AQUARIST & PONDKEEPER

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INSIDE

FOCUS ON ...
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EDITOR
Dick Mills

ART EDITOR
Mick Beeken

ADVERTISEMENT MANAGER
Gwen McNeil
Tel: 01233 713188

SALES CONSULTANT
John Young
Tel: 0181-904 8886

PUBLISHER
Ian Hunter

PUBLISHED BY
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TELEPHONE: SUBSCRIPTIONS/ ADVERTISING AND PRODUCTION/ CLASSIFIEDS & BUYERS GUIDE/ACCOUNTS
01233 713188

FAX NUMBER
01233 714288

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COVER

Goldfish are very adaptable things and can cope with a wide range of temperatures, therefore posing the question: "Should they really be classed as coldwater fish?" Read on in this issue.

PHOTOGRAPH BY DAVE BEVAN

COMMENT

Well, it certainly looks as if the gremlins have had a good holiday for they were back with a vengeance in our last issue!

Among those that leapt from the page were an upside-down photograph, an incorrect book price (should have been £284.00 not £28.40 — when we make a mistake we make a big one) and incorrect photographic credits. We regret these errors and hope no-one was too embarrassed or inconvenienced.

Our really bad mistake was, in Bernice Brewster's article on feeding Koi, to completely reverse what all existing Koi keepers know and that is Koi appetites DECREASE with falling water temperatures and not increase as was printed. If anyone knows of a good disguise shop I might just be able to walk around KOI '98 without being taken to task (at best) or thrown into the nearest vat (at worst). Again our apologies.

Just how set are you in your fishkeeping ways or interests? Would you never consider other areas of fishkeeping or are you a dyed-in-the-wool tropical/coldwater/freshwater/saltwater isolationist? OK, if you live in a flat with no garden then indoor fishkeeping has to be your scene by default (unless a roof garden pond is a possibility), but you can always get a taste of 'the other side' by taking in a show or exhibition arranged by other 'fanciers'.

Recently, I had a most enjoyable day out at a Goldfish Show. Of course, many of the faces were familiar (you tend not to categorise people at tropical open shows too much), but for anyone not too involved with the Goldfish scene the concentration of interest in a single species (albeit with many varieties) is quite an eye-opener; it was an odd feeling to know that everyone was talking about the same fish! One thing that I didn't hear was the phrase 'I've got a bigger one at home' although there may well have been an occasional muttered 'I've got a better one at home' — a slight difference you'll agree.

Whilst a day at any show is a thing to be enjoyed, going into 'strange territory' puts an added edge to it; whilst (as they say) familiarity breeds, there's no need to be contemptuous of other people's different ideas — we should all have something to learn from each other.

Dick Mills

EDITOR

E-MAIL ADDRESS:
101372.3451@CompuServe.com

REGULARS

Iggy Tavares, PhD, shows how to manage this predator

PHOTOGRAPHS BY THE AUTHOR USING A PENTAX Z-20 CAMERA

The Wolf

C. (N) dovii, which is one of the largest cichlids known, reaches sizes of over 2ft. Apart from the common name of Wolf Cichlid it is also called the Rainbow Bass

Male *Cichlasoma (Nandopsis) dovii* showing normal colouration.

Central America is home to many large colourful cichlids, some of which are available in the UK from time to time. *Cichlasoma (Nandopsis) dovii*, the Wolf Cichlid, is found across Nicaragua and parts of Honduras and Costa Rica where it inhabits rivers but is also found in Lakes Managua and Nicaragua.

C. (N) dovii, which is one of the largest cichlids known, reaches sizes of over 2ft. Apart from the common name of Wolf Cichlid it is also called the Rainbow Bass, while the native name is guapote. In Costa Rica it is the premier gamefish where the current record is 11.5 pounds although there are unconfirmed records of larger fish. The Wolf Cichlid is also one of the food fishes in Nicaragua.

In the wild

In the wild the Wolf Cichlid lives up to its name since it hunts and feeds on other fish. Their torpedo shaped bodies are built for speed while their highly protractile jaws and teeth give them the perfect armoury for gripping and eating their prey.

Mature males tend to be pale purple in colour over-laid with horizontal rows of black spots. In younger males a broad, black horizontal band runs along the mid-line from behind the gills to the caudal peduncle. His fins are green with darker spots. Females tend to be yellowish in colour and also have the black horizontal band. Her fins are a plain pale yellow-green in colour.

The Wolf Cichlid is definitely a handsome fish and worth keeping but because of its potential size one needs large aquariums for their proper care and husbandry.

In London

In London juvenile *C. (N) dovii* are often available for sale at a reasonable price (£5 to £8, depending on size). These young *C. (N) dovii* fish are rather plain looking and would not usually attract the attention of a hobbyist, unless one knows what one is looking at. I have never kept these cichlids as I am familiar with what size the fish can

Cichlid

Female *Cichlasoma (Nandopsis) dovii* with fry.

grow to and also their capabilities for fierceness.

In reality they need a minimum sized tank of 4ft in which only one pair of fish can be kept, and this has deterred me. Fortunately, over the last couple of years, I have been able to observe and photograph several pairs of mature *C. (N) dovii* caring for eggs and fry at two aquatic outlets in London.

The first is Morden Waterworld, Morden, Surrey, where the cichlid expert is Chris Jupp. The other is Fin King Aquatics, Elephant and Castle, London, where Danny Vaughn has set up several large tanks for breeding large American cichlids at which he has been quite successful.

Suitable aquariums

A pair of *C. (N) dovii* need a minimum sized tank which is4 ft long, 2ft wide and 2ft high. *C. (N) dovii* are hearty eaters and produce a lot of waste products. Moreover, they tend to dig if their tank is provided with gravel. Hence the most suitable filtration for these cichlids is provided by an outside large canister type filter.

The male can turn nasty towards the female and, therefore, plenty of protective furnishings need to be provided in the tank. I have observed that long narrow branching bog wood, and plenty of it, arranged so that the fish can swim under it provides very effective cover for the female. The bog wood also produces a natural looking habitat in which these cichlids seem to be very happy. Large, flat boulders provide these cichlids with a suitable site to spawn on. *C. (N) dovii*, being Central American cichlids, need hard water which should be kept at a temperature of 26-28°C (75-80°F).

Feeding

Wolf Cichlids are big eaters and in the wild primarily eat other fish. In the aquarium they take all sorts of pellets. They will, of course, 'wolf down' Guppies and small feeder Goldfish but will also take other live food such as Earthworms and Freshwater Shrimp. Two feeds a day should be sufficient to keep them in good health.

Wolf Cichlids at Morden Waterworld

I first came across a breeding pair of Wolf Cichlids at Morden Waterworld. The male and female were similarly sized at about 10 to 11in. They immediately attracted my attention because they were caring for free-swimming fry. The fish were, of course, not for sale. I was able to follow the progress of the fish over the next couple of years, as every time I visited the shop, I made a bee-line to their tank.

During this time the male grew considerably larger (14in TL), while the female was slower growing (11in TL). This was probably due to her expounding most of her energy in producing eggs, which happened every month or so. At Morden Waterworld, the *C. (N) dovii* were housed in a 48in floor standing tank filtered through and outside central system. The tank was furnished as described above.

For the most part the pair got on reasonably well. I have never seen the female beaten up or with ripped fins, although on one occasion a divider was placed in the tank when the male was overtly aggressive.

I have never actually witnessed a spawning but I expect it is typical of

most Central American cichlids, where the female attaches a row of her eggs to the cleaned rock and the eggs are then fertilised by the male. This activity is repeated lots of times, takes over an hour and can result in several hundred eggs. I have noticed that it is the female who usually provides all the care for the eggs, which primarily involved fanning of the eggs and some mouthing.

On one occasion, however, when the eggs were just about to hatch, I found the male caring for the eggs while the female kept her distance. The eggs usually hatched in three days depending on temperature, at which time they were moved to another site, usually in a depression under one of the bog wood roots. Both the male and the female were usually very aggressive at this time and even tried to attack my finger if placed on the aquarium glass front.

The fry were usually free-swimming in a another four days. The fry were fed on crushed TetraMin flake and did very well on this basic diet with no additional live food at all. On one occasion the tank was heavily infested with snails during a breeding period and I did not expect the eggs to survive. However, all the eggs hatched and resulted in a large batch of fry. Apparently the snails did not touch the eggs. Chris Jupp has raised many young *C. (N) dovii* which are available at a reasonable price at Morden Waterworld.

Chris Jupp and Paul Walden (owner-manager) ensure that a good selection of other cichlids, including those from Lakes Malawi and Tanganyika and from the Americas, are always available.

Wolf Cichlids at Fin King Aquatics

More recently I came across two smaller breeding pairs of *C. (N) dovii* at Fin King Aquatics. The male was in full breeding colours of blues and purple, while the differently coloured female appeared ready to spawn. These pairs of *C. (N) dovii* were set up in two separate 4ft aquariums with bog wood and rocks. On one visit one pair of fish had apparently been cleaning a rock that morning and were now engaged in pre-spawning behaviour during which they were acting quite aggressively.

However, no spawning tubes were visible. While I was there the female was doing most of the displaying to the male. This took the form of a threatening sort of display where the female swam up to the male from underneath him with her mouth open but stopping short of contact with him. Her fins were flared and she seemed to be indicating to the male that she was ready to spawn. This was repeated several times while I was present but it was a few days before the fish finally spawned.

On another occasion pre-spawning behaviour took the form of the male trying to viciously bite the female. She was, fortunately, very quick in getting out off his way and managed to take cover from the pursuing male underneath the bog wood roots.

I have had numerous opportunities to study and photograph females with their fry and eggs at Fin King Aquatics. Here, females usually looked after eggs and fry while the male patrolled the surrounding area. The male usually assisted in the moving of newly hatched fry from the open rock surface to hidden more secure locations, usually under bog wood.

Once the fry were free swimming Dan starts initially feeding the fry with a Liquifry before proceeding to powdered flake. As soon as the fry could take it they are moved on to Tubifex worm and grew very quickly thereafter, reaching almost 1in in size within five or six weeks.

Male *Cichlasoma (Nandopsis) dovii* in full breeding colour.

A massive aquarium

In the basement of Fin King Aquatics Danny Vaughn and Dave Edwards (owner-manager) have built a massive pond sized aquarium which covers an area approximately 12x6ft and is 3ft deep. Part of this pond-like set-up is glass fronted, which gives one the opportunity to see the fish. Many large Central American cichlids live happily in this tank together with some endangered Malagasy cichlids and some 1ft long Nile perch. Some of the cichlids have started spawning here.

When everything is properly set up in this basement area the hope is that pairs of cichlids can be removed prior to spawning in the pond, and moved to large separate breeding tanks where they can spawn. The young could then be cared for by the parents in security, and the young grown on to a good size for sale.

It could be very interesting to try catch these cichlids in their big pond, which might be accomplished at feeding time using a couple of large nets. I am hoping that once these other big cichlids have been isolated and have spawned I will be able to observe and photograph them for further articles in *A&P*.

THE WOLF CICHLID ...
managing a predator

Fact File

Scientific name: *Cichlasoma (Nandopsis) dovii.*
Common name: Wolf Cichlid, Rainbow Mass, Guapote.
Distribution: Nicaragua, Honduras and Costa Rica in rivers and lakes.
Size: Can reach 24in.

Aquarium Care

Aquarium size: 48x18x18in (125x50x50cm), minimum.
Aquarium decoration: Plenty of bogwood roots under which the female can hide.
Temperature: 26-28°C.
Water: Hard and alkaline (pH 7.8, 20°DH, approximately).
Diet: Large pellets, some live or frozen food.

Conclusions

In the wild *Cichlasoma (Nandopsis) dovii*, the Wolf Cichlid, is a fearsome piscivore which lives up to its common name. However, a pair can be successfully maintained in a properly furnished large aquarium (minimum size 4ft long). Here the *C. (N) dovii* should successfully breed and raise fry. If kept with a community of other large Central American cichlids trouble usually brews as they come into breeding condition.

The other fish, big or not, will be attacked, damaged and even killed, unless the aquarium is enormous and provides adequate cover. *Cichlasoma (Nandopsis) dovii* is not for the faint-hearted beginner but is a splendid fish for the cichlid specialist with a large aquarium.

Further reading

A. Konings, *Cichlids of Central America*, 1989, TFH Publications Inc.
D. Conkel, *Cichlids of North and Central America*, 1993, TFH Publications Inc.
P. V. Loiselle, *The Cichlid Aquarium*, 1994, Tetra Press.
G. K. H. Zupanc, *Fish and Their Behaviour*, 1985, Tetra Press.

Pre-spawning behaviour of *Cichlasoma (Nandopsis) dovii*. Note the open-mouthed female below.

Dave Garratt *asks if these are the most endearing marine fish available?*

PHOTOGRAPHS BY GORDON WIGENS UNLESS OTHERWISE STATED

Marine Inflatables

This large Pufferfish, *Arothron moppa*, is not always readily available.

There can be few fish available within the marine hobby that are as endearing and interesting as a large Dog Face or Porcupine Puffer. They grow to a large size for a captive fish (although nowhere near their natural size) developing into an active and appealing fish that can rapidly become a pet, albeit not a cuddly one, as opposed to just another fish.

The fact that my wife gave my Porcupine Puffer the name E.T. suggests how cute these fish can be

I once kept a 6in Porcupine Puffer that probably attracted as many favourable comments as the rest of my fish put together. The fact that my wife gave him the name E.T. suggests how cute these fish can be.

Inflation

Puffers take their common name from their ability to inflate themselves with water, greatly increasing their size and thus

deterring predators. Even at the relatively small size of 6in a fully inflated Porcupine Puffer is quite an imposing sight. The inflation is a defence mechanism adopted at times of perceived threat, therefore it is stressful to the fish and is not something that should be precipitated by the aquarist merely for its curiosity value.

Should you have to catch a Pufferfish use a large container big enough to cope should it inflate. Do not lift the fish out of the water as it may then inflate with air and experience great difficulty in deflating. If this happens the fish will float on the surface and suffocate when you return it to the tank.

You will need to gently push the fish under the water surface to enable it to deflate.

Other characteristics

Other specialised features of the Puffers concern toxins, scales and dentition. The Canthigasters, also known as Tobies, and the Dog-Face Puffers have smooth scale-less skins, whilst in the Porcupine group the scales are adapted into spines that face outwards in the event of inflation.

Despite possessing internal organs that contain one of the deadliest poisons known to man the Pufferfish are considered a delicacy in Japan. They are used by highly trained chefs to produce a dish known as Fugu. Despite all their training, and the well-known risks, Fugu poisoning still kills a number of Japanese diners every year.

MARINE INFLATABLES ...
endearing marine fish?

Dental problems

The Puffers all possess teeth that are fused into a hard bony palate. Do not underestimate the power of these beak-like jaws as they can use them to literally bite chunks off hard coral, so they would have no real problem in removing the end of your finger-tip! These teeth grow constantly and in the natural course of events they are kept worn down by a diet of crustaceans and by gnawing on hard corals.

In captivity hard-shelled food must be made available, for example mussels and other molluscs with the shell intact, to enable the Puffers to keep their teeth worn down. Failure to do this will result in the Puffer becoming unable to feed and requiring a visit to a specialist vet to have its teeth filed down.

Danger — Poison!

The Puffers have another means of defence in case the inflation does not prove a sufficient deterrent. They can emit a deadly toxin, tetrodontoxin, from their skin, whilst their internal organs are also poisonous. In the wild the fish would emit its toxin allowing it to make its escape by swimming away from the shell shocked predator.

The Puffer is not immune to its own poison hence the need to swim away, an option that is not available to the Puffer or its tank-mates, in the closed confines of an aquarium. Should the Puffer have cause to emit toxin in your tank you will suffer a complete fish wipe out.

The only, and very remote, chance of saving them would be if you were around at the time and could immediately transfer all of the fish to a new tank. An efficient power skimmer and charcoal may give you a little longer but to illustrate how powerful this toxin is I can relate a story from a reputable wholesaler. He told me of a Puffer releasing toxin into one of his tanks. He quickly removed the stricken fish to another stocked tank (he placed the Puffer in a tank of its own) only to find that the tiny amount of water transferred on the

The prickly spines on this Porcupine Puffer, *Diodon hystrix*, are normally carried flat, but watch out for them when the fish is inflated!

fish themselves, and on the net used to catch them, contained enough toxin to wipe out the fish of the second tank — you have been warned !

Keep the aquarium well maintained, provide excellent water quality, choose the tank-mates of your Puffer very carefully and generally cater for your Puffers' every need so as not to cause them any stress, thus avoiding the deadly outcome of a toxin release.

Types of Pufferfish

Pufferfish can be conveniently split into three groups: the smaller species of the genus Canthigaster, Dog Face Puffers of the genus Arothron and the Porcupine Puffers (Diodon and Chilomycterus).

The genus Canthigaster

The genus Canthigaster, also known as Tobies, has a widespread distribution although there are a number of exclusively Hawaiian species. They all remain relatively small in captivity, rarely exceeding 3in, consequently they do not place such a heavy biological load on the filter bed as the larger Puffers do.

Although generally peaceful to fish other than their own kind some of them have acquired reputations as fin nippers. They are omnivorous feeders that generally do well in captivity but are not as hardy as the larger Dog Face or Porcupine Puffers.

Because of their omnivorous diet and crushing teeth they must not be trusted with invertebrates. Two Indo-Pacific species dominate the imports into the UK:

Valentine Puffer (*C. valentini*). The species with probably the worst reputation as a fin nipper. Reaches 3-4in in captivity and double this in the wild.

Sharp Nose Puffer (*C. solandri*). A very attractive species that again will only reach 2-3in in your tank, ie, about half the size reached in its natural habitat

Dog Face Puffers

The long snouts of these fish give rise to a puppy dog look and hence their common name. They can achieve a size of 10-12in in an aquarium and possess formidable fused teeth. Despite having no pelvic fins they are active swimmers and must have plenty of swimming room.

Do not over clutter the tank with rockwork that may restrict free swimming space. A Puffer will, however, be happier if he has a large cave as a resting place.

Puffers are voracious feeders and can get particularly worked up at feeding time, often exhibiting a feeding frenzy. They could put smaller fish in danger of an accidental but nevertheless serious bite.

Friends of mine who have kept many Puffers always feed simultaneously at both ends of their 8ft tank to ease congestion and the possibility of an accident. Hard-shelled food is essential and on no account can they be housed with invertebrates.

Most literature says two Puffers of similar size will fight but the friends I have already mentioned have kept Puffers together for many years. Their tank was an 8ft long 200 gallon tank housing 2x10in Dog Face Puffers, a beautiful 8in deep blue Dog Face Puffer, a 10in Porcupine Puffer and a 4in Spiny Boxfish.

I am not recommending you try this — I use the case to illustrate that with a large tank and with all the fish originally being young and under 4in in size they achieved a community Puffer tank. They also kept other suitably-sized fish in this tank but did not risk anything too small.

Common species available are usually Indo-Pacific in origin. Some of them may reach up to 20in in length on the reef but a maximum aquarium size is usually 10in or less. The species most commonly seen for sale include:

Dog Face Puffer (*Arothron nigropunctatus*); Blowfish

This Valentini, or Saddled Toby, *Canthigaster valentini*, has almost an exact mimic in the Saddled Filefish, *Paraluteres prionurus*.

PHOTOGRAPH: LINDA LEWIS

(*A. hispidus*); **Reticulated Puffer** (*A. reticularis*); **Spotted Puffer** (*A. meleagris*) — a very attractive species that has white spots and various colour stages of yellow, grey and brown.

Porcupine Puffers

All that I have written about the Dog Face Puffers applies to the Porcupines. I have two anecdotes to illustrate points already made.

My Puffer mad friend had a small, perfectly circular, small chunk of fingertip neatly removed by his 10in Porcupine Puffer whilst inadvertently dangling his finger in the tank whilst using a syphon tube. My own 6in Porcupine Puffer disgraced himself by accidentally biting the head of my small 2in Clown Trigger during a feeding frenzy.

Unfortunately the Trigger died next day and my wife banished the Puffer from the house; it was sold to a friend.

To summarise: feed hard-shelled food to keep those formidably teeth worn down and choose tank mates carefully. Again these fish need plenty of free swimming space and are happiest with a nice large cave they can call home. Invertebrates must be avoided. Commonly available species include:

Common Porcupinefish (*Diodon hystrix*). Can be a giant 36in in the wild and must make an amazing sight if a fully-grown adult inflates itself. Fear not, however, as aquarium size is unlikely to exceed 10in. The species has a widespread geographic distribution.

Long-spined Porcupine Fish (*D. holocanthus*). Another large Porcupine but not quite on the scale of *D. hystrix*. May reach 20in on the reef but only 8-10in in captivity.

Spiny Boxfish (*Chilomycterus schoepfi*). Despite remaining smaller than species of the Diodon genus this fish may be quite pugnacious.

MARINE INFLATABLES ... endearing marine fish?

Polluters of their own environment

I would like to conclude with a few words about the somewhat messy habits of the larger Puffers as it is an aspect that must be catered for in any aquarium housing them.

The Dog Face and Porcupine Puffers do not just achieve a good length but also a formidable girth. Fish of such size are obviously going to need large amounts of food to keep them healthy.

What goes in must come out; in this case, via their waste products. They are going to place an enormously high load on the biological filter bed. Coupled to the high waste production is their extremely messy feeding habit. They will take large chunks of food into their mouths, chew on it, then spit it back out and proceed to eat the smaller bits.

As most of their food, once the shell has been cracked, will be soft bodied molluscs, you can imagine the cloud of minute food particles that is produced. To cope with their appalling table manners you will need excellent biological filtration, a well-maintained power skimmer and a very efficient and regularly cleaned out mechanical filter.

Even with all this in place you will need large and regular water changes to maintain water quality, in particular to maintain a reasonable pH level.

As I have said before, Puffers make endearing pets and reward their owners by being relatively hardy, disease free and easy enough to keep, even for a beginner. You must however, pay attention to the various points mentioned, in particular those relating to diet, tank-mates and aquarium management.

You can almost imagine calling this Dogface Puffer, *Arothron nigro-punctatus*, 'Rover'.

PHOTOGRAPH: A&P LIBRARY

Derek Lambert *describes the aftermath of his fish-collecting trip*

PHOTOGRAPHS BY THE AUTHOR

The A&P Costa Rican Quest

The real criteria for judging the success of a trip can only be measured by the information gathered out in the field and how many fish are successfully adapted to captive life

Sunset over Lake Arenal.

The next morning we were up at the crack of dawn and had a quick breakfast. Next we took all the luggage down to the checkout desk, paid the bill and waited for the free hotel minibus to take us to the airport. Soon we were sitting on the plane heading back to America and, finally, Gatwick.

The return journey went to schedule and we had no problems in Houston. In England we quickly accomplished the formalities and soon we were home again. At this point most collectors finish their articles and we are left to make assumptions about what happens to the fish afterwards.

Adaptation to captive life

Yet the real criteria for judging the success of a trip can only be measured by the information gathered out in the field and how many fish are successfully adapted to captive life. So this article in the series is really about what happens to the fish as soon as we arrive back home and the process of their adaptation to captive life.

When I walked into the fish room with my collection of fish, exhausted from over 24 hours on the road, Pat said: "I have 8x2ft tanks all cleaned out and half full of stood water, plus

THE A&P COSTA RICAN QUEST ...
flinging his net one last time

another dozen of the 12in tanks ready as well."

"Great," I said, "now all we have to do is pump the water out and put rainwater in them instead!"

"Pardon me (or words to that effect), Derek, but what do you mean, rainwater?"

"Well the fish we have are in soft slightly acidic water at the moment."

So all Pat's hard work in preparing things in the fish room was wasted on this occasion. An hour later we had all the tanks half full of rainwater, with a little tapwater added to raise the pH and hardness to the same as the water the new fish were in.

During this period the fish had been warming up to the same temperature as the fish room so the bags could be carefully opened and the fish released.

Check water quality

Taking the time and trouble to check water quality both with these wild-caught fish — or indeed with any fish you buy in a shop — will save you making the mistake of releasing fish from one type of water directly into another.

In extreme cases this will kill the fish immediately from pH shock but with hardy fish or less extreme changes it will stress the animal concerned and leave it vulnerable to disease. This is why new fish tend to develop diseases. To prevent this I always try to recreate the water quality a new fish is in and then slowly change them over to my tapwater.

Obviously, there are some fish which hate hard alkaline water and these I keep in soft-water tanks all the time. Most of my Killifish live in this type of water and after the sort of conditions we had been catching the Costa Rican fish in I decided to keep them in soft, slightly acidic, water as well.

Later that day all the new fish received their first feed. This consisted of newly-hatched Brine Shrimp and for the larger specimens, live Blood Worm. Pat offered to do this feed for me so I could go straight to bed and catch up on some sleep. A very welcome offer at this time, I can tell you!

The next morning I took my morning cup of tea (the first of too many, so Pat says) in the fish room with me and looked round at the newly-arrived fish. To tell the truth I looked round at all the fish — once again Pat had done an excellent job

Rio Java. Home to tonnes of Bloodworms and *Brachyrhaphis terrabensis*.

of looking after them. Apart from the one or two which had looked very shaky when they arrived everyone was looking good.

Alien environment

Once again they had a feed of live food rather than flake. This is because they have never seen flake food and I wanted them to settle into the alien environment before having to cope with something else different.

Now came a prophylactic treatment for intestinal nematode worms. Generally I don't treat a fish with any medication unless I know they are diseased or infested with parasites, but this is the exception. Normally I don't find these parasites in the wild caught fish I bring back myself. They tend to be much more of a problem in commercially-farmed fish which travel to a consolidator before being shipped on. At these centres various fish breeders' stock are combined into large holding vats and those with nematode worm infestations pass them on to healthy fish from other breeders.

After a particularly nasty outbreak of this pest several years ago I decided to always treat all new fish that come into the fish room from whatever source. I use Levamisole which, unfortunately, is only available from a vet but is the best medication on the market for the eradication of this parasite.

It is usually used for the treatment of cattle and sheep but is just as effective when used on fish. There are several different strengths available but the commonest is 7.5 per cent which is used at a rate of 1ml per 75L of aquarium water. It knocks out any worms in the fishes gut within a few hours and the dead worms drop out of the anus a couple of hours later.

A repeat dose a week later makes sure none have been left behind. Luckily, none of the new fish had this problem but it is always better to be safe than sorry.

The only exception

Later that day came the first feed of flake food. Most of the fish took this without any problems. The only exception was some small baby Cichlids which had taken the Brine Shrimp earlier in the day but didn't even look at the flake food.

Months on they still only eat live foods despite being what look like *Cichlasoma septemfasciatum*. We have another collection of this species just slightly bigger and they took flake from day one. Why the two collections are so different I have no idea, unless they turn out to be a closely related species which is more choosy about what they eat!

Anyway, over the next few days I kept a close watch on all the new arrivals. This is the most dangerous time for pests like White Spot and sure enough a couple of fish came down with it.

Unfortunately, it was not the standard form which responds well to Malachite Green (the basis for most modern White Spot treatments) which is my preferred medication for this parasite. Instead it survived this treatment and needed to be dosed with Methylene Blue instead. By this time I had lost a couple of the weaker fish from those collections affected by it, but careful observation meant I caught it before too much damage was done and most fish recovered well.

Careful quarantine procedures

The other thing which limited the damage done by this parasite was the careful quarantine procedures we have in our fish room. All new fish, from whatever source, are kept well clear of our established stocks. Nets, buckets, and even a siphon tube are kept specifically for those fish in quarantine and each one is washed out before and after use to make sure nothing is passed between tanks.

After working in each of the quarantine tanks we also washed our hands very carefully. A time-

Small pond where we caught huge numbers of *Brachyrhaphis roseni*.

consuming process to be sure but the only way to be certain no disease is passed from tank to tank with potentially disastrous results.

Quarantining is something many experienced aquarists fall down on. We all get to the stage where we believe we can cure any disease which comes along and many people become so confident they don't bother to quarantine at all.

Whilst I never got to this stage myself I did have a very bad experience many years ago which stopped me from falling into that trap. I exhibited a Goldfish at a show where they provided the tanks. This tank had no cover so water could easily splash in from the tank next door which contained a rather poorly-imported Moor.

Obviously, this was carrying a very nasty disease and infected my fish. We never did get to the bottom of exactly what it was but it killed all my Goldfish breeding stock and it took many years before I ventured back into that branch of the hobby again.

So my advice to other aquarists is to quarantine everything for at least two weeks. All our new fish stay in quarantine for one month and we rarely have problems in our established fish tanks.

Over the coming months I shall be looking at the various species of Costa Rican fish we collected this trip and dealing with how to keep and breed them in captivity. I also plan to include some information on the Killifish we missed out on and one or two other interesting fish from this area.

Until next month, Good Fishkeeping.

THE A&P COSTA RICAN QUEST ...
flinging his net one last time

Catch from sewage stream at San Vito.

Cichlasoma septem-fasciola, bottom centre.

Mature *Brachyrhaphis rhabdophora* male from the Quebroda in Hotel Del Sur grounds.

FROGS & Friends

By BOB and VAL DAVIES

BREEDING PROBLEMS

Following comments in a previous Fact File that the breeding of species with a wide distribution can be problematic several keepers have reported such problems with Boa Constrictors which although from the same country originated from widely separated regions within that country.

The Boa has an extensive distribution throughout South America although the taxonomy is confused and several species/subspecies are recognised by some there are disputes over the taxonomic status of certain forms.

Failure to breed may be due to incorrect breeding conditioning or simply bad timing but it has been suggested that specimens from one region may not recognise a potential mate from a distant region for unknown reasons. One theory is that scent, which is important in mating snakes, is not recognised — however, more work needs to be done on the subject.

Hybridising or interbreeding of subspecies is frowned upon by some keepers who maintain that even subspecies should be kept 'pure' although in the wild certain reptile species intergrade where their ranges overlap.

We know of some Tortoise keepers whose animals have never bred over several years for reasons which are not clear. Since the Spur-thighed Tortoise has a wide distribution around the Mediterranean and its taxonomy is by no means resolved it could be their specimens are incompatible. The Tortoise Trust recommends that species and subspecies should not be indiscriminately mated in order to maintain the purity of the line.

Another example is that of Emerald Tree Boas (*Corallus canina*) and Green Tree Pythons (*Morelia viridis*), both of which have a reputation for being difficult to breed. Much of the recent successful breeding in the USA has largely been achieved with specimens from restricted localities or islands.

One major problem is that someone obtaining a Tortoise or other species may not know its origins — it might already be the product of indiscriminate breeding.

HERP FACT FILE

Uromastyx acanthinurus, a desert species with efficient salt glands. PHOTO: BOB & VAL DAVIES

SALTY PROBLEM

Anyone who has kept a Green Iguana will be familiar with the salty deposits which appear around the nostrils and frequently needs wiping from the vivarium glass. During a recent conversation a lay keeper said she had been told to add salt to her Iguana's diet to replace this loss. This is not advisable — the lizard is actually trying to get rid of various salts in this manner.

Some, but not all, lizard families, certain Turtles and a few Snakes possess nasal salt glands which concentrate potassium, chloride, sodium and carbonate ions — these are then sneezed out via the nostrils. This function, aided also by the kidneys, controls osmoregulation, ie, the water balance inside the body. A good example of a lizard with salt glands is the Dabb Lizard (*Uromastyx* spp.) — a desert herbivore which feeds on plants that have a high osmatic value to aid extraction and conservation of water in a dry habitat and consequently have high concentrations of salts.

Rather oddly, salt glands have not been found in Tortoises which are herbivores from generally dry habitats, yet they are found in some insectivorous lizards.

DIARY DATE

BHS National Show. The Herpetological Society is to hold a National Show on Sunday, 29 November 1998. The event is to be held at Aylestone Leisure Centre, Leicester — we have no directions as yet.

NATIVE SPECIES

Issue 41 of the 'Natterjack' (BHS Newsletter) contains

DWARF GECKOS

A previous issue mentioned the Cape Dwarf Gecko (*Lygodactylus capensis*). Around May this year their close relative, the Painted Dwarf Gecko (*Lycodactylus picturatus*) from Tanzania appeared in some dealers' shops. The colouration is rather subdued — brown/grey with darker markings but according to mood and temperature the head and neck turns a bright yellow — the rest of the body an attractive lighter grey. They have thrived in daytime temperatures of around 28°C (82°F) dropping to 20°C (68°F) overnight in a dry vivarium furnished with cork bark for climbing.

Dwarf Painted Gecko just beginning to lose its grey and yellow colours.
PHOTO: BOB & VAL DAVIES

They are diurnal and although reportedly short-lived in the wild one of our original Cape Dwarfs is still going strong after almost three years. Lively little Geckos ideal for the keeper who is short of space — they have a total length of only 3in (8cm) and feed readily on small crickets.

BOSC'S MONITOR — PROBLEM SPECIES?

Baby and sub-adult Bosc's Monitor. The latter is already obese due to high protein diet.
PHOTO: BOB & VAL DAVIES

In previous articles problems associated with certain species have been pointed out and readers asked to consider them before purchase. Two major considerations are eventual size and suitable diet — the classic example being the Green Iguana, although as previously suggested the popularity of this species seems to have waned somewhat recently — possibly as people become aware of potential problems. Even so we receive many reports of Iguanas suffering from dietary deficiencies being presented to vets and we have turned down several requests to take on specimens which have grown too large for their owners — various institutions will no doubt also provide similar reports.

Another species, not as common as the Iguana but still imported in substantial numbers and posing similar problems, is the Bosc's Monitor (Varanus exanthematicus). Like Iguanas, Red-eared Turtles and certain other species these lizards, often imported as babies are appealing when small but with a potential adult size of around 1m (39in) they ultimately need a large vivarium (one American keeper recommends 2.5x1.3x1.3m). Southern subspecies are said to grow even larger.

Bosc's Monitor has a wide distribution over much of sub-Saharan Africa commonly inhabiting savannah grasslands. It is variously called Savannah Monitor, Cape Monitor or White-throated Monitor. Hatchlings measure 2.5-3in (8cm) and if handled regularly can become tame. One specimen we know is 'cuddly tame' and will tolerate being cuddled like a baby but another which was older when obtained would cheerfully take off your fingers given half a chance!

Monitors, like other large lizards, have a powerful bite and since their teeth are recurved (like those of most snakes) they can be difficult to dislodge.

A frequent problem with captive specimens is obesity. An acquaintance with an animal welfare organisation told us that he sees many specimens which are so obese they can hardly walk. One such animal was seen recently in a shop which reluctantly accepted it. The major causes of obesity are lack of space and unsuitable diet. Since most Monitors are predators and scavengers it is assumed that rodents are a suitable diet but captive-bred rodents have a higher fat content than wild ones.

Combined with lack of exercise such a diet piles on weight — Monitors tend to become lazy under such conditions. According to one study Bosc's Monitors feed mainly on invertebrates such as centipedes, millipedes, scorpions, insects and snails. Stomach samples from a number of specimens showed, apart from invertebrates, only a frog, a toad and lizard eggs (including those of their own species).

Some specimens will take large earthworms (Lumbricus). Supplying a growing Monitor with sufficient insect food would be a costly exercise and many keepers tend to provide rodents, dog food and eggs partly because books recommend them and partly because they make feeding simple. Rodents should only be given once or twice a month, dog food is too high in protein and often too rich in vitamins and minerals for reptiles and normal hens' eggs, being unfertilised, lack biotin which causes deficiency. In the wild the Monitor has to work hard and move about to maintain its food supplies — feeding only four or five times a week is advisable, and in much of its range activity is reduced in the dry season with little or no food being taken between late December and February.

Unfortunately, this species, being common in shops, is often bought by beginners and suffers as a result. From what has been said above they should not be bought unless proper conditions and diet can be provided. Realistically, relatively few people can provide these.

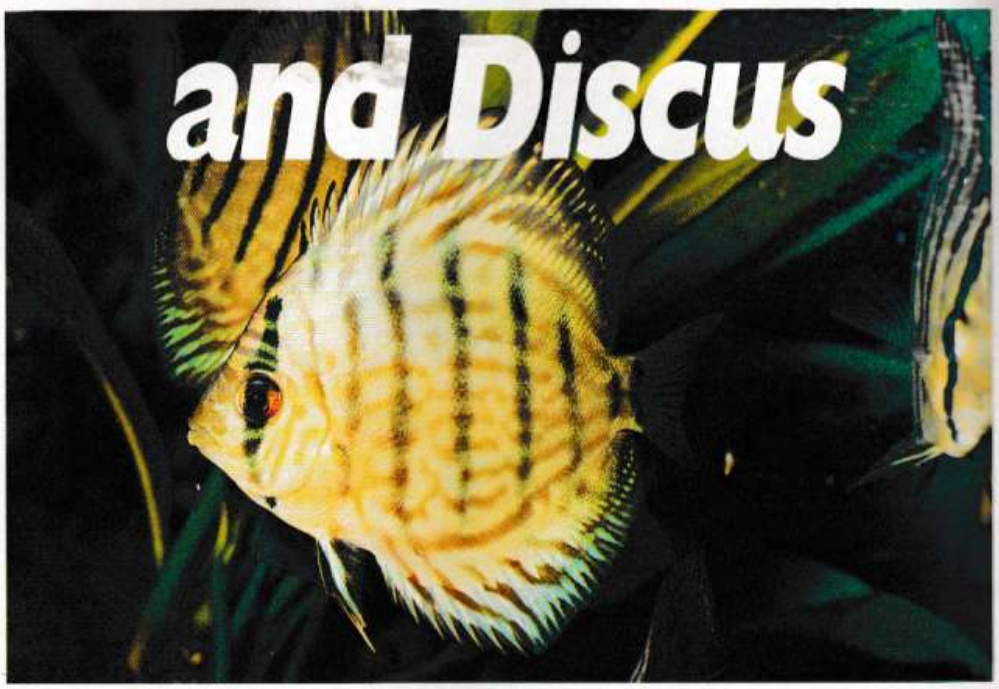
details of two new inland breeding sites for the endangered Natterjack Toad which were previously unknown. Both sites are in Scotland and were unrecorded by Scottish National Heritage which is the local wildlife conservation authority although local people knew of the sites but had evidently not realised their significance.

Land around the first pond had been completely ploughed up destroying the surrounding habitat and possibly preventing any interchange between the two sites which are quite close together. Isolating a pond in such a manner encourages inbreeding with eventual disastrous results for the population. These new discoveries have now been reported and it is hoped that full protection will be given to both sites to ensure their survival.

Mark Evenden *looks at two very important water quality parameters as they affect Discus keeping*

PHOTOGRAPH BY GORDON WIGENS

pH, Hardness and Discus



pH

The most common problem posed to me by hobbyists new to keeping Discus is the control of pH in their aquariums.

The pH of tap water varies from town to town but, almost without exception, due to both nature and water company additives, it will measure in excess of pH 8 as it comes out of the tap. So, what do we do about it, as no Discus will put up with that condition for long?

Firstly, you must establish from a sample of your water its qualities, especially those of pH, General Hardness (GH) and Carbonate Hardness (KH). Initially, people just try to alter the water's pH to make it more acidic (to a lower pH number than it was before) and, therefore, more suitable for Discus.

> If you do not decrease the Carbonate Hardness you will experience a pH 'rebound' in a few hours and this will cause damage to your fish

However, if you do not decrease the Carbonate Hardness (buffering capacity) you will experience a pH 'rebound' in a few hours and this will cause damage to your fish.

In an ideal world without water meters we would all buy reverse osmosis (RO) units, produce soft water and everyone, including our fish, would live happily ever after. But, as we don't, we spend £100s on fish, tanks, etc, but not £99 on an RO unit!

Buy this before your fish and you will not have to buy so many! But, a word of caution: RO water is too pure for your Discus. Personally, I do not use commercially-available additives to put 'life' back into it, I just mix 60 per cent RO water with 40 per cent dechlorinated tap water; this gives me pH 6.5, GH2 KH1-2. You may have to alter the percentages depending on the original quality of the water where you live.

Another popular way to lower the pH is to introduce aquatic peat into

your filter system, as this naturally lowers the KH and subsequently the pH and gives your aquarium an Amazon tinge to the water. If you elect to use peat remove any carbon as they do not get on with each other!

If you have tap water as I do with low GH and KH values but high pH simply add API 'pH Down' little by little until you establish the chemistry you need. You could boil water to soften it but this is not a viable proposition bearing in mind the quantities of water you will be needing.

Alternatively, collect rainwater — many people do — but filter through carbon for 24 hours before use to remove any contaminants.

Problems with soft water

Let's suppose you live in the centre of a city where your tap water is pH 9, GH20 and KH 11 — and a spoon stands bolt upright in it! However, you bought a five gallon a day RO unit and with patience and practice you can now produce water pH 6.5, GH 4 KH 2, ideal for your six Discus. What could go wrong now?

If you feed sparingly, 'open the window' of the aquarium by performing little and often water changes, then probably the answer is 'nothing'. However, the lower your carbonate hardness the less buffering capacity your water has and, if you leave it unchanged, it will suffer 'pH Crash' — your pH values can drop alarmingly.

Monitor your pH and KH at least twice a week; if the KH drops, do a water change with water having a slightly higher KH value or add 1/4 teaspoonful of bicarbonate of soda per 30 gallons of water. Above all, get to know what effects anything you do to your water has on it, and, therefore, your fish.

If you can manage and maintain acceptable (and stable) conditions, your Discus will flourish, live long and breed; monitor water quality and fish behaviour, they are linked so closely. I am not an expert on water chemistry but I know my way around it; you can only learn with experience.

Getting the water before you buy the fish = fewer problems! You do not need super soft water to keep Discus; our main system is just tap water that has been filtered through carbon; however, we are lucky that our water is quite soft.

Hardness

The exact degree of hardness has several, but different, effects on aquarium water. Bicarbonates prevent a solution changing in acidity (pH). Soft water lacking this protection is extremely volatile. Excessive hardness, on the other hand, causes organisms/fish problems absorbing substances through their delicate system of membranes.

Therefore, for ease of maintenance (and your fishes' health) medium soft water (pH 6.5, GH 4/5 and KH3/4) is desirable. Only go the 'Full Monty' (pH 6 GH 0-1 and KH0) if you want to breed Discus, have a good understanding of water chemistry and can do daily water changes. Test — Understand — Modify.

Best of luck!

FOCUS ON FISH PHOTOGRAPHY

The Peril Fish Photo

Linda Lewis opens up her diary

PHOTOGRAPHS BY THE AUTHOR

▶ Shots like this where flash shows at top can be salvaged with a careful trim.

My life as a photographer of fish began in September 1991 when the editor of *A&P* called. He asked for a photo of one of my own fish to accompany an article that I'd sent him about some Peppered Corydoras catfish that had bred at just six months of age.

He wanted proof that it was really *C. paleatus*. I tried to get that photo, believe me, but the fish was so small, my camera so bad (a compact with a closest focussing distance of 1m) that in the end I had to pay a professional to do the job for me — that hurt!

More in a fit of pique than creative enthusiasm I went out and bought an SLR — an old Nikon, fitted with a 55mm macro lens. I thought photography would be easy, once I had the right gear.

November 1991 — A batch of slides came back from the processors. Out of 36 slides only one was even recognisable as a particular fish — the rest could have been virtually anything.

I wondered why I was bothering to try — after all, I never even wanted to be a photographer.

May 1992 — I decided to join a local Camera Club a few months back and was amazed at the difference it made. I learnt about depth of field, use of aperture size and so on. A real eye opener.

s of a grapher

March 1993 — The limitations of a 55mm macro lens began to get to me — you needed to get so close to the fish that if it was awake, let alone active, it would have moved out of frame before I got time to focus. I decided it was time to upgrade, and treated myself to a secondhand Nikon F801, plus a new, and exorbitantly expensive 105mm macro lens.

This lens can offer life size reproduction so that a 1in long fish appears 1in long on the slide — very useful for detail, or for photos of fry or eggs.

June 1993 — The numbers of useful shots per batch increased to 10 or more, although the occasional roll still produced nothing at all worth keeping.

November 1993 — The Editor rang to ask for a picture of a North Sea Cod — I couldn't help him except to offer a shot of a plate of fish and chips!

December 1993 — On a visit to Birmingham Sea Life Centre I found a huge tank full of, yes, you've guessed, North Sea Cod. I took some photos, knowing full well that I would never be asked for a picture of one again!

February 1994 — Pictures from a trip to Bristol Zoo Aquarium come back. They include several of a juvenile marine angel fish but I forgot to make a note of which species it was — the slides are useless.

March 1995 — I spent hours sorting through my thousands of slides. Hundreds end up in bin. The most common faults are dirty marks or scratches on the aquarium glass so that the fish looks as though it has been gardening, light from the flash gun sneaking in at one of the corners, not enough of the fish in focus or a distracting background.

It is very hard to keep an eye on the scenery when you're trying to get a photo of an active fish, and it is worth an each way bet to say that when you do finally catch the fish in frame it will be right in front of the heater, an uplift tube, or worse still, another, more brightly-coloured fish!

August 1995 — Bought a tiny tank for the purposes of photographing fast moving fish. It included a separate piece of glass which fits inside and which reduces the amount of space that the fish has to swim in. This gives the photographer a much better chance of getting an in-focus shot.

Problem — first you have to

◀ Missed me (again)!

FOCUS ON FISH PHOTOGRAPHY

The Perils of a Fish Photographer

catch the fish. Second, once you do, it's bound to show its displeasure by losing much of its colouring so you end up with a lovely sharp frame-filling picture of a faded-out, sorry-looking fish!

February 1996 — Thinking about giving up photography all together after a series of minor disasters. One film comes back underexposed — I'd forgotten to adjust the setting after doing some landscape photography. Then wasted another film as I hadn't noticed that the flash setting had been knocked off its usual through the lens setting.

Then I spent hours and lots of film, trying to get a picture of my favourite fish — an aged Harlequin Rasbora — for an article I'd written. This fish knows what I am up to and for some reason never wants to play ball. When I finally do get a shot the tiny fish seems to be glaring at me!

It is uncanny how fish DO know that it is them that you wish to photograph. All the other fish in the tank swim past the lens just daring you to press the shutter, but the one individual you actually want to snap stays hidden, or keeps out of view behind a bigger fish.

So then you decide, what the hell, you'll photograph the Chocolate Gourami instead — the one that just moments before was parading up and down in front of you. No sooner has that decision been made than he gets stagefright and hides away. Then of course, some catfish start to spawn, just as I have to go out, so I miss the entire process. I got home, just as they were finishing, grabbed the camera, got in position, then the phone rang! When I tried again, the camera jammed — the batteries had run out.

As I had no spares I had to go out (again). I decided, not for the first time, to find another hobby!

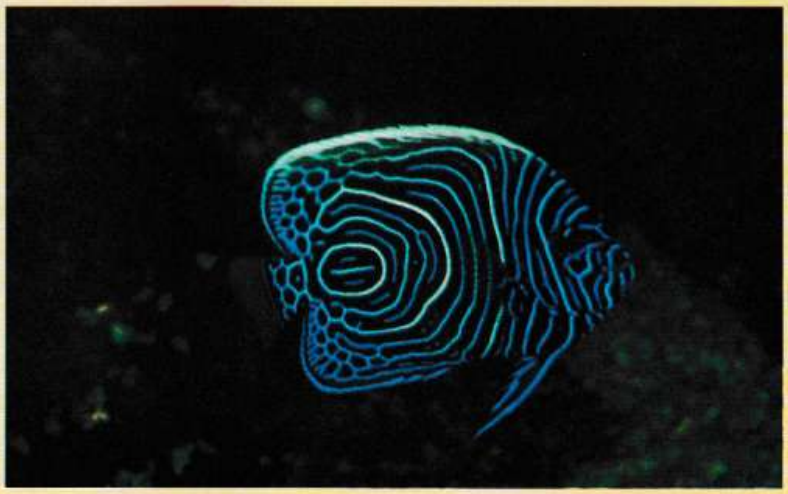
November 1996 — Films came back from the Supreme Festival of Fishkeeping, held each year at Weston-super-Mare. The task of photographing the Supreme Champion fish for *A&P* always fills me with dread. First, you have no idea which fish has won, so you have to try and get a decent shot of all the finalists (plus a careful note of what each one is).

Second, the conditions for photography in the Show Hall are the worst possible. There are reflections everywhere, no room to move, tanks at all levels. I decide never to volunteer again (until next year that is).

April 1997 — I entered what I thought was a really good photo of a fish into my Camera Club's annual competition (natural history section). It got nowhere because the judge thought that taking a picture of a mushroom was more difficult. What he meant was that he had never come across a fish photographer before, and didn't know how to mark one — in other words, if in doubt, give it nowt!

August 1997 — My photo agency called asking had I got a picture of a Scat? I sent them one but it was no good for them as the fish was too big in the frame, yet the same shot was printed in *A&P* three months before. Now have to try and take frame-filling shots for the magazine, plus smaller ones for the agency!

Spent a few days on holiday in Chester with no thoughts of photographing fish. One day I woke to find it



▶ Some kind of juvenile marine Angel?

FOCUS ON

FISH PHOTOGRAPHY

The Perils of a Fish Photographer

raining so I wandered down the lane to a garden centre only to find an excellent tropical fish section. Not only that but they had the most amazing tank of Kissing Gouramis I had ever seen.

I stayed for hours, watching the fish and taking photos. Those lucky shots turned out to be some of my best.

As I hope you can see being a photographer of fish is filled with perils, yet it can also be immensely satisfying. Those Kissing Gouramis will stay in my memory for ever now, thanks to a roll or two of slide film, and a timely shower of rain!

▶ I like this picture, but the judge ...

Choosing a Camera

FOCUS ON FISH PHOTOGRAPHY

Dick Mills wonders why, when they make it so easy, it turns out to be so difficult!

It goes without saying that to take a photograph of a fish (or of anything else for that matter) you need a camera. It is also almost superfluous to say that any of today's cameras will make an excellent job of doing so but, in our specialist world of fishkeeping, things are not that straightforward.

There are some cameras that are more suitable for the job than others and for those smarty-pants who are wondering why film wasn't mentioned in the opening sentence there are media other than film which can now be used, too!

Type of Camera

Looking mainly at film cameras you really will do best by using a computer world phrase — WYSIWYG. This acronym stands for "What you see is what you get" and is not applicable to all cameras. Without going into parallax problems try this for an analogy: if you look out through the keyhole of a door you will see a different view than is seen through the letterbox because they are positioned apart on the door; the same can be applied to a camera that has a separate viewfinder to the lens that takes the

PHOTOS BY A&P LIBRARY

◀ Spot the fish! Early efforts prove harder than they look (the fish is top right).

FOCUS ON

FISH PHOTOGRAPHY

Choosing a Camera

photograph.

This difference in viewpoint may no matter to any great extent in general photography — say for taking views and holiday snapshots, but in the world of 'much-closer- up' aquarium photography this becomes a major setback.

So, do make use of a single-lens-reflex camera (SLR) which not only allows through the lens viewing but also permits very easy lens interchangeability. The standard SLR lens permits focussing down to around 18in (50cm) which may be fine for big fish (or photos taken in public aquariums) but for close-up single fish shots you will need a macro-lens or convert your existing lens for close-up work use by means of extension tubes or a reversing lens adapter.

Getting a Good Photograph

One often feels that film manufacturers make their profits from the thousands of sub-standard photographs thrown away by frustrated fish photographers, so it pays to get things right. Here, again, we might well practice methods from other activities, and this time it is fishkeeping itself: no matter what others may say find out a technique that suits you and produces good results — and stick to it.

Whether the actual photograph is good or bad technically-speaking is neither here nor there if you don't like the actual colours! It may seem peculiar but some cameras do seem to prefer certain makes of films as far as colour rendition is concerned, so get this bit sorted out first.

Films these days can be obtained in a wide range of sensitivities (slow, to 'blink and you'll miss it'). It might be thought that using the fastest (or most sensitive) film rating would be best and may actually do away with the need for extra lighting entirely.

As in everyday life there is a price to pay for this high-speed facility and it is not necessarily money but a drop off in quality. So, to achieve a compromise, go for a modest-speed film and use supplementary lighting. Film speeds are usually rated in ISO numbers rather than DIN numbers: whilst the slowest film may be 25 ISO and the fastest 1600 or even 3200, most fish photographers settle for around 100/200/400 ISO. On a personal note I find that a 400 ISO suits me fine — but I'm still having to work out the techniques!

Flash photography is the most convenient form of extra lighting. Setting up an aquarium under floodlights is not necessary and only overheats the aquarium and the photographer! Flash lighting also has an extra benefit in that it 'stops' the action of the fish so that all the delicate finnage can be seen.

Rather than going into the actual techniques of using flash your attention is drawn to the article by Iggy Tavares elsewhere in this issue.

Sore Elbows

The main problem with fish photography is that water and glass both foreshorten and reflect. You might say I have used the second property to 'copyright' my photos — if you see a photograph in which a reflected ring around the fish says 'f = 1: 55mm' in reverse, then it'll be one of mine! SO, watch out for reflections — try inking out the white letters on the camera lens front ring with a felt tip pen, and avoid buying a 'flashy' camera covered in chrome plating.

The biggest problem is focussing. Using a large aperture opening (low 'f' numbers) reduces the depth of field (front to back) area of what's going to be in focus. With the use of extension tubes and/or macro lenses this means a fish may only have to deviate around a fraction of an inch or a few millimetres for parts of the photograph to be out of focus.

Chasing a fish around the tank, constantly trying to adjust the focus is not recommended, either photographically or from a stress point of view.

Either use a small photographic tank or a three-sided glass trapping device to confine the fish, or, alternatively, focus on a predetermined spot (use a nearby plant as reference) and wait for the fish to swim into the area. Use Iggy's tip of a tripod otherwise just as the fish gets into position your arms will give up holding the camera!

Once you get your photographs back from the processors don't give up on poorly composed shots.

▼ Underwater compact camera with sighting device attached.

Much can be salvaged from judicious cropping or a very well-written caption!

Underwater Cameras

With many more people watching tropical marine fish in their natural surroundings whilst on holiday the question of capturing these stunning moments on film crops up. Underwater cameras, like their land-bound counterparts, come in many guises.

Some are nothing more than conventional cameras housed in a watertight operating case; others may be specially designed for underwater use. A further problem arises here in actually composing the photograph you want — apart from breathing, swimming and trying to maintain position in a constantly moving three-dimensional unfamiliar environment you've still got to view the scene and through a face-mask as well!

Most underwater camera use a frame or grid-like rangefinder to look through (which brings us back to separate viewfinders again). Probably the main disadvantage of using a compact camera in a watertight case is the limitations of any built-in flash gun — even in sunlight coral seas the light level drops off rather quickly.

To do underwater photography well you must also be a master at underwater swimming (preferably with scuba equipment rather than just a face mask and snorkel tube) and then kit yourself out with the appropriate camera. However, most of this can be hired at the point of operation. Again, readers are pointed towards Bob Goldstein's article elsewhere in this issue.

New Alternatives

Digital photography is now with us with all its convenience of a re-usable medium (computer type memory or floppy disk) should the shots fails to impress. With these cameras their need be no time

◀ Underwater — at least it's the right way up!

delay between shooting and viewing the result thanks to the replay feature. The LCD viewing screen can also be used to frame the shot before taking but beware, using these facilities eats up batteries!

Theoretically there should be no problem in achieving good results, for you can always 'doctor' the shots at home on the main computer — the removal of 'red eye' is but one easy adjustment that can be made post-shoot.

Whilst quite suitable for aquarium photography assuming you use a camera able to focus down to your close-up requirements one aspect of digital photography which rather lets it down is that the majority of cameras do not provide picture resolutions of sufficiently high enough quality for publication in magazines or books, although they are quite good enough for the resulting prints to be handed round at Fish Club night, and as a method of keeping identification or spawning records of your fish and tank set-ups.

It is but a short (albeit expensive) jump from digital still photography to digital video. Whilst top of the range digital video-cameras may have a 'single frame' or 'single shot' facility here again the ubiquitous computer can provide the means to produce 'stills' from your original movie using a video-capture and printing programme. But then you'll want to edit the highlights of your video anyway.

Whichever way you care to approach fish photography the world could be your lobster (or oyster) — if only it was in focus I could be more specific!

FOCUS ON FISH PHOTOGRAPHY

Don't Buy Underwater

Robert J. Goldstein says look before you leap

PHOTOGRAPHS BY ANNIE MERCIER AND JEAN FRANÇOIS HAMEL

I've always wanted an underwater camera. Who hasn't? But you wouldn't buy a SCUBA outfit for your first outing, nor go diving without a NAUI, PADI or equivalent course, would you?

The same applies to underwater cameras. I learned this lesson the hard way, but you can have a better first time outing if you rent before you buy, and take a two hour photography course from a dive shop.

I couldn't resist a great deal on a used Nikonos IV-A and SB-101 strobe. I wrote the cheque, read the instruction booklets, packed 20 rolls of film, and was ready to rock and roll when the plane landed on Bonaire in the Dutch West Indies.

A Whole New World

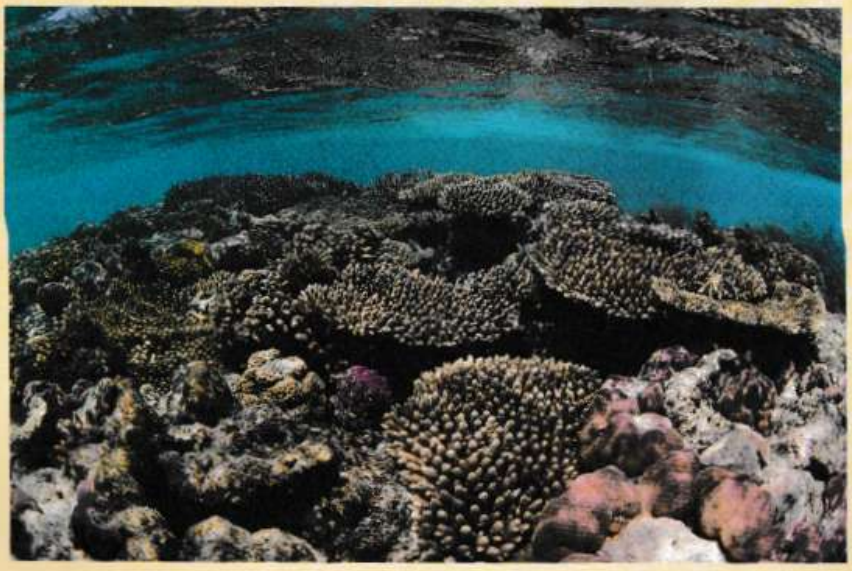
The very next morning I flopped into my flippers, slurped on my snorkel, and began swimming off the beach and free-diving to 15ft (not exactly the blue zone, but also not so bad for a guy who swims and looks like a penguin).

Getting eyeball to eyeball with wrasses, surgeonfishes, and angel- and butterflyfishes was a whole new world.

Feverishly snapping a shot on almost every belly flop to the coral and sand below, I actually grumbled (it comes with age) waiting for the strobe to recycle between shots and all the way back to the beach every time I had to change film. Snort! Foof! Why the heck didn't Kodak put 100 shots into a spool instead of 36?

Barely into an hour and my fifth roll the camera's electronic controls squeaked, blinked, and burped and I was out of business. Zoom! Back to the beach and the car and the nearest dive shop.

Luckily, a commiserating pro was on duty at the Bonaire Dive and Photo Shop. Following a frenetic fresh water wash and overnight soaking to wash out all traces of salt the camera was born again, thanks to immediate on-island and follow-up off-island care by Underwater Photo-Tech in New Hampshire.



That Camera... Yet

What went wrong? I did! On almost any resort island, I could have rented the newest Nikonos and strobe models (often including autofocus and autoexposure) for only $25 a day, gotten insurance for a couple of bucks more in case I flooded, banged or dropped it deeper than I wanted to go, and taken a quickie course on loading the camera and taking pictures of fish instead of semi-pictures of dorsal fins. A course! Of course!

Learned the Hard Way

Here's what you'll learn in the course. First, use the view framer, because even what looks like a straight line to you between camera and fish is refracted very sharply upward. If you're not sure what to do about the O-rings on the camera back let the dive shop reload for you. If you reload yourself, hold the camera facing downward. There's lots more I learned the hard way.

So I spent my money and I got my expensive camera back. Was this the end of it? Could I get better shots at depth? Do divers do it deeper? I spend three Saturdays taking a SCUBA training course in my home town.

My next trip was to Fiji in the South Pacific, where I did my open-water certification (at age 60, not so bad). With my camera and strobe now repaired, I was ready to go.

This time I shot almost a dozen rolls, including four on that many SCUBA dives. The strobe kept firing and the film advancing and I was in heaven. I couldn't wait to get home and get that film developed.

Disaster! Every shot was blank. Once more the camera and strobe went to Underwater Photo-Tech. This time they found worn parts, a leaky strobe, and a bad advance mechanism. How much to repair? Sorry, but the parts were no longer available. Shriek!

Now I located another company, the Southern Nikonos Centre, in Austin, Texas. Yes they had the parts for a Nikonos IV-A. Yes they could fix it, but no long-term promises. When they finally did the work I was advised that my camera rewind would need replacement eventually, and other parts were inexorably corroding. Sooner than I would like I'd need another camera. As to the strobe, forget it; unrepairable. Tick off $670 for a new strobe.

Successful Roll with SCUBA

Well, I just got back from Maui. Guess what! I did several rolls snorkelling and, on my last day, one more roll between two dives (I use a tank of air in just over a half hour; beginner's consumption).

Now understand that this was going to be my only successful roll with SCUBA out of a total of six dives at two locations in the Pacific. When I tried to remove this most valuable (to me) film, the rewind mechanism wouldn't budge. Not to be outdone and unwilling to surrender that roll (featuring me mugging with a Turtle at 50ft), I locked myself into a darkroom, opened the camera back, and removed the film, to then learn that the film uptake of the spool was not rewinding rather than the camera.

After much squeezing and who-knows-what, I got the film back into the spool. Finally, all the film was delivered to my local photo shop for processing. The next step is to test the rewind mechanism of the

FOCUS ON FISH PHOTOGRAPHY

Underwater Cameras

camera with a roll of throwaway film; it's cheaper than sending off the camera for another expert evaluation (for all the good that seems to do me).

I just got the film back. Disaster. Although the new strobe fired just fine, the camera still was unsynchronised with the light output, and this after being worked on by two different repair shops.

My advice to you? Don't buy an underwater camera unless you shoot all the time and go places where you cannot rent. When planning a vacation, look up the dive shops in town and at the big hotels. They all rent cameras and most provide a course in how to use them. Take the course.

Once you've mastered underwater photography at the dive shop and at the insurance company's risk, then you can look at options for owning your own, particularly if you have more dollars than sense.

Nikonos cameras come in several models, including an autofocus-autoexposure that will eat your retirement fund. Most underwater cameras come with a standard 35mm lens, but 28mm is better. If credit is no object go for a fast 12 or 15mm wide angle lens and a double strobe.

Examples of new equipment and approximate costs in dollars

Nikonos V camera body with 35mm lens	870
SB-105 strobe for Nikonos	670
Sea & Sea MX-10 camera with flash	500
Sealife Reefmaster camera	200
Aquatic Epoque camera	200
Ewa-Marine underwater camera housing	200
Ikelite underwater camera housing	550
Underwater housing for Nikon N-50	1200
Underwater housing for Nikon N-90	1800

Vast Differences in Underwater Cameras

If you already own an autofocus SLR, you might consider an underwater camera case, but don't expect to save much, as cases and underwater strobe lights cost as much (sometimes more) than a regular underwater outfit.

There are vast differences in underwater cameras. The less expensive ones have inadequate strobe output to produce high quality images, but are fine for holidaymakers. Professional photographers use largely Nikon equipment, either a Nikonos camera and SB series strobe (sometimes two), or an N-90 in an underwater case. I've seen images produced by the less expensive cameras with built-in flash, and I'm not impressed.

If you buy after you try, be prepared for the occasional snafu. Get an extended warranty.

Numbers to squirrel away are Nikon's Parts Department (1-310-516-7124), Helix in Chicago, a specialist in new underwater cameras and cases (1-800-33-HELIX), the Southern Nikonos Centre (1-713-462-5436) for all kinds of repairs and annual maintenance, and Underwater Photo-Tech (1-603-432-1997) at 16 Manning St., Suite 104, Derry, N.H. 03038.

Finally, a word of painful experience. Never, ever purchase used underwater camera equipment from anyone, company or person. The equipment is difficult to analyse, with some problems only manifesting at depth. Buy new, warranted equipment that you can send back, or none at all.

However, if you want a really great deal, forget what I just said and give me a call ...

FOCUS ON FISH PHOTOGRAPHY

Fish Photogr is Fun!

Iggy Tavares, PhD, espouses the virtues

PHOTOGRAPHS BY THE AUTHOR USING A PENTAX Z-20 CAMERA

▶ The two pictures on this page show close up tank shots of a Bleeding Heart Tetra (right) and a Leopard Danio (below).

Fish photography can be fun and very satisfying, especially when photographing cichlids exhibiting brood care. Photographing cichlids with their fry is in fact relatively easy and only requires being in the right place at the right time with the correct photographic equipment.

On the other hand, photographing small, quick swimming fish in the aquarium is difficult and can be very frustrating. But there are ways and means to make photography of these fish simple and easy.

aphy

▲ Large cichlid with fry, *Theraps hartwegi*.

The Equipment

A single lens reflex (SLR) camera is almost essential for good quality fish photography. There has been a dramatic rise in the number of small auto-focus range-finder cameras on the market.

The unsuitability of the range-finder camera for general fish photography stems from the fact that their minimum focussing distance is of the order of three feet. Another disadvantage is that the image you see in the viewfinder is an approximation of what you are photographing.

With the SLR camera what you see in the viewfinder is the actual picture that the camera lens has in its frame.

Another essential piece of equipment is the macro lens that allows you to focus down to about 1in if necessary. The 50mm macro lens is the ideal work horse for close-up fish photography.

A 90mm macro lens is also available but is less suitable for photographing large fish as this would require standing further back to frame the whole fish and could lead to problems.

A cheaper alternative to the macro lens is the use of rings or bellows between the camera and the standard lens. This is a fiddly operation and the macro lens cannot be recommended too strongly.

A small flashgun that can sit on the camera and be used off camera is also required. Many advocate the use of three flashguns for fish photography but the set-up then becomes cumbersome, takes time to organise and is, in fact, very restrictive. It is possible to take good photographs in any place and at any time without considerable forward planning, with just the SLR camera and a single flashgun.

With film one has the choice of using negative film or slide film. Slide film offers better colour resolution but is more expensive and you only get one copy, with extra slides costing £1 each, so that a full extra set is £36.

Developing and obtaining two sets of prints can cost as little as £4.50 and you can see the end result without the need of a projector. When using flash, suitable film speeds are 100 or 200 ASA. Faster speeds can be used when experimenting without the use of a flash.

The Technique

Many cichlids make good subjects for photography. Their general behaviour that involves staying still in one place allows one to take their photograph.

With the small flashgun mounted on the camera successful photography involves approaching the aquarium glass at an angle and not head on. This allows the flash to bounce harmlessly away from the camera. Shooting straight on would cause some of the flash to bounce of the glass back into the camera, ruining the shot.

With the SLR camera fitted with the macro lens you can get pin sharp photographs at all distances. An auto-focus SLR camera with macro lens will even do the focussing for you, at the touch of a button.

For camera settings a good starting point is to have the camera aperture set at f11 to f16 and the shutter speed at flash synchronisation (1/60 to 1/100 sec). With a little trial and error the perfect combination will soon be arrived at.

With cichlids spawning on a particular piece of rock it is possible to set up the camera on a tripod, focus the lens on the spawning site and to then use a long remote control lead to take the photographs. The flash firing off does not usually disturb the spawning cichlids.

Cichlids with fry also make good subjects for photographing. When guarding young cichlids tend to be at their most aggressive and do not back off easily, allowing the photographer to come in close to get those appealing photographs that editors love.

Other medium-sized, slow-moving fish can also be photographed in the general aquarium using the above

FOCUS ON FISH PHOTOGRAPHY

Fish Photography is Fun!

technique. Most catfish from Corydoras to Hypostomus are easily-photographed, always remembering to maintain that all-important angle between camera and aquarium glass.

Of course, it goes without saying that all glass surfaces need to be perfectly clean both inside and outside in order to obtain perfect photographs.

Close-up Photography

Close-up photography of small, fast moving fish such as Tetras, Barbs and Danios in a large aquarium is difficult if not impossible. Using the methods already described it is possible to photograph shoals of these fish in the general aquarium using a small aperture (f22) to increase the depth of field and therefore get a larger number of small fish in focus.

For close-up photography of single fish a special narrow photographic tank, generally 12x12x1in (30x30x2.5cm) is used. Movement of the fish is restricted by the use of another pane of glass inside the narrow tank that can be adjusted to stop the fish moving.

I have refined this technique by devising a 'V' shaped tank that removes all the fiddling about. The 'V' shaped glass tank consists of two 12in square pieces and two 12x1in pieces glued together with silicone rubber to form a tank that is just 0.5in wide at the top. In this tank fish are held motionless with little effort. The fish are held undamaged and spend less than two minutes in the tank, while four to five close-up photographs are taken, after which the fish are simply poured out back into their usual aquarium.

With this type of close-up photography one does need to be shooting face on and, therefore, one cannot use the flashgun on the camera. I have devised a 2.5ft long, thin aluminium bracket that can be screwed on to the camera base to carry a small flashgun above the camera that points downwards. The flashgun is synchronised to the camera by a cable.

With the 'V'-shaped tank and the flashgun off camera, pointing downwards, perfect results are obtained every time.

Camera settings range from f11 to f16 for aperture and 1/60 to 1/100 for shutter speeds, but some experimentation is recommended. A selection of suitable aquarium backgrounds placed behind the 'V' shaped tank will result in an acceptable looking photograph. Fish that do not show fright colours are particularly suitable for this type of photographs.

Tetras, Barbs and Danios are good subjects although their colours tend to fade if they are greatly stressed while trying to catch them before their portrait is taken. Guppies, Swordtails, Platies and even Siamese Fighting Fish show little or no colour fade and are, therefore, excellent subjects.

Conclusions

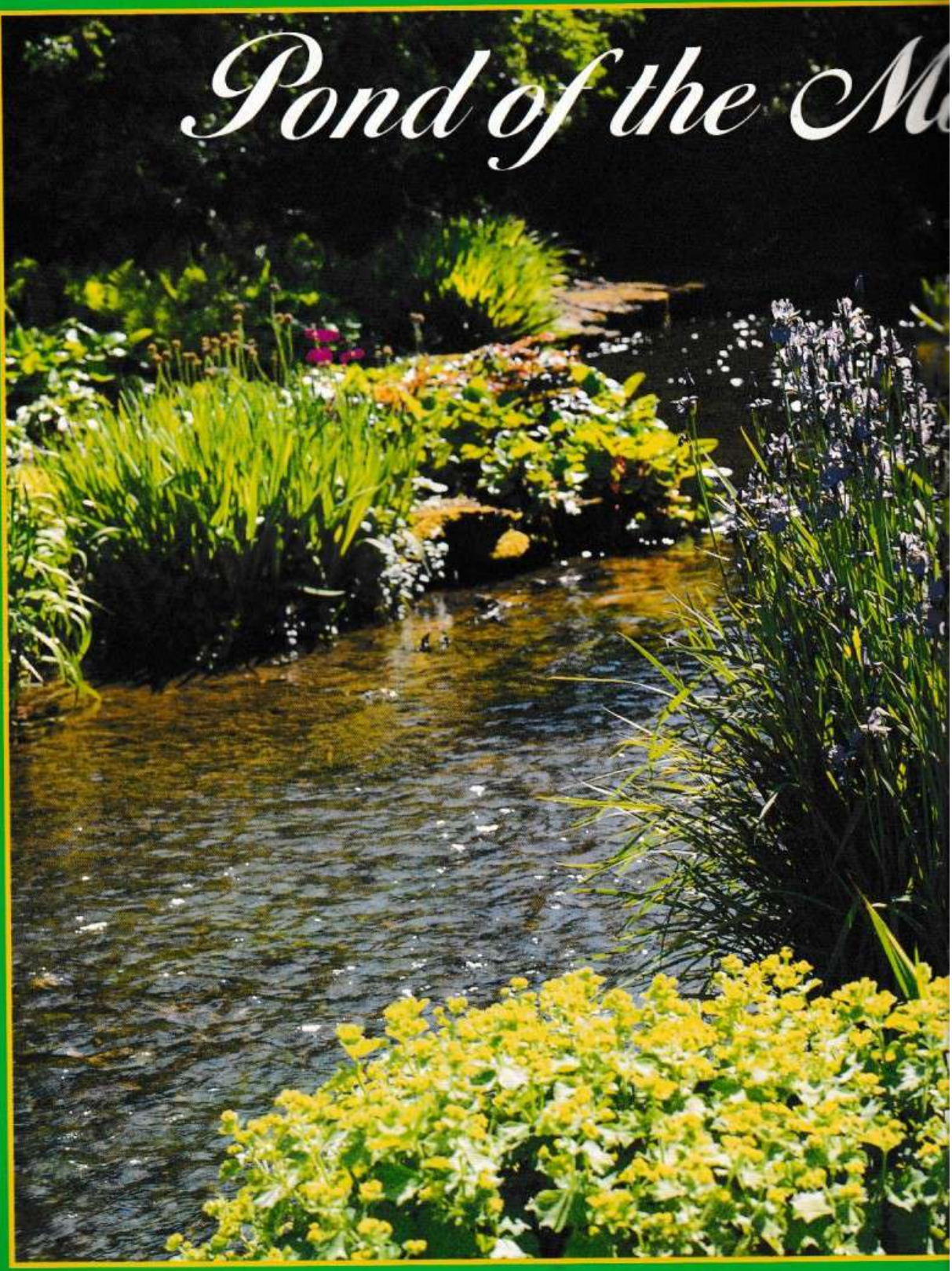
Photographing one's fish does add another dimension to the hobby. Not only does it provide a permanent record of your fish but it is possible to capture interesting behaviour on film.

An essential piece of equipment is the SLR camera fitted with a macro lens and a small flashgun. A complete second hand camera set-up could be purchased for around a £100. The macro lens might, however, be difficult to obtain second hand and a new one might set you back about £90, but is well worth the expense.

Perfecting the photography does take a little practice but very soon, using the techniques described, you should be enjoying good photographs.

▼ Tanganikan Dwarf Cichlid, *Neolamprologus multifasciatus*, attached to its shell, are easy to photograph.

Pond of the M



Irises dominate beds at Letheringsett Gardens.
PHOTOGRAPH BY DAVE BEVAN

Dick Mills *looks at pond filtration and the alternatives*

PHOTOGRAPHS BY A&P LIBRARY

What's in a Pond?

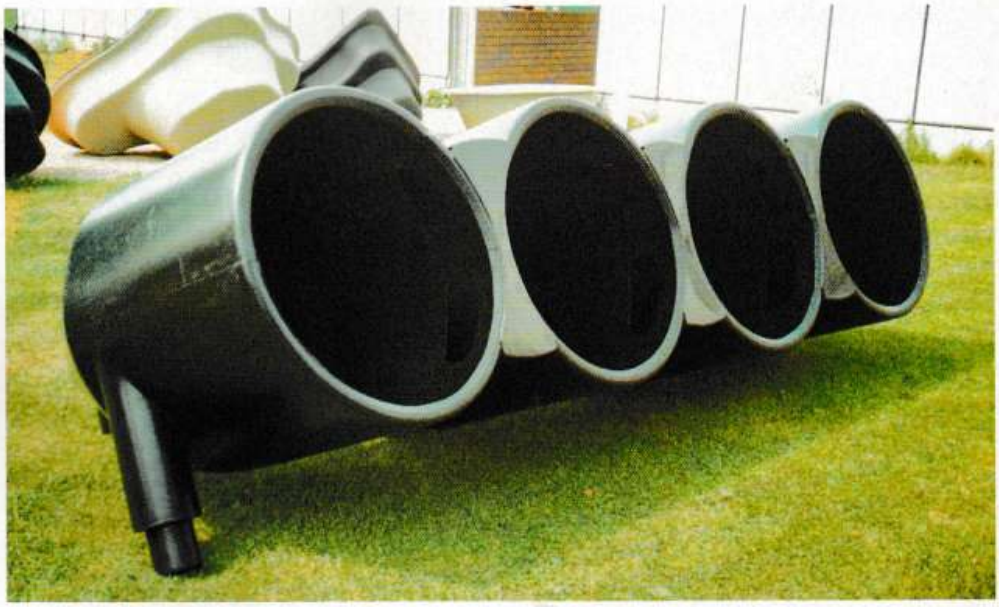
The short, sharp answer to the above question is probably unprintable in a magazine of this quality but the polite version is 'dirt'! However, that simple statement makes for an equally short article giving no information about pond filtration at all — hardly a good start. Let's pose the question a little more constructively and ask: "Do ponds need filtration and what are the alternatives?"

The need

Unfortunately, just like the myth of the indoor balanced aquarium, the pond won't look after itself. There are very few cases where everything has combined to provide a perfect internal, seasonal balance year in, year out. Again, like the aquarium, a pond is not a 'slice of underwater life' — well, it is, but it's not going anywhere — and only in the most ambitious ponds, linked to genuine moving waterways, is anything like a self-cleaning process going to occur. In general, then, we have a body of nearly stationary water, often overstocked (or underplanted), overfed, and, sometimes, over-neglected.

Unfortunately, just like the myth of the indoor balanced aquarium, the pond won't look after itself

No wonder the water conditions are of debatable quality — and we expect fish to survive in it! The upshot of it all is that some form of man-assisted, or man-provided, cleaning is required on a continuous basis. Thanks to the ever-increasing understanding of water quality control it is quite simple to install the correct filter for your pond in almost any manner you care to name.



A centrifugal filter system showing transfer ports in each chamber.

A to Z of plants

By
DICK MILLS

PHOTOGRAPH BY
A&P LIBRARY

S FOR *STRATIOTES ALOIDES*

Is it a floating plant or is it rooted? The answer to this lies somewhere in between, for the Water Soldier (also known as the Water Aloe) does appear to have a bit of an identity problem when trying to categorise it being neither one nor the other.

Stratiotes aloides (Linné)

Description: A member of the Hydrocharitaceaea and named in 1753, *Stratiotes* has bright green ribbon-like leaves radiating from a central crown, much like the spines of a Sea Urchin or quills of a Porcupine. The serrated leaves may number around two dozen in total in established, mature plants and can reach nearly a metre in length, although only a few millimetres wide. There are some roots emanating beneath the crown which may come into play as anchoring devices during winter.

Distribution: Europe and North West Asia.

Cultivation and Propagation: This is a hardy plant requiring very little maintenance. It can be used as an all year round pond plant but it has also been successfully kept in indoor heated tanks. Flowers are white and male and female flowers are only found on separate plants with (as if to make life even more difficult) groups of plants in separate areas containing only one sex (female plants are the more common). However, once the two sexes do manage to get it together then a fruit in the form of a berry is produced. The plant rises to the surface in summer to flower, then drops down to the bottom in autumn to overwinter. Some reports suggest that varying pH levels can also cause this levitating and descending action. Propagation is by runners which may be severed from the parent plant to provide new stock.

Other Species: This is the sole remaining species in the genus although several fossilised forms have been identified as other different species.

The Water Soldier, Stratiotes aloides.

The means

All filters work the same way — water passes through some device which either traps (mechanical), adsorbs — notice the 'd' — (chemical) or converts (biological) suspended solids or dissolved materials in the water before returning the water back to the pond. The actual manner in which these processes are used or housed is, on the one hand, a matter for the filter designers and, on the other, what suits the requirements of the fishkeeper.

In-pond systems

Built-in filtration systems are commonplace in aquariums but not necessarily so in ponds. To the non-initiated, a pond's filter is the sponge on the submersible pump's inlet but genuine in-pond filters do exist.

The biological type, where a matrix of perforated pipework is buried beneath an area of pond substrate (usually behind a retaining wall and often 'fenced off' from foraging fish) is often advocated but it can have a long-term maintenance drawback.

The submersible, pre-pump unit does save the problem of having external pipework to something hidden in the rockery and it is easily raised (courtesy of a locating float indicator and attached nylon cord). It is now possible to use ultra-violet clarifiers under water for even less obtrusive water treatment. The problem of taking up valuable pond space, particularly in the smaller pond, can be counteracted by using a pump/filter combination where the pump is fitted with a container of space saving filter medium such as Siporax. A further alternative (only just describable as 'in-pond') is to feature a filtration unit integrated into a pondside waterfall feature.

External systems

If ease of maintenance outweighs your ease of installation requirements then the external pond filter is the answer. These are connected by extra pipework in all cases and may be pump fed (as in a remotely sited filter box) or gravity fed (where the filter chamber is sunk into the ground alongside the pond). In the first instance water returns to the pond by gravity, usually down a water course or waterfall and in the second type the cleaned water is pumped back to the pond.

Pump fed

Pump fed systems (utilising a submersible pump in the pond itself) are quite simple devices, the latest ingenuity in design being not to make the units look like filters! Pondside planters and even mini-towers camouflaged with hanging vegetation all make the acceptable face of external filtration more ... well, acceptable. The main factor to be taken into consideration when installing external, pump-fed, filters is the size of the pump required to give the now accepted flow rate of complete pond volume every two hours; you must bear in mind three things — the height (or head) of water is to be raised, the extra resistance offered by long pipe runs and last (but by no means least), the resistance offered by the filter medium when doing its job, usually semi-clogged up!

When the water reaches these filters it is usually fed through a spraybar down through layers of differing grades and a final biological section before returning to the pond; alternatively, the water is fed

Spiral filter cone.

External filter with aeration on input, UV on output.

into the bottom of the filter and allowed to rise up through the various media before 'overflowing' back to the pond.

A criticism of these filters is that the average fountain pump used to feed them is not capable of shifting all of the very materials (solids) you want the filter to trap. A sump type pump is better at doing this and it is always a good idea to incorporate a float switch to ensure that when you drain down the pond the pump is automatically switched off when the water level reaches a certain minimum depth and is protected against overheating and eventual burn-out. Surface pumps can also be used to feed such filters but must be fitted with a non-return valve to preserve the 'prime' in the event of power cessation through deliberate switch-offs or inadvertent power cuts.

Gravity-fed

If you don't mind digging the necessary hole gravity-fed systems can be quite big, multi-chambered affairs ideal for providing excellent water treatment. Water flows into these systems quite automatically (the choice of bottom or midwater draw-off points of water is up to you), and rises to the same level in the filter as the main water level in the pond. An often separate final chamber houses the pump to return the water to the pond; the pump can be of two types — submersible (but submerged in water in the final filter chamber) or surface (usually a central heating pump housed in a dry, weatherproofed compartment). Of the two arrangements it is easier to maintain the latter and it's an idea to isolate the pump in the usual manner with a stopcock on either side to facilitate pump cleaning or even necessary replacement.

The sequence of design of the chambers is as follows: the first chamber acts as a settlement area

WHAT'S IN A POND? ... Do ponds need filtration and what are the alternatives?

and where suspended solids are trapped in brushes and the finest sediment falls to the base the subsequent chamber can contain open-cell foam blocks of varying densities if required with the final chamber being given over to biological media, usually a high surface area material such as Flocor, Siporax, Springflow, plastic rings or even simply gravel.

Vortex filters work on a 'wall of death' principle. Water enters at a tangent and as it is whirled round the cleaner lighter water is flung by centrifugal force to the outside of the cylindrical, cone-shaped chamber, with the heavier solids falling down the hole in the centre of the whirlpool to the base from where they can be easily flushed away or hoovered out. These are usually sited ahead of the main filter unit to act as an initial solids removal agency; this results in less maintenance time being spent on the main unit.

UV clarifiers

These 'add-ons' are for the management of green water and must be used in conjunction with a trapping filtration system. Some units come with the UV clarifier integrated into the design but many are available to fit to an existing filtration system. One fact that affects UV performance is exposure time of the water to the UV light — the slower the better. One way to achieve this is to arrange for only a small proportion of the circulating water to pass through the UV device (a simple 'T' piece and flow-adjusting device will do this) at a slower rate than the main pump capability. For those units using a quartz tube in the water jacket design this needs to be kept impeccably clean as any build-up of algae, calcium or other debris will limit the lamp's efficiency; the lamp should be changed after every six months of use.

An additional form of water purification

One of the products of filtration is that nitrates are produced by nitrifying bacteria in the biological sections of filters. In some areas it has to be appreciated that these will be added to the high level of nitrates already in the water supply used to fill, or top up, the pond. Special trickle filters (working anaerobically) can be constructed to remove nitrates from aquariums but there is a more natural (and decorative) way to achieve this in the pond. By simply arranging for the water flow from your filter to return to the pond via a water-course filled with water-cress, or some other fast-growing aquatic, you will have not only a ready consumer of nitrates but also something you can add to your salad table.

Conclusion

With such a diversity of designs on the market there is absolutely no excuse for not fitting your pond with the exact filtration system for its needs. However, it should be appreciated that whilst a filter will make your fishes' life much more comfortable — and even allow you to keep more fish in the same size of pond — the most expensive filter in the world won't be able to do its job efficiently unless you maintain it properly.

ASK A&P

Coldwater

Q My Goldfish is losing its colour. Is this normal?

A *Yes. Goldfish change colour a lot during their lives, and the last colour change can happen when the fish is quite old. All little Goldfish start off brownish and then turn to the typical 'gold' colour completely or partially. This first change can take some while to complete — attractively patterned black and gold fish often disappear their owners by turning completely gold. For some this is not the end, though, and colour continues to be lost, resulting in either white markings, or, sometimes, a completely pinkish-white fish. Many goldfish breeders regard such fish as inferior. However, I personally have a white Fantail in my pond, and consider it to be extremely attractive.*

Tropical

Q I hope you don't mind me e-mailing you. It's about airpumps. I am without fish at the moment but once kept tropicals. The tank was kept in my bedroom as their was no space available elsewhere. Anyway, how do powerheads work and are they much quieter than airpumps? My airpump drove me nuts.

A *Powerheads are not only almost silent but can be much stronger than airpumps, so can run far bigger undergravel filtration systems. The silence is achieved by being placed in the water — any vibration or noise is muffled by the water. They work like ordinary pumps, with an impeller inside a magnetic coil, and are quite cheap to run. Some have a venturi device as well so can output bubbles (this starts the noise up again, though!) Nowadays, I use powerheads on all the main tanks — the airpumps only come back into use for very gentle filtration in fry tanks.*

Marine

Q How important are pH readings? I have heard that they are good indication of water quality, but I also hear of aquarists that never perform pH checks. Can you explain what pH means, and should it be monitored?

A *pH is defined as hydrogen ion concentration but can be more helpfully thought of as a balance of acid and alkali. The scale runs from strong acid at pH 1 to strong alkali at pH 14. The middle of the scale occurs at pH 7 and indicates when the acid and alkali balasnce each other out to give a neutral pH.*
We run marine aquaria at a pH similar to what we would find in nature, ie, between 8.1 and 8.4, that is to say, the water is slightly alkali. However, the apparent small range of 0.3 is not a small as it appears as the pH scale is a logarithmic scale. This means each whole point is ten times as acidic or alkaline as the next, ie, pH 9.0 is ten times moree alkaline than pH 8.0. It, therefore, follows that what may seem a small pH change is in fact quite substantial and could exert quite an effect on one of the fundamental requirements of our aquaria, ie, its stability.
In a marine aquarium the pH will always tend to fall due to the production of acids and nitrates through decomposition of organic matter brought about by the biological activity of the filter bed. Although a marine aquarium has a built-in capacity, called buffering, to resist these pH lowering changes it will eventually be overcome and the pH will fall. This is a sure sign that water quality is failing and the tank is overdue for a water change. The water should not get to this stage of low pH as correct stocking levels, feeding regimens, water changes and tank maintenance all help prevent, or greatly slow down, the pH lowering process.
However, even in a well maintained tank if it contains a number of large, messy eaters such as Puffers and, or, Triggers, the pH may be difficult to maintain and the tank will require extra water changes.
Because of its association with the need for water changes pH testing acquired a reputation as an indicator for deteriorating water conditions. Nowadays the nitrate test has probably surpassed it as the single test that gives an overall indication of a tank's health (if such a single test exists). In short, yes, it is a necessary test, especially in the early life of a tank. However, I can see how experienced aquarists, who know every detail and whim of their tanks, may have little need to run the test on a regular basis.

Plants

Q I know that most aquatic plants will provide cuttings or by dividing roots by which means you can grow extra plants but I believe some plants flowers and produce seeds. Can these be collected and sown in mud, or something, to make more plants?

A *Obviously many pond plants flower — Water Lilies and Water Hawthorn are good examples — but so, too, do aquarium plants. For instance,* Hygrophila *will produce violet flowers if it gets its head above the water and* Cryptocoryne *actually flowers inside the steam and it is only by the study of this flower head that positive identification of some crypts can be made. But back to your query.*
The best example of aquatic plants flowering and setting viable seed is Aponogeton. *This genus has, depending on the origin of species, one or two flower spikes. It is quite a simple matter to pollinate these by the simple expedient of rubbing them together. Soon, dark brown seeds will 'set' and can then be sown in a sandy substrate in shallow water to produce more plants.*

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Out & About

L'Aquàrium a Barcelona

Daniel Conway visits the city's aquarium

PHOTOGRAPHS COURTESY OF L'AQUÀRIUM BARCELONA

▶ L'Aquàrium de Barcelona.

I went to visit the Barcelona Aquarium with the manager of the Marine Unit, at Kew Gardens, Mr Peter Morris.

The city of Barcelona is famous for its turn of the century, neo-classical and baroque architecture and, in particular, of one architect. Peter Morris gave me a whole new perspective on Gaudi's architecture. Gaudi's unfinished cathedral, La Sagrada Familia, is probably Barcelona's most cherished tourist attraction.

Gaudi is famous for making his buildings look incredibly organic. If you were to imagine Barcelona lying at the bottom of the Mediterranean, underneath the waves, you would think you had discovered the lost city of Atlantis.

One of Gaudi's buildings, La Pradrera, gave us just that impression, as we admired the wrought iron balcony frames attached to the undulating sides of the walls, like Kelp beds on the rocks.

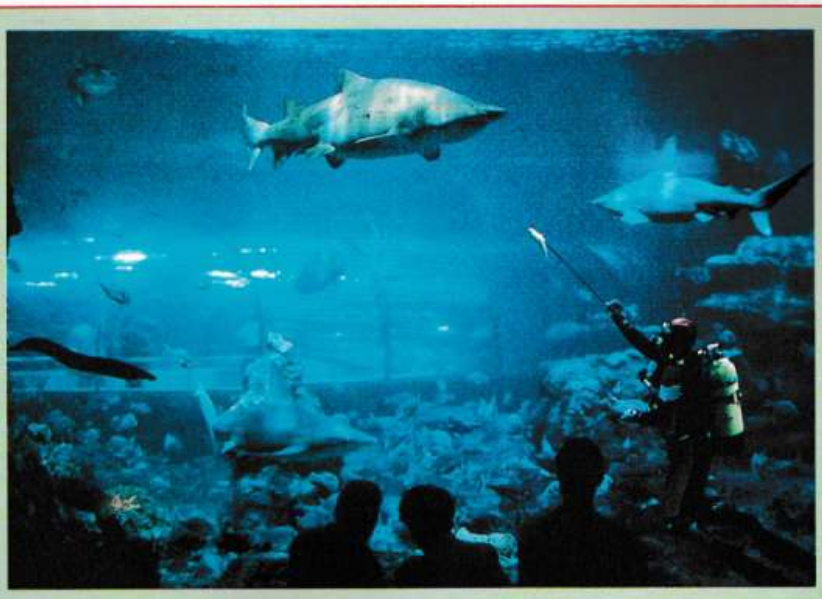
Peter Morris introduced me to the director of L'Aquarium in Barcelona, Mr Jordi Sabate, who kindly showed us around what he proclaims to be the best aquarium in Europe, especially on the Mediterranean front, where 14 out of the 21 tanks on display are dedicated to the Mediterranean.

A Maritime Culture

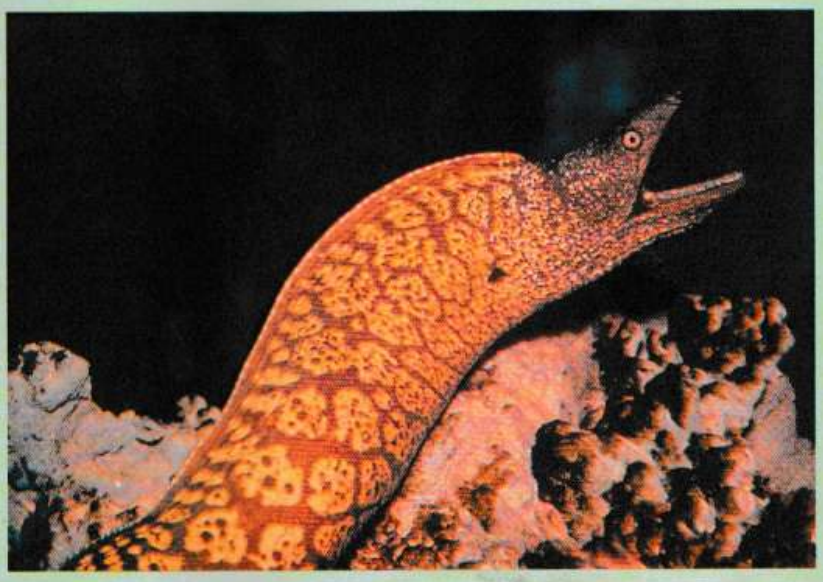
"We want to be the best in the world on the Mediterranean theme. Barcelona's culture is a maritime culture," declared Mr Sabate.

This guided tour would certainly show us the natural inhabitants of any imaginary city of Atlantis, in the vicinity.

Mr. Sabate said: "We try to show features of the real



In with the Sharks!



A very colourful Moray Eel, *Muraena helena*.

habitat as seen through the eyes of a diver."

The Oceanarium undoubtedly provides the visitor with just that kind of experience. An 80m long transparent tunnel stretches beneath a single gigantic 36m diameter tank, which alone stands out by its capacity to hold Sharks, big, mean looking ones.

Atlantis a Spanish City?

What if you were to discover Atlantis to have been a Spanish city? Then would you be surprised to learn what the stars of the show turned out to be. In which case L'Aquarium of Barcelona caters admirably for just that, the main attraction, five Grey Bull Sharks (*Carcharhinus plumbeus*).

The Oceanarium might be considered Spain's equivalent to an underwater bull-ring, in honour of Atlantis. Watch the divers dodge the Grey Bulls like toreadors, enticing their match as the spectators wave their handy aquarium guide books in

Out & About

L'Aquàrium de Barcelona

awe, through the safety of the looking glass.

"The enchanted city of Barcelona is renowned for its hospitality," wrote Miguel de Cervantes, in Spain's most celebrated novel, *Don Quixote de la Mancha*.

True to form, the other seven tanks in Barcelona's aquarium contain a welcome array of tropical visitors from around the globe such as a volcanic atoll in Hawaii to the coral reefs of Australia and the Carribean. The Harlequin Tuskfish (*Lienardella fasciata*), in bright blue and orange stripes, is a colourful acrobat that makes an appearance on the Australian stage.

Picasso Would Be Proud

Picasso would be proud of the fact that the fish named after him, the Picasso Triggerfish, should also be present in the city where he tasted Barcelona's fruits at first hand and, in the process, made a name for himself as young artist.

The light intensity of the tanks is varied diurnally according to the daily cycle of the sun. By mimicking the natural environment as closely as possible it is felt that the welfare of the animals is served best.

Having said this, the water temperature in all the Mediterranean tanks is kept at a constant average Mediterranean sea temperature of 17°C all year round. Depuration of the water supply starts under the sands in the beach off Barcelona harbour.

A natural filtration system, the sand in the beach is used to sieve out any organic particles and floating debris that may be found offshore before the water passes up the funnels that connect the sea to the aquarium. Once in the 'engine room' of the aquarium, you might be mistaken for thinking you were on board a cruise liner, with tall cylinders towering above you.

Ozone Filter Tanks

Here the water from the Mediterranean is pumped through ozone filter tanks, to kill off any bacteria, viruses or parasites. Then pumped through protein flocculators that control the pH or acidity of the water supply and oxidizes any organic material that may lower the pH before being filtered through sand again and encased in special sealed tanks to be exposed to rays of UV light.

Just like the Aquarium of the Americas in New Orleans (featured in *A&P*, January 1998, pp 62-65), so, too, coincidentally is the aquarium in Barcelona situated right next to an IMAX cinema showing 3-D films.

Education is given a top priority at L'Aquarium and they even have classrooms and a theatre in which to act out the behaviour of the fish. Children of three to 17 years old are given an insight into the life under the sea.

The facilities are ultra-modern, as the aquarium itself is still only two years old. The children are provided with a microscope each and the rows of benches look more like a university lecture laboratory than your average school.

As Jordi Sabate sees it: "The children are the future visitors of the local aquarium."

L'Aquàrium de Barcelona is situated at Mundo Submarino, SA, Moll d'Espanya del Port Vell, s/n 08039 Barcelona. (Telephone for group reservations: 93 221 7474. Fax: 93 221 9226).

▼ Harlequin Tuskfish, *Lienardella fasciata*.

Alex Stephenson goes in search of the boundary line

PHOTOGRAPHS BY DAVE BEVAN

Warming to Goldfish

The majority of fishkeepers, supported by most aquarist societies, class the Goldfish as 'coldwater'. I think this is open to question. When compared to other species, which are native to such places as Britain, Scandinavia, Northern Europe, parts of North America, etc, their requirements are different.

I would go further and say, the whole idea of separating species into

> Goldfish are very adaptable things, and can cope with a wide range of temperatures

Lionhead Fantail.

two convenient groups is 'unhelpful'.

Let us look first at what is normally described as 'the tropical community tank'. These are set up to house a number of different species. The temperature chosen is usually about 75°F (24°C).

'Seasonal' fish

This, in itself of course, is a compromise. Species coming from different parts of the world may require different temperatures. Some might prefer it warmer, some cooler, while others would benefit from 'seasonal changes'. A good example of a 'seasonal' fish is the Rosy Barb (*Barbus conchonius*). This is a nice, medium size, peaceful Barb, popular as a community fish.

In most aquaria this fish reaches 2in to 3in in length, sometimes bigger but, this is the usual size. In the wild this fish grows to a length of 6in. The Rosy Barb is a native of Northern India where it enjoys a climate which is seasonal, winter temperatures being much lower than the summer ones.

WARMING TO GOLDFISH ...
in search of the boundary line

Many years ago I used to breed 'Rosys' in an outside pond. I discovered, firstly by doing my homework (and then by experience), that the best temperature range for Rosy Barbs was between 60-70°F for most of the year. I also found that letting them slowly drop down to 50°F (10°C) for a few weeks, to represent 'winter', suited them and made them extra keen the following season.

Now, this temperature range of 60-70°F, which suits Rosy Barbs, is also the preferred temperature range for Goldfish. We know this because it is within this range that Goldfish do best all the things which Goldfish do. They eat well, grow and develop, remain resistant to disease, and they breed.

Adaptable fish

So, how can we justify calling one of these fish 'tropical' and the other 'coldwater?'

Goldfish are very adaptable things, and can cope with a wide range of temperatures. This is how they manage to survive our climate. Going up the scale, at 80°F they grow quickly and are very active but they tend not to spawn. Also, in my view, Goldfish kept at constantly high temperatures, lack stamina and have significantly shorter lives. Going on towards the 'outer limits' they can tolerate temperatures around 90°F, but not for long. At this extreme Goldfish become distressed.

Two important changes

Going down the scale at

Moor Goldfish.

temperatures below 60°F we find Goldfish 'slowing down'. They eat less, stop growing, and don't breed. Below 50°F important changes begin to take place as the fish prepares to go into 'winter mode'. Two of these changes are very important and, as Goldfish keepers, you need to be aware of them.

Firstly, the fish becomes less resistant to disease. Experts claim that the immune system stops functioning. I am not a scientist but my experience over many years leads me to support this view.

Secondly, the fish's digestive system becomes inefficient, and much of what is eaten is not digested. It is even possible that food can remain, undigested, within the fish, long enough to decompose. Should this happen the fish is in serious trouble. Finally, at 40°F and below, Goldfish are 'shut down' for the winter.

You could say they are on 'life support' and little else. Strong, healthy fish can even survive at temperatures just above freezing, but not for long.

We've all heard stories about Goldfish being frozen, and how, when thawed out, they swam away. Well, strange things can happen but, in most cases, these fish will never swim again. Remember, even though your pond may have 4in of ice on the surface the water at the bottom is not that cold. If it was the pond would freeze solid. You have to admit being able to cope with such a wide range of temperatures is pretty impressive.

Bear in mind, though, that the more exotic varieties can be less tolerant. This is part of the price paid for selective breeding. The obvious question to ask is, why are Goldfish so adaptable?

Selective breeding

To throw some light on this we need to look at where they come from. All modern Goldfish have been produced by several hundred years of selective breeding in much the same way as other domestic animals.

However, they are all related and have a common ancestor. The ancestral Goldfish is found in Southern China. This area lies across, and to either side of, Latitude 30°N and is seasonal. If you study a map of the world you will see that the 30th Parallel runs across the globe taking in places like North Africa and the Gulf Coast of the Southern United States.

So, this is not a cold climate. Most of the year temperatures will be temperate to warm and the winter, by our standards, short. This means Goldfish have evolved to cope with a long, warm season and a short cold one.

Compare this to our climate, where the warm season is very short and the winters seem to go on for ever, and you will realise that Britain is an inhospitable place for Goldfish. These fish are simply not equipped to deal with temperatures below 50°F for five, often six months, of the year.

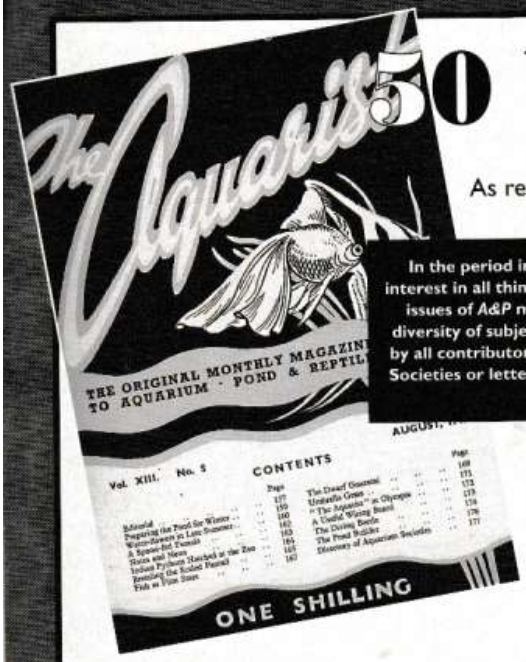
How then can we call Goldfish a coldwater species? As a matter of interest the Rosy Barb is also found at a Latitude of 25 to 30!

Red Cap Oranda.

50 Years Ago ...

As recounted by Editor **Dick Mills**

In the period immediately after the war the increase of interest in all things aquatic was rapid. Looking through past issues of *A&P* makes interesting reading not only for the diversity of subjects raised but for the apparent enthusiasm by all contributors whether they be authors, reporters from Societies or letters from readers. August 1948 threw up this selection of topics ...



August 1948 saw a change in editorship at *A&P* with Alex Fraser-Brunner leaving for an eight month period in which he would be conducting a survey of the fishes of the Gulf of Aden on behalf of the Colonial Office — a task which he relished, especially as he would be switching his attention from Guppies to Sharks and other large fishes. The incoming Acting Editor (Fraser-Brunner obviously confident in that the Sharks wouldn't get him and that he would return) was to be another well known figure in the form of Anthony Evans, who would later move on to create the *Petfish Monthly* magazine.

Following the great freeze up of the 1947 winter (I remember it well!), pondkeepers were still recovering from losses sustained during that terrible period, so it was no surprise to see in the August issue recommendations as to what precautions to take to lessen the effects of the coming winter. Porridge was one suggested dietary ingredient to build up protective fat!

Chemical wastes were apparently just as effective in killing river fish as they are today but up to the 18th century things were very different with several colonies of fishermen between Kew and Westminster on the Thames. A report dated 1791 reveals that Salmon appears in the river about the middle of February and sells at a vast price. Lesser Lamprey is taken in amazing quantities (between 1,000,000 -1,200,000 annually). Species taken as far downstream as London Bridge included Barbel (*Barbus barbus*), a few Roach, and Dace and Bleak in great plenty; Eels extended far down the river with Flounders brought up by the tide as far as Fulham.

With the introduction of the fry food Microworm only a year gone it was not surprising that an opportunity for a 'breeding station' arose. It consisted of six 'cells' in which the worms could be cultured and fed to the fish in rotation. It sold for the price of 15/6d plus 1/3d for postage and packing — in today's money that is 72.5p plus 6p p&p.

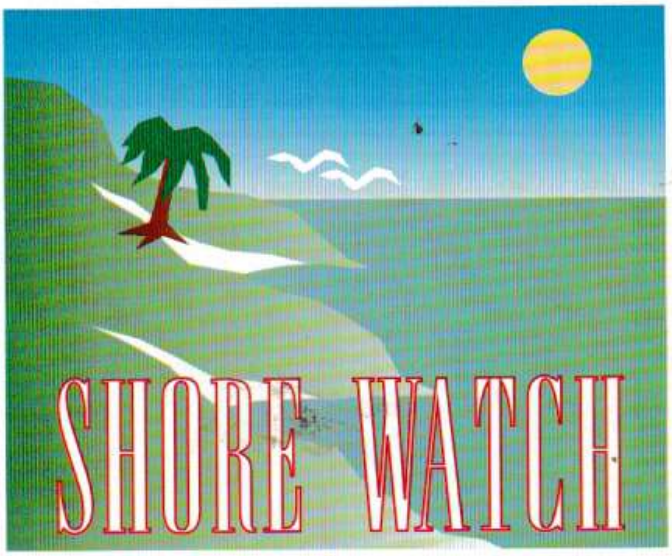
An article with a difference (which may be pertinent considering today's video age), was one describing the filming of setting up an aquarium, with even a location shoot when collecting specimens from a local pond.

At the *Evening News* Flower Show at Olympia the *A&P* display stand proved to be a great attraction to visitors. The organisers took the trouble to place a poster outside the Hall advertising the 'fancy fishes as bright as the flowers'. Cecil Creed (readers may remember him as a Vice-President of the FBAS up to his death last year), earned a special vote of thanks from *A&P* for giving up three days of his vacation to deal with the enquiries on the stand.

Ever inventive, one aquarist contributor named D. W. Jones came up with an idea of running multiple heaters from one thermostat in separate tanks of differing sizes. It simply meant that the connecting leads from the thermostat went to a distribution board into which the separate heaters were then plugged. The main problem was in using the correct sized heater for each tank. The illustration showed a 12 gallon tank (containing the thermostat) with a 200 watt heater, a six gallon tank needing a 100 watt heater and a nine gallon tank with a 150 watt heater.

A very humorous article by Major R. Lane discussed all the problems of excavating a pond, including a remedy for blisters and backache, culminating in a most prophetic final sentence ... "You will now be all set for a visit from the nearest heron."

The Directory of Aquarium Societies reached a total of 70. 'Togetherness' by Societies resulted in Wolverhampton & D.A.S. and Walsall & D.A.S. co-operating in several meetings, amongst which was a combined visit to the Belle Vue Aquarium where they were conducted around by the Curator, Gerald T. Iles (also the Secretary of the then one year old F.N.A.S). Similarly, the 'Three Towns Show' held at Dagenham featured a 100 tank display by the Societies of Benhurst, Havering and Dagenham.



BY
ANDY HORTON

In the column for the year I will examine some aspects of the biology and behaviour of the rock pool fish and marine invertebrates that are both interesting and useful knowledge for aquarists.

"Is there any fish that you would not keep in aquaria?"

One Shark comes immediately to mind because of its sheer size and migratory habits: the Basking Shark, *Cetorhinus maximus*, the largest fish in the sea except for the Whale Shark, *Rhincodon typhus*.

The Basking Shark reaches 10m long and weighs 3 tonnes or more. It feeds exclusively on plankton, cruising along with the water entering its huge mouth and the plankton collected on the gill rakers, before the water passes out through the broad gill slits.

CORNISH SHARKS

In the middle of April this year reports began to come in of a large population of Basking Sharks seen from the Lizard peninsula in Cornwall.

They are often seen because in times of plankton abundance they will cruise in the surface waters, often close inshore with half their body out of the water.

The sharks occupied the sea from the horizon to the shore. Over 200 sharks were seen in in Kennack Bay.

Basking Sharks are present every year off the south-west of Britain and are also well known visitors to the Isle of Man shores. I have seen a huge specimen in the entrance to Shoreham Harbour, Sussex, and in the last century there is a report of the largest recorded Basking Shark stranded on Brighton beach. It measured 11.12m long.

Large carnivorous sharks like the Shortfin Mako, *Isurus oxyrinchus*, and the Porbeagle Shark, *Lamna nasus*, visit British seas in the summer but these fish rarely exceed 3m in length. There are no records of shark attacks on bathers.

Earlier this year the Basking Shark received protection under the Wildlife and Countryside Act in British territorial waters. This does not extend to the seas of other European countries as there is an EC fishing quota for shark livers.

Cuttlefish, Sepia officinalis. The Cuttlefish is well disguised amongst the pebbles and rocks. In the long term Cuttlefish should be kept on a soft sand substrate. A Protein Skimmer is an essential requirement if you wish to keep these attractive molluscs. Access to plentiful supplies of fresh seawater is another necessity.

PHOTOGRAPH: ANDY HORTON

KILLERS OF THE SEA

Such a huge congregation of Basking Sharks attracted the attention of one of the fiercest and most powerful predators of the oceans. Killer Whales, *Orca orca*, were seen with the whales. It is unlikely to have been a happy coexistence.

Killer Whales are armed with a formidable array of teeth and they are known to attack Basking Sharks which most be a rather brutal sight with pods of Orcas tearing into the larger sharks.

A large expanse of the sea would have been covered in blood. Killer Whales will also tackle the formidable Humpback Whales, *Megaptera novaeangliae*, which can easily be up to 16m long.

Humpback Whales are seen every year from the cliffs of the Shetland Isles. There is also a recent report of a Killer Whale attacking and killing a

Great White Shark, *Carcharodon carcharias*.

Killer Whales are actually the largest of the dolphin family Delphinidae and the larger males are usually between 5m and 9m long.

The Harbour Porpoise, *Phocoena phocoena*, is the smallest of the fully aquatic mammals that visit the British coasts. Adults are about 7m long and usually travel in small groups.

At the end of April there was a report from the Shetland Isles of hundreds of porpoises off Sumburgh Head completely filling the sea in all directions.

Tompot Blenny*, Parablennius gattorugine. *Compatibility between species is a major concern of the aquarist. Tompot Blennies will eat small Sea-anemones and attack the larger ones.

PHOTOGRAPH: ANDY HORTON

SEAHORSES IN CAPTIVITY

Of the smaller fish and invertebrate animals that will not outgrow the home aquaria there are many that present their own particular problems.

I would have to think seriously about the problems before I would keep Seahorses in captivity. On the northern coast of the English Channel there is one species, sometimes called the Spiky Seahorse, *Hippocampus ramulosus*, which is very rarely caught, although a collection of about 30 caught off Dorset comprised the basis for the breeding programme by the Sea Life Centres.

It is best to try keeping the commoner Pipefishes first. Like Seahorses they feed on prodigious amounts of live foods and although they can be persuaded to take dead food, this should be only be used as a last resort when live food is unavailable.

Mysids (a small prawn-like crustacean) are the mainstay of their diet and these can be collected in large numbers in brackish water around the British Isles.

The trouble as far as the home aquarist is concerned is that the normal household events, bad weather and holidays, all get in the way, and it is usually not practical to provide a continual year long food supply. I usually only keep Pipefishes for short periods when their food is easy to provide.

The Seahorse*, Hippocampus ramulosus, *at Brighton Sea Life Centre. Unless you are absolutely sure that you can provide live food for 365 days a year, my advice is not to keep these attractive fish.

PHOTOGRAPH: ANDY HORTON

CUTTLEFISHES

Cuttlefishes, *Sepia officinalis*, present their own special problem which defeated me earlier this year.

Bob Alexander, from Dorset, had hatched 20 Cuttlefish from their egg capsules the previous summer and now they were growing too large to all be kept in the same tank together. He would have to release them into the sea or find another home for them.

Although, I could only quickly set up a tank to accept these fascinating animals I was encouraged that they were easy to keep, and set off to collect them. I knew that they discharged their ink when faced with danger (I had put a Squid, *Loligo* sp., in a tank once) but I did not anticipate their propensity to do so. They arrived back home in Sussex in a pool of black ink seawater, but when settled in the aquarium they did not squirt their ink — they had probably exhausted their supply.

Each Cuttlefish can manage about four discharges. Three days later, and feeding avidly on small live prawns, they had built up their supply of ink and turned the aquarium sea water so black that I could not see the Cuttlefish.

The trick then is to instal an efficient Protein Skimmer that Bob said would clear the ink in an hour

I think 'efficient' is the key word as my home-made Skimmer did not do the job properly. It was operated by an air-pump and used a wooden diffuser stone.

However, I discovered that is essential to set the Skimmer to the correct height in the water for maximum efficiency. The outlet pipe dripped copious quantities of black ink into the collection cup, but not enough to clear the water.

In short, I decided to release the Cuttlefish into the sea and next time I would prepare the tank properly in advance.

The colour changes and active predation on prawns and crabs make it worth taking more time and effort to keep them, although I may try the Little Cuttlefish, *Sepiola atlantica*.

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

Caught in the Net

Kathy Jinkings logs on for more Internet Fish Information

This month we shall be concluding our tour of commercial Internet sites. The first stop this time is at Waltham laboratories, **www.waltham.com.** Here they conduct research into the best foods for a variety of pets, which results in many of the brands we are familiar with, such as Aquarian fish foods and Whiskas cat food. Waltham have taken a great deal of trouble over their site, making good use of both new and old web technologies. The site is best viewed with one of the later browsers, as they have used style sheets, but older browser users can still enjoy a visit.

The site is clear and easy to navigate, and enhanced rather than overloaded by animated GIFs. They may possibly have gone a little overboard in suggesting that readers might like to visit the Microsoft site to download the newest fonts; I didn't do this and I can't imagine many people will. Still, it looks fine in the standard fonts.

Starting with the 'Waltham' link from the menu bar at the bottom you are taken into an area of the site which explains more about Waltham and their work. Here you will find a picture of the Centre for Pet Nutrition that you can drag your mouse over to spin the picture round so as to see a full 360° panorama, and a video of a happy Labrador-type dog with a voice-over. The menu bar to the left allows you to either jump to the area you are interested in, or to click the 'next' arrows from page to page to work through the whole tour methodically.

Since we are concentrating on fish you can jump straight to the AquaCentre, where an unobtrusive slider at the top plays a short voice clip, and underneath text and fishy photographs you can download another 360° panorama. All the gadgets and gizmos are optional and need to be clicked to activate, so if you are pushed for time you can move through the pages quickly without looking at any of them.

This provides a full multimedia page with lots to do without impacting the initial download times. Still inside the Waltham section, you can look at the photo galleries, which show small photos of a variety of fish (and other pets) along with some information about them.

Unfortunately, the link to the fish pages, located on the bottom menu bar, returned the message 'document contains no data', but this glitch can be overcome by using the index link to display a site map, and selecting the fish pages from there. The first page is 'choosing fish'. This does not go into individual species in detail, but provides short synopses of what you can expect from a cold water, tropical or marine aquarium.

Moving on to setting up, this page gives short but good information on the equipment you will need, setting up the new aquarium, and finally introducing your fish. Since this is the Centre for Pet Nutrition it is unsurprising that the 'feeding' pages contain a higher level of detail. The gist of the information is that you should buy foods produced at Waltham, but the informative text explains clearly and concisely why nutrition is so important, the different chemicals and nutrients that fish need, and much more.

It is also explained how often and how much you should feed your fish. The consequences of incorrect feeding are also explained. This is one of the most complete discussions of fish nutrition I have seen on the Net, and is presented so that everyone will be able to understand. In 'Your fish's health' the text discusses the need for clean water, and points out that many diseases are caused by pollution. This is once again concise, but provides sensible advice.

In the Petzone you will find advice on photographing your fish (along with several other pets), and you are invited to send your better pictures for advice (and exhibition on the page) to Waltham. In the 'your pictures' section some of the photos sent are shown, along with the relevant advice on how they could have been even better.

The photos change on a regular basis, so they won't necessarily be of fish!

The 'Did you know' section features lots of fascinating facts, including the world's longest lived goldfish, who was named Fred, and how baby Jewel Fish recognise their parents. There are lots of snippets in here, and you can't always tell which are the fishy ones from the titles, so you'll have to read them all.

I had intended only to write a couple of lines about Waltham, as when I visited the site a couple of years ago it was extremely mediocre. Someone has put a lot of work into this, and come up with a site that is informative, fun, and still manages to plug the foods tested there. Well done, Waltham!

Of course, you don't need to be a big company to have a web site. Take time in your browsing to drop in at the Fur and Fins pages, at **http://www.aquaticJLB.demon.co.uk/**. This is the page for a fish and pet store in Redbourn, and the web site has been done as part of a school project by Paul Emerton. It is fairly basic so far, but he's got big ideas and will probably appreciate any constructive criticism and encouragement.

Castle Aquatics in London have a web site with a changing special offer available only to Internet visitors. Check out their page at **http://www.jepa.co.uk/castle/.**

At Talisman Aquarium Services, **http://www.window.to/Talisman/**, you can find out that renting an aquarium for your business is not as expensive as you thought it was, or just hire someone to maintain an aquarium you already own. Exactly what you can expect to get for your money is fully detailed. In addition to this you can read about the history of fishkeeping, and can follow the unassuming 'general fishkeeping' link to an unsuspected treasure trove of information including building your own systemised filter, building your own aquarium cabinet, local retailers, the tribulations of redesigning a 6ft tank, successfully raising Killifish and much more. Many pages are hidden in sub-menus, so you need to have a good look to find all the information.

And ... well, that's it. Out of the whole Internet I have succeeded in finding three pages representing small UK businesses. Of the major international players, the pages (when they have them) assume that the readers are in America. Where is Interpet? Animal House? King British? Not to mention all the little (and not so little) shops around the UK.

While it costs money to set up a professional website, with Java, shockwave and other bells and whistles, lots can be done with a little forethought and a do-it-yourself approach. This is shown clearly by the number of continental and American retailers pages that have been reviewed in 'Caught in the Net' because their design and content make them a worthy addition to anyone's book marks.

When I talked to a few companies a while ago about their web plans a common response was that 'no-one's interested'.

The hobbyists' pages on the net are growing by the day, increasing in number and content. If commercial interests don't wake up soon, they may find that not only are we buying mail order, but buying it from another country.

On the topic of mail order from another country, a remarkable bookshop is to be found at **www.seahorses.com.** So far as I know this is the only one of its kind in the world, and fortunately they do supply by mail order. This is a bookshop specialising entirely in second hand aquatic books and magazines. If you desperately want a book that is out of print or an old issue of a magazine, the odds are that you will find it on their catalogue or that a quick e-mail will get them to find it for you. A book I had spent months searching for was winging its way across the Atlantic within a week of e-mailing Seahorses. This is a service that really shows the true power of the Internet, and is well worth a visit.

Next month we will be taking a tour of Koi and Goldfish sites.

Kathy Jinkings (British Aquatic Resource Centre — http://www.cfkc.demon.co.uk) (AquaSource International — http://www.aquasource.demon. co.uk)

Nick Dakin sees stars

PHOTOGRAPHS BY THE AUTHOR

A Call to Arms!

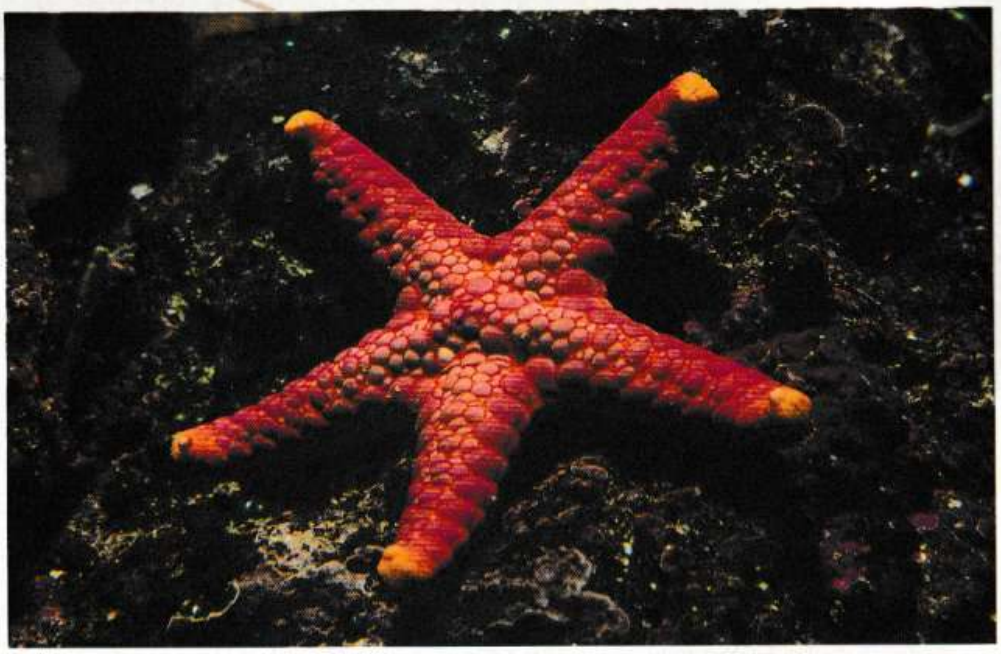
PHYLUM: ECHINODERMATA.
CLASS: ASTEROIDEA

Ask any child (or adult for that matter!) to draw an underwater seascape and there is a strong likelihood that the first creature to appear on the paper will be a Starfish. Illustrated books, cartoons, advertisements, in fact anything featuring a scene from the ocean will invariably feature a Starfish.

We learn from a very early age that the sea is associated with Starfish, and Starfish are what the sea is all about

We learn from a very early age that the sea is associated with Starfish, and Starfish are what the sea is all about. But apart from the fact that Starfish have five legs and occupy any beach where children are found(!) what do we really know about these fascinating animals?

Starfish are extremely common marine creatures, being found on shorelines and shallow seas in every part of the world. Species can be discovered in the coldest Arctic waters, through temperate and sub-tropical zones, to the very warmest tropical regions.



Red Starfish.

This is not totally unsurprising as they belong to a very large invertebrate group consisting of approximately 6,000 species; these include Sea Urchins, Sea Lilies, Feather Stars and Sea Cucumbers, most of which have found a place in the marine aquarium. The one thing these creatures have in common is a five-rayed symmetry, illustrated most clearly in the Starfish's five legs.

Starfish are not particularly well developed in an evolutionary sense having no distinct head, brain or complex sense organs. A simple nervous system extends down the arms and across the skin which responds, rather ponderously, to touch and surrounding water quality. The presence of nearby food can also be detected by the same process and may be likened to 'smelling' the water.

Locomotion is fascinating to observe as Starfish seem to glide over even the roughest terrain. This is due to the movement of hundreds of pairs of tubed feet connected to a water vascular system, unique to echinoderms. Put simply, each leg incorporates a canal filled with sea water which can, by a system of valves and muscles, control each pair of feet.

The mouth of the Starfish is situated at the centre of the underside and many species are capable of pushing their stomachs out through the mouth to engulf and digest food outside of the body. This

A CALL TO ARMS! ...
seeing stars

feeding behaviour is common in those species that feed on bivalve molluscs, using their strong feet and arms to prise apart the two shells, the stomach is then inserted and the shellfish digested from within!

Starfish are also capable of the most extraordinary regeneration and reproduction. Should an arm be lost it will quickly be regrown and the animal regenerated to its normal state. More than this, however, is the fact that many species, when cut in half, will actually develop into two separate animals!

Commercial oyster and mussel fishermen discovered this to their cost when plagues of Starfish used to prey upon their valuable shellfish cultures. Each Starfish was caught, cut in half and thrown back into the sea, only to regenerate into two animals and increase the plague still further!

In the normal course of events Starfish reproduce by means of eggs and sperms ejected into the water, where the larvae develop until metamorphosing into an adult to settle on the sea bed .

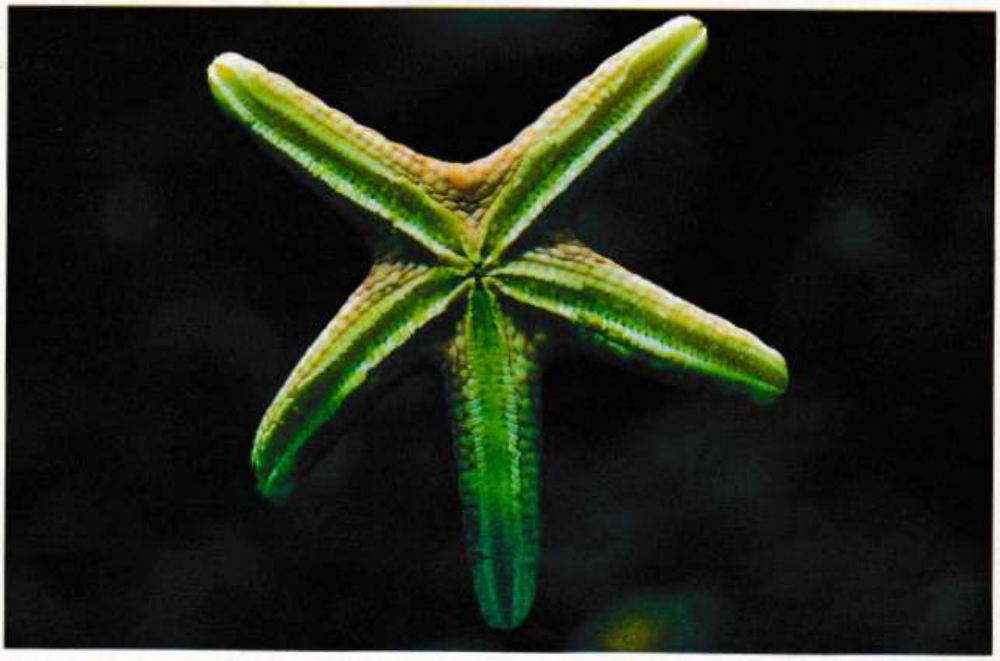
The following species are commonly available and generally do well in the marine aquarium: **The Blue Starfish (*Linckia laevigata*), Bun Starfishes (*Culcita novaeguinea* and *Culcita schmideliana*), Red Starfish (*Fromia elegans*), Orange Starfish (*Fromia monilis*), Red-knobbed Starfish (*Protoreaster lincki*), Common Knobbed Starfish (*Pentaceraster mammillatus*).**

Reef aquarium compatibility

While most marinists consider that ALL Starfish are suitable for the marine aquarium, nothing could be further from the truth. There is a myth that all Starfish are algae-eaters and this is also untrue in the extreme!

In fact, most Starfish feed upon other animals and only a very small proportion eat algae. A case in point is The Crown of Thorns Starfish (*Acanthaster planci*) which has become notorious for destroying large areas of hard corals on some reefs.

The species mentioned above will eat algae predominately whereas some other commonly-imported specimens will make a meal of molluscs, clams, hard corals and even some sponges! As a general



An underside view of the Pink Starfish.

rule of thumb, if a starfish constantly refuses meaty food but dwells on blanched spinach or marine algae then it would be safe to assume it is an algae eater.

Some dangers

Starfish are generally clumsy in their travels in the aquarium and can make a nuisance of themselves. For instance, if a coral or rock is not properly seated then a Starfish might very well cause it to tumble. It, therefore, pays to make sure that all objects are firmly located and cannot be dislodged.

Choosing a healthy specimen

When choosing a Starfish avoid those specimens that have missing arms, open wounds or reddened areas on the skin. Try to see the Starfish feeding before purchase if possible and make a positive identification; after all, ending up with a specimen that predates on future tankmates is not going to be a good investment!

A stationary animal does not necessarily mean that it is unhealthy; some Starfish move very slowly during the day giving the impression of inactivity.

Most species are nocturnal and only become active at night. However, many specimens will make daytime forays if hungry or if they learn that food is available at a certain time each day.

Mixing it with fish

There is a great temptation to place a Starfish in a fish-only aquarium for added interest. This is inadvisable as Starfish are very sensitive to fish waste and generally soon deteriorate in a fish-only system.

They are also susceptible to Copper medication and will certainly have to be removed permanently should such a treatment be required.

Feeding

Starfish should initially be offered meaty foods such as shellmeat, Cockle, Squid, Mussel, Prawn, Lancefish or Mysis to establish a preferred diet. Blanched spinach may also be offered in the case of algae-eaters. Feed every one to three days. If there are fish or crustaceans that would steal the food first place a small piece of food on the floor of the aquarium and place the Starfish directly over the top.

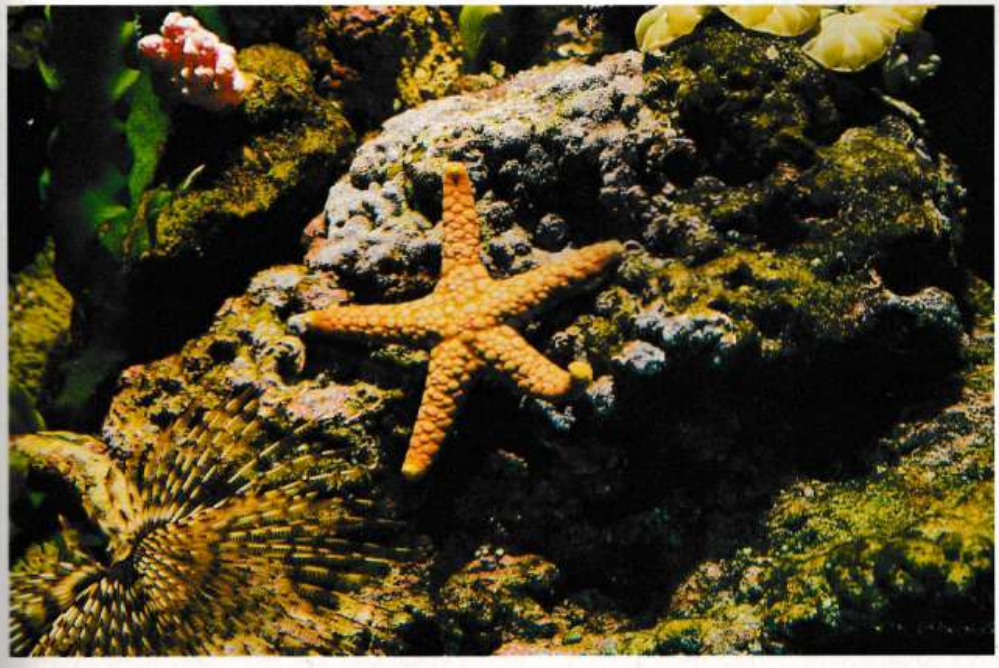
Otherwise, position the food right next to the Starfish and let it move over it.

Health

Starfish often suffer from bacterial infections leading to open wounds if water quality is allowed to deteriorate and the correct diet is not provided. Being quite sedentary, they may also attract the unwanted attentions of crustaceans and inquisitive fish which may do some damage; therefore, tankmates must be chosen with care.

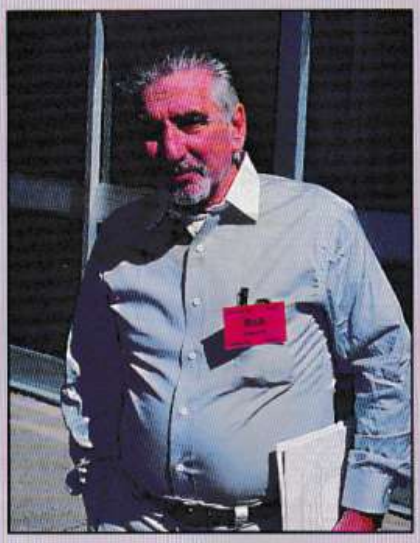
Tank and water conditions

Tank size: Over 20 gallons (91 litres) nett.
pH: 8.1-8.3.
Ammonia and Nitrite: Zero.
Temperature: 24-26°C (75-79°F).
Nitrate: Less than 10ppm (preferably zero).
Specific Gravity: 1.022-1.025.
Redox Potential: 350-450mv.
Water Changes: 15 to 25 per cent every two weeks with high quality nitrate-free water.
Filtration: A protein skimmer and activated carbon should be seen as essential.
Lighting: Not too important, starfish do not rely upon light directly.
Water Circulation: Moderate to good water movement is preferred.



Orange Starfish, *Fromia* sp.

Famous Faces in Fishkeeping



A&P meets the faces behind the names and lets them tell you of their own individual aquatic interests.

This Month:
BOB GOLDSTEIN

A&P: How long have you been in fishkeeping and what started you off?
BG: Since I was about five or six years old. I got a 10 gallon tank from my older sister and the family has blamed her ever since!

A&P: Can you remember your first aquarium and what you kept in it?
BG: I got one or two Goldfish with that 10 gallon tank but I quickly moved into Livebearers, Zebra Danios, and juvenile Sunfishes from parks in the NY area where I grew up.

A&P: What are your special interests?
BG: I especially enjoy collecting, photography, travel abroad, snorkelling, and breeding. My favourite fish are annual Killies and marines. I still enjoy catfishes but haven't been breeding them in a while.

A&P: Are you into breeding?
BG: Yes, marine fish and shrimp, and especially annual Killifishes at the moment and for the past several years. But I've also gone through phases of attempted breeding of every kind of catfish I could get my hands on, and I used to breed a great variety of unusual anabantoids. I stopped breeding cichlids many years ago as they are simply no challenge at all. I recommend the African cichlids, in particular, for people who participate in the Special Olympics.

A&P: Do you belong to any Aquatic Society.
BG: I belong to our local society, the Raleigh Aquarium Society, and to the American Killifish Association, the Breeders Guild, and the North American Native Fish Association. I have been a member of various catfish and anabantoid associations in the past but I'm no longer active in those areas. Of course I was also in the ACA, but have lost interest.

A&P: What do you think about Fish Shows?
BG: Three great benefits are seeing what a really great specimen can be in the right hands, meeting and learning from top-notch aquarists (who may not know they are), and learning from the seminars typically associated with Fish Shows. Another benefit is inducing people to breed by having categories for tank-raised stock. People will do anything for a trophy and a lot of breeding is induced by the love of the trophies rather than the fish. That's fine, so long as it gets people into breeding and learning what it takes. Finally, it's a way for people who may feel a little unusual to meet other people who, it turns out, really ARE a little unusual.

A&P: If money was no object what aspect of the hobby would you like to follow?
BG: Travel to exporting and collecting stations around the world, and going on collecting trips to East Africa and South America. I'd also like to visit more South Seas locations for underwater photography, for which money definitely needs not to be an object.

A&P: What fish would you never keep and why?
BG: I don't like keeping any fish that there is no possibility of breeding. I think that breeding and dissemination of offspring justifies capturing wild stock, but simply keeping them to look at does not. That's a personal bias which I recognise separates me from normal people.

A&P: What's your favourite aquarium book?
BG: William T. Innes' *Exotic Aquarium Fishes* has the best organisation and writing, and neatest layout ever prepared. I've no doubt it was never intended to be more than a labour of love, and its eventual great success was just gravy for Innes, who was a printer by trade and a very self-effacing person who wanted to leave something for posterity — and certainly did.

A&P: How do you think fishkeeping is keeping up with other modern day attractions?
BG: It has changed. People who keep fish only have not grown as they should, even with the terrific advances in equipment and literature, and broad dissemination of techniques and exchange of information. The number of breeders is still minute compared with all the people who keep fish. Additionally, the fish portion of the hobby has wound down considerably as more and more people switch to African cichlids, which for the most part, aren't as difficult as Guppies. People are specialising in simplicity rather than growing by exploring all aspects of the hobby, and that's depressing. On the other hand, the reef portion of the hobby is impressive in the intellect and extensive reading and participation of its members. I think this group grew up *de novo*, rather than from the ranks of standard aquarists, hence they are full of enthusiasm and don't know laziness. If this is true, that they have appeared *de novo*, then I think they represent the future, as it is they who will put the effort and intellect into solving the problems of breeding and growing marine fishes and invertebrates, and this is where advances need to be made.

A&P: What do you get from fishkeeping that keeps you interested?
BG: There are always new challenges in breeding and raising, especially with marines and difficult annual Killies, but also with many kinds of freshwater fishes. I also enjoy going back to the old favourites and getting a tankful of fry of, for example, some really nice Tetras, Barbs, or unusual Gouramis, and often find that my skills are no better than they used to be, for I still fail quite a bit with difficult fish, but I keep trying!

A&P: What's next in your fishkeeping plans?
BG: I'm trying to succeed with Dottybacks and Pygmy Angels and have some success with the former. It's more a matter of time in the fish room and getting some local help with the cleaning than anything else. The challenge is there and the costs of doing the work are not high. I also want to do a lot more travelling, to the South Pacific especially, as I only recently was scuba certified (at age 60) and have had a terrific time taking underwater shots that never come out thanks to my old Nikonos IV-A camera (I need a new one).

BUY LINES

NEW PRODUCT REVIEW

ULTRA ... A BRIDGE OVER CALMING WATERS

A magical water feature full of thriving fish and flourishing plants can add considerably to a garden's charm, but visibility is a prime virtue when keeping pond fish.

For this reason the Ultra collection of beautifully fashioned timber products from Interval Systems Ltd includes an attractive 3m (10ft) long bridge, very competitively priced at just £532 including VAT and delivery.

From the bridge's vantage point the tranquil movement of fish, plants and water can be fully appreciated.

Environmentally sound, Ultra's bridge is crafted from the finest Baltic Redwood from the well managed forests of Scandinavia and supplied as a ready-to-assemble package. The wood is pressure impregnated and guaranteed for 15 years and the bridge's smooth planed boards are pre-drilled ready for just bolting together. Designed to blend in with all garden decors the bridge's gently curving hand rails and main runners are laminated to prevent warping and provide extra strength.

Safety, too, has been a major consideration and extra cross members are included in the bridge package, to decoratively partially block the gaps under the hand rail. Also, to prevent slipping in damp and wet weather, the boards of the bridge are supplied ready grooved.

• To fully complement the bridge Ultra's creative range of "outdoor interiors" are featured in a catalogue available from: Interval Systems Ltd., PO Box 40, Woking, Surrey GU22 7YU. Tel: 01483 727888. Fax: 01483 727828.

One of Interval Systems Ltd's creative range of outdoor products.

MARCHIORO

Children love small pets and the unique range of Aquazoo crystal clear plastic tanks from Marchioro provide the living accommodation for anything from fish, spiders, insects or other land invertebrates.

These ranks range in size from 1.5-27 litres and come with wine red, speckled white, sea blue and mint green coloured, air-vented, clip-on lids.

Five sizes in the range have a secure clear plastic top hatch whilst the three larger sizes benefit from two opening hatches.

Aquazoos 1-3 have carrying handles; Aquazoos 14 and 16 are a shallower design suitable for more "crawly" creatures.

A central divider with each side having its own top hatch is a feature of Aquazoo 16.

• For full details contact: Marchioro (UK) Ltd., Marchioro House, High Street, Overton, Basingstoke, Hampshire RG25 3HA. Tel: 01256 771700. Fax: 01256 771856.

The Aquazoo crystal clear plastic tanks from Marchioro (UK) Ltd.

JOHN McLAUGHLAN HORTICULTURE

So confident of their product's efficiency are they that Viresco Aqua, the two-party remedy for algae bloom and blanketweed, now comes with a money back guarantee if the customer is not satisfied.

The remedy first removes the algae-encouraging nutrients in the water and then, following the collapse of the algae, assists its further degradation.

The company also produces Aquaclin, a granular, slow-release fertiliser for aquatic plants. The granules are a type of zeolite onto which has been added the full range of plant nutrients.

Whilst the plants can take up nutrients through root hair contact phosphate is absorbed (and retained) by the zeolite.

• Further details of both products from: John McLaughlan Horticulture, 50A Market Place, Thirsk, North Yorkshire YO7 1LH. Tel: 01845 52558. Fax: 01845 523133.

AQUARISTS AT PETS, PETS, PETS

Sponsored by Sainsbury's Pet Club, a series of Pet Shows has been held around the country. These involve over 100 marquees with traders and manufacturers showing and selling their wares for the pet trade — from rats to horses.

There was an aquatic section with Aquarian, Tetra, Juwel Aquariums, Underworld Products and Aquaspan all putting on a display about the delights of fishkeeping.

Held in May and June the venues were Tatton Park, Cheshire (May 2/4), Wollaton Park, Nottingham (May 16/17), Highclere Castle, Berkshire (May 30/31), Harewood House, Leeds (June 6/7) and Knebworth House, Stevenage (June 20/21).

Being outdoors the weather was mixed but despite rain and mud each show attracted pet lovers in their thousands. It is a fact that most aquarists are pet lovers and so own a dog or cat, too, hence many of these thousands visited the aquatic marquees looking for advice from the Aquarian Advisory Service and Tetra's Information Centre.

The organisers are planning another series of Pet Shows in 1999 at different venues — look out for details in your local Sainsburys and the TV Road Show Pet Rescue.

PHOTOGRAPH SHOWS two dogs admiring the Goldfish on the Aquarian stand at the Pets, Pets, Pets Show at Harewood house.

PHOTOGRAPH BY DR DAVID FORD

BACK TO NATURE

The first fish bred at Macduff Marine Aquarium have been released back to the sea. About a dozen young Thornback Rays and Dogfish were returned to the wild from Banff beach at the end of May although some are to be kept in displays at the Aquarium.

Both Rays and Dogfish hatch from egg cases known as Mermaids' Purses. These are collected by divers from the display tanks and transferred to a nursery for hatching, which takes around four months depending on water temperature. The youngsters due for release were born from September last year onwards.

The average size Rays are now 10cm whilst the Dogfish are around 15cm.

Aquarium staff believe that having survived the earliest months of life (when they are usually most vulnerable), the young fish have been given the best possible start to life and that their chances of survival are good.

The Macduff Aquarium can be found at 11 High Shore, Macduff, Scotland AB44 1SL. Tel: 01261 833369. Fax: 01261 831052.

PEOPLE ON THE MOVE

Richard Grew has been promoted to the position of Manager of the Pet & Aquatic Department at Ullesthorpe Garden and Aquatic Centre.

Richard has been with the centre for 18 months, is an active aquatic hobbyists and a keen supporter of Leicester City Football Club.

Director Ian Tallis says: "Richard's appointment is part of our strategy to make each department a centre of excellence in its own right with a professional, dedicated and knowledgeable team which will give ultimate customer care and allow each department to reach its full potential."

Ullesthorpe Garden & Aquatic Centre, recently voted garden Centre of the Year by *Nurseyman and Garden Centre* magazine and acclaimed as one of the best aquatic centres in the Midlands by *Gardening Which*, can be found at Lutterworth Road, Ullesthorpe, near Lutterworth, Leicestershire LE17 5DR. Tel: 01455 202144. Fax: 01455 202585.

John Harrison, General Manager of Blagdon Garden Products since 1995, has joined Tetra UK as Country Business Manager.

He replaces Cliff Nash, who has been promoted to Director of Water Gardening Worldwide.

Following overseeing the successful return to profitability of Blagdon (now the third largest pond equipment supplier in the UK) after receivership and takeover by Ubbink Group, John says: "I am totally thrilled to join Tetra as it is probably the best known brand in the aquatic market and I look forward to working with such a committed team. Tetra has an excellent brand name and superior products which are supported by a coherent long-term global strategy."

Tetra UK, Mitchell House, Southampton Road, Eastleigh, Hampshire SO50 9XD. Tel: 01703 620500. Fax: 01703 629810.

IN MEMORIAM

Peter Golding remembers John Ransome

John Ransome passed away peacefully at his home on Tuesday, May 26 1998 after battling with cancer.

I considered John as a true friend, but I am not unique as I discovered by speaking to many "long-termers" in the pet trade. They all felt exactly as I did about John.

John was a friend willing to help whenever possible, a gentle man with the unique ability to understate his successes in both business and private lives.

Some 35 years ago John, together with Allan and John Riley, formed John Allan Aquariums Limited in Bury St Edmunds, quickly establishing themselves as one of the most respected aquarium manufacturers and distributors in the aquatic trade.

I shall never forget the story of their first weeks in business, moving a single light bulb to the location where they were working in the factory — a true example of acorns and oak trees.

John leaves behind his best friend Cathy whom he married in March of this year, his two daughters, Yvonne and Linda, and grandchildren.

To die at only 58 years of age just goes to prove how cruel this life can be for a man who always considered others and who had far less vices than the majority of us.

John, you will not be forgotten and, as one of his friends recently said: "Our lives are so much the richer for having known John."

How very, very true.

SEVEN SEAS COMPETITION

MORE THAN £500 WORTH OF PRIZES ON OFFER!

Seven Seas Pet and Animal Health Care has launched a brand new range of new formulation Phillips fish foods and given them a bright, new look. And to mark the occasion they are offering FIVE great prizes in this easy to enter competition.

Phillips fish foods were first launched in 1962 and are full of carefully balanced nutrients to help freshwater, marine and tropical fish stay healthy and active.

The Cold Water Flakes contain a special blend of ingredients and the flakes are unique for their exceptional nutritional value and quality. Their clean, crisp shape and enhanced flake colours make them the ideal choice providing protein, carbohydrate (fibre) and fats, together with vitamins and minerals for all round good health, development and long life.

Phillips new improved Tropical Fish Flakes are a unique blend of the finest ingredients, having a clean, crisp shape and are a convenient and easy way to feed all tropical fish.

The range also includes Aquatabs which are produced from a blend of nutritious flaked food and formed into a handy and convenient to use tablet. Phillips Aquatabs can be pressed on to the inside glass below the water surface allowing owners to watch their fish enjoy this nourishing and appetising food.

Proteins are the foundation of all fish foods and are especially beneficial for the development of muscle tissue. Proteins consist of amino acids which are produced when protein is broken down within the gut of the fish.

Fats and oils are made up of small molecules known as fatty acids and are called upon when needed as a source of energy. Fats are an important part of all fish tissue and are the key to the continued development of cell structure.

Carbohydrates (fibre) is commonly known for its immediate source of energy for fish. The inclusion of fibre is also beneficial in aiding the digestion process.

Aquatabs are available in packs of 24 tablets price £1.19. Tropical Flakes and Cold Water Flakes are available in 14g, 50g, 100g, 550g and 2kg sizes, priced from £1.59 to £40.99.

For further information please contact Seven Seas Pet and Animal Health Care on (01482) 375234.

PRIZES ON OFFER

The first five correct entries drawn will each receive a Phillips Fish Food Polo Shirt and £100 worth of Phillips Fish Food of their choice.
For further information please contact Tim Smith on (01482) 375234, ext. 480.

COMPETITION QUESTIONS

1. *NAME TWO BENEFITS OF FEEDING CARBOHYDRATES?*
2. *NAME TWO PRODUCTS IN THE PHILLIPS FISH FOOD RANGE?*
3. *WHEN WERE PHILLIPS FISH FOODS FIRST LAUNCHED?*

All you have to do to be in with a chance of winning is to answer the following questions and send your entries on a postcard or sealed down envelope to: SEVEN SEAS COMPETITION, DEPT AP8, MJ PUBLICATIONS LTD, 20 HIGH STREET, CHARING, KENT, TN27 0HX, to arrive no later than September 18, 1998.

SEVEN SEAS PET and ANIMAL Health Care

PHILLIPS

Meet the Societies

VIVIPAROUS

We turn the spotlight this month not on a Society with a regular meeting place and organised timetables of yearly events but one whose members are bound by a common interest in a particular aspect of fishkeeping — livebearing fishes, their culture in captivity, and, more importantly, their continuing conservation either by protecting their native habitats or by captive breeding programmes.

Many of the members of Viviparous are highly respected aquarists who not only practise livebearer fishkeeping at home but frequently travel abroad to collect, study, research (and even discover) the species in their own waters.

Viviparous — The Livebearer Information Service — was founded in 1987 by a small band of dedicated enthusiasts. Today Viviparous is one of the largest livebearer organisations in the world and produces a range of services to suit all livebearer enthusiasts.

These include: A quarterly magazine containing two colour photographs and information sheets on livebearers; A Fancy Guppy Section within the magazine with articles on the maintenance and breeding of this fascinating animal; A "Stock Market" where members advertise spare stock for sale or exchange; Regular auctions throughout the UK; An International Convention and Show with speakers on all aspects of the livebearer hobby. To give but one example, Harro Hieronimus (the President of the German Livebearer Organisation, DGLZ), has provided two lectures covering Cultivated Livebearers and Livebearers of Honduras; For those aquarists concerned with conservation Viviparous runs a very effective Species Maintenance Programme which helps maintain captive stocks of endangered livebearers. This is coordinated by Tim Henshaw of Bolton Metro Museum Aquarium and runs in conjunction with the FAITAG Endangered Livebearer Project.

Membership of Viviparous costs £8 and lasts for a year from the moment you join.

To become a member send a cheque or postal order (made payable to 'The Livebearer Information Service') to: Viviparous, "Northside", Spridlington Road, Faldingworth, Market Rasen, Lincolnshire LN8 3SQ.

LIZ DONLAN'S KOI CALENDAR

There is no doubt that August is the highlight of the show season when Koi '98 — (The British Koi-Keepers' Society — National Show) takes place at Billing Aquadrome, Northampton on the 22nd/23rd. Virtually every major dealer from the UK will have a stand at the show and there are numerous bargains to be had. However, when comparing prices between the various dealers do check carefully that you are looking at like-for-like.

Koi food and equipment are available at never-to-be-repeated prices (the dealers' nightmare; the hobbyists' delight) and Koi can be purchased at knock-down prices — particularly as a number of dealers use the National to 'clear out' existing stocks ready for the new stocks arriving in the autumn.

A major transformation in Koi '98 is that the show is going Japanese style — ie, all Koi of one size and variety are exhibited in the same vat, irrespective of its owner.

There is no doubt that everyone benefits from this type of show — the exhibitors and visitors can compare the winners, side by side, rather than walking half a mile from one vat to another and then trying to remember what the first Koi looked like! It is also much easier on the judges as, again, they're not having to keep walking to and fro between vats and, more importantly, it enables them to make a much fairer assessment of Koi of the same size and variety.

In addition to all the above you can be sure to see an outstanding selection of Koi as exhibitors tend to be more selective on which Koi they enter in a Japanese style show — not only do they enter their best Koi but they also ensure that the fish are in prime condition as they know their living jewels will be sharing their vat and water conditions for two days with other exhibitors' Koi.

If you've not already done so then mark off August 22/23 as a 'MUST DO' in your diaries. At the time of writing I'm keeping my fingers crossed that, having spent the last two months with severe back problems, I'll be fit enough to attend Koi '98.

If you go and it's raining all weekend then you'll know I'm not there and I've put a curse on the Show!

A covered pond in the Mid Lincs Section which provides year-round facilities for admiring the Koi. Yours truly is featured with her back to the camera waiting to judge some of the Koi in a 'photographic' competition.

PHOTOGRAPH: MIKE DONLAN

EDITOR'S NOTE: I need to apologise to the Yorkshire Section for incorrect information about their show in previous issues; I do hope no lasting damage was done. Incidentally, both I and Liz scour the aquatic press for Koi event details — would you believe, not all comes directly from the Societies involved. There's only one real way to get your information across — send it in yourself or risk the 'Chinese Whispers' syndrome and Editors who think they know best!

SHOW CALENDAR

AUGUST

2 Yorkshire Koi Society. Harewood House, nr Leeds. Show Manager Mr Glasspole, 01845 526164.

9 Potteries & District. Exhibition at Stapeley Water Gardens, Natwich, Cheshire.

16 Scottish Section BKKS. Closed Show. 1pm- 4pm, at OKI Ltd, Cumbernauld, Central Region.

22/23 KOI '98. Billing Aquadrome, Northampton. General enquiries to Margaret Bishop, 01702 522388.

29/30 Ireland Section BKKS. 6th Open Show. Hillmount Nursery Centre. Upper Braniel Road, Gilnahirk, Belfast. Show Chairman Trevor Geary, 01247 466865.

30/31 South East Section BKKS. Open Show. Ravens Wood School, Bromley, Kent. Show Chairman Alan Maskell, 0181 698 5779.

SEPTEMBER

5/6 Birmingham/West Midlands Japanese Style Show. Little Heath Nursery & Aquatics, Burcott.

5/6 West Wales Section (BKKS). 6th Annual Koi Show at Llanelli Flower Festival, Peoples Park, Llanelli. Contact Angie Evans, Show Chairperson, on 01639 710045. PLEASE NOTE CHANGE OF DATE — originally August 30/31.

6 Leicestershire Section BKKS Show. Farm World, Gartree Road, Leicester. Contact Ray Dunkley, 0116 2771600.

6 Lower Thameside Section BKKS. Closed Show. Venue to be advised.

12/13 North of England Koi Chapter ZNA. Open Show Japanese Style. Arena Sports & Social Club, Sheffield. Contact Yvonne Muse on 0114 273 7341 (day) or 0114 289 1437 (evenings).

12/13 Mid-Somerset Section BKKS. Closed Show in conjunction with Countryside Cavalcade, Royal Bath & West Showground, nr Shepton Mallett.

27 Northern Koi Club. 6th Open Show Japanese Style. at Cascade Water Gardens. Show Chairman Liz Donlan, 0161 794 8282 (work), 0161 643 9107 (home).

KOI MEETINGS IN AUGUST

1 Leicestershire Section BKKS. Meet at Kirby Muxloe Sports Club. George Money speaks on 'Microscopes'. Contact Ray Dunkley, 0116 2771600.

5 Leicestershire Section BKKS. Fun Night, Bottle Auction, Darts, Devil Among The Tailors. Contact Karen Boyton (PRO & Editor) on 0116 233 0797 (home) or 01455 550550 (work).

5 Leicestershire Section BKKS. Taking members of the Peterborough & Cambridgeshire Section round some of their ponds. Contact Karen Boyton (PRO & Editor) on 0116 233 0797 (home) or 01455 550550 (work).

11 Nottingham & District Section BKKS. Guest speaker, Bernard Channing, of Japanese Water Gardens, talking on filtration systems. The Western Club (off Derby Road), 357A Derby Road, Lenton, Nottingham, at 8pm. Contact Shirley Hind on 0115 981 0923.

12 Merseyside Section BKKS. Guest speaker, Jack Howcroft, at the Burtonwood Brewery, Childwall Abbey, Score Lane, Liverpool, at 8pm. Contact Syl Bennett on 01942 204948.

15 Leicestershire Section BKKS. Pond visit. Contact Contact Karen Boyton (PRO & Editor) on 0116 233 0797 (home) or 01455 550550 (work).

16 The Crouch Valley Section BKKS. Contact Peter and Brenda Scott on 01375 642321.

23 Northern Koi Club. Coach trip to Koi '98 at Billing Aquadrome, Northampton. Tickets £12. Coach departs the Manchester area at 8am and leaves the show at 4pm. Anyone who is interested in a seat on the coach should ring Liz Donlan on 0161-794 8282 (work).

25 The Crouch Valley Section BKKS. Visit to Hanningfield Reservoir (7.30-9pm). Contact Peter and Brenda Scott on 01375 642321.

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, could I make one small plea to Publicity Officers — please ensure that you include a contact name and number to be used in conjunction with any Shows or Meetings whose details we may pubish.

Copy for Koi Calendar can be sent to me c/o MJ Publications Ltd, 20 High Street, Charing, Nr. Ashford, Kent TN27 0HX, but, if more convenient, Secretaries can also send information direct by telephone on 0161-794 8282 or by fax on 0161-793 9696.

FOCUS ON FISH HEALTH

Diseases of Fishes

Robert J. Goldstein, PhD,
looks at fish medications

▶ Laboratory for the study of fish diseases.

PHOTOGRAPH BY BOB GOLDSTEIN

The basis of drug therapy is that the drug should be effective against a parasite at a dose that doesn't hurt the host fish and must be capable of delivery by injection, in food, or as bath. The problems with many commercial products are that they are useless for ordinary fish diseases, are recommended at an incorrect dose or as a dip when they must be injected or ingested, or have expired (outlived their shelf life).

As examples of things to watch out for I have seen several preparations indicated as active ingredients erythromycin, Victoria green, nitromersol, and triethylene glycol. Erythromycin is effective mostly against Gram-positive bacteria, but rarely do Gram-positive bacteria cause warm-water diseases in aquarium fishes.

Victoria green is a dye whose efficacy is unknown; however it tints the water a pretty green colour. Nitromersol is not the drug of choice for any aquarium fish disease, but some manufacturers include it in kitchen sink preparations.

Triethylene glycol is a form of antifreeze and toxic to fishes and people. Why anyone would use it in a fish medication for anything but a vehicle for something else is beyond me.

Drugs which purport to treat Lymphocystis are snake oil: Lymphocystis is a virus and there are no aquarium drugs that can treat it, despite hyperbole on labels claiming to make the 'environment unfavourable' for Lymphocystis. I don't know

what that means. Do you?

We do have several useful drugs as well, and competent companies offering them in the correct doses for the appropriate diseases, backed up by substantive literature. Let's look at some of the classes of drugs available and how they rank.

Among our other highly effective drugs, formalin, malachite green, copper sulphate, and the benzimidazoles are strong defences against protozoans and metazoans that frequently reach our tanks from fish ponds. Let's look at the useful fish disease medicaments available today.

Rules

There are many rules for treating fish diseases, of which the most important is to treat fish in a separate, bare, hospital or quarantine tank with strong aeration but no carbon filtration.

Always start with a smaller than recommended dose and increase the dose gradually, watching your fish for indicators of stress. Note that you can often decrease the dose and increase the temperature in the quarantine tank, maintaining hardness to protect the fish's gills by providing calcium ions for osmo-regulation. Several manufacturers offer enhancers purported to increase the effectiveness of almost any treatment. These are slime promoters which provide a wound dressing for scraped, scratched, or otherwise skin- or gill-irritated fishes. Products such as NovAqua, PolyAqua, Therapy, and similar complexed water conditioners will do a good job and I recommend they be used in hospital tanks together with the parasite-killing drugs.

Dyes

Malachite Green made from the zinc-free oxalate salt is generally safe, but some fish are sensitive and can be killed (Tetras, some catfishes, others), and it is unsafe for baby fishes. It is effective against skin- and gill-invading parasitic protozoa, but is toxic at low pH, in soft water, with increasing temperature, and so it's not safe to just dump it in according to package directions. Malachite Green can be combined with formalin in an effective anti-protozoan therapy, but with vigorous aeration as both stress the respiratory system. Malachite Green will also stain the silicon sealant of aquariums, and shouldn't be used in show tanks.

Other dyes available to aquarists include acriflavine (useful for incubating eggs and for treating cuts or bites) and Methylene Blue (hardly worth keeping except to darken tanks and stain your silicon sealant). Methylene Blue is an oxygen carrier and may be useful for tanks suffering near anoxia due to decomposition, but its anti-protozoan properties are speculative only.

Potassium Permanganate, a powerful oxidiser, is effective against many external parasites, but may interact with other drugs and should be used alone if at all.

◀ Typical range of fish medication products.

PHOTOGRAPH COURTESY OF TETRA (UK)

Simple Chemicals

Copper sulphate is a cheap, effective drug that kills many ectoparasites, but, unfortunately, also kills desirable invertebrates, and is not suitable for reef aquaria. Unfortunately, this effectiveness against invertebrates does not extend to Hydra, which is merely irritated into shrinking temporarily.

Copper sulphate can clear up green water, attack Velvet Disease, and at high, sustained doses is also effective against crustacean ectoparasites and flukes.

Maintaining a high dose for a long contact time is necessary, and this requires constantly checking the concentration with a Copper Test Kit. Copper precipitates unless stabilised with citrate or another chemical

FOCUS ON

FISH HEALTH

Diseases of Fishes

that keeps it ionised and in solution.

Years ago we used uncitrated Copper in marine tanks to treat Salt water Ich (*Cryptocaryon*), adding more and using our test kits to check the concentration.

Where did the Copper go? Into precipitates at the bottom of the tank. Then when we did a massive water change and brought the pH back up to 8.3 where it should be, massive amounts of Copper ions were released back into solution, and we killed our fish with Copper toxicity. Because it kills fish at high doses a lower dose for a longer contact time is the safer alternative. Citrated Copper allows the maintenance of a constant moderately high level in the aquarium without continually adding more copper. Uncitrated Copper is a time bomb.

Formalin (38 or 40 per cent formaldehyde in water) kills many protozoan and metazoan parasites, fungi, and even external bacteria. Several companies offer formalin in combination with Malachite Green or with Copper Sulphate. All three forms are widely used in aquaculture to treat fish diseases and to protect eggs from invading fungi and bacteria.

Do not use it as a prophylactic. It is only appropriate when you are certain that the problem is a parasitic protozoan, fluke, or copepod, confirmed by observing a recognisable stage under the microscope. (Any cheap microscope is adequate for almost all aquarium protozoan skin and gill parasites).

I add it drop-wise, with a final concentration of between four and 10 drops per gallon. Once the fish show signs of distress I dilute the quarantine water by half, but keep the fish in the medication for 24-48 hours without feeding and certainly without plants (which will be killed and then rot) or carbon filtration.

That's for pharmaceutical grade formalin. Aquarium preparations are diluted, and recommendations given in teaspoons per gallon.

The same caution applies: start with the minimal dose and work upward until the fish show stress, then cut the concentration in half by doing a partial water change. Formaldehyde is a powerful irritant of eyes and the mucous membranes of your nose and lungs.

Complex Chemicals

Organophosphates are powerful insecticides in agriculture, and effective against fish lice, copepods, leeches and skin and gill flukes of fishes. They interfere with control of nerve impulse transmission in invertebrates. The common organophosphates in aquaculture are the chlorinated phosphonates.

These drugs should be used sparingly as fishes may be adversely affected by multiple or prolonged exposures. They were thought safe for people until neurological symptoms began showing up in handlers of agricultural organophosphates. Do not contaminate your hands or eat while using these potent chemicals.

Among the benzimidazoles the most common type in aquaculture is metronidazole, chemically called 2-methyl-5-nitro-1-imidazoleethanol. You probably know it by the brand name Flagyl. It is a safe drug, used for treating human vaginal protozoan infections. It also works against a wide variety of external aquatic protozoa, including Trichodina, Trichodinella, Tetrahymena, Epistylis, and probably also the free stages of Brooklynella, Ichthyophthirius, and Cryptocaryon.

Several repackagers mix benzimidazoles with organophosphates as

▼ Expert knowledge of remedies will be to no avail unless correct diagnosis is made at the outset. This Characin is suffering from White Spot and the spots can be seen on the caudal fin and body ...

PHOTOGRAPH BY A&P LIBRARY

treatments for parasitic crustaceans, protozoans, and leeches. The preparations are effective, but directions should be followed for temperature control, strong aeration, and a water change after treatment.

Introducing Antimicrobials and Antibiotics

For treating bacterial diseases, we have two classes of drugs: the naturally occurring antibiotics and the synthetic antimicrobials. We no longer use most of the natural antibiotics in fish culture because overuse in the past has resulted in the development of drug-resistant strains. That's not the fault of the home aquarist (who doesn't pass his fish around), but of fish farms, shippers, and wholesalers.

They're not unique in the error of their ways: physicians and hospitals have over-prescribed antibiotics for years and that is why drug-resistant microbes appear everywhere in public health. The synthetic furan antibacterials, if not over-used in the future, may be effective for many years.

Anti-Microbials

Nitrofurans are synthetic drugs effective against all common Gram-negative bacteria of fishes.

Preparations in the hobby are nifurpirinol (Furanace), nitrofurazone (Furacyn), furanone, and furazolidone. Nitrofurazone is touted as a treatment for fish fungus, which is more or less true since fish 'fungus' is typically a bacterial infection known better as Columnaris or Cotton Wool Disease which can appear fuzzy like a fungus. Nalidixic acid is another synthetic active against Gram-negative bacteria.

Antibiotics

Antibiotics are uncommon on shelves, mostly because the old standby penicillins and erythromycins are ineffective against aquarium fish diseases or, as in the case of tetracyclines, should be given in food rather than dissolved in water.

There are some exceptions, such as neomycin and kanamycin which are still new, so drug-resistance is not yet a major problem, and oxytetracycline which, although most effective when added to food, can be used as a bath at a high concentration.

Anti-Worm Preparations

Internal worms sometimes occur in fishes, but except for some capillaria-type nematodes they are rarely cause for concern. Get a cat or dog wormer food from a veterinarian, and you'll be certain you are using the right drug at an effective dose and delivering it through the correct route.

▼ ... whereas these Banggai Cardinalfish, *Pterapogon kauderni*, have not contracted the disease — they always look this way!

PHOTOGRAPH BY A&P LIBRARY

AUCTIONS & EVENTS

16 August KAAS Open Show, The Cliffe Memorial Hall, Cliffe, near Rochester, Kent.
18 August South Park Aquatic Study Society. 8pm. Wimbledon Community Centre, St Georges Road, Wimbledon SW19. Combined meeting with other clubs. Further information from Ken Seaton, 0181-641 2848.
30 August Swallowfield A.S. Open Show. Information from G. Hobson, 01256 467889.
13 September Silktown A.S.
15 November FNAS
22 November Oasis F.C.

SOCIETY WORLD

Over 200 Entries at Grocklemania '98

Dr David Ford, Aquarian Advisory Service

Nearly 400 aquarists from 23 Aquatic Clubs made the sea crossing to the Isle of Wight, some with their prize fishes, to give a record entry of 208 fish in the annual Grocklemania Aquarists' Weekend at Haven Holiday Park, Ryde, Isle of Wight.

Called Grocklemania, because a non-resident on the Island is called a Grockle, the highlight of the Show is the 'Thomas Crapper' award. Aquatic Clubs compete in several competitions for the award of a lavatory seat (he invented them).

Apart from all the usual Haven delights the leisure centre at the park hosted Isle of Wight Reptiles with Koga, the Burmese Python, Sea Cadets, who gave a marching display, and stands by SPASS, BKKS and Isle of Wight societies.

The Show is sponsored by Hagen, who had a stand selling their wide range of aquatic items.

There were lectures, a heat of the AquaChamp competition and the Aquarian Schools' Painting Competition, plus the Aquarian Advisory Service with two consultants, Drs David Ford and Peter Burgess, on hand to answer questions.

This annual event gives aquarists the chance to stay at the Haven Park at a special reduced rate for the weekend, so with its emphasis on the fun of fishkeeping plus the Isle of Wight Open Show on the Sunday it is a great holiday for any aquarist and their family.

For details of the 1999 Show contact Les Pearce on 01983 613575.

Bill Slade of Burgess Hill AS representing the 'Burgess Hillbillies' receives the Thomas Crapper Award from FBAS President Jack Stillwell.

RESULTS

Best in Show — Gary Randall (Independent); Best Coldwater — John Powell (Erith DAS); Best Livebearer — Les Pearce (IOWAS); Best Junior — Tom Whiddett (Mid Sussex AS); Aquarian AquaChamp Heat Winner — Keith Mower (Erith AS); The Thomas Crapper Award went to the aquarists of the 'Burgess Hillbillies' group.

SHOW DATES AND FESTIVALS

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

2 August Yorkshire Koi Society (BKKS)
9 August Grimsby & Cleethorpes A.S.; Salisbury A.S. (FB)
16 August KAAS Show (FB) (new date); Perth A.S. (FS)
23 August Glenrothes A.S. (FS)
30 August Swallowfield A.S. (AA); T.T.A.A. (Area Group) (FB) USA
5 September Bristol A.S. (I)
6 September Alden A.S. (YAAS); Cardiff A.S. (FB); Cramlington A.S. (FB); South London A.S. (AA); Wyke A.S. (Y)
12 September Hounslow A.S. (FB)
13 September Lincoln A.S. (Y); Mid Somerset (BKKS); Silktown A.S. (FN); South of Scotland A.S. (FS)
19 September Plymouth A.S. (FB)
20 September Mid Sussex A.S. (FB); Otley A.S. (Y)
26 September Northern Goldfish & P.S. (I)
27 September Darwen A.S. (FN); Fair City A.S. (USA)
4 October Basingstoke A.S. (AA); Grangemouth A.S. (FS); Halifax A.S. (FN); Littlehampton & Bognor A.S. (FB)
11 October Doncaster A.S. (Y); Washington A.S. (FB)
18 October Halifax A.S. (FN); Solway A.S. (FS)
19 October West Cornwall A.S. (FB)
24/25 October British Aquarists Festival, Manchester (FN)
30 October/1 November Supreme Festival of Fishkeeping, Weston-super-Mare (FB)
1 November Bradford A.S. (Y)

CHAMPION OF CHAMPIONS CONTEST 1998

This highly regarded contest will once again be sponsored by *Aquarist & Pondkeeper*, the final being staged at the British Aquarists Festival in Manchester during October. Every Society holding an Open Show anywhere in the UK is entitled to enter. Show Secretaries should apply for declaration forms direct from: JOHN YOUNG, 13 EAST COURT, NORTH WEMBLEY, MIDDLESEX HA0 3QJ. If your Show has already been held and you failed to apply at the time you may still do so providing you are able to supply all the information we require in accordance with the Rules of the Competition.