan some Koi keepers rent mud ponds to "finish" the Koi they want to enter into competitions. The mud pools are usually full of green water, as it is highly nutritious. In this "green" environment you can find that Koi tend to grow faster and their colours develop better. Certainly we saw this happening when our pond mark "5" went through the normal pea green stage of new ponds.

Green water can also help prevent the fish from getting sunburnt. A plus to many people is that if you have green water then you should not get blanketweed. I say "should not" because in paler green water you may get some blanketweed as well.

But there are some downsides too. A major aesthetic problem is that you can't see the fish unless they come to the surface. There is the additional risk that it is far harder to see if any health problems are developing. You also have to accept that the pond may look a bit mucky. You certainly won't have the gin clear water that many pond owners take pride in displaying.

Green water can also cause some water quality problems. But to understand those it's important to know what causes "green" water in the first place. Water is home to numerous types of algae, which can probably be described as forms of aquatic "plants".

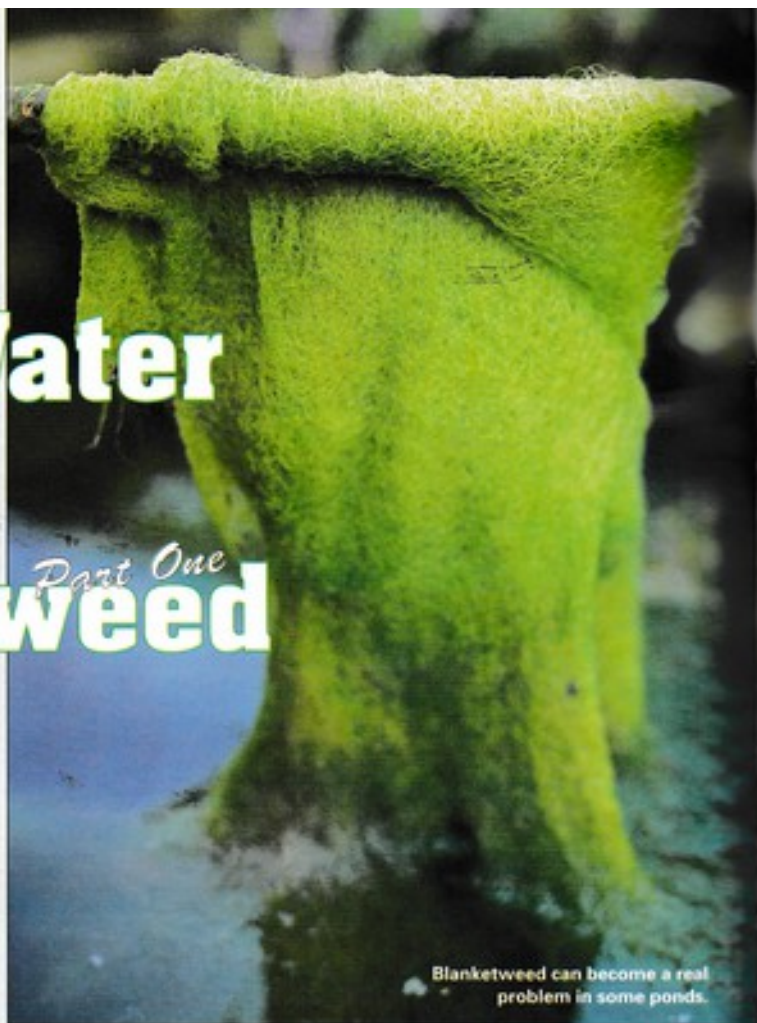
Each of the individual algae, which cause green water, is made up of just one cell. In that cell they have a sac (chromatophore) containing chlorophyll. Chlorophyll is the stuff that causes plants to have green leaves, etc. So there are all these minute "plants" floating around in the water and the chlorophyll sac inside them makes the water look green.

To take this one stage further, some algae have more than one cell, i.e., they are multicellular. The cells are joined end to end to form long, continuous threads. These "threads" are sometimes called "filaments". Thus we have filamentous algae. Pond keepers use one generic name for all the different types of filamentous algae, which is "blanketweed".

Some similar characteristics

Algae can cause various problems in fishponds, particularly with pH. Whether "plants" like to be below or above water they have some similar characteristics. One of these characteristics is they release carbon dioxide when it is dark. During the day, with the help of the energy from sunlight, the algae "use up" some of the carbon dioxide in the water as part of the process of obtaining food.

pH is a measurement of hydrogen ions, it is also an expression of free



Blanketweed can become a real problem in some ponds.

floating carbon dioxide. On this basis, the more carbon dioxide in the pond water, the higher the pH value is likely to be. Conversely, as the carbon dioxide is lowered in the water, so the pH drops back down. This explains why some ponds with green water or a lot of blanketweed, tend to have pH fluctuations with the pH rise occurring in the pondwater once it is dark.

We can summarise some of the problems of green water for fish as pH fluctuations and the addition of carbon dioxide to the water at night. Some of the worse problems are seen when the algae, just like other plants, blooms.

Importance of oxygenation

If you want to have a green water pond then it is even more important than normal to oxygenate the pond heavily in hot weather and particularly at night. During hot, oppressive or thundery weather the worse thing you can do for your fish is to turn off the venturi, waterfall or fountain so it is quieter for your neighbours to sleep.

A much better way to cultivate good relations with your neighbours would be to invite them to a barbecue, buy them a pint or a bottle of plonk — or give them some chocolates. But keep your oxygenating system going 24 hours a day for your fish!

Green water (and blanketweed) can be controlled using a number of natural and different methods. As I am aware that it is possible to disrupt the alkalinity and the pH of some pond waters relatively easily, I feel it is preferable and "fish safer" to use natural methods whenever possible.

• See next month's issue for the natural controls for green water and blanketweed.

Selecting Pond Pumps

Selecting a water pump for your garden pond can be something of a nightmare these days. There are just so many to choose from and much of the package labelling is confusing with various different figures quoted. So how do you select a pump for your pond?

First of all you must have a clear idea of exactly what this piece of equipment is going to do. Do you want it to operate a fountain, waterfall, or filter system? Each use requires a pump to do a different job.

A pump for your fountain

There are lots of systems on the market specifically designed to pump water for a fountain. Many of these are low cost and have fairly slow flow rates. For a small fountain these will be perfectly adequate. Buying larger pumps with a much faster flow rate will cost more to run and will shoot water higher into the air. You might think this looks great but on a windy day it is perfectly possible to almost empty a small pond in a few hours. In general stick with the smaller ones unless you are buying a pump to do more than one job.

A pump for your waterfall

Here we need to look at the "maximum head". This is the height a pump can push water up to. If the top of your waterfall is going to be six feet above the pond's water level then you are going to need a pump with at least that maximum head. You also need to check the flow rate at that height. Most pumps make a big noise about their flow rates at zero head but that figure will drop off dramatically when it has to pump "uphill". For example, a pump quoted at 528 gallons per hour will fall to a mere dribble at a six foot head. Since a waterfall six inches in width requires a flow rate of about 300 gallons per hour, you would either have to step up in pump size to one designed to shift 660 gallons at zero head, or drop your waterfall height to about two feet and use the original pump.

Since pumps with a higher maximum head tend to use more power, if running costs are going to be a concern, then it may make

more sense to reduce your waterfall's height and opt for a smaller pump. You also need to check each manufacturer's figures for flow rate at a specific head, as this will differ according to the pump's design.

A pump for your filter

Pond filters can be divided into two types — gravity and pump fed filter systems. In a gravity fed system the pump has to pull clean water through the filter, whilst in a pump fed system it has to push dirty water through the filter.

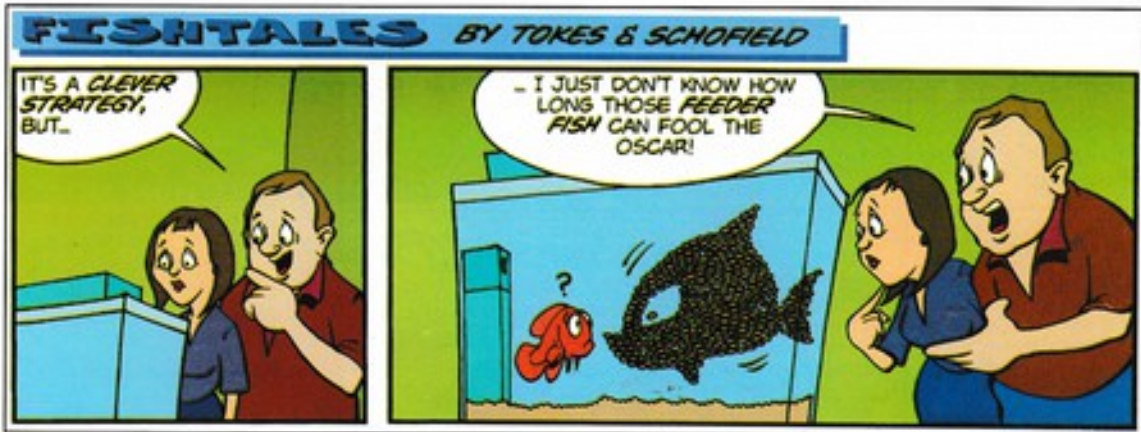
For a pump fed filter system to work properly it must be run by a pump capable of dealing with solids. (Koi can produce solid waste up to 1cm long). It should be situated at the deepest part of your pond. An alternative to this is to fit a pre-filter (most pumps have one as standard) to make sure only very fine particles are taken into the pump. These pre-filters tend to be relatively small and will clog quickly. This causes the flow rate to drop dramatically and affect how efficient your filter will be. To prevent this happening you have to clean your pre-filter frequently.

Whether pump or gravity fed, you should aim for a flow rate through your filter of about half your pond's volume every hour. Make sure you take the head into account and over estimate your pond volume rather than under estimate it.

What if I want to run a waterfall, filter and fountain?

Many people like to return the filtered water via a waterfall. This is where mistakes can occur when working out the head. You need to check the very highest point water needs to be pumped to. This is usually the start of your waterfall which may be several feet higher than the filter.

Another easy mistake to make is not taking into account the water flow required for your waterfall. In a 500 gallon pond your flow through the filter will need to be 250 gallons per hour but if you have a six inch wide waterfall you will need to have a flow through of 300 gallons for it to look effective. The extra flow through your



right Waterfalls like this require 300 gallons of water per hour for every six inches of width.

below These pre-filters tend to be relatively small and will clog quickly. This causes the flow rate to drop dramatically and affect how efficient your filter will be. To prevent this happening you have to clean your pre-filter frequently.

PHOTOGRAPHS: DAVE BEVAN



filter will do no harm, and you will have enough slack in the system so that when the pre-filter starts to clog it will show first in your waterfall rather than in the water quality dropping.

Fountains, etc., will also add to the flow rate you need from your pump. In general you should add a third to your flow requirement for each fountain and ornament.

A few other pointers to look out for

It is a legal requirement for manufacturers to display the power rating for electrical equipment. This is done so that you can make an informed choice about which piece of equipment to buy. The cheapest equipment, which seems to be a real bargain, is often a power guzzler which will cost you dearly in the long term.

Guarantees are many and various! Check exactly what they cover and for how long.



Pumps designed for other uses are sometimes suggested as suitable alternatives to those specifically designed for pond use. Central heating circulators are a case in point. These may actually work very well but if salt or any other chemical is added to a pond there is a grave risk of metal contamination with cast iron bodied units. Also the impeller can only handle perfectly clean water — even a tiny piece of solid matter can clog the system. If this does happen it can take ages to dismantle the system and put it back together again after cleaning.

Overall it makes far more sense to buy a unit specifically designed to do the job. It may cost more to start with but your fishes' very lives depend on it.

THE WHO'S WHO OF POND PUMP MANUFACTURERS

Range

Manufacturer

AMPHIBIOUS	Interpet/Blagdon, Vincent Lane, Dorking, Surrey, RH4 3YX. Tel: 01306 881033
AQUAMAX	Oase (UK) Ltd., Oase House, 2 North Way, Walworth Industrial Estate, Andover, Hampshire, SP10 5AZ. Tel: 01264 333225
AQUARIUS	Oase (UK) Ltd., Oase House, 2 North Way, Walworth Industrial Estate, Andover, Hampshire, SP10 5AZ. Tel: 01264 333225
CASCADE	Hazelock Cypria, Waterslade House, Thame Road, Haddenham, Aylesbury, Buckinghamshire, HP17 8JD. Tel: 01844 292002
FISH MATE	Petmore, Lyon Road, Hershon, Surrey, KT12 3PU. Tel: 01932 700001
HIDRAPOND	Interpet/Blagdon, Vincent Lane, Dorking, Surrey, RH4 3YX. Tel: 01306 881033
IRS	Interpet/Blagdon, Vincent Lane, Dorking, Surrey, RH4 3YX. Tel: 01306 881033
LAGUNA	Hagen, California Drive, Whitwood Industrial Estate, Castleford, WF10 5QH. Tel: 01977 556622
NAILLUS	Oase (UK) Ltd., Oase House, 2 North Way, Walworth Industrial Estate, Andover, Hampshire, SP10 5AZ. Tel: 01264 333225
PRIMA	Hazelock Cypria, Waterslade House, Thame Road, Haddenham, Aylesbury, Buckinghamshire, HP17 8JD. Tel: 01844 292002
RENA FLOW	Rena, Bury Farm, Pednor Road, Chesham, Buckinghamshire, HP5 2JJ. Tel: 01494 786759
TETRAPOND	Tetra, Mitchell House, Southampton Road, Eastleigh, Hampshire, SO50 9XD. Tel: 01703 620500
TITAN	Hazelock Cypria, Waterslade House, Thame Road, Haddenham, Aylesbury, Buckinghamshire, HP17 8JD. Tel: 01844 292002

The YOUNG AQUARIST

Give your fish a good start by following the simple rules:

- Plenty of swimming room
- Small regular feeds including live foods
- Frequent water changes
- Cull



Mosquito Fish, *Gambusia holbrooki*. This is a rare black speckled female. Black speckled males are common in Florida but coloured females are very unusual.

PHOTOGRAPH: DEREK LAMBERT

In our early days of fishkeeping we kept some livebearing fish in our first community tank. These were cultivated Platies, delightful, peaceful community fish and showing beautiful strong coloration. Platies are very easy to keep but one of the drawbacks with the cultivated varieties is that they breed far too easily. Breeding fish gives much pleasure to aquarists. Indeed, for my son and I the most important and pleasurable aspect of keeping fish has always been in the breeding and raising of our own young fish. Why should a Platy breeding in our first community tank be a drawback then? The reason is that our first experience taught us that there is more to raising fry than you would think.

In the early hours of one Sunday morning our female Platy gave birth in our two foot community tank — it was a wonderful experience to watch the birth, but help! The babies were being born where all the other 'batty' fish, including their mother, would gobble them up wouldn't they. Oh dear! What could we do? We decided we would have to catch the babies out and put them in a container which we could float in the main tank and this we promptly did.

There were about 25 babies in that little container, tiny replicas of their parents without the deep colour. They were hungry from birth, for they had no yolk sac to keep them going for a day or two. We fed them on powdered fry food, they seemed to be hungry all the time and we were unsure how much we should give them (remember the little and often rule). Well, we fed them too much, after

all 25 babies needed a lot of feeding didn't they? The water became cloudy, we had to change it often — too often. Some died, making the container a little less crowded. They grew very slowly and when the few survivors were released into the main tank they were poor specimens of their kind with nothing like the size and colour of their parents and definitely not suitable as parents for future generations.

What then is the solution to this problem? If you do not have another tank in which to raise the young, leave them alone — some will be eaten including the sickly ones but some robust ones may survive in a heavily planted tank — it's better this way than to produce poor stock.

If you wish to save the fry this is what you should do

- Give them plenty of room. This means that they should have a tank of their own, 18 x 10 x 10 inches to start with for 25 baby Platies.
- Feed them small amounts several times a day. The best food for newly born livebearers is Brine shrimp. Unfortunately this is not easily obtainable at the moment and is very expensive. Micro worm is a good substitute — this is easily cultured and cheap (see Classified pages for starter cultures). Sieved Daphnia can also be used. Dried fry food should be fed sparingly but be careful not to overfeed. Little and often is the golden rule.

- When the fry are a few days old carry out a 10 per cent water change twice a week — increasing to 20 per cent a week as they grow.

- Cull. Look for deformed and weak fish and remove them from the colony. This is the hard part of breeding fish but if you want good, healthy stock culling is essential.

- When your young are growing well find new homes for them. If they are well-grown, robust fish your local aquarium shop may take them off your hands but don't expect much for them. Shops may offer you food or goods in return for the fish, but the fish you offer have to be of good quality to be accepted.

N.B.: A female will be much happier in a heavily planted tank rather than a plastic breeding trap. The 18 x 10 x 10 inch growing on tank could be used as your breeding tank. When the mother has dropped all her fry return her to the community tank. I will deal with this aspect of breeding in next month's column.

If the breeding tank is heavily planted remove much of the plant so that you can look closely at the fry. Close observation is essential.

ASP contains many articles on the breeding of fish and sometimes it seems so easy when you read them but it isn't always easy. If you would like to try rearing your own young fish, go ahead for it's fascinating.

Good luck!

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*

HELPING YOUNG FISHKEEPERS BECOME YOUNG AQUARISTS... HELPING YOUNG FISHKEEPERS BECOME YOUNG AQUARISTS

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Ask A&P

Your queries solved here ... with the featured problem winning a prize from ALGARDE

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STAR LETTER - GENERAL

FLUIDISED BED FILTERS

Q I have recently been looking at different filtration systems for my tropical tank. I have now come across the fluidised bed filter. I asked at my local aquarium shop and they did not seem to be very helpful. Could you possibly shed some light on this system and the different types of models you can get.

Mr M. Scott, via Internet

A Fluidised bed filters have become popular in the last few years. They work by passing oxygenated water around grains of sand. Bacteria grow on each grain of sand and break down ammonia into nitrite and then into nitrate — just as they do in any

biological system. Because sand has more surface area than most biological filter systems these filters are considered more effective than many old style biological filters. The down side is that they must have water passing through them constantly, so a power cut will adversely affect them quicker than with the old types.

There are several fluidised bed filter systems on the market. Rainbow Lifeguard has several modular systems that can include UV sterilisation, chemical, and mechanical filtration as well as the basic biological filter system. Quicksand filters (distributed by Underworld Products, Tel: 01509 610310) are simpler systems but just as effective biological filters. Both these systems attach to the outside of an aquarium and are quick and easy to install.

TROPICAL

NEW PLANTED AQUARIUM

Q I have just bought a 36 x 18 x 18 inch tank along with a Fluval 204 external filter, 300 watt in action heater, 25 watt power glo tube, elite 800 airpump and a bag of pea gravel. This is my first aquarium and I am going to do a community set-up and am hoping to grow a lot of plants in it. I have read a lot about planting from various sources and they all seem to say different things and I am a little bit confused.

Do I need to buy a laterite or will the pea gravel be adequate? Will the light be OK to use or will I have to buy another to go with it? I am also thinking about buying a thermocare 25 watt heating cable. Do I really need this or is it just a waste of money?

Also I have read a bit about CO₂ systems. I am on a tight

budget and they seem to be a bit pricey and wondered if I need one or do the tablets work just as good or will the plants grow perfectly well without using anything at all?

Steve Garnett, Hull, E. Yorks

A The problem of conflicting advice is one which drives beginners completely up the wall! There is a very simple reason for it — there is more than one way to successfully grow plants and keep fish. In fact there are almost as many different ways as there are successful fish keepers. Certain basic rules, however, do apply and looking at what you have purchased so far you should have the beginnings of a good set-up.

Let's sort out the lighting first as this is essential for good plant growth. This must be a tube



designed to grow plants, so a Triton Hi-spec, Arcadia Freshwater or other well known brand would be ideal. The makers of Power-glo also make Flora-glo which has a better spectrum for freshwater aquarium plants, so it might be a good idea to go back to whoever sold you the Power-glo and ask them to swap it for a Flora-glo.

You will still need to add another tube. Also remember to replace them both every six months. The light intensity fluorescent tubes produce drops off after this period of time in use, although the tube will still light. Make sure both your tubes have reflectors with them as this doubles the output of light onto the plants.

Next we come to the heating cable and here we are moving into pieces of equipment which will make a difference but are not essential. You could use an Algarde heating mat instead of the ThermoCare cable and produce the same result. Both these heating units create warmth in the substrate which enhances plant growth but if you are on a tight budget they can be left out.

The same can be said for CO₂ units, however, most people

who are serious about underwater gardening (and that is what you are doing here) add a unit to their aquarium. They really do enhance plant growth, however, as you say the gas system is expensive. Most tablets are designed for small aquaria (which yours is not) and just how effective they would be in this set-up is difficult to say.

Personally, I would spend the extra money on a gas system. If it is too much just at the moment then you can always add it at a later date.

Now we come to the most important area of your new aquarium — the substrate. A bag of pea gravel alone will not be enough. Initially it will have zero nutrients in it for the plants to use for growth. I would replace this with something like Volcanit (Tel: Aquamedic on 01802 353600 for your local stockists). This sort of substrate will give your plants the best possible start when they are first introduced to the aquarium.

PICTURED ABOVE Beautiful planted tanks like this one require correct lighting, a good substrate and regular feeding if they are to grow into an aquatic garden.

PHOTOGRAPH: M.P. & C. PILDOR



ALGARDE

These pages are 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.

COLDWATER

SQUIRREL PROBLEMS

Q My goldfish have started dying. I have tested the water and looked for signs of disease to no avail. I have noticed squirrels drinking from the pond do they pose a threat to the goldfish in so much as they may carry a disease that harms them. If so what can I do about it.

B. Miles, via Internet

A Squirrels are almost certainly not the problem as far as disease is concerned. In fact there are very few diseases which can transfer from mammals to fish or vice versa. Fish T.B. is the commonest of these but the bacteria which cause this infection has, as far as I know, never been reported in squirrels.

Having ruled out the squirrels as a source of infection, and you say that you have tested the water and looked at your fish for signs of disease, we are left with a couple of other factors which could be causing a problem.

COVERING THE EDGE

Q I have recently built a wildlife pond with the back and sides changing from water into a bog garden and then to dry land. This has worked very well, these areas of the pond are now covered with plant growth and look very natural. The problem I have is with the front edge. Here the liner finishes directly at dry land and is exposed. I am looking for a suitable plant to grow over this edge of my pond and down to the water. Can you suggest something?

P. Bond, Lincolnshire

A There are any number of plants you can use to cover this area.

Personally I like Creeping Jenny *Lysimachia nummularia*. This is a prostrate creeping perennial which only grows to a height of two inches but will spread quickly. It is a great ground cover plant and will grow right over the liner and down to the water's surface. The "aurea" form has lovely yellow warts which turn greenish as the season progresses and can become totally green in very shaded areas.

During summer months it has a mass of small bright yellow flowers. Since the stems root all along

their length, cuttings can easily be taken and, in a very short time, the edge of your pond can be covered from just a single plant.

If yellow is not your colour, there are plenty of other ground cover plants with this rooting prostrate growth pattern. For blue and white flowers look no further than *Periwinkles*. The *Vinka* genus has several really useful plants including some variegated forms which will spread over the edge and down to the water's surface.

Most likely of all during spring is that your fish have been weakened by their winter hibernation and with the warmer weather health problems have set in causing sudden death.
Alternatively you may have been feeding them a normal pond fish food too soon. With the fluctuations in temperatures during spring, fish should be carefully fed with a low temperature food.
Finally, squirrels coming to your pond to drink suggests that you have trees nearby. It is possible that leaves from these are falling into the water and poisoning it. There are many trees, including willows, which have toxic substances in their leaves and bark. If these fall into an enclosed body of water like an ornamental pond, it is possible for these to build up over a period of time and kill your fish. A good clean out and netting over your pond will solve the problem now and prevent it happening in the future.

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PICTURED BELOW Creeping Jenny, *Lysimachia*

nummularia, makes an excellent plant to cover a pond's edge.

PHOTOGRAPH: DAVE BEVAN



WATERCRESS — I'LL BE DAMNED!

Recently, a water loss from my pond started giving me some grief. I had invested in a pair of waders — so that I could plant (and maintain) the far shelf without having to abseil down a vertical face of the rockery — and I naturally wondered whether my foot had driven a piece of stone through the base of the fibreglass pond? Fortunately, on checking around the cascade first, I found the water's escape route. Being a new installation the rockery had settled and the cascade unit had tilted slightly, but that was only the start.

Being keen on nitrate reduction, I'd planted some Watercress, *Rorippa nasturtium-aquaticum* (var. *Tesco*) in the cascade to absorb nitrate from the water. It had rapidly flourished all through winter, not only to provide some excellent white flowers held on sturdy stalks but excellent salad material too.

However, on thinning out this rampant growth, I discovered that it had developed a half-inch thick mat of roots beneath the pebbles in the cascade; this, in turn, had formed a very effective silt trap (we get a lot of bathing birds — especially Finches — in the cascade who obviously bring their own dirt supply with them). This had built up to form an effective dam raising the water level enough to overflow the lip of the pre-formed unit.

Most pondkeepers know about the ability of cascade-side plants to "drink" water, or any nearby soil to suck it up through capillary action, but a water-level-raising natural dam was something I hadn't bargained for!

Dick Mills

PICTURED LEFT Watercress, *Rorippa nasturtium-aquaticum*, developed a half-inch thick mat of roots beneath the pebbles in the cascade; this, in turn, had formed a very effective silt trap which built up to form an effective dam and raised the water level enough to overflow the lip of the pre-formed unit.

PHOTOGRAPH: DAVE BEVAN

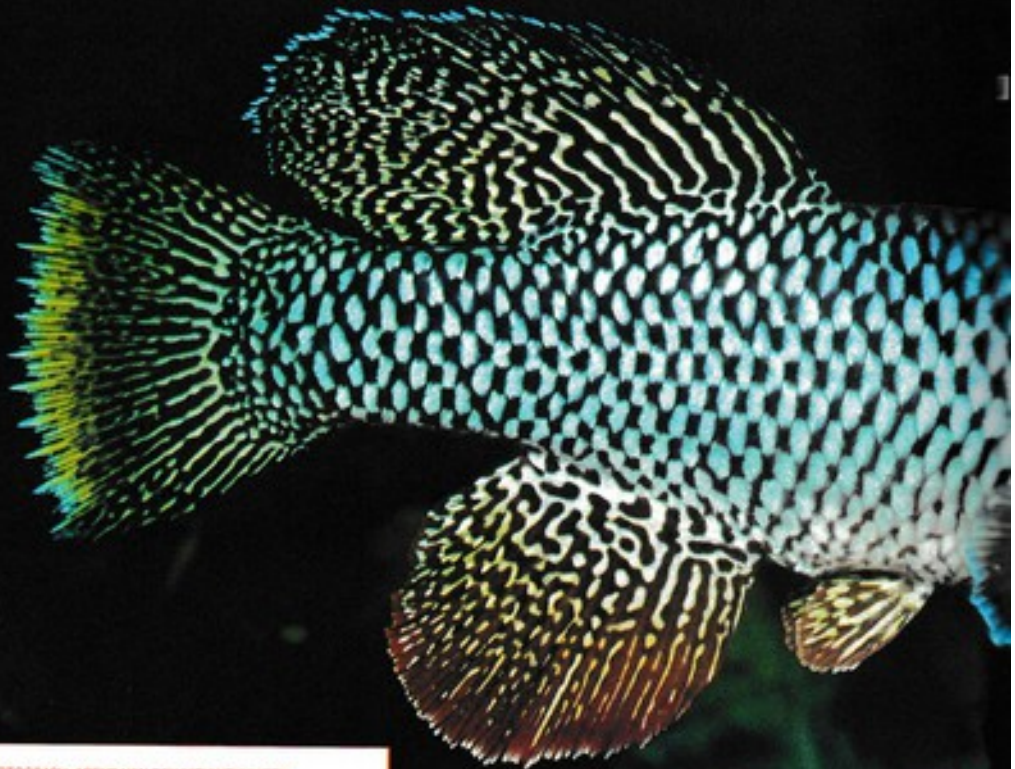


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FACT FILE

PHOTOGRAPH: AREND VAN DEN NIEUWENHUIZEN

Common Name: Furzer's Notho

Scientific Name: *Nothobranchius furzeri* (Jubb, 1971)

Family: Cyprinodontidae

Origins: Limpopo River drainage on the Mozambique/Zimbabwe border

Size: 6cm

Diet: Primarily live foods of all kinds. Can usually be trained to take frozen foods as well and some prepared foods

Temperature: 72-85°F

Aquarium Type: Prefers a well planted aquarium with dark substrate (peat). The water should be soft to neutral with an acidic pH. Can be maintained in a community aquarium but not with slow moving long finned species. Adult males are aggressive towards each other and females unwilling to spawn. Best kept in a species aquarium with one male and three or four females

Reproduction: Substrate spawner with eggs being laid into waterlogged peat. After conditioning with plenty of live foods place a ripe female with a male in a breeding tank during the evening. Next day, most pairs will spawn repeatedly into the peat. They should then be separated and the peat drained until it is moist, but not sodden. Then place it in a polythene bag and store at 78°F for 12 weeks. After being replaced in water most of the eggs will hatch. The fry eat newly hatched brine shrimp and Microworms as soon as they are free swimming

Planner

JUNE 2000



Thur	1	
Fri	2	
Sat	3	SOUTH PARK STUDY SOCIETY (Wimbledon). Open Show & Auction. IGS rules
Sun	4	CAR URFA A.S. Open Show & Auction. FBAS. Contact 0191-422 3919 ERITH A.S. Open Show. FBAS. Contact 020 8300 5463
Mon	5	
Tue	6	SOUTHEND & LEIGH. Club Meeting. Contact 01702 305740 GLOUCESTER F.C. Club Meeting. Contact 01453 824810
Wed	7	CORBLY & DAS. Club Meeting. Contact 01536 761736 HOUNSLOW. Club Meeting. Contact 01784 259230
Thur	8	TELFORD & DAS. Meeting. Contact 01902 372945
Fri	9	
Sat	10	
Sun	11	BRACKNELL A.S. Open Show. FBAS. Contact 01895 639749 THAMESIDE A.S. Open Show & Auction. FNAS. Contact 0161-339 6393
Mon	12	ILFORD & D. A.M.P. Society. Contact 0181-350 7329
Tue	13	
Wed	14	GARDENER'S WORLD. NEC, Birmingham HOUNSLOW. Club Meeting. Contact 01784 259230
Thur	15	GARDENER'S WORLD. NEC, Birmingham
Fri	16	GARDENER'S WORLD. NEC, Birmingham
Sat	17	GARDENER'S WORLD. NEC, Birmingham CORBY & DAS. Club Meeting. Contact 01536 761736
Sun	18	GARDENER'S WORLD. NEC, Birmingham BRISTOL TROPICAL A.S. Open Show & Auction. FBAS. Contact 0117 932 4383 GLENROTHES A.S. Open Show & Auction. FSAS. Contact 01592 882359
Mon	19	THORPE & DAS. Club Meeting. Contact 01953 605394
Tue	20	SOUTHEND & LEIGH. Club Meeting. Contact 01702 305740
Wed	21	HOUNSLOW. Club Meeting. Contact 01784 259230
Thur	22	
Fri	23	
Sat	24	A.M.G.K. (GOLDFISH). Open Show & Auction. IGS rules. Contact 01327 261198
Sun	25	YORK A.S. Open Show & Auction. YAAS. Contact 01904 470875 WELLAND VALLEY A.S. FBAS. Contact 01536 248269 WORKINGTON A.S. Open Show & Auction. FSAS. Contact 01900 67951
Mon	26	
Tue	27	LINCOLN D.A.S. Club Meeting. Contact 01522 783620
Wed	28	
Thur	29	
Fri	30	

MAJOR DATES IN 2000

August 19/20, Yorkshire Aquarist Festival (YAAS), Doncaster Exhibition Centre, October 20/22, Supreme Festival of Fishkeeping (FBAS), New Horizons, South Downs Holiday Village, Bracklesham Bay, near the Witterings and Chichester, October 28/29, British Aquarist Festival (FNAS), George Carnall Leisure Centre, Kingway Park, Urmston, Manchester.
FEDERATION CONTACTS: AofA, Ian and Rhona Walker, 01252 668747; FBAS, Paul Corbett, 01983 721246; FNAS, Army Chadwick, 0161-652 6207; FSAS, James Sheekey, 01475 704219; USA, John Reid, 01738 634689; YAAS, Terry Nelson, 01724 289736

FISH PROFILES

KUHLI LOACH (*ACANTHOPHTHALAMUS MYSERI*)

By IGOY TAVARES, PhD

The Kuhl Loach, *Acanthophtalamus myseri* (Valenciennes, 1864) has previously been placed in other genera such as Pangio and Cobitis and is also known by other common names such as Myers' Loach and Slimy Loach. Some of the other common names probably arise because there are several other similar looking species such as *A. kuhli* and *A. semicinctus*. In fact there is so much intra-species variation that it is often difficult to know what species one has. Kuhl Loach are slim eel-like fish that have a striking coloration of dark brown incomplete vertical bands extending the whole length of their orange body. Male and female Kuhl Loaches can reach a size of four inches (12cm) and are difficult to tell apart as they show no external differences. Kuhl loach have a widespread distribution from Thailand, through Malaysia and even to the larger islands of Indonesia.

Kuhl Loach have a habit of burrowing in the substrate where they tend to spend daylight hours out of sight. To accommodate this behaviour, it is important that the substrate be smooth surfaced to prevent damage to the loach's barbels. Also, if the substrate is small grained, it is easier for the Kuhl Loach to burrow around. Several hiding places should be provided for this nocturnal fish in the form of bogwood and rocks placed to create nooks and crannies for it to occupy. Kuhl Loach have a habit of "disappearing" sometimes for weeks on end, only to "reap-



KUHLI LOACH CV

Family: Cobitidae
Species: *Acanthophtalamus myseri*
Origins: Southeast Asia
Aquarium Type: Community aquarium
Feeding Position: Bottom only
Size: 10cm
Temperature: 75-80°F
Diet: Sinking tablets, pellets or flake, Tubifex worms and various frozen foods

pear" again when it suits them. A tight fitting lid is needed on the aquarium to prevent them disappearing permanently. The Kuhl Loach feeds on the bottom at night and hence sinking food such as tablets should be fed every night, just before lights out. Water chemistry is not critical but should be clean and well aerated and maintained at 24-28°C. This tank could also house some of the smaller barbs, danios and rasboras to provide an active daytime community.

Kuhl Loach are difficult to breed. They are known to lay green coloured eggs in floating vegetation. For breeding success one would have to dedicate a small aquarium, containing floating plants that has been filled with soft water, to a colony of mature Kuhl Loach. In spring, the Kuhl Loach would have to be fed heavily for a period of several months on live foods such as Tubifex worm, which is probably one of their main foods in the wild. If spawning did take place, it might be prudent to remove the floating plants containing eggs to another similar small tank. Free swimming fry should be given green water and Microworm initially, followed by larger foods.

The Kuhl Loach is a spectacular coloured fish that makes it a firm favourite with fishkeepers. If one feeds at the same time each night under low light conditions, one should then be able to enjoy the antics of the beautiful Kuhl Loach.

PHOTOGRAPH: AREND VAN DEN NIEUWENHUIZEN

SILVER SHARK (*BALANTIOCHELIOS MELANOPTERUS*)

By IGOY TAVARES PhD

Balantiocheilus melanopterus (Bleeker, 1851) is a freshwater fish and therefore not a shark but is a carp-like cyprinid. It is often known as the Bala Shark and sometimes even as the Malaysian Shark referring to where it is found. It is also found in rivers in Thailand, as well as Borneo and Sumatra. The body of the Silver Shark is covered in small silver coloured scales, while the unpaired fins including the shark-like dorsal fin have a black back edge. These unpaired fins are usually silver white in colour, although gold finned fish are occasionally available. This beautiful fish does however grow to 14 inches (35cm), even though most specimens in the shop start at about three inches. Males and females look very similar most of the time, except if the female fills up with roe.

The Silver shark is a shoaling fish and does best when a minimum of six specimens are housed in a large aquarium, with a minimum size of 72 inches length. They are an active species and therefore the tank should provide plenty of open swimming space. The silver shark is partial to eating plants and hence only tough species such as Java or Indian Fern will survive their attention. Alternatively plastic plants can be used in this aquarium to add some colour. They should be offered some vegetable foods such as lettuce as well as large flake foods or small pellets together with



SILVER SHARK CV

Family: Cyprinidae
Species: *Balantiocheilus melanopterus*
Origins: Southeast Asia
Aquarium Type: 72 inch tank
Feeding Position: Top and mid water
Size: 35cm
Temperature: 75-80°F
Diet: Large flake, small pellets, live and frozen foods

some live or frozen foods. The Silver shark adapts relatively well to medium hard water, but with large fish a good external filter and frequent water changes are a must. A suitable temperature range for the Silver Shark lies between 24-28°C (75-82°F). Silver Sharks are good jumpers and a tight fitting top is required on the aquarium. For company, a shoal of the larger Asian barbs can be included in this set-up.

Many Silver Sharks are still captured from the wild, although there has been a trend towards breeding this fish in Asia. In keeping with cyprinids, one would expect the Silver Shark to be a prolific egg scatterer. However for success, one would need a large aquarium filled with soft water containing properly conditioned, well fed mature Silver Sharks where the females are noticeably filled with roe. The substrate would have to be covered with a dense growth of plants to prevent eggs from being eaten. Once eggs have been laid the parents would have to be removed. Free swimming fry should be fed with infusoria to start with and should prove to be fast growing.

A shoal of Silver Sharks are a spectacular sight in a large aquarium. The shark-like appearance of this cyprinid belies its peaceful nature, yet attracts the fishkeeper.

PHOTOGRAPH: AREND VAN DEN NIEUWENHUIZEN

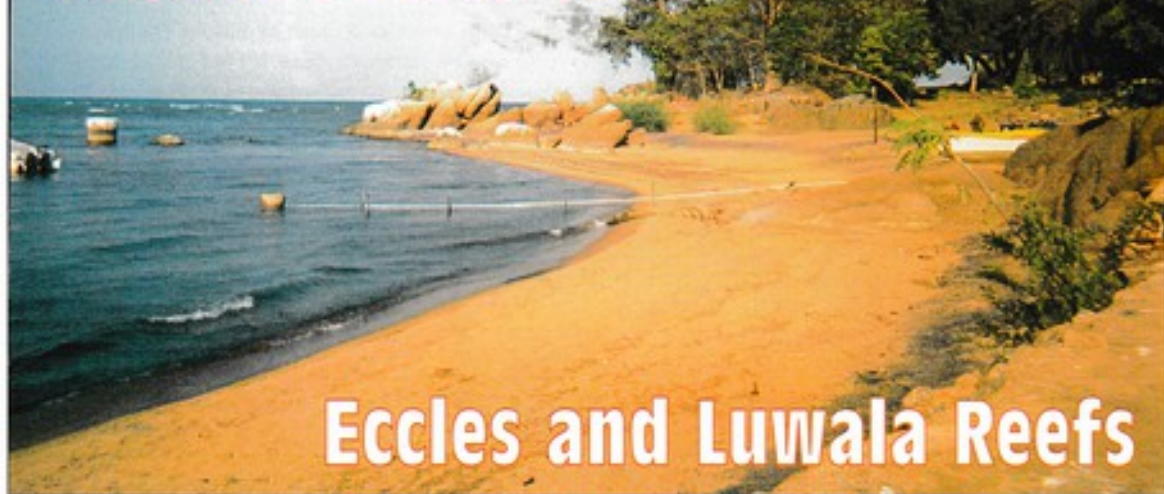
TROPICAL

DAVE TOURLE of the British Cichlid Association takes us under the waves of Lake Malawi:

PHOTOGRAPHS: DAVE TOURLE UNLESS OTHERWISE STATED

below Kimbiri Point. As before we were participating in Stuart Grant's Lake Malawi Safari, based at his export station at Kimbiri Point and under the guidance of the 'Master' of African Rift cichlids, Ad Konings.

A Dive to Remember



Eccles and Luwala Reefs

It was during the last week of September 1997 that I made my first dive in Lake Malawi, close to Maleri Island. My partner, Sonia Guinane, and I were part of a small group of enthusiasts with a passion for African Rift Lake cichlids, especially those from Lake Malawi. In the following two weeks, I completed 10 dives at various locations which left me with many wonderful memories and an insatiable appetite for more. As a result, I made sure I was able to return to the lake two years later in September 1999 for a month to try to fulfill that need!

As before, we were participating in Stuart Grant's Lake Malawi Safari, based at his export station at Kimbiri Point and under the guidance of the 'Master' of African Rift Lake cichlids, Ad Konings. On October 12, during the third week of our tour, a party of four divers, including me, boarded Stuart's boat, the *Lady Louise*, (named after his daughter) and set out from a base-camp at Chiofu, which is situated on the southeastern coast of the lake, to discover the delights and sights of two rocky 'Reefs'.

The weather conditions on that day are best described as 'variable', but in no way did this diminish our enthusiasm for the impending dives ahead. With a slight wind giving the lake's surface a fair sized chop I was secure in the knowledge that once below the surface, all thoughts of how badly your recently eaten breakfast might be coping with a 'life on the ocean wave' would be forgotten and the beauty of the lake's endemic ichthyofauna would be overwhelming.

Reefs have individual names

Our first port of call was Eccles Reef, which is situated between Chinyankwazi Island and the mainland of Makanjila, in the southeastern arm of the lake. This general area gives rise to several rocky reefs, the two



main ones being Eccles Reef, known locally as Chimwalani, and West Reef, whereas the others are less well known to Malawian fish hobbyists. All these reefs have individual names, but the majority are to be found in water as deep as 20m and as all, with the exception of Chimwalani, are below the surface, it was not possible to see them from our boat.

After dropping anchor, my friends and I set about preparing and donning our scuba gear, which is always of great interest and amusement to the local fishermen who take time out from their labours to witness this event! Then with all checks completed, a backward roll from the gunnels of the Lady Louise into the welcoming blue waters of Lake Malawi. Once below the surface and descending, the true beauty of the surrounding vista is breathtaking. The visibility is about 15m and the first thing that hit me was the sheer number of fishes, massing around the huge rocks that make this a very distinctive location. Eccles Reef is famed for its range and number of species, so the kaleidoscope of different colours and shapes darting this way and that, certainly confirmed this fact to me.

While working my way around the first of many, large rocky pillars, my attention was immediately drawn to a flash of colour. A large male Zebra Red Top was going through his display, dashing back and forth with his orange red dorsal fin proudly erect and in striking colour contrast to the bright blue of his head and flanks. As I approached to within 2m of him, he became aware of my presence and bolted for cover in the rocks nearby. After only two or three seconds he reappeared, approached my now very still form and having decided that I posed no threat, returned to his singular task of reinforcing his territorial claim on his area of rock.

Sit and watch this beautiful fish

His colours were stunning and I have never seen the same in aquarium specimens. (I have found this holds true for all fishes in the wild as the colours are brighter, deeper and the markings so much more intense). I wanted to sit there and watch this beautiful fish for a lot longer, but with so much more to see, I had to regretfully tear myself

away and move on, only to see another Red Top, followed by many others. The Reef is swarming with Red Tops which is surely every Mbuna keepers dream scenario!

This species is to be found at several locations throughout the lake, but are not seen living alongside the more common blue/black form of Zebra. I saw these remarkable fish at another site during the Safari, Nakantenga Island which is not very far from our main base, Kambiri Point. I am assured that to the expert eye, slight geographical differences can be detected, enabling the various populations to be identified, but to me they all looked the same and equally stunning. Other populations are recorded at Mpharga Rocks, near Chilumba in the northern part of the lake, a reef northeast of Nankoma Island and Nkhudzi to the south.

As I carefully made my way around the reef, another interesting and distinctive fish got my undivided attention. A large male *Labeotropheus fuelleborni* was also doing the 'territorial display bit' and his response to my approach was exactly the same as the Red Top — dive for cover, check out the big goggled eyed intruder that has settled nearby and then just carry on regardless. One of the more enchanting aspects of diving in the lake is the endearing habit of all the fishes to show a keen interest in anything new and unusual that happens to come by. I have been followed, nipped, pecked and stared at by countless fishes of all different shapes and sizes and get the amusing impression of a fishkeeper having 'the tables turned', with them looking at me through my dive mask as I would look at them in an aquarium.

The *Fuelleborni* was quite large, measuring about 15cms and a gorgeous blue colour, with slight darker bands on his flanks and a splash of yellow in the unpaired fins. His distinctive 'nose' covers a broad underslung mouth which is an evolutionary result of their unusual feeding pattern: whereby they shear off the algae strands by leverage, rather than the body jerking method seen in so many other Mbuna species. This also allows the *Fuelleborni* to keep its body at a closer angle to the rocks and it is thus better able to resist being swept away by the stronger currents found at many of these submerged reefs. Another factor is the laterally compressed body and extended dorsal fin which help stop this fish from 'wobbling' in the turbulent waters. As I

looked around at the surrounding rocks, I could see the many clear 'scrape' marks, almost looking like tiny tyre tracks left by this unusual cichlid, in the dark algae covered rock face.

It was at this point, whilst studying the rocks that I noticed another fairly

below I was then rewarded with the memorable sight of a large *Tyrannochromis macrostoma* female with a mouthful of fry which she released to enable them to browse on the *aufwuchs*. On occasions as she was standing guard she would take the large cloud of tiny fishes back into her cavernous mouth whenever danger threatened, which to witness was a truly wonderful experience that proved to be the highlight of this dive.



David Tarragon diving at Minos Reef. As you can see the fish have little fear of mankind.



A DIVE TO REMEMBER



left I came across a nest of the catfish, *Bagrus meridionalis* — the 'Kampango', as it is known locally. This fish is found in large numbers throughout the lake and is fished extensively by the Malawian fishermen.

below A large male Zebra Red Top was going through his display, dashing back and forth with his orange red dorsal fin proudly erect and in striking colour contrast to the bright blue of his head and flanks.

common inhabitant of Lake Malawi's rocky substrate, the Malawi Crab, *Potamonautus orbispinus*. This particular little chap was in a state of agitation, as I had unwittingly settled almost on top of him and he was trying to work out his best escape route, without leaving the cover of his rocky crevice. I took a couple of photographs and the resulting flash caused him to retreat even further into the tight rockwork. He had obviously decided on a defensive tactic rather than retreat and this was confirmed when I extended my index finger to within 'fighting' range and was left with no doubt at all that, any closer and I would be rewarded with a nasty nip for my cheek! His boldness increased when I backed away and I was certain he was actually punching his claw in the air to salute his victory over this clumsy interloper.



Unusual hunting technique

I decided to move away from the central point of the reef and descend to the deeper and sandier surrounding areas. I was fortunate enough to see a large *Nimbochromis linni* working its way over the rocks with its very obvious trunk like snout, the main distinguishing feature from the very similar *Nimbochromis polystigma*. Another fish that I was delighted to see was a very attractive *Nimbochromis livingstonii*. Sonia and I had kept a specimen of this piscivore in our Malawian Haplochromine tank at home a couple of years previously, and we were both fascinated by his unusual hunting technique of lying on his side at the bottom and 'playing dead' in the hope of gaining the attention of his inquisitive prey. It was interesting to watch his breathing come to a halt at the approach of any other fish, although there were none small enough for him to catch and consume! The fishes I observed at the reef were, however, far more colourful with very clearly defined, dark brown blotches on a snowy white base.

I continued to follow the slope of the reef to a depth of about 12 metres and once again settled on the bottom to watch the 'locals'. My eye was drawn to a vivid yellow splash of colour which turned out to be a *Pseudotropheus barlowi*. The colouration of this species is a bright yellow, with lovely pale blue finnage and, as it is usually found at deeper depths of up to 25m, this was an unexpected pleasure. I managed to get close enough to see the distinct dip in the snout which is one of the identifying features of this species. It was at this point that I came across a nest of the catfish, *Bagrus meridionalis*.

The 'Kampango', as it is known locally, is found in large numbers throughout the lake and is fished extensively by the Malawian fishermen. The nest was formed by a fairly big excavation in the sand up

against a large rock, thus forming a sort of semi-circular pit which was full of young catfish, being carefully guarded by a lone parent. An even more interesting aspect is the fact that it is actually the male who provides the aftercare and defence of the juveniles. I was touched by his determination to remain with his young, in spite of my getting to within a few centimetres of his head with my camera. He would not budge an inch and remained steadfast in his devotion to duty and so having gained my respect, I moved slowly away and left him to his vigil, as I headed back towards the reef.

Many more different cichlid species

Moving slowly over the sand and rocks, I saw many more different cichlid species. To my right was *Pteronilapia gonolatus*, recognisable by the black submarginal band in the dorsal fin and the two rows of blotches on the flank. Further to the left was *Protomeias taeniolatus*, a predominately herbivorous cichlid that sucks algae from small pockets in the rocks. One fish I really wanted to see, which had so far eluded me, was the beautiful species, *Aulonocara maylandi*. There were many *Pseudotropheus tropheus* 'yellow gular' to be seen, as well as the easily recognisable *Pseudotropheus crabro* darting in and out of the dark recesses of the mountainous rockwork.

In a deep gully, I was delighted to observe a truly impressive male, *Chilotilapia cucullus*, moving to and fro in a proud and arrogant display that no self respecting female could hope to ignore. His body was aglow, with the light reflecting metallic blues and greens, but his real claim to fame had to be the great swollen lips that tipify this gorgeous fish. Unfortunately, he proved to be very camera shy and any attempts to get within reasonable range were thwarted and at one point, I was convinced that he was laughing at my awkwardness and obvious frustration. It is actually quite difficult to swear underwater with a demand

valve between your clenched teeth!

In the end I gave up and had to settle for the few long distant shots that I had succeeded in taking. Moving on, I was then rewarded with the memorable sight of a large *Tyrannochromis macrostomus* female with a mouthful of fry which she released to enable them to browse on the aufwuchs. On occasions as she was standing guard, she would take the large cloud of tiny fishes back into her cavernous mouth whenever danger threatened, which to witness was a truly wonderful experience that proved to be the highlight of this dive. A quick check of my dive computer indicated that I had been down for 45 minutes and it was time to return to the surface. Once back aboard the *Lady Louise*, all of us compared notes and Ad organised the refilling of the airtanks in readiness for the next dive of the day at another reef, just a short distance away, but apparently a quite different kettle of fish. (pardon the pun!).

Luwala Reef is only 2km from Eccles Reef and yet it seemed like a completely different environment. The current felt a lot stronger and in fact, I had to make use of the anchor-chain to aid my descent, for fear of being carried away from the dive site. The reef itself, is quite a bit smaller, but deeper at approximately 18-20m below the surface, surrounded by many sandy areas. Having reached the bottom, I found the visibility to be only about 7-8m as the strong current was stirring up a lot of sediment. After taking a minute or so to note my position and get my bearings, I set off to take a circular route around the reef. The first notable inhabitant I saw, was a *Copidichromis borleyi* 'Gold Fin' which is easily recognised by the very elongate pelvic fins of the male. I passed a number of males, all defending areas around large rocks, while the silvery females were swimming around in groups just a short distance away.

An invertebrate feeder

After negotiating a particularly large outcrop of rocks, I came across a group of the largest *Fossochromis rostratus* that I had encountered so far. Unfortunately, they were all females with no male present, but I was still pleased to see this species, having maintained a colony in my own tanks and becoming rather fond of these sand dwellers. This fish is an invertebrate feeder, sifting the sand in search of food, but it also uses the sand as cover when threatened. Known to the local people as 'Chimberje' or 'Chigumbuli' which means 'sly person', it is able to avoid being caught in the fishermen's nets by burying itself completely in the sandy substrate. This is something that we discovered ourselves when attempting to remove our *Rostratus* to another tank! Having removed all the rocks and décor, I was baffled as to where the last two *Fossochromis rostratus* had gone, only to find them five minutes later, by rummaging around in the sand at the bottom of the tank!

Moving on from there, I noticed a very large, circular nest in an open area of sand. The sheer size of it intrigued me, so I was very interested to see who had actually built it. I settled down on the edge and did not have to wait very long before the owner had plucked up enough courage to return, in spite of my presence. It turned out to be a pair of large *Dorsichromis kribia*, a very impressive metallic blue predator, (the males of this species can grow to about 30cm, with the females just slightly smaller) and they were obviously not happy about me being so close as they were making frequent movements back and forth. I decided to move on before they became too agitated and backing away carefully, I continued with my circuit of the reef. There is one other thing worth mentioning here and that is the total absence of Red Top Zebras on this reef and yet at Eccles Reef, only 2km distant, the place is swarming with them!

As I descended onto an open sandy area, I was pleasantly surprised to discover a large community of *Pseudotropheus livingstonii*. These little fish get to about 6cm in length and have a strong association with the empty shells of the Malawi snail, *Lorites apusorum*. This is exactly what I found, with the area being littered with many empty shells, all with *Livingstonii* residents, but strangely these shells have no connection with breeding as this species only uses them for protection. For breeding purposes, they migrate to the nearby rocks and the mouthbrooding females remain there until the fry are ready to be released, probably in

the vicinity of the shells on the sandy bottom.

Whilst looking over this field of shells, I was amused by the thought that it looked very much like a caravan site. If at all possible, I wanted to get some photographs, so yet again, I settled carefully on the substrate to prepare the camera. Just as I looked into the viewfinder, a flash of blue registered in the corner of my left eye and at the same time, all the *Livingstonii* had disappeared into the protective cover of their shells. Looking around intently to find the culprit, I saw a metallic blue *Sciaenochromis fryeri* with a red ventral fin, patrolling around the edge of the snail shell field on the lookout for *Livingstonii* fry. *Sciaenochromis fryeri*, which can reach 20cm TL, is frequently confused with its close cousin, *Sciaenochromis ahli*. The fish in question was moving quite fast, but stopped briefly to give this big newcomer the once over, but as I attempted to take a photograph, he soon went on his way and I lost sight of this attractive, elongate piscivore.

So many fascinating scenarios

Having completed my circuit in about 40 minutes, I returned to the anchor and slowly made my ascent back to the *Lady Louise*. I was desperately trying to commit all the sights to memory by going over the dive again in my head. There were so many fascinating scenarios to remember and unfortunately, there was almost too much to see in such a short space of time. Back on board and a welcome bottle of beer later, I was able to reflect on the really wonderful collection of diving experiences this safari had so far provided and the pleasant prospect of more to come in the following, albeit final week. As the *Lady Louise* headed back to Kambiri Point, the thought of a proper bed that night was a real luxury.

Now back in the UK, I have to confess that rather than fulfill my need for the ultimate Malawi fishkeepers trip, it has only whetted my appetite for more. I am now looking forward to my next opportunity to dive in the blue waters of Lake Malawi in the not too distant future. When I do eventually return, I will make it my number one priority to go to both Eccles and Luwala reefs, as they were certainly the highlight of my last trip.

I have been followed, nipped, pecked and stared at by countless fishes of all different shapes and sizes and get the amusing impression of a fishkeeper having 'the tables turned', with them looking at me through my dive mask as I would look at them in an aquarium. This is a male of the common blue/black form *Pseudotropheus zebra*.

PHOTOGRAPH
M.P. & C. PEDWORTH



MICHAEL EDWARDS has been to visit Wychwood Waterlilies in Hampshire. Here the world's largest collection of hardy waterlilies thrives under the care of the Henley family; PHOTOGRAPHS: MICHAEL EDWARDS

POND

Wonderful WATERLILIES



◀ Some growers consider the yellow waterlilies the most striking and *Nymphaea* "Mariacea Chromatella" is probably the best known. It has beautifully marked pads and its flowers darken in bright sunlight. A stunning plant, its optimum planting depth is eight inches (20cm) with a maximum survival depth of 12 inches (30cm).

There's nothing quite so indicative of summer as a pond dotted with the large and showy flowers of waterlilies. With the advent of spring this is the ideal time of the year to buy and plant these impressive flowers.

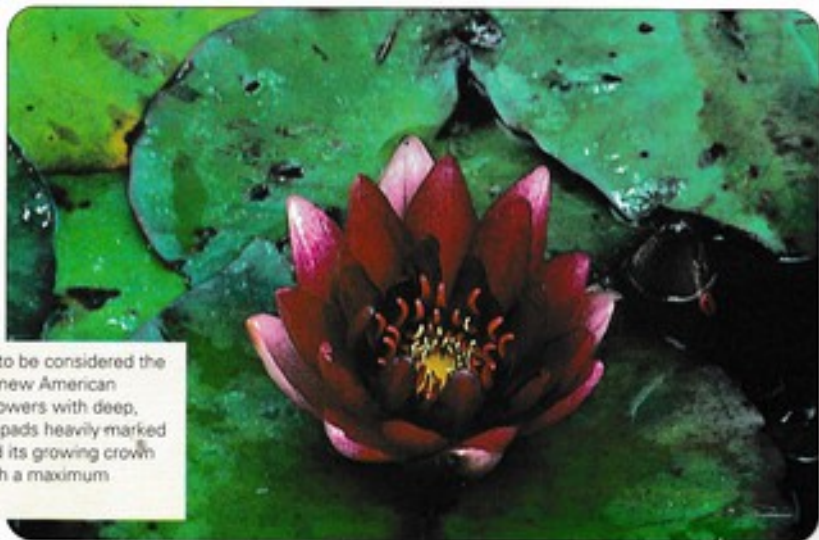
There are scores of different varieties to choose from as there are outlets to purchase from, but I was well impressed by Wychwood Waterlilies in Hampshire run by Reg, Ann and Claire Henley. What they don't know about aquatic plants isn't worth knowing and their farm at Odiham also houses the largest collection (264) of hardy waterlilies in the world.

One of the problems with buying waterlilies is that it is all too easy to choose the wrong variety resulting in it taking over the entire pond. Whilst looks are important, it is also significant to choose varieties that will produce the most flowers and that will thrive in the depth of water at your disposal. Solid sided containers are best suited to waterlilies, rather than baskets. This will help to contain an otherwise very vigorous lily.

▶ *Nymphaea* "William Falconer" used to be considered the darkest of the red waterlilies before the new American arrivals. However, it produces profuse flowers with deep, golden centres set off with bright green pads heavily marked with brown. It is a medium depth lily and its growing crown depth should be eight inches (20cm) with a maximum survival depth of 12 inches (30cm).

Waterlilies are very much influenced by sunlight and their colour, or lack of it, can often be attributed to light availability during the flowering period. For best results, therefore, you need to position your lilies where they will receive full sun for at least part of the day.

The following varieties are my personal recommendation and are intended as a guide only. Your own circumstances might dictate you grow smaller or larger varieties. Planting depth is taken from the crown of the plant to the water surface.



World Oceans Day is on June 8 2000, so to mark this very special event **ANDY HORTON** is back with a Shorewatch Special:

PHOTOGRAPHS: ANDY HORTON

Rockpooling at the seashore

Living within walking distance of the sea, I have the opportunity to observe seasonal variations on the shore. In March, as the first flowers burst into life on land, the sea also blooms, as the sunlight is utilised with carbon dioxide and nutrients in the seawater (photosynthesis) to promote the growth and rapid reproduction of the plant plankton (phytoplankton).

MOVING INSHORE

Small rock pool fish, crabs, sea slugs and other creatures swim, scuttle or slither into shallow water and between the tides to lay their eggs. By June the fry begin to hatch and a shore pool disturbed by a stick or a net, reveals darting prawns and small fish resting on the bottom like the sand coloured Gobies. Under rocks or hiding in crannies are the Blennies, and amongst the weed the colourful Wrasse hide.

TIDES

Tides govern the lives of those who make their living from the sea. The great bulge of water is pulled by the moon and sun in a wave around the Earth approximately every 12 hours 25 minutes. As this great wave funnels up the English Channel, the water rises up the shore twice a day and then recedes leaving an expanse of shore accessible to the rockpooter. The following day, the tide is about 50 minutes later. These things are known to the visitor to the seaside, who probably does not appreciate that the largest 'spring' tides, when the water rises up the shore the furthest and also goes out the furthest occurs at roughly the same time of the day. In Cornwall the lowest spring tides occur during the middle of the day, but in Sussex they occur at dusk and dawn.

ROCKPOOLING

Of course, such knowledge is important to the rockpooter, the naturalist explorer at low tide. The rockpooter must aim to arrive on a rocky shore a

World Oceans Day was first declared at the Earth Summit in Rio de Janeiro in 1992. At the beginning of June there is an opportunity for people in many parts of Britain to increase their understanding of the wildlife of the oceans and the marine environment. Details of many of the events, including rock pool rambles and wildlife cruises around the British Isles, can be found at:

URL = <http://cbr.nc.us.mensa.org/homepages/BMLSS/WOD.htm>



above Sea Anemones are known for their commensal associations with other animals. The anemone *Calliactis parasitica* has taken up residence on the shell of a Hermit Crab.

left Interesting fish, crabs and other animals found on the British seashore, that are unable to tolerate the high sea water temperatures an aquarium is likely to attain during the summer months. This means installing some form of cooling device to reduce the temperature to 22°C or below, or returning the cold water species to the sea. In the short term beer coolers can be used. However, they are unreliable and the best option is to bite the bullet and purchase a special 'aquarium cooler'.



ShorewatchSpecial

couple of hours before the low tide. It is essential to consult the Tide Tables that are available in newsagents and ship chandlers in seaside towns. If only the high tide time is given, time your arrival four hours (add another hour for British Summer Time) after the high tide. Follow out the receding tide and explore in the pools and under rocks, making sure that you return every rock the right way up and in the position that you found it.

SEAWEED ZONES OF THE SHORE

Large brown seaweeds occupy different parts of a rocky shore; each adapted to the degree of immersion and exposure. The upper shore is only immersed by the spring tides, and then only for a short time. Two brown seaweeds, the Channelled Wrack, *Peletia canaliculata*, and the Spiral Wrack, *Fucus spiralis*, have adaptations to prevent drying out and can survive when the tide is out. Acorn Barnacles settle in this zone.

On the middle shore for half the day the tide will be in, even during the period of neap tides. The common brown wrack of this zone is the Bladder Wrack, *Fucus vesiculosus*. Mussel beds will form and both limpets and periwinkles will graze the rocks. Beadlet Anemones are resident and Shore Crabs will be found from spring to autumn.

Lower down the shore, the Serrated Wrack, *Fucus serratus*, with saw-like edges to its fronds, will straddle the rocks.

Aquarist rockpooter

Often the rockpooter is a hurry to move down to the interesting areas where the sea laps against the exposed land. The lower down the shore, the more the pools resemble the open sea which contains a far greater variety of fish, crabs and other creatures. The open shore rock pools are restricted to a few fish like the Common Blenny, *Lipophrys pholis*, that are adapted to live in oxygen-deficient pools.

Under rocks and in even the smallest pools at the extreme low water mark, the variety of life can be astonishing with as many as 40 different species of fish to be discovered. Some will be rock pool fish that will only reach a length of a few centimetres and others the fry of much larger fish like the Bass and Grey Mullet.

If I have bored the fish enthusiasts with the rather drab and dull seaweeds, there is a reason. The native marine enthusiast is the ecological aquarist; he can observe first hand the relationship between the various creatures of the seashore and their watery environment. In the long term this can help him maintain his fish and crabs better in captivity. However, in the short term it is hard enough to put a name to each of the fish and other animals, to discover if they are suitable before taking them home in a bucket.

The British Marine Life Study web site contains lots more information about the marine life around the British coast, including hints and advice on seawater aquaria, recommended books, and articles and information not found anywhere else

URL = <http://cbr.nc.us.mensa.org/homepages/BMLSS/>

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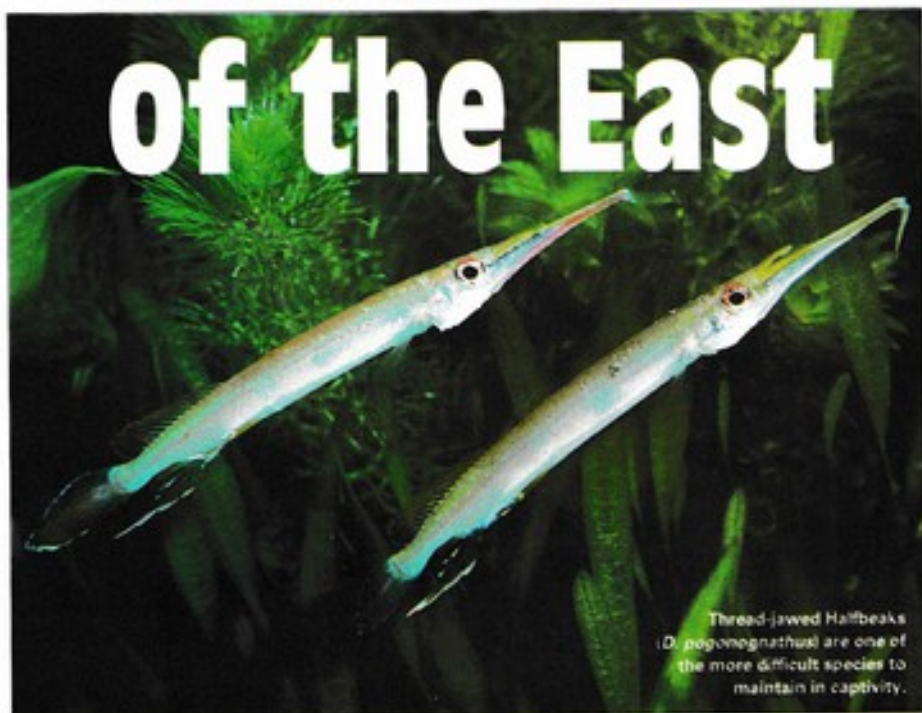
Photo: P. H. H. H.

Livebearers are some of the most popular of all aquarium fish but there are far more fish which breed in this way than just Guppies. **ROY OSMINT** focuses on ...

PHOTOGRAPHS: MAX GIBBS UNLESS OTHERWISE STATED

TROPICAL

Livebearers of the East



Thread-jawed Halfbeaks (*D. pogonognathus*) are one of the more difficult species to maintain in captivity.

They are perhaps not the most beautiful of aquarium fishes nor subjects that would naturally spring to mind for a small community set-up, but for anyone seeking something a little different from the usual run-of-the-mill livebearers, Halfbeaks could offer an absorbing and challenging solution. So what exactly are Halfbeaks, why are they so-called, where do they come from and what sets them apart from the other ever-popular livebearers? Let's take a look!

Halfbeaks are members of the family (Hemirhamphidae) an intermediate group somewhere between the Flying Fishes (Exocoetidae) and Gar Fishes (Belontiidae). It is a large family which includes species that are found in the three aquatic habitats of freshwater, saltwater and brackish water. By no means are all family members livebearers but the two or three forms likely to be of interest to the aquarist do reproduce in this way.

Unmistakable in appearance Halfbeaks are slender and elongated with only minimal lateral compression. The dorsal fin is set uncommonly rearward just forward of a fan-shaped tail and almost directly opposite the anal fin, giving the fish a distinctly Pike-like image. But the outstanding characteristic is undoubtedly the curiously extended and formed mouth structure and it is from this that the creature's popular name is clearly derived. The lower jaw is elongated to a far greater extent than the upper creating a strange beak-like projection. A particu-

larly unusual feature is apparent in the actual jaw movement for whereas in most fish varieties it is the lower jaw that moves as food is taken, in this species it is the upper that hinges with the lower remaining quite rigid. The effect of this characteristic becomes evident when the fish is viewed in profile, for then it can be clearly seen that this mouth design and mechanism, which is in perfect alignment with the fish's straight back, presents an extreme example of an absolutely natural surface-dweller and feeder.

'New World' subjects

It is generally recognised that the well-known livebearing species of aquarium fishes are "New World" subjects exclusively indigenous to the Americas and are classified Livebearing Toothcarps. The Halfbeaks, however, present an exception to this widely held generalisation having a natural distribution on the other side of the world in South East Asia. Here they inhabit a variety of waters in and around Thailand, Malaysia, Singapore, the islands of the Sunda Strait and the Philippines among others. Their natural diet predominantly consists of insects and their larvae, fish fry and any other live foods in the upper level of the water. In fact so proficient are these fishes at catching surface insects that in many regions they are highly valued as a natural means of controlling

LIVEBEARERS OF THE EAST



left The Orange-finned Halfbeak (*Dermogenys ebrardii*) grows to about 10cm and has a similar body shape to *Nomorhamphus celebensis*. Both species need similar diets and aquarium conditions.

PHOTOGRAPH
DEREK LAMBERT

mosquitoes and other dangerous insects.

Of the forms likely to be available and of interest to the average fish-keeper are the Celebes Halfbeak (*Nomorhamphus*), the so-called Wrestling Halfbeak (*Dermogenys pusillus*) and the Red or Thread-jawed Halfbeak (*D. pogonognathus*). Advice on the care and general requirements of these fishes frequently tends to be described as being appropriate to all, but this is not entirely true and certainly the first mentioned genus originating as it does from the freshwater lakes on the island of Sulawesi (Celebes), needs to be treated somewhat differently to the more brackish subjects latterly referred to.

Much has also been previously written about the aggressive nature of these fishes and although this is not without some foundation it is in some cases exaggerated or misunderstood. It would also be true to say that some keepers of Halfbeaks seem to experience grave difficulties in keeping them alive at all, while others are able to maintain and breed them with apparent ease. Opinion as to the actual degree of challenge involved with these fishes tends, therefore, to be divided dependent upon the success or otherwise of those expressing it. In general terms though, providing that favourable conditions and a suitable nutritious diet are offered there is no reason why success should not be achieved.

A peaceful temperament

The Celebes Halfbeak (*Nomorhamphus celebensis*) although potentially reaching a relatively large 10cm size in most cases possesses a basically peaceful temperament and can usually be successfully housed in a good sized community tank alongside other similarly sized occupants. The rule here is — as with many other species — if it fits in the mouth it will be regarded as food! In addition to being longer than other Halfbeak varieties it is also a little more laterally compressed and the beak-like mouth projection less developed. Coloration of this fish is basically a pale tan merging to silver along the flanks. Fin colours vary among individual specimens and can range from patches of dark brown through to

pale red. There is also usually a dark section on the lower beak.

As previously stated this is a freshwater subject by nature but, due to the tendency of some dealers to treat all Halfbeaks as brackish — it may well be accommodated in a saline solution at the point of sale. When purchasing it is therefore important to establish from the stockist whether this is the case and if so at what dilution. Do not be hesitant to request this information — any dealer worth their salt (pardon the pun) will be happy to supply it. Whatever the answer these conditions should be approximately reproduced in a temporary tank at home so as to help minimise stress. Any necessary adjustments can then be gradually made prior to the fish being introduced to their permanent home.

To accurately determine the salt content of the water use a hydrometer to measure its Specific Gravity. Always ensure that the instrument is one specially designed and calibrated for aquatic use and that comparisons are made with water of the same temperature. The hydrometer functions by establishing the relative density of saltwater against that of freshwater registering freshwater as having a specific gravity of 1.000 and pure sea water as about 1.024. It will thus be realised that anything between these extremes can effectively be described as brackish. In the case of the Celebes Halfbeak we know that freshwater should be the desired objective. If this is how it is being kept at the purchase point — all is well and no further action need be taken. If not, determine the Specific Gravity reading in the dealer's tank and before purchase reproduce these conditions at home. Once the fishes have been introduced gradually eradicate the salt content by 20 per cent weekly partial water changes replacing with freshwater at the same temperature. The saline dilution will steadily reduce until eventually all traces of salt have disappeared.

Most-frequently seen

Of the other varieties mentioned earlier the so-called Wrestling Halfbeak (*Dermogenys pusillus*) is probably the most frequently seen. This

species is smaller than the Celebes reaching a maximum length of about 7cm in favourable conditions, although males will generally remain less than this. Coloration varies considerably among individuals and is largely determined by the fish's place of origin or that of its ancestors, for it has a wide Asian distribution.

Often the flanks and belly will be a silvery/white with the back an olive brown tinged with green. A lovely blue iridescence can be seen in the silver sections particularly when viewed from certain angles in reflected light. Fin coloration is usually a pale version of the upper body hue, a red marking of varying size and intensity is apparent on the dorsal fin of male specimens.

The Wrestling Halfbeak though essentially a freshwater species is frequently found in its natural environment inhabiting waters that are greatly affected by ocean tides. It is, therefore, accustomed to fluctuating levels of salt dilution in the water. In fact it is quite probable that for short periods this fish can withstand fully marine conditions, for there is evidence to indicate that it is distributed between islands via the sea.

Water in the aquarium should consequently be brackish with, as a guide, approximately two to three teaspoonfuls of marine salt added to each 10 litres. The salt content is not too critical, indeed some small variations are probably desirable in order to simulate conditions altered by the ebb and flow of the tide. In any event the procedure for determining, achieving and maintaining brackish conditions are the same as previously described for the Celebes Halfbeaks except that when carrying out partial water changes replace with water of a similar specific gravity reading.

Wrestling Halfbeaks can be housed in a good sized aquarium with other similar sized species, towards which they will not normally demonstrate undue aggression. Rival males, however, can be extremely belligerent towards each other as they strive for dominance, although not often inflicting actual injury. The resultant disturbance can however seriously unbalance an otherwise peaceful community so a species tank is in many ways the better option.

Highly proficient catchers of live foods

In their natural habitat Halfbeaks, as we know, are highly proficient catchers of surface insects and other live foods that exist in the upper strata of the water. Within the aquarium efforts should be made whenever possible to provide similar opportunity. Whereas quality flake food, especially

right The Celebes Halfbeak (*Nomorhamphus celebensis*) although potentially reaching a relatively large 10cm size in most cases possesses a basically peaceful temperament and can usually be successfully housed in a good sized community tank alongside other similarly sized occupants.



that specifically produced for carnivores, will often be enthusiastically taken, a diet that does not involve the fish in exercising its natural live-catching skills for which it is so perfectly designed is never quite satisfactory.

Mosquito Larvae and Fruit Flies along with various other insects are ideal for this purpose. *Daphnia* and Brine Shrimp are also suitable, but due to the fish's curious mouth structure that effectively prevents any low level feeding, these should be attracted towards the surface using bright light. Worms such as Tubifex are another nutritious possibility provided they are offered using a floating feeder device.

Halfbeaks, like most other of the popular livebearing varieties, are able to store sperm cells within the body thus enabling fertilisation of successive batches of eggs without the requirement to re-mate. Average broods consist of about 15 identical miniatures of the parent apart from the beak, this does not start to develop for a number of weeks, after which the lower section can be seen beginning to lengthen. The gestation period of this group is normally rather longer than for many other well known livebearers, but this does of course depend on water temperature. Another significant sexual difference from most of the "New World" varieties is that the male Halfbeak's sexual organ (andropodium) is formed from short front rays in the anal fin as opposed to a fully-developed gonopodium of Poeciliinae.

For a controlled breeding attempt set up a tank containing water at about 23°C, this need not be deep but should contain plenty of submerged and floating plants to offer protection to the fry. Ideally a number of well conditioned specimens should be introduced at a ratio of about two males to five females. During courtship the male fish will swim beneath the female and probe her under-regions with the tip of his beak. This ritual will determine if his advances are in fact welcome or otherwise. In some cases, at around the time fertilisation takes place, both partners can be seen to excitedly leap out of the water.

Opinion seems divided on the question of cannibalistic predation by the adults on newly-born fry, but by far the safest course of action is to separate them as soon as possible, this is particularly so in the case of the Celebes Halfbeak.

Halfbeaks are, in general, a fascinating group which with correct attention to conditions and diet will provide a continued source of interest and challenge.

BOB & VAL DAVIES take a break from *Frogs & Friends* this month to look at the how and why of creating a wildlife pond:

PHOTOGRAPHS: DAVE BEVAN UNLESS OTHERWISE STATED

Creating a WILDLIFE POND



Wildlife pond, central, with shallow top and running into bog garden and 'beadew' beyond where insects attracted to flowers provide food for wildlife. PHOTOGRAPHS: BOB & VAL DAVIES

Why are they needed?

In various parts of the world scientists are investigating the disappearance or reduction of some amphibian populations. The permeable skin of amphibians makes them particularly sensitive to environmental factors and they are regarded as 'bio-indicators', signalling the health or otherwise of our planet.

Various causative factors are suspected; climatic changes — possibly due to El Nino and increased ultraviolet radiation due to ozone layer damage. Recent studies of mass mortality and population declines have found fungal and viral agents. It is not yet clear whether these are newly introduced or indigenous. If the latter then it could be that they have suddenly become more virulent due to the depression of the frogs'

immune system due to unfavourable changes in their environment.

For years they have been subjected to the twin man-made evils of habitat destruction and pollution and many of them have colonised our garden ponds as their own have been destroyed. A recent report (*Lowland Pond Survey*, free from D.E.T.R., RDD2 Division, Eland House, Bressenden Place, London SW1E 5DU), possibly underestimated, claims a net loss of 2,000 ponds between 1990 and 1996. Although new ponds have been created they are often not suitable for amphibians, being mainly designed for amenities such as angling and wildfowl. Small ponds which are often suitable were not included in the survey and the report concludes that these are vulnerable to destruction in the future.

Toads also face slaughter every spring as they migrate to their favoured spawning pond. The hazards of crossing busy roads have been

reduced in some areas by the construction of toad tunnels and the use of volunteers who help the toads across in spring.

Natural hazards

Predation is part of the web of life and amphibians have adapted to ensure their species survive; a secretive, mainly nocturnal lifestyle; toxic or noxious skin secretions, camouflaged appearance and the production of large numbers of eggs have enabled survival up to now. Even so, protection is never complete; amphibians are eaten by many creatures from the moment they are laid; eggs are eaten by waterbirds, tadpoles fall prey to carnivorous aquatic insects and larvae, grass snakes and fishes. Newts will butt their way into frogspawn to extract the eggs and readily eat tadpoles — even their own larvae. One study suggests that female newts can recognise their own eggs by scent and will eat those of other females in preference but will eat their own if food is scarce.

Alien hazards

In recent years two introduced hazards have appeared: the escape or deliberate dumping of Red-eared turtles and American Bullfrogs both of which naturally prey on aquatic life. The latter being particularly voracious will soon deplete native wildlife in and around a pond. Although the import of both these species has been banned it is not illegal to have/keep them if obtained prior to the ban. Bullfrog tadpoles are still occasionally seen on sale having 'come in with the fish'.

Alien plant species are also causing concern — three in particular: Azolla (*Azolla carolinensis*), Curly pondweed (*Laurostichum major*) and New Zealand water stonecrop (*Crassula helmsii*) also known as *Tillex recurvata*. The threat to wild ponds from these three was outlined in a booklet accompanying BBC Wildlife magazine some time ago. They are extremely invasive and can quickly choke a pond, yet all are commonly on sale in aquatic retail outlets. Azolla often adheres to other plants and can be unwittingly introduced into a garden pond where it will soon colonise the whole surface. Self-propagation is natural to plants but in the confines of a garden pond prolific species can soon make life impossible for the other inhabitants unless severe control is exercised.



Life in the garden pond

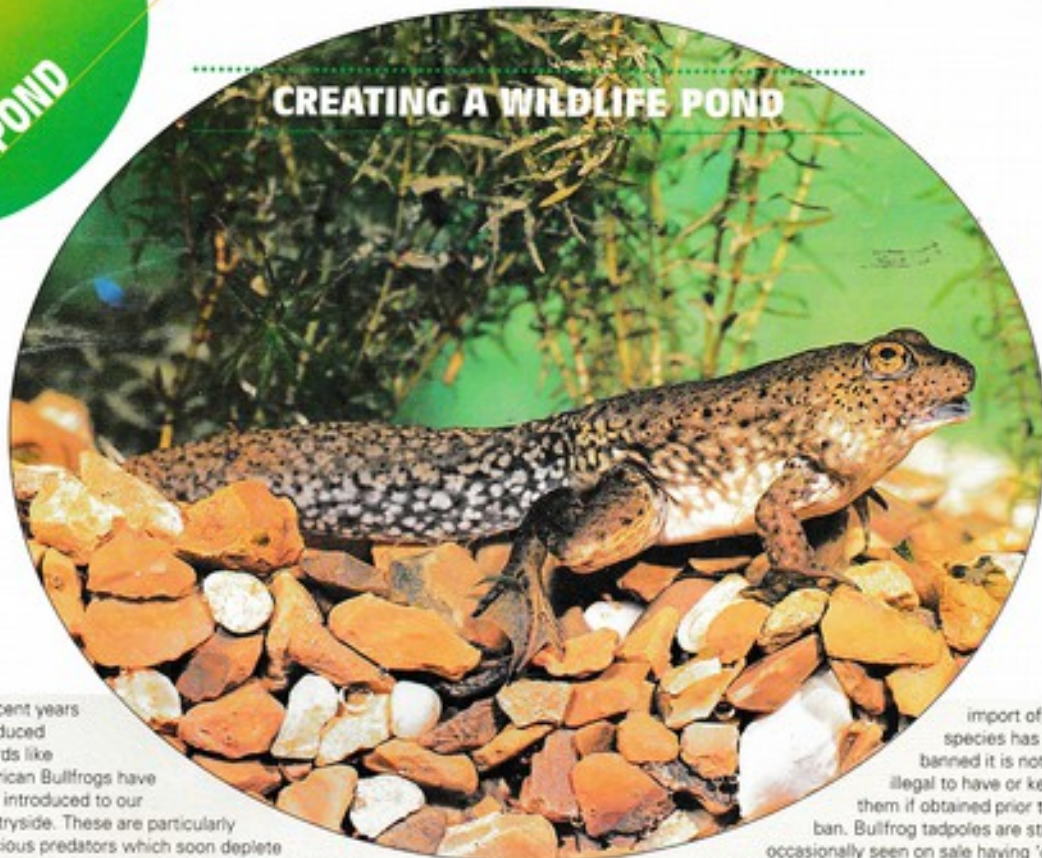
Although many amphibians survive in garden ponds that are less than ideal a little forethought in the planning stage is helpful. The size is obviously restricted by available space but the usual rules on ponds apply — a depth of at least 18 inches (45cm) to prevent total freezing and a shallow end which is preferred by frogs for spawning. Great Crested Newts seem to prefer deeper, larger ponds. Easy means of

above right An easy means of leaving the pond is essential — formal ponds surrounded by overlapping flagstones can be death traps. Here shingle has been used as an edging so amphibians can come and go as they please.

right Blackbirds often sit at our pond to take frog tadpoles and on two occasions a heron has been seen eyeing up the prospects but seemed to decide it wasn't worth the effort.



CREATING A WILDLIFE POND



In recent years introduced hazards like American Bullfrogs have been introduced to our countryside. These are particularly voracious predators which soon deplete native wildlife in and around a pond. Although the

import of this species has been banned it is not illegal to have or keep them if obtained prior to the ban. Bullfrog tadpoles are still occasionally seen on sale having 'come in with the fish'.

gress are essential — formal ponds surrounded by overlapping flagstones prevent both adults and young from leaving the water at the end of the season.

Large, neatly manicured lawns and sparsely planted gardens are a hazard — amphibians face potential desiccation and predation when crossing these. A bog garden acting as a corridor to densely planted areas is ideal but not always possible. Gardens that are completely fenced off prevent dispersion of the young causing overpopulation in a limited area. Such fencing may prevent colonisation in the first place. Lawns hold another potential death trap — newly metamorphosed amphibians may disperse via the lawn and can be massacred during mowing operations. Checking first and delaying mowing will help.

Within the pond conditions may be unsuitable: dense plantlife leaves little room for the occupants — newts in particular as they require some open spaces for their courtship rituals. A heavy growth of duckweeds (*Lemna* spp.) can, like *Azolla*, completely cover the surface excluding light which is necessary for other life forms. A heavy build-up of silt and dead leaves can be dangerous particularly when the pond freezes — some frogs overwinter under the water and some tadpoles/newt larvae remain behind — look out for these during cleaning operations!

After a near disaster last year our wildlife pond was given a good clean out in February. Heavy rain also diluted the over-rich water producing ideal conditions by the time of the first spawning. Nutrient-rich water soon turns into 'pea soup' as increased light occurs when the days begin to lengthen producing less than ideal conditions for amphibians and can be troublesome to eliminate.

Useful food for newts and their larvae

Daphnia and *Cyclops* are useful but their development is often temperamental. At times the water can be red with thousands but they

disappear quickly. Both are useful food for newts and their larvae. Chemical algicides are not recommended where amphibians are present; barley straw blocks may be useful but they take time to work. Although frog tadpoles will eat *Blanketweed* dense masses of it can trap them; newt larvae are particularly susceptible to becoming entangled in it. Manual removal of dense masses is advisable before spawning — the tadpoles will see off the rest.

Once established a garden pond will soon attract other forms of wildlife, some desirable others less welcome. Bloodworms, glassworms and gnat larvae will appear and provide food for newts; various flying insects are snapped up by frogs and toads. Carnivorous beetles and dragonfly larvae may also turn up—in a small pond these predators can be removed when seen although it could be argued that they are part of the natural life. Blackbirds often sit at our pond to take frog tadpoles and on two occasions a heron has been seen eyeing up the prospects but seemed to decide it wasn't worth the effort.

Completely cleared of Koi

Heron can make short work of frogs (and fish). A friend had his large pond completely cleared of Koi by herons; having restocked with *Shubunkins* it was then cleared by thieves who possibly thought they were Koi! Grass snakes, where they occur, may find a garden pond irresistible; in a recent account one pondkeeper, having had all the tadpoles eaten constructed a snake-proof fence of mesh, angled outwards around the pond — evidently it was successful.

Although amphibians in garden ponds are relatively 'safe' they can become victims of their own success. Once colonised ponds may attract newcomers; those born there will probably return until eventually the water is practically full of spawn. Frog tadpoles do not eat all the jelly — it decomposes and too much can pollute the water. The only solution

is to remove some to various containers for hatching and rearing or give some to friends who may have an empty pond. Overnight the carbon dioxide content can increase especially as the weather becomes warmer. Early morning sees overcrowded tadpoles 'blowing bubbles' at the surface — a danger sign! Filtration is an obvious threat to tadpoles — it also removes many beneficial small organisms.

A reasonable plant growth is advisable; plants recycle nutrients, helping to maintain a balance. After spawning our frogs spend much time, apparently basking, in the baskets of the marginals and among other pondside plants. Aquatic plants are used by newts for egg deposition. Although the female normally folds her eggs inside leaves they are often simply stuck on longer leaves that cannot be folded and are even found adhering to roots or grass.

Planting wild flowers

In one of our fishponds newts regularly attach their eggs to plants in the shallow end. The goldfish have discovered this and by turning onto their side can wriggle through the plants to eat the eggs accompanied by an audible sucking sound which warns us to look for eggs and remove them to the frog pond. If desired one can make the garden more attractive to other wildlife by planting wild flowers. As well as being beneficial to various creatures it is also a means of preserving the plants themselves many of which are becoming less common in the wild.

In recent years 'purpose-built' wildlife gardens have become more popular; the main feature being an amphibian pond with the surrounding area designed to replicate a wild habitat. In an ideal set-up, as well as shrubs and wild flowers, logs and other hiding places are needed and will soon attract insects and birds. Here a Red Admiral butterfly is feeding on a Buddleia flower.

In recent years 'purpose-built' wildlife gardens have become more popular; the main feature being an amphibian pond with the surrounding area designed to replicate a wild habitat. In an ideal set-up, as well as shrubs and wild flowers, logs and other hiding places are needed and will soon attract insects and birds. Here a Red Admiral butterfly is feeding on a Buddleia flower.

PHOTOGRAPH
BRIAN BEVAN

mended before starting. In an ideal set-up, as well as shrubs and wild flowers, logs and other hiding places are needed and will soon attract insects and birds. However, this is not to everyone's liking — garden design is a matter of personal taste but providing basic conditions, as outlined, above will be beneficial to amphibians that colonise the pond.

Despite the keeper's efforts fatalities will occur. As with other creatures amphibians are subject to accidents and disease. They depend on finding adequate food during the summer to survive the winter hibernation. Mild winters can cause depletion of their food reserves leading to weak, sickly specimens in spring. It is not uncommon to find that some of those remaining in the pond over winter have died, particularly if the pond has frozen over. Another natural hazard, the attentions of too many males to a female may cause death in extreme cases.

Disease can strike, sometimes with no obvious symptoms. Three tragedies occurred in our pond this year. Two females were found in a bloated condition, unable to submerge and, because of their size, completely ignored by the males. A third bloated female was found with her swollen tongue protruding — she died soon after. Whatever the cause the infection thankfully did not spread to the others. The odd one or two deaths are natural, larger numbers of diseased and dying amphibians should be reported to Froglife, Triton House, Bramfield, Halesworth, Suffolk IP19 9AE. Tel: 01986 784518. Fax: 01986 784579. e-mail: jim@tritonhouse.demon.co.uk.

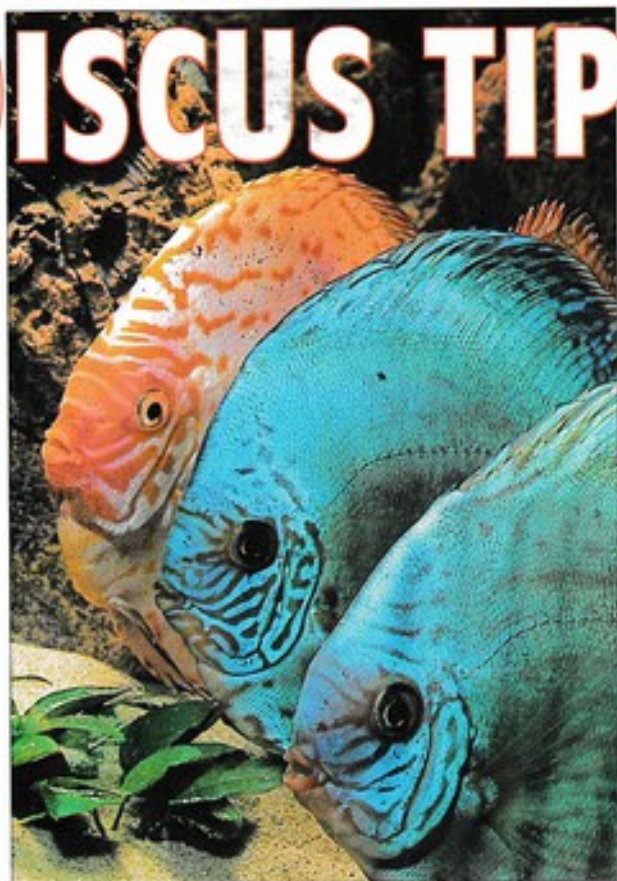
Having set up a wildlife pond it can be maintained with relatively little effort and will provide many hours of interest and fascination. These days wildlife needs all the help it can get. One caution, which should be common sense, pesticides and weedkillers are fatal to wild creatures. Amphibians are excellent pest controllers as are the many birds which will be attracted to your pond and garden.



This month **TONY SAULT** is our guest Discus Pool writer:

PHOTOGRAPH: M.P. & C. PIEDNOIR

A to Z of DISCUS TIPS



left A group of beautiful Discus showing just a few of the colour forms available.

Acidic water is preferable for Discus but need not be exactly 6.3 or exactly 6.5 as long as it is on the acid side of neutral. Acid buffers can be used quite safely to lower your pH.

Brise shrimp nauplii are the ideal first food for Discus fry when removed from the parents. Hatch at a temperature of 80-82°F, pH of 7.5 or over using six teaspoons of salt per gallon of water and one teaspoon of eggs.

Canister filters are ideal for Discus species or community tanks, choose one that will turn over the volume of the tank two to three times per hour.

Disinfect a tank that has had disease in it with Potassium Permanganate. Anything that can be boiled should be, all other equipment associated with the tank should be placed in Potassium Permanganate. Use enough Potassium Permanganate to turn the water a deep purple and leave standing for one week, then clean out and thoroughly rinse with fresh water.

Earth worms to feed to your Discus can be encouraged by using grass cuttings built up in layers in a garden corner, not the compost heap. Keep moist and the worms will enter through the bottom and work their way up through the layers.

Fungus on a batch of eggs can be delayed by adding a dose of the broad spectrum bactericide/fungicide on days one and

two prior to hatching.

Gill problems can be caused by poor quality water, too high a temperature, oxygen depletion, or parasites. Always eliminate the first three before treating for parasites or you will just make the problem worse.

Heat treatment for Discus has long been recognised as "the cure without drugs". The temperature is raised to 90-92°F for a few days, this speeds up the fishes metabolism and induces feeding. Good aeration should be used in conjunction or oxygen depletion may occur.

Intestinal parasites are usually accompanied by the excretion of white faeces. These should be examined for any indication of parasites before resorting to a treatment of drugs.

Juvenile Discus are very strong shoaling fish and should not be kept in a shoal smaller than six.

Knowing the normal behaviour of your Discus will assist you to easily spot the abnormal if and when it does occur.

Loss of colour or when the Discus turn very pale can be caused by over bright lighting or too high a pH.

Mauve gill filaments instead of the normal creamy white, indicate a toxin in the water such as ammonia. Test all the tank parameters especially the pH, ammonia and nitrite.

Nitrate in high quantities in the Discus tank can produce the same symptoms as external parasites. Signs such as flicking fins and rubbing against objects. When you see these symptoms always test your water first before using drugs.

Open wounds or scratches from the tank decor will heal much faster if a broad spectrum bactericide is added to the water to inhibit infection.

Prevention is always better than cure. There is no substitute for a clean, well maintained, sensibly stocked aquarium.

Quarantine tanks are a must for the serious Discus keeper, these can also double, if needed, as hospital tanks.

Razer-back is the name given to Discus that are badly infested with parasites and have lost a lot of weight causing the forehead to become very sharp pointed.

Spiromonias in Discus can be cured quite easily, treat with Metronidazole, one 200mg tablet per 10 gallons of water.

Tail and fin rot is caused by bacteria attacking the Discus which usually succumb due to stress. Find and remove the cause of the stress then treat the bacterial problem.

Ultra violet sterilisers can be used quite successfully to "dampen" down harmful bacteria but should not be used constantly or as a matter of course. A breeder who uses constant UV is also expecting you to use one or suffer the consequences.

Vitamins are essential to the health of your Discus but need not be added in quantity to your beef heart mix. As long as you add an amount of one good quality flake this will contain all they need.

White worms for your Discus can be cultured in margarine tubs using a mixture of peat, soil and fine sand. Feed the culture daily on Ready Brek mixed into a paste.

Xtra feeds of a cultured live food, such as white worms or small red earth worms, can be used to bring spawning Discus into top condition.

Young Discus can be weaned onto solid food within days of leaving their parents. Try a very fine powdered food such as Promin to get them off Brine shrimp and on to solid food.

Zero ammonia is essential in the Discus tank. Mature the tank for at least four weeks using a small shoal of Corydoras. The Discus should be introduced last when the tank is fully mature.

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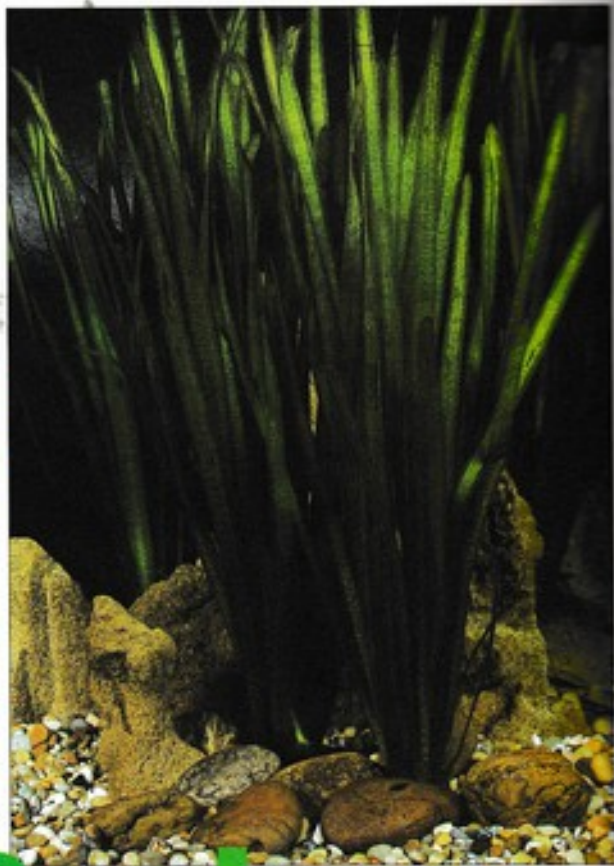
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Plant expert **STEPHEN HOOK** takes a look at some common aquatic plants for furnished aquaria:

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The Aqua Gardener

Vallis

There are three common freshwater species of *Vallisneria* — *spiralis* (Straight Vallis), *gigantea* (Giant Vallis), and *aristata* var. *bruceensis* (Corkscrew Vallis). All these plants belong to the Hydrocharitaceae or frog-bit family. The word Hydrocharitaceae comes from the Greek words *hydro* meaning water and *charis* meaning elegance, most of the members being showy aquatic plants.

V. spiralis grows in the mud at the bottom of fresh-water streams and ponds in tropical and sub-tropical regions. It is very common in Southern Europe, and temperate North America. The name *spiralis* applies to the shape of the flower stems, however, it is also known as eel grass or tape grass. This species requires deep water, as the leaves are long and it is necessary to cover them. They are light green and lined, and are good oxygenators in tanks. The roots are fibrous and help to purify the soil; propagation is by horizontal runners, on the end of which the new plants form. These new plants are the same sex as the parent plant — the majority of them being female. Few of the seeds germinate successfully, but when they do, they produce both sexes.

Vallisneria is dioecious, that is to say that the male and female flowers

grow on different plants. The female flowers have no staminodes, and a small perianth sessile on the ovary. This is surmounted by three broad styles, is unilocular or one-celled, and contains numerous ovules. The male spathes contain many zygomorphic flowers. These have three unequal sepals, three minute scale-like petals and three stamens — only two of which are fertile. As the time for fertilisation approaches, the female plants send the flowers up to the surface by producing long spiral stems. The male flowers become detached, and also rise to the surface.

above left The large, hardy variety known as *L. mullerti* is now considered a hybrid, *Ludwigia palustris* x *repens*, and comes from South America. This variety grows successfully in a tank because it gives off less roots.

above right *V. spiralis* grows in the mud at the bottom of freshwater streams and ponds in tropical and sub-tropical regions. It is very common in Southern Europe, temperate North America and makes an excellent hardy aquarium plant.

the sepals forming a float. The female flowers remain stationary, and the males float about until they come into contact. The stamens are semi-erect, and the anthers burst to release the large adhesive pollen-grains. Once fertilised, the long spiral stems of the female flowers contract, and the fruit opens under the water. The male flowers always remain closed to prevent damage when below the surface, growing near to the crown of the plant, while the female flowers grow from the actual crown.

Owing to the fact that the male flowers depend upon the wind to blow them in the vicinity of the female flowers in order to pollinate them, wind is considered to be the pollinating agent. Nearly one-tenth of all flowering plants are wind-pollinated. The embryo has a large round cotyledon, adjoining a narrow and tapering hypocotyl. At the base of this is the plumule which is directed downwards.

V. gipsonii has leaves almost 1m in length, and measuring as much as 1.4cm wide. They have bristly edges, and are easily distinguished from *Sagittaria* by the three longitudinal stripes of two different shades of green. *V. gipsonii* is a native of the East Indies and Southern Asia.

Corkscrew Vallis has leaves between 15cm and 25cm long while Straight Vallis has leaves between 24cm and 45cm long. All grow well in various tanks according to the size of the species, providing they have sufficient light. Although most aquarists think of *Vallisneria* as a fresh water plant there are three species to be found in tropical seas as well.

False Loosestrife

Although people usually hesitate to call plants as anything but their English names, False loosestrife is an exception to that rule, and is widely known by aquarists as *Ludwigia*. In America it is sometimes called Swamp loosestrife, and in England it is also known as Marsh *Ludwigia*.

It is not a member of the Lythraceae, and therefore not a true loosestrife, but belongs to Onagraceae or the willow herb tribe, while the sub-order to which it belongs is Isnardia. This latter name is derived from the 18th century French botanist Antoine d'Isnard. Most members of Onagraceae are herbaceous and hardy. A number of them creep, and they love moisture. *Ludwigia palustris* is not commonly found in England, and is mostly localised to Sussex and Hampshire, but in America there are 25 species. The Evening primrose and *Fuchsia* are very close relations, and although it cannot be classed as a true aquatic, *Ludwigia* grows very well in water. Its natural habitat is on the sides of ponds and streams, often together with water-cress. It is, therefore, classified as a bog plant.

The leaves are entire, and arranged in pairs, and adventitious roots grow freely. The flowers are yellow, and the parts are arranged in fours. That is to say, the calyx is four parted, there are four stamens, and the fruit is an egg-shaped capsule which is four-celled, and four-valved. This plant blooms in July, and when grown under water some of the leaves emerge.

There are several varieties of *Ludwigia* suitable for aquaria (rather depending upon the size of the tank) and mostly coming from different parts of America. The large, hardy variety known as *L. mullerii* is now considered a hybrid, *Ludwigia palustris* x *repens*, and comes from South America. This variety grows successfully in a tank because it gives off less roots. Florida boasts a red-leaved variety which unfortunately tends to lose its colour once it is removed from its natural environment.

Ludwigia is a good oxygenator in a tank, and is also decorative. To keep it growing successfully, it is necessary to keep the shoots nipped back, and not to trim the plants from the roots as is common to many other plants.

The best method to propagate young plants is to put cuttings into small flower-pots containing wet soil, over which is a layer of sand. The cuttings will root in a very short time, and then the pots can be placed in the bottom of the tank. If plenty of light is allowed the undersides of the leaves will turn red.

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Life in the Oceans

THE CRUSTACEANS - PART 2

Shrimps and Barnacles

Shrimps and prawns inhabit all areas of the seas from rock pools and intertidal sand flats to the deep-sea, some being totally oceanic, often performing feeding migrations of over 800m, to the surface and down again in one day. Basically it is best to think of these as small lobsters and the best way to tell if you have caught a shrimp or a prawn is to employ the saying "shrimps like sand, prawns like pools". Take a powerful tooth down to the rocky shore one night and go rock pooling. Their eyes light up in the dark, and it is a most rewarding experience. They feed on all sorts of food, mainly filter feeding and deposit feeding, although a few specialised adaptations have occurred.

Most people have heard of the Cleaner wrasse which inhabits coral reefs and clean ectoparasites of fish. Many species of shrimp also act in this manner. These are highly coloured creatures and tend to fish at a local cleaning station. The fish remains totally motionless whilst the shrimp climbs all over its body, often poking the claws into delicate areas such as gills. If the fish is small, the weight of the shrimp drags the fish to the bottom, and it appears that the shrimp is eating a dead fish.

Though not a true shrimp, the Mantis shrimp is a very powerful predator indeed, the main item on its menu being crabs. As the name suggests this shrimp resembles the praying mantis insect by having two large arms curled under the body. These are pushed forward and belt a crab. The force of this action has been measured and likened to being hit by a 2.2 bullet. The crab is beaten to death and the force of the blows shatters the body so that the shrimp can consume the juicy parts. Mating is similar to that of crabs, although hermaphrodites do exist.

Penaeid prawns are very important in shrimp aquaculture. They make up the largest harvest of all species that are cultured, and often support local communities in underdeveloped countries. The world harvest is

around 0.75 million tons. That's a lot of prawns as the average weight when harvested is 20 grams. With advancements in science, and understanding of the biology of different species, it is now possible for more and more species to be cultured. Many species are being depleted at a vast rate for the Far East market. Without culture these would soon be on the endangered list but their future is now more promising.

Also, whole areas of coral reefs have been destroyed in the past by cyanide and dynamite fishing for the aquarium trade. We can now culture over 35 species of fish for this trade and also some of the cleaner shrimps as well. So not only does aquaculture produce fish and invertebrates at a low price (salmon is now the price of cod) to the market, it also has the potential to save many species from the endangered list, and whole areas of reefs from destruction.

above Many species of shrimp clean ectoparasites off fish. These are highly coloured creatures which tend to fish at a local cleaning station. The fish remains totally motionless whilst the shrimp climbs all over its body, often poking the claws into delicate areas such as gills. Here we can see a Pacific Sailfin Tang being cleaned by a pair of Cleaner Shrimps.



The Barnacles

Why bother to look at such a grouping of animals as the common barnacle? Basically they are amazing animals and the following paragraphs will reveal all.

Mr Charles Darwin was out to dinner and during polite conversation (this was after the publication of *The Origin of Species*) was informed that he knew nothing about barnacles. This remark must have hit home as during the next eight years he devoted himself to studying barnacles. He eventually produced two volumes dedicated to the humble barnacle. These are still used as a source of reference today, and every reputable marine library has copies. After these were published he referred to them as 'his blessed barnacles', blessed being the most vulgar word available to a gentleman of that period. So if Charles Darwin spent eight years studying them, I am sure that a few paragraphs here are worthy of your attention, and you will never see barnacles in the same light again.

Barnacles belong to a group known as the cirripedia, the name is taken from the fact that their legs have become so modified into feeding structures they are not legs any more, but cirri. So cirri and pedis = legs, thus we have the grouping cirripedia which are exclusively barnacles and contain the 900 or so species.

These are the most highly modified marine crustaceans and are effectively headless, with no abdomen or segmentation, their size ranging from a few millimetres to 75cm. They are found in most marine environments and I really do mean most environments. They are present in huge numbers in 'normal' habitats, often reaching a density of over 90,000 per square metre of rock surface. The oldest species of barnacle alive to date was found at a hydrothermal vent site on the Mid Atlantic Ridge, dating back 260 million years. As such, the barnacle is one of the oldest creatures living today.

However, many are parasites and can be found in places as diverse as dolphins teeth, corals actively feeding off the polyp and if you cut open a certain species of turtle (but please don't do this) you will find 200-300 barnacles attached to the throat. They cover many hard surfaces, on the backs of whales and crabs, and have caused millions of pounds to be spent by their behaviour in covering pipe works and ship's hulls.

There are two different forms of non parasitic barnacle, these being the stalked and non stalked forms, the latter being the more advanced. Evolution here has acted to reduce and lose the vulnerable stalk. The beast lies on its back and cements itself to the surface by a bio-adhesive, and builds a shell around the body. It still has a cuticle exoskeleton which is moulted allowing any damage to be repaired and growth to occur.

above Blood Shrimps make very beautiful and fascinating aquarium inhabitants. They tend to be rather timid at first and are happiest if kept in pairs.



Banded Boxing Shrimps are naturally found living as pairs in the wild and this is the ideal in captivity as well. The problem is that shrimps of the same sex will kill each other so sexing becomes very important. Males tend to be smaller than females and are more slender — if in doubt, keep just one by itself!

LIFE IN THE OCEANS

Shell provides cover

The soft new cuticle is not a problem as the shell provides cover for the animal when the new cuticle hardens. The legs are now the feeding appendages but also force water down into the shell providing a current allowing the animal to breathe. If you place a small barnacle encrusted rock into a tank you will see how these limbs beat to catch food, if you are lucky, you will see a mating. Also watch how the animals respond when you pass a shadow over them, for the shadow could be a fish waiting to nip off a juicy arm.

The legs are covered in stiff hairs which give the appearance of feathers. These catch the food, but also force smaller animals which could pass through the filter down to the mouth. So why don't the smaller animals just pass through the filter and escape? If you are a microscopic member of the plankton, water is a very different substance from what we humans perceive it to be. It is all to do with size and the weight of the animal. This was worked out by one Mr Reynolds who was an esteemed physicist.

We biologists are renowned for our ability to avoid mathematics at any cost and where possible we leave numbers to other learned people. So, Mr Reynolds devised a number for each size of particle and this is known as the Reynolds Scale. That number depicts how fast a particle will sink. To cut a complicated story short if you are a microscopic animal swimming in seawater it's like us swimming in warm pitch, a very thick sticky substance. Filter feeders can therefore catch food just by creating a current towards the mouth parts.

REPRODUCTION: These beasts have one big problem to reproduce

sexually as they cannot move to find a mate. So most are hermaphrodites but the male part still has to find another animal, to deliver the sperm. They do this with an elongated penis or multiples thereof, known as penes. One species inhabiting northern waters has eight penes, each fifteen times the length of its body, the largest organ of its type in proportion to the body size. When the animal is feeling a bit horny it throws the penis out of the shell and just prods around looking for a receptive beast. This is the clever part for on this organ are sensory cells which pick up chemical signals from the receptive animal and these chemicals guide the penis to the part of the body which is waiting for the delivery of the sperm.

Variations do occur where animals sit on top of each other, the bottom one being a large female and the smaller one on top being a dwarf male, waiting to attend the female. This is taken further in another species where the male attaches to a female, stops feeding and metamorphoses into, basically, a sack producing sperm until all the energy reserves are used, when the male dies and another takes its place. Oh how good it must be to be the female of that species.

Eggs are brooded and larvae are released. Called nauplii, these can remain in the plankton from a few days to months and develop through six stages. They then form a distinct non feeding cypris larva. Now the countdown begins!

This baby beast has to find the right place to settle and metamorphose into a feeding juvenile before its energy reserves are used up, or it dies as it has no mouth to feed. The animal doesn't settle anywhere as this would often lead to death by either being eaten or being crowded out by other stronger animals. It recognises chemical signals from the adult population and thus is attracted to a safe place where it can build its house, grow, and reproduce.

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Derek Lambert's Cutting Edge

PHOTOGRAPHS: DEREK LAMBERT UNLESS OTHERWISE STATED

• OUR MONTHLY LOOK AT RARE FISH AND THE SHOPS THAT SUPPLY THEM •

T Last month I mentioned the lovely Koi I saw at Shirleys Aquatics but at the time my photographs had not been developed. Well now they have, so I am including a photograph of just one of these beautiful works of living art with this month's Cutting Edge. Whilst fish with price tags in their thousands may be out of your price range, they also had a good range of young fish which would be a good investment for the future.

This shop has far more than just Koi, however. Their tropical and marine sections hold a good range of fish at reasonable prices as well. Once again my eye was drawn to some Altum Angels (good size, condition and price) but it was the Wakin (Tri-tail) Goldfish which nearly opened my wallet. They were beautiful nacreous creatures, well up to size and many with good colour. Only my lack of a suitable aquarium held me back from buying any. Some of the other Goldfish were of a very high standard as well, so this shop is well worth adding to your list if you are looking for something special in that line. The lemon yellow singletails were some of the best I have seen in years and well up to show standard.

The range of equipment was also good (just as you would expect from such a large venue) but one product I never expected to find was a 1lb can of Brine shrimp eggs. In the past you could expect to pick up Brine shrimp eggs from any number of sources but with the present Utah lake crisis Brine shrimp eggs are almost as rare as gold dust and often just as expensive. Sorry to say I grabbed the last can (more should be available by now but check by phone beforehand), and I have been very pleased with the hatch rate.



above Last month I mentioned the lovely Koi I saw at Shirleys Aquatics but at the time my photographs had not been developed. Well, now they have, so I am including a photograph of just one of these beautiful works of living art with this month's Cutting Edge.

New one-sided livebearer

Over the last few years we have seen a major upheaval in the *Jenynsia* genus with several new species described and a few old ones re-instated. The fish we have always known as *Jenynsia lineata* even proved to be another species — *Jenynsia multidentata*. This shuffling around of names and descriptions of new species meant very little to the livebearer hobby as none of the new species were available.

I am pleased to say that has all changed now and *Jenynsia maculata* has been established in the hobby. They were collected by Jaap-Jan de Greef during 1997 at a place called Embalse de Maldonado in Uruguay. The American aquarists who were the first to work with these fish have

now taken them through three generations and have a stable breeding group.

In many ways it looks very similar to *Jenynsia multidentata* except for colour. The fine spots, dots and lines commonly seen on that fish are replaced by much larger black spots over all of the body. These are arranged in lines and have a sharpness never seen on the old species.

As yet they are still in very short supply but a colony has already been established in the UK so we should see youngsters start appearing in the specialist livebearer auctions over the coming year or two. Next month I hope to bring you a photograph of this fascinating new species.



left The Celebes Rainbowfish is now called *Marosatherina ladiges* (Ahl, 1936), with the new genus named for Maros, a town in the southwestern part of Sulawesi, which lies in the distribution area of this species.

PHOTOGRAPH: M.P. & C. PEDNOR

New names for old!

Those of us who have been keeping aquarium fish for a long time are used to the way scientific names seem to change almost as fast as the seasons do. So it will come as no shock to find that one of the best known Rainbowfish has a new name. Celebes Rainbowfish were first introduced to the aquarium hobby in 1933 a full three years before they were described by science as *Telmatherina ladiges* (Ahl, 1936). They were an instant hit and have remained popular ever since.

More recently other members of the *Telmatherina* family have been imported, one of my favourites being *Telmatherina celebensis*

Continued overleaf ▶



◀ Continued from previous page

from Lake Towoeti. These new imports have occurred because this island is now more accessible with new roads being built and many jungle areas cleared to make way for agriculture. This means live and newly collected specimens of a number of species have become available to scientists for the first time and a proper phylogenetic analysis of the Telmatherinidae has been undertaken. This proved that the Celebes Rainbowfish should be placed in its own (monotypic) genus. The Celebes Rainbowfish is now called *Marosatherina ladigesii* (Ahl, 1936), with the new genus named for Maros, a town in the southwestern part of Sulawesi, which lies in the distribution area of this species.

Literature

Aarn: Ivantsoff, W. and Kottelat, M. *Phylogenetic analysis of Telmatherinidae* (Teleostei: Atherinomorpha), with description of *Marosatherina*, a new genus from Sulawesi. *Ichthyol. Explor. Freshwaters*, 9(3), 1998, pp 311-323.

Identity crisis

Finally this month I hand you over to cichlid expert Mary Bailey so she can unravel the true identity of 'Haplochromis zebra obliquidens'.

Haplochromis obliquidens is a Lake Victoria cichlid which also has the distinction of being the type species of its genus, i.e. the first species described and that on which the definition of the genus was originally based.

Some years ago a stunningly colourful cichlid appeared in the hobby under the name *Haplochromis obliquidens*, but purporting to be from Lake Malawi; this could not be correct if the fish were truly *H. obliquidens*. At the same time its coloration in no way resembled that described for the true *H. obliquidens*, which suggested it might be a Malawi masquerading under an incorrect name. Except that nobody familiar with the fishes of Lake Malawi in the wild had ever encountered a similar fish.

Because the ID was so obviously incorrect, this fish was subsequently re-labelled *Haplochromis 'zebra obliquidens'*, the designation under which it is now best known, although it is still sometimes seen as *H. obliquidens*. Until recently its true identity and provenance have remained a mystery to aquarists, and it has been

right Riddle solved ... *Haplochromis 'zebra obliquidens'* is in fact *Astatotilapia latifasciata*.

PHOTOGRAPH: MARY BAILEY



left More recently other members of the Telmatherinidae family have been imported, one of my favourites being *Telmatherina celebensis* from Lake Towoeti. These new imports have occurred because this island is now more accessible with new roads being built and many jungle areas cleared to make way for agriculture.

below Over the last few years we have seen a major upheaval in the *Jerynsia* genus with several new species described and a few old ones reinstated. The fish we have always known as *Jerynsia lineata* even proved to be another species — *Jerynsia multidentata*.

assumed to be an undescribed species.

In fact this fish has been described — its scientific name is *Astatotilapia latifasciata*, the specific name meaning 'broad-banded'. It is endemic to the Lake Kyoga basin, which lies to the north of Lake Victoria and contains not only Lake Kyoga but also a number of other lakes and swampy areas. It is known from both Lake Kyoga and Lake Nawamampasa, but as the ichthyofauna of the region is poorly studied it may occur in other lakes in the basin as well. It tends to be solitary in its habits, and is thought to be primarily an insectivore, with indications that it may occasionally also feed on the scales and fins of other fishes although it has not proved notorious for such behaviour in captivity.



The Red Striped Killifish

A perfect aquarium fish

There are a few species of fish whose adaptability makes them ideally suited to life in the aquarium. Using the criteria that the fish are beautiful, will do well in almost any conditions, easily bred, and not only easily bred, but will also do so in a variety of conditions I would like to propose a killifish, *Aptosemion striatum* (Red striped killifish) as my candidate for the perfect aquarium fish.

You may be surprised at the choice of a killifish probably based on the misapprehension that killifish are short lived and difficult to breed. Now, while it is true that the killifish group includes the true annual fishes, the eggs of which do require a dry period, there are in fact more species of non-annual killifish whose eggs develop and hatch without a dry period.

Red striped killifish originally come from swamps, brooks and streams in the coastal rainforest of southern Equatorial Guinea and Northwest Gabon. Where temperatures will hover around the upper 60s or lower 70s°F and water will be soft, less than 1 DH, and have a pH on the acid side of neutral. There are, however, enough commercial bred strains of *A. striatum* so that it is now tolerant of a wide range of water chemistry, pH 5-8, hardness up to 20 DH and temperatures 60-80°F.

Like a lot of killifish *A. striatum* does not take kindly to large sudden changes in water conditions so when you acquire new stock try and find out what water they are in. If it's your local retailer the chances are that their water is similar to your own, however, if you've gone further afield I would recommend acclimatising gently.

Put your new fish in a flow tank or very small aquarium. Using an airline with a regulator valve in it siphon water into the fish from their proposed new home using the valve to adjust the flow to a slow drip such that the aquarium will fill over the next 24



to 48 hours. During this period make sure the aquarium is well covered.

Housing

A. striatum is not as boisterous as some of its close relatives and will live quite happily in a community tank with fish that are not overly aggressive. Although you should be cautious about mixing with fish with long flowing fins such as guppies as they may be tempted to nip them. If breeding is your aim an aquarium as small as 12 x 8 x 8 inches is more than sufficient for a pair.

Feeding

While most young fish can be trained to eat flake, they are happier on meatier food either live or frozen, particularly if you are going to breed them. I feed a lot of frozen bloodworm primarily because of the ease of handling although a feed of live food, be it a bag bought from the local aquatic outlet or just a net full of mosquito larvae from the water butt, is immediately rewarded by a surge in egg production.

Breeding

The first and easiest is the natural method, which is simply to keep them in a well planted tank with plenty of surface plant cover. Introduce a pair or couple of pairs, feed as much live food as possible and ensure the fish are generally well looked after. In about three weeks you should start to see fry appearing — particularly when you move the surface plants aside.

I then start to introduce food for the young fry which are relatively large and perfectly capable of taking newly hatched brine shrimp. Brine shrimp is easily the best fry food. Once I am happy there are a good number of fry in the tank, I move the parents to another tank thus allowing the young fry to grow on in safety. Adult fish may predate the fry although the main danger to the small fry are their older siblings.

The other method of breeding is far more interventionist; the adults are spawned onto nylon wool spawning mops in almost bare tanks. It is often beneficial to condition the females on a diet of live food for a week or so before

introducing the males. The mops can be removed daily or every other day and the eggs transferred into a suitable container — empty margarine tubs are ideal for this purpose.

The eggs need daily inspection to remove any that are infertile and succumb to fungus and regular water changes should be carried out. Addition of a fungicide agent such as acriflavin or methylene blue may be useful in limiting the spread of fungus to good eggs.

The first eggs will start to hatch from about the 10th day although some may take some time longer to hatch. The newly hatched fry can then be transferred to larger containers or a small tank for raising. The main drawback of this method is finding a way of keeping the various margarine tubs, etc., from getting too cold and thus killing all your hard collected eggs and fry.

In the absence of a space heated fish house or specially converted egg incubating cupboard, tubs can be floated in larger tanks taking care not to capsize them and empty their precious cargo into the main tank. If all accidents are avoided the fry can be moved into larger quarters as they grow.

These are such a stunning little fish and there are few sights as impressive as a tank full of them. I hope you will have the opportunity to keep them.

Further information about the British Killifish Association can be obtained from Adrian Burge, 14 Hubbard Close, Wymondham, Norfolk NR18 0DU. Visit our website <http://www.bka.freemk.com> or send your subscription of £15 to Cliff Griffiths, 8 Crophorne Close, Woodrow North, Redditch, Wores B98 7SJ.

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