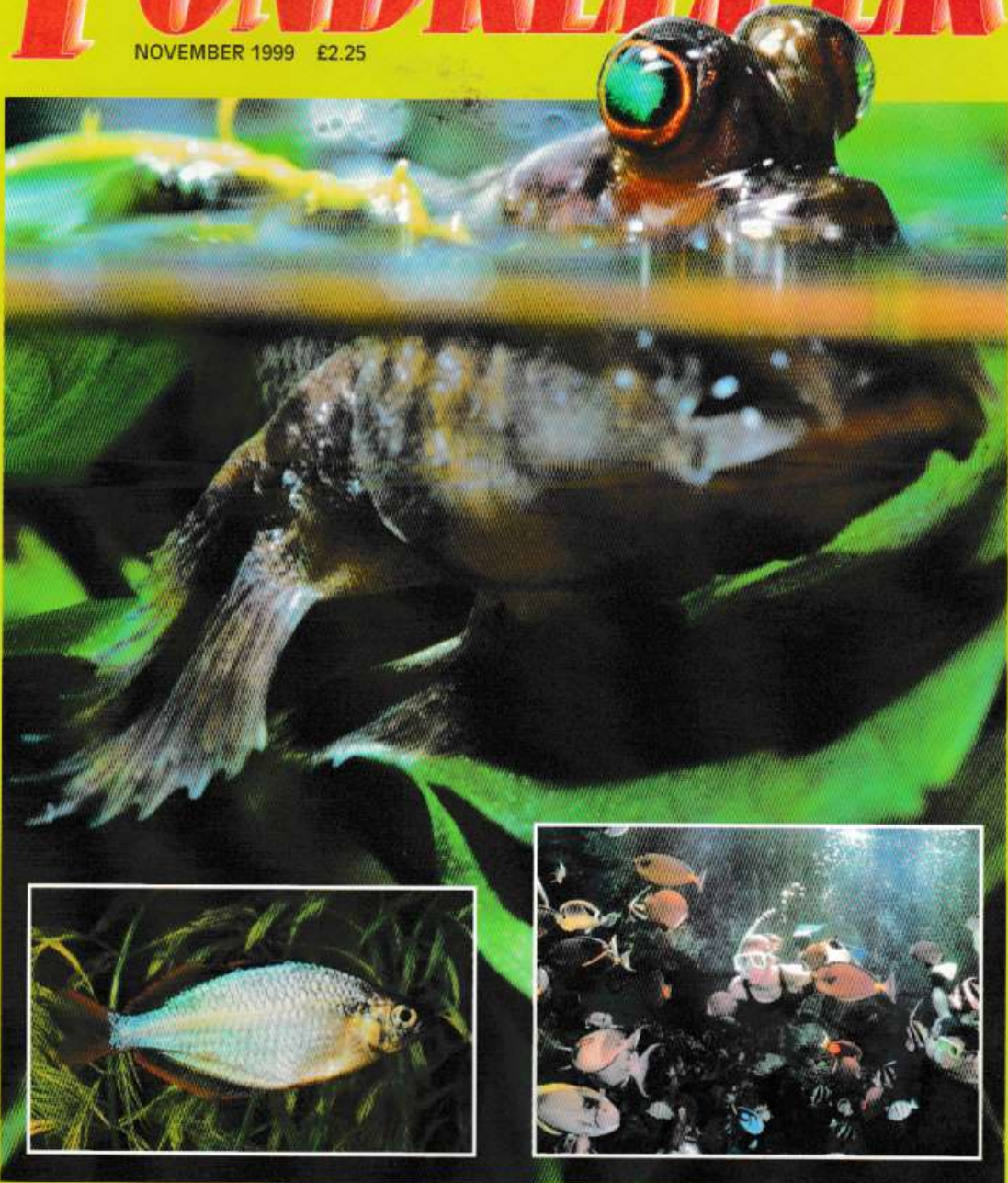


AQUARIST & PONDKEEPER



NOVEMBER 1999 £2.25

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



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EDITORIAL

As I write this it is difficult to believe that autumn has well and truly arrived. Today the sun is shining brightly and I have been able to sit outside for a short while. A closer look at the pond showed me that everything is closing down for the winter and despite the Dahlias flowering their hearts out, the first real frost is just round the corner.

This means seed and plant catalogues will be dropping through our letter boxes over the next few weeks. This is all to the good because, as a gardener, I start to plan lots and lots of projects for the New Year now. Very few of them ever come to fruition, but the intentions are always good.

One of my projects for next year is cleaning out my wildlife pond. This has become so overgrown that finding water in it is a major achievement — but there has been plenty of wildlife in and around it this year. I would like to say that this will be a feature for A&P next year, but to be honest if I do write about it I will definitely write under a “nom de plume”. My pond really does need a major overhaul.

This month we have an article by Nick Fletcher which guides potential new pond keepers away from some of the worst pitfalls of pond building before they fall into them. Sadly this comes too late for me — over the last 30 years I have indulged in just about every pond folly Nick describes in his article!

Until next month.

D. Lambert
EDITOR

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COVER PICTURE

Butterfly Mudskipper (*Periophthalmus papilio*)

COVER PHOTOGRAPH: M.P. & C. PIEDNOIR



FISH OUT OF WATER

TEXT BY DR PETER MILLER

Mangrove forests or “mangal” are characteristic features of tropical muddy shores in estuarine conditions. They are of great biological and environmental importance. The mangal is often subject to extremes of physical conditions, notably in salinity and temperature, but is rich in organic material and provides a variety of food resources for aquatic life. Among gobies which exploit this in the Old World, by far the best known are the Mudskippers. Their amphibious habits have attracted much attention, and reports from the Arabian Gulf even reached to ancient Greece.

► Continued overleaf

above *Periophthalmus barbarus* in a mangrove tidal area, Phuket.

PHOTOGRAPH: MAX GIBBS

below Mangal habitat in Gambia. In this type of habitat only cast nets stand much of a chance of catching fast moving Mudskippers.

PHOTOGRAPH: DAVID ARMITAGE



DR PETER MILLER of Bristol University is one of the leading authorities on Gobies, but within the group it is the amphibious Mudskippers which attract most attention:

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

T rue Mudskippers are distinguished from their closest relatives, among the oxudercine gobies, by possession of a lower eyelid and protrusible eyes. There are three genera, of different habitat zonation within the mangal. Two of these are more elongate, and have horizontal teeth in the lower jaw. *Scartelaos*, with simple teeth and a fringe of short barbels along the lower jaw, occurs on more fluid mud down to MTL, and is omnivorous, sorting organic material (algae, nematode worms, harpacticoid crustaceans) from a mud ball in the mouth. *Boleophthalmus*, with notched lower jaw teeth and no jaw barbels, occurs on soft mud up to the lowest trees, and is more herbivorous, skimming off a surface layer of mud and algae by side to side movements of the head.

The best known genus is *Periophthalmus*. These are carnivorous and have erect lower jaw teeth, and tends towards a shorter body, with more obvious scales. This genus extends into the forest, following the edge of the tide, and feeds on polychaete worms, crabs, smaller crustacea, and insects, including dipteran larvae.

Mudskippers are territorial, seen around burrows excavated when the tide recedes from soft mud below the tree line, and eventually occupy these in pairs. When digging, they use the mouth, and pellets of mud are deposited around the opening, forming a raised rim, 2-10cm across, or a "turret", which may be up to 5cm high. The burrow and surface area becomes filled with water. Pairs may remain in burrows at high tide. The burrow plan differs between species, with either a single or double opening. To attract females into territories, the male displays his large, colourful first dorsal fin and inflates his colourful throat, as well as arching the body and executing a few jumps.

Territory defended by the males

A spacing of nests in excess of six metres apart has been observed, and immediate territories up to 25cm around the nest opening may be defended by the males which display and chase intruders away. These are usually other males, but sometimes even crabs will be seen off. The other Mudskippers, *Boleophthalmus* and *Scartelaos*, contest territory by

mouth pushing, and have a dark blue mouth lining.

Mudskippers lay eggs, lining the burrow in a single layer. As with other gobies, these are protected by the male, and, after hatching, young fish may be found in the burrow. Later, juveniles disperse, sometimes beyond the mangal to adjoining rocky shores. The eggs of *Periophthalmus cantonensis* are oval in shape, about 1.14x0.74mm in size, with pale yellow yolk and the usual attachment filaments at one end. The postlarva hatches at 2.84mm, and becomes bottom-living at 14mm, after about six weeks when reared in aquaria, feeding on oyster larvae, copepods, minced fish and eventually ordinary fish food. At 15mm, and 50



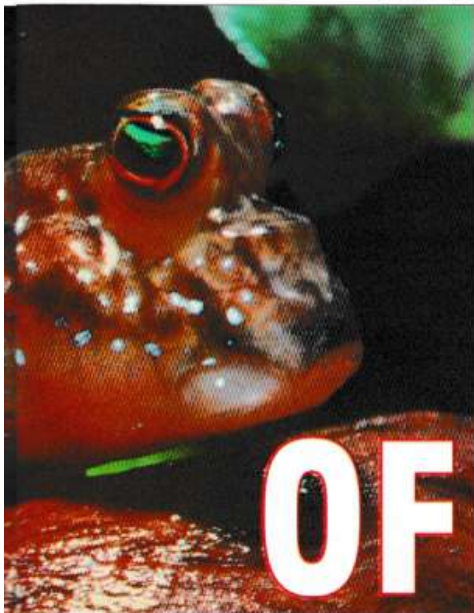
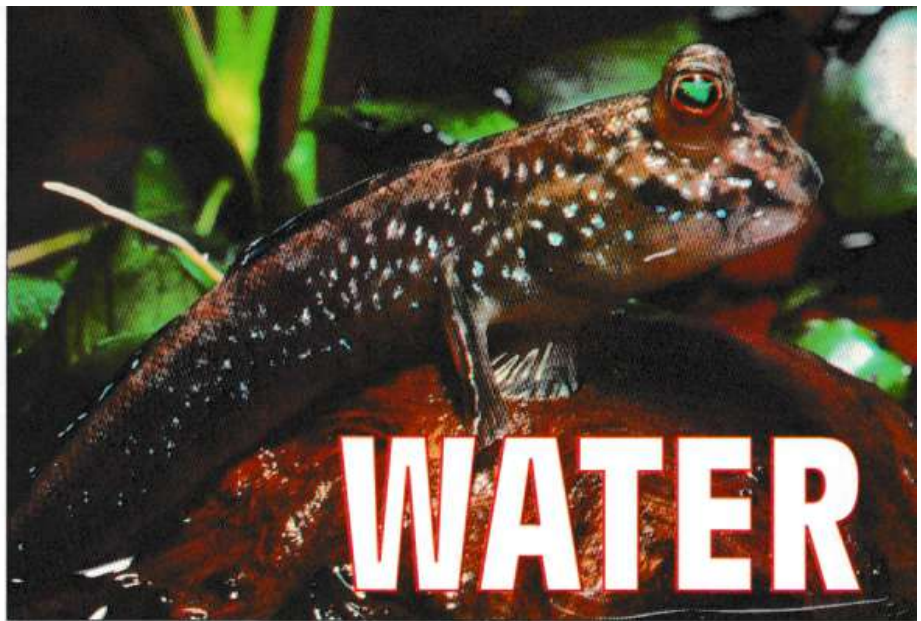
days, the little Mudskippers become amphibious.

As permanent residents in the mangal, Mudskippers need to tolerate environmental fluctuation, although, by their amphibious nature, they can move away from unfavourable conditions at low tide. A changing factor is water salinity and, in the *Periophthalmus* investigated, a high degree of tolerance (euryhalinity) has been shown: *P. sobrinus* can survive sudden transfer from full strength seawater to 20 per cent, and will live in fresh water if allowed several days acclimation at 20 per cent seawater. At lower salinity

the Mudskipper excretes more ammonia than urea, a change which brings its physiology closer to that of normal bony fish.

Biological interest aroused

It is the many adaptations of the basic goby plan for amphibious life which have aroused so much biological interest. For a fish to come out of water, various problems need to be solved; apart from an incidental one of being bitten by the numerous mosquitoes present in the mangal, these include breathing in air, movement in air



(a much less supportive medium than water) and desiccation. Loss of water by evaporation in the air may contribute to the death of *Periophthalmus sobrinus* within 50 minutes exposure to bright sunlight, when body weight may be reduced by 12 per cent. Overheating must play a part in these fatal circumstances, since, given humid conditions and shade, these Mudskippers can be kept out of water for a day and a half, and tolerate a somewhat greater weight loss.

Even within much shorter periods in the wild, Mudskippers may frequently roll in moisture or splash the body with fin movements. The lower eyelid cups water to moisten the eye. For *P. sobrinus* death occurs at air temperatures of 43-44°C, when body temperatures rise to 33-35°C. Some *Periophthalmus* species, including *P. sobrinus*, can live in well-aerated water, although deprived of access to the air, but others, such as *P. australis*, experience a "diving syndrome" under these circumstances, which they can tolerate for only a limited time. Out of water, *P. sobrinus* does not release urine, and the composition of its nitrogenous waste alters towards urea rather than ammonia, the usual excretory product of fish in water but a very toxic substance needing ample

dilution. Despite this change, accumulation of nitrogenous excretory products may well be the ultimate limiting factor for duration in air.

Modification of swimming techniques

Locomotion in air is achieved in Mudskippers by modification of swimming techniques. The pectoral fins are muscular, and long-lobed, and their lower rays, like those of the tail fin and the pelvic fins, are strengthened. In water, Mudskippers paddle with the pectorals, head partly exposed, but swim fast or skim to escape danger by vigorous strokes of the tail, ultimately bounding over water at up to 2.5m per second.

In the air, a distinctive method, so-called "crutching" by moving the pectorals together, using the tail as a skid, is the slower mode of progression, at up to 10cm per second, but, when necessary, this gives way to skipping, when the tail is used as the main propulsive organ and as a fulcrum. Some *Periophthalmus*, such as *P. chrysospilos*, can climb trees as the tide rises.

In air, the high head, with eyes at apex, facilitates observation of prey or predator, and the mobile eyes are often pulled downwards into the socket where a lower eyelid may protect against mud or drying. The eye of Mudskippers has a thick cornea and slight long sightedness (hypermetropia). In cell composition the lower retina has many cones, which aid watching rivals in display, while the upper retina has many rods, appropriate for locating prey on the mud.

Comparisons have been drawn between Mudskippers and the evolution of land vertebrates, like the amphibians, from fish. It seems, however, that the Mudskippers could never make further progress as effective land dwellers. Other constraints apart, the forward position of their pelvic fins (i.e., hind limbs), situated, as in all perches and gobies, at the front of the abdomen below the pectoral fins (forelimbs), could not permit the balanced walking technique of a tetrapod.

Conclusions

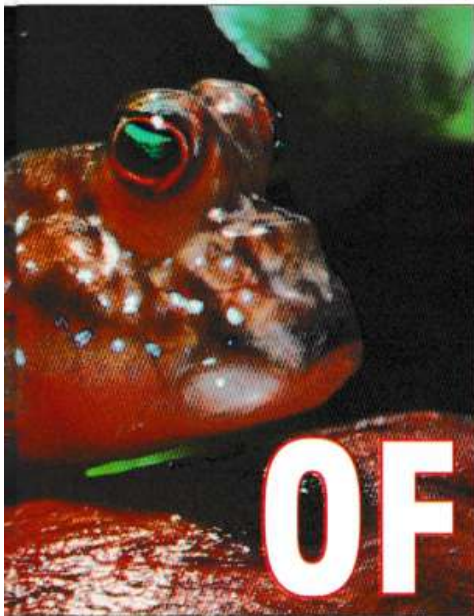
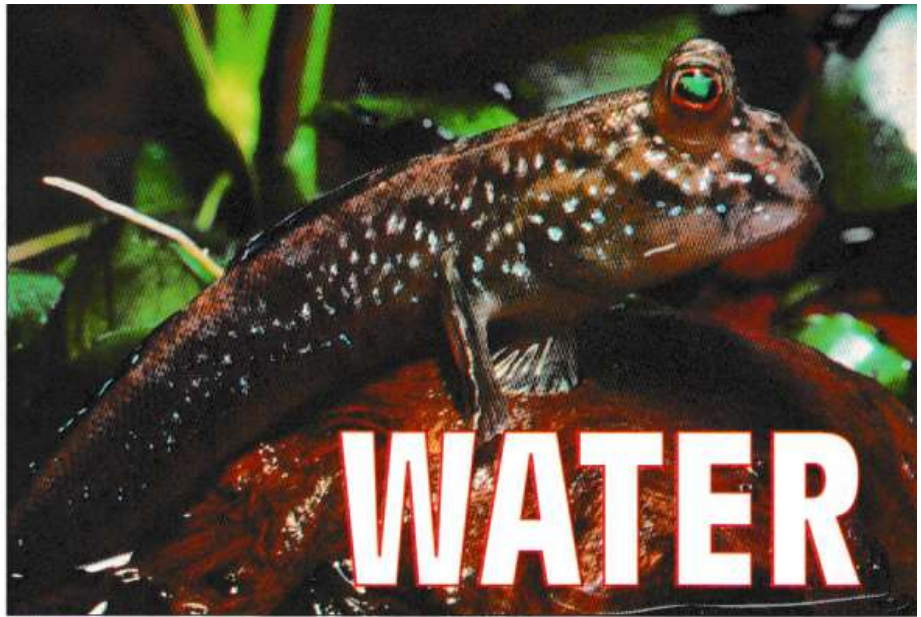
Evolutionary interest apart, Mudskippers make lively and responsive pets, and would suit the rising popularity of paludaria. They need a lar-

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TROPICAL

FISH OUT OF WATER



left Blue Flag Mudskippers (*Periophthalmus vulgaris*) are carnivorous and feed on polychaete worms, crabs, smaller crustacea, and insects, including dipteran larvae in the wild.

PHOTOGRAPH: MAX GIBBS



left *Periophthalmus barbarus* are found along coastal habitats in Southeast Asia and Australia. They grow to a maximum adult size of 15cm.

PHOTOGRAPH: MAX GIBBS

gish tank, at least 24x12x12 inches, with a few inches of brackish water, at tropical temperature, and a sloping, emergent bank of fine sand, with bogwood or stonework to taste. Light is needed and a cover for the aquarium, since it is not impossible for small Mudskippers to climb glass. Feeding can be an exciting time, when earthworms, crickets, or strips of meat or shrimp, offered in the air, may be actively pursued. Given this care Mudskippers can live for some years. If tank size

permits, other brackish fish, such as scats, *Monodactylus*, puffers, archerfish, or large sleeper gobies, could be accommodated in the water filled part, provided these were of comparable size to the Mudskippers.

Finally, Mudskippers are of culinary interest in the Far East, where they fetch a high price for use in soup and are reputedly an aphrodisiac when eaten raw. In Taiwan, for example, wild caught fry are cultivated in shallow ponds and, when of a suitable size, caught in individual wicker traps. Breeding to order in captivity is still only possible by use of hormone treatments.

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How do Mudskippers breath?

Out of water Mudskippers have been thought to respire through the skin, especially that of the tail, since *Boleophthalmus* has vascularised papillae on the tail, and *Periophthalmus* has capillary networks between the scales of the body. The mouth cavity and nasal sacs have also been proposed as respiratory organs, but, more recently, respiration has been thought to be probably through the gills, which are somewhat stouter and less liable to collapse in air.

By this theory, in water, normal gill ventilation is the rule, but in air the opercular chamber is inflated to hold both air and water and closed at the opercular opening. After feeding, when prey is seized and water expelled from the gill chamber, water needs to be replenished from a nearby pool.

Such behaviour has been observed, but direct measurement of oxygen uptake by Mudskippers has shown that, in *Periophthalmus cantonensis*, the skin is used to an equal extent as the gills even in water and, in air, about three-quarters of the oxygen used enters through the skin.

These findings correlate with the fact that the gills of *Periophthalmus* are reduced in surface area in comparison with those of *Boleophthalmus chinensis*, in which the skin is less important for respiration and whose gills seem better adapted for functioning in air.

left If tank size permits, other brackish fish, such as Monos, *Monodactylus argenteus*, could be accommodated in the water filled part.

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STEVE HALLS answers some basic questions:

PHOTOGRAPH: M.P. & C. PIEDNOIR

MARINE

Ozone Use in Aquaria



above A Mediterranean tank set-up like this could benefit from the addition of an ozoniser.

Many hobbyists do not understand the positive benefits of ozone and therefore shun it as unsafe or complicated. In this article Steve Halls answers some basic questions about Ozone and explains how in fact ozonisers are extremely simple to use and have much to offer marine hobbyists.

Possibly the most misunderstood pieces of equipment for marine aquaria, ozonisers have always received a mixed press. While ozone has gained a reputation for its ability to perish everything it comes into contact with, the truth is that adding an ozoniser to your aquarium can be extremely beneficial.

? What is Ozone

Ozone is an allotropic form of oxygen and is present in the atmosphere as a gas. Whereas oxygen is normally present as a molecule of two atoms and is known by its chemical symbol O_2 , ozone has an extra atom and is known by the symbol O_3 . This extra atom makes ozone very unstable, which is why it can be so useful to us in aquaria as the instability ensures it breaks down before it enters the main aquarium.

OZONE USE IN AQUARIA

Ozone has a very distinctive smell and can often be detected after a heavy thunderstorm when the air seems to be "alive". If used properly in a marine aquarium there should be no odour as any excess ozone is collected in a carbon cup or filter.

? How is Ozone produced

Ozone is created as the result of an electrical discharge inside an ozone generator. Traditionally these generators were made from aluminium, then stainless steel as it was discovered that aluminium oxidises quickly, causing the unit to require frequent cleaning and sometimes gives inconsistent ozone production. The optimum units, however, utilise a glass reaction chamber, which ensures the unit can be used in humid conditions often found in aquarium cabinets, filter compartments, and gives maintenance free, consistently accurate, safe results. A good ozoniser/redox controller will also be low voltage and come with a transformer for added safety.

? How is Ozone used in an aquarium

Ozone must never be introduced directly into an aquarium as its strong oxidation effects would be fatal to livestock (ozone is far stronger than chlorine). The most common method of adding ozone is through the venturi on a protein skimmer. Always ensure the skimmer you are using is ozone resistant and uses ozone resistant piping to avoid expensive repairs! If the skimmer has a suitable venturi, it may not be necessary to use an air pump to force air through the ozoniser. The venturi on a good skimmer will pull air through the ozoniser of its own accord.

? What are the benefits of using Ozone

Ozone can greatly enhance the efficiency of biological filters and protein skimmers as it is extremely efficient in converting ammonia into nitrite and then into nitrate through oxidation. In the same way, organics, urea and other compounds that can cause discoloration of water and poor water quality are oxidised. Ozone will also kill bacteria and free swimming parasites. Finally, and importantly, Ozone can raise the Oxidation Reduction Potential (ORP) of an aquarium.

? The importance of understanding ORP

A high ORP is important in marine aquaria as it is the measure of the oxidising capacity of water. A low ORP indicates a high level of unwanted organic matter in the water. Generally the higher the ORP, the better the water quality — up to around 450mv. A good ORP level would be around 350-400 millivolts (mv) although it is important to note that it is inadvisable to increase the ORP by more than 50mv over a 24 hour period. Running at an exceptionally high level of around 600mv can harm fish and invertebrates and as ORP will vary throughout the day it is advisable to use a Redox Controller to ensure a constant level.

Using a Redox Controller with an ozoniser, the required ORP level can be set, and ozone will be produced until the desired ORP level has been achieved. This is a far safer method of using an ozoniser as it ensures the aquarium is never overdosed. More advanced ozonisers contain built in redox controllers and may come supplied with a platinum ORP electrode, rather than the gold electrodes used previously, to provide more accurate results over a longer time period.

? How much Ozone should be used

The ideal dosage will vary between aquaria. The correct dosage is dependent on a variety of factors as we have discussed, however, as a guideline the ozone production should be between 5-15mg/hr per 100 litres. Aquaria with high stocking densities will require more ozone than, for example, reef aquaria with few fish.

Conclusions

The results of efficient ozone use can vary from subtle yet perceptible improvements in water quality, and the general well being of livestock, to dramatic improvements in protein skimming and water clarity with huge benefits to aquarium inhabitants.

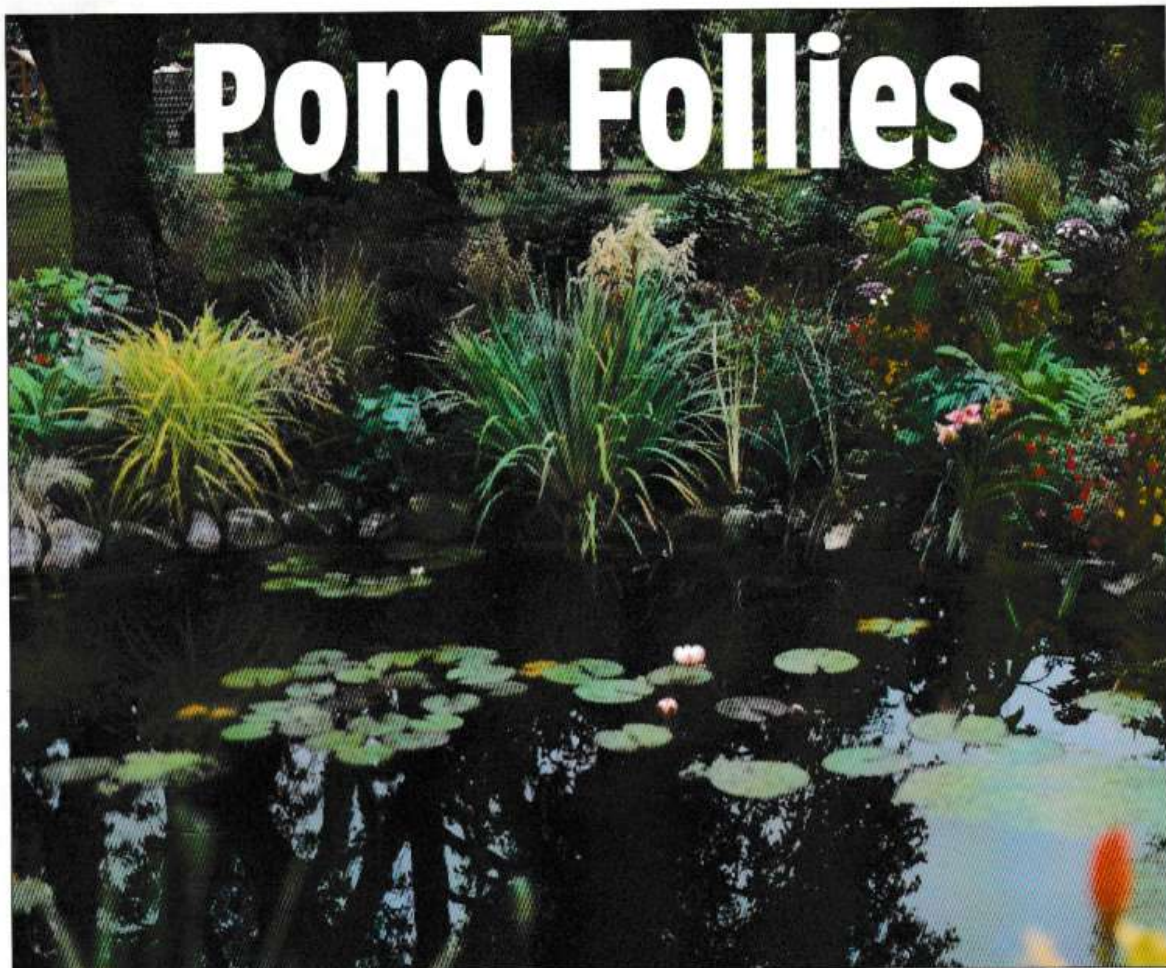
PRECAUTIONS WHEN USING OZONE

There are precautions necessary when using ozone, yet they are straightforward to administer and should not dissuade marine Fishkeepers from considering the use of an ozoniser.

- Use a protein skimmer that is ozone resistant and preferably one that has both an ozone non-return skirt to prevent ozone bubbles entering the aquarium, and a carbon cup on top of the skimmer to ensure ozone does not escape into the ambient air.
- Do not use ozone on internal skimmers unless they are placed in a sump.
- Use only ozone resistant tubing as other types will break down and require expensive repairs.
- Always ensure water that has been in contact with ozone is filtered through carbon before it enters the aquarium.
- It is advisable to use an airdryer to increase the efficiency of an ozoniser. An airdryer is usually a cylinder containing compounds that remove the humidity from air passing around them.
- Ensure the ozoniser is either placed above the skimmer water level or has a non-return valve fitted to prevent water back-siphoning in the event of a power cut.

NICK FLETCHER is no stranger to the pitfalls of pondkeeping. The irony is most of them are totally avoidable:

PHOTOGRAPHS: DAVE BEVAN UNLESS OTHERWISE STATED



Pond Follies

What distinguishes a good garden pond from a bad one? Almost invariably, lack of forethought at planning stage.

This explains why some creations of 1,000 gallons or less can be both beautiful and functional, while others of 10 times that capacity will always struggle. Available funds (or lack of them) have surprisingly little to do with the end result, although fixing a budget and costing all materials before you pick up a spade is always a good idea.

Success hinges on three issues. Your pond must be capable of supporting, long-term, a healthy population of fish. It must be pleasing to the eye, otherwise it defeats the point of its existence. And, finally, it must be easy to service. This last consideration is not just for your own convenience, but has implications for the well-being of the livestock. If regular

maintenance cannot be carried out quickly and without hassle, it is soon neglected. Water quality then suffers, with inevitable consequences.

Ignorance of pond products (including the common building materials) is at the root of so many sob stories. However worthy these tools of the trade may be, their applications and limitations have to be acknowledged. Paying closer attention to instructions and packaging information, or some timely quizzing of sales staff at the aquatic store, could eliminate simple misunderstandings.

For example, a UV unit is designed to cure green water but is useless at controlling filamentous algae. A fountain pump, with strainer to prevent the impeller clogging, is not the ideal tool to power a filter (a solids handler is required). Vigorous waterlilies like *Nymphaea alba* are unsuitable plants for shallow ponds. And so on.

The following 10 issues relating to ponds and fish husbandry crop up time and again. But why put yourself and your fish through needless anguish?

above If you follow Nick's advice in just a year you can have a pond as attractive as this one.

1: Pond Liners (stretching credulity)

Liners make pond building easy ... all too easy. They are really best reserved for informally-shaped creations that would be difficult to execute in brick or blockwork. Square or rectangular structures lend themselves better to a hard shell finished in smooth glassfibre or G4. Why? A good pond should allow full water circulation, with no dead spots. This is not easy to achieve in formal ponds, even those with faired corners, and flow is further impeded by the inevitable creases you get with butyl or plastic sheeting. Liners are flexible, but not that flexible.

If you do lay a membrane into a square excavation, the usual advice is to pleat it at each corner and tuck it behind itself. However, this will form pockets that trap decaying solids and can shelter sick fish: these remain unseen until it is too late to treat them. Hidden casualties can poison a pond in no time, so always seal off these gunge traps with tape and mastic.

2: Plant Shelves (have a rethink)

Marginal aquatics are attractive, but how many garden ponds have you seen planted all the way around the perimeter? The "contour map" design so popular in construction diagrams shows one or more stepped marginal shelves leading down to a relatively small area of maximum depth, which of course reduces potential water-holding capacity and swimming space for fish. The redundant shelving merely acts as a silt trap and a convenient shallow fishing platform for herons.

Better, then, to incorporate only the shelves you plan to use: for example, at either end of an oval or figure-of-eight-shaped pond. Build them properly — at least a foot (30cm) wide, and dead level. Lay a concrete skim or some slabs over the shelf excavation, followed by cushioned underlay, followed by the liner. This gives a crisp outline, rather than the sagging profile that results in pots tipping over and spilling compost into the water.

3: Valves (pay now or swear later)

Slide or ball valves, particularly in the larger diameters, aren't cheap - but are worth their weight in gold in modern, filtered ponds. Every filter chamber, whether above or in-ground, should be drainable to waste via a valve. Vortex settlers, especially, need this refinement, as they collect the most solids and what about valves to isolate in-line equipment requiring regular maintenance — external pumps and UV's?

Valved pipework can bypass the flow through biological chambers during aggressive medication of the pond, and if you have a submersible pump powering more than one piece of equipment, they are the easy way of putting the flow where it's needed — for example fountain/waterfall, or filter/venturi. This element of control comes into its own in winter, when you want water to circulate in a way that causes minimum heat loss.



above In a shallow pond the temperature will fluctuate rapidly and to extremes; green water organisms will proliferate, cutting off light needed by higher plants to photosynthesise (a process known as eutrophication). No amount of UV will keep a pond only inches deep clear of algae.

below Loose ends that wreck the appearance of a pond include sloppy, unsecured edging in inappropriate materials and scant attention to levels, resulting in expanses of liner above the waterline.



POND FOLLIES



left Don't dig a shallow pond in the mistaken belief that it will be safer for young children: they can drown in a tiny amount of water. You may as well put the interests of your fish first and go down at least a yard!

ber a live round. Some dealers will keep their fish out of the sales area for a few weeks and medicate prophylactically against parasites, but this is no defence against the real killers, bacterial or viral pathogens. The dealer should not be blamed if fish you buy from him subsequently go down with such infections — the responsibility is yours alone.

Meaningful quarantining entails keeping your new arrivals in a large vat or separate pond of heated water (around 70°F), serviced by a mature filter. Conditions should be as good as — ideally better than — those in your main pond. The high temperature will encourage any latent infections to surface quickly, although problems can still crop up even months after introduction. Aim for a three-month period in the quarantine facility: but even three weeks is better than nothing.

One batch of fish per tank, for the duration, please. It's pointless having them in isolation for a long period, then adding new arrivals before releasing the original fish into your pond: the newcomers could have passed on a problem to the first consignment.

4: Stocking Desimplified

Fish stocking levels are calculated in two ways — either according to the pond's surface area or its capacity in gallons/litres. Unless your pond is outside normal design parameters (a borehole topped by a wishing well or some such unlikely shape), it is probably safer to work on gallonage. The trouble with calculating on surface area alone is that many apparently large ponds are actually very shallow (with associated problems which are dealt with later).

For filtered ponds, a final stocking level of 100 inches per 1,000 gallons (55cm per 1,000 litres) is the absolute maximum — you are always told not to exceed half that, on the correct assumption that the fish will grow. This works with Goldfish and Rudd (fairly well), Orfe and Tench (not so well), but with Koi, not at all. A six inch Koi can realistically quadruple its length and multiply its weight 50-fold, so it is meaningless to talk about "fish" in general: some species grow a lot bigger, faster, than others, and this must be taken into account.

5: Quarantining (ignore it at your peril)

People who never quarantine their pondfish and get away with it are playing Russian roulette — it's only a matter of time before they cham-

6: Deep is Beautiful (shallow kills)

Traditional wisdom would have Koi ponds at least 5 feet deep, goldfish ponds a minimum of half that depth. This rather misses the point — a pond should be a stable ecosystem, even if it relies on technology to speed up or enhance natural processes such as the nitrogen cycle. The shallower a body of water, the harder it will be to achieve this stability.

Temperature will fluctuate rapidly and to extremes; green water organisms will proliferate, cutting off the light needed by higher plants to photosynthesise (a process known as eutrophication). No amount of UV will keep a pond only inches deep clear of algae.

Don't dig a shallow pond in the mistaken belief that it will be safer for young children: they can drown in a tiny amount of water, so you may as well put the interests of your fish first and go down at least a yard!

7: Don't Medicate (until you know what's wrong)

If something is amiss with your fish, test the water before you do anything else. Test for ammonia, nitrite and pH, and preferably for dissolved oxygen levels too. Random, hopeful medication rarely works, and is far more likely to make a bad situation worse. Example: high nitrite concen-

right *Gunnera manicata*. A big mistake many people make is planting marginal species that grow too tall and rampant for the size of their pond. *Gunnera manicata* has leaves which are fully five feet across and can grow to almost tree-like proportions during the summer.

PHOTOGRAPH: KEITH LAMBERT



tration, brought about by an inadequate or immature filter, is mistaken for a parasite problem (the fish are flicking). The "remedy" causes the filter to crash completely, and all the fish are lost.

8: Coordinate your Hardware (a one-stop shop)

"Choose a filter pump to circulate your total pond volume once every two hours minimum, at the required head". A simple statement like that can cause a beginner endless problems. How much water does the pond hold, really? What is meant by "head"? (It's the vertical distance between the water surface and the delivery point back to the pond, and the greater this is, the greater the drop-off in pump performance). Some manufacturers specify flow rate at a notional head of 4 feet, or a metre — this is honest and realistic for most pond applications.

If you buy your pump, filter and UV from one manufacturer you are more likely to end up with a coordinated package, the elements of which connect up easily and work together in harmony. A guarantee of clear water may well apply, too. Later, as your confidence grows, you can mix and match.

9: Easy on the Feed (or the filter won't like it)

For optimum growth and stable water parameters, pondfish should be fed small amounts five or six times daily from spring to late autumn. This allows them to obtain maximum nourishment, and does not put periodic strain on the filtration system in the form of ammonia spikes. So if you and your partner both work and can manage only a morning and an evening feed, don't divide the six-pack ration by two. If you are serious about growing on your fish, invest in an automatic feeder. Otherwise, two small meals a day: pondfish never starve, but many die through misplaced kindness.

10: Don't Bodge (you'll regret it soon enough)

Too many ponds are spoiled through lack of attention to final detail. The journey towards completion has been long, so go the extra yard — it makes all the difference. Loose ends that wreck the appearance of a pond include: sloppy, unsecured edging in inappropriate materials; exposed pipework; scant attention to levels, resulting in expanses of liner above the waterline; unconcealed external filters (cistern tanks

play no part in garden design); spoil heaps thinly disguised as "waterfalls"; surrounding flowerbeds made barren by distribution of subsoil from the excavation (hire a skip); marginal planting with species that grow too tall and rampant for the size of your pond; and mixed ornaments. If you like gnomes, fine, but please don't try and blend them in with Japanese lanterns, deer scarers and water bowls. It doesn't look good!

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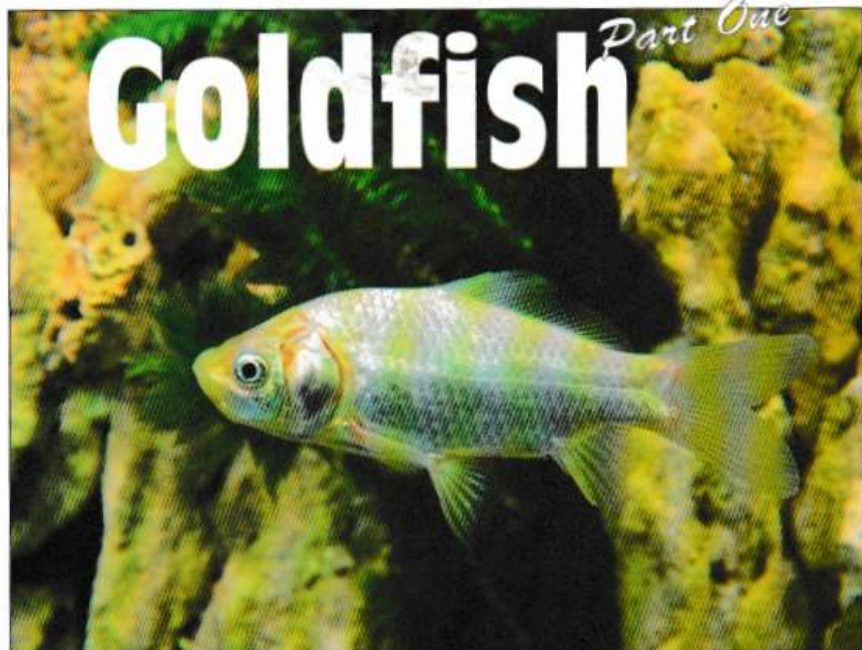
FISH TANKS & CABINETS

Foods & Tropical Plants

ALEX STEPHENSON starts a new four-part series on the ever popular Goldfish:

PHOTOGRAPHS: MAX GIBBS

Aspects of



White or silver Goldfish have no pigment at all except the guanin crystals.

Most of us are familiar with goldfish so, I will keep the technical information as brief as possible. *Carrasus auratus* (Goldfish) belongs to the Carp family and is a native of China. Today the wild form can be found in an area north of Canton, from Nanking in the east, to Chungking in the west. In addition to this there are feral populations in many countries of the world.

The Common Goldfish, so called to identify it from its more exotic relatives, is probably the world's most widely kept pet. There is a myth that goldfish are easier to keep than "tropicals". This idea is wholly misleading. In my experience there are many tropical species which are less demanding and easier to maintain. Broadly speaking, the more "developed" the variety, the more "unforgiving" it is. The "common", being closest in form to its wild ancestor is normally the hardest. However, this does not excuse mistreatment. Yes, they can survive in a bowl — no, they don't like it. Yes, they can tolerate poor conditions for a time — no, they will not thrive. Goldfish, like any other living thing, deserve respect and a healthy environment to live in.

The common goldfish has one caudal, dorsal, and anal fin, and two pectoral and pelvic fins. The natural coloration of this fish is an olive brown, darker on top, lighter underneath. This is the colour of the wild ancestor. About 1,000 years of selective breeding has resulted in the majority of the cultivated form turning from olive to gold at an early age.

The way it works is this. Goldfish have three colour pigments, orange/red, yellow, and black. They also possess a crystal formation called guanin, which is silver, and gives the fish a metallic appearance. When all these pigments are mixed together, as in the wild form, the result is olive or bronze, or whatever you prefer to call it. In a good strain of goldfish a gene is present which causes the fish to lose the black pigment leaving the red and yellow. The result is a gold coloured fish, the intensity of colour being determined by how much of each colour is present. For example, true yellows don't possess any red pigment, while silvers have no pigment at all except the guanin crystals.

Colours and combinations possible

It is easy to see that by careful selection, and a lot of hard work, various colours and combinations are possible. A couple which have been developed are described as "Blue" and "Chocolate", while a popular two tone, is red and silver. It's true to say that our knowledge of how all this works is "sketchy". We know, in some cases, what will happen but, we don't know why. In other cases, the results leave us mystified. The study of genetics is at the very frontier of science. We've learned a lot in a very short time, just enough perhaps, to realise we know very little.

If your experience of the common goldfish is limited to observing commercially bred imports, your impressions of this fish may be poor. Let me explain, there is a vast difference between the commercial product and a quality fish bred with the show bench in mind. This is not to say, you can't find a good fish in a pet shop but, it's rare. You will, of course, pay much more for a selected fish with a show pedigree.

To pick a good fish, first of all it must be healthy and strong because, no matter how pretty a fish may be, it is no use unless it lives. This applies just as much to "commons" as it does to the more delicate varieties. When I select a fish, I firstly look from above and expect to see both sides of the fish evenly matched, although females can be a bit "fuller" one side during the breeding season. When looking at the side profile, I like to see a smooth top line and a bottom line to match. The faults most often seen are a concave face, giving a "snouty" appearance, and a hump on the "shoulders". This totally ruins the top line and it will not improve with age.

All the fins should be short and rounded without any hint of coming to a point. The majority of imported fish have fins which are too long. Density of colour is very important and, with a self coloured fish (all one colour), should extend as far as possible to the extremities of the fins. With fish of more than one colour, the fins should match. Bear in mind that the strength of colour in these fish normally improves with age, so a young fish is allowed to be a little paler. As far as breeding goldfish is concerned, the trick is to breed good goldfish. Any strain left to breed without some form of selection will quickly deteriorate and revert to the wild form.

Selective breeding down the drain

Most people with garden ponds know that a few goldfish fry survive from time to time. Sometimes these grow up and change colour but, many don't. If these "uncoloureds" are allowed to breed unchecked, eventually almost all of the offspring will fail to colour. To a goldfish enthusiast, this is 1,000 years of selective breeding gone down the drain.

Keeping the common goldfish successfully requires the same good fishkeeping practices as any other species. The main requirements being good water quality, suitable food, and plenty of space. Within reason, the "common" can cope with a wide temperature range, provided sudden changes or wide variations are avoided. Likewise, with pH and hardness values. Healthy goldfish constantly search for food and will attempt to eat just about anything. The result of this is large amounts of waste products so, if you keep these fish in a confined space such as an indoor aquarium, regular partial water changes are essential. In Britain we have several Goldfish Societies, whose main aim is to promote the keep-

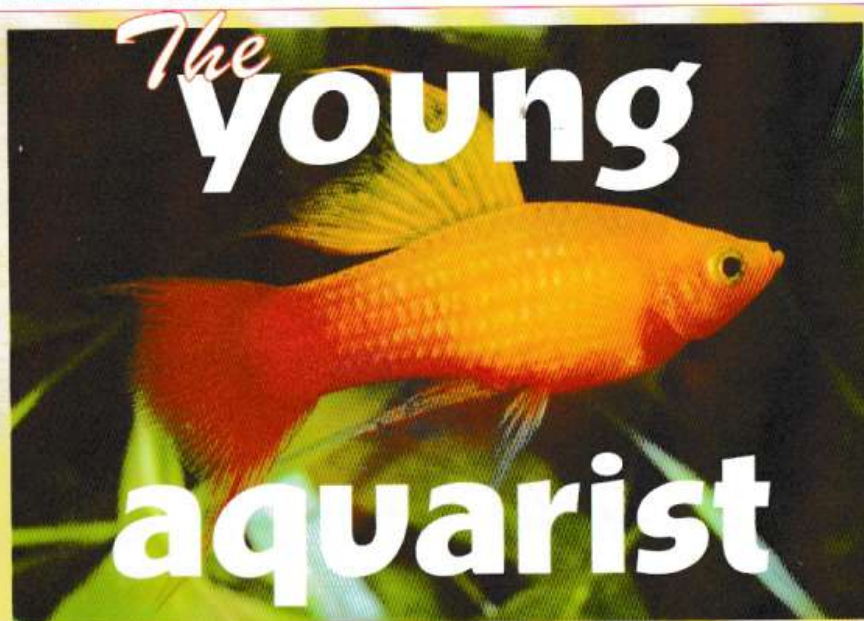
ing and breeding, and general appreciation of all forms of goldfish. These organisations have developed a set of show standards covering most of the popular varieties including the "common". When shows are held annually, often some of the biggest classes are for "commons", proof indeed that this fish is highly regarded.

If you enjoy the Common Goldfish, or any of its exotic relatives, and want to share your enthusiasm with like minded people, why not contact one of these societies? Beginner or expert, you will be very welcome. As a matter of no importance — I don't like the name "common" to describe this fish because, good ones are surprisingly uncommon, in every sense.



top of page True yellow Goldfish do not possess any red pigment.

above The fish has a predominance of the orange/red pigment.



This month we are visiting the aquarium shop to make our purchases and what a wonderful collection of fishes there are. With all this choice it's a real temptation to buy too many all at once, but remember the tank is only 24 inches long and can only house about 20 fish up to 2 inches long (adult size, not present size) when fully stocked.

Only buy six fish the first week and then add another six every other week until your tank is full. The temptation is to always keep a few more, but give your fish plenty of room and they'll spread their fins and grow into beautiful specimens of their kind. Adding new fishes slowly like this allows the tank system to mature and is an important part of stocking a new tank.

What to look for when choosing fish

- Lively and active fish swimming in a manner appropriate to their kind with fins well spread.
- A robust body shape, avoid thin, weedy specimens.
- No sign of shimmying (sick fish often slowly weave from side to side erratically).
- No dead fish in the tank.

By now you have probably made up your mind which fish you want, or have you? If not, my shopping list might be helpful. It is best to start with the easier species first and many of these are also very attractive. The challenging species should come later.

Shopping List

Easy bottom dwellers are Corydoras species such as *C. paleatus*, *C. aeneus* and *C. trilineatus* (a very attractive Cory, see photograph in September issue of *A&P*). Corydoras are funny little characters that scuttle around the bottom of the tank and occasionally wink at you. Aspidoras species are also good, we've kept *A. albater* and *A. menezesi* amongst others. These are also peaceful bottom dwellers as are Bristlenose cats which are also good at keeping the tank clean of algae.

Easy middle of the tank swimmers are the small Danios, such as Zebras, Pearls and Leopards. Platies and Guppies are small, active, livebearing fishes. Small Tetras like Neons and Cardinals look good, as well as Penguin Fish and Silver tips, but avoid Serpaeas as they can be nasty. Small, peaceful Rasboras like Harlequins and Red-Tails are also good additions.

Top of the tank fish are Hatchets, Lampeyes, and usually your Guppies like it there too. Avoid Halfbeaks at this stage, they are not a beginner's fish and need special care.

Other items to be bought are a gravel cleaner, water conditioner, a good quality flake food and tablet food.

When you arrive home with your fish, turn the tank lights off and introduce them slowly into their new home, gradually mixing the water from their bag with the aquarium water. Before switching the light on again, allow the fish to settle in their new home for a few hours.

Once your tank is up and running tank

maintenance is important. Hoover the gravel once a week and take out a bucketful of water (larger tanks need more water removing — about one fifth of the total volume). Replace with water of the correct temperature to which a water conditioner has been added.

Feeding

A good quality flake food should be used. Be careful not to overfeed. A small pinch of food sprinkled on the surface should all be eaten within a few minutes. Once you have a few catfish in your tank they need to be fed with tablet food a couple of times a week. Live food should also be given once a week. Note well that overfeeding pollutes the water and will kill your fish!

Observation

This is very important for all aquarists (I still carry out an inspection of all my tanks every day).

From now on you will need to keep a close eye on the following:

- If your tank is planted and has the lights on for extended periods, watch out for algae — too much and you will need to reduce the lighting.
- Check daily to see that all your fish are healthy.

The most common disease is itch or white spot as it's commonly called. Early signs are

fish flicking against rocks, ornaments, etc., over a period of time. Later, white spots develop over the fins and body. This disease can kill all the fish in your tank unless you act promptly but don't worry — it is easy to

cure if noticed early enough. See your local dealer for the medication and treat all the tank if this happens. White spot is most likely to occur when your fish are under stress and the stress of being moved to a

new tank may be enough to trigger it. Generally though fish are quite undemanding creatures and if given a well maintained aquarium, correct feeding and compatible companions, all should be well.



top of page, left Hatchet fish (*Carnegiella strigata strigata*) are good surface dwellers.

top of page, right Easy middle of the tank swimmers are the small Danios, such as Zebras, Pearls and Leopards. This one is a rare species, *Brachydanio nigrofasciatus*, but is still suitable for a beginner.

above left Easy bottom dwellers are Corydoras species. This one (*Corydoras melanistius*) is commonly found for sale in aquarium shops.

above Platies are beautiful small, active, livebearing fishes well worth adding to your new tank. This one is a Sunburst Lyretail Variatus Platy but there are many other types available.

left Penguin Fish (*Thayeria boehlkei*) are lovely hardy Tetras ideal for a beginner's set-up.

ALL PHOTOGRAPHS BY DEREK LAMBERT

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

See you next time ... *Pat*

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We are currently thinking about setting up a marine tank to house one or two pairs of captive bred English seahorses. However, before we do this, we need a bit more information about options for caring for the Seahorses when we are away on holiday. Particularly as we have read that they really are a species who need a pretty regular/constant supply of live or frozen food.



Are there any other options that are fair to the fish but do not involve relying on a friend or neighbour to come in and feed them one or two times a day?

Lucy and Steve,
 Manchester.

I would love to say go ahead and set up an aquarium for native Seahorses. The truth of the matter, however, is that they do have to be fed with lots of live foods virtually every day, with the addition of some frozen foods as well. Unless

you have a knowledgeable fish-keeping neighbour who is willing to take this job on for you whilst you are away, then it is best to leave well alone.

pictured above
 Seahorses of all types require specialised feeding at all times. If you are unable to provide this, it is best not to even attempt to keep them. This beautiful fish is the Yellow Seahorse, *Hippocampus kuda*.

PHOTOGRAPH: LINDA LEWIS

Q I have recently taken up the hobby and have set up a 10 gallon tank. I have bought two very good books which helped me greatly. I am running the tank fully set up, substrate in, rocks and living plants. The plants have settled in well, in fact many of them have new leaf growth. I have not yet put fish in, the water condition is good, however, I bought some Bamboo canes and split them down the middle to make a curtain to hide the power filter. I washed and soaked the Bamboo in aquarium disinfectant but have found in the last two days that white fungus like growth has appeared on the

canes. They have been submerged in the tank for a week. Is this fungus dangerous and should you not use Bamboo in an aquarium?

John Benham

A Thank you for your letter about your problem with Bamboo, which is growing fungus. It graphically illustrates how important it is not to use just any material in a fish tank. Fortunately, you have not put any fish in the aquarium yet so there has been no real harm done.

I would suggest removing the Bamboo immediately and changing almost all the water. The aquarium can then be refilled using tapwater

raised to the correct temperature. Add a water conditioner to the new water and then leave everything to settle down again for a week or so.

It is possible to use Bamboo in an aquarium, but it has to be treated with a sealant, available from good aquarium shops, before it is added to the set-up. This way nothing poisonous can leach out into the water and fungus cannot grow on it. Split canes, however, should still be avoided since they can have sharp edges which may harm your fish. A better solution to screening your power filter is plastic plants. There are some very good ones on sale now which will blend in with natural plants. They have several advantages over real ones since they will never die, are easy to clean if algae grows on them, and can be packed very tightly together to make a dense screen to hide your filter.

Good luck with your new fish tank.

Q I have been a fishkeeper for many years, having purchased my first A&P when it was priced at 2/6d in old money.

My first interest was in the trusty Goldfish, but I soon transferred my interest to tropical fishes. At this time, your magazine had a contributor who, if my memory serves me well, who specialised in Goldfish whose name I seem to remember was Arthur Boarder. Unfortunately, this gentleman, again if my memory serves me correctly, died many years ago.

I believe he wrote a book on the breeding of Goldfish. My interest

has now reverted to fancy Goldfish and I would be most grateful if you could let me know the name of this book, and whether it is still in print. Failing that, could you please recommend a book that is in print which would prove useful to me.

L. J. Forrest, Torfaen, Gwent.

A I am sorry to say that Arthur Boarder died some time ago and his book is out of print as well. My personal favourite book on Goldfish was written by Frank W. Orme. This is entitled 'Fancy Goldfish Culture and was published by Saigo Publishing Co. Ltd., 1 Royal Parade, Hindhead, Surrey, GU26 6TD. ISBN 0 904558 63 0. I think this book may be out of print as well since it is 20 years old now.

Moving on to more modern publications I think Goldfish Breeding and Genetics by Joseph Smartt and James H. Bundell is one of the best available. This is published by TFH and has their code number of TS-217. This should be available from your local aquarium shop.

Since you are just starting up again with Goldfish it would be a good idea to join a specialist club. The Goldfish Society of Great Britain can be contacted through Mr R. S. Saltrick, 38 Herent Drive, Clayhill, Ilford, Essex. IG5 0HE. This organisation has contacts over the whole of the U.K. and is an excellent source of knowledge about these beautiful and fascinating fish. They also hold auctions and regular meetings where you can obtain good quality fish of known parentage.



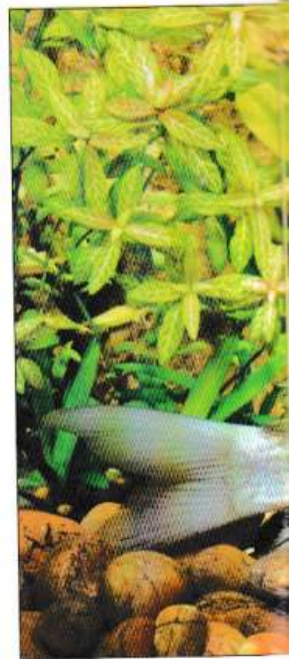
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TROPICAL

ROY OSMINT looks at Shark varieties that do not live up to their fearsome reputations:

PHOTOGRAPHS: MAX GIBBS UNLESS OTHERWISE STATED

Shark by Name ..



The Shark! A creature whose perceived reputation inevitably precedes it. Almost more than any other guaranteed to conjure up distinctive stereotypical mental images. A huge fearsome predator of the deep capable of inflicting horrific death and destruction on almost anything that comes within its compass. Colourful impressions abound of the unmistakable, superbly designed aqua-dynamic body cutting through the ocean with consummate ease, towards the unwary swimmer!

Of a menacing form excited by the scent of distant blood, homing in on its target with truly remarkable speed and accuracy. Of powerful jaws lined with hideously large triangular serrated teeth, ripping, tearing, crushing flesh, sinew and bone as the monster violently pitches its mighty head back and forth in a savage feeding frenzy. Such graphic descriptions seldom fail to excite the senses and arouse our almost natural curiosity towards the grim and the gruesome, as well as our seemingly instinctive appetite for bloodcurdling shock and horror.

Clearly there are some species that live up entirely to this infamous reputation for unbridled savagery. Many people around the world carry horrific scars to remind them of their encounters with the creatures, whilst others have not survived to tell the tale!

But there are other Shark varieties that certainly do not behave in this manner. Some of the largest forms such as the huge Basking and Whale Sharks that can reach a staggering 40 and 60 foot respectively live on

little more than tiny planktonic food that is screened from the respiratory water by specially designed gill rakers.

Very interesting you may be thinking! But what has all this got to do with the average aquarium? There is a connection, albeit a somewhat loose one. It concerns the Shark's generally perceived formidable "jaws" reputation and how this, over the years, has been used by the freshwater tropical trade to considerable commercial advantage.

Extremely attractive and interesting

I am of course referring to that group of justifiably popular fishes known collectively as freshwater "Sharks". The majority of these are extremely attractive and interesting subjects in their own right and can make a highly desirable addition to many types of community aquaria. Even without the "Shark" appellation I have little doubt whatever that these fishes would have become firm favourites. But the title has certainly not done their popularity any harm! You only have to observe the initial reactions of newcomers and non-fishkeepers to realise that this is so.

In fact, of course, this group of fishes has no scientific connection whatever, as well as precious little resemblance, to the cartilaginous marauders of the deep to which they have in name been conveniently

.. but Not by Nature



far left *Labeo frenatus* (Red-finned Shark). This handsome fish is a frequent free-swimming visitor to all water levels but seems to spend much of its time grazing on mid-distance plant leaves rather than on the bottom.

left *Labeo rubropunctatus* (Red-spotted Shark) was described by science in 1813 but is one of the more recent introductions to the aquarium hobby. Whilst we are still learning about its nature in the aquarium we do know it can grow up to 40cm (16 inches) so will need a large aquarium if it is to be happy.

below *Labeo bicolor* (Red-tailed Black Shark) really is a gem of a fish although it is territorial and may harass other fish in the aquarium.

PHOTOGRAPH: M.P. & C. PIEDNOIR

fish by catching the public's imagination — and it often works to some extent!

Further complications arise when in some instances a single suitable-charismatic name becomes applied to more than one species. Such practice, though undoubtedly confusing, in most cases probably does no direct harm. But it does, nevertheless, emphasise the unreliable and relatively meaningless nature of popular names in general. Only a fish's accurately assigned scientific nomenclature is universally recognised and can positively identify a particular species.

Despite these rather misleading connections there are a number of fishes in this group that have deservedly long been admired by both inexperienced and veteran fishkeepers alike. With good reason, for in

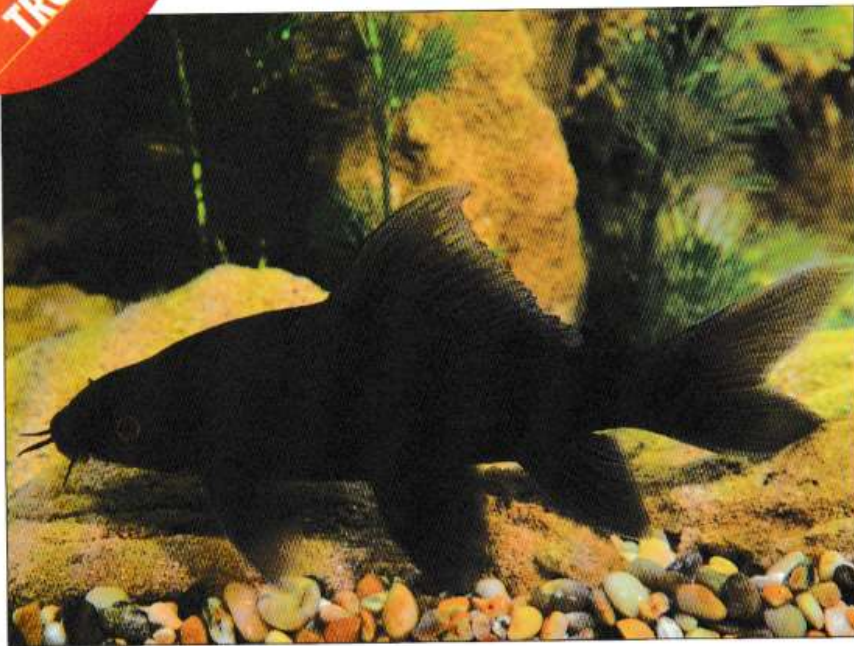
linked. The only reasonable comparison that could be made between our freshwater aquarium "Sharks" and their high-image marine namesakes, is a not much more than passing resemblance in general body configuration when viewed in profile, together with some equally vague similarities in certain fin shapes and postures.

Apart from those species that have over the years become firmly established and popularly recognised within the hobby as "Sharks", there are also from time to time, I have noticed, new ones that suddenly spring up locally in various retail outlets. These are normally variations on standard fish forms to which the dealer has independently decided to apply the spurious term "Shark" in an effort to draw greater attention to the



TROPICAL

SHARK BY NAME ... but not by nature



left *Morulius chrysophekadion* (Black Shark) is one of the largest of this group reaching a length of some 50cm (19.75 inches). Although it is unlikely to attain anything like this size within the confines of the average home aquarium it is nevertheless a large species suitable only for a tank of generous dimensions.

below *Labeo variegatus* is known under at least three different names — Marbled, Variegated or Harlequin Shark. This is one of the rarer species rarely seen for sale. It is a very attractive fish which grows to 30cm (12 inches).

most cases not only are they individually extremely attractive creatures, but can also bring a special character and contrast to many aquarium set-ups.

Let's take a look then at a few of the more commonly seen and generally recognised varieties!

Labeo bicolor (Red-tailed Black Shark)

This really is a gem of a fish. It is certainly not surprising that for very many years it has remained among aquarists the most popular of all the so-called freshwater "Sharks".

Native to the swift-flowing rivers and streams of Thailand, *Labeo bicolor* is remarkably tolerant to a range of water quality and temperature conditions. One of its principal attractions, however, is the striking contrast, in good adult specimens, between the uniform jet black body which has the appearance of velvet, and the brilliance of the carmine red tail.

Observing this fish in a well furnished and mature aquarium provides an almost endless source of wonder and fascination. From the majestic manner by which it effortlessly glides through open water, suddenly to veer off to harass an unsuspecting trespasser. To the sheer precision and delicacy it demonstrates when grazing across an algae-coated rock.



This is one of fishkeeping's great characters!

The question of harassing trespassers is in fact a very relevant one. *Labeo bicolor* starts to develop from an early age territorial instincts that strength as the fish gets older. This natural inclination is demonstrated in its most aggressive form towards other members of its own species. For this reason it is generally advisable to maintain only one in the average aquarium. More can sometimes successfully be kept in a very large tank furnished in a manner that allows each individual to occupy and

defend its own particular space, but even here conflict and bullying is likely to be a frequent occurrence.

The fish's mouth, typical of browsers and bottom-feeders in general, is underslung and exhibits a pair of small barbels. The lips are rather thicker than normal and possess an inner fold with a bony covering that is perfectly suited to grazing activities. It is also capable of inflicting quite considerable fin damage when it has a mind to do so!

My own experiences of keeping a single *Labeo bicolor* in a community aquarium suggest that actual fin damage to other species is relatively rare. The fish's highly developed territorial instincts, however, are always apparent. Frequent, generally harmless, challenges will be made upon various other inhabitants whenever they cross the invisible boundary that marks its self-appointed province.

Interestingly, some community members will probably be afforded far greater leeway in this respect than others. Behavioural patterns do vary among individual specimens quite considerably, but I have always found that maximum force tends to be directed towards those fishes that display one or both of the Shark's own colours, i.e., red or black. This in many cases seems to be a definite harassing trigger!

Those that have read various of my previous articles will know that I am generally a strong advocate of purchasing from dealers lower cost juvenile fishes, rather than the more expensive fully matured specimens. This to me makes sound common sense, both financially and practically! *Labeo bicolor*, however, is one of a small number of exceptions that I would make to this generalisation. For some reason, possibly connected with transportation trauma, very immature subjects frequently do not do well, becoming stunted in growth and lacking in colour. For this reason it is usually better to pay a little more for this species and obtain a somewhat larger fish that is likely to have passed this development block stage and consequently has a better chance of maturing into a fine adult specimen.

Labeo frenatus (Red-finned Shark)

This handsome fish is another native of Thailand, but generally does not grow as large as *Labeo bicolor* reaching a maximum of some 9cm (3.5 inches). This is compared with the previously described species that in favourable circumstances has a potential for almost twice this size.

Labeo frenatus has more streamlined contours and does not sport the intense colouration of the Red-tailed Black Shark. It displays a more brownish/grey body with red finnage. The mouth of this species is not situated so far underneath as with *bicolor*. Although a frequent free-swimming visitor to all water levels it seems to spend much of its time grazing on mid-distance plant leaves rather than on the bottom. In most other habits and behavioural characteristics this fish can be considered virtually identical to the previously described variety.

Morulus chrysophekadion (Black Shark)

In its native Thailand habitat this fish can reach a length of some 50cm (19.75 inches). Although it is unlikely to attain

right *Balanteocheilus melanopterus* (Silver Shark). Several different species are sold under the name of Silver Shark, but this one, sometimes known as the Bala Shark, is the generally recognised form — and what a beauty it is!

anything like this size within the confines of the average home aquarium it is nevertheless a large species suitable only for a tank of generous dimensions.

During its middle age adult stage a good specimen of *Morulus chrysophekadion* has a magnificent uniform jet black body. Young individuals, on the other hand, display a more greyish/black hue often with some white edging to the fins, whilst older fish tend to develop a bronze tint to the scales. Another characteristic feature of the juvenile fish is an unusually large eye apparently out of all proportion to the rest of the body. This incongruity generally becomes more normal as it approaches maturity, at about the same time as the fins lose their white trim.

For obvious reasons this is not a subject to keep with significantly smaller fishes. But in a suitably sized and appropriately furnished tank in the company of those with similar bulk, such as perhaps some of the heavyweight Cichlids and large Catfishes, it makes a splendid addition. "Appropriately furnished" in this context should be taken to mean plenty of rockwork under which the fish can shelter when desired during the day, and a complete absence of natural plants, which will not be tolerated.

Balanteocheilus melanopterus (Silver Shark)

Here again, I have in the past seen various species sold under the name of Silver Shark. But this one, sometimes known as the Bala Shark, is the generally recognised form — and what a beauty it is!

Native to Thailand, Sumatra and Borneo, this extremely active fish can attain in its natural environment a length of some 35cm (13.75 inches), though in the average aquarium one of about 12cm (4.75 inches) would normally be considered a fine specimen.

The superb streamlined body is overall a magnificent glistening silvery green that constantly changes with the angle and intensity of light falling upon it. Most fins are attractively contrasted by a yellowish tinge, bordered in deep black. All fins in well conditioned specimens are very erect, especially the dorsal, and the large powerful tail is deeply forked. Together these give the fish in silhouette its passing shark-like appearance.

Unlike the other so-called freshwater sharks already described this



TROPICAL

SHARK BY NAME ... but not by nature

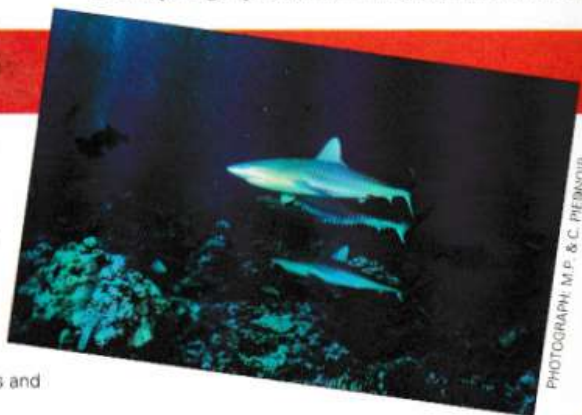
one does not demonstrate territorial instincts and more than one can be kept in a good sized community aquarium perfectly compatibly. In fact there are few better sights than a small shoal of *Balantiocheilus melanopterus* swimming together in a nicely laid out tank. Do make certain, though, that an aquarium containing this species is well covered at all times. These fish are extremely accomplished jumpers! Another point to bear in mind is that to remain healthy they require a diet rich in vegetable matter. If this is not supplied in sufficient quantity they will seek it elsewhere — namely your aquatic plants!

Silver Sharks usually tend to be quite expensive and you should expect to pay the going rate for a good specimen. Although, as always, prices can vary quite considerably from dealer to dealer and shopping round is well worthwhile. As before, I would warn against purchasing individuals that are too small. They may appear good value on the face of it but this will turn out to be false economy if future development becomes inhibited.

The species described, together with various others that collectively have become known as freshwater "Sharks" have for many years justifiably found a place of special affection among aquarists at every level of the hobby. Long may it continue — I have little doubt that it will!

A&P Fact File

Grey Reef Sharks, *Carcharhinus amblyrhynchos*, are a threat to divers and small manned submersibles throughout the coral reefs of the world. They are generally found in clear water areas from the surface down to depths of 450 feet, although may dive to depths of 3,000 feet. Strangely enough they are more likely to attack when bait is not being offered, than when it is. Whilst not a large shark it grows to a maximum size of about six feet and becomes sexually mature at seven years of age. They are livebearers which produce broods of up to six youngsters nearly two feet long at birth. The gestation period is approximately 12 months and once adult they may live as long as 25 years.



PHOTOGRAPH: M.P. & C. PLEINCH

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DAVID TWIGG unravels the mysteries of Koi varieties:

PHOTOGRAPHS: DAVID TWIGG

KOI

Koi Varieties *Part Three*

Showa Sanshoku, or Showa as it is commonly known, was developed in the late 1920s by crossing a Hi-Utsuri with a Kohaku. It is an extremely popular variety with UK hobbyists and good examples are wonderful to see.

Last month we saw that the Sanke was a fish that has a non-metallic skin with a two colour pattern (red and black) on a white base or body colour. In the simplest terms a Showa is also non-metallic but with red and white markings on a black base.

As time has passed this variety has changed with "fashion". The early Showa had large amounts of Sumi (black) and Hi (red) with only small amounts of white. Today it is possible to find Showa with very little black but a lot of white. This variety is known as Kindai Showa and may be difficult to tell from a Sanke at first sight.

There are however some basic differences that will allow the viewer to tell them apart:

- Showa will always have Sumi on its head but a Sanke never will.
- The Sumi on the Showa wraps around the upper body (tends to be "banded" rather than patches) and finishes below the lateral line; Sumi on the Sanke is always above the lateral line.
- You will recall from last month that the Sanke can have "stripes" in the base of its pectoral fins. In the case of the Showa this area becomes solid Sumi and is known as Motoguro.

Ideally the Sumi on the head of a Showa should be a stripe diagonally across the head or in the shape of a "V" but neither type should be without some white on the tip of the nose.

All the usual attributes relating to body shape, skin quality, etc., should be looked for when assessing the merits of Showa and they can even help you determine the male from female Koi. The accompanying photos give a better idea of the patterns found on modern Showa.



left A lovely "modern" Hi (lots of red pattern) Showa but does not exhibit Motoguro.



right A magnificent Showa clearly showing the "banding" of the Sumi.

Liz Donlan's KOICALNDAR

Although the show season and pond visits have come to an end for this year, the next couple of months sees the busiest period for hobbyists purchasing their new Koi. Japan is overtaken by the UK's dealers all purchasing their new stocks of Koi from the autumn harvests. Many dealers have hobbyists queuing up at their doors to view the new shipments as soon as they arrive assuming that the best will go first. However, this isn't necessarily always the case. After all, everyone's tastes differ.

It can, however, be a frustrating time for those hobbyists who have unheated ponds as, for them, it is the wrong time of year to purchase Koi. Some dealers are, of course, willing to reserve Koi until the warmer weather arrives, but a word of warning ... it is hardly fair to expect a dealer to hold a Koi for months and months and then hold him responsible should the Koi develop any problems.

right The Northern Koi Club enjoying their packed lunches at the beautiful pond and garden of Tony Bowcott as part of their visit to the Black Country Koi Club.

PHOTOGRAPH: LIZ DONLAN



SHOW CALENDAR

OCTOBER

JULY 2000

30 Yorkshire Koi Society (celebrating its Silver Jubilee) at York Racecourse. Contact Jeff Gleanpole (Show Manager) on 01845 526164.

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.

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!

OCTOBER

9 Northern Koi Club at Klasic Koi, Clarendon 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 Glynis Morgan-Davies on 01706 218243.

There are numerous Koi clubs in the UK and, this month, we're including a list of those which we currently have details for:

The British Koi-Keepers' Society Sections

Central, Pat Stevens (Membership Secretary), 0121 588 2445.

Cheshire & District, Keith Grainger, 01782 773892.

Crouch Valley, Brenda Scott, 01375 642321.

East Pennine, Betty Koserer, 0114 2341151.

Ireland, Trevor O'Leary, 01247 466865.

Isle of Wight, Kevin Driscoll, 01983 291676.

Kesnet Valley, Peter Gilman, 01635 821484.

Leicestershire Koi, Karen Boyton, 01502 587116.

Manchester & District, Sue Evans, 0261 480 5821.

Midlands & Surrey Border, Jim Freeman, 0181 941 2988.

Mid Staffs, Val Stokes, 01543 278359.

Northants, Peter Parker, 01908 311021.

Nottingham & District, Shirley Hind, 0115 981 0923.

Petticoes & District, Tina Burgess, 01782 617526.

South East, Mick Wright, 01634 718943.

South Hants, D. Harrison, 01708 590699.

Staffs & North Essex, Alan Carter, 01206 850011.

West Wales, Basil Evans, 01581 772190.

Working & District, Carole Coote, 01903 232277.

Yorkshire Section, Andrea Thornton, 01924 275749.

Independent Koi Clubs

Birmingham and West Midlands Koi Club, Alan Smith,

0121 422 3896.

Black Country Koi Society, Tony Burnett, 01384 305290.

British & West Koi Club, Larry Lemay, 01451 896207.

Cambridgeshire Koi Club, Graham Hagger, 01487 711129.

KOI SOCIETY MEETINGS/EVENTS

NOVEMBER

3 BKKS Leicestershire Section. Guest speaker, Kevin Goodey of Kusuri Products. Contact Karen Boyton on 0116 233 0797.

7 BKKS Worthing & District Section. Guest speaker, Gary Hillier speaking on Identification. Contact Carole Coote (Secretary) on 01903 232277.

9 BKKS Nottingham & District Section. Annual General Meeting plus Spectacular Double Celebrity Show at the Western Club, off Derby Road, Lenton, Nottingham. Contact Shirley Hind on 0115 981 0923.

21 Northern Koi Club at St. James Church Hall, Salford (near Hope Hospital). Kate McGill

(BKKS Judge) talking on Koi Varieties. Contact Glynis Morgan-Davies on 01706 218243.

24 East Midlands Koi Club. Topic: Winter Health (please ring for details of venue). Contact

Richard Jones on 01283 2249975.

25 Witham Valley Koi Society. Results and club judging of September's fish competition.

Contact Ray Lee on 01522 872733.

27 Cambridgeshire Koi Club. Cabaret Evening. Contact Peter Liddiard (PRO) on 01487

740030.

Desert Koi Keepers, Alison Allen, 01202 879437.

East Coast Koi Club, Alan Wright, 01502 587116.

East Midlands Koi Club, Richard Jones, 01283 224975.

Eastbourne & District Pondkeeping Club, Brian Dale,

01323 231389.

East Yorkshire Koi Society, Steve Matthews, 01964

527863, or Clara Hill, 01462 246777.

Fylde & District Koi Club, Chris Ingledew, 01772 625581.

Heart of England Koi Society, Paul Stacey, 01203 674821.

Merseyside, Syd Bennett, 01942 204948.

Midland Koi Association, Keith Hanson, 01527 545230.

North East Koi Club, Jean Hope, 0191 416 5794.

North Lines Koi Club, Ken Bush, 01473 883377.

North of England ZNA Chapter, Yvonne Mose, 0114 289

1457.

North Wales Koi Society, Keith Perry (Chairman), 01492

348003 or Dawn Davies (Membership), 01352 762149.

Northers Koi Club (ZNA Friendship Club), Glynis Morgan

Davies, 01706 218243.

Norwich Koi Club, Jerry Allen, 01603 452012.

Oxfordshire Koi Club, Kevin Sexton, 01865 874008.

Plymouth & District Koi Keepers' Society, Sandra

Crocker, 01752 210118.

South Devon Koi Club, Stan Moring, 01801 840019, or

Christine Brackstone, 01803 833472.

South Essex Koi Club, Mick, 01702 342400, or Barry,

01268 565739.

South West Koi Club, John Sprout, 01934 822620.

Wessex and Southern Koi Society, Mrs Jenny Lenton,

01425 276885.

Wirral & District Koi Society, Dave McColloch, 0151 677

1382, or Steve Cope, 0151 327 7457.

Witham Valley Koi Society, Ray Lee, 01522 872733.

York & District Koi and Pond Fish Club, Andy Hudson,

01904 348155.

Yorkshire Koi Society, Rita Thomson, 01723 864867.

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 9886.

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Stingers of the oceans

Drifting in the surface currents of the oceans are the deadliest and most dangerous animals in the sea. Jellyfish and jellyfish-like animals are responsible for injuries varying from an innocuous sting that is scarcely felt and leaves no mark from jellyfish in the seas around Britain, to an excruciating pain and rapid death from the Box Jellyfish of tropical seas.

Cnididae

Jellyfish are classified in the phylum (major group) Cnidaria of animals that contain stinging cells called cnidae, of which the nematocysts are the commonest type. The stings are activated when the jellyfish, hydroid, or sea anemone, comes into contact with its prey, or anything resembling its prey, which unfortunately in many cases also includes human skin. These stinging cells can be seen under the microscope and their mechanism is arguably the fastest action in the whole of the animal kingdom. The fluid filled capsule called the nematocyst everts and forces the filament to discharge venom into its prey of smaller organisms.

The Box Jellyfish, *Chironex fleckeri*, that inhabits the murky seas

Andy Horton's

SHOREWATCH

on the north Australian coast, possesses a powerful sting that has been responsible for at least 65 fatalities. Extensive stings cause rapid respiratory failure, coma and death.

British seas

In the seas surrounding the British Isles at least six species of true jellyfish, occur during the summer.

These are the Common, or Moon, Jellyfish, *Aurelia aurita*; Barrel Jellyfish, *Rhizostoma octopus*; Lion's Mane Jellyfish, *Cyanea capillata*; Compass Jellyfish, *Chrysaora hysocella*; Mauve Stinger, *Pelagia noctiluca* and *Cyanea lamarckii*.

In addition there are two species of jellyfish-like animals, technically colonial hydrozoans. These are the notorious Portuguese Man-o-War, *Physalia physalis*, and the By-the-Wind Sailor, *Velella velella*, which are occasionally seen swarming in the bays of south-western Britain or washed up on the beach.

Life cycle

All jellyfish have just a short life cycle. The adults mate and discharge their eggs or larvae, small swimming embryos that find a suitable place to settle into a small anemone-like polyp. They grow like anemones for a year, before breaking off and losing their tentacles and changing into medusae for the final stage of their short lives.

Year of the Jellyfish

Since the beginning of May I started receiving reports of large swarms of thousands of Moon Jellyfish, *Aurelia aurita*, in the English Channel where they are not common every year. Jellyfish swim by pulsing their umbrella-like bells, but they are largely at the mercy of the currents and prevailing winds. On the west coast, jellyfish are more common and off Scotland as many as 450 Moon Jellyfish were reported in an area

of just 75 square metres.

The large transparent Barrel Jellyfish, *Rhizostoma octopus*, was reported in large numbers from the Irish Sea and around the Isle of Man. Moon Jellyfish and Barrel Jellyfish are generally harmless; their stings cannot be felt by adult people.

Lion's Mane Jellyfish

From between the two piers at Roker, Sunderland, came the first reports of jellyfish the size of dustbins, pulsing gently in the shallow water with an occasional purple/brown red specimen spread-eagled on the beach. Predictably, the local newspapers carried reports of children being treated for stings. The sting of this jellyfish is much over-rated. It usually resembles an acid burn and leaves no mark.

Sting reports

At the end of the British Marine Life Study Society Information Line I receive calls like, "Something has stung, or bitten me! What is it?" The first sting report came in from off Ryde on the Isle of Wight. The only stinging jellyfish found in these seas is normally the Compass Jellyfish, *Chrysaora hysocella*, and we have no clear idea of whether the sting is painful for this species. If the skin is already broken many harmless animals can produce a sting. There have been a handful of reports of the Moon Jellyfish causing a sting and raising a rash.

Weever stings

By far the most common sting on the south coast of England is from the bather stepping on to a fish buried in the sand called the Lesser Weever, *Echiichthys vipera*. The offending black dorsal fin and spines embedded in the foot are sharp, painful, and cause swelling. The pain reaches its maximum intensity within two hours and then subsides. The treatment is to place the limb in hot water of

SHORE WATCH Fact File



The Snakelocks Anemone is a common animal in the rock pools of the south and west of Britain. Although the sting is not felt when handled it has been responsible for many stings and this summer a young child playing in a Guernsey rock pool received a severe blistering and rash from this anemone which required hospital treatment.

PHOTOGRAPH: ANDY HORTON

SHORE WATCH Fact File



The Lesser Weever buries in the sand just below water in British seas. Woe betide a bather who treads on the erect black fins or spines which can inject a sting which is very painful for two hours. If the spine remains it should be carefully removed. Complications are unlikely to occur.

PHOTOGRAPH:
ANDY HORTON

above 40°C (44°C is recommended) to permanently relieve the pain.

Lionfish stings

Tropical marine aquarists often keep attractive Lionfish, *Pterois* sp., which have slender spines containing venom. It is a popular display fish in an aquarium on its own. Inevitably, aquarists are careless enough to get stung. All these stings respond to immersion in hot water. Ninety-two per cent of the stings were painful and 95 per cent of the wounds were

minor, four per cent involved blistering and one per cent went septic.

Other stinging fish like the Scorpion Fish, family Scorpaenidae, and the notorious Stonefish, *Synanceia horrida*, have similar stings, but there are no deaths on record directly attributable to the fish's venom.

Other British stingers

Without raising unnecessary scare stories, it is wise to regard any jellyfish washed on a British

beach as potentially harmful. Both the jellyfish, *Pelagia noctiluca*, and the Portuguese Man-o-War, *Physalia physalis*, have caused painful injuries and local tissue damage in adults. However, these species are inhabitants of warmer seas and will only be discovered in exceptional years off the west coast, usually Cornwall.

So a report of a sting on the thigh and another on the shin of swimmers off the Kent and Sussex coasts was more likely to be another animal. The favourite choice turned out to be an attack by the parasitic fish known as the Sea Lamprey, *Petromyzon marinus*, which left a circular wound where the fish had rasped at the flesh trying to get a hold.

SHORE WATCH Fact File



Pterois voltans. The spines and fins of all species of Lion and Scorpion Fish can inject venom into the victim or careless aquarist.

PHOTOGRAPH: LINDA LEWIS

Anemone stings

Sea anemones and corals are the members of Cnidaria most likely to be kept intentionally by aquarists. All of them possess stinging cells, which are used to capture food, fight for space with other corals and anemones and to protect themselves against enemies. They will be handled several times from the collection point to the home aquarium. The sting could harm the other inhabitants of the aquarium, but it is unlikely to harm the hard skin of the aquarist's fingers.

The Snakelocks Anemone, *Anemonia viridis*, of the western shores of Britain and the Mediterranean Sea feels sticky to the touch, but it has not been known to injure aquarists or rockpoolers.

However, this is not the whole story. I have received two reports from snorkellers off the Dorset coast that experienced a stinging sensation and watched their abdomen erupt in a prominent rash, which lasted for at least a month, with the scars remaining for two years.

Unwanted guests

Stinging bristleworms are a common unwanted guest in the tropical marine aquarium. There is a possibility of even such a dangerous creature as the Australian Blue-ringed Octopus, *Haploclausa maculosa*, arriving by accident. This is a serious problem animal that certainly should not be kept where children have access to the tank. Octopuses are notorious tank-escapers. The bite is not painful and may not even be noticed. However, the symptoms are serious, requiring medical treatment to prevent paralysis and death.

The rare Cone Shells have a proboscis capable of injecting venom, and in at least 10 species it is capable of killing an adult.

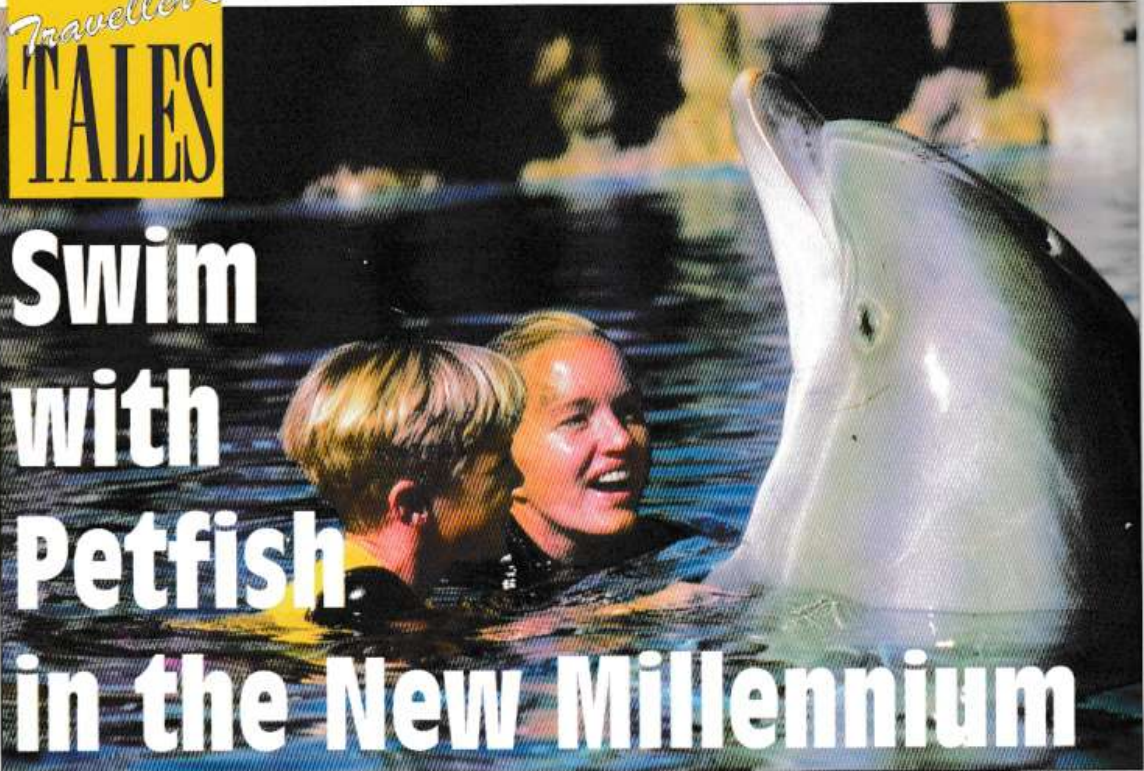
Web Site

Information about dangerous animals in the sea is found on many web sites. Links to the recommended web pages can be accessed by going to the British Marine Life Study Society Jellyfish page at: <http://ourworld.compuserve.com/homepages/BMLSS/moonjell.htm>

Andy Horton will be able to answer the first question about British marine life free of charge (if a SAE is provided). Please send any queries to Andy Horton, Shorewatch, Glaucus House, 14 Corbyn Crescent, Shoreham-by-Sea, Sussex BN43 6PQ. The answer to your question, as well as a list of popular books, may be found on the British Marine Life Study Society website.
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COURTESY OF
SEA WORLD

Sea World of Florida is building an inland sea where you can snorkel with captive coralfishes! Sea World in Florida is the most famous of all public aquaria. The theme park started life as a public aquarium based on sea fishes and mammals. Backed by the Anheuser-Busch companies, who also own Busch Gardens and four other Sea World "Adventure Parks" as they are now called, this Park is the largest with 200 acres of shows, attractions and exhibits.

Based in Orlando, 10 minutes south of downtown Orlando or North of Kissimmee on the I-4 motorway, Sea World has had to compete with Disney Theme Parks and Universal Studios for customers from the 40 million people who visit Florida each year.

After USA and Canada, the British are the most numerous holiday-makers in Orlando. This is why ITV now carries so many adverts for Disney Florida as well as Disney Paris. Many of these visitors are aquarists and all head for Sea World with its huge acrylic tanks of fish, the moving platform in the tunnel of "Terrors of the Deep", Tropical Reef aquaria and the "Touch Tanks" of giant Rays. Famous for its "Shamu" exhibits, where Killer Whales perform incredible tricks, visitors are also amazed to find Hawaiian dancing girls, performing pets, water ski shows, motion rides through an Arctic display and a giant water-coaster ride, not to mention the fireworks and lasers! Public aquaria were never like this in the UK — or the rest of the World for that matter.

Often visitors — aquarists or not — return from a Central Florida holiday saying that they enjoyed Sea World best of all the theme parks, including Disney World.

Discovery Cove

In the summer of 2000 Sea World will open a second, separate Theme Park which is currently being built adjacent to their site. Only 1,000 "guests" per day will attend with pre-booked reservations and each with a personal attendant. The price (yet to be announced — but it won't be cheap!) will include a main meal, snorkel gear, wet suits, towels, lockers, beach chairs, hammock and umbrella.

With this equipment visitors will be able to swim with and "pet" Atlantic Bottlenose Dolphins and Cow-nose Rays, then swim down an Amazonian River, through a waterfall into a 35 feet high aviary filled with 30 species of tropical birds.

The Coral Reef

Of most interest to aquarists is the Coral Reef exhibit with artificial coral and seawater but real Coral fishes. Visitors will be able to snorkel with Angelfish, Butterfly fish, Spade fish, etc., in fact more than 75 species and a total of 10,000 of them!

To keep informed on progress those with internet access can visit www.discoverycove.com and the Sea World site www.seaworld.com or for prices, when declared, ring 001 407 351 3600.



Fact File

Discovery Cove will open in Summer 2000 but visitors will need to prebook — it may be 2001 or even 2002 before UK visitors get a chance. Vacationing in Florida is well advertised with many cheap-looking offers. However, when essential insurance, tourist taxes and living costs are added always estimate £1,000 per person for two weeks.

Theme Parks are expensive, Sea World is nearly £40 with parking fees and taxes, Disney and Universal twice as much. Multi-ticket options are the best buy but these cost £100s per person. Everything in Florida looks cheaper than the UK but this is because their VAT (sales tax) is not included until you pay the bill. Prices are really about the same as here, it is just the choice that is incredible.

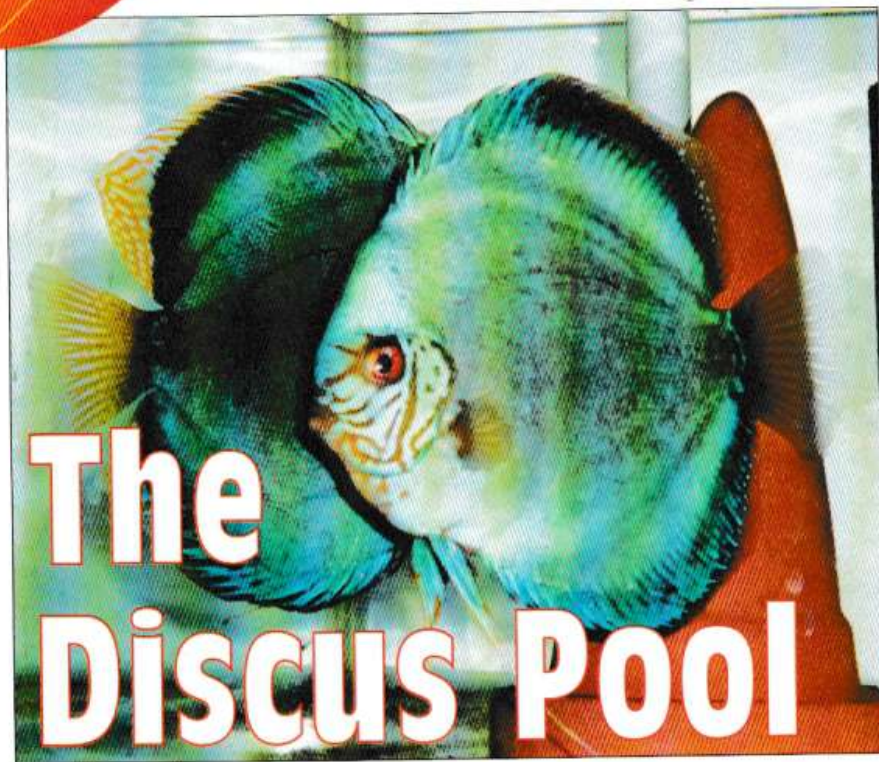
The main problem is jet-lag from the five hour difference and it doesn't go away — but you can live with it until you return and recover (up to a month later). Flights are awful with everything arranged for their convenience, not yours. But it is all worth it just to visit Sea World.

top of page Sea World of Florida is building an inland sea where you can snorkel with captive coralfishes!

above left & left Sting Ray Lagoon is where Rays can be handled by the visitors — next year they will be able to swim with them!

STEVE PUNCHARD & GARY COWBURN continue the new monthly column on Discus:

PHOTOGRAPH: STEVE PUNCHARD



The Discus Pool

Purchasing Discus

WHERE TO BUY?

There are four main options when purchasing Discus in the UK and there are advantages and disadvantages to each of them.

• Professional Breeders

When considering buying from a professional breeder, first try to visit their premises, check out their set up and observe the overall quality of the Discus. Examine their breeding pairs carefully, taking note of how many fry they are producing as this is a good indicator of whether they are successful breeders. Look for good hygiene standards and water quality. If these seem fine, ask for information about caring for the fish, and find out if they are willing to give good after sales service in case any problems should arise. One advantage of dealing with a professional breeder is that they are usually more flexible when it comes to pricing. Don't be afraid to ask about discounts for larger purchases, such as buying six or more fish.

The disadvantage of dealing with professional breeders is that there are not many of them so there is a lack of choice. You may be involved in considerable travelling to obtain fish. The quality also varies between breeders. Some are excellent, whilst others are rather poor, so care must be taken to ensure you purchase good fish and you need to be prepared to walk away empty handed if you do not like what you see for sale.

It is important to ensure that the fish are feeding well and to check that there are black faeces at the bottom of the tank — this is a sign of good health. Also check the fish's eye size in relation to their body as they should not look too big.

left A beautiful breeding pair of Discus at S. & D. Punchard Discus.

It is always best to ask other Discus keepers for advice about the reputations of different breeders they have dealt with.

• Dealers of Imported Discus

Discus from abroad are brought into the country by dealers for two main reasons. Firstly, they are cheaper, but are often of lower quality. Secondly, dealers are able to cash in on the latest strains which are seen advertised in magazines, despite the fact that they may be unable to breed them themselves. This means that though they may be cheaper this will usually be reflected in the quality of specimens available and care must be taken to check for the presence of disease when considering buying them. Again follow the above guidelines and your own "gut feeling".

• Your Local Aquarium Retailer

Buying from your local aquarium shop has obvious advantages.

These include less travelling time and expense. You also have access to local advice, a nearby contact point and regular supplier. If the retailer is supplied by a good breeder then all the above may make it a worthwhile and a good way of purchasing your fish. The disadvantages are that the fish could be poorly kept, possibly starved and of poor quality. They may also be overpriced. Any Discus which is starved, black in colour and wasting away is over priced and should be left well alone. It is always a good idea to ask the retailer what foods are used and how often the fish are fed. If they only feed a pinch of flake a day their Discus will probably be in poor condition. Ask who their supplier is, since buying poor quality discus is the main reason why people lose fish. Overall there are some good and bad aquarium outlets and it is wise to follow the above guidelines.

• Mail Order Discus

Buying from mail order is probably the most unsafe way that Discus can be purchased. Your only guide and the main point to look for is a good reputation, but this is sometimes difficult to establish. In this case check how long the breeder has been in business as this is a good indicator of their reliability. Ask about guaranteed live delivery and discounts available for larger orders. For large numbers of fish always insist on same day delivery via train, as this reduces stress for the fish. If delivery is overnight, heat packs should be used and delivery should be before 10am the next day. You, the customer, are paying for the service provided and should therefore insist on the best to reduce the risk of receiving unhealthy fish. Only buy if you feel confident of good service, including after sales advice. It is always wise to check prices on the relevant website or ask for current price lists from various breeders as even high quality Discus can be overpriced. When good standards are

operated, this way of buying Discus enables people who live a long distance from reputable breeders to obtain quality stock.

Once you have decided on who to buy your fish from, you need to consider whether you intend to keep them in a furnished aquarium or in sterile tanks. This is because they do not like to be moved too often, so the setup you move them into should ideally be their final home. If you do not intend to breed from your Discus but would like to grow them to as large a size as possible, it is best to purchase bigger fish in the first place. I believe these are generally better value and require less special attention than very young fish. This early care will have already been provided by the breeder. Another point to remember is that the bigger they are the fewer you need, but the smaller they are the more you need to buy.

Why are the bigger Discus better value?

Let's look at how many feeds go into growing a fish to different sizes: Start feeding brine shrimp at 14 days old — four feeds a day for four weeks = 112 feeds for one to two inch fish at six weeks.

At six weeks feed fine beef heart six times a day for six weeks = 252 feeds for two inch fish. At 12 weeks hamburger mix six times a day for 12 weeks = 504 feeds for four inch fish. At 24 weeks hamburger mix four times a day for 28 weeks = 784 feeds for adult fish. Plus 365 water changes and 365 PH checks, etc.

Also take into account the cost of gas, electricity, water, purifiers, equipment, cost of manpower etc. and you will probably realise why bigger is better and why Discus may at first seem expensive, but are they?

If you are opting for the furnished tank you can plant and decorate the

tank as you wish and then buy all the other species of fish first. Once these have settled in you can add your large Discus. They should then settle in very quickly, not becoming shy as two inch fish probably would in furnished surroundings.

Buying a shoal of adult Discus can be quite expensive, so I would suggest buying them at about four inches in size. If buying smaller two inch fish more will be needed to create a shoaling effect and it is important to note that Discus feel safer in larger shoals and will therefore feed better, etc.

For those intending to breed discus I feel it is better to buy as many smaller fish as you possibly can accommodate and afford. Make sure you don't put too few into larger tanks or buy fish that are too small — this is false economy due to the frequent feeding and maintenance needed for fish to reach their full potential.

The following is a rough guide to stocking levels:

Four large Discus in a 30x18x15 inch

Six large or eight smaller Discus in a 48x18x15 inch

Eight large Discus in a 48x24x18 inch

12 large Discus in a 60x24x24 inch

16 large Discus in a 72x24x24 inch

As Discus are shoaling fish the more that are kept together the better. In a larger shoal they will feel more secure, any aggression will be spread amongst the group and there is less chance of a strict pecking order developing which can disadvantage some fish. This helps reduce stress which is one of the main factors in promoting the health of your fish. Also remember to keep in mind other tank companions when choosing the size of aquarium, making sure there is plenty of room for the main feature — your Discus!

DISCUS DIRECTORY

To advertise in the Discus Directory:

• Telephone 01233 500070 • Facsimile: 01233 500021

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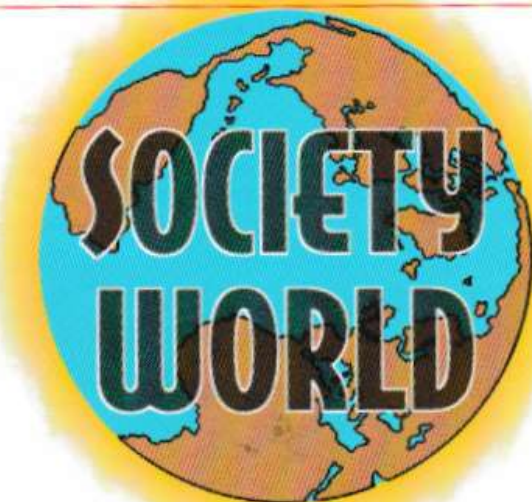


Yorkshire Aquarist Festival moves to summertime

As we go to press with the November issue we are in the final run up to BAF. Next month we will be able to bring you a full report on this premier aquatic event and a full list of the major winners. News has just reached my ears, however, of a change in the Yorkshire Aquarist Festival date next year. Normally this is announced as the previous years festival is taking place, but this year nothing was said, so we knew something different was happening in 2000.

After years of being held during March or April, depending on when Easter was that year, the Yorkshire Aquarist Festival has moved back to a summer time date. This year it will be on the weekend of August 19/20 at the Doncaster Racecourse Exhibition Centre. This is something of a nostalgic move for me as I still have vivid memories of sleeping in a tent next to three rather large Scottish aquarists some 20 years ago.

At the time a goodly number of people brought caravans or tents along and made use of the camping facilities at this venue. Thankfully, I will not have to sleep on the hard ground under canvas next year as I now live within



easy travelling distance of the Festival but the experience falls into the category of all those "long hot summers from our childhood".

Viviparous Auction - the place to be!

By this time of year most of the fish shows are over but there are still a number of worthwhile events up and running around the

country. Most notable of these is the Viviparous Livebearer Auction. This is being held on November 21 at The Junction Pub, Featherstone, Pontefract. The auction starts at 1pm and non-members are welcome to attend.

This and Viviparous's convention auction are the largest auction of livebearers held in the UK. In a normal auction over 100 species and varieties of livebearer will be sold and prices will vary from £1 up to as much as £50 depending upon the species and quality of the fish being sold. If you are at all interested in obtaining

some rare livebearers or breeding stock of some of the beautiful cultivated varieties of livebearer, then this is the place to be on Sunday, November 21. For further details contact Peter Moore on 01977 709790.

Millennium Celebration Fishkeeping Weekend

Another event which should not be missed is the A.S.A.S. Millennium Celebration Fishkeeping Weekend, November 6/7. Saturday evening there is a celebration dinner but the main event is on Sunday. This is going to be held at the Deaf Centre, Arundle Street, Portsmouth. Two lectures are being planned for Sunday, one by Brian Walsh and the other by Martin Munt on Fish Fossils. A fee of £1 is charged for the two, unless you are showing fish in the Open Show in which case entry is free.

This exhibition has a full complement of show classes so all types of fish will be on display. It also incorporates the F.B.A.S. Supreme Championship so some of the country's best fish will be present. All this adds up to an event well worth the trek down to Portsmouth to see.

For more details contact Paul Corbett on 01983 721246 or Jack Stillwell on 01705 691030.

EVENTS, SHOWS & FESTIVALS

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

OCTOBER

- 31 Scottish International Open Show (FSAS), Supreme Championship & Auction. To be held at Grangemouth Community Education Unit. Contact Jim Bryson on 01324 882065 or Jim Sheakey on 01475 704219 for full details.

NOVEMBER

- 2 Southend & Leigh A.S. (FBAS) Auction
2 Gloucester Fishkeeping Club Talk: "Fishkeeping with a Difference". Contact Caroline on 01453 824810.
5/7 Association of Southern Aquatic Societies Millennium Celebration Fishkeeping Weekend. Contact Paul Corbett on 01983 721246 or Jack Stillwell on 01705 691030 for further details. The FBAS Supreme Championship will also be held at this event. Contact Alan Henderson on 01536 268269 for further details.
7 Bradford A.S. (YAAS) Open Show & Auction
7 Merseyside A.S. (FNAS) Auction
9 York & D.A.S. Mini Auction. Contact Alan Holmes on 01904 414272 or 01904 687748.
11 Ilford & District Aquarist's and Pondkeeper's Society Meeting. Contact L. Smith, 0181-550 7329.
12 Doncaster A.S. (YAAS) Auction
20 Goldfish Society of Great Britain meeting. Ann Telford speaking on "Water Quality". Contact R. Saltrick, 0181-550 1252.
21 Viviparous Livebearer Auction & Show at The Junction Pub, Featherstone, Pontefract. Contact Peter Moore on 01977 709790 for further details.

- 21 Oasis Fish Club Auction. Contact Ann Banks on 0191-384 1433
28 TV Cats (AofA) Meeting & Auction

DECEMBER

- 4 FBAS AGM & General Assembly
13 Ilford & District Aquarist's and Pondkeeper's Society meeting. Contact L. Smith, 0181-550 7329.
14 Gloucestershire Fishkeeping Club meet at St. Augustine's Church Hall, Matson Lane, Matson, Gloucester, at 7.30pm, for annual Christmas Bash. This year a 10-pin bowling event. For information contact Caroline on 01453 824810.

JANUARY 2000

- 4 Gloucestershire Fishkeeping Club meet at St. Augustine's Church Hall, Matson Lane, Matson, Gloucester, at 7.30pm. Our first meeting of the new millennium. For information contact Caroline on 01453 824810.
15 Goldfish Society of Great Britain meeting. Contact R. Saltrick, 0181-550 1252.
29 Y.A.A.S. Yorkshire Association of Aquarist Societies AGM

MARCH

- 18 Goldfish Society of Great Britain meeting. Contact R. Saltrick, 0181-550 1252

OCTOBER

- 20/22 Supreme Festival of Fishkeeping (FBAS) to be held at Bracklesham Bay, near Chichester, Sussex

Derek Lambert's Cutting Edge

PHOTOGRAPHS BY DEREK LAMBERT UNLESS OTHERWISE STATED

• In this 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

There have been few really beautiful species of fish introduced to the aquarium hobby to compare with Neon Tetras. There have, however, been one or two over the years and one such has to be Neon Dwarf Rainbowfish, *Melanotaenia praecox*.

This little beauty has been known to science since 1910, but was introduced to the aquarium hobby as recently as 1992, after Dr Gerald Allen saw it alive for the first time in 1991. Originally prices were as high as £25 per fish but, as with all things, prices slowly dropped to more reasonable levels, and you can now find them for sale priced at about £2.50 per fish.

Neon Dwarf Rainbows only

grow to about two inches in size and as they mature become the most gorgeous of all the small Rainbows. Both sexes have lovely bright blue bodies and males have red finnage, whilst females have orange. Male *Melanotaenia praecox* also develop very high backs and youngsters can be sexed by this characteristic, even before their full colour is showing. Stunning fish, to say the least, and well worth including in your community aquarium.

They adapt well to most water conditions, although extremes at both ends of the scale should be avoided. Good water quality is important (as with all Rainbowfish), so adequate filtration is

important, as are regular partial water changes. Care must be taken not to change too much of the water at one time since they seem sensitive to pH changes.

Their dietary requirements are the same as most community fish consisting of a good quality flake food and occasional feeds of live foods. As with most Rainbows, they are best kept in a group of six or more. This allows them to form a shoal which helps prevent them from becoming timid or shy. This can happen if solitary individuals are kept in community aquaria.

Ideally, the aquarium should contain plenty of plant cover and only house other small peaceful community fish. If you want to

breed them, use a well planted aquarium containing a group of two males and four females. The adults will spawn amongst plants regularly and a few fry will survive and can be reared on fry food and newly hatched Brine Shrimp. For larger numbers, the adults should be removed after they have spawned. Eggs take about 10 to 12 days to hatch and the fry will need liquid fry food for the first week before moving on to powdered fry foods, etc.

News about Cichlids from A&P's COSTA RICAN QUEST

Back in August I mentioned that a number of Cichlid species brought back from our *Costa Rican Quest* were now being bred. One of these is *Cichlasoma (Archocentrus) septemfasciatum*. This species has a natural distribution along the Atlantic slope of Nicaragua from Rio Grande to the Rio Sixaola basin which is the boundary between Costa Rica and Panama. It was in a tributary of the Rio Sixaola that Arthur Frisby and I came across a pair nursing a brood of young. After some trials and tribulations we finally managed to catch a



above Male *Melanotaenia praecox* have lovely bright blue bodies and red finnage. They develop very high backs and youngsters can be sexed by this characteristic even before their full colour is showing.

right Female *Melanotaenia praecox* have lovely bright blue bodies but with orange fins, not red.



small group of fry and it is these which are now breeding.

Sexing these Cichlids is easy because the female has a lovely black and gold patch in the middle of her dorsal fin. There is a bright golden area around a black spot on her flanks. The dorsal fin colour can be seen when the babies are about 1.5 inches long but the flank colour takes a little longer to develop. Apart from colour pattern, males also have longer and more pointed dorsal and anal fins when fully mature.

As Cichlids go this species is just a little larger than the typical dwarfs, with both sexes achieving four inches in captivity. They are also fairly peaceful and can be kept in an aquarium with similar sized fish.

The water quality in the wild, in the habitat where we caught them, is very soft and moderately acidic, but the youngsters have adapted to very hard and alkaline water without any problems. The fry ate all foods ravenously right from the start and within a few weeks had doubled in size. This rapid growth continued until they reached about three inches when growth slowed down and the fish started to mature sexually. At this time some fin nipping occurred and soon a few pairs could be identified. These were isolated from the rest to allow them to breed. The offspring now number several hundreds ranging in size from one inch down to fry a few weeks old.

As can be seen from the photographs this is a very attractive

Cichlid but is, unfortunately, not commonly available through the trade. Apart from the fish Arthur and I brought back from Costa Rica there are several other strains in the aquarium hobby. You should, therefore, be able to track some down through specialist outlets or the British Cichlid Association.



top of page Rio Sixaola, Costa Rica. It was a tributary just off this river that Arthur and I collected some fry of *Cichlasoma (Archocentrus) septemfasciatum* which are the fish now breeding in captivity.

above A female *Cichlasoma (Archocentrus) septemfasciatum*. Sexing these Cichlids is easy because females have a lovely black and gold patch in the middle of her dorsal fin as well as a bright golden area around a black spot on her flanks. The dorsal fin colour can be seen when the babies are about 1.5 inches long but the flank colour takes a little longer to develop.

PHOTOGRAPH: M.P. & C. PIEDNOIR

left A mature male *Cichlasoma (Archocentrus) septemfasciatum*. Apart from colour pattern males also have longer and more pointed dorsal and anal fins.

PHOTOGRAPH: M.P. & C. PIEDNOIR

DAVE GARRATT warns marine hobbyists about some of the real thugs of the sea:

PHOTOGRAPHS: M.P. & C. PIEDNOIR

Invertebrate



Marine hobbyists very quickly come to realise the aggressive nature of marine fish and the problems that this can entail. There are so many literature sources that make reference to the problem that it does not usually prove too difficult to overcome. However, invertebrates, in particular sessile ones, are not such obvious contenders in the belligerence stakes. They are not so well reviewed in the literature and may well catch out the inexperienced aquarist. Like

fish, some invertebrates are out and out predators, and should be avoided unless their tank mates are carefully chosen. Avoiding some of these predators may not be as easy as it sounds as they may be brought into an aquarium, unbeknown to the aquarist, via living rock.

Predators

Cephalopods, especially Octopus, are being seen for sale increasingly and you may well see Cuttlefish and even Nautilus occasionally. All these species are for advanced aquarists only and would require an aquarium designed specifically for them. They are also efficient and skilful predators that will readily eat most fish and Crustaceans.

The Green Mantis Shrimp (*Odontodactylus*) is a beautiful Crustacean that is sometimes kept by hobbyists but it is a voracious predator that would again need its own specific tank. Another Crustacean to avoid is the Swimming Crab (*Macropipus*).

As mentioned earlier certain predators may be unwittingly brought into the aquarium as small species hidden inside the crevices of living rock. Small Mantis Shrimps and small Swimming Crabs may arrive in your aquarium in this way. They will cause havoc as they grow and mature and the only defence is vigilance at the time of purchase.

Whilst not a predator as such, Bristleworms (*Hermidice*) are nevertheless a further pest that may be introduced unwittingly into the aquarium with live rock. They are scavengers that may well damage sessile invertebrates as well as giving the hobbyist a painful rash if touched.

Finally, some predators are so specialised as to make them unsuitable for captivity. The prime example is the Harlequin Shrimp (*Hymenocera*), a creature that exists solely on a diet of live fish!

Accidents will happen

Regular readers of *A&P* will know by now that whenever possible I like to augment my articles with "real life stories", i.e., experiences of myself, friends or fellow marine aquarists. Whilst being a strong advocate of reading as many books as possible, I feel actual tank related experiences are very useful. Sometimes the unexpected will happen and no amount of reading will have prepared you for it.

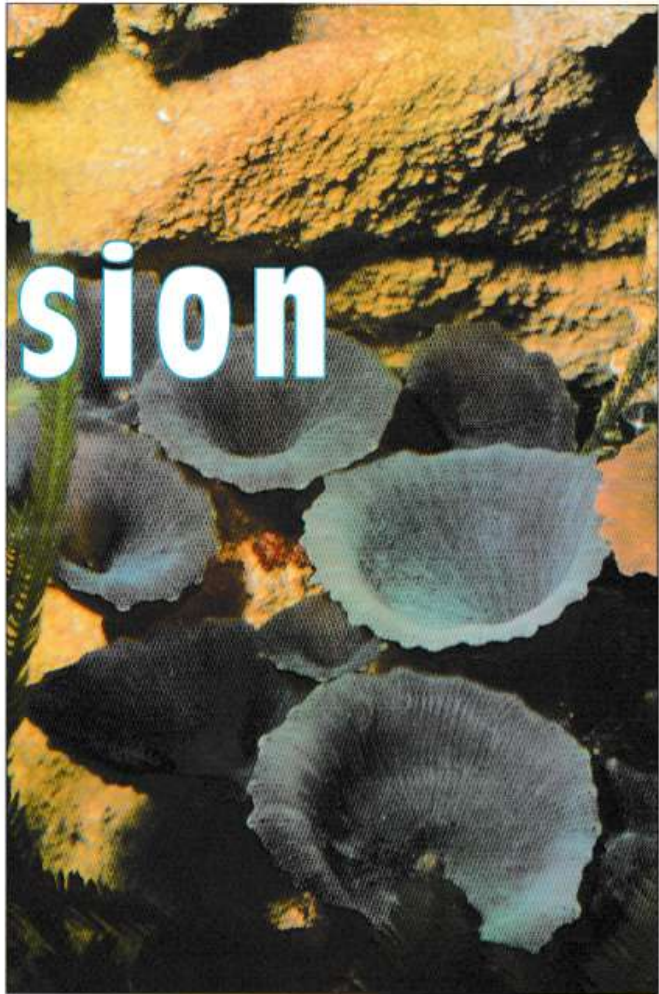
Anemones are a very popular addition to the home aquarium and hobbyists are well aware of the stinging nematocysts that they use for

Aggression

defence or to capture prey. Most fish are inherently aware of the danger and steer well clear, thus the Anemone poses no threat to them. Anemones feed through their symbiotic relationship with Zooxanthellae and/or filter feeding, although like most creatures they will not pass up the chance of a free meal, hence there are a number of instances where Anemones can present a threat.

I know of many cases where a sizeable fish has disappeared completely overnight, one particular case involving a three inch Sweetlips (*Plectorhynchidae*) illustrates the point. There had been no other fish large enough and not enough scavengers to have dispatched the missing fish, it had not been sucked into the works of a power filter and was not hidden in the rock work. The only explanation was a large 10 inch Carpet Anemone (*Stichodactyla*), a species renowned as possessing a fearsome sting. The logical explanation was that the fish somehow stumbled into the Anemone either in a panic (a good reason for not having your lights all go off together and plunging the tank into sudden darkness), or because the fish was ill anyway.

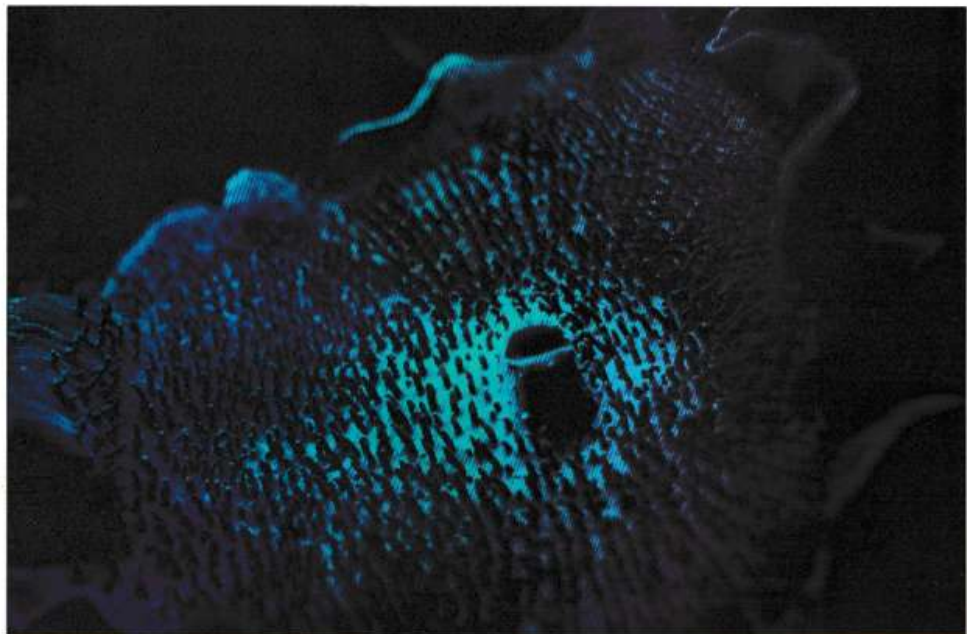
Another story relates to the loss of a small Regal Tang to a Giant Mushroom Polyp (*Rhodactis*), a species generally regarded as a harmless filter feeder. This story was repeated when a friend's six inch Giant Polyp closed and enveloped a



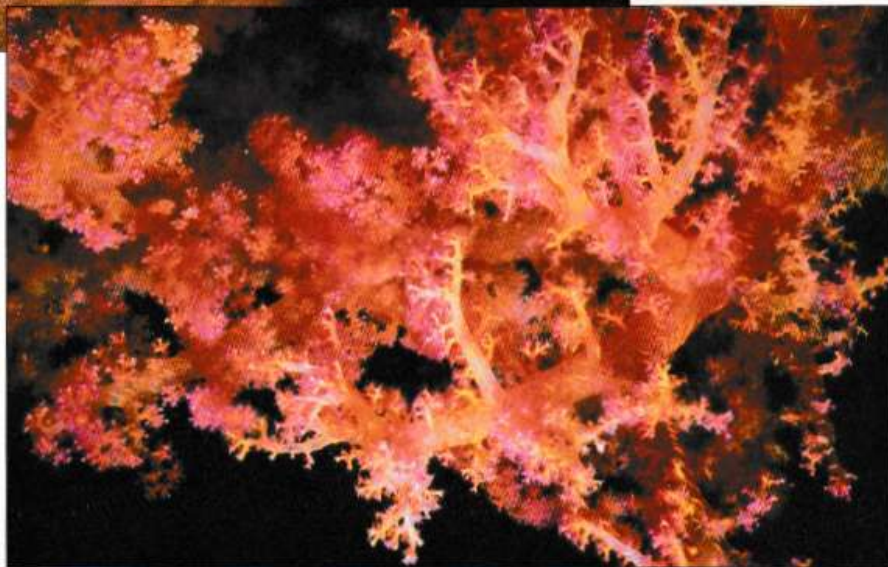
left Nautilus are efficient and skilful predators that will readily eat most fish and crustaceans.

above right Mushroom polyps are one of the least aggressive of all corals.

right A small Regal Tang has been lost to a Giant mushroom polyp (*Rhodactis*). This is a species generally regarded as a harmless filter feeder.



INVERTEBRATE AGGRESSION



passing two inch Rock Beauty. Apparently, there followed a great deal of thrashing about by the fish now trapped inside the Polyp and, eventually, the Rock Beauty forced its way out, but it was a close run thing (shades of Harry Houdini!).

Amongst the Anemones there is a species that will actively threaten your other livestock, this being *Pachycerianthus mans* (Fireworks Anemone). This spectacular Anemone has long flowing tentacles (up to eight inches long) and packs a very powerful sting, thus making it a very real threat to fish and other invertebrates.

Finally, placing Anemones too close to one another or too close to Corals, will lead to them stinging one another as they fight for their share of available space.

Opportunistic scavengers

The term is really self-explanatory. If the opportunity comes along to eat virtually anything considered remotely edible, these scavengers will take it. The classic example is the Hermit Crab (*Dardanus* and *Pagurus*). Bear in mind that a sick, slow moving fish comes into the category of a feeding opportunity. Hermit Crabs can reach quite a size and I have seen a large Hermit (three inch shell) instantly dispatch a four inch Wrasse. Admittedly the Wrasse was already in a fair degree of distress. These large Hermits can also wreak havoc with your other invertebrates ranging from small Crustaceans to sessile invertebrates. Slow moving fish or fish that bury themselves when sleeping could also be in danger. The Shame-faced Crab (*Calappa flammea*) is another crab that may be seen for sale but it could also create havoc amongst your sessile invertebrates.

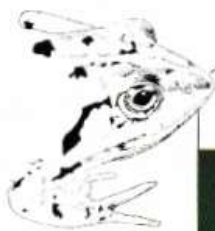
Small crabs, for example, Boxing Crabs (*Lybia tessellata*), Anemone Crabs (*Neopetrolisthes ohshimai*), Arrow Crabs (*Stenorhynchus seticornis*) and other miniature reef crabs, remain small and present no threat. Dwarf lobsters are beautiful, if shy and retiring, additions to any tank. The Red Dwarf Lobster (*Enoplometopus occidentalis*) may well be shy and

attractive, but as well as scavenging it is quite capable of catching small fish and other Crustaceans.

Crustaceans such as Shrimps are also scavengers, but I saw an amazing incident in my own tank that taught me never to underestimate the size, strength and optimism of these scavengers. I had a large Boxing Shrimp (*Stenopus hispidus*) that within

above Dave Garratt has seen a large Hermit Crab instantly dispatch a four inch Wrasse. Other invertebrates are in danger as well.

left Tree Corals are fairly unaggressive corals.



Bob & Val Davies's

FROGS & FRIENDS



Herp Fact File: SNAKES

There are some 2,400 different species of snake, divided into 417 genera, and 11 families. Roughly one tenth of the total species are venomous. Sizes range from six inches (15cm) to 38 feet (4.7m). Distribution is worldwide except for the Antarctic and Arctic regions, Iceland, Ireland, New Zealand and some small islands. Habitats vary from almost completely fossorial; terrestrial; arboreal; semi-aquatic to almost completely aquatic as in the sea snakes some of which even give birth to live young at sea, although a few go on land to lay eggs.

All snakes have a basic "design": an elongated body, numerous pairs of ribs which are "free", i.e., not connected to form a ribcage as in mammals. All lack limbs but vestiges of these are apparent in some pythons and boas, showing as spurs either side of the cloaca (vent). They are usually more apparent in males who use them during mating. Although many snakes climb truly arboreal species possess a prehensile tail.

There are relatively few variations on the basic form although the main differences are length, girth and coloration. Other variations include tail length, type of scalation and head shape. Certain species possess distinctive features such as an upturned, modified rostral scale (See picture of Hognose, *A-Z of Reptiles and Amphibians*, October 1999). "Horns" which are actually modified scales occur in some vipers. Other specialised features include small sensory tentacles on the snout as in the fishing snake (*Erpeton tentaculatum*) of Southeast Asia. The leaf-nosed snakes (*Langaha* spp) of Madagascar are notable for the peculiar rostral extension — the exact purpose of these is unclear but there must be some sexual significance as the appendages have different shapes in the sexes. In males it is narrow and pointed, in females it is broader with an uneven "jagged" edge. A distinctive feature of Rattlesnakes is, of course, the rattle on the tail which is made from modified scales retained when the snake sloughs, becoming progressively larger.

Most species feed on mammals, others may take, sometimes in addition, lizards, birds or other snakes. A number of specialist feeders occur; egg-eating snakes (*Dasypeltis* spp) feed on birds' eggs, swallowing them whole and cracking them by means of special extensions in the vertebrae in its neck. Many small, burrowing forms such as the blind snakes (*Typhlops*) feed almost exclusively on termites and ants and their pupae. Insectivorous species include the rough green snake (*Opeodrys aestivus*) and its cousin the smooth green snake (*O. vernalis*). Worms and slugs form the prey of some small species. The snail-eaters such as *Dispsas* species have large anterior fangs in the lower jaw



which assist them in extracting snails from their shells. Crayfish, salamanders, toads, frogs and even frogspawn are taken by certain species, in some cases as an exclusive diet.

Prey is swallowed whole without chewing. This is possible due to the elasticity of the jaws and the loosely articulated bones of the skull. Food items several times larger than the head can thus be swallowed. This ability is much reduced in the more primitive species such as thread snakes (*Leptotyphlopidae*), blind snakes (*Typhlopidae*), pipe snakes (*Aniliidae*) and the sunbeam snakes (*Xenopeltidae*) — these have reduced mouths and short lower jaws which are capable of little movement.

Reproduction is by internal fertilisation. Most species lay eggs but some produce live young. A few snakes guard their eggs but no other parental care exists.

All snakes have the senses of sight, hearing and smell. They are not totally deaf as previously thought — they actually possess a small bone (stapes) which can transmit sound to the brain. Eyesight is generally poor but the forked tongue is an efficient scent detector. Certain other groups have a further sense — specialised heat-sensitive pits. These occur in some boas, some pythons and in pit vipers (such as the Rattlesnakes). In the latter they are seen as two "holes" in the face: in pythons they may be situated in the labial or rostral scales and are found in the labial scales of certain boas.

above Emerald tree boa, an arboreal species with prehensile tail and labial heat pits. PHOTOGRAPH: BOB & VAL DAVIES

DANGER ZONE

An American magazine recently contained an item concerning a young lady whose fingers were trapped when her Leopard tortoise (*Geochelone pardalis*) retracted his hindlimbs as she carried him indoors. When she finally forced the limb away her fingers were swollen and the tips bloodless. We had a similar experience when trying to give medication to a large red-foot tortoise (*Geochelone carbonaria*). On another occasion the closing shell of a box turtle produced a severe nip on a finger. It is worthwhile cautioning children to beware of

these possibilities.

Another article criticised an account by a Rattlesnake bite victim who claimed that "many deaths attributed to Rattlesnake bites are actually caused by a violent reaction to horse-based antivenom". This was denied — only three deaths have occurred in 30 years due to anaphylactic shock from the use of antivenom. A further claim stated that the treatment had already "exceeded the maximum recommended dosage". Evidently there is no "maximum recommended dosage" for snakebite. It can need huge amount of antivenom — possibly up to 50 vials.

The dangers of snakebite evidently do not deter the inhabitants of Sweetwater, Texas, where an annual Rattlesnake round-up is held. According to reports some three or four thousand pounds of Western diamondback rattlesnake are collected and butchered — the meat is on the menu at refreshment stalls. Naturalists and others have protested that the wild population cannot withstand such depredations and there are moves to give the Rattlesnakes legal protection. The round-ups may be difficult to ban — many regard them as "cultural heritage" and the Sweetwater round-up is said to bring some \$8,000,000 into town each year.

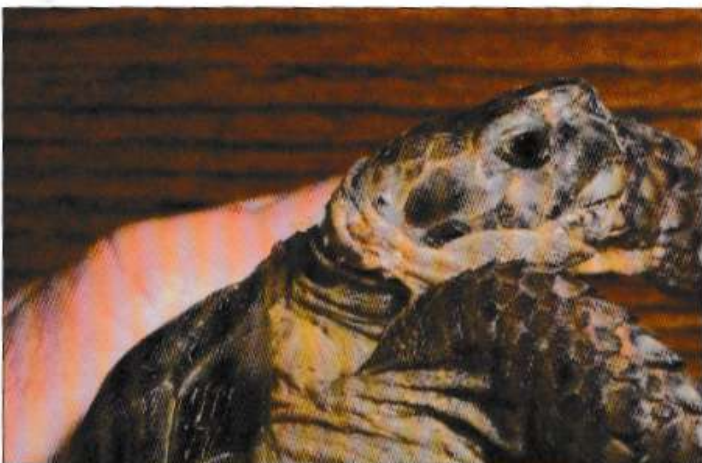
TORTOISE AGGRESSION

Many people would be surprised to hear that tortoises can be aggressive, possibly thinking of the gentle, inoffensive creature they once kept as a pet but whilst recently observing a group of Horsfield's tortoises (*Agrionemys horsfieldi*) some serious aggression was observed.

In a captive situation the tortoises have less living space than in the wild therefore encounters between individuals are more frequent. Male tortoises, particularly in the breeding season, can be aggressive both towards females and to other males. Courtship consists of pursuing and circling a female, nipping her feet and head and butting her shell. Butting is accomplished by a forwards push by the male, retracting his head as he does so. Butting can go on for weeks even after mating has occurred — this may, however, stress the female and once eggs have formed further mating could possibly damage them with fatal results for the female, so separation is advisable. Gravid females prefer to be isolated and may refuse to deposit eggs in the presence of others.

Watching the group, all half-grown specimens, male/female, male/male and female/female aggression was observed. At its mildest it consisted of threatening with open mouth, usually when feeding even though they were well-fed and plenty of food was available. In some cases one would force another aside by a sideways swipe of a forelimb. The males must have been feeling the first stirrings of maturity as signs of mating behaviour began to occur. One male in particular became a real pest, butting, biting necks and nipping the feet of both sexes. Eventually he and another male were found tearing away at the neck of a companion having inflicted severe wounds leaving skin hanging. Surprisingly little blood was apparent and the wounds soon healed. To prevent further such occurrences the two culprits were immediately isolated.

Biting was not confined to males; on two occasions a female inflicted a severe wound on another female, possibly due to competition over food. Oddly enough when the group was split up two males



continued to live together peacefully as did three females with only one bite being inflicted.

Aggression in tortoises seems to vary between individuals and according to species; Horsfield's have a reputation for being aggressive but some species tend to be more sociable. Four male Hinge-backed tortoises (*Kinixys erosa*) showed no signs of aggression during some three months in our care but this is hardly a firm conclusion — trouble could break out when the hormones become active. Our Moroccan spur-thighed male is a persistent suitor constantly chasing the female, but his aggression is restricted to normal foot-nipping and butting. He takes no notice of a younger, smaller male who follows him around during courtship butting either him or the female. Generally speaking it is advisable to keep tortoises separately apart from at mating time; or at least be prepared to separate them should serious aggression become apparent.

above A neck wound, almost healed, on a female Horsfield's tortoise. Antibiotic ointment is advisable to prevent infection.

PHOTOGRAPH: BOB & VAL DAVIES

SOME LIKE IT HOT

Agamas are not the most popular of lizards among hobbyists. At one time around 60 species of the genus *Agama* were listed but recent nomenclatural changes have divided these up into several genera with consequent name changes. For many years the Hardun or Starred agama (*Agama stellio*) was regularly imported — this is now *Laudakia stellio* — three or four years ago a subspecies, *L. s. brachydactylus*, appeared in the trade and enjoyed temporary popularity for a while due to their attractive appearance. However, many hobbyists would, if asked about agamas immediately think about the red-headed agama (*Agama agama*) and would no doubt classify it as short-lived; difficult to keep; drab; uninteresting or "petshop stuff".

Unfortunately the Red-headed agama has in recent years been one of the "bread and butter" species commonly seen in petshops. The species has been imported in large numbers mainly because it is relatively cheap. Importers have tended to bring in substantial numbers which would then be wholesaled out to retailers — one importer once informed us that exporters often "bribed" them by offering rarer species as long as they would accept a large quota of red-heads — this also helped to defray freight costs on dearer species.

Being imported in overcrowded conditions they were often dehydrated and stressed. For some reason the species is usually heavily infested with mites and ticks which does not help its well-being during importation. Once here they were kept together in substantial numbers which caused further stress. Although in the wild they tend to form hierarchi-

cal groups consisting of a dominant male and a dominant female along with various subservient, usually younger, specimens, in the artificial conditions in captivity several dominant males would be in close contact. This can lead to serious fights and injuries — further stress!

Whenever we have viewed this species in crowded conditions one or two would be showing the red coloration of a dominant male, the others would be in drab, submissive livery. Little wonder that when purchased they tend not to do well; being a "petshop" species they are frequently bought by beginners especially since they are relatively cheap. Few Red-headed agamas have ever bred in captivity — we know of one instance of captive-breeding but one factor that is probably missed by inexperienced keepers is that they need temperatures around 35°C (95°F) and UV light to do well. Fortunately there does not seem to many about this year.

Not all *Agama* species have the complex social structure and can be maintained more easily in the vivarium although it is not a good idea to include more than one male. Relatively few species are imported at the moment — *L. stellio* occasionally crops up and two other

► Continued on page 48

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Bob & Val Davies's
Frogs & Friends

Some Like It Hot

◀ Continued from page 47

species which we can recommend are the Ground agama (*A. acculeata*) and the Tree agama (*A. atricollis*). All become tame, have thrived and bred in daytime temperatures of around 36°C (97°F) dropping to 20°C (68°F) at night. *L. stellio* and *A. acculeata* need a dry atmosphere, a sandy substrate is ideal. *A. atricollis* is semi-arboreal and needs some provision for climbing and a slightly more humid atmosphere than the former. Although many Agamas inhabit dry, scrubby savannah type areas it is advisable to research any unusual species one obtains. Some are high altitude dwellers, used to a short summer and cold winter. Other species



left Ground agama (*A. acculeata*) from Tanzania. An attractive and reasonably easy species.

PHOTOGRAPH: BOB & VAL DAVIES

need a substantial temperature drop at night.

As long as healthy specimens are obtained and the right conditions provided there is no reason why Agama species should not thrive and breed. This includes the red-heads if kept in groups of one male with one or more females.

Bob & Val Davies's
A to Z of Reptiles & Amphibians

D *Dendrobatidae*

The best known members of this family are the arrow-poison frogs from the rainforests of Central and South America although it also contains around 112 species of the genus *Colostethus* — commonly known as rocket or stream frogs. The latter are small, drab frogs and only one or two species appear in the hobby. The name "arrow-poison" is a misnomer; it is based on the belief that toxins from the frogs' skins were used to tip arrows. In actual fact skin toxin from *Phyllorhates terribilis* was used by the Southern Choco Indians of Colombia. The Northern Choco used *P. bicolor* and *P. aurotaenia* which are some 20 times less toxic than *P. terribilis*. In areas where poisoned arrows were used they were tipped with vegetable poisons such as curare.

Taxonomy is in the usual state of flux but the following genera are widely accepted — the number of species will no doubt be revised:

Genus: *Dendrobates*, 26 species; *Epipedobates*, 25 species; *Mimobates*, 8 species; *Phyllorhates*, 5 species; *Aromobates*, 1 species.

Two new species of *Dendrobates* have been discovered this year in the Tamshiyacu-Tahuayo reserve in Peru, one of which has been named as *Dendrobates duellmani*.

The bright aposematic (warning) colours and mostly diurnal behaviour have made Dendrobatids popular particularly as several species have been successfully bred in recent years. Not all species are brightly coloured — the Venezuelan skunk frog (*Aromobates nocturnus*) is drably coloured and protects itself not by toxins but by a foul-smelling secretion. Several species have numerous colour forms, *Dendrobates tinctorius* having more than 20. Considerable variation is also shown in *D. pumilio* from Costa Rica, Nicaragua and Panama. Several colour forms exist on mainland Panama but each of the islands off the coast seems to have its own colour form. Sizes of Dendrobatids vary from 12mm to 6cm.

The skin of one wild-caught *P. terribilis* is said to contain sufficient toxin to kill 20,000 mice — no antidote is known. The toxicity of other species varies, some may possess little or none — not all species have been tested. The toxins are complex alkaloids — recent studies suggest that they are derived from the prey insects which feed on poisonous plants; the toxins being transferred to the frogs although certain elements are thought to be actually synthesised within the frogs' body.

At least one toxin, epibatidine from *Epipedobates tricolor*, may eventually prove to be a painkiller more powerful than morphine. This has actually been produced synthetically but certain harmful elements still need to be eliminated. In captivity, due to the different diet, the toxins eventually disappear and captive-bred specimens are toxic-free. Most specimens available in Britain are likely to be captive-bred but in any case all frogs should be handled as little as possible.



One of the most fascinating aspects of keeping Dendrobatids is the complex breeding behaviour which involves parental care — this is the subject of future articles.

The most commonly available captive-bred species are *Dendrobates aurtatus*, *D. truncatus*, *D. leucomelas*, *D. tinctorius*, *D. azureus* and occasionally *E. tricolor*.

top One of the many forms of *Dendrobates histrionicus*.

PHOTOGRAPH: BOB & VAL DAVIES

above *Dendrobates azureus* from Surinam — a highly sought-after species.

PHOTOGRAPH: BOB & VAL DAVIES

NewsDesk

Koi Company prize winner set to jet off to Japan



above A Japanese Koi farm built in mountainous surroundings.

At this year's Koi Company open week Tony Westwood of Scottdales Garden Centre won an all expenses trip to Japan.

For eight days Tony will sample the magic, mystique, beauty and atmosphere of this wonderful country as a guest of Koi Company and OrnaFish International at their new residence in Niigata.

On his arrival at Tokyo airport he will be treated to a journey on the world renowned bullet train into Niigata. There, he will spend several days hand picking his way through vast amounts of top quality Nishikigoi selected by the world's finest Koi breeders. Then, to end a fantastic week, Tony will spend a day sampling the sights and sounds in the magnificent city of Tokyo.



right Chris Edwards, Quarantine Manager (left) presenting the flight tickets to Tony Westwood.

See what A&P Contributors Mary Bailey & Sonia Guinane have been up to in Malawi!

Check out their lunatic progress so far on www.lakemalawi.com! If you do, please note Mary claims she was not (near to last picture) actually sleeping in the cockpit of the boat but wrapped up to keep warm as she was suffering from shock after being thrown across the boat in a gale and catching a delicate part of her anatomy on the corner of the helmsman's footrest. She now sports a hand sized bruise — but, mercifully, Ad Konings decided not to shock the world at large with that picture ...

Mosquito fish spark environmental fears

Philip Bowron has kindly sent us this report on the latest scientific research into the impact of mosquito fish on the herpetological fauna of the world

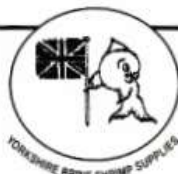
The continued use of mosquito fish (*Gambusia affinis*) to control disease carrying mosquito larvae may be one of the leading causes of declining amphibian populations across the world according to new research carried out in the USA.

For the best part of the century governments in the USA, Canada, Australia, New Zealand and the former Soviet Union have introduced mosquito fish into rivers in a bid to suppress the numbers of mosquito larvae. But tests carried out by Lee Kats of Pepperdine University in California have shown that this may have caused an unforeseen environmental disaster.

In a number of laboratory experiments he was able to show that when mosquito fish were offered the choice of mosquito larvae or tadpoles, they happily ate both. When the experiments were recreated in rivers,

the results showed that wild mosquito fish actually had a preference for tadpoles. Sixty five per cent of fish caught had tadpoles in their stomachs while only 56 per cent had mosquito larvae.

Kats believes that a number of amphibian species, such as California newts and California treefrogs, which are being considered for protected status are declining because they have been unable to evolve a defence against mosquito fish. He feels that the need to use these fish needs to be questioned and a new solution to the problem of mosquito larvae found before it is too late.



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Danish aquarist **JORGEN WIMO** shares his knowledge of this rare and delicate plant with *A&P* readers:

PHOTOGRAPHS: JORGEN WIMO UNLESS OTHERWISE STATED

Aponogeton bernierianus

When planting an aquarium it is almost impossible not to include species of *Aponogeton* in one's choice of flora. These are, however, large, delicate specimen plants which make big demands on the aquarist because they are not going to just look after themselves. If the aquarist understands and satisfies these demands then his plant will produce an imposing inflorescence.

One day I discovered that our local dealer had acquired some new *Aponogeton* species and, as I have always been quite fond of these plants, I immediately bought one. It was *Aponogeton bernierianus* which was originally described as *Ouvirandra bernieriana* by Decaisne. *Aponogeton bernierianus* is endemic to Madagascar and as opposed to the species from Asia and Australia this African species develops an inflorescence of two to six spikes. The species from Asia and Australia have an inflorescence with only one spike.

The leaves are dark green and can reach a length of 40cm and a width of 5cm, whilst the leaf stalk can attain a length of 5 to 20cm. The leaf has two to four longitudinal veins and the edge is wavy with the leaf itself deeply undulating. There can be holes in between the cross ribs

which are caused by missing leaf material, but these holes are not a sign of poor quality leaves, just a natural aspect of the plants growth. The leaf stalk comes from a thick starchy tuber, which can be from 1-3cm in diameter and from which the roots radiate.

Aponogeton bernierianus is a true aquatic plant which does not have a swamp form with emersed leaves. It is a seasonal plant which, despite being in an aquarium, follows the seasonal pattern of its natural habitat. This means that the plant has a resting period in the dry season (our winter), at which time the leaves fall off, while growth and flowering are in the rainy season (our summer).

In the resting period (December-February) the tuber should be kept in cold water and sand at a temperature of 17-18°C. During the period of growth it should be kept at a temperature of 23-26°C and in a substrate rich in nourishment. The pH value should be 6.5-7 and the DH value 4-14.

Once growth begins new leaves are produced very quickly. Shortly after this and quite suddenly one can see that the plant is sending up its inflorescence.



photograph 1 When the flower stem of *Aponogeton bernierianus* reaches above the surface of the water, the flowerbud itself is covered by a covering leaf, which very effectively hides the wonder of the flower.

photograph 2 The covering leaf is bursting from below and one can see the first pink flowers.

photograph 3 The covering leaf is only attached at the very end of one of the two spikes.



From my notebook

- 13/9: The stem with a flowerbud is nearly 10cm long.
- 19/9: The stem is nearly 20cm long and another stem from the same plant is nearly 5cm long.
- 7/10: The growth of both flower stems has stopped. The cover glass has been removed to let more light reach the plant. Flower stem number three has started growing. It measures 5cm.
- 2/11: At this time I think that the plant is receiving sufficient light but may need more nutriment to aid the flower development, so I added some plant fertiliser.
- 30/12: Flower bud number four has reached 1 cm above the surface of the water and 10 hours later it has grown to 5cm above the surface, but as there is no cover glass at all the flower bud has dried up. The humidity is at this time 65 per cent.
- 5/1: A new flower bud has reached, above the surface of the water and this time there is only a 10cm wide opening in the cover glass.
- 16/1: The stem just below the flower bud is very thick (nearly double the size of the rest of the stem) obviously filled with air to enable it to carry the flower. The flowerbud is nearly open by now. This was shielded by a covering leaf which is being pushed off as the flower grows.
- 17/1: The flower has come out. There are two spikes with pink flowers. These spikes are 10cm in length and the bottom flowers come out first.
- 20/1: Both inflorescences are by now above the surface of the water and at the bottom are green. At the bottom small green fruits are developing and these are clustered in groups of four.

The flowers are bisexual and consist of stamens, pistil, two petals and no sepals. Pollination was no problem, as the greenfly on my floating plants made sure that all the flowers were pollinated. This is what one calls the natural method.

The seeds float and ripen in 10-14 days and are small nuts covered with a porous surface. In literature one can read that the seeds will ger-



minate quite quickly but all mine were eaten by Apple snails before they had a chance to develop.

Besides sexual reproduction, one can also obtain new plants by division of the tuber. At one time when my plant was put in another tank for the winter I was able to divide the tuber into three sections and produce two more plants. Of course sexual reproduction from seeds will produce a lot more young plants, but if you do not have room for large numbers of this species then division is probably the best method of reproduction.

Every aquarist should give himself/herself the opportunity of watching the development and flowering of these fascinating plants. Now at springtime — at the moment of writing — my *Aponogeton bernierianus* has been put into a warmer tank and it has already produced four leaves. My family and I look forward to seeing the lovely flower again, and this time I will save the seeds and produce many more specimens of this most beautiful plant.

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photograph 4 Both the pink spikes are almost fully erect.

photograph 5 Both spikes are pointing right up in the air. The flowers below are already fertilised and developing into seeds whilst the flowers at the top are still undeveloped.

top of page Various members of the *Aponogeton* genus make spectacular plants for a planted aquarium. Here a large specimen has been positioned in front of a piece of bogwood and is surrounded with lower growing *Cryptocorynes*.

PHOTOGRAPH: M.P. & C. PIEDNOIR



ANDY STRATTON highlights some of the rarer long-snouted Corydoras:

The Hidden Ones

Over the last few years the aquarist has been spoiled for choice as far as Corydoras are concerned. Year after year Corydoras never seen before find their way into the hobby. It's always exciting to see a new species of Corydoras (or one that has only been seen as a photograph in a book) swimming around in your local dealers' tanks. If you look more closely into these shoals you may well find a few specimens of the type of Corydoras this article is about. They are collectively known as Long-nosed Corydoras because, yes, you've guessed it, they have longer snouts than the more often seen Short-snouted Corydoras. Often it is only their faster swimming behaviour that will catch your eye and give their presence away as their colour pattern is sometimes very similar to that of the Short-snouted Corydoras they live with.

Aquarium care

In their natural habitat these Long-snouted Corydoras will spend much of their time out in the flow of the stream. In the aquarium, therefore, they enjoy more space and a greater amount of water movement than is normally provided for Corydoras. Power filtration can be used to create the flow, clear bright water with a neutral pH suit these Corydoras well. A water temperature in the 76-80°F range is fine.

Long-snouted Corydoras will search for food below the surface of the substrate, so this should be of silica sand or very fine gravel. As they move along feeding in this manner, they use their pectoral fins to push away the sand from around their eyes, thus leaving easy to see tracks in the substrate. Even when kept on this type of substrate a small callus may appear on the tip of the snout so the use of large pea gravel should be avoided. Tubifex, White worms and Bloodworms are all greedily

eaten. A good quality flake is also acceptable and so are commercial tablet foods.

Companions and tank size

These Corydoras will suit the medium sized community aquarium. If breeding is not a consideration any of the multitude of South American Characins or Dwarf Cichlids that are available can be safely housed with them, but known fin nippers should be avoided (your dealer should be able to advise you which fish may cause problems).

Spawning

If you are attempting to breed these Corydoras a 90x45x45cm sized tank is a good choice. As these fish can be very timid, one end of the tank should be heavily planted covering about a third of the space. The other two-thirds are left as clear open swimming space. Small dither fish can be present. A shoal of Hatchets and Cardinals, etc., will put the Corydoras at their ease.

Personal observation of Long-snouted Corydoras has shown their spawning behaviour to be more aggressive than their Short-snouted cousins. Long pre-spawning runs are made by both sexes. These are normally started by the females, often as early as the day before spawning starts. Once the males get involved they begin to force the females into the "T" position. The male will grip the female with his pectoral fin spine and this often results in the fin membrane tearing away from the spine. Spawning may continue on and off over a 48 hour period. The percentage of fertilised eggs has proven to be higher in the Long-snouted species — the reason is not known as there seems little difference in their spawning behaviour.

Etymology

Corydoras: Kory — helmet. Doras, Cuirass — body armour.
 Acutus: Sharp
 Narcissus: After Narcissus, son of the Greek river god
 Pastazensis: After Rio Pasta system where they are found
 Cortesi: In honour of Dr Abdon Cortes Lombana

FACT FILES

SPECIES

Corydoras acutus (Cope 1872) (see photograph 1)

Corydoras acutus is found in the Rio Ampiyacu and the Rio Yavari, Peru. Also in the Rio Yasoni Ecuador. This species is found with *Corydoras leopardus* or *Corydoras trilineatus*. It is distinguishable from other Long-snouted species by dark coloured blotches in the dorsal fin. Some specimens are more dotted on the body than others. This was perhaps the first of the Long-snouted Corydoras to be spawned by David Sands in 1980.

Corydoras stenocephalus (Eigenmann & Allen 1942) (see photograph 2)

This species was originally thought to be a colour variety of *C. acutus*. It comes from Peru and is found in the Rio Neshua and Rio Tambopata system. *Corydoras stenocephalus* is sometimes found with *Brochis splendens*. There are never any blotches on the dorsal fin or dots or dark markings on the body.



***Corydoras pastazensis pastazensis* (Weitzman 1963)** (see photograph 3)

This species has been imported over the last few years. In the main they have been large fish (55-65mm SL) and have proved difficult to settle into aquarium life. I have kept 10 specimens now for over 18 months and they have never really appeared happy. This species is found in Peru and Ecuador. A sub-species *Corydoras pastazensis orcesi* Weitzman & Nijssen was described from the Rio Napo, Ecuador.

***Corydoras narcissus* (Nijssen & Isbrucker 1980)** (see photograph 4)

One of the most attractive of all Corydoras, this species was discovered in a small creek running into the Rio Ipixuna, Brazil. A single specimen was captured along with seven *Corydoras arcuatus*, a species which shares a similar colour pattern.

***Corydoras cortesi* (Castro 1987)**

(see photograph 5)

This species was imported for the first time in 1993. It comes from the Rio Arauca, Colombia. It is very similar in appearance to *C. simulatus* (which lacks the mid-lateral stripe of *C. cortesi*) and *C. septentrionalis* (which has a much larger and more solid body blotch than *C. cortesi*).



CREDITS

PHOTOGRAPH 1: ANDY STRATTON

PHOTOGRAPHS 2, 3, 5: DR DAVID D. SANDS

PHOTOGRAPH 4: MAX GIBBS



Interpet Aqua Air Longlife Air Stone

• Interpet sent us a sample of their new long life air stones which they claim will last longer and create finer bubbles than

standard air stones. Whilst checking out how fine the bubbles were compared to standard air stones was easy enough (yes, they are marginally finer and the bubble stream looks very pleasant), but just how do you test if it will last longer than standard stones?

Normally this would have stumped just

about any review team, but A&P includes fish breeders who use newly hatched Brine Shrimp eggs to feed youngsters on. This process creates a lot of slime and soon clogs conventional air stones. Three months is about all you can hope for under these conditions so we will be able to tell if this new stone really is any better than standard types.

Tetratrec IN600:

INITIAL REVIEW

• We have several major brands of filter on test at the moment. All of these have been designed for two to three foot aquaria and include internal and external filters. This month we have selected the Tetratrec IN600 for initial review.

This is an internal filter which is designed for tanks between 50 and 100 litres (up to 90x30x30cm) in size. The manufacturers say it has a flow rate of between 300 and 600 litres

per hour. The wide variation on this figure is due to it being adjustable. This is a feature well worth including otherwise the water currents produced by power filters may be too strong for some species of fish.

Another really good feature is the easily removed cartridges which are supposed to make cleaning easier than with other internal filters. Certainly removing them was quick and easy, but slipping them back into position was much harder and, in the end, involved taking the base unit off the aquarium side so they could be re-positioned properly. This was, however, due to the clumsiness of

the person (our "Ed") doing the job rather than any design problem.

In fact, the only area where we have any concerns about this filter is in the height of the unit itself. It is designed for tanks up to 90x30x30cm in size and yet the filter is about 27cm top to bottom. This means your substrate has to be less than 3cm deep or the top of the filter will sit above your

aquarium!

Since the test aquarium is only 25cm tall we had to position it at an angle along one side. This does not affect how the filter functions, but it does look a little odd.

Apart from this one problem this looks like a very good internal filter which has been doing a good job for the past month. We will do our full report on it during early spring.

Manufacturers are invited to send new products to A&P for independent testing and assessment. An initial review will be published as space permits and this will be followed up approximately six months later with a full report in the magazine



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TROPICAL

MARY BAILEY gives the lowdown on this ever-popular Cichlid:

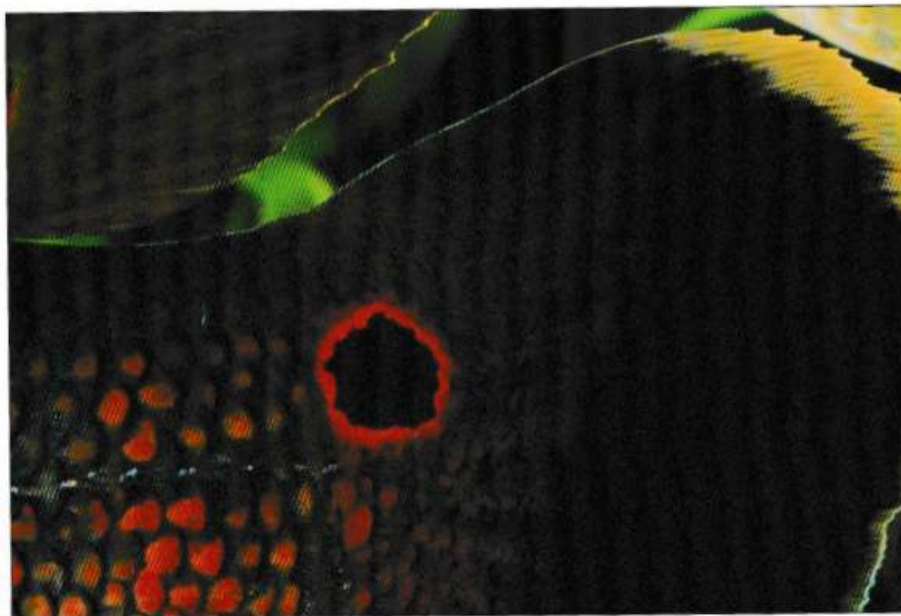
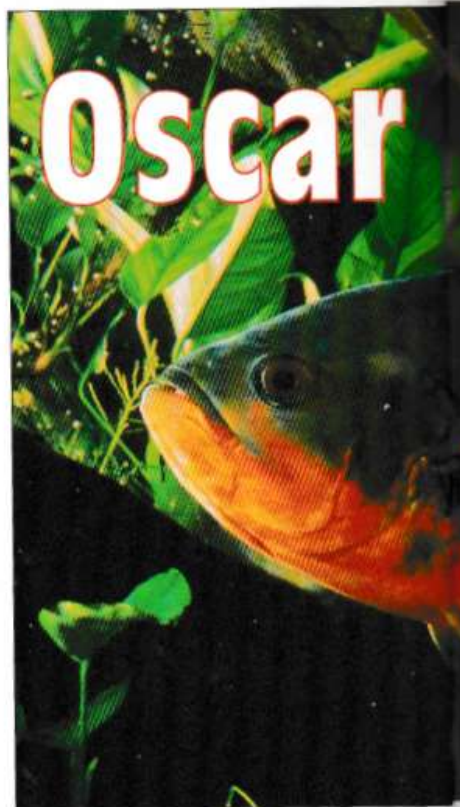
PHOTOGRAPHS: M.P. & C. PIEDNOIR UNLESS OTHERWISE STATED

Living with Oscar

When I was a little girl, the name "Oscar" conjured up visions of a balding, bespectacled, rather jovial man who always won the Onions Class at the village Flower Show, despite the efforts of my dad to beat him. It takes a lot to blot out such childhood associations but, nowadays, when I see that "feed Oscar" cathode advertisement on the TV my immediate mental image is, of course, a large olive-brown fish with red markings — and I don't suppose anything is ever going to blot out that image, not after 25 years of cichlid-ity.

I could so easily have been one of those innocent beginning aquarists who see baby Oscars and fall in love. In fact, I did just that but, my recently-acquired other half (who had been in the hobby and knew all about the "downside of cichlids") said: "No way, not in my community tank you don't!" I was devastated but when he explained why, I had to admit — albeit reluctantly — that he had a point.

Unfortunately, many aquarists are not so lucky. I must admit it does seem a little strange to assume that because we can buy all sorts of fishes in the shop they will thus all live happily together in the same aquarium. After all, how many times do we go into our supermarket, buy what catches our eye then take it home and mix it all together in the hope of producing cordon bleu? On the credit side, however, for every



above Most aquarium Oscars are portly compared to their wild counterparts. However, this wild caught fish exhibits the typical flat ventral profile found in nature. Different populations of Oscars — which may eventually turn out to be separate species of *Astronotus* — are found in various parts of the Amazon system in South America and this fish may actually belong to one of these other species.

left Close up of the eye-spot or ocellus, on the caudal area. It was this marking which originally gave Oscars part of their scientific name — *ocellatus*.



aquarist who has forsworn cichlids forever, after an "accidental" (as opposed to planned) Oscar has devoured his Neon Tetras, there must be another, who faced with the same catastrophe, concluded that cichlids were more interesting than Neons anyway! Tough on the Tetras though ...

The lowdown on this ever-popular cichlid

What the "Oscar Experience" (whether regarded as disastrous or beneficial) clearly illustrates is the necessity of always finding out first about what you are buying — how big it grows, what it eats and what conditions it requires. Although Oscars have been around a long time, it can be quite difficult to find out more than "large fish, large mouth, large tank" from the literature so here is the low-down on this ever-popular cichlid.

Astronotus ocellatus means "star-back with an eye spot" — a pretty good portrayal of the original specimen from which the scientific description was prepared, more than 150 years ago. The eye-spot, or ocellus, on the caudal area is well-known to hobbyists but I think aquarium Oscars must derive from a different wild population, as we do not generally see anything like the whole series of ocelli which the type specimen had along its back. A pity, but who knows — there is a current trend towards importing new wild stocks of "old favourites".

Where the name Oscar comes from is more of a mystery. Some authors state it is a corruption of the Latin name (well, the letters are all there), others of the name of a native fisherman or early importer. One book, dating from the 1950s, refers to "Oscar's Cichlid" which suggests some human involvement — but who, or why, has long since been lost in the mists of time.

Different populations of Oscars — which may eventually turn out to be separate species of *Astronotus* — are found in various parts of the Amazon system in South America. In this region the water is generally rather soft to very soft with a pH which rarely rises above neutral (pH7), and in some areas is astonishingly acid — down to pH 4.5 in some Rio Negro biotopes. Although aquarium Oscars are amenable to maintenance in almost anything that comes out of the tap, breeding may prove to be another matter entirely, and for this purpose I would suggest soft(fish) water with a pH of 6-6.5.

In nature, temperature varies considerably with seasonal water levels: the rainforest surrounding the permanent rivers is generally low-lying so, when the rivers are swollen — with rain and/or melt water from the Andes and Guianan highlands — the entire area is flooded, often to a depth of several metres. This flooded forest, igapo, provides a huge area of additional habitat for aquatic creatures and, of course, a vastly increased food supply. The floods tend to bring a significant drop in temperature, sometimes to below 70°F; the waters then warm up to somewhere in the lower 80s but evaporation soon starts to lower the level of the water, which then heats up more easily. At the end of the cycle all that is left of the floods is residual pools of muddy water which can become very hot indeed; but that is rather academic for any fishes trapped there, as those not picked off by predatory birds which gather for easy pickings, soon find themselves without any water at all — and dead. In the aquarium, a temperature in the upper 70s suits Oscars very well and can be raised to the lower 80s to stimulate breeding.

Increased food supply

Breeding, in nature, takes place soon after the inundation begins. The increased food supply brings the fish into condition and the vastly increased available habitat provides plenty of spawning territory. I can find no details of what is used as a spawning site — probably not the stones usually chosen in the aquarium, as the forest floor is composed of decomposed vegetation rather than rocks; maybe fallen wood, or even the submerged trunks of living trees, are used.

Although Oscars in the wild have to distinguish boy from girl, I have never been able to spot any external differences between the sexes nor do I know anyone else who has fared better. The most sensible way to obtain a pair is to start with half a dozen young ones, of about two inches, grow them on together and let them pair naturally. Unfortunately, probably the majority of Oscar fans start off with that one "accidental" and not until it is quite large do they decide it would be fun to breed their pet. Now, any large cichlid (and many a small one, for that matter) that has been used to regarding the tank as its exclusive territory is going to take exception to the sudden arrival of competition, even though (with the benefit of time to think about it) it might appreciate the chance of a mate. The first reaction is almost invariably "ex-termin-ate". A clear tank divider will solve the problem letting the possible pair size each other up with no chance of harm. BUT, if you don't know what sex your Oscar is, and have little chance of deducing that of any potential partner, you may be left Oscar-juggling for months (or longer) before you achieve a compatible match. So, if you are resolved on an Oscar, think hard right at the start about whether you might want the patter of tiny fins later on.

LIVING WITH OSCAR

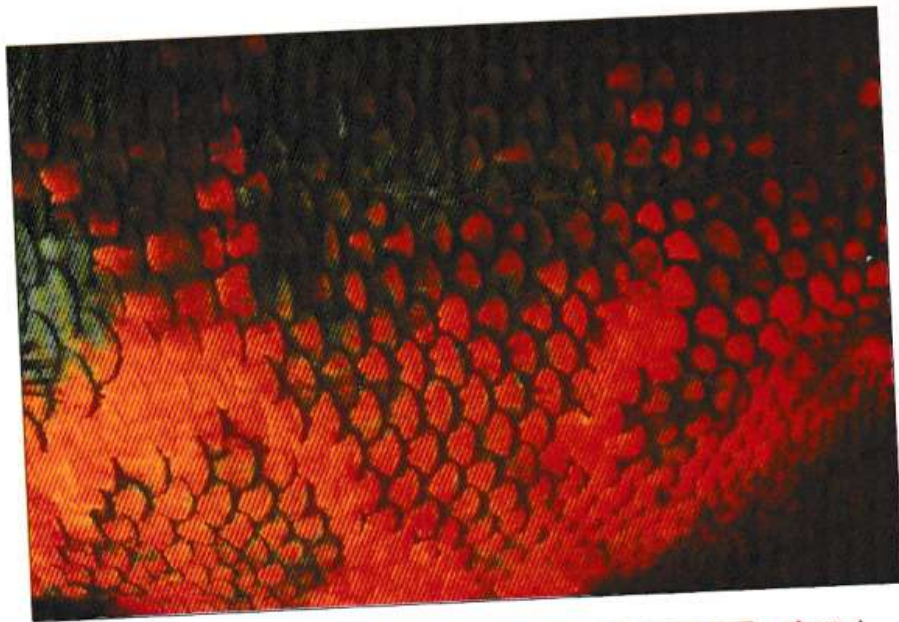
Opportunistic Oscar

As regards natural diet, Oscars can be termed opportunistic omnivores — they feed on whatever happens to be around — even detritus. Nevertheless, it has become abundantly clear, in captivity smaller fishes are the preferred food item — these, and other live prey, are what the wild Oscar will eat given the choice. This does not mean that you have to feed live fishes to your pet, although it has to be said that Oscars can be very useful for disposing of culled fry; to my mind, it does make sense to use raw fish and other aquatic creatures — shrimp, prawns, shellfish — as the main part of the diet. Earthworms are also an excellent food.

Diet is important for two reasons. Firstly, its immediate effects on the metabolism of the fish. Oscars fed extensively on dried foods have a marked tendency to develop digestive problems: they cease eating, sometimes "bloat", become sluggish and often eventually die. This may be a serious instance of constipation but, as far as I know, no

one has dissected such a deceased Oscar to find out. Secondly, Oscars are messy feeders, and if they are fed messy foods the effect on tank health (and thus ultimately fish health) can be dire. Particular foods (most dried foods when chewed) tend to pass through the gills (instead of down the gullet) in large quantities, to sink into the substrate and pollute the tank.

Oscars tend to get hooked(!) on particular foods, if the diet isn't var-



above A close up of the beautiful red scales along the flanks of this wild Oscar.



left An aquarium bred Oscar looking after its eggs. Many Oscar fans keep a large Plec in their tank as a companion and scavenger; as a result, many a pair of Oscars have been unjustly accused of egg-cannibalism while the real culprit goes unsuspected.

ied, and breaking such habits can be very difficult. It may be necessary — for your pet's ultimate benefit — to starve him or her out, offering new foods and removing them if ignored. Under no circumstances should you give in and offer the food to which the Oscar is addicted. It is unlikely to starve to death — I've known an Oscar that stopped feeding for six months with a digestive upset, then one day resumed as if nothing had happened! Most aquarium Oscars are portly compared to their wild counterparts, which tend to have a flat, or even concave, ventral profile rather than the rounded curve we normally see in the aquarium.

Bigger is much better

Oscars can easily grow to 12 inches or more in captivity, and in the space of two years. This demands spacious quarters — a MINIMUM of 36x15x15 inches for a single fish with 48x15x15 inches for a pair. Bigger is much better. Oscar aesthetics tend not to match those of humans as however you arrange your tank your pet will rearrange it. Plants are not really a viable proposition; rocks must be large and heavy and firmly bedded on the bottom. Bogwood can be used and is probably the most natural decor for a fish that reputedly skulks amongst roots and submerged branches along the edges of lakes and rivers; bogwood may be moved around but it is lightweight and unlikely to come crashing through the front glass on to the Axminster.

Some Oscars delight in heater-smashing, so equipment must be firmly fixed in place, with silicone sealant if necessary; alternatives are in-tank compartments for equipment, separated from the Oscar by a perforated divider (to allow water circulation) siliconed in place. An external filter with built-in heater still won't solve the problem of vandalism of inlet/outlet pipes — "toys" such as plastic plants or ping-pong balls might divert the fish's attention from more vital equipment.

Filtration needs to be efficient and be backed up by regular partial water changes to reduce nitrate levels. Avoid excessive turbulence (no spraybars) as these fishes come from slow-moving or still waters; go for a system with a moderate turnover and a large media-holding capacity. Although many authorities pooh pooh the idea, I have successfully kept an Oscar (and other large cichlids) using undergravel filtration. Lighting need only be moderate — those large eyes are thought to be designed for low-light viewing in shady waters; strong lighting may cause discomfort and, ultimately damage particularly the albino forms which, if they follow the pattern of mammalian albinos, are probably even more light sensitive.

Resist the temptation to mix Oscars with other fishes — the Oscar is likely to eat anything smaller, intimidate anything more peaceful or, conversely, be intimidated itself by anything which is its match in temperament or size. Many Oscar fans keep a large Plec in their tank as a companion and scavenger; as a result, many a pair of Oscars have been unjustly accused of egg-cannibalism while the real culprit goes unsuspected ...

Had we but space enough, and time, then I could tell you about the dif-



One of the many cultivated varieties of Oscar. This one is often sold as an "Albino Oscar" However, the eyes of true albinos lack black pigmentation and appear pink.

PHOTOGRAPH: LINDA LEWIS

ferent aquarium-bred varieties of Oscar but that will have to wait for another day ...

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Fish Profiles



PHOTOGRAPH: M.P. & C. PIEDNOIR

Blind Cave Fish (*Astyanax fasciatus mexicanus*)

By Richard Friend

Should you feel the need for an "odd ball" in your community tank, be it for fascination reasons, or just plain talking point, then the easily-kept Blind cave fish may well be your choice.

The Blind cave fish, *Astyanax fasciatus mexicanus*, belongs to that huge family the Characidae. With cousins such as Piranha and Neon Tetras, it has a wide distribution from Africa to America.

Generations of living deep down in dark caves have left this fish with no colour and no eyes. I find it difficult not to feel squeamish about this, but it in no way affects the fish. The senses that they have developed to counter this disability are acute, and the Blind cave fish will be first to the food in the community tank and by no means left out.

The sad fact is that the fish are born with eyes, but gradually a skin grows over each, rendering them useless. The colour is an overall pinkish white. Research has shown that the fish were originally ordinary inhabitants of rivers and lakes, so the move to caves was presumably for protection, food supply, or perhaps floods or environmental changes left them in the caves where they found existence possible. Colour and eyes were subsequently lost.

They make an excellent addition to the community tank where they will hold their own perfectly. A small shoal will treat the complete tank as their cave, there is no need to provide special decor. They will spend their day cruising over rocks and other solid objects, and will quickly learn to react to anyone entering the room that might be bearing the next meal.

A maximum size of 9cm can be reached. They like live food and insects but will readily take flake and frozen as well. Although not too fussy about water conditions they should be treated to cooler temperatures, below 78°F, with pH 6.5-8 and good filtration. Breeding is possible, but since any eggs or fry produced will be eaten by the other fish they are best spawned in a separate tank.

The fact that they will survive quite happily at temperatures down to 66°F means that they might be kept in a peaceful cold water set-up, making them one of the more versatile and adaptable fish of the hobby.

BLIND CAVE FISH CV

FAMILY: Characidae
SPECIES: *Astyanax fasciatus mexicanus*
ORIGINS: Underground river systems from Texas to Mexico
AQUARIUM TYPE: Community, coldwater or species tank
FEEDING POSITION: Mid water-bottom
SIZE: 9cm
TEMPERATURE: 66-78°F
DIET: Insects, live, frozen and flake



PHOTOGRAPH: IGGY TAVARES

Mollies (*Poecilia hybrids*)

By Richard Friend

Should you decide to add Mollies to your fish collection, these delightful livebearers will captivate you and demand too much of your attention. One look at the sail-like dorsal fin and bright colours it is easy to see why. Captive breeding has produced a choice of excellent strong colours to pick from.

For such a popular and much kept fish there remains an amazing amount of misconception about the water requirements of Mollies. This stems largely from the fact that these adaptable little fish are found naturally in the wild in both brackish water and fresh; that is why they can survive with the addition of salt to the water and without.

As most people would want to keep them in a community tank, the addition of salt can be forgotten, so long as the water is not acidic and soft, which can prove a problem. Temperature is another point of confusion, they are quite happy to live between the large range of 70-85°F so will settle well in your community tank.

Breeding Mollies is easy, rearing the fry in a community tank, is not. They will undoubtedly become the next meal for the other inhabitants. In a well planted tank inevitably some will gradually survive from the monthly live births, but if you want to save fry in quantity then a separate tank and a breeding regime should be set up.

The Black molly originates from Mexico to Columbia, although the true black form does not exist in the wild and was bred from the mottled fish that came from this area. They are a peaceful fish for the community tank and are long-lived.

Sailfin Mollies hail from North America, from Mexico up to Texas, these species are truly adaptable, being found to venture from the rivers out into the sea. In the wild they can reach 12cm in length.

Mollies are browsers and will spend their time picking at the algae on your decor. They will adapt to flake foods, but an occasional treat of live Brine Shrimp or even frozen, will be greatly appreciated. These fish in the wild seem to be constantly looking for and finding food, even more so than other fish, so a little and often feeding routine will benefit them.

MOLLY CV

FAMILY: Poeciliidae
SPECIES: *Poecilia latipinna*, *Poecilia mexicana*, *Poecilia sphenops*, *Poecilia salvatoris* and *Poecilia velifera* hybrids
ORIGINS: North to South America
AQUARIUM TYPE: Community tank — species tank for the more serious breeder
FEEDING POSITION: Browser at all levels of the aquarium
SIZE: 6-12cm in the wild, usually less in aquariums
TEMPERATURE: 70-85°F
DIET: Flake, live or frozen Bloodworm and Brine shrimp



PHOTOGRAPH: M.P. & C. PEDNOIR

Kribensis (*Pelvicachromis pulcher*)

By Iggy Tavares

West Africa has provided aquarists with a range of beautiful cichlids, one such beauty being Kribensis, *Pelvicachromis pulcher*. This cichlid comes from Nigeria, West Africa where it occurs in pools and streams of soft acidic water where the banks are thickly planted with *Vallisneria*, *Nymphaea* and other plants interspersed with roots of trees and fallen branches. *Pelvicachromis* species are also found in large rivers such as the Niger and the Kribi and hence the more commonly used name Kribensis.

P. pulcher is one of the most popular cichlids because of its lovely colours. Males, which can grow to 12cm, have a dark brown stripe below the dorsal fin and another along the lateral line. The pelvic fins and the stomach area of the male are pink. Females, which are a lot smaller than males, have a rosy red stomach area especially when gravid. Both males and females, tend to have black spots ringed in yellow on the dorsal fin and also in the caudal fin. Males have an elongated and pointed dorsal, ventral and caudal fins, while that of females tend to be rounded.

P. pulcher favours aquariums that are densely planted containing soft water but generations of tank breeding have adapted them to other water types. In a community setting, suitable tank mates would be a shoal of six to eight Harlequins or Zebra danios and perhaps a few Swordtails or Platies to provide a nice contrast. Alternately some of the smaller less boisterous Barbs such as Cherry or Checker could be kept instead. Kribensis readily eat flake foods but love live foods.

Pairs, if well fed, mature and healthy will spawn readily. Spawning sites for Kribensis can be provided by a half clay flowerpot, or a coconut shell installed in the midst of the plant thickets. The intensity of coloration of the male and female in particular increases dramatically. The female prepares the chosen cave for spawning and cares for the eggs but both parents usually protect and supervise the free-swimming fry. Kribensis fry, as soon as they are free swimming, will eat powdered fry foods, but will grow faster if fed some live food, such as Brine shrimp and Microworm.

Kribensis is a beautifully coloured dwarf cichlid with interesting spawning and brood care behaviour. Both female and male look after their fry resulting in harmonious behaviour most of the time.

KRIBENSIS CV

FAMILY: Cichlidae
SPECIES: *Pelvicachromis pulcher*
ORIGINS: Nigeria, West Africa
AQUARIUM TYPE: Community or separate
FEEDING POSITION: Bottom and mid-water
SIZE: 10 to 12cm
TEMPERATURE: 75-80°F
DIET: All foods but some live food appreciated



PHOTOGRAPH: IGGY TAVARES

Thick-lipped Gourami (*Colisa labiosa*)

By Iggy Tavares

The Thick-lipped gourami is a labyrinth fish which has an additional respiratory organ located in the head that enables them to obtain atmospheric oxygen. Like other Labyrinth fish, also called Anabantids, the Thick-lipped gourami habitually comes to the water surface to gulp air. This added feature gives them the ability to survive in shallow water where temperatures soar beyond 86°F and oxygen levels drop.

The male has a reddish brown body with a series of parallel, horizontal blue bands. The dorsal and anal fins are suffused with blue with a marginal brown edge. In the breeding period, the male's silver throat and belly go darker in colour. Females are less colourful fish, having a lighter barring pattern. The pelvic fins are in the form of long thread-like extensions, which are used as feelers. These deep bodied fish can grow to 4 inches (10cm), with the female staying a little smaller. A golden brown colour variety of the Thick-lipped gourami called Sunset gourami is sometimes available.

The Thick-lipped gourami's native range includes Northern India, Bangladesh and southern Burma. Here it lives in slow flowing streams but also in ponds and in rice paddy fields where the water is very shallow. In the wild they eat all sorts of Crustaceans but also Algae, where the thick lips of this gourami might be of special assistance.

A pair can be housed in a well planted community tank. They adapt to most water types, provided this is clean. Other inhabitants could include other Indian fish such as small Barbs or Rasbora species. All these fish will eagerly take flake food which can be fed two or three times a day.

For a spawning attempt set up a small separate well planted aquarium that includes some floating plants. The plants offer the female some respite from an over zealous male while the floaters will anchor the bubble nest that the male soon builds. A mature well fed pair will eventually spawn under the nest, with only the male tending the eggs and nest for a few days. The female can be removed immediately after spawning and both should be removed once the eggs have hatched. The fry need to be fed on very tiny foods such as liquid fry food, powdered fry food, and some live foods such as rotifers and other organisms found in green water and later on newly hatched brine shrimp.

The Thick-lipped gouramis are handsome, hardy fish with interesting breeding habits that are easily observed in the aquarium.

THICK-LIPPED GOURAMI CV

FAMILY: Belontiidae
SPECIES: *Colisa labiosa*
ORIGINS: Northern India, Bangladesh and Southern Burma
AQUARIUM TYPE: Community
FEEDING POSITION: Surface and mid-water
SIZE: 10cm
TEMPERATURE: 75-80°F

The Siamese Fighter (BETTA SPLENDENS)

Siamese Fighters were one of the very earliest exotic fish to be kept in aquaria. They were first imported to France in 1892 from their native Thailand. Even here they had been kept and bred in captivity, although not for their stunning beauty. They were actually bred for fighting and males with longer finnage stood more chance of winning their periodic battles than those with natural short finnage.

Apart from shorter finnage the wild form also had less well defined coloration, with drabber multi-coloured males being the norm. This made it difficult to tell males apart, so for betting purposes, fish with solid coloration were developed by selective breeding. Eventually, single coloured blues, reds, and greens became available.

This development continues in the aquarium today. There are now many different colour forms available and through the endeavours of private breeders throughout Europe and America more are appearing all the time. Fin forms have also changed and whilst the classic long finned type is still commonly found in the trade, other types have become established.

The fish pictured is a Red Delta bred by French aquarist M. Maurin. In this form the tail is much wider than ordinary long finned types. Another fin mutation may be seen from time to time — Double-tail. In this form the tail is separated into two parts and the dorsal fin also has many more rays in



it than usual.

Captive care for all these varieties is similar. It goes without saying that males must never be kept together. They can, however, be safely housed with two or more females, providing plenty of cover is available. This is important even if housing a single male in a community tank. Despite their pugnacious temperament towards their own kind, in general, they are far more likely to be picked on by the other fish in a community tank. Plants give them an area where they can hide away and avoid more boisterous species.

They eat all foods including commercial flake foods but to keep them in tip-top condition they should have a feed of live

food once a week as well. They will adapt to most water conditions and tolerate a wide temperature range from 70-86°F, although the ideal is about 78°F for this fish.

'Wild' Fighters from Colombia?

In the 1950s Fred Kyburz (a Swiss botanist living on top of a steep hill outside of Cali, Colombia) wanted some fish for his outdoor pond. After trying Goldfish several times (they were snapped up by native birds almost as fast as he could put them in) he tried Siamese Fighters. These thrived in their new home and flock bred all by

themselves.

Everything was fine until a few years later a torrential downpour ruptured the pond wall and all the water cascaded down the hill and into a nearby stream.

From here the survivors made their way out into the flat lands of the Cordilleras watershed. Once there, they not only bred successfully, but underwent a population explosion. Within no time at all they were an established part of the fauna and over the ensuing years hundreds of thousands were exported to USA.

These fish, however, had degenerated into multicolored wild type fish with short fins and even shorter tempers. Males would rip each others fins apart almost as soon as they were placed in the same bag. With the long finned fighters this was not a problem, males are sorted prior to shipping, but these newly evolved "wild" type Columbian fighter males were almost impossible to separate from females unless you closely examined them. Since no shipper had the time to do this, they always arrived at their destination in a really bad way.

REFERENCE

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PHOTOGRAPH: KEVIN WEBB
BREEDER: M. MAURIN