AQUARIST & PONDKEEPER

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REGULARS

EDITORIAL

Well, here we are at *A&P's* 75th Anniversary edition! To celebrate this very special occasion we were originally planning to include a number of features about the good old days and a potted history of the magazine itself. The problem with this idea was the very limited space (despite an extra 16 pages this month) we have in the magazine.

If we took up large chunks of it with this sort of feature, we would have little or no room for what *A&P* is really all about — the fish! Instead we have included a couple of fascinating features taken from the very earliest days of our magazine's life. This way we can celebrate *A&P's* birthday, whilst not reducing the fish content of the magazine.

In the end, I do have to admit that one article on the early days has slipped into the magazine this month. John Cornelius has managed to capture the very essence of those bygone days, but also has something very pertinent to say about the aquatic press today. You can find his article on page 39, with our (let's be trendy here, after all we are 75 years young, not old) "mission statement" directly after.

Until next month ....

D. Lambert

EDITOR

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COVER PICTURE

PHOTOGRAPH: MP. & C. PIÉDNOIR

Boeseman's Rainbowfish
Melanotaenia boesemani Allan & Cross, 1980

Boeseman's Rainbowfish is one of the more recent introductions to the aquarium hobby, only making its debut in 1983. Heiko Bleher imported specimens to Germany and soon established a large breeding group. Within a short time they became the most popular and sought after Rainbowfish in the hobby and, as our cover picture and the photograph above show, this popularity is justly deserved.

In the wild it is a lake dwelling Rainbowfish which is found in the Ayamaru Lakes region of the Vogelkop Peninsula, Irian Jaya. Here they were originally found in huge numbers throughout Lakes Ayamaru, Hain and Aitinjo as well as in the creeks which feed these lakes. Unfortunately, over-fishing for the aquarium trade (up to 60,000 specimens per month were being collected by 1988) caused a rapid decline in numbers and eventually the government had to step in to prevent this gorgeous fish from becoming extinct. Most aquarium specimens are now bred in captivity.

In captivity this is a peaceful, robust Rainbowfish which grows up to 12.5 cms (five inches). It is best kept as part of a shoal of Rainbowfish, although single pairs will do well in a mixed community tank. They need clean well filtered water and will be one of the first fish to suffer if ammonia or nitrite levels start to rise for any reason. Unduly high nitrate readings will also cause problems, so lots of growing plants in the aquarium and regular partial water changes are important to their well being.

Otherwise, they are extremely easy to feed and care for. They will eat all commercial fish foods and seem to thrive on them. If you add regular feeds of live foods, however, their coloration will become even more intense. The pH should be neutral to alkaline and a temperature anywhere between 24-28°C is fine.

Breeding takes place almost every day with up to 20 eggs produced by each female. These are deposited amongst fine leafed plants or on spawning mops close to the water's surface. The adults generally leave the eggs alone, so after a week of spawning the plants or mops can be moved into a separate hatching and rearing tank. A week later the fry start to hatch out. These are very small to start with and need feeding on liquid fry foods or infusoria. After a week they are usually large enough to take newly hatched Brine Shrimp.

Whilst adults can tolerate some chlorine in the water the youngsters cannot. For this reason it is important to add a dechlorinator to any raw tapwater before you use it in the rearing tank. The youngsters tend to be fairly slow growing and full adult colour is not achieved until the fish are a year to 18 months old.

At first glance both sexes are similar in appearance. Females, however, are less intensely coloured and the male's first dorsal fin is longer and more pointed.

RAZOR

By R

Silently and with intuitive anticipation, the shoal moves steadily on its predetermined course through turbid waters of the Orinoco floodplain. Their instinctive destination a small, sparsely wooded island of trees that at this time of year is a favourite nesting site of the Great White Egret. Here the hungry fish linger among the partially submerged tree trunks and patiently await their moment!

High above in the tangled overhanging branches some of the now rapidly growing young Heron like birds are starting to take advantage of their parents' food hunting absences to explore, venturing precariously away from the relative safety of the nest. With spindly legs still awkward and unstable some lose their footing and with wings as yet not sufficiently developed to arrest their fall, flutter helplessly downwards.

It is for this reason that the Red-bellied Piranha have made their long journey to this place — the very moment they have been waiting for! Almost at the instant a bird hits the water the fish swarm in and surround the struggling creature. Immediately a single prominent member of the shoal moves forward, at the same time drawing back its lips to reveal a set of fearsome razor-sharp teeth. Without delay it commences to slice into the delicate flesh of the Egret's underbody. This is the signal to the rest!

Suddenly the previously tranquil water explodes into a seething turbulence of frenzied feeding as the ravenous Piranha, excited by the sight and smell of blood, violently thrash and jerk their sturdy bodies in a frantic effort to ensure a share of the prize. In a very short time it is over. The boiling water returns to its former composure as the writhing fish disperse. Now the only remaining suggestion of the recent savagery are the few pathetic white, bloodied feathers gently being carried away on the current. The Piranha pack reassemble in deeper water — the next meal may not be far away!

Fearsome predators

Piranha are without doubt among the world's most fearsome predators. Jaws pound for pound more powerful than those of any other aquatic animal are equipped with numerous interlocking razor-sharp triangular teeth, capable of slicing through flesh and sinew with truly horrifying ease as they come together in a scissor-like bite! With a reputation for such potential carnage it is hardly surprising that over the years writers and film makers have seized upon the fish's behaviour to help nourish their respective audiences' seemingly insatiable appetites for blood-letting and violent death!

Although this has undoubtedly produced many nail bitingly, entertaining adventure situations, an almost inevitable consequence of bringing together fact and fiction in this way has been that various exaggerations and distortions have been applied to the fish's true nature and disposition, giving it a worse press than perhaps is warranted!

This, of course, in no way suggests that the fish is not dangerous — in many instances it most certainly is! The stories that we have all heard about shoals of Piranha attacking large mammals and even humans, within minutes rending every trace of flesh from their bones, are unquestionably not without foundation. But to balance this it would also be true to point out that generations of native Indians have bathed in Piranha-infested reaches of the Amazon and Orinoco rivers without suffering too much harm.

The truth of the matter is that though there are some 30 different Piranha species found in South America, not all are ferocious carnivores. Some forms are exclusively fruit eaters and possess dentition suitable only for this type of diet. Others are parasitic — solitary hunters that gain nourishment from eating the flesh and fin of other aquatic creatures.

MOUTH

OSMINT

The most aggressive

It is the Red-bellied Piranha (*Serrasalmus nattereri*) that is the species probably most frequently seen and referred to. It is also one of the most aggressive! The body is extremely laterally compressed with an overall coloration that changes with the fish's age. Adult specimens are typically bluish grey on the back with flanks of light brown to olive embellished with numerous glistening spots. The belly and throat areas display a striking and contrasting orange/red, which together with the characteristic blunt head and under slung bulldog style jaw adds to the fish's menacing appearance.

This stocky fish reaches an average length of some 25cm (10 inches) with individual specimens often considerably larger or smaller than this. The dorsal and anal fins are broad based and set well back on the arced body. An adipose fin is present as in the case of many Characins, the family to which Piranha belong.

Even this savage predator that carries such a formidable reputation does not, in fact, obtain a high overall percentage of its essential animal protein from the flesh of large live terrestrial and airborne creatures. Most comes from other fish, with much of this being cannibalism on its own kind. Only occasionally will it get the chance to savour the flesh of living land-based animals, but as we have seen, when an opportunity presents itself and circumstances are favourable, it does the job with frighteningly ruthless efficiency.

In general terms the Piranha, it must be said, is not a fish for the average aquarist. Frequently injudicious attempts at keeping it are doomed to failure from the outset simply through a lack of appreciation of what is actually involved, as well as some basic misunderstandings of the fish's unique nature and requirements. A situation I have to say not always assisted at the point of sale where information and advice can sometimes be vague or even in some instances downright misleading.

Of course not all dealers offer Piranha for sale, after all they are not exactly "bread and butter" fish. Those that do, other than real specialist outlets, will frequently display an aquarium containing numerous juvenile specimens that on the face of it may be swimming around in a state of apparent harmony. Often, however, a closer look will reveal the start of a very different story!

Some individual fish may well already be showing "telltale" signs of injury. Missing fins, small chunks of flesh

above A picture that says it all!

below An adult trio of Red-bellied Piranha.

PHOTOGRAPHS: MR. & C. PIEDNOIR

RAZORMOUTH ....A terrifying look at Piranha

gouged out of the body, or perhaps an absence of the occasional eye! Wounds of this type are likely to be particularly found on smaller members of the group, clearly indicating, even at this young age, the emergence of a regime of dominance of stronger fish upon the weaker.

Cannibalistic methods

In keeping with most other predatory fish species, a group of Piranha, no matter how well fed, will not all develop at the same rate. Before long a slight size discrepancy will occur, whereupon the larger start to inflict injury upon the smaller. Eventually these weaker members of the shoal will be killed off and eaten. This process does not, however, stop here for as the remaining fish grow, development imbalances continue to occur and the same cannibalistic methods of determining dominance are maintained. In many instances a tank of small predatory Piranha will, if left to their own devices, regularly reduce their own numbers in this way until eventually only a single very large, extremely powerful, and self satisfied fish, remains — the ultimate totalitarian regime!

It is possible in very large aquaria where conditions are entirely favourable to maintain a shoal of Piranha that will live in reasonable harmony. This is achieved only where the fishes themselves have come to terms with their environment and each other by establishing a definite hierarchical system — a pecking order in which each member of the group knows and accepts its place within the overall community structure. In general terms, however, before such an accommodation is reached the prospect of much blood-letting and violent death is to be expected.

An expensive business

For those wishing to keep Piranha in more modest circumstances the only really sensible way forward is to acquire a single specimen. But even here a sizeable aquarium is required — these are quite large and very powerful fish. Purchasing a mature Piranha from a specialist dealer can be an expensive business, so as with almost any other species many advantages arise from getting a juvenile fish and raising it to maturity yourself.

The Piranha aquarium should be well filtered, preferably using an undergravel system supported by a good power unit. Heaters should be of robust construction and protected from possible damage by the fish, using rocks, etc. Plants will not normally be eaten, but in many ways artificial alternatives may provide a better option.

Obviously, predatory Piranha must receive a diet high in animal protein. The form that this takes can vary between individual specimens, but certainly by buying a young fish you will have far greater opportunity of influencing it than is likely to be the case with a mature subject more set in its eating habits. In some cases only moving prey may be readily accepted. This might include live fish, earthworms and insects. But in many others a range of non-live meaty edibles will be enthusiastically taken such as chicken, haddock, cod, sprats, liver, beef heart and carnivore flake among numerous others. In the end it comes very much down to trial and error.

Do not forget that this fish bites — yes, even the hand that feeds it! A small specimen is capable of administering a nasty nip, whilst a mature one can inflict a fairly serious wound. The teeth of the Piranha are so perfectly designed for slicing through flesh with minimum resistance that it is said victims feel no pain, although it must be stated that I have no first hand experience as to the authenticity or otherwise of this claim!

Projecting a self-image

I suspect that in many instances those who choose to keep predatory Piranha may do so,

left Normally the teeth of a Red-bellied Piranha are tucked away behind its lips but even at rest you can see a hint of their formidable dentition.

PHOTOGRAPH: MP. & C. PIEDNOIR

people endeavour to use the threatening appearance of a heavily chained and studded Rottweiler to portray a desired character representation. Not that I am, of course, suggesting that the fish be taken for exercise around the local block — but you know what I mean!

As responsible aquarists we should never consider purchasing any species without first acquiring some knowledge of its habit and behavioural characteristics, thus enabling accurate assessment of its suitability for the intended circumstances.

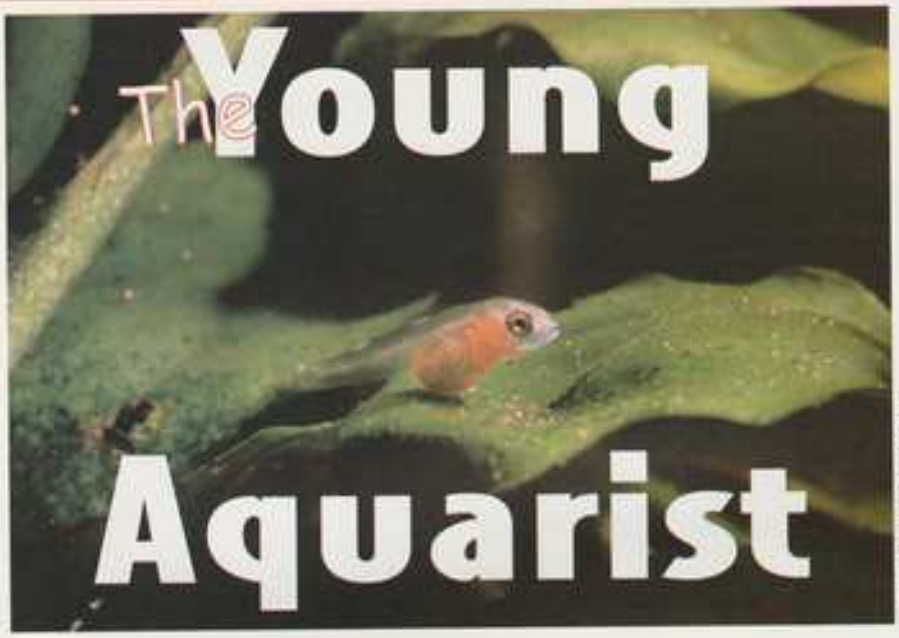
At no time is this fundamental rule more relevant than in the case of the predatory Piranha.

Ignore it at your peril!

not so much out of any particular interest in the animal itself, but more from a fascination stimulated by the creature's fearful reputation, or from a desire to use this reputation in order to help project a certain self image. This would be in much the same way as, for instance, some

above A shoal of Red-bellied Piranha on the prowl.
PHOTOGRAPH: MP & C. PEDNOR

The Young Aquarist



PHOTOGRAPH: M.P. & C. PIZZNOR

When my son was ten years old he became very interested in fish. He was full of enthusiasm — still is — and I learned a lot from him. Goldfish were the first interest but soon, when he saw all the beautiful tropical fish in our local aquarium shop, he dragged me along and we were both hooked from that day on. This page is based on our experiences from the beginning which I would like to share with you.

Taking the first steps

One of the first things you need as a beginner fishkeeper, before you buy any fish, is a book that tells you about caring for your fish. Fish food manufacturers often produce free booklets that give this kind of help. Other small, inexpensive books are available if you look in aquarium shops. Perhaps you can find one in your local library. The sort of book to look for is one with pictures and a little information about lots of different tropical fish. This will give you the best chance of getting to know most of the fish you see when looking around an aquarium shop. This book should also be light and easily carried because you will need to take it with you on each and every visit to the shops.

Many of you reading this column will be keeping fish already. Have you had any problems caused by not following any of the three important points mentioned? Share your experiences 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:
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Why did I choose White Shark as my e-mail address? Well, White Sharks are one of the largest livebearers in the world and I love livebearers!

See you next time ... **Pat**

What you really need to know
(about the fish you'd like to keep)

1. What size does it grow to?

This is very important. Many small (two inch long) fish sold in aquarium shops are very pretty, young fish (or small and ugly if that's what you like), but, if you haven't got your little book with you, you won't know that these may grow into enormous fishes. Maybe one or two feet in length, that just will not fit into your 24 inch long aquarium. Beware of fish labelled "African Barb" or other very general names. This usually means the shopkeeper does not know what this species is and it may turn out to be one of the big ones (this is a mistake we made more than once!). You should only buy species that are clearly named and which you can identify in your book.

2. Is it a good community fish?

You need this information or you may buy a very quarrelsome fish that bullies or even kills the other fish in the tank. It's best to start with small, peaceful, community fish (even with these you can get a nasty one — we've had those).

3. Where does it prefer to swim: top, middle or bottom of the tank?

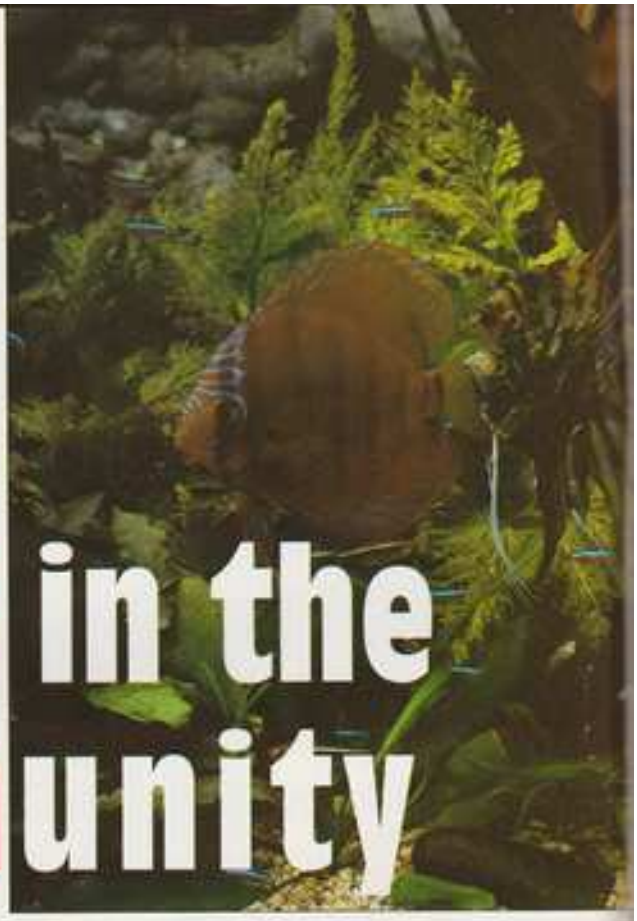
This matters a lot especially in a small aquarium. If all the fish you chose swam at the same level of the tank it could make them squabble in the crowded swimming space. Look at fishes in dealers' tanks and you will see which part of the tank they like to swim in. Your book should also tell you this.

Buy your fish from a good aquarium shop. The shopkeeper should be able to help you. We were very lucky when we started out, we had a great local shop where lots of Saturdays were spent looking at, and learning about, the fish before any were bought.

Most of us start with a 24 inch long tank which will hold about 20 fishes each up to two inches in length. This is probably the best size to begin with. I will not tell you which fish to keep because you should visit the shops and see what you like, and provided that you follow the three WHAT YOU NEED TO KNOW points you'll make a good start.

Discus breeder TONY SAULT has some helpful advice for would-be Discus keepers who don't want just Discus in their aquarium:

PHOTOGRAPH: MP. & C. PIEDNOIR



Discus in the Community

I am often asked: "Can I keep Discus in my community tank?". The simple answer to this is: "Yes you can" — but before you rush out and purchase some Discus for your setup there are some important requirements which you must consider.

First let us look at a basic Discus species tank and then see if their needs can be met in your proposed community setup. The most important factors being:

- **Good quality water**
- **Acidic pH**
- **High temperature when compared to "normal" tropicals**
- **Company**

Tank bred Discus, contrary to some people's beliefs, will readily accept hard or soft water, and actually grow faster in harder water. They will accept either bare or furnished tanks with gravel or sand as a substrate as well, so I do not class these as needs.

Good quality water

By good quality water I mean water that ideally has been passed through a water purifier to remove all the chemical and metallic nasties that tend to inhabit our mains water supply. At the very least it should be filtered through activated carbon before being allowed to come into contact with the fish.

Acidic pH

Despite the term "acidic", the pH does not have to be 6.3 or 6.5 depending upon which book you read last, but anywhere on the acidic side of neutral — 6.8 will do fine.

Temperature

Even though Discus will live at "normal" tropical tank temperatures, they certainly do not thrive or attain their full potential. If tank temperature was given seasonal fluctuations then Discus would probably approve of a winter temperature of 78-80°F, 80-82°F in the spring and 82-86°F in the summer.

Company

Discus are a strong, shoaling fish and as such should never be kept in shoals of less than six. Smaller shoals, particularly of young Discus, encourage nervousness and are subject to the pecking order syndrome. This is where the dominant fish finds it very easy to control its tank mates feeding habits. In fact it will try to stop them feeding altogether if it can.

So now we know the basic conditions required we can look at what else will adapt to these conditions.

Plants

Any plants purchased for this community must be able to withstand the slightly higher temperature and acid water conditions. Two which spring to mind are Amazon Swords and Vallisneria, but there are plenty of others. If you are unsure of which other plants might be suitable, then there are companies advertising in this magazine which can supply packs of plants specifically for Discus tanks or you can ask

at your local aquarium shop. Most shops will be only too willing to advise you on which plants will do best in this sort of set-up.

Tank mates

As Discus are notoriously fussy feeders it is always wise to have some cleaners in the basement. I would suggest Corydoras to fulfil this function. There are lots of species to choose from but some of the most common ones in the trade are *Corydoras aeneus*, *Corydoras julii*, *Corydoras melanistius* and *Corydoras paleatus*. All are good workers and earn their keep in a Discus community set-up.

Another ideal choice would be the Clown Loach (*Botia macracanthus*). These are also very social fish which need to be kept in a group of three or four. Whilst still in the basement area, there are a number of Dwarf Cichlids which will enhance the community such as Rams (*Papilliochromis ramirezi*). A pair of Rams will take over an area of about 10 cms square usually in a corner as it is easier to defend.

Moving up to the first floor, the most obvious choice would be the Amazonian Tetras. The most popular ones to complement your Discus would be Cardinal, Neon or Lemon Tetras, but the choice is really wide. Another addition should be the "window cleaners". In my opinion it is a fallacy that you can not keep suckermouth catfish with Discus because they attach themselves to the sides of the Discus. The secret is knowing which ones to buy. If they grow very large like the common Plec then their very presence can unnerve the Discus, but small "Plecs" such as those in the genus *Peckoltia* are a welcome addition to the community.

Finally, I am often asked if it is still dangerous to keep Angels with Discus. My answer to that is "I never knew it was!" I have over the years bred both Discus and Angels in the same tanks and never once had any problems.

left A beautiful Discus community aquarium like this is possible if you follow Tony's advice.

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seen with anything else.

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Derek Lambert's

Cutting Edge

PHOTOGRAPHS BY DEREK LAMBERT UNLESS OTHERWISE STATED

• In this new monthly column I shall be focusing on new and rare fish which have become available to the hobby recently for the first time or have returned again after a long absence. I will also be including fish which are in need of captive breeding if they are to survive in the long term

This month I am happy to report on a new Killifish introduction to the UK hobby — *Cualac tessellatus*, the Checkered Pupfish. This gorgeous two inch long Killifish is found in only a few thermal springs around Rio Verde, in Mexico. The best known of these is Media Luna but there are several others in the same area which also hold populations of this species.

I had looked for this species in Media Luna several times in the past, but did not have any luck on those occasions. Mildly disappointed at the time, I just added it to my wish list but did little about trying to find any. That all changed after I saw a photograph of this species in a newly published book during 1996.

I started checking all the Killifish societies around the world to find out if anyone had it. A few had been imported in the past but all failed to breed successfully. In the end I decided that it would probably have to wait until I was out in that part of Mexico again.

This finally happened a year ago and, this time, I was lucky enough to team up with Juan Miguel Artigas Azas, a keen aquarist, who lives just a few hours drive from these springs. Instead of Media Luna, Juan suggested visiting one of the other more remote springs and trying to find the fish there.

Males of this population have a dark black caudal fin and very strong reticulated patterning over much of the body. The drive down the dirt track to this spring was the usual bone shaking experience but once there it made the journey well worth the effort.

Fish could be seen teeming throughout this small spring and the *Cualac tessellatus* could easily be spotted from above because of their black tails. Seeing them and catching them proved to be two entirely different things. After an hour of fishing, Juan had caught the few pairs of fish that I wanted

top left Male *Cualac tessellatus*, the Checkered Pupfish. This gorgeous two inch long Killifish is found in only a few thermal springs around Rio Verde, in Mexico

left Juan Miguel is one of the few aquarists who can use a cast net to collect fish. This is a vital tool when trying to catch some species of fish.

and we could leave.

What was I doing while he was catching the fish? Testing the water of course! Tetra had kindly given me a complete set of their testing kits and I was using them on all the habitats I visited. This one, though, had me believing the testing solution was wrong. I had a reading of 120°GH! Before repeating the test I asked Juan about this high reading and he confirmed this was normal for this habitat. The strange thing was the pH. With such a high general hardness I was expecting a high pH as well but this proved to be only moderately alkaline.

Once back in the UK I set up my new acquisitions in a 30 inch aquarium with plenty of artificial spawning mops. They were fed lots of live food as well as a good quality flake food and soon started to court. Apart from their black tails, males have larger fins and more colour than females.

A few days after I observed courtship I found the first eggs amongst the spawning mops. These were very large and took less than a week to hatch. Unfortunately, when the babies were born they had a large yolk sac which is very unusual for this type of fish. Within a week of birth most of the fry had died, but I did manage to rear a group of five babies from these initial eggs.

During the winter my adults stopped producing eggs and only restarted in late spring. By then they were large fish and prone to eating any eggs almost as soon as they were produced. My five youngsters, however, had sexed out by this stage and seemed to be courting most mornings . In went a mop and over the next few weeks I collected 50 or so eggs from these youngsters.

This time they were placed in a hatching tank with my normal very hard and moderately alkaline water (as before), but with a spoonful of salt added. Now the eggs took two weeks to hatch and the fry were able to eat newly hatched Brine shrimp a day later. Mortality has been almost zero since then and I have several tankfuls of youngsters growing on.

Apart from this problem with breeding, the *Cualac tessellatus* have proven to be model aquarium inhabitants. They eat all foods, are generally peaceful, although adult males spar a little whilst they are sorting out a pecking order.This species would make a useful addition to any community aquarium. Whilst they are primarily bottom dwellers and like some cover on the bottom, they will soon adapt to a new aquarium and will spend much of their time out and about at the front looking for food.

Finally this month I have had this report from Mary Bailey of the British Cichlid Association about the latest Malawian taxonomy:

New scientific names for a number of previously undescribed Melanochromis species from Lake Malawi

In 1997 a number of species of Melanochromis, *known in the aquarium hobby by trade names and/or temporary names given them by Dr Tony Ribbink and his colleagues in 1983, were given formal scientific names. Unfortunately the work creating these names has remained little known to aquarists, who may thus find themselves at a loss when confronted by the new names in recent and future hobby publications. Table 1 may thus prove useful, even though the hobby names are so well established in many cases that it is unrealistic to expect that the aquarium trade will accept the new ones in the foreseeable future. The pronunciation and meanings of the scientific names (which are all latinised Greek, meanings as given by the authors) are given in brackets.*

TABLE 1

Scientific Name	Hobby/Trade Name
M. cyaneorhabdos (sigh-ane-nee-oh-rab-doss, blue stripe)	M. sp. "Maingano"
M. dialeptos (die-a-lep-toss, very small)	M. sp. "Dwarf Auratus" M. "East Coast"
M. elastodema (ee-lass-toe-dee-ma, broken stripe)	M. "Chizumulu johanni"
M. perileucos (perry-lew-coss, white edged)	M. sp. "Black-White Johanni"
M. baliodigma (bal-ee-oh-dig-ma, spotted pattern). Note: There are two different species known as M. "Blotch", this is the one from Likoma. The species from Makanjila on the SE Malawian coast is *M. xanthodigma*, see below)	M. sp. "Blotch"
M. benetos (ben-ee-toss, blue)	M. sp. "Blue"
M. lepiadaptes (leppy-adapt-ees, scale-eater)	M. sp. "Lepidophage"
M. xanthodigma (zantho-dig-ma, yellow pattern). Note: The Makanjila M. "Blotch", see *M. baliodigma*, above)	M. sp. "Blotch"

Reference

Bowers, N. and Stauffer, J. R. 1997. Eight new species of rockdwelling cichlids of the genus *Melanochromis* (Teleostei: Cichlidae) from Lake Malawi, Africa. *Ichthyological Explorations of Freshwaters*, 8(1), pp 49-70.

above right The thermal spring where Juan Miguel caught *Cualac tessellatus*.

right *M. elastodema*, one of the new Melanochromis, which is well known as *Chizumulu johanni*. This specimen is photographed freshly caught from its natural habitat by Mary Bailey.

PHOTOGRAPH: MARY BAILEY

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Ask A&P

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

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Marine

Q I am just about to set up a marine invertebrate aquarium and thought I would light is using fluorescent tubes purchased from a DIY store. These are so much cheaper than those offered for sale in aquarium shops and do the same job, don't they?

Don Williams, Tadcaster.

A *No they do not do the same job. Even all tube designed for aquarium use do not do the same job. Each one has a specific spectral output designed to satisfy the needs of the plants and animals which live under them. Many species of marine invertebrates rely heavily on algae for food production and waste removal. These live in their body tissues and need sufficient light of the correct colour to function properly. Without it they decline and, with them, the invertebrates die, too. Many aquarists are appalled to find the thriving anemone they purchased a few months ago has shrunk to only a third the size it used to be. This is because the lighting was not correct and the Zooxanthellae algae have died back. There are several different manufacturers of aquarium lights, all of which produce bulbs specifically designed for marine aquarium use. Consult your local marine aquarium shop and take the advice offered. You will also need to have more than one of these tubes above your tank, so be prepared to spend the money needed to set your tank up properly. The few pounds extra spent now will produce for better results and save you money in the future.*

Prize Winning Problem

Please could you recommend a photo reference or encyclopaedia type book which has a good photo of every tropical fish species, sea horses, etc., with care of each species, and any other useful information?

Peter Granville, West Sussex.

There are over 10,000 known species of freshwater fishes of which almost half will be seen in the aquarium hobby from time to time. Added to this you have the huge range of marine fish which are also regularly imported. For any one book to illustrate them all would be almost impossible, although some have done a good job of including most of those regularly seen in the trade. The two main books of this type are Dr Axelrod's Atlas of Aquarium Fishes *published by TFH (they also have a marine fish version written by Dr Burgess), and the* Aquarium Atlas *series published by Boensch. The original freshwater book has now grown into a series of books covering marine and freshwater fishes, plants, inverts, etc.*

These two mammoth, ever expanding, works still don't come close to including every fish available in the hobby. Specialist titles are more successful in this respect with many different areas of the hobby covered in real depth. TFH have a huge range of these and the new Aqualog series are also worth seeking out. Even such specialist publications are still missing a few of the new species because, as fast as they are being published, new species are being discovered or imported for the first time. India and China are really opening up now but vast tracts of Africa are still closed to fish collectors and have plenty of new species to offer the discerning aquarist.

This is the reason why most aquarists are constantly adding to their libraries. In fact I have more fish, plant and pet books on my shelves than the local library does! — with plenty more to come.

ALGARDE

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

PETER A. LEWIS delves into the genus *Lamprologus*:

PHOTOGRAPHS: PETER A. LEWIS

Shell-dwelling Cichlids ...

from Lake Tanganyika

Part 2

Lamprologus kungweensis (Poll 1956)

The shape of this species places it in the *meeli/hecqui* group of shell-dwellers and the distinct yellow-gold line across the top of the eyes of both maturing male and female is an identifying characteristic. Personally, I do not believe that *L. kungweensis* is a distinct species that occurs along the shoreline of the Lake near to the Kungwe mountain range, rather than a geographical variant of *Neolamprologus hecqui*.

Mature male fish reach 6.25cm with the female remaining slightly smaller, lighter and less intense in colour. Shells are readily accepted. I have been keeping six specimens with several shells in a tank heavily overgrown with Java Moss with only a scattering of gravel. Since burying their chosen shells was not an option, they adapted by pulling Java Moss across them for camouflage and security. It was not until I moved this covering to take unobstructed photographs that I realised what was taking place. Within minutes of my moving the Moss the cichlids were grabbing mouthfuls and pulling it back again!

When breeding, the normal blotch pattern across the flanks becomes darker and the blotches become larger, extending into the base of the dorsal fin. Additionally the male becomes dotted with an irregular pattern of small black spots across the normal grey background of the face and forehead. A female signifies her willingness to spawn by quivering at the mouth of her chosen shell until she can hold the interest of a male.

She will then enter the shell, deposit her eggs and withdraw to allow the male to fertilise them. The shells were

right
L. kungweensis male. Since burying their chosen shells was not an option they adapted by pulling Java Moss across them for camouflage and security.

SHELL-DWELLING CICHLIDS ... A Lake Tanganyikan species

large enough to allow the male to enter, which he dutifully did and presumably fertilised the eggs since, some seven to eight days later, a group of tiny fry could be seen gathering at the entrance. The female cared for the fry and would actually carry strays back to the shell in her mouth should they wander too far from its sanctuary. The male did not appear to have a monogamous attachment to the female but would assist in keeping conspecifics from the female's shell.

The fry took newly-hatched Brine Shrimp and sifted *Daphnia* as their first food in addition to finely-powdered, freeze-dried *Krill*. While the number of fry from each spawn varied between 15 and 28 the survival rate was high since the young would disappear into the Java Moss as soon as they were able to fend for themselves. Rather than add more shells to the tank and run the risk of overcrowding I merely removed young at a size of around 1.25cm and placed them in a rearing tank, devoid of shells, to grow to maturity; in the absence of shells they seldom tried to set up territorial zones.

Lamprologus meleagris (Buscher 1991), The Lace Lamprologus

Originally sold as the "Pearly *Ocellatus*", *L. meleagris* is an attractive silver-black cichlid that rarely exceeds 6.25cm with purplish flanks that are spotted with irregular, iridescent pearl-like spots that highlight the scales and fins. At the lower edge of the operculum is a distinct black eye-spot or "ocellus" edged with blue. The throat is silver with just a hint of blue and the eye has a bright blue band across its upper edge. Females can be up to 1.25cm smaller than males and their colours are not as intense.

Breeding seems to pose few problems unless too many *L. meleagris* are allowed to inhabit the same aquarium at which point cannibalism will occur as parents vainly try to protect their young from other inhabitants of the tank. My method is to place a pair into a 60 litre tank decorated with rocks, waterlogged driftwood, a 5cm deep layer of gravel and three or four suitably-sized shells.

In a very short time the pair will have explored the tank, pushed or pulled the shells to where they want them in the tank and set about the business of raising a family. The male enters the shell only to fertilise the eggs after which he is content to leave the hatching of the eggs to the female. Since *L. meleagris* are so secretive about spawning, no obvious colour changes take place, the first sign that spawning has been successful is the appearance of several 6mm fry at the mouth of the female's shell.

The fry are unique in that they have a distinct red-brown pattern of bars across their body against a grey-white background. Once the fry have emerged the male then takes his turn as caretaker and will aid the female in defence of the shell, often attacking my hand if I am cleaning

above left *L. meleagris*, female with fry.

left *L. meleagris*, checking out a shell.

right *L. meleagris*, adult male. This species was originally sold as "Pearly *Ocellatus*".

the inside of the tank. As the fry become more adventuresome the male and female prepare a small pit outside the shell in which the fry are encouraged to stay rather than being allowed back into the shell.

It is for this reason that I breed *L. meleagris* as single pairs since, once the fry are required to live their lives outside the shell, they become prey to other fish in the tank. Mature parents will not bother their progeny that will slowly establish their own territory within the breeding tank as space and decorations allow.

Lamprologus ocellatus (Steindachner 1909)

A stunning cichlid with a specific name that means "eye spot", referring to the very distinctive gold outlined spot on the operculum. The distinctive concave outline of the snout has resulted in the nickname of "Frog-faced" Dwarf Cichlid among European hobbyists. There is a distinct, gold coloured iris to the eye and a golden-cream coloured body. A gold form has been introduced into the hobby by Rene Kritter who discovered this variant at Nundo Point in Zambia. This colour morph has a very distinctive, golden-yellow sheen to the scales along the side of the fish. A discrete feature of the golden morph is a golden-brown "skull cap" that sits across the head of the fish, between the eyes.

Endemic to Lake Tanganyika's Tembwe Bay, Kigoma, *L. ocellatus* appears to be restricted to muddy or sandy shores which are littered with empty shells of the snail, *Neothauma tanganicense*. It is usual for the male to be more intensely coloured than the female. Only the edges of the fins are coloured, the body of each fin being clear, speckled with blue or gold but lacking any pattern. The anal fin possesses seven to nine spines, a fact that can be used to distinguish *L. ocellatus* from other similarly-coloured species.

A full-grown male will be 5cm standard length while his mate is likely to be barely 4cm in length. The dorsal fin of the male golden variant is edged with an orange-red band while that of the female is clearly paler, often white-trimmed. Further the soft rays of the anal fin of the female are lacking in colour. Mature females exhibit a more rounded belly while males have longer bodies that are best described as oblong in shape. A personal observation is that the teeth of mature males appear larger and more prominent than those of the females.

A male and several females occupy a small territory, usually no more than 30cm in radius, around their chosen shells. It is usual for a colony to totally rearrange the substrate around their territory to establish a mound of sand as border to their domain. Konings (1988) in his video, *Tanganyikan Cichlids*, suggests that this is to provide a rampart at the edge of their territory and also to create a catchment area that diverts a flow of water and plankton to the vicinity of the shell and fry. For an in-depth discussion on the living, hiding and spawning behaviour of *L. ocellatus* within the confines of a discarded shell the reader is referred to Paulo, 1986. Breeding is quite straightforward and can even be accomplished with only one pair in a 55 litre aquarium with a fine substratum and several clean, empty snail shells.

Once spawning is complete, the female occupies her time fanning her pectoral fins across the entrance of the shell to ensure fresh, oxygenated water enters, and discourages any itinerant snail or other unwelcome visitors from entering and disturbing the spawn. At

left *L. ocellatus*, a stunning cichlid with a specific name that means "eye spot", referring to the very distinctive gold outlined spot on the operculum.

SHELL-DWELLING CICHLIDS ... A Lake Tanganyikan species

this point the female also becomes intolerant of the male and is likely to drive the male away. In a communal situation the male is likely to do no more than search out another female with whom to breed.

Hatching occurs after 72 hours at 26.5°C and the fry are free-swimming some four to six days later. The fry are not completely colourless but sport a distinct black wedge that runs from just behind the operculum into the caudal peduncle. A typical batch of fry is small, usually no more than 20 young, their growth is rapid if fed newly-hatched Brine Shrimp or sifted *Daphnia* as a supplement to microscopic fry food. Pulverised, freeze dried *Krill* or freeze dried Brine Shrimp are foods that powder easily to a pepper-like fineness.

Gradually the young become both bolder and larger and venture further from the shell until they are eventually evicted, after some four to six weeks, and either take up residence underneath the shell or establish their own shell and surrounding territory and begin on their own family. Sexual maturity takes 9-10 months to achieve.

Lamprologus ornatipinnis (Poll 1949)

As the specific name implies its beauty lies in the "ornate fins" which are distinctively marked with a series of striations that vary from black to purple. While mature males may reach a total length of 5cm females are likely to be up to 1.25cm smaller. The female is also considerably plumper in the belly region and shows a distinct, metallic purple sheen in this region when breeding.

Currently I house one male and five females in a 70 litre aquarium decorated with a heavy growth of Java Moss, several shells and an arrangement of rocks and driftwood. Breeding is interesting: the male will await the call of one of the females whereupon he will enter her shell to fertilise the newly-deposited eggs only to re-establish his territory on a temporary basis around the entrance until the fry appear.

At this point, the

▶ Continued o page 2

above L. ornatipinnis, female. As the name suggests beauty lies in th "ornate fins" which are distinctively marked with a series of striati that vary from black to purple.

left L. signat male. This cich is likely to spe many hours perched on a or similar vant point near the shell just observing the activity in the and surround

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male will promptly retire back to his own chosen shell and await further developments within his harem!. Introducing another male into this colony has always resulted in the intruder being banished to a corner of the tank from where he was removed before being harassed to the point of death.

L. ornatipinnis also forms a nursery pit or channel outside the shell in which the young spend most of their time until they become fully mobile and independent of the protection afforded by the female.

Lamprologus signatus (Poll 1952)

One of the smallest shell-dwellers collected from the littoral zones of the Lake Tanganyika's Zambian shoreline in the vicinity of Cape Nundo and Cape Kabwe Ngoaye. Males, fully grown at 5cm, have flanks crossed by a series of 12 or 13 pairs of narrow, brown vertical bands extending into both dorsal and anal fins through the caudal peduncle into the caudal fin.

The female does not possess any such markings and, when first collected, the male and female were described as different species. A distinct black spot may appear about midway along the dorsal of certain females but this does not hold true in all cases and may be an example of geographic variability. Although reported to be a monogamous cichlid, I have had best results with *L. signatus* when maintained in a 70 litre aquarium on a harem basis with one male serving the needs of four to five females. Each female will then regard several shells as their refuge rather than maintain just a single shell as their retreat.

For a monogamous relationship to occur, a pair each must be allowed to select its own "mate" by natural selection (from several immature specimens kept together in a larger tank) rather than merely putting a male and female together in the same tank. In this way "bonded pairs" can be netted and transferred to a smaller breeding aquarium furnished with several empty snail shells and a substratum of fine sand or gravel.

Unique with *L. signatus* is the way the pair will transfer the non-adhesive eggs and wriggling fry, deposited initially deep inside an empty shell, between successive shells within the tank. Any attempt to house more than one male in an aquarium that provides insufficient territory or refuge will result in serious fights.

L. signatus behaves in an almost lethargic manner in captivity, often making it appear that it is too much trouble to rise to take live foods such as adult Brine Shrimp or Mosquito larvae. This cichlid is likely to spend many hours perched on a rock or similar vantage point near the shell just observing the activity in the tank and the surroundings. Spawns are small with 20-25 young from a single spawning being rare. More likely less than 15 young will result from each spawning.

Next Month

Neolamprologus species

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This is your chance to win one of 12 boxes of "565g for the Price of 450g" TetraPond Floating Foodsticks, each worth £8.25, which we have to give away to readers of *Aquarist & Pondkeeper*. Simply unscramble the anagrams below to find three words associated with TetraPond Floating Foodsticks. Write down your answers on a postcard or sealed envelope together with your name and address to: Department Tetra Foodsticks, Tetra Competition, PO Box 2162, Bournemouth, BH2 5ZA. Entries to arrive no later than October 10, 1999.

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EDIT

INETORP

EVETAGLEB

DR ROBERT J. GOLDSTEIN gives us an insight into the world of Killifis

Beginning with

Killies, in almost all aquarium fish books, are included in the single family *Cyprinodontidae*. A few years ago, Dr Lynn Parenti's new classification system broke them into several smaller families, limiting the *Cyprinodontidae* and erecting the *Fundulidae* and *Rivulidae*. Some revisions were warranted (such as combining the Florida and Yucatan flagfishes within a single genus), but others require tunnel vision to see the point, and haven't lasted.

For simplicity and consistency with the information in your tropical fish textbooks, I'll stick with the old scheme. Juergen Scheel, before his untimely death, completed his *Killifish Atlas* for TFH, agreed that the new system did not quite solve the problems of classification, and he too elected to remain conservative. For killifish aficionados, I highly recommend both his earlier *Rivulus of the Old World* and the more recent *Atlas*, although I'm afraid the first is out of print.

Killies are everywhere. In the USA we have species in the southwestern desert, along the Atlantic coast, and inland everywhere. They occur on the Caribbean islands, and throughout Central and South America. Killies are abundant from coast to coast and throughout Africa, and range northwards to Iberia. A few killies occur in Asia, but only the fringe of the group.

Who can forget the glorious photograph of a blue gularis in the old Innes' *Exotic Aquarium Fishes*, or the striking painting of the Argentine pearl fish? But who has seen either more than once or twice in an aquarium shop? Well, if killies are so terrific, why aren't they common in the hobby?

Killies are infrequently seen in retail shops. The small domestic supply is provided by local breeders almost exclusively, and retail shops are supplied only when stock on hand exceeds the home aquarist's mail order needs.

Killies abundant among specialist breeders

Mail order? That's right. Killies are abundant in the fish rooms and hatcheries of a select core of specialist breeders who provide stock to each other, usually as trades and sometimes through sales. Some produce too many offspring of too many species and seldom trade, instead selling excess stock through the mail. Beyond price, however, the stock is a labour of love, and the killifish breeder prefers to get his production into the hands of serious aquarists who will attempt to breed the fish. Selling stock at pet stores is a last resort to finding them homes.

Throughout the world, some of the very best aquarists in

PHOTOGRAPHS: DEREK LAMBERT

KILLIES

far left *Cubanichthys pengelleyi*, a rare Killifish from Jamaica.

left *Northobranchius rachovii* is a typical substrate spawner from Africa. The natives refer to these as "fishes that fall from the sky" which is their explanation of how these fish appear in temporary rain pools many miles from any river.

each country have formed killifish breeding and trading associations. These groups hold conventions, establish show standards, disseminate technical, taxonomic, and breeding information, and raise funds for private importations of wild stock, substituting for a once-thriving import business in wild tropical fish that has today mostly vanished. In the United States, the American Killifish Association is now about 34 years old. The members of AKA, officially and unofficially trade through the mail with members of the British, German, Dutch, and other killifish associations. If you want to get started with killifishes, then you absolutely must join the BKA.

Appeal to do-it-yourselfers

What accounts for the popularity of these little fishes? To an extent it's their coral reef type colours and unusual breeding habits, but mostly it's the appeal to do-it-yourselfers. And doing it yourself covers the gamut from catching wild fish during collecting expeditions to South America or Africa to building a fish room, creating aquariums out of pickle jars, making spawning mops out of knitting yarn and wine corks, making spawning mud out of agricultural peat moss, and duplication nature by drying out the eggs for six months and then adding rain water and skim milk to force hatching.

Getting started is a kick. Your first pair of fish or vials of eggs, purchased from a BKA member, will arrive through the mail. The shipper will pack the fishes individually in a large volume of air or oxygen over a smaller volume of water in plastic bags, double rubber band, and then invert the bag into a second bag to obliterate corners. Cardboard boxes or Styrofoam fish boxes are used, depending on the size of the order and the weather.

Killies do fine in small tanks if fed live foods exclusively. Growing Daphnia is a big help to breeding, and all producers maintain green water for the smallest fry and rely on Artemia nauplii, Microworms and Vinegar eels for growth.

In a typical breeder's room, the killifish section contains two to five-gallon tanks and numerous gallon jars as spawning containers and plastic shoeboxes for hatching and rearing early stage fry. A big hatch might require a 29 or 40 gallon tank for growing on of 100 or more young. Growth is fast, most killies attaining sexual maturity in two or three months. This rapid growth requires frequent, heavy feeding and unending massive water changes.

Many killies breed year round in permanent waters such as streams, rivers, lakes, ponds, backwaters, and sloughs. A few are winter spawners requiring temporary waters like vernal pools and isolated puddles in flood plains. These coldwater temporary pools are home to other winter breeders like Fairy shrimp and Salamanders. Whilst the Salamanders have this requirement because their eggs and tadpoles are easy prey for predaceous fishes, in the case of killies the reason is more subtle.

The eggs of these "annual" killies require a precisely timed period of heat and high oxygen levels essential for normal embryonic development. Stored permanently under water, their eggs barely develop before stopping. Only a period of drought can trigger development to continue forward. And then, only immersion in cool water and a rise in the surrounding carbon dioxide level can induce the embryo to secrete an enzyme (chorionase) that dissolves the egg shell from within, enabling hatching.

That aquarists can duplicate this marvellous phenomenon in a fish room is exciting; that it's not sure-fire is challenging.

'Fishes that fall from the sky'

Annual fishes occur on the plains of eastern South America and the savannahs of eastern Africa. Wherever they occur, the natives refer to them (in several languages) as "fishes that fall from the sky", their explanation of how a fish can occur in a rain pool miles and miles from any river.

The East African species occur in floodplain pools on certain soil types whose chemistry has been investigated by Dr Brian Watters, a Canadian geologist. All are in the genus *Nothobranchius*, and most have reds and blues in profusion. Of all the Nothos, the most prolific and hardy seem to be *Nothobranchius guentheri* and *Nothobranchius korthausii*, both spectacular fishes.

Fed, even as adults, on adult live Brine Shrimp or on nauplii and spawned over peat moss in small tanks, they'll produce large numbers

BEGINNING WITH KILLIES ... An insight into the world of Killifish

of eggs highly resistant to noxious odours in the peat moss or changes in environmental chemistry. The fry are sexable within two months, breeding by three, and the fish are old and dying by one year of age. People who keep killies must breed them constantly in order not to lose the species.

The South American equivalents are more diverse and complicated in their varying habitats, soils, locations, and even their classification. The principal groups are *Pterolebias*, *Austrofundulus* and *Cynolebias*, but there are additional smaller genera. Classification of the South American killies will require many years to unravel the relationships and evolution. The species most frequently sold to pet stores are the Black pearl fish (similar to the Argentine pearl fish), and several relatives.

Breeding methods in fish rooms is the same as for the Nothos, with peat moss providing the substitute for floodplain soil, and drying and bagging the peat moss serving as a substitute for summer drought.

By far the largest group of non-annual killies are the plant spawners, fish which often live a couple of years. These killies are bred using synthetic yarn sunk on the bottom or floating under a cork, the yarn serving as a plant substitute that can be manipulated and doesn't require light. Periodically the yarn mop is removed, squeezed dry, and the large yellow eggs (angelfish size) removed with the fingers and placed in shallow dishes with acriflavine for hatching some week to three weeks later.

I use a lazy man's method, placing the entire mop in a jar of water with Daphnia and an air stone for hatching, and then pouring the fry into a growing on tank. I'd rather make a few spare mops than pick individual eggs.

The fish in this group have had many names, but typical examples are the Golden pheasant, and the Lyretail and its relatives. The Blue gularis is related to this group but can also be spawned as a soil breeder.

One of the most interesting fish I ever collected was *Rivulus marmoratus*, a synchronous hermaphrodite from southern Florida, Mexico and the Caribbean. This fish comes in one style only, and each individual has an active ovotestis, laying fertilised eggs all by itself.

Most Rivulus species moderately pretty

Unfortunately, the fish isn't much to look at, but it's the only vertebrate animal that reproduces this way. All other *Rivulus* species are normal plant spawners, except one or two that either soil breed or somehow got classified in the wrong group. Most *Rivulus* species are moderately pretty, though one, *Rivulus xiphidium*, is spectacular. *Rivulus* are native to western and northern South America, the Caribbean and the southern United States.

What fish are readily available today? Enquire at the shops in your area and ask whether they purchase from local breeders. Your best source will undoubtedly be the BKA in the UK just as mine is the AKA in America.

To join the BKA send a cheque or PO made payable to the British Killifish Association, to The BKA Registrar, Cliff Griffiths, 8 Cropthorne Close, Woodrow North, Redditch, Worcs, B98 7SJ. Membership costs £15 in the UK, £18 for Europe and £28 overseas. This organisation also hold an annual weekend convention which this year will take place at the Portland Hotel, Buxton, on October 1st to 3rd. Contact David Mellor on 01663 746381 for more details

below *Crenichthys baileyi baileyi*, a highly endangered North American species of Killifish.

about this event.

The address of the American Killifish Association's membership chairman is Darrell Ullisch, 3084 E. Empire Avenue, Benton Harbor, Michigan 49022, USA. He can also be reached via e-mail at rivulus@compuserve.com. Membership dues outside the US, Canada, and Mexico are US $40 with the journal by surface mail and US $47 with the journal by air mail.

If as an old-timer you miss the new and rare species when the hobby was based on wild imports, then welcome back to the good old days; they never left!

left
Aphyosemion gardneri, one of the non-annual Killifish which will use yarn mops to lay their eggs in. This is a very prolific species which often produces large hatches requiring 29 or even 40 gallon tanks for growing on 100 or more young.

THE PONDKEEPER

This month JOHN DAWES takes us through the practical steps you need to take at this time of year to ensure your fish survive the winter:

PHOTOGRAPHS: JOHN DAWES UNLESS OTHERWISE STATED

Autumn Leaves and Friends

We call it "autumn". Our American fellow hobbyists call it "fall". I prefer the latter, because the first time I came across the term all those years ago it created a beautiful, immediate and enduring image of a shower of golden and red falling leaves gliding gently and silently to ground.

Falling leaves undoubtedly constitute one of the main attractions of autumn for the vast majority of the population, including pondkeepers. However, for some pondkeepers ... and all pond inhabitants ... falling leaves can constitute one of the major headaches — if not THE major one — of the autumn season. In reality it's not the immediate effects of the falling leaves themselves that are the major source of this headache, but, rather, what can subsequently happen to them, since, left unattended, they can eventually wreak havoc in a pond.

However, before looking at this in a little more detail, I'd like to "go back a bit" in order to "go forward".

Tell-Tale Signs

Autumn will arrive officially on September 21 ... at least, in theory. In practice it can arrive earlier, if we are unlucky and experience one of those dull, wet and depressingly cold Septembers. Equally, it can also arrive considerably later, if we are lucky and experience one of those glorious bronze-tinted Indian summers that can make September one of the most aesthetically pleasing months of the whole year.

Either way, we need to bear in mind that winter WILL arrive sooner or later. Therefore, autumn pond maintenance is absolutely essential if we are going to stand a chance of getting our fish and plants into good shape before the cold weather really sets in.

Irrespective of the calendar there are some tell-tale signs of autumn that we can look for. Ground frost is one of these. When it arrives we can be pretty sure that we are well on the way, even if it isn't cold enough for ice to form on the surface of the pond.

By now, though, the pond plants themselves will have begun showing signs that summer is well and truly over. Water lily leaves, for example, will have begun browning, at least, around the edges, while their blooms will now appear much less frequently, or may even fail to open and begin to show signs of frost damage.

Marginals, too, will have begun browning and dying back from late summer onwards. If you grow pondside plants like Hostas and Astilbes — both of which will have flowered ages ago — you will find that the leaves in the former begin to pale, go limp and gradually die off, while those of the latter will brown and drop off as the weather cools. Other pondside plants will also begin showing their own autumnal characteristics from late summer on.

Even the submerged oxygenators will show "symptoms" of autumn in that they will gradually stop growing. If they have had a particularly good growing season, to the extent that some shoots have reached the surface and begun growing across it, the exposed tips will be "burned" by cold winds and frosts.

The fish, though, will still be active, since, being coldwater species, they are perfectly at home in autumn water conditions. Many will, in fact, appear more active and hungry than during the hottest of the summer weather.

Autumn Jobs

Although labelled as such, autumn pond jobs should form part of an on-going, evolving, year-round maintenance programme. If, for example, good water quality has been maintained through the summer season, the fish will face the colder weather and shortening days in a stronger, healthier state than would otherwise be the case. Also, if their diet has been appropriate

they will have begun building up their energy reserves, once the high metabolic demands of summer begin to decrease.

Gradual though the transition from late summer to early autumn may be, there's no doubt that after the characteristic summer burst of activity, the pace of life begins to slow down as we move into autumn. However, as the fish will feed quite avidly well into this season, it is important to keep up the supply of food until they show signs of slowing down. Early autumn is a good time to start changing gradually from a high season formulation to a sinking, easily digested cold weather diet. Properly fed fish stand a much better chance of surviving the winter than underfed ones (but if the temperature drops significantly in late autumn feeding should cease altogether).

If any late spawnings have occurred, as often happens during a good August, it may pay to remove, at least, some of the young fish to indoor quarters to give them a better chance of surviving the winter.

As autumn really gets under way the pond may need protecting (by means of a net) against falling leaves from surrounding deciduous trees and shrubs. Alternatively, remove the leaves several times each day with a hand net. The important thing is to prevent these leaves from sinking and accumulating at the bottom of the pond, where they can cause problems later on. These problems are not so much caused by the leaves decomposing (although this could lead to severe water quality deterioration if leaf accumulation is excessive), but by the gases of decomposition becoming trapped within the pond when ice forms on the water surface during cold spells. Therefore, if autumn shows signs of being severe, give serious consideration to installing a pond heater early to prevent total ice-overs, thus providing an open hole for toxic gases to escape.

Submerged oxygenators can be cut back at any time, since growth will have stopped by (at most) the middle of the season. Dead leaves and blooms should also be removed from surface plants, while marginals can be tidied up. Some marginals and hardy lilies can also be divided at this time of year, while tender types can either be brought indoors, e.g., into a greenhouse, or given suitable mulches (in the case of bog plants), or moved to deeper water (in the case of marginals).

A partial water change, such as that recommended for spring will be found very beneficial during autumn. Alternatively, early autumn can be regarded as a good time for a major overhaul, as long as this is done early enough. In other words, the job must be completed with sufficient time left for re-maturation (i.e., before temperatures begin to slow down the metabolism of the fish and other forms of life, including micro-organisms), to the extent that re-establishment of good water conditions and "re-setting" of the fish run the risk of becoming major challenges.

Part of the overhaul should also include the pump and filter. If you are unsure about how to service your pump, consult your local retailers. These days many retail outlets offer a pump repair/ maintenance service at a very reasonable price.

When rinsing out filter media do so — if at all possible — in pond water. If this is not possible tapwater will do, but it won't be so gentle on the filter microfauna and it is the

▶ *Continued on page 30*

far left The tenderer pondside plants, like *Gunnera manicata*, benefit from mulching in preparation for the colder months.

above right A further bonus of autumn pond installation is that a tour of specialist retailers (Tisbury Fish Farm in this case) will often uncover special autumn deals on ponds, pond-making materials and left-over pond plants.

PHOTOGRAPH: GORDON WIGENS

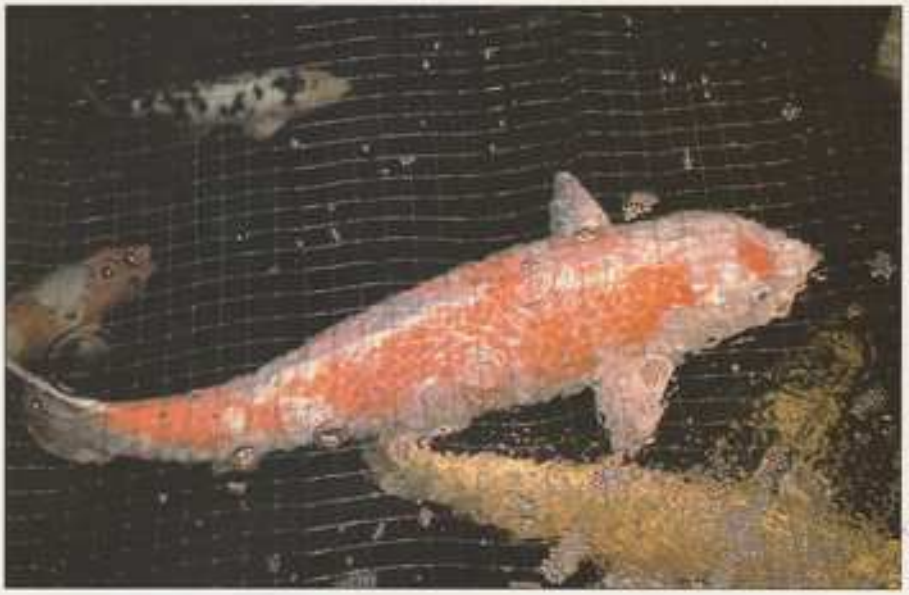
right Properly fed fish stand a much better chance of surviving the winter than underfed ones (but if the temperature drops significantly in late autumn, feeding should cease altogether).

PHOTOGRAPH: GORDON WIGENS

THE PONDKEEPER

◀ *Continued from page 29*

microflora on which biological filtration depends. Detergents, of course, are out, no matter how thorough you can make the after-rinse. If you own a multi-chamber filter, it's worth servicing one chamber a week, thus minimising the overall effect on the filter micro-organisms.



Pond Installation

If you are considering installing a new pond — of whatever type — early autumn is one of the best times of the year to do so, in my opinion. You need to avoid particularly cold or wet days when the soil is either frozen or waterlogged, of course. If this can be done, you can then enjoy one of the great benefits of an autumn-dug pond, i.e., the valuable "luxury" of several months' maturation before full stocking with fish in the spring.

If a pond is dug at this time, is stocked with, say, 50 per cent (or more) of the plants and a few (only a few!) hardy fish (after an initial setting up period of at least a week), and if a good filter system is installed and put into operation (perhaps helped along with a filter "fertiliser"), the ensuing winter months will create excellent conditions for full stocking the following spring.

A further bonus of autumn pond installation is that a tour of specialist retailers will often uncover special autumn deals on ponds, pond-making materials and left-over pond plants. You can often, therefore, not only set up a system with all the environmental advantages mentioned above, but also at a fraction of the price that it can cost during the peak season.

Major Enemies

Autumn pond care has two major enemies: complacency and fear.

The first one can arise owing to the fact that there is no magical switching-off of summer pond characteristics and switching-on of autumn features. The process is gradual. Consequently, it is possible to be lulled into a false sense of security, believing that there will be enough time to carry out all the jobs before the arrival of winter. You may be lucky and may, indeed, manage this. On the other hand, you may not ... as a result of which, you will place the welfare of your fish and other pond inhabitants at risk. Remember, they have no choice in the matter. But we do!

Fear is also a potential killer in that, "just to make doubly sure" that they eliminate all potential threats to the welfare of their stock, some inexperienced fishkeepers can be over scrupulous, cleaning everything out so thoroughly that they, effectively, set up a raw, clinical pond with a raw, clinical filter ... but one that is immediately re-stocked with a full complement of fish. The result is a system that, quite simply, can't cope with the biological load and invariably ends up in distress for the pondkeeper ... and much worse for the fish.

If I have a parting thought, it is to advise all beginners to put their thinking caps on before they plunge in, or before they decide to delay their maintenance programme. Look at the situation from the fishes' point of view (it can be done!), talk to experienced pondkeepers and water gardeners, as well as your local dealer, read all you can ... and then get stuck in! It's great squelchy fun ... I assure you!

above Astilbe leaf fall in autumn: potential problem in the making.

top of page As autumn really gets under way, the pond may need protecting (by means of a net) against falling leaves from surrounding deciduous trees and shrubs.

PHOTOGRAPH: GORDON WIGENS

DICK MILLS casts an eye over the wettest attractions at the Palace:

PHOTOGRAPHS: DICK MILLS UNLESS OTHERWISE STATED

Out & About

Hampton Court Palace Flower Show

above Tetra's "Taste of Japan" garden was one of the few with fish in the display and enough water depth to make it a practical pond for the home garden.

PHOTOGRAPH COURTESY OF TETRA

Out & About

Hampton Court Palace Flower Show

With Hampton Court Palace Flower Show (billed as the largest attraction of its kind in the world) opening its gates to the tenth anniversary crowds this year, it was interesting to notice the subtle changes that have occurred since its earliest days.

For the exhibitors it's probably the alterations in the "Show Rules" that have made the most impact since the overall organisation of the Show has passed to the Royal Horticultural Society a few years ago. For those exhibitors keen to get amongst the medals, it is now of paramount importance to get everything correct, especially from the botanical aspect, for the hawk-eyes of the Judges are quick to spot an "out of place" plant or perhaps an incompatible (to neighbouring plants or even climatic conditions) species.

What is evident is that the "Aquatic Village" concept has shrunk — from the usual ten or so "water gardens" of yesteryear there were only seven in this category this year and even less had fish in them. Design appeared to be the attraction and these ranged from purely natural to highly bizarre; it would have been interesting to have taken a survey to see just which gardens would have been "taken home" if size (or money!) had been no barrier.

A certain amount of allowance had to be made if any of the water gardens were to be considered suitable for fish-inclusion at home. Many looked, on the surface (if you'll pardon the pun), quite attractive but most would have required an extra two feet of water depth if they were to fulfil any long-term fish-holding capabilities.

One display where water depth was critical was Bronze Medal Award "A Taste of Japan" presented by Tetra. Here, a pool in front of an authentic Japanese Tea House was crossed by a traditional bridge below which Koi cruised to and fro seeking shade from the overhead sun. Naturally, the large specimens on show attracted a crowd of admirers especially when the fish were supplied with a generous helpings of Koi foodsticks!

A novel approach

Moving water always adds an extra "something" to any display and there were several instances where a novel approach had been featured. In the display presented by The Very Interesting Landscape Company, rotating copper sprinklers ensured that snake-like patterns of water kept the viewing public interested but none more so than the "as featured on television" water-pouring crows found on the Federation of British Aquatic Societies display entitled Merlin's Water Garden. These "turned into metal" carrion characters stood in groups but, every few seconds, one would open its beak to pour out a stream of water into the pond; it was a novel interpretation on the ishi-odoshi bamboo deer-scarers favoured by Koi keepers. On the same Bronze Medal display a "water cannon" proved to be literally just that, whilst squirting frogs and a flute-playing Peter Pan also lent jets of water to the scene.

Next door, the fairytale scene was continued with the Tudor Rose Award, Gold Medal winning "Wind in the Willows" scene presented by Lilies Water Gardens. Here amongst skilfully selected (and equally deftly planted) wild flowers lurked Ratty's waterside cottage, an imperious Toad Hall and (probably missed by most) Badger's lair entered by a cleverly hidden miniature door. Fairies were well to the fore in "A Secret World of the Flower Fairies", a display not included in the aquatic village whilst any stressed out visitors (from long journeys, crowds or just the heat) could find solace in "The Feng Shui Garden" — nothing but tranquillity in every direction.

Over the years, the Antony Nolan Memorial Garden have become justly famous for its crowd-attracting designs and this year's "Take a Slow Boat to Happiness" was no exception: would you believe a real canal narrow-boat had been built into the design? Most people would settle for a pond in the home's garden but here was a home in a garden pond! The winners of a design competition amongst students at the renowned Capel Manor horticultural centre produced "Still Water & Dreams" for Anglo Plant's garden and an unusual feature was the use of crystals to make up the pathways and, in one instance, the substrate of a pond.

Exotic presentation

Naturally, Water Lilies are an expected component feature of any pond but one very exotic presentation, presented by Dorset Water Lily Company as a separate addition to their tranquil "Woodland Waters" main display consisted of tropical species with their brilliantly-coloured

right Woodland Waters. Dorset Water Lily Company presented this beautiful tranquil "Woodland Waters" feature as well as a separate water lily display.

left Wind in the Willows. Gold Medal winning "Wind in the Willows" scene presented by Lilies Water Gardens. Here amongst skilfully selected (and equally deftly planted) wild flowers lurked Ratty's waterside cottage.

spiky flowers held high above the water.

If rockwork is your thing then a Stonehenge-like garden would have had you satiated. From a typical cave formed from mini-monoliths gushed water into a small pool. A huge portal of slate formed the entrance to the garden and even the fence, against which weary Show-visitors supported their aching backs as they sat to take a break, was made from slates uprightly-embedded into the turf.

Elsewhere in the Show, on Show gardens and general displays alike, water was used imaginatively from frothy columns supporting two large dice in an aptly-named "The 'Patience' Garden" staged by Nuffield Hospitals to an enormous incline of parallel paths of flowers down which cascaded water (Citroen in Bloom).

The overall inference this year was that "water features" were just that with the moving liquid there in its own right; whilst water does add a superb dimension to any garden, any visiting fishkeeper would have been disappointed to find very few fish-inhabited ponds to drool over.

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Liz Donlan's KOICALENDAR

As can be seen from this month's calendar there's still plenty happening within the Koi world — shows, photographic competitions, meetings, social events, etc., so if you want to be where it's all happening, just pick up the phone and contac t any of the numbers listed below.

For some time I have been critical of the number of shows being held in the UK and have advocated that organisers, exhibitors, dealers and the general public would all benefit more if some of the shows were amalgamated. I've already heard a whisper that one club in the north west is planning a Millennium Show at a major Koi dealer and they will be inviting two or three other clubs in the area to join in ... so watch this space for further details.

right The Northern Koi Club holds two auctions a year at Klassic Koi. As the auction is held outdoors a gazebo was erected over the selling pond to ensure the Koi were well shaded.

PHOTOGRAPH: LIZ DONLAN

SHOW CALENDAR

SEPTEMBER

4/5 North of England ZNA Chapter. The Phoenix Sports and Social Club, Bawtry Road, Sheffield. Contact Yvonne Muse on 0114 289 1437.
5 BKKS Leicestershire Koi Annual Show at FarmWorld, Gartree Road, Leicester. 10am-5pm. Contact Wayne Eady on 01455 446014.
12 The Cambridgeshire Koi Club Show at Thorpe Hall, Peterborough, from 10am. Contact Graham or Jane Haggar on 01487 711129.
25/26 BKKS Isle of Wight Section 1st Open Show (Japanese style) at Medina Leisure Centre, Fairlee Road, Newport, Isle of Wight. Contact Kevin Driscoll on 01983 291676.

KOI PHOTOGRAPH SHOWS
These events are for club members only, so if you're interested in taking part you'll need to apply for membership.
SEPTEMBER
11/12 BKKS Manchester & District Section. Contact Sue Ennis on 0161-480 5821.
18/19 Witham Valley Koi Society. Contact Ray Lee on 01522 872733.
OCTOBER
2/3 BKKS Nottingham & District Section. Contact Shirley Hind on 0115 981 0923.

KOI CLUB AUCTIONS
A number of Koi Clubs organise regular auctions whereby surplus Koi and equipment are sold at competitive prices — unless there's half a dozen bidders interested, then the price goes in favour of the seller!
SEPTEMBER
5 BKKS Crouch Valley Section at Baryleylands Farm, Billericay, Essex. Contact Graham Hall on 01277 753579.
19 BKKS Worthing & District Section Autumn Auction. Contact Carole Coote (Secretary) on 01903 232277.
OCTOBER
9 Northern Koi Club at Klassic Koi, Clarefarm Garden Centre, Nel Pan Lane, Leigh, Warrington, Cheshire. Entries and viewing 10am-12 noon. Auction commences at 12 noon prompt. Non-members welcome to attend and bid for items. Contact Glynnis Morgan-Davies on 01706 218243.

There are numerous Koi Clubs/Societies throughout the UK and we will publish details of their meetings each month as and when we receive details. However, don't forget to include a contact name and number.
Copy for Koi Calendar can be sent to me: Liz Donlan, 594a Bolton Road, Pendlebury, Swinton, Manchester M27 4ET. Tel: 0161-794 8282. Fax: 0161-793 9696.

KOI SOCIETY MEETINGS

SEPTEMBER

5 BKKS Worthing & District Section. Guest speaker, Duncan Holmes, on 'Anaesthetics and Water Quality'. Contact Carole Coote (Secretary) on 01903 232277.
11 BKKS Leicestershire Section are holding a Bring a Bottle evening at one of their members' ponds. Contact Karen Boyton (Chairman) on 0116 233 0797.
12 BKKS Nottingham & District Section are visiting their own members' ponds. This is always an ideal opportunity to glean ideas for your own ponds and gardens, so why not contemplate joining the Nottingham & District Section — you might just be in time to take part in this event. Contact Shirley Hind on 0115 981 0923.
12 BKKS Worthing & District Section entertain the Wessex and Southern Koi Society. Contact Carole Coote (Secretary) on 01903 232277.
14 BKKS Nottingham & District Section at the Western Club (off Derby Road), 357A Derby Road, Lenton, Nottingham, from 7.30pm. Guest speaker, Kate McGill, 'Dual Judging'. Contact Shirley Hind on 0115 981 0923.
19 Northern Koi Club. Coach trip to Koi Pool, Kirei Koi and Blackpool Illuminations. Contact Glynnis Morgan-Davies on 01706 218243.
23 Witham Valley Koi Society. Yvette from Mount Pleasant Koi will be talking about the ins and outs of being a Koi dealer. Contact Ray Lee on 01522 872733.

Well known Koi enthusiast DAVID TWIGG unravels the mysteries of Koi varieties. PHOTOGRAPHS: DAVID TWIGG

Koi Varieties

Koi are wonderfully colourful coldwater fish that will happily mix with the many other species found in our garden ponds. They have one big difference though, the size to which they can quickly grow given good water conditions; 24 inches (60cm) is not uncommon. This is often the reason why pond keepers become Koi keepers in order to give their pets the best possible environment in which to thrive.

Koi have been developed in Japan from colour mutations found in food carp. Today's Koi are a million miles away from those early specimens and various colour and pattern varieties were defined by the Japanese for the purpose of exhibiting Koi and competition between breeders. It is for this reason that the Japanese variety names have been adopted around the world for the purpose of identification.

Generally speaking, as Koi get larger they become less timid and owners soon find that at feeding times Koi will actually take food from their hands. This sort of closeness with the subject of ones hobby means that any potential health problems can be spotted early and the colour differences between the Koi in the pond become more apparent. It is often at this time that people get the Koi books out and learn that they are grouped into 13 different classes each containing a number of varieties.

Although all Koi are coloured in a variety of ways some colour/pattern combinations are, for a variety of reasons, thought of as more desirable than others. As Koi grow so their coloration and pattern can change, as can skin quality; these and other factors mean that the pond keeper must keep the water condition at its optimum in order to keep the Koi looking good.

Certain points good Koi should achieve

So, how do we tell our Koi apart? There are certain points

that all good Koi, regardless of variety, should achieve. Body shape, including the head, can vary widely so a good well rounded body (not pot bellied or rugby ball shaped though) is preferred and the head should not be pointed. Skin quality is often overlooked by the newcomer to the hobby; skin should shine, have a depth of "gloss" rather than a "flat" finish. This is of course a different quality to that of the metallic varieties where an obvious metallic sheen can be seen.

Another skin feature is the presence of shiny or reflective scales as compared to metallic. These scales show as either gold (Kin) or silver (Gin) and a good quality "GinRin" as it is known can be quite stunning. Observation of Koi on a regular basis will help enable the reader to spot these differences; the show scene is particularly good for viewing high quality Koi.

Koi appreciation, the art of knowing a very good Koi from a good Koi or a bad Koi from a not so bad Koi, is something that is learned over time. We look and look at Koi, and discuss their relative merits with other Koi keepers and dealers in order to find the best Koi for our ponds. It is impossible to describe "appreciation" in a few words but below follows the description of a couple of varieties that you may well have in your pond.

Most pond keepers are drawn to Koi by their bright colours when visiting their local aquatic centre. The Ogon is often the first Koi chosen for the garden pond, so I will start with its description.

Ogon

There are several Ogons and they all fall into the Class of Hikari-muji-mono. Hikari means metallic and muji-mono relates to a single colour. Because these fish are one colour then more emphasis is placed upon the conformation of body shape, quality of the metallic sheen (lustre), clarity of the head and the even coloration and alignment of the scales. Fins are normally, on non-metallic Koi, translucent at the base grading to clear at the edge. On the ogon, however, the fins are the colour of the body and this colour depth should again be even across the fins.

Although nominally a single colour metallic grouping there is one deviation from that. When an Ogon has dark centres to its scales then it becomes known as Matsuba Ogon; Matsuba meaning pinecone scalation.

The traditional Ogon is Gold but they can be found in several colour variations the most common of which is the Yamabuki (yellow) Ogon. Other colours include the Orengi (orange), Purachina (platinum) and Nezu (silver grey).

The Matsuba variants are Gin (silver) Matsuba and Kin (gold) Matsuba and the additional feature to be appreciated here is the pinecone scalation. The dark scale centres should be clearly defined and these should be evenly distributed over and along the top of the body and down below the lateral line.

Kohaku

Kohaku can probably best be described as the most highly cherished of the Koi varieties. It is a two colour, non-metallic Koi. The Kohaku is a white Koi with a red (Hi) pattern on its back. As mentioned above the importance of body shape and skin quality is paramount but here with a two coloured Koi the balance of pattern is also judged. Obviously the "depth" and "shade" of Red should be the same across and along the Koi.

Good specimens of Kohaku should have clearly defined edges to the pattern and the white should be a good unblemished colour, often described as "snow" white. The contrast between the two colours can be striking to say the least and this is why the Kohaku is so highly prized.

Although a Kohaku cannot have colour variations as in the Ogon it does have pattern varieties and these are generally known by the number, or placement, of Hi patches along the length of the body; Nidan (two step), Sandan (three step), Yondan (four step).

far left A female Ogon with good body shape and clean head.

left A more slender male Ogon with excellent skin quality.

right A high quality Kohaku showing superb body volume and excellent "Kiwa" (sharpness to edge of pattern).

far right Same Kohaku from different angle and giving better view of pectoral fin coloration changing from white at base to translucent at edge.

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BLANKNEY KOI FARM
Martin Road, Blankney, Metheringham LN4 3BE. Tel: 01526 378510

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BARDILLS AQUATIC CENTRE
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Oxford OX3 9TL. Tel: 01865 513692. Fax: 01865 513692

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BA11 1EQ. Tel: 01373 454242.
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Ipswich IP8 3EG. Tel: 01473 652705.
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NORTH EAST KOI & AQUATICS
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NE40 4ND. Tel: 0191-413 1529.
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East Yorks YO15 1LW.
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The Aquarist's Early Days

75th Anniversary Year

75 YEARS YOUNG!

By John Cornelius

Practically the first thing I ever looked at was a tank of tropical fish. I was born just after the Second World War in Liverpool — the *Aquarist & Pondkeeper* was already 25 years old. My father had converted the old Anderson air raid shelter into a warm, damp underground fish house. I can still see the rows of tanks of *Brachydanio* fry and young Platies, Swords, Giant Danios and Australian Rainbows, as well as Barbs and Siamese Fighters; I can still hear the reassuring hum of the air pumps.

There was the sour-mash smell of Micro Worm cultures along with the Brine Shrimp and Tubifex; boxes full of old dusty heaters and thermostats and other clutter, momentarily fashionable then discarded, like metal earthworm grinding discs and miles of green plastic coated wires. Other boxes contained old copies of the *Aquarist & Pondkeeper* and the long extinct *Water Life*.

Magazine must have run at a loss

As a child I soon developed a passion for tropical fish and reptiles and many happy rainy afternoons were whiled away browsing through the old *Aquarists*. I'm sure the magazine must have run at a loss for many years; you got the impression that it was run by a handful of tweed-jacketed, well-heeled semi-eccentrics comfortably ensconced in the "Home Counties" for whom "profit" was a dirty word and the last thing on anyone's mind.

The articles were well-informed, intelligent and above all readable, written by committed enthusiasts with a gift for communication and a great command of the English language. Any fees received must have been negligible, yet they wrote with rare flair, clarity and humour, every month, year in, year out, decade in, decade out.

Names like Raymond Yates, Laurence E. Perkins, Roy Pinks, Robert Bustard — the pioneer of modern reptile keeping techniques — are forever engraved in my memory, although there are many others whose names now escape me, for example the correspondent from Northern Ireland who compiled the *Aquarist Notebook* column for many years and who was totally obsessed with Java Moss.

Rarely a month went by without him having mentioned the dearth of the stuff in his hometown or else, on rare, bountiful occasions of plenty, he would be offering readers a chunk of the moss free on receipt of a SAE.

Few contributors formally trained biologists

Very few of these contributors were formally trained biologists, although some were undoubtedly educated genteel types: the greatest of them all was the legendary Jack Hems, a Bohemian type who saw no conflict with his Soho, cafe-society and his consuming passion for fishkeeping and his phenomenal output of books and articles on the subject.

The 1960s saw a major sea-change in aquarium literature: cheap American books and magazines began to appear. The *Aquarist* marched on, mostly unaffected by these new publications. Rival magazines came and went — I actually became a regular contributor to one of these in the 1970s, not through lack of loyalty to the *Aquarist* but simply because I got fed up with sending articles and letters to the *Aquarist* which went unanswered and unacknowledged, because of the editorial chaos which apparently reigned.

Occasionally I would get an article returned after many months, even years, had elapsed, with a letter of apology which suggested to me that my deathless prose had been jammed in the back of a drawer somewhere for the duration.

Factual articles as good as ever

Today, no longer a fishkeeper but an occasional glancer at the trade press, I find that the solid factual articles are as good as ever but there are sadly fewer of them per issue. Instead most of the hobby magazines are filled with acres of informative but deadly dull items on the latest equipment available. This is common to most trade magazines who understandably wish to keep their advertisers sweet.

But it does make me wonder whether any real writers are still about who keep fish or whether there is just no room for them in this white-hot technological world. In the meantime, fashions come and go but the *Aquarist* rolls on into the next millennium. Here's to the next 75 years ...

What the Editor says ...

John has beautifully captured the feeling of Aquarist & Pondkeeper*'s early days, but just as importantly, he has also captured the essence of what* A&P *is still about today, and here I quote directly from John: "The articles were well-informed, intelligent and above all readable, written by committed enthusiasts with a gift for communication and a great command of the English language." A&P built its reputation on these articles and our "mission statement" for the future is simply to maintain the high standards our magazine has always been known for.*

Special Feature

75th Anniversary Year

Greetings ... from the Land of 'Hasta Luego'

JOHN DAWES returns to *A&P* as a regular contributor in "The Pondkeeper" this month, but where has he been since he gave up the Editorship of *A&P*?

PHOTOGRAPHS: JOHN DAWES UNLESS OTHERWISE STATED

A&P — established in 1924 ... and still going strong! Remember this oft-repeated statement doing the rounds all those years ago? Well — it seems as if we could well be on the verge of being able to claim so again, as we head for the new millennium under the stewardship of our brand new editor, Derek Lambert.

As a former editor of this magazine myself, I know only too well the challenges that lie ahead, not just for our editor, but also for all of us who will be contributing to the "new generation" *A&P*. I, personally, relish this challenge and am delighted to have received an invitation from Derek to give our readers a brief update on what I've been doing since leaving *A&P* and to start writing for the magazine again, after a break of a few years.

Non-disappearing act

No, I didn't (as some readers might think) disappear into the ether when I gave up the editorship of the magazine some years ago. Dick Mills took over and guided the publication through some very difficult times, keeping it going until, today, we find it ready to push on into a new and exciting phase.

In the meantime, Vivian (my wife and business partner) and I have developed our aquatic consultancy in new directions. One of the first things we did was amplify my magazine writing schedule which (owing to the many demands of editing *A&P*) had been in "ticking over mode" for several years. Within a few months I was writing for some eight aquatic industry and hobby magazines. Today, the number stands at 14, some on a monthly basis, others bimonthly.

Books, too, started taking up a larger share of our time, my involvement being two-fold: either as author, or as editor/editorial consultant. Subject matter has varied considerably, making life very interesting indeed. For example, there's been a beginner's book on tropical freshwater fish, a concise encyclopaedia of popular freshwater tropicals, a pond keeping/water gardening manual (based, partly, on a Question/Answer format), and, most recently, a book on Dragon Fish (*Scleropages formosus*), written in collaboration with a number of Singaporean partners. This last book, which has just appeared in English and Chinese, was launched at the National Library in Singapore in May, where I also invited to address the invited guests.

Way back in 1987 Vivian and I became consultants to the biennial trade/consumer show, Aquarama, which is staged in Singapore. This relationship with what has become the premier event of its kind in the world, has flourished over the years and our involvement in organising the conference and fish competition has grown accordingly. My own participation as fish competition judge, as well as chairman and speaker at the conference, has also expanded markedly over the past decade.

What has taken, and is taking, the lion's share of our time, though, is the administration of Ornamental Fish International. OFI is a worldwide organisation (it currently has members in 40 countries) representing all sectors of the ornamental aquatic industry. As editor/co-

ordinator, I am responsible for running the Secretariat and, with Vivian, publish the organisation's Newsletter and OFI Journal, update the website (http://www.ornamental-fish-int.org), organise the AGMs and conferences, liaise with Ministries and other agencies on legislation matters, attempt to resolve international and national "situations", like the recent Spring Vicaemia of Carp (SVC) crisis between the UK and China, or the current KLM crisis on transportation of livestock, etc., etc.

The OFI work is fascinating and difficult … and takes us all over the world, sometimes for meetings, sometimes to address conferences, sometimes for other reasons. Over the past 18 months or so, for example, our work (both personal and on behalf of OFI) has resulted in visits to Sri Lanka, Germany, Holland, Mexico, Oslo, the UK, northern Spain, Missouri and Singapore. Lined up for the coming months are northern Spain (again), Hawaii, a return trip to the Rio Negro, Kenya and Germany.

So, far from disappearing, we've been busier than ever.

Andalucia-bound

Mind you, two years ago, we did "physically" disappear from the UK, when we decided to move home and business to Andalucia in southern Spain. It wasn't an overnight decision, of course, since, for about eight years previous to the move, we had had a property near Estepona (about one hour west of Malaga and 30 minutes east of Gibraltar, where both of us were born).

Running our business from home in Wiltshire meant that we couldn't take holidays there and, at the same time, be free from telephone, fax, e-mail and normal mail. We, therefore, started coming over to Spain for what we termed "therapeutic visits". At first, we made a couple of visits a year, then three, then four … and so on. Each time, it became progressively more difficult — particularly in winter — to return to Wiltshire. Logic (and Andalucia) won in the end, culminating in our permanent move on July 28, 1997, a date indelibly ingrained in our memory for all time.

We expected to be homesick for Wiltshire, but, again, Andalucia won, much to our delight. So far, we have had two wonderful years (and a bit) since our move, experiencing all sorts of exciting old and new things in the meantime. Particularly good have been the fishkeeping opportunities that our gentle Mediterranean climate provides us with. For example, we keep a range of species that, hitherto, I've only ever kept in aquaria. Now, they are distributed among our main pond, plus four mini-ponds.

Rosy Barbs, Tiger Barbs, Golden Barbs, White Cloud Mountain Minnows, Red Shiners, Florida Flag Fish, Paradise Fish, Peppered Corydoras, Guppies, Swordtails, Platies, Zebra Danios and (of course!) my "first love", *Gambusia holbrooki*, all form part of our expanding pond collection. The plants, too, make interesting reading. Water Hyacinths that flower for months on end, yellow and pink Calla Lilies, Limnophila, Vallis, Java Fern (*Microsorum pteropus*), night-blooming lilies and a whole host of other species, all do exceptionally well over here.

We do miss good quality aquatic shops and centres, though. Boy, do we miss them! There are other things we miss, from people to places, to daffodils in spring…but you can't have everything…not even here!

One of the big pluses for us are the Andalucians themselves. They have an enviably admirable approach to life, which you can't avoid assimilating. They have, for instance, a charming way of saying goodbye … they don't! Instead of saying "Adios", they say "Hasta luego" (see you later). What a friendly and optimistic note on which to part company with friends, or even strangers. Let me, therefore, in true Andalucian style, bid all our readers a fond "Hasta luego" … while at the same time, offering Derek and the team all the very best as they take *A&P* into the 21st century.

far left *Gambusia holbrooki*, one of John's favourite fish. PHOTOGRAPH: DEREK LAMBERT

above One of our mini-ponds (we have four: another one like this one, plus two "Urn-ponds"). We also have a main pond.

below Vivian hand feeding our assorted collection of "tropical pond fish". The fish actually feeding are two of our male *Macropodus opercularis*.

75th Anniversary Year

This was the first article on amphibians to be published in the Amateur Aquarist & Reptilian Review *(August 1924, Issue Number 4), when the magazine changed its name from* The Amateur Aquarist. *Of course, this magazine is now known as* Aquarist & Pondkeeper.

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

75 YEARS YOUNG!

AXOLOTL

Axolotl are peculiarly suited to a life of confinement and no aquarist should be without a pair. Hardy and extraordinarily interesting, they breed regularly if kept under proper conditions.

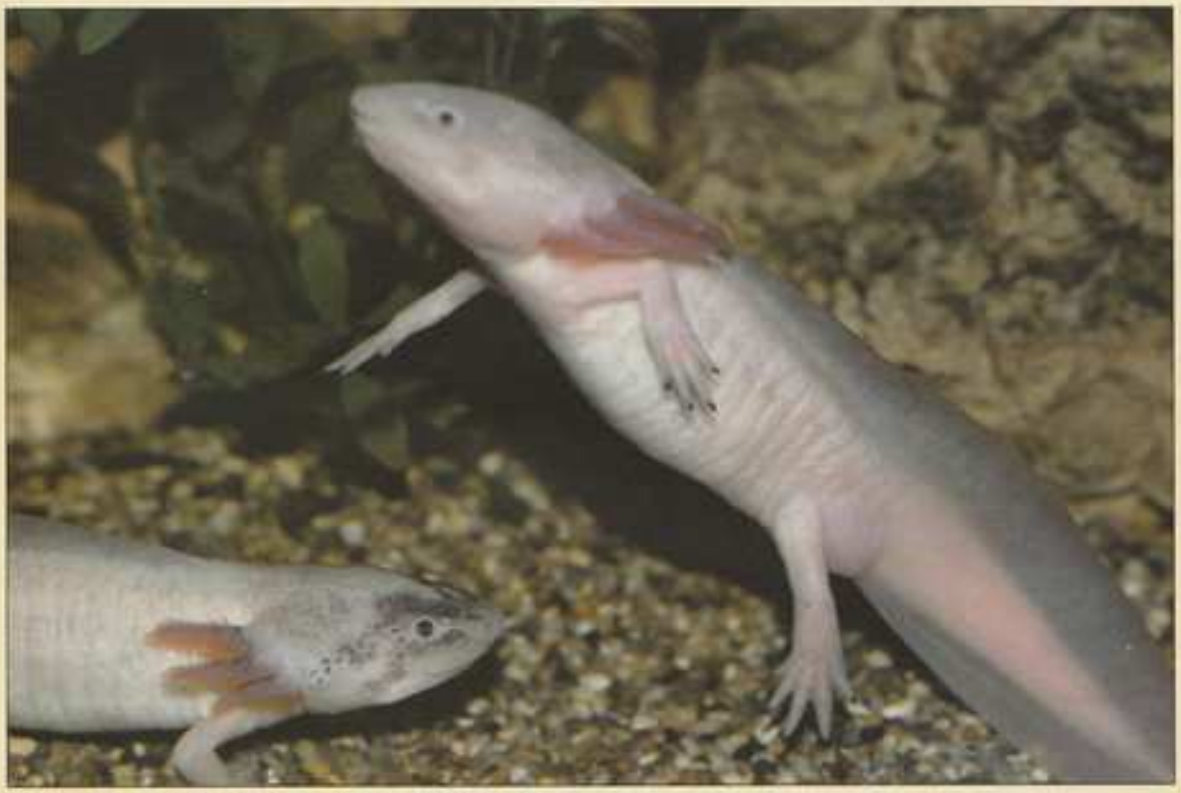
Though possessed of three pairs of feathery gills, Axolotl are not entirely dependent upon oxygen in the water, being in the habit of rising to the surface and gulping down atmospheric air after the fashion of an adult newt. They are, therefore, able to live under conditions which would prove insupportable to fish, but like any other living creature, they thrive better with ample accommodation.

Axolotl have become quite famous owing to their remarkable history. Living and breeding in the Mexican lakes without ever venturing upon land, they were, at one time, considered to be perfectly aquatic animals, but in the sixties(1860s) a number of imported specimens astonished the world by absorbing their gills and fins, developing eyelids and yellow spots, and thus transformed, walking out of the water fully adapted as terrestrial creatures. They were then recognised as a well-known North American salamander-the Amblystome (*Amblystoma tigrinum*).

Like 'Peter Pan'

It is thought that ages ago, the climate of Mexico was sufficiently moist to allow the adult batrachians to live out of water, as their North American brethren do to this day, but that upon the climate becoming dry the Amblystomes were forced to keep to the lakes (batrachians having a naked skin cannot exist without moisture) and eventually got over the difficulty by ceasing to grow up like "Peter Pan". The most remarkable feature of the evolutionary change is that three Mexican batrachians bring forth their young whilst in what is really the larval stage of their existence.

After the Axolotl had revealed the secret which it had kept so long, scientists commenced to experiment and it soon became comparatively easy to induce them to transform into the adult form by allowing the water in which they were kept to gradually evaporate, thus forcing them to make



free use of their lungs. More recently it was found that by feeding them on thyroid, Axolotl could be made to accelerate this development.

Interesting as these experiments may be, aquarists are likely to be satisfied with Axolotl as they are, for as terrestrial salamanders they are not nearly so attractive. The typical form is blackish without any pretensions to good looks, but a striking albino variety, bred from captive specimens, which has long been on the market, is comparatively handsome, its chief adornment being the deep pink feathery gills.

A sort of cave should be formed in the tank in which Axolotl are kept so that the batrachians can seek seclusion when so disposed, and this they will do during the greater part of the day.

Expressionless faces

As evening approaches they become exceedingly lively, swimming to and fro quite gracefully, though, when ambling about on the bed of the aquarium, they are comically awkward. Their faces are as expressionless as the toe-cap of a boot, which their heads somewhat resemble in shape, but they are not nearly so stupid as they look.

They very soon learn to take food from the fingers and show quite an intelligent interest in one's approach at meal times. As the chief item of their diet should be raw meat or fish, it is wise to accustom them to feed from the fingers, to avoid the possibility of the water becoming fouled by discarded portions of food. Improvised forceps formed of two thin strips of wood fastened to a narrow block at one end are very useful for the purpose.

Axolotl will readily partake of Bloodworms, Earthworms and even Tadpoles or small Minnows, which should form a variation to the menu at times.

top of page Albino Axolotl. PHOTOGRAPH: LINDA LEWIS

far left Normal colour form.

75th Anniversary Year

The following article, by **S. G. Whittle (Vice-President of the British Aquarium Society),** *appeared in the very first issue of The Amateur Aquarist (as A&P was called then) in 1924. In many ways it epitomises the sort of article A&P has been, and still is, all about. Our use of the English language has changed a little over the years, but the fish have not and if you keep and breed Paradise Fish today you will still see them behaving in exactly the same way as Mr Whittle describes in this article. At the time colour reproduction techniques did not allow A&P to produce this article with colour pictures, so it appeared with a line drawing. This time we can reproduce it in full colour and show you the true beauty of this, the first tropical fish to reach Europe.*

PHOTOGRAPHS: MAX GIBBS

Paradise Fish as Parents

75 YEARS YOUNG!

Save for the familiar Goldfish, the Paradise Fish was the first tropical species to reach Europe alive.

Imported into France in 1869 from Eastern China, it is now cultivated throughout the greater part of Europe and America, its popularity being undoubtedly due to its comparative hardiness, adaptability and beauty.

The reasons for its popularity are not far to seek, for within limits it is extremely hardy and immune from disease; it lives contentedly in a small aquarium and is easy to breed, whilst its habits are extraordinarily interesting, and above all, it is superbly beautiful.

An aquarium 20 inches long, well stocked with vegetation and filled with matured water, makes an excellent home for a pair of Paradise Fish.

In the winter a temperature of 65-75°F is required, and from 75-80°F during the summer.

The tank should face south in order that it may get an hour of sunlight. Scraps of garden worms, enchytrae, live daphnia or shrimp should form the principal items on the "menu", the food being given to the fish every second day during the winter and once a day in the summer.

For breeding purposes the selected pair should be preferably from one to two years old. Fish beyond this age are not very productive, and experience shows that the power of reproduction is lost at about five years.

A second tank for the spawning should be in readiness, filled to a depth of about four to six inches with matured water, and having a bed of clean sand covered by a layer of sediment from a well- established aquarium.

Plenty of aquatic weeds should be planted at the end of the tank to ensure cover for the female, as the male becomes extremely brutal towards her before the spawning. No aquatic snails must be introduced, but to keep down algae, etc., a few of the tiny fish dubbed "millions" may be employed.

Two males displaying

Bob & Val Davies's

FROGS&FRIENDS

Herp Fact File: MATE RECOGNITION IN FROGS & TOADS

In areas where humidity and temperature are appropriate frogs and toads may breed at any time of the year. In other areas suitable conditions may be seasonal or periodic (i.e., alternating wet and dry seasons). Under these circumstances breeding occurs in a sudden burst usually referred to as "explosive breeding" in which dense congregations of both sexes indulge in fairly short but intense mating behaviour.

Successful breeding demands accurate recognition of the correct sex and correct species. The latter is particularly important where two or more species occur — in one South African region 13 species were recorded in the same location. The most important factor in mate recognition is the advertisement call (see earlier *Frogs and Friends*). In one experiment female Southern Toads (*Bufo terrestris*) were attracted to a recording of males from a distance of 40 metres (130 feet).

Once at the breeding site other factors come into play; the most important non-vocal stimulus is said to be tactile, namely size and skin texture — in one study males of a larger species were seen to reject females of small species, possibly the skin texture was also involved. Skin texture is thought to be important in species such as the Spiny toad (*Bufo spinulosus*) which do not call. During the breeding season males of certain species such as *Bombina orientalis* develop a rougher texture on the dorsal surface which might be a signal to other males.

In other cases scent may play a part — this aspect has not been studied thoroughly, but males of several species develop glands on the body during the breeding season — possibly scent from these attracts females or repels males. In some instances these glands are coloured which might imply visual recognition. Since sexual colour differences are not common in anurans they may be unimportant except in a relatively few species that are diurnal breeders although this does not explain why males of some nocturnal breeders develop coloration on the throat pouch. It could be that being nocturnal their night vision enables recognition of this feature.

Not all diurnal breeders exhibit sexual colour differences; Arrow-poison frogs (*Dendrobates* and *Phyllobates*) show such distinction — courtship is preceded by calling and certain ritualised behaviour which permits mate recognition. Males of some *Colostethus* species (diurnal breeders related to Arrow-poison frogs) develop a black throat pouch when in breeding condition.

There is much room for investigation on this particular topic and anyone keeping anurans may well make some important observations which could add to the existing (but incomplete) knowledge.

above Spiny toad (*Bufo spinulosus*). Numerous small spines give the skin a distinctive texture.

PHOTOGRAPH: BOB & VAL DAVIES

Conservation — Native Species

No doubt many of us cursed the rainfall over the last winter and in early spring but one particular group of creatures has reason to be grateful — the Natterjack Toads (*Bufo calamita*) on the Sefton (Merseyside) coast. Owing to the wet winter the scrapes (pools) where they spawn were full and, according to the Ranger Service this has been an unexceptionally good year with lots of toadlets metamorphosing successfully.

It would seem that if the winter had been dry it could have been disastrous as, following the two previous winters, breeding had been very poor. In fact last year there was apparently no breeding. Therefore it was encouraging to hear that numbers now appear to be holding steady at this site.

Regarding the rare Sand Lizards (*Lacerta agilis*) which inhabit the same area we were informed that accurate records were more difficult. This species tends to occur in scattered pockets along the Formby/Sefton coast and observation can be difficult. Mating was recorded in spring at some of the sites.

A rough guess is that they also are holding steady. Some time ago we mentioned that a group of Sand Lizards had been released at secret sites in Wales — initial reports indicate they are doing well. In addition a captive breeding project at Chester Zoo is also showing encouraging results.

English Nature has formulated a Species Habitat Action Plan which will draw in all various agencies concerned in conserving and increasing numbers of all species. Part of this programme will be concerned with improving recording/monitoring of Sand Lizards at all sites to assess overall progress of the species.

Recent years have seen conservation management work in certain locations to try and offset the effects of housing, tourism, new roads and afforestation. In particular sea buckthorn had invaded much of the habitat and needed to be cleared. EC funding has, during 1996-1999, assisted in the "Life Project" which has been concerned with the above work.

Diary Date

Sunday, September 12 1999. The International Herpetological Society Reptile Fair to be held at the Alumwell Sports Centre, Primley Avenue, Walsall. Half a mile from Junction 10 on the M6 (follow signs for Walsall).

Supply and Demand

In today's consumer society the law of supply and demand applies to reptiles and amphibians as it does to other commodities. Rare species command high prices although with many commoner species the price may vary according to where you buy; at a show in April Dwarf Fire-bellied Newts were £1.50. each, at another show in July they were £7.50. each.

A newspaper report on a lost Cornsnake (*Elaphe guttata guttata*) mentioned the purchase price as £85 whilst anyone in the know would realise that this species can be purchased for substantially less. Last year one private breeder was selling them at three for £10 towards the end of a show.

Over the past few years successful captive breeding has tended to cause a glut of certain species, particularly common colubrid species such as Cornsnakes and several Kingsnakes (*Lampropeltis* spp.) as well as Leopard Geckos (*Eublepharis macularius*). Bearded Dragons (*Pogona vitticeps*) were once quite rare but their high fecundity (20 eggs per clutch, possibly three clutches per season) has recently made large numbers available. Likewise the Veiled or Yemen Chameleon (*Chamaeleo calyptratus*) has appeared in substantial numbers because of its phenomenal breeding potential.

Unfortunately such intensive breeding is not always beneficial for the animals' welfare. It was common practice at one time for some keepers to "double-clutch" snakes, i.e., arrange the first mating as early as possible in order to produce another clutch the same season. Usually this was governed by the profit motive. Breeding before full maturity, often in order to recoup initial outlay (plus profit) has also occurred. In the case of a Milk Snake only one egg was produced; the female remained stunted, never achieving her full size and subsequent breeding results proved disappointing.

Because of the glut and subsequent low prices some show committees have actually put a minimum price on certain species such as Cornsnakes and Leopard Geckos to be sold at shows. However at the time of writing there seems to be a shortage of some of the common colubrids. At the end of last year many keepers were saying that they would be reluctant to breed this year. Whether this has happened is not clear — it could be that hatchings are simply a little late. Since the end of last season there seems to have been a larger than usual number of breeding pairs of colubrids for sale.

Supply and demand also seems to be affected by "fashion", often by the availability of new or rare species or colour mutations. For the past few years Cornsnake mutations have been fairly popular. Rarer species which have come mainly from the USA have started at high prices.

Two years ago the first captive-bred Frilled Dragons (*Chlamydosaurus kingii*) were retailing at £295 each — captive breeding has lowered the price substantially. Giant New Caledonian Geckos (*Rhacodactylus* spp.), being prolific breeders and relatively easy, have halved in value in the USA, although they are still fairly expensive here. Still commanding high prices are the rare Geckos — *Underwoodisaurus* spp. — the last we saw were £400 each. The price is bound to come down given time.

At the moment certain Indonesian/North Australian species, particularly Pythons, are increasing in popularity. A few captive bred specimens have been imported, mainly by individuals to set up breeding groups and have been quite highly priced owing to rarity value. The recent lifting of a ban on imports from Indonesia into Europe has seen the arrival of a few shipments containing species such as Green Tree Pythons (*Morelia viridis*), Amethystine Pythons (*Morelia amethistina*), D'albert's White Lipped Pythons (*Leiopython albertisii*), Macklot's Pythons (*Liasis mackloti*) as well as several unusual Geckos and other Lizards some of which had possibly never been previously imported.

Naturally prices are relatively high, but obviously if people have the money and want something badly enough they are willing to pay. Some of these Indonesian Snakes are said to be captive bred for export. We recently went to view a shipment brought in by an importer and although not "python fans" we were tempted by baby Green Tree Pythons and D'albert's (white-lipped).

above D'Albert's White-lipped Python. A captive-bred hatchling, this species is increasing in popularity and slowly becoming more readily available. PHOTOGRAPH: BOB & VAL DAVIES

above The Asian Spiny Turtle (*Heosemys spinosa*) would take some swallowing. PHOTOGRAPH: BOB & VAL DAVIES

A Bit of a Mouthful

Whichever group of animals one studies, a fascinating aspect is the variety of ways in which they have adapted to their particular niche. Simple examples are the numerous body shapes of fish: flat, bottom dwellers; fast streamlined open water species; elongated "wrigglers"; laterally depressed forms such as *Chorisodon* and many others. Among birds different types of bills have developed to suit different methods of feeding. Apart from the above features a host of others are involved; body size, limb size and shape (or absence of limbs) tail shape, coloration, skin texture and various other physical features.

Evolution can be a mind-boggling subject and in many cases on the reasons for certain features. One puzzle is

▶ *Continued on page 48*

Bob & Val Davies's

Frogs & Friends

A Bit of a Mouthful

◀ *Continued from page 47*

why some chameleons have horns whilst other species do not? The answer must lie somewhere in their ancestry. Back in the mists of time there was a stupendous burst of adaptive radiation when many different (often bizarre) forms evolved, many of them to die out for a variety of reasons. One reptilian feature which evolved over 200 million years ago was the chelonian shell.

This "basic" design has survived, relatively little changed, to the present. Among other reptiles there are lizards that look like snakes, snakes and lizards that can be mistaken for worms but the turtle shape is distinctive. Once in had evolved there was only limited possibility for further diversity although some adaptation occurred so that there are differences. Possibly the most bizarre shell shape is seen in the Asian spiny turtle (*Heosemys spinosa*) in which the marginal scutes (shields) of the carapace (upper shell) bear spiny projections — certain writers have referred to this species as the "cogwheel terrapin".

These prominent projections tend to disappear as the turtle grows. *H. spinosa* is a basically terrestrial species spending much of its time among forest litter. One would think that the spiny outline would impede the movement but apparently not — generally speaking the "rules of evolution" dictate that only successful features that assist survival are retained.

Another Asian terrapin (*Cyclemys dentata*) has a "toothed" margin but not as extreme as that of *Heosemys*. Again the "teeth" reduce with age. A North American species, the Mississippi map turtle (*Graptemys pseudogeographica*) exhibits similar change. Young specimens have a serrated edge at the rear of the carapace which disappears as the juvenile grows. Because, in all three cases, these features eventually disappear the possible reason for them is protection against predators during the more vulnerable juvenile stages.

Bob & Val Davies's

AtoZ of Reptiles & Amphibians

B *Bufo*

A genus in the family Bufonidae. Often referred to as "typical" toads, the most familiar species being the Common Toad *Bufo bufo*. The genus is widely distributed although absent from Madagascar, New Zealand, some Pacific islands and Australia. The Marine or Cane Toad is found in Australia but it has been introduced there. Central and South America has 50 plus species, Africa over 42 species, Asia 35 species, Europe and North America around 19 species. These numbers are approximate — taxonomic revisions sometimes occur and previously unknown species are occasionally discovered. A wide variety of habitats are utilised; tropical rainforests to semi-desert regions. Most *Bufo* species tolerate drier conditions than do common frogs.

Although the general body shape is squat, the skin covered with rough, warty lumps some species have a fairly smooth skin and there are several with rough, spiny skins. A prominent feature is the presence of parotoid glands just behind each eye; these have small pores from which toxins can be produced to deter predators. In Bufo marinus the toxin can actually be squirted a considerable distance. Skin secretions may be poisonous, irritating or simply noxious — although concentrated in the parotoids they can be produced from other parts of the body. *Bufo alvarius*, a largish species from the USA, has large poison glands on the hindlegs. The toxic secretions contain bufotoxins which can vary chemically from species to species. That in Bufo bufo increases cardiac activity and lowers pulse rate. Eggs of certain species are known to be toxic particularly those of *Bufo marinus*.

Bufo species tend to hop rather than jump — the Natterjack (*Bufo calamita*) is also known as the "Running Toad" because of this mode of locomotion. A few species are diurnal and several others are mainly aquatic — although the majority are nocturnal/crepuscular and enter the water at breeding time. Reproduction depends on the prevailing climate; temperate species breed in spring, others in the rainy season. Some are opportunistic breeders, spawning wherever sufficient water is available. Breeding sites vary from tiny pools to large lakes according to species. In a few cases running water and even brackish water are used. Eggs are laid in strings, often in thousands.

Possibly the most familiar in the hobby are Cane/Marine Toads and European Green Toads (*Bufo viridis*) although a few African and North American species are occasionally available. The majority of *Bufo* species are relatively easy to keep, often become tame and may live for 20 plus years.

above This male Common Toad (*Bufo bufo*) was found hiding in Linda Lewis's shed. Its rough warty skin, typical of many members of the genus, is clearly visible in this photograph.

below Strings of Common Toad (*Bufo bufo*) spawn. In some species thousands of eggs will be produced.

PHOTOGRAPHS: LINDA LEWIS

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The European Co
– NATR

CHRIS SPENCER looks at the one of the most maligned and

Snakes! One of the most maligned and misunderstood creatures of the animal kingdom. Indeed to some people the mere mention of the word is enough to send a cold shiver down their spine. Yet, much of the fear of these fascinating and often strikingly beautiful animals stems from the dark ages and has been handed down through folklore.

In view of this many superstitions have evolved around snakes giving them a sinister and macabre reputation. Two of the most popular beliefs assume that the skin of a snake is slimy to the touch, when in fact it is dry or that previous to striking they can induce an hypnotic effect over their intended victim. Another misconception among these old wives tales is that the mate of a slain King Cobra will relentlessly pursue the slayer to reap its revenge.

Consequently snakes have been mercilessly persecuted despite these reptiles playing a very important part in the ecology of this planet and the majority being harmless to man. Nature, however, has seen fit to equip some species (less than 10 per cent) with poison glands and fangs for self defence and to aid them in hunting.

ommon Grass Snake

IX NATRIX

, misunderstood creatures:

PHOTOGRAPHS: CHRIS SPENCER

pictures 1 to 5 This unique sequence of shots was taken by the author as the youngsters started hatching.

Description

The genus *Natrix* includes three European species of water snake of which *Natrix natrix*, the grass snake, is the best known. Its body is an olive brown in colour and this background is overlaid with a pattern of black spots. At the point where the head and body join there is a striking yellow collar. Adults may reach a length of up to 1.5m when full grown.

This genus is sometimes referred to in America as the Eurasian Water Snakes because of their preference for aquatic habitats. As well as the three European species there are many Asian members of this genus.

Habitat

The Grass Snake can be found throughout Europe, Asia and North West Africa. Although termed as a semi-aquatic reptile, this species is often found in a dry habitat and I have sometimes come across the animal in my travels, by the waterside. It is an extremely good swimmer with its head just breaking the waters surface, like the periscope of a submarine. A snap of the fingers will bring the snake to a dead stop in its tracks, where it will remain, completely motionless, until it decides if is safe to continue on its way.

THE GRASS SNAKE ... A most maligned and misunderstood creature

Feeding

In the wild state it feeds mainly on fish and amphibians although in captivity it can be persuaded to take dead foods. Suitable food items are fishes and small rodents which can be stored in a deep freezer until required (with the approval of the rest of the household). When required these foods need to be thoroughly thawed out. One food item my snake definitely would not accept as part of her diet, was earthworms that I had dug from the garden. The method I favoured when feeding dead fish was to drop the food item into the water dish. When things were quiet the snake would take the food and the water could be changed.

Any species of whole small fishes are suitable as food but if a marine species is on the menu, (e.g., Whitebait) there is a problem. Marine fishes contain the enzyme Thiaminase. This enzyme destroys the vitamin B1 in the snake's body which causes a lack of muscle control and could lead to the death of the animal. The effects of this enzyme can be counteracted by breaking it down. This is done by heating the intended food to 80°C (175°F) for five minutes, or alternatively sprinkling vitamin B1 powder onto the food before feeding it to the snake.

Breeding

The snake in my keeping was a pregnant female and one quiet evening I had the good fortune to observe her laying her eggs. She began laying when the light was reduced at the end of the day and continued the process over the next few hours. The following morning she stayed with her body coiled around the eggs until, as most snakes do, she departed showing no further interest in them.

I removed the eggs and placed them in a home-made incubator. They were partially buried in the peat and kept in the position that the snake laid them. The incubator was a small plastic container half filled with moist peat to maintain a high humidity with air holes in the sides for ventilation and a lid on top. This complete unit was then placed on bricks which were standing in a small aquarium half filled with water. Into the water I placed a heater stat and maintained the temperature between 80-85°F.

I checked the eggs daily for signs of mould and kept the peat moist with a light spraying of clean water when necessary. After seven weeks the first cracks appeared in the shells as the hatchlings began chipping at the egg with their egg tooth. Over the next few hours the first baby snakes about 20cm in length began to wriggle their way out. A small plastic container, complete with substrate about one inch deep became their home and a water tray was provided by utilising the lid from a coffee jar. The hatchlings were kept in the container for about ten days till they shed their skins and began to feed.

Behaviour

These snakes are reasonably docile by nature and are easy to keep in captivity. They do have a defence mechanism that they use if they are not used to being handled and often expel a foul smelling secretion from their cloacae if they feel that they are being threatened. One specimen in my care ejected its secretion over me much to my chagrin. Another method of defending itself, if the foul smell technique fails and it is still confronted with a hostile situation, is pretending to be dead, a process that is termed akinesis. The snake coils its body loosely, remaining totally inert and even lolls its tongue limply from its mouth in a final dramatic attempt to feign death.

right Adult female Grass Snake at home in her vivarium

bottom left New born youngsters free of their shells at last.

Perhaps the logic behind this defence is that a predator, used to eating fresh meat, will have experimented with carrion before and found it to be distasteful. It may be possible that the snake is attempting to convey this impression to its would-be attacker.

Accommodation

A purpose made vivarium can be bought, or you can design and make your own, which is what I prefer to do. Whichever method you choose, if the occupant is not to be subjected to a life of abject misery, it must be large enough, and needless to say, must be escape proof. The vivarium that I constructed is made of plywood with a perspex front and a top also made from perspex which is fastened down with wing nuts. It is three feet wide by four feet in length and is two feet high, to give space for branches and rocks thus accommodating reptiles that favour climbing. In the sides there are many small holes to ensure that there is adequate ventilation. A most important fact often overlooked.

Maintenance

The maintenance of the vivarium is fairly basic. It needs regular cleaning and daily checks. This is especially true when keeping fish-eating snakes because uneaten food will soon decay in the humid atmosphere. The water requires changing on a daily basis and I prefer to use rainwater for my snakes. Lighting and heating should be turned down towards the end of the day to simulate the coming of night.

The ultra violet fluorescent tube lighting is beneficial to the snake allowing it to produce the vitamin D3 in its skin which is essential to its well-being. Heating the vivarium is extremely important because they have to rely on external sources to gain body heat. I position a heat pad underneath the substrate. Cat litter is placed towards the front of the vivarium with a mixture of gravel and mosses towards the back. The temperature can be varied by using tungsten light bulbs of different wattages. This way the snake can seek out its preferred temperature. It may choose to spend its time in the heavy, shallow bowl of water provided or it may retire to the branches and rocks placed in the vivarium.

Reptiles are intriguing animals to keep and more than compensate for the time and effort required. With a little imagination the vivarium can be set up to imitate a natural environment and be aesthetically pleasing to the onlooker. So, if you are now contemplating the keeping of a snake, then please don't be swayed by superstitious nonsense. You may even have the good fortune, as I did, to observe the emergence of baby snakes as they hatch out from their shells.

FACT FILE

Common Name: European Grass Snake
Scientific Name: *Natrix natrix*
Size: Up to 1.5 metres
Colour: Olive brown with black dots and yellow collar around the neck
Habits: Semi-aquatic
Breeding Season: From early spring clutches of up to 30 eggs laid; hatching August to September
Incubation: 8-10 weeks
Hibernation: Begins in October
Diet: Amphibians and fish. Recommend dusting (Vitamin B1 in powder form on food)

VIVARIUM REQUIREMENTS

- Provide large vivarium (escape proof lid) reasonably high to allow for branches, rocks, thus accommodating climbing reptiles
- Temperature range 64-75°F provided by heat pad and tungsten (household) light bulb
- Lighting — tungsten light bulb plus ultra-violet fluorescent tube
- Substrate — gravel or cat litter, minimum depth two inches
- Decor — rocks, trees, branches
- Ventilation provided by many holes in sides of vivarium
- Water provided by large shallow bowl

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DAVE GARRETT guides us through some of the most spectacular and difficult to keep marine fish; PHOTOGRAPHS: DAVE ALLISON UNLESS OTHERWISE STATED

Large Angelfish

above *Pomacanthus imperator*, adult Emperor Angelfish with a Cleaner Shrimp removing parasites from its gills. This photograph was taken in the Red Sea just off the coast of Southern Egypt. PHOTOGRAPH: TREVOR MCDONALD

Can there be a more stunning group of fish than the Pomacanthidae, or Angelfish. Anyone who has seen mature specimens of the Regal Empress (*Pygoplites diacanthus*), Emperor (*Pomacanthus imperator*), Scribbled (*Chaetodontoplus duboulayi*), Majestic (*Euxiphipops navarchus*), Blue-Face (*E. xanthometapon*) or the King and Queen (*Holacanthus passer* and *H. ciliaris*) Angels cannot fail to wonder at the beauty of their vivid colours and startling markings.

Small wonder that they are possibly the most popular of all marine fish. Beautiful as they are, the spelling and pronunciation of their rather grand names is a nightmare!

Although Angelfish are stockier in their build there is a marked similarity between them and the Chaetodontidae or Butterfly fish, the tell tale difference is the spines found on the lower edge of the gill covers of Angelfish. The spines can cause problems when attempting to catch an Angel and if using a net it is very important to use a delicate high quality one.

The family has a widespread distribution, being found in the Indo-Pacific region, Australasia, Western Atlantic, Caribbean and Red Sea. The Pomacanthids vary widely in their size and whilst some may reach 24 inches in the wild and 10 inches in captivity there are a number of dwarf species that never grow beyond four inches, they belong to the Centropyge genus. The Centropyges are not covered in this article but there are two *A&P* articles to be found as references 1 and 2.

Colour confusion

Many Angelfish exhibit striking changes in pattern and coloration as they mature from juveniles into adult fish. The juveniles of some species may act as cleaner fish, with their striking, and often very similar, blue and white markings providing an advertisement for their services.

Many species although quite distinct when adult are very similar to each other when in their juvenile phase. For example, *Pomacanthus imperator*, *P. semicirculatus*,

LARGE ANGELFISH ... *Spectacular and difficult to keep marine fish*

P. annularis, P. asfur, Euxiphipops sexstriatus, E. navarchus and *E. xanthometopon* all have variations of a basic pattern of white lines on a blue body colour.

The Queen and Blue Angels (*Holocanthus ciliaris* and *H. bermudensis*) also show similar juvenile marking and coloration. These two fish add to the confusion as adults may inter-breed to produce a hybrid known as "H. townsendi".

Angels in captivity

There are five main problems when keeping large Angelfish: Suitability for captivity; acclimatisation to captivity; aggression; diet; and a tendency towards a sudden demise!

Consequently a beginner's tank is not really a suitable abode for an Angelfish.

1. Suitability for Captivity

Certain species live on a diet of sponges, some exclusively so, and as such are totally unsuited to captivity because of the hobbyist's inability to replicate this diet. There are specific "Angel diet" foods available on the market but even using these it would probably not be possible to keep the exclusively sponge based feeders.

The unsuitability of Angels for captivity, and consequently how often species deemed "unsuitable" are seen for sale, is the subject of much debate and disagreement. Reference 3 by Dr Allen lists the dietary requirements of Angelfish and on this basis he grades them into four categories of difficulty.

His difficulty group four are species that he considers to be exclusively sponge feeders that cannot survive for any reasonable length of time in captivity. Immediately we have uncovered another bone of contention, i.e., what is a reasonable length of time.

Very little work has been done on survival times in captivity although several of the large public aquaria on the continent have well documented cases of Angels living for well over 10 years in their aquaria. The whole topic of suitability and hardiness in captivity qualifies for further debate at the end of this article.

2. Acclimatisation

Most authors suggest buying small specimens to ensure a much better chance of them taking to captivity. Large mature adults will sometimes refuse point-blank to eat anything once in captivity and I have seen beautiful fish waste away in this manner. Excellent water quality and stability is a must if these sensitive fish are to be kept with any degree of success.

below *Pomacanthus imperator* sub-adult. This Emperor Angelfish has started to change to its mature coloration but the transformation is incomplete.

far right *Holacanthus ciliaris*. With their startling yellow and blue coloration Queen Angelfish have to be one of the most attractive marine fish kept by aquarists.

below *Euxiphipops navarchus*. Majestic Angelfish are probably not a good choice for captivity because the diet is almost impossible to recreate.
PHOTOGRAPH: LINDA LEWIS

You must also provide imaginative aquarium decor to allow caves and bolt holes for these sometimes nervous fish.

3. Aggression

Angels can be somewhat unpredictable, ranging from merely territorial to outwardly violent, belligerent, aggressive bullies, capable of killing their tank-mates. I have seen numerous Angels over the years and as such can illustrate the potential for aggression, sometimes of a somewhat unpredictable nature, with a couple of stories.

I know of a dealer who was selling a stunning adult 10 inch Queen Angel at a giveaway price, but it came with a warning. No matter what size tank the Queen had been placed in it immediately launched viscous attacks on it's tank-matesThe final straw came when it was placed in a tank housing just a 4 inch Lionfish. The Angel promptly picked up the Lionfish by it's tail and smashed it into the rockwork killing it instantly — unbelievable but true.

In another tank a friend had to remove an adult Clownfish to prevent a slow merciless death at the hands of an Fireball or African Pygmy Angel (*Centropyge acanthops*).

The Angel had been in the tank for a year or so with the already well established Clownfish but one day it turned on the Clownfish, despite being the smaller fish, and never let up.

Finally, a close friend raised juveniles of an Emperor, Majestic and Blue-Faced Angels to adult fish of differing sizes. They were in a large 150 gallon tank and coexisted peacefully for a few years but eventually a dominant order arose and the smallest fish (the Majestic) became the subject of bullying intense enough to prevent it from feeding.

If you want to keep a large Angel you may well have to keep it with small fish that present no threat or challenge to it, e.g., Damsels, Gramma's, Clownfish, Gobies, small Wrasse, etc. Failing that you will need to find tank-mates able to defend themselves, perhaps not as easy as it sounds in view of the story of the Lionfish, however most Angels would think twice about bullying a Triggerfish! If you want to keep more than one Angel ensure they are of different sizes, colour, pattern, genus, or keep a large Angel with a dwarf species.

4. Diet

Even ruling out the exclusively sponge feeding Angels, they are still a demanding group of fish to feed. Specialist Angel diets, that will contain plankton and sponges, are a must in your attempts to provide a varied and suitable diet. Angelfish are constant browsers that will continually pick at algae growth, therefore a good algae growth in the tank and the use of foods containing algae will be a boon. To these special sponge and algae foods add live and frozen brine shrimp, mysis and some meat based items such as mussel.

5. Sudden death

One evening Gordon Kay (an old friend and ex-contributor to this magazine) was looking at my tank said "that is the fattest and healthiest looking Blue-Faced Angel I have ever seen." Talk about the kiss of death — it was! The fish died in the space of two hours one morning, without a single mark or symptom to be seen. It was not the only Angel I have lost in this way and I know of numerous aquarists with similar experiences — the question of why needs close examination.

Martin Moe's 1982 publication and revised 1992 edition (Reference 4) listed a "dirty dozen" ailments of marine fish and this would seem an excellent starting point. Many of these were diseases that would have easily seen symptoms and hence would not show as a sudden death of unknown cause of an apparently healthy fish, e.g., Oodinium, Cryptocaryon, Lymphocystis, bacterial infection, fungal disease, tuberculosis, lice and flukes, thereby removing eight from our list. Some of these diseases, such as Oodinium, may kill quickly but you will have tell tale signs beforehand.

Any aquarist with enough experience to be keeping large Angels should not be having water quality problems hence poor environment is unlikely. Whilst some fish must almost certainly die from organ failures due to old age I am sure such cases do not even come remotely close to accounting for any appreciable number of sudden deaths.

Bearing in mind that large Angels are quite belligerent fish well equipped to look after themselves then bullying looks unlikely. However, juveniles are a different matter and like most marine fish they can be the subject of incessant bolling. Large Damsels are quite capable of domineering a young Angel to the extent of not letting it feed. The

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bullying can be quite subtle but again with a vigilant aquarist it should not go undetected so again we have dismissed this as a cause of sudden death.

We have now eliminated 11 of the dirty dozen and are left with one, i.e., poor diet, hence returning us again to the question of feeding Angelfish. Perhaps despite our best efforts we cannot replicate their diet well enough to sustain a long life in captivity. Perhaps a long period of missing a vital but unknown vitamin or element contributes to a slow deterioration and then sudden failing of a vital organ. Could it be that there are a lot more species that we should add to our list of unsuitable for captivity ?

I once spoke to Richard Sankey (previous owner of TMC) about this problem and he offered an interesting opinion as to what may cause some of these deaths.

He suggested that sometimes placing a maturing Angel in captivity arrested its development. Although outwardly the fish appeared healthy this slowing down of it's maturation led to a sudden untimely death. Any other suggestions will be welcome through the pages of this magazine.

To summarise

1. **Large angels are not for beginners.**
2. **Ensure you do not buy an "impossible species".**
3. **Do not buy large mature specimens.**
4. **Beware of aggression especially if attempting to keep more than one Angel.**
5. **Attention to diet is vital.**
6. **Water quality and stability are of paramount importance.**

The hardiness debate

The question of Angelfish and their suitability for the home aquarium has raged for many years with polarised courses of action often advocated. Germany led the way with outright bans of some species whilst some articles from the United States claimed success with very difficult species.

Dr Allen (Reference 3) rates Angels on a scale of one to four with group four meaning the diet of these species cannot be catered for in captivity, therefore long term success is not possible.

To reinforce earlier comments Dr.Allen does not list any Angelfish, not even Centropyges, as easy fish, they all appear as a difficulty level of at least three. Some of the species in group four are listed below:

Chaetodontoplus species: *conspicillatus, personifer, passer, clarionensis*
Pomacanthus species: *annularis**
Euxiphipops species: *navarchus*, xanthometopon*, zonipectus*
Holocanthus species: *passer*
Pygoplites species: *diacanthus**

Not everyone will agree with this list, indeed I know of long lived specimens in hobbyist's tanks from all the species marked with an asterisk. However, I am sure these are exceptional cases — how many die after 12, 18 or 24 months — hardly long term success. Personally I would add species such as *Holocanthus tricolour* (Rock Beauty) to the list.

The debate of "suitable" Angels was rife in the late 1980s and I have chosen two articles to illustrate the disagreements. Because of his own success with *C. personifer* Jay Hemdal takes Hans Baensch to task over his sharing of similar views to Dr Allen (unfortunately I only have an anonymous copy of this article, it was published in a fishkeeping journal in the late 1980s).

In another article (Reference 5) concerning *Holocanthus passer*, Richard Stratton states "the hardiness of this species is legendary" adding that he believes the fish to be an opportunistic feeder. A further theory, in particular concerning the alleged hardiness of Red Sea specimens of *P. diacanthus*, is that the original location of the specimen, e.g., Red Sea, Indo-Pacific, etc., may well have some bearing on hardiness.

Personally, after seeing many, many, fish meet an early demise I believe large Angels to be very delicate fish that are for the advanced hobbyist only. I feel diet is a major factor in shortening life-spans, with some regularly imported Angels eating well in captivity, but never truly adapting to an artificial diet. Exactly which species fall into this category may be open to debate but do we have the right to do anything other than err on the side of caution and not take dubious species from their natural environment.

above

Pomacanthus imperator, Juvenile Emperor Angelfish.
PHOTOGRAPH: LINDA LEWIS

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Long standing aquarist PETER CAPON looks at the history of the Cardinal Tetra in the hobby and gives us a unique insight into its breeding habits in the wild: PHOTOGRAPHS: MAX GIBBS UNLESS OTHERWISE STATED

The Life and Cardinal Tetra

The Cardinal Tetra, *Paracheirodon axelrodi*, was first discovered in the 1950s and, whilst it is slightly more colourful than the Neon Tetra, *Paracheirodon innesi*, it did not take the aquarium world by storm in the manner of the latter fish.

It was named by science in 1956 by Schultz as *Cheirodon axelrodi*, in honour of Herbert Axelrod, and one day later by Myers and Weitzman as *Hyphessobrycon cardinalis*. Under the rules governing the naming of fish and other animals, the International Commission on Zoological Nomenclature ruled that the earlier name had priority.[1]

The original name of the Cardinal Tetra is thus *Cheirodon axelrodi*. However, after further studies by Weitzman and Fink in 1983, the Cardinal was renamed as *Paracheirodon axelrodi* to clarify the relationships between the Cardinal, the Neon *Paracheirodon innesi* and the Least Neon *Hyphessobrycon simulans* as *Paracheirodon simulans*.

P. simulans differs from *P. axelrodi* and *P. innesi* by reference to the jaws, teeth, hydromandibula ("face bone") and the operculum. For the aquarist the main difference is that the colours are less intense, particularly the red on the ventral region.

far left A school of Neon Tetras.

PHOTOGRAPH: M.P. & C. PIEDNOIR

below *Paracheirodon axelrodi*, Cardinal Tetra.

bottom right *Paracheirodon innesi*, Neon Tetra.

Times of the

forest streams that are heavily shaded.

Although much of the literature states that the cardinal is a black water fish this is not strictly true as the cardinal requires less extreme conditions. *P. axeldrodi* in the wild exhibit light phobia, preferring light levels up to only 300 Lux. The fish also dislike strong currents preferring a flow of only a few cms per second. Generally the fish tend to congregate near the waters edge where the flow is slowest. Cardinals are usually to be found in water only 70cms deep,generally there are no water plants and the substrate is covered to a depth of up to 60cms with dead leaves.

According to Chan[2] wild cardinals move down stream when the water levels are

The Cardinal introduced to Europe in 1956

In consequence the three Neons are all classified in the genus *Paracheirodon*.[1] The Cardinal Tetra was first introduced to Europe in 1956 with the first shipment to the USA one year earlier. The Cardinal is similar to the Neon in both shape and colour, except that in the Neon the red coloured band below the iridescent blue/green stripe is located only to the posterior portion.

In the Cardinal the red runs from the operculum to the caudal peduncle. In common with *P. simulans* and *P. innesi* the iridescent line on the flank terminates before the caudal peduncle. In the majority of other tetras with lines on their flanks these lines almost invariably terminate at the caudal peduncle.

Paracheirodon axelrodi is found in the igarapes of the Rio Orinoco, Venezuela through to the igarapes of the Rio Vaupes and the Rio Negro in Brazil. The fish are found in the middle to upper sections of the igarapes and rarely in the actual rivers. The igarapes are small

CARDINAL TETRA ... *The life and times of this colourful fish*

low and up stream at high water. Spawning takes place with rising water levels. Generally the breeding season starts at the end of March and continues to the end of June, it is dependent on the rainfall patterns. A late start to the rainy season will mean a late breeding season, however, according to Axelrod[7] the fish start spawning in June and continue until August or September when most of the adults die.

The local Indian collectors think this is an annual fish and in all the areas that Axelrod has been fishing he only once found a rather hollow bellied Cardinal at the northern end of the Rio Negro in San Gabriel da Cachoeiro. The fish are most commonly found deep in the shallow swamps and igarapes at a considerable distance from the Rio Negro.

Western man first discovered the Rio Negro some 450 years ago when a Spanish explorer, Orellana, gave it the name Negro to describe its colour. The Portuguese didn't get to the area for another 200 years when Alexo Rodrigues Ferreira rediscovered it. The river when measured by volume is the second biggest in the world.

Normal life span 12 months in the wild

The cardinals' life span under aquarium conditions has been shown to be five to seven years but in their natural habitat the fish is an annual because of the "drain" on the parents caused by the extreme lack of food. The wild fish normally only live for 12 months with a few specimens lasting up to 16 months. Mostly *Paracheirodon axelrodi* are found far into the shallow swamps and igarapes which eventually drain into the Rio Negro.

According to Dr Ning Labish Chao from February onwards, or whenever there is a rise in water level, the cardinals spawn. The baby cardinals form into bolinhos swimming in ball shaped groups in the shallows whilst the adults cruise in deeper water to guard them. June was the best time to see these bolinhos. Chao witnessed a bolinhos like a spinning ball just below the surface when a one inch tetra of another species approached the ball obviously intent on a quick meal. Out of nowhere an adult cardinal tetra dashed towards the interloper driving it away. The adult then swam around the juveniles a few times before disappearing.

Protection of the fry is not very common in the characins and, if it were not for the fact that the reporter of the formation of bolinhos was a respected scientist with experience in the field, we might have discounted the reports of bolinhos formations that initially came from the local fish collectors.

By July/ August the water level starts to drop continuously and the cardinals move downstream. By August the first young fish are 15mm or larger.

Cardinals usually spawn in the evening; in the aquarium they drop approximately 500 eggs per female. In captivity they show an eight to 12 day spawning rhythm when adequately fed. But it is doubtful whether females are able to spawn more than once or possibly twice in the wild where food is scarce. In their native habitat cardinals feed on small copepods, tiny mayfly larvae and *Macrobrachium* shrimp.

In the aquarium 4dh or 28mg/litre of calcium are ideal for keeping the fish but a lower mineral content is essential for spawning and egg development.Classically aquarists have used peat or oak leaf extracts to acidify and partly soften water but inorganic acids, such as phosphoric acid are easier to dose in accurate amounts. The advantage of peat or oak leaf extracts lies in the bactericidal and fungicidal properties of humic and tannic acids which naturally protect the eggs from attack by bacteria and fungus. Indeed, peat and leaf extracts mirror the natural water conditions of the cardinals habitat and probably contribute to successful spawnings.

Important breeding factor

One of the most important factors in breeding cardinals is the water hardness which should be so low as to be almost imposible to measure. The breeding tank should be cleaned thoroughly and furnished with nylon mops to catch the eggs. Under no circumstances should the parents be fed in this tank and if they haven't spawned in a few days they should be removed and the tank re-cleaned and set up for another attempt.

Cardinals appear to spawn in the evening or at least at times of low light and will often perform if their aquarium is covered with a dark cloth. Indeed, immediately the eggs have been laid it is advisable to exclude light,as the eggs appear to be affected and may even

above *Paracheirodon simulans*, False Neon Tetra.

fail to hatch. The fry are also photophobic, at least for the first few days of life. A high intensity fluorescent light can be positively dangerous to Cardinal fry.

The hatching time of the fry is dependent on the pH. A pH of below 5.5 causes longer hatching time and greater losses of fry. Hatching success is at its best between pH5.5 and 6.0 with an optimum hatching rate at pH 5.8. The new born fry normally start to search for food about 120 hours after hatching. Foods should be sparingly added to the aquarium in just sufficient quantities for the tank for raising the fry must be kept scrupulously clean at all times as they cannot cope with pollution from uneaten foods or waste products.

Paracheirodon axelrodi are rarely bred by either the private aquarist or the commercial Far Eastern fish farms. Almost all the fishes offered for sale are imported from the Rio Negro area of Brazil. The imported fish tend to be offered only at certain seasons when the collectors can find them in sufficient numbers. The local fishermen are known locally as piaberos. In Portuguese piaba means small characin but in Barselos the word has come to mean all small fishes suitable for the aquarium, hence piaberos are collectors of aquarium fish.

The Cardinals are caught in a large scoop shaped hand net called a rapiche and then transported by the Indians in small boats to a local centre, where they are sold to a trader in Barcelos who takes the catches from a number of collecting teams, then sells the fish on to the exporters in Manaus from where they are sent by air to many parts of the world. The local trader also acts as a store-keeper to the local Indians often allowing them credit on food and other necessities against the value of next season's catch.

A sustainable cash crop

Dr Ling Labbish Chao of the University of the Amazon, Manaus, Brazil clearly stated that there is no evidence that any Rio Negro fish species is endangered or threatened. At the present time the danger of over fishing does not exist. The production of cardinals, in particular, is so great that the market does not exist to take them all. Price is not a consideration as piaberos only get between $1.50 and $2 for 1,000 fish.

The Cardinals are a sustainable cash crop for some of the poorer inhabitants of the area.[1] In 1993 more than 16 million cardinals are recorded as being exported from Brazil. It is probable that some 25 million were actually collected by the piaberos who use Barcelos as their headquarters.

When first imported, the cardinals need feeding up and conditioning. Personally, when I was in the trade, I used to open the bags into a bucket and, by way of air line tubing, siphon water from the tank into which they were to be introduced into the bucket to acclimatise the fish slowly to the new water. Usually the water in the tank was clean rain water. Over the next few weeks the water was slowly changed by numerous water changes until they were in water almost identical to the local tap water.

It has been suggested that cardinals suffer when kept in hard water from calcium deposits in the kidney tubuli, which can result in severe blockages leading to death. It is said that aquarium raised fish are less sensitive than wild caught specimens.

Cardinals are attractive fish for the community aquarium of smaller fishes but fish such as Angels and other species are likely, if large enough, to regard them as a tasty meal. Given reasonable care and not too hard water they can live for several years in your home aquarium.

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below A school of Cardinal Tetras.

PHOTOGRAPH: M.P. & C. PIEDNOIR

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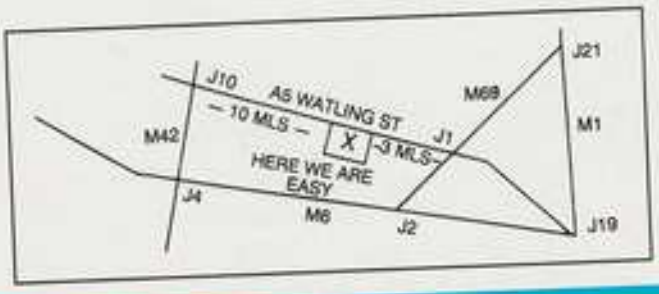

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The Goldfish Season

ALEX STEPHENSON charts the year's activities:

PHOTOGRAPHS: GORDON WIGENS

above All too soon summer gives way to winter ...

PART 5

There is an "old wives tale" which says: "Years ago summers were long and the sun always shone." I don't believe this for a moment because firstly, my old wife doesn't have a tail, and secondly, because I remember the weather was as unpredictable then as it is now. As a Goldfish keeper, my main complaint is the length of the winter.

With any luck, late summer is one of the times when pond owners can expect to enjoy their outdoor fish. The pool itself should be in good shape, with plenty of plant growth and a decent display of flowers on the water lilies, etc. Adult fish will be fat and content, while youngsters will be growing fast.

Winter management planning

Unfortunately, this idyllic state doesn't last. Shorter daylight hours inevitably lead to cooler temperatures. In just a few weeks we can expect the first frosts. So, when still appreciating the warm weather, the serious Goldfish keeper is already planning the winter management of his (her) stock. These considerations will include things like, which fish are to winter outside and, which will be brought in?

And, is the pond to have a total clean-out, or just an interim service? So, remember, when you see a Goldfish breeder sitting by the pond, eyes half closed, with a gin and tonic, they are not relaxing, they are making important decisions!

As far as Goldfish are concerned, winter is when temperatures are consistently below 50°F (10°C). In most parts of Britain this situation lasts for five, sometimes six months of the year. This means even the hardiest of fish need to be in good condition, with plenty of reserves to sustain them, until such time as spring arrives. This is why the condition of your fish early next season, is dependent to some extent upon how you've cared for them this season.

"Spring Death" is the vague but appropriate name used to describe a situation where fish which seem to have come through the winter successfully, die for no apparent reason in the spring. There must be many reasons for this occurrence because, as water warms up, it's not only the fish that become active, disease organisms rouse themselves as well. It stands to reason that fish already in a debilitated condition stand less chance of survival than those with some reserves of strength.

If you have acquired any new fish this season, it will be wise to keep a close eye on these as temperatures fall. Most imported fish have never experienced cold and many of them, particularly the more fancy varieties, might fare better if they are wintered indoors. At least for their first winter. Some hobbyists in fact always winter their more sensitive fish inside.

As far as the indoor facilities are concerned, now is the time to start preparations. Check and test all the equipment. Make sure you have spares for all the vital machinery. Don't forget things like diaphragms for the air pump. Do a proper estimate of the number and size of the fish you intend to accommodate. If you are using tanks which have been empty for a time, make sure they are clean and still serviceable. If you think these things sound too obvious to mention, last year I tried to fill a tank with a crack in the base! Fortunately, it was in the fish house so, there was no harm done.

Goldfish breeders never have enough space

Once you are satisfied everything is ready, make a note of which fish are to be housed in which tanks. With me, it's usually about this point that I realise I need more tank space. Goldfish breeders never have enough space. The trouble is, if you go on extending your facilities, with more tanks and more ponds, eventually you create a monster which is too big to manage. This brings us neatly to the conclusion of this series.

Remember, we keep fish for enjoyment. When the hobby takes over your life and becomes a chore, when there is so much work there is no longer any pleasure in it, then it's time for a rethink.

Fish Profiles

PHOTOGRAPH: DEREK LAMBERT

The Guppy
(*Poecilia reticulata*)

By Richard Friend

Way, way back many years ago, long before I had any notion that I might one day become a fishkeeper, I knew of only two words about the hobby. One was aquarium, the other — the Guppy. I never really knew why this name of a fish should stick with me in such a way. Could it be that the Guppy is as synonymous with fishkeeping as the aquarium itself, because it is the first fish that any newcomer buys? Could it be that the Guppy is the most popular fish in the hobby? No doubt many will disagree, having their own favourite fish. But certainly the Guppy has a great deal going for it.

Poecilia reticulata has been developed into a vast range of wonderful colours and fin shapes. Lace, gold, red ,green — Swordtails, Pintails and Veil-tails — there is a huge list.

Guppies belong to the same family as Mollies and Platies, Poeciliidae, nearly all of which are livebearers. The forefathers of today's highly cultivated Guppies originated from South America and Trinidad, from where a certain Robert Guppy sent back some specimens to the British Museum in 1860. They have now been introduced to many parts of the world, unfortunately not only in aquaria.

An easy and welcome addition to the community tank, they will accept a temperature range of 23-30°C, but will be happier in an average of this. A well-planted tank is preferred, and they will take flake as well as the usual live foods, and will also nibble at your plants. No need for a single purchase — Guppies are impressive in shoals.

The Guppy is probably one of the first fish that a fishkeeper breeds successfully, actually they do all the work themselves. Mature from three to six months, the male and female are easily recognised, making a change in the fish world. The female is the bigger and is far less brightly adorned than the male and the male has a modified anal fin forming the rod-like gonopodium.

One mating will serve the female through several pregnancies, as she is able to store the sperm until required. Once underway she will then produce up to 50 young every four weeks or so.

Try all the masses of different varieties of fish available in the hobby, but you'll always remember your Guppies, and no doubt return to keeping them at some time.

GUPPY CV

FAMILY: Poeciliidae
SPECIES: *Poecilia reticulata*
ORIGINS: South America, Trinidad
AQUARIUM TYPE: Community
FEEDING POSITION: Mid water
SIZE: 3.5 cm males, 6 cm females
TEMPERATURE: 70-80°F
DIET: Flake, frozen and live foods

PHOTOGRAPH: MR. & C. FIEDNOR

Bristlenose Catfish
(*Ancistrus temminckii*)

By Kathy Jinkings

The Bristlenose is an ideal fish for nearly every community aquarium. What other fish can be relied upon to remain small enough for most aquaria, be friendly to all its tankmates, easy to keep and spawn, interesting to watch, and performs sterling service in ridding its home of every scrap of algae?

There are many species of Bristlenoses, and while some are easy to identify, the vast majority show up in aquarium shops simply labelled "Bristlenose" (or even Bristlenose Pleco or just Pleco). Most of the commonly seen ones belong to the species *A. temminckii*, *A. cirrhosus* or *A. dolichopterus*, and fortunately all these can be kept in the same way.

Ancistrus temminckii and *A. cirrhosus* are brownish with large white spots, while *A. dolichopterus*, also known as the blue chin, is almost black with white spots. In all these species the male has a nose which is adorned on the top and sides with soft, fleshy "bristles", while the female has only a few bristles or none. A male and two females will fit easily into a three foot aquarium. Their mouths are specially adapted to eat algae, forming a sucker with which they graze their way across the glass and plant leaves, carefully scraping off algae. They are so diligent at this that very soon there will be no algae left, so they do need feeding properly on vegetable flake, blanched lettuce, cucumber, sinking algae pellets and a variety of other vegetable foods. Although they enjoy live foods such as Bloodworm or meat, this needs to be given only as a treat — the main diet should be vegetarian.

They will spawn readily in the aquarium, with the male guarding a neat lump of eggs which resembles a giant orange raspberry. He is a painstaking parent, fanning the egg cluster constantly to ensure that they are well oxygenated, removing dead eggs, and guarding the tiny fry until their yolk sacs are consumed. The little fish are easy to raise on the same vegetable diet as their parents.

Ancistrus dolichopterus was known very early in the aquarium trade, and managed to thrive and breed even with the primitive early aquarium equipment. Provided that you can provide clean water, lots of vegetable food, and a well-oxygenated tank, your Bristlenoses will thrive. Although some of the rarer and more expensive species need soft water, the "common" species are quite happy living and breeding in tap water from hard water areas.

BRISTLENOSE CV

FAMILY: Ancistrinae
SPECIES: *Ancistrus temminki*
ORIGINS: South America from the north as far south as Argentina
AQUARIUM TYPE: Medium sized community
FEEDING POSITION: Bottom
SIZE: 15 cm
TEMPERATURE: 70-75°F
DIET: Fresh vegetables, algae, algae wafers, occasional Bloodworm and other meaty food treats

PHOTOGRAPH: IGGY TAVARES

The Ram
(*Papillochromis ramirezi*)

By Iggy Tavares

The Ram is variously known as Ramirez's Dwarf Cichlid, the Orinoco Butterfly Cichlid, the Butterfly Dwarf Cichlid and even by its old genus name of *Microgeophagus ramirezi*.

The Ram is a wonderful kaleidoscope of colours. The anterior part of this Cichlid is mainly yellow, with the posterior part being mainly blue. Throw in a pink snout, red rimmed eyes, indigo mid spots, a pink belly in females and yellow fins suffused with red and spangled in blue, to produce the beautiful Ram. There are also various colour morphs created by selective breeding, to choose from. Males, apart from growing larger (7 cm) than females (6 cm), usually also have longer first rays in their dorsal fin.

Indigenous to the Orinoco basin in Venezuela and Columbia, we now know that the natural habitat is small streams and lakes of open Savannah rather than rain forest. Here the preferred biotope is the vegetated riverbanks, where the water has a pH of around 5 and the hardness is down to 1°dH.

Rams should do well in a nicely planted community tank containing small tetras or better still in a small aquarium of their own. In the community tank, they usually occupy the bottom of the tank and will not trouble the other occupants. Water should be well aerated and clean, and if there are any plans for spawning attempts the water should also be soft. In a larger tank containing two or more pair of Rams, wonderful interaction and skirmishes can be observed between males and sometimes even between females, although little if any damage is ever sustained during these encounters.

The preferred food for Rams is live foods such as Daphnia, Bloodworm and even Whiteworm, but they will readily take the equivalent frozen foods. Today's mass produced Ram will also take flake, grudgingly. However, to bring Rams into spawning condition, live food is an important addition to their diet.

Spawning behaviour of Rams is a delightful affair, which can be readily observed, since they spawn out in the open rather than in caves and crevices. My Rams usually spawned on large flat pebbles but also in pits in the gravel. Both parents care for the 50 to 200 eggs and the resulting brood. Initially free-swimming fry need minute foods, such as infusoria to survive.

The Ram with its coat of many colours and interesting behaviour makes a wonderful addition to a community tank, provided suitable conditions prevail.

RAM CV

FAMILY: Cichlidae
SPECIES: *Papillochromis ramirezi*
ORIGINS: Venezuela and Columbia
AQUARIUM TYPE: Community or separate
FEEDING POSITION: Usually bottom
TEMPERATURE: 75-79°F
SIZE: 6 cm females, 7 cm males
DIET: Mostly live and frozen foods, although flake will be taken by captive bred fish

PHOTOGRAPH: MR. & C. FIEDNOR

Upside-down Catfish
(*Synodontis nigriventris*)

By Derek Lambert

Here we have one of nature's oddballs. Any fish which spends most of its time swimming around upside down and is awake when all of the other fish are asleep has to be considered a little strange. In fact it is very typical of most members of this genus and has been popular with aquarists since the 1950s when it was first imported to Europe from its native habitats in Zaire.

The body colour is brownish mauve overlaid with black spotting. This colour continues into all the fins and tends to be very similar both across the back as well as on the belly. Males are more slender and tend to have darker coloration. Maximum size for males is 8 cm, whilst females will reach 10 cm.

This is generally a hardy fish which will fit in well in an average community aquarium. It is peaceful and can be kept with fish of a similar size or even smaller without any problems. The tank should be well planted and have a number of caves or other places where it can retire to during the day. Even a large plant leaf will be pressed into service if all else fails but a roomy cave tucked away in a quiet corner of the aquarium suits it much better.

It will eat all foods but loves live foods such as mosquito larvae which is scooped up as it glides along underneath the water's surface at night. Worms such as Bloodworms and White worms are quickly rooted out from where they have fallen into the gravel and even flake and tablet foods are hunted out as soon as they are fed. Although this is predominantly a nocturnal fish it will feed during daylight once it has settled into its home.

This is one of the few *Synodontis* to have been bred in captivity. The eggs are laid in a pit dug in the substrate and both parents care for them. After about four days they are free swimming and able to eat their first meal. This should be of small live foods such as Microworms or Brine shrimp. In a couple of months they adopt the adult upside-down swimming position and gather together to form schools. Later they become more solitary and become a little territorial.

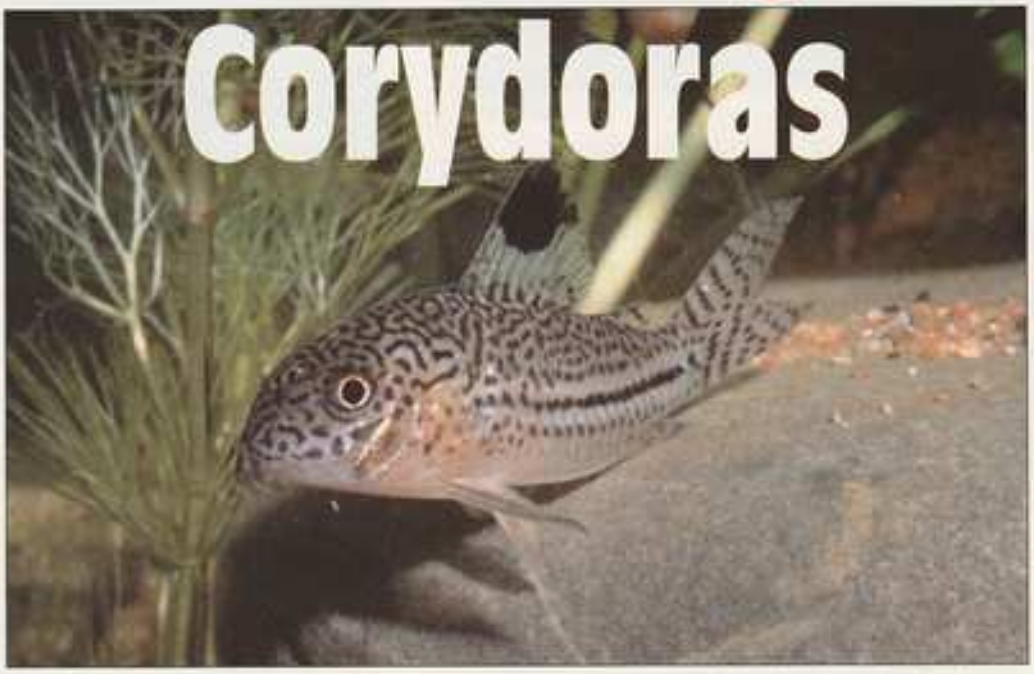
UPSIDE-DOWN CATFISH CV

FAMILY: Mochocidae
SPECIES: *Synodontis nigraventris*
ORIGINS: Zaire
AQUARIUM TYPE: Small fish mixed community
FEEDING POSITION: All areas of the aquarium are covered at night
TEMPERATURE: 72-80°F
SIZE: 8 cm males, 10 cm females
DIET: All foods accepted, but prefers live and frozen foods

GORDON DAVIS shares his method of breeding Corydoras:

PHOTOGRAPHS: MP. & C. PIEDNOIR UNLESS OTHERWISE STATED

Breeding Corydoras



above *Corydoras milineatus*. Gordon had six of these in such a set-up, spotted egs after eight days and had no clue as to which pair was responsible.

As with all fishkeeping conversations the subject of breeding often rears its sometimes ugly head! You can get a great deal of pleasure and sense of achievement from breeding fish, but you can also get headaches and hassle.

If I can jump the gun briefly, after you have convinced the loving couple to "get it together" what are you going to do with these baby fish, that initially, you can't even see? Do you take the parents or the fry out, or do you leave them together? Tank size, space required, time, filter type, what food? how much? how often ? Got a headache yet?

The main questions you need to ask yourself before you start are:

- If your fish breed have you got aquarium room for them to grow to a size that is worthy of sale or exchange?
- Have you a pre-arranged agreement? Rolling up at your local aquatic outlet with 127 baby catfish only to be told, "No thanks we can't sell 'em!", is not a good experience.
- I know it's your hobby, but is a four foot aquarium housing 50 baby bronze Corydoras for several months, only to eventually have to part with them, your scene — come on, be honest, you even cry with Rolf Harris on that blasted vet programme!

OK, enough said, and you are still going to give it your best shot. If you've tried and succeeded, good for you. If you've tried and failed or are considering giving it a go, the following method may work for you, as it has for me.

Suggested set-up to breed Corydoras catfish

I use a minimum aquarium size of 36 inches but prefer 48 inches, the idea being this will be the breeding and growing on tank. This should be lighted by a two foot long fluorescent tube on a timer for eight to 12 hours per day depending on aquarium position and natural sunlight.

STAGE ONE

Fill with eight inches of water, straight from the cold tap and leave to stand 24 hours. This will allow time for the gases to escape and room temperature to be achieved. Then switch the heater on and set it at 78°F. The following day start up your filter system. Nothing exotic, just two cheap air pump operated foam filters, one each side is ideal. Maybe a steadily bubbling airstone near the heaterstat can be added

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BREEDING CORYDORAS ... Achievements and headaches of breeding fish

to keep the temperature even throughout the aquarium.

I am not one for bare sterile aquaria, neither are fish. Bogwood, rock, and plants can be taken from an existing aquarium and added to the breeding setup. I always recommend that bogwood, rocks and plants have a 15 minute soak in salt water to kill off any undesirables before placing them in a new setup.

Now is the time to let Mother Nature do her thing and allow time for the aquarium to mature. The plants will get a foot hold, Java moss is great as it will grow on bogwood and rock giving the aquarium a lived in look. It also provides shelter, protection and security for fry. A scattering of Indian Fern floating on the surface will add shade, plants in general will aid water quality and your fishes well being. For a substrate I sprinkle a cup full of silver sand over the bottom to give them something to forage in. I have heard that this can cause damage to their barbels because of its abrasive nature, but my fish have never experienced a problem like this.

STAGE TWO

Two weeks later, all's well? Put in the Corydoras, but which ones? If you have observed a pair showing interest (males are slimmer and tend to have more pointed pectoral fins than females), say in your community aquarium, move them to the new set up. Alternatively buy a pair or group of the species you want to breed.

I have had six *Corydoras trilineatus* in such a set-up, spotted eggs after eight days and had no clue as to which pair was responsible for the estimated 30 eggs, of which 20 made the grade. I always remove all the fish as soon as I spot eggs, mainly because I have had eggs disappear when I left them in. On other occasions I have had eggs not hatch, and twice had them hatch and disappear within a week? Overall I have had a better success rate when I removed the parents.

The eggs can be found stuck to the glass, plant leaves or basically anywhere that takes their fancy. They take three to four days to hatch, then it's magnifying glass time. During the hatching period I remove the floating plants as well. If any of the eggs turn white and fluffy, chances are they are diseased or infertile. I have removed "bad eggs" and the rest have been fine. Any fry that are deformed or not swimming properly, I remove as soon as possible.

Using the same setup a pair of *Corydoras aeneus* that had previously produced eggs in a community aquarium, refused point blank to produce the goods in this purpose built set-up! Which goes to prove something or other?

Feeding fry often has aquarists reaching for some strange and often expensive products. Personally, as a starter food I have only ever used a good quality flake food very, very sparingly. I remove any uneaten food within minutes of them finishing and with Java moss in the setup they can always find something extra to chew on.

When my young fish are big enough to be identified as a type of their species, rather than a pin head with eyes, finely chopped earthworm is a good way of putting some meat on them. I do not recommend Tubifex or Bloodworm as I think they can cause digestive problems. Brine Shrimp? You do not get Brine Shrimp in naturally freshwater, neither do my fish, although some breeders swear by it. Daphnia is fine as long as you do not introduce undesirables with it. Keep the water fresh with two to three times weekly, partial water changes. I remove two buckets full and replace with tap water that has stood for 24 hours. This is poured slowly back into the aquarium to avoid giving the fry a cool water shock. If there is a great difference between temperatures, a drop of water from the kettle will warm it slightly. My method is to replace the water using a watering can with rose spray.

I have to admit the breeding setup I have described has worked not only with Corydoras Catfish but, using various water levels and a Java moss covered bottom for egg protection, it has proved ideal for breeding Zebra and Leopard Danios, Tiger Barbs and Buenos Aires Tetra's.

So, What are you waiting for? Go forth and multiply.

Fact File

Corydoras julii, Corydoras leopardus & Corydoras trilineatus Confusion

One of the commonest species of Corydoras you see for sale is *Corydoras julii* and yet very few of these fish are actually this species. Almost all of the fish you see offered for sale under this name are actually *Corydoras trilineatus*. You can tell the difference between these two closely related species by a close look at the colour pattern. In *C. julii* the head and body is finely spotted, whilst in *C. trilineatus* the spotting tends to be larger and form irregular blotches and lines. The body shape is also different with *C. julii* having a somewhat more slender and less robust appearance.

The other species you see masquerading as *C. julii* is *C. leopardus*. The colour pattern on this fish is almost the same as that on *C. trilineatus*. However, a look at the snout clearly shows this fish to be a long-snouted Corydoras unlike the previous two.

left Albino *Corydoras aeneus*, female, looking for somewhere to place a clump of eggs held in her pelvic fins. PHOTOGRAPH: LINDA LEWIS

far left *Corydoras aeneus*, a large group of three month old youngsters ready for sale or exchange, but can you bear to part with them?

left *Corydoras sterbai*, one of many beautiful species of Corydoras well worth trying your hand at breeding.

Andy Horton's SHOREWATCH

Examining the biology and behaviour of rockpool fish and marine invertebrates that are both interesting and useful knowledge for aquarists

Autumnal Equinox

At the equinoxes in March and September each year, the Earth's elliptical path takes it on its closest orbital position to the Sun. Three days later, at the New Moon on September 25, 1999 the combined gravitational pull of the Moon and the Sun produce the greatest range of tides of the year. The tide springs furthest up the shore and also recedes to its lowest ebb. The Autumnal Equinox occurs on September 23, 1999. Exceptionally high tides peak on September 28, 1999. Just over six hours later the tide will go out a long way, and it will be one of best times of the year to go rockpooling. The low tide may even recede further than Chart Datum, the mark of the lowest astronomical tide, from which the tidal measurements are taken.

Low Water

For most of the 6,095 mile (9,809km) British coastline there will be two high tides every day. The Earth moves around on its axis every 24 hours, the Moon during the day and night moves through 1/30th of its orbit around the Earth. This means that it will be approximately 1/30th in a different position 24 hours later. Each day the high tide will average 50 minutes later than the previous day.

The amount of difference varies. In the middle of September 1999 the high tide will only be just over 30 minutes later the following day. On April 9/10, 1999, the difference reached 93 minutes later.

A copy of the local Tide Table is essential for any rockpooler wishing to visit a particular shore. The Tide Tables are available at ship's chandlers, newsagents, port authorities and local shops in seaside towns. The more expensive Tide Tables will show the time and height of low water as well as the details of the high tide. These are essential in areas like the Solent where there are more than two tides a day.

Gravitational Pull

As every schoolboy knows it is gravitational pull of the Moon and the Sun that influences the tides. Water pull is best visualised as a horizontal movement, not as a vertical up and down movement as viewed from the shore. Visits to the seashore will indicate that there is a considerable variation in the height of the tide from week to week.

SHORE WATCH Fact File

The Shore Crab, *Carcinus maenas*, osmoregulates, adjusting its bodily fluids to live in almost fresh water down to a salinity of 0.4% in summer. It is only able to do this in warm water, forced to return to higher salinity water as the estuarine water temperature falls in autumn.

PHOTOGRAPH: ANDY HORTON

The highest and greatest range of tides occur when the tide is funnelled into a narrow area, increasing from west to east up both the English Channel and Bristol Channel as they get narrower.

Time of the Day

It is interesting to note that high spring tides occur at approximately the same time of the day every year in each location on the coast. This means that low springs occur at dawn and dusk in mid-Sussex (Brighton) but occur around the middle of the day in south Devon (Torbay). This has practical and social significance to rockpoolers.

As the nights draw in from the Autumnal Equinox to the Winter Solstice, the prospects of rockpooling on the Sussex coast are restricted by darkness. Devon rockpoolers can enjoy a summer's day rockpooling under the warm sun in the middle of the day.

Living with the Changing Tides

Low tide is the quiet period. When the tide goes out the permanent residents of the shore close down their lives. The Limpet stops feeding and retires to its home on the rock, tightly clamped down to preserve water in its conical shell. Likewise, the Topshells and Winkles close their wafer thin operculum over the marine shell aperture to retain moisture.

Even the intertidal pools are still. Anemones still expand their colourful tentacles, but prawns and small fish are apt to hide in the seaweed often draping into the pools and do not embark on their quest for food until the incoming sea refreshes the pool.

Feeding at High Tide

Why are the small Fish, Crabs and Prawns quiet at low tide? Is it because they are unable to sense food in the still waters? The Plankton in the sea is the start of the food web. It is avidly consumed by the Acorn Barnacles, which will only open up their feathery cirri to collect food when they are submerged. Mussels can only extract the Plant Plankton from the sea underwater, which is why Mussels near the sea are larger

SHORE WATCH Fact File

What stimulates the small green fish known as the Blenny, *Lipophrys pholis*, to breed in rock pools during spring? Is it the temperature of the water? Or is it amount of daylight? This small fish is meant to regulate its activity according to the state of the tides, but quickly loses this rhythm in captivity. Adult fishes only spend a small part of their lives on the shore, returning to the shallow seas after breeding in spring.

PHOTOGRAPH: ANDY HORTON

than the ones on the upper shore; they have a longer feeding period.

Many of the Prawns and mobile life forms will swim or crawl in and out with the tide and it is often only the stragglers that are left behind, trapped in the pools as the tide recedes.

Biological Clock (Endogenous Rhythms)

Feeding opportunities are dependent upon the state of the tides, at least one researcher has speculated that some of the animals of the rock pools like the Shore Crab, *Carcinus maenas*, may have an in-built biological clock which compels them to be active at high tide.

It would have to be a sophisticated clock to account for the small differences in the tides each day. In order to check on their hypothesis they removed the crabs to an aquarium and observed their heightened activity as the tide came in each day.

Testing the Hypothesis

As Shore Crabs are easy to obtain I decided to conduct my own experiment and I placed one freshly caught Shore Crab in each aquarium and observed their behaviour closely as the tide came in. This crab is a good subject as it instantly settles into a new environment.

However, despite dozens of experiments I was completely unable to correlate the behaviour of the crab with the state of the tide. The answer may lie in the artificial aquarium environment and variables like the absence or presence of Planktonic food in the water. The Crab became agitated with the addition of food. It would also be more active in warm water and climb on to rocks out of the tank if the dissolved oxygen content fell.

Migration of the Shore Crab

The Shore Crab is the most widespread of all the crabs found on British beaches. They are found where there is a minimum of shelter like an odd rock or two, and can even be discovered underneath the groynes on sand and shingle shores. A large number of the adult Shore Crabs undergo an annual migration from the shallow seas offshore up estuaries into brackish, almost fresh water, from June on the English Channel coast, and throughout the summer.

The migration will always occur with the flood (incoming) tide and I would guess that the temperature of the water is important. It is just possible that the increased activity of the Crab in the experiment was due to an instinct of annual migration. Before winter they return to the sea.

Andy Horton on behalf of the British Marine Life Study Society will help readers who have any difficulties to pursue their interest in the marine life around the British Isles. The first enquiry will be answered free of charge but please enclose a return stamp and do not forget to include your address. For more information please write to: Andy Horton, Shore Watch, British Marine Life Study Society, Glaucus House, 14 Corbyn Crescent, Shoreham-by-Sea, Sussex, BN43 6PQ.
E-Mail: bmlss@compuserve.com
Web Site: BMLSS (England): URL= http://ourworld.compuserve.com/homepages/BMLSS/BMLSS (Scotland) URL=http://www.ed.ac.uk/~evah01/bmlss.htm The Webmaster for the Scottish site is Alan Pemberton.

SHORE WATCH Fact File

The Purple Sunstar, *Solaster endeca*, is a colourful occupant of colder northern seas.

PHOTOGRAPH: ANDY HORTON

News Desk

Hozelock to close Cyprio operation at Frognall

Hozelock have announced that they will be transferring all operations from their Cyprio factory at Frognall, near Peterborough, to their main UK manufacturing plant at Midpoint Park, Birmingham. The move is scheduled to be completed by October 1, 1999 and will involve the loss of approximately 32 jobs at Frognall.

Hozelock Group Chairman, David Codling, tried to justify the decision with the following statement:

"We are very disappointed to have to sever connections with Frognall where we had enjoyed a good relationship with our employees. However, the case for making use of the significant resources at our Birmingham site in terms of engineering, purchasing and manufacturing support, and the fact that Birmingham already serves our international distribution centre, are clearly economically compelling."

Wal-Mart are coming!

Recently the press has been full of stories about how Wal-Mart's takeover of Asda will affect food prices in supermarkets. What you may not realise is just what is on offer in larger American Wal-Mart stores. Not just an aisle of pet foods as most supermarkets offer now, but full blown pet departments selling a wide range of pet and aquatic products.

These departments probably represent the greatest threat to our traditional small pet and aquatic stores for many years. Of course Asda may not go all the way down the American route. Most of their current stores would be too small to accommodate such an expansion of product lines, although some larger branches probably could — particularly those on the drawing board.

Focus Do It All Petworld Superstores set to expand

Focus Do It All Petworld have announced it is expanding by another 30 stores this year. This makes them the fastest growing pets superstore in the UK.

Petsmart in stark contrast

In 1996 Petsmart (an American based company) snapped up Pet City for a cool £150 million. They felt certain this brand of superstore was the way forward in the UK and would be highly profitable. Just three years later the economic realities of the situation have sunk in with a first quarter loss of £2.75 million (last year for the same quarter it was "only" £2.3 million).

It appears the American management has now decided to dump the loss making British stores for a rumoured knockdown price of just £15 million. Perhaps this is a salutary warning to all the big boys planning to expand into this section of the retail market.

British aquarists and pet keepers of all kinds seem to be prepared to spend a few pounds more for their pet needs, just so they can have access to top quality advice and personal service which only a small shop can really provide.

Fishkeeping Christmas Raffle in aid of The Jordan James Gregory Trust

The Jordan James Gregory Trust, which raises funds of the Foundation for the Study of Infant Deaths, is running a BIG PRIZE RAFFLE this Christmas.

The top prize is a Juwel Vision 260 complete set-up worth over £600. With another £966.95 worth of great prizes, including a Water Purifier, UV Pond Clarifier and, of course, several one year subscriptions to *Aquarist & Pondkeeper* magazine, this is one Christmas raffle you cannot afford to miss.

To obtain tickets contact your local aquarium shop or pet store. Since uptake has been a little slow in some sectors of the retail trade (out of 50 shops contacted by fax not even one replied, let alone offer to help sell tickets), you may need to contact the organiser directly to support this excellent cause.

Ian can be reached by phone on 01983 533516.

"If you could see the chemicals in tapwater, would you still do this to your fish?"

asks Les Holliday

Aquatics Adviser to Hagen (UK) Ltd

Whilst our drinking water is treated by the authorities to make it absolutely safe for us to drink, it isn't good for fish. Even minute traces of chlorine can damage delicate gills, causing distress. In some areas tapwater can have chlorine levels over 75 times the acceptable limit for aquatic life! Tapwater may also contain chloramine and traces of heavy metals like iron, lead and mercury - all potentially toxic to fish.

So the message should be clear: don't let your fish come into contact with tapwater until you've made it safe for them first. **Aqua Plus** is made to do that job, quickly, effectively. When you start a new tank, doing a water change or transporting fish, always treat the water with Aqua Plus to eradicate all traces of chlorine and chloramine and neutralise metal ions ***before*** exposing fish to it.

Your fish will benefit from the P.H.E. contained in Aqua Plus too. This rich supplement of essential oils visibly reduces transport stress and has a calming effect on most fish. Transportation and handling may strip away the protective mucous coating on scales and fins leaving the fish vulnerable to lesions and disease. The unique ingredients in Aqua Plus provide protection while their natural mucous regenerates.

Developing good habits in water management is the best way to prevent problems in your aquarium, so when you think water: think Aqua Plus first.

British Aquarists Festival '99

Saturday & Sunday
October 23/24th
10.00am–5.00pm

The region's premier fishkeeping exhibition— a must for all fishkeepers!

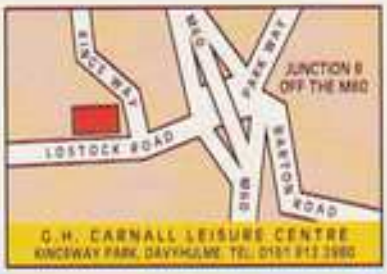
George Carnall Leisure Centre

Kingsway Park
Urmston
Manchester

Admission: Adults £2.50. Children/OAP's £1.50
Group discounts available for 20 or more.

- Conservation
- Tableaux displays
- Expert Help & Advice
- Trade stands from leading manufacturers
- Rare fish for sale
- Fish habitat display
- Furnished aquarium display
- Aquarian Aquachamp final

See the 'Champion of Champions' contest



Come and join us on our 48th birthday—bring along the family!

Free parking, refreshments, licensed bar, public transport to the door.
(Venues 2 minutes from Junction 9—off the M60)

For further details contact show organisers **A. Chadwick 0161 652 6207/B. Walsh 01254 776567**

Organised by the Federation of Northern Aquarium Societies.

Society World

EVENTS, SHOWS & FESTIVALS

Rule Codes: A = A of A; FB = FBAS; FN = FNAS; FS = FSAS; I = International Goldfish Standards; N = NEFAS; U = USofA; Y = YAAS

AUGUST
28 Swallowfield (AofA) Open Show
29 Tyne Tees A. A. (FBAS) Open Show, Day Convention inc lectures & Fish Breeders Sales. Contact Jane Bell for full details. Tel. 01325 466630
29 U.S.A.-Perth (U.S.A.) Open Show & Auction

SEPTEMBER
4 FBAS General Assembly
5 Aiden A.S. (FNAS) Open Show & Auction
5 TV Cats (AofA) Meeting & Auction
5 Wyke Show Society (YAAS) Open Show & Auction
12 Cramlington A.S. (FBAS) Open Show
12 Silktown A.S. (FNAS) Open Show & Auction
12 South London (AofA) Open Show
12 Yorkshire Cichlid Group Autumn Auction at St Annes Church Hall, Wrenthorpe, Wakefield. 500 pre-booked lots! Contact Phil Oldridge on 01302 886512 or Phil Lowe on 01924 367086 for full details
19 F.S.A.S. - Glenrothes (FSAS) Auction
19 Otley A.S. (YAAS) Open Show & Auction
19 Northern Area Catfish Group Open Show & Auction
25 Northern Goldfish & Pondkeepers Society (I)
26 Darwen A.S. (FNAS) Open Show & Auction
26 Fairchy A.S. (U.S.A.) Open Show & Auction

OCTOBER
1/3 British Killifish Association Convention. At The Portland Hotel, Buxton. Lectures including overseas speakers, Show & Auctions. Contact David Mellor on 01663 746081 for full details
3 Basingstoke A.S.(AofA) Open Show
3 Halifax A.S. (FNAS) Open Show & Auction
10 Doncaster A.S. (YAAS) Open Show & Auction
17 Halifax A.S. (FNAS) Open Show & Auction
23/24 British Aquarists Festival, Manchester (FNAS). See advert for full details
24 Dunstable D.A.S. Auction. Contact Ian Pitts on 01462 731225 for details
31 Scottish International Open Show (FSAS), Supreme Championship & Auction. To be held at Grangemouth Community Education Unit. Contact Jim Bryson on 01324 862065 or Jim Sheakey on 01475 704219 for full details.

NOVEMBER
7 ASAS- Portsmouth (FBAS) Show & Day Convention including lectures. The FBAS Supreme Championship will also be held at this event. Contact Paul Corbett on 01983 721246 or Jack Stillwell on 01705 691030 for further details.
7 Bradford A.S. (YAAS) Open Show & Auction
7 Merseyside A.S. (FNAS) Auction
21 Viviparous Livebearer Auction & Show at The Junction Pub, Featherstone, Pontefract. Contact Peter Moore on 01977 709790 for further details.
28 TV Cats (AofA) Meeting & Auction

DECEMBER
4 FBAS AGM & General Assembly. Federation Contacts: AofA, Chris Ralph, 01703 560318; FBAS, Paul Corbett, 01983 721246; FNAS, Amy Chadwick, 0161 652 6207; FSAS, Hugh Bowie, 0131 539 2790; USA, John Reid, 01738 634689; YAAS, Terry Nelson, 01724 289736

HAF CHAMPION OF CHAMPIONS CONTEST — Have you won first, second or third Best in Show this year at any open show in the UK? If so, then you are eligible to enter your fish in the "Champions of Champions" contest — the premier event of its kind. For further details contact Mr A. Chadwick on 0161 652 6207.

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