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FEBRUARY 1990
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COVER STORY

(Photograph: Harry Grier/ Florida Tropical Fish Farms Association)

The Hi-fin White Tetra is a man-made variety of the Black Tetra, *Gymnocorymbus ternetzi*, otherwise known as the Black Widow. The magnificent fish gracing our front cover this month were produced by Ekkwill Tropical Fish Farm in Florida.

White Tetras, despite their lack of body pigmentation, are not albinos (albinos have red/pink eyes). Their aquarium requirements are identical to those of their wild-type counterparts: neutral or slightly acid, soft water, a temperature range of 20-26°C (68-79°F) and a varied diet. In the wild, *Gymnocorymbus ternetzi* grow to around 5.5cm (2.25in), while White Tetras can grow slightly larger.

GUEST EDITORIAL

ANIMAL KEEPERS AND THE LAW

*After studying veterinary medicine at Cambridge University, **David Alderton** now works as an author, journalist and consultant, specialising in the fields of pet care and natural history.*

Many aquarists will not even have heard of the *Dangerous Wild Animals Act* . . . but it could soon be costing them £500 per year, with other hidden 'extras' such as public liability insurance adding to this total! This particular Act was passed in 1976, with the aim of keeping the public safe from tigers, lions, bears and other animals capable of causing serious, substantial injury.

Since then, however, anti-animal keeping groups appear to have seized upon the loose structure of the Act to demand the inclusion of numerous species, far removed from the original spirit of this legislation, with the apparent aim of deterring people from keeping exotics.

As I write this piece, it is unclear exactly as to which species are the subject of current proposals. The Department of the Environment will not confirm or deny any suggestions, merely inviting comments on the Act and its Schedule (where the species are listed). But I understand that members of the family Scorpaenidae, including the Lionfish (*Pterois volitans*) are under active consideration for inclusion here.

If they are listed, aquarists will have to apply to their Local Authority for a licence to keep such fish. The charge for the issuance of a licence is an entirely arbitrary matter. Perhaps not surprisingly, certain Local Authorities have sought to price the keeping of such animals out of the range of most people. A recent survey has shown that you can pay from £10-£500 for a licence, simply depending on where in the country you live.

In addition, this legislation is retrospective, so if you already keep a species which is added to the schedule following this review, then you must still apply for a licence. But if you were to purchase an animal already listed, such as a cayman, the pet shop itself is under no obligation to tell you about the Act or that you need such a licence! So you could buy a 'dangerous animal' and be quite unaware of its status or your own legal obligations.

If Lionfish are listed . . . what next? Piranhas? Anemones? Raids on the homes of fishkeepers and herpetologists who may keep such species and might not have a licence?

The DoE should get its priorities right if it really wants to protect the public. Each year, about 250,000 people are bitten by dogs, and this costs the National Health Service approximately £7 million. Yet it refuses to do anything with regard to any dog registration scheme, or tackle the growing nightmare of the Pit Bull Terrier and other notably aggressive breeds.

The civil servants involved should emerge from their ivory towers and consider the practicalities of their regulations. They may also like to bear in mind that one of the groups best qualified to advise the DoE are those who actually keep such animals, as they are in daily contact with them.

David Alderton

David Alderton

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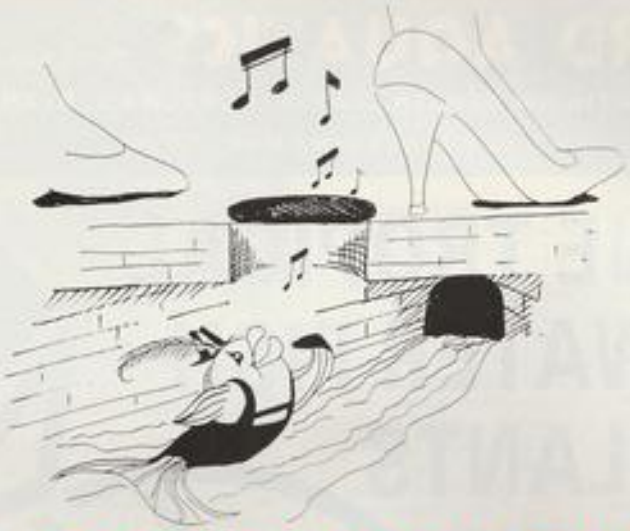


THE GOLDFISH THAT PLAYED DEAD

Or the story of the yodelling Goldfish . . . as retold by **Jason Endfield**

There is no such thing, I don't suppose, as a 'talented' fish — at least, not in the same way as, for example, a performing dog or cat. I view with scepticism claims such as that made by the great Beatrice Lillie in a song from decades ago entitled "I heard my Goldfish yodelling". A talented fish indeed!

Talent, however, takes on many forms, and I believe that I have seen it displayed in a clever way by a specimen of the very same species that Miss Lillie sang about — the humble Goldfish.

This particular individual, having the highly original name of Golda, lived with a Shubunkin called Wallace in a tank at my grandmother's flat. They were a present to her, and because pets are effectively banned where she lives, they appeared to be the ideal way to evade the system. I supplied the tank and air pump, while my mother provided the carefully chosen fish.

We had, however, forgotten one thing . . . that was to tell my grandmother about it all. She was none too pleased, as I remember, when she returned home that day to find everything set up for her. "What about when I go on holiday?", and "I haven't got time for pets", were two of the more repeatable comments, but I hastily explained their benefits over other pets and the therapeutic value of fish (that's a good one!), and she calmed down.

Everything was fine. Grandma was doing everything correctly, but I think the fish sensed that she didn't actually relish having them. Golda and Wallace eyed my Grandma with caution.

Not very long had passed when we had a worried 'phone call: "Golda isn't very well" was the news. "How can you tell?" I asked: "She's on her back", came the reply . . . Golda wasn't very well, I decided, so I called around. I looked at Golda and, sure enough, she looked back at me from an almost upside-down position. Wallace appeared to be fine, but it was decided there and then that Golda, Wallace, tank and all should be moved to our house for 'observation'.

Grandma had warmed to the fish by now and had quite accepted them as pets, but

Golda had other plans it seemed — as soon as they were at their new location, she turned the right way up and recovered instantly.

Had she thought out this plan? Well, "the escape from Grandma's" was complete and successful. Very puzzling — apparently at death's door one minute and fine the next. Perhaps it was the complete change of water and environment — I don't know, but Grandma was amazed and not a little bit put out — After all, her hospitality had been snubbed . . . by a fish . . .

This 'talent' for playing dead has never since been repeated, but we are careful whenever Grandma comes to visit — we try not to let Golda see her, in case the shock proves too much!

Talented fish should, however, be very wary — many an unobservant fishkeeper would have disposed of Golda thinking she was all but dead. And, returning to the song I mentioned at the beginning of this tale, Miss Lillie sang wonderingly about what could be causing her Goldfish to yodel — was it hunger? Or sickness? It was difficult to tell, but the action decided upon in this unusual situation was to flush the musical fish down the toilet (how times have changed, I hope). Needless to say, the fish ceased to yodel and, I dare say, was never heard of again.

So what is the moral to all this? Well, I suppose if there *is* one, it would be that we shouldn't be so quick to dispose of sick (or yodelling) fish — I have witnessed some remarkable recoveries, including that of our very own Golda.

Oh, and if you happen to be passing a sewer (as one does) and you hear strange noises emanating from its direction, well, you never know, it could just be a very old yodelling Goldfish . . . !

Tomorrow's Aquarist

By David Sands

What's in a name?

I recently had the local press catching up on the old news that I had a fish named after me . . . the picture of me through the fish tank looking at "my" fish was the result the talented photographer, Godfrey Birtle (who once played in the same group with me!), produced a smashing picture that appeared on the front page of the Lancashire Evening Post.

How do fish attract a certain name?

Well, apart from the Greek and Latin references to special attributes of a new fish (if I take my favourite group of catfishes *Corydoras* as an illustration, *Corydoras barbatus* refers to the unusual cheek bristles of males), scientists sometimes name fishes after colleagues or famous scientists of an earlier period.

If I take my favourite group of catfishes once more, *Corydoras*, then some of the early ichthyologists have been remembered. *Corydoras copei* after Edward Cope, *Corydoras steindachneri* after Steindachner and *Corydoras nattereri* after the great South American explorer Natterer.

Sometimes the names given to fishes refer to the river, place of capture or country of origin. *Corydoras acrensis* comes from the Acre region in Brazil, *Corydoras guapore* comes from the Guapore River in the Mato Grosso region of Brazil (I called my cottage Mato Grosso!), *Corydoras xinguensis* from the Xingu River in Brazil and *Corydoras surinamensis* from the Surinam River in Surinam.

Sometimes tropical fish collectors and importers have been acknowledged, *Corydoras schwartzi* after a Brazilian collector and *Corydoras adolfoi* after his son who took over his family business (the same surname cannot be used twice or that could create confusion!) *Corydoras cochui*, *Corydoras axelrodi* (named after guess who) and of course *Corydoras davidsandsi* (no prizes for guessing that one!).

The name can tell you a lot . . . *Corydoras simulatus*, *Corydoras condiscipulus* and *Corydoras imitator* tell those with an interest that these fish are similar in colour pattern to others.

When a fish is first discovered by scientists (often years after someone else collected them in nature) they go to great pains to distinguish it from others that it is most closely related to, and then they publish a special article (known as a paper) for other researchers to see.

The main specimen is then labelled and preserved for reference and usually stored in a major museum like the British Natural History Museum or suchlike (Paris, Amsterdam, Berlin, New York etc). This specimen is referred to as the Holotype. If there are more specimens, they are given other names and kept close by in case other researchers want to look at them.

I've seen several specimens in the British Natural History Museum collected by Charles Darwin and described (detailed) by the scientists of the day. The Peppered Catfish, *Corydoras paleatus* is one species that was collected on the voyage of the Beagle all those years ago. What a mouldy looking specimen it was too!

DEATH OF A SPECIES

(A crisis of identity at the British Museum of Natural History).

I

Dulled glass, formless statues,
the regiments of dust catcher jars conceal an insignificant bottle. Inside this waiting container, is sunk a holotype *Corydoras paleatus* (Jenyns, 1842). In Latin-death this solitary species is preserved thirty lives longer,
land-locked from its native waters.

One amongst a host of type material collected from the dawn of taxonomic zoology. A "new age" captured on the bible-bleaching Beagle Voyage, now standing on a grey metal shelf corridors away from public view, for the select few;
in a gallery of death.

II

A minute fish, known to God
but previously unknown to science now has a place in this hall of fame, the long rows of paratypes, surviving Napoleon, designated by Gunther, selected by Boulenger or precisely chosen by Tate-Regan during the endless world war years.

Time was sucked dry, in slow, careful preparation. A world of measurmeristics, scale and fin ray counts. Earthly constellations remain out of mathematical reach of single-minded scientists locked in desire to classify. Zoology, richer for the papers,
Nature, poorer for the collection.

III

Take a jar in childish anticipation;
could Darwin have handled this very specimen? Probably not, but even so, the animal within shared the same historic sea journey from La Plata to South Kensington in forced migration, fresh water to fixative.

Unscrew the glass top, formalin vapours fill the nostrils and mask the space between a naturalist and simple enthusiasm; pause to breathe, search with eyes instead of imagination as euphoria fades as the coin size remains, described by Jenyns, slips wet and deteriorated onto the polished bench for the photograph.

IV

Beyond South Kensington's cathedral walls Darwin's published letters hide the briefest mention of his South American fish collections.

The volume closed a cryptic idea forms. In one second-split did that moment fix a place in time between two minds, both in wonder of the nature of this planet.

Paleatus poetry

Last month, I wrote that I liked poetry and wondered if any of you had taken pen to paper to write about fishes. If you have, I would like to see your efforts.

My entry for last year's national poetry competition was about the Peppered Catfish and I dedicated it to Gordon Howes of the fish section at the British Museum.

DAVID SANDS

A pair of *Corydoras paleatus* (male above) — the Peppered Catfish — inspiration for my poem Death of a Species.

Letters

Prickly Cory problem

I keep two 7 in Oscars in a 50-gallon tank. They are fed twice daily on a diet of mealworms, pellets, cat food and raw beef.

I decided to keep other fish with the Oscars and had hoped to buy a pair of Jack Dempseys, so I went into Farrago Waterworld in Yeovil where I was shown the letter from Dr David Ford published in Your Questions Answered (*A & P* – November, 1989) suggesting that *Corydoras* catfish could be kept with Oscars.

Having been advised by Waterworld against keeping territorial cichlids such as Oscars and Jack Dempseys together in such a confined space, I therefore decided to buy four two-inch Corys.

Within 12 hours, one had been totally dismembered and one other was lodged down an Oscar's throat, head-first! The Oscar was showing signs of obvious distress, so I tried to remove the catfish with tweezers myself, but failed.

I 'phoned Waterworld and asked for help. Help soon arrived, complete with operating kit and medication.

The Cory had to be removed with scissors, tweezers, scalpel and a very steady hand. The Oscar (a perfect patient) lay perfectly still throughout the operation, and now appears, thankfully, to be none the worse for its ordeal.

Needless to say, the remaining two Corys were moved to safer quarters and a 14 in Pleco has taken their place.

I'm sure that I will never try to keep *Corydoras* cats with Oscars again. Maybe other readers have had more success.

Jan Thompson
Yeovil,
Somerset

Dr David Ford Replies

I still believe that Oscars and *Corydoras* can co-habit because I have kept them together for many years with no problems. Only a stupid fish would try to eat the prickly *Corydoras* . . . and Oscars are far from stupid.

However, what I believe may have happened is that Jan's Oscars are a potential breeding pair which may have attacked the Corys simply for being in their territory.

DAVID SANDS

Corydoras catfish are (with some notable exceptions!) generally safe in an Oscar tank . . . but how safe are the Oscars?

Nevertheless, there's a lesson to be learned here — better to choose a "Plecostomus" or a largish *Pangasius* cat instead.

David Ford
Head of the 'Aquarian' Advisory Service

MINIREEF COMPETITION

December was obviously a good month for entering competitions. We were absolutely swamped with entries for our **Minireef Competition.** The lucky winner of a complete **Minireef H39** system valued at **£885.40** is:

Gary Masters from Ilchester in Somerset.

Congratulations to Gary, and sincere thanks, both to the hundreds of *A&P* readers who entered the competition, and to **Minireef** for their generous sponsorship.

The correct answers were:

1. West Germany.
2. Two.
3. (i) Spiral Filter or Minireef Biological Spiral Filter.
   (ii) Nitrate Filter.
4. £885.40

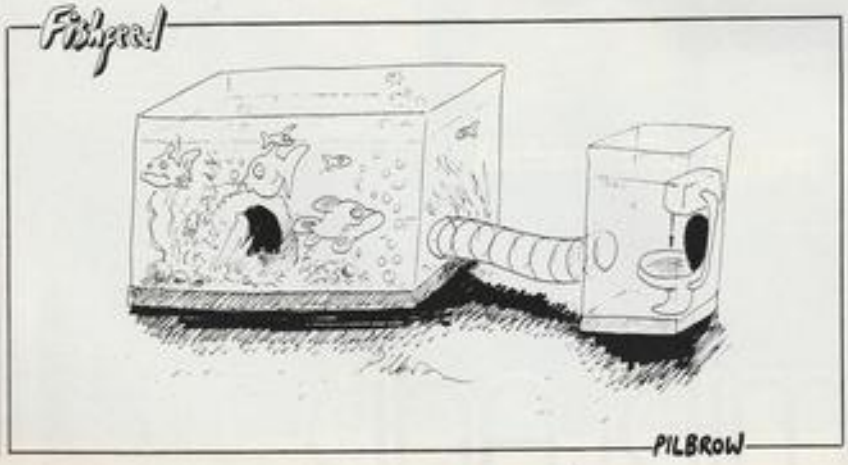
'Tortoises as Pets' supplies

I was very pleased with the treatment you gave my article **Year-round Tortoise Care** in the December '89 issue of *A & P.*

In the reference section at the end of the feature, I included details of one of my books: **Tortoises as Pets,** indicating that it was available from the publishers, Meadowbank Studio.

However, Meadowbank are moving abroad in the near future and will no longer be able to handle enquiries or orders regarding the book. I have therefore taken on this responsibility myself and am now able to supply the book, either directly or through booksellers. I would be most grateful if you would bring this information to the attention of *A & P* readers.

Jim Wright
'Tremeneth',
Shrubberies Hill,
Porthleven,
Helston,
Cornwall, TR13 9BJ.



Two adult males displaying to each other. Note the reddish fins.

THE GLASS HEADSTANDER

CHARAX GIBBOSUS (LINNAEUS 1758)

Bill Tomey's latest introduction is a somewhat inappropriately named, but nevertheless interesting, Amazonian characin.

(Photographs by the author)

Family: Characidae.

Sub-family: Characinae. The name derived from Charax (Gr): pointed pole, palisade, stockade, referring to the appearance of the sharp teeth.

Genus: *Charax.*

Species: *gibbosus;* derived from gibbus (Latin) meaning "humped", with humped back.

Origin: Guyana, Amazon Basin, Rio Paraguay; spread over a large area of tropical waters in South America.

Sex differences: Adult males and females are about the same size, but the male shows some red in the otherwise transparent fins. The black shoulder dot is always present in both sexes. During the breeding season the male becomes more or less yellowish, like wax. The female always stays the same colour. Even in breeding condition it is difficult to see how the female could carry up to 600 eggs.

Size: Up to ± 15cm (6in) in the wild, but in captivity they usually reach a maximum of 11cm (4.3in).

Aquarium requirements: *Charax gibbosus* is a shoaling fish, usually adapting very rapidly to the aquarium

This mature specimen can be identified as a female because of its lack of red pigmentation in the fins.

environment and the local water conditions. As nearly all fishes originating from the Amazon, they prefer a pH between 6.5-7.5, but they may react negatively to temperatures lower than 25°C (77°F). If disturbed, they are fast as a lightning flash, but otherwise, they prefer to stay quietly together between dense growth of aquatic plants, hiding in the shadows and swimming now and then. At a temperature below 25°C (77°F) they don't swim at all.

Behaviour in the aquarium: First and foremost, these *seem* to be friendly fishes. However, this is misleading, especially if the aquarium is also populated with smaller fish species such as Guppies, young Mollies, etc. Under such circumstances the sharp pointed teeth indicate just how rapacious these fish can be.
In the wild they eat anything alive that is small enough to pass through the sharp teeth and powerful jaws in the rather small head, typical of the species.
As mentioned already, *C. gibbosus* prefer to stay silently, but very alert, between the plants, observing every movement, ready to attack. Their prey ranges from insect larvae to beetles, worms and, of course, young fish, even of their own species.
Sometimes — as all fish with such teeth tend to do — they nibble the top leaves of soft aquatic plants.

Diet: *Charax gibbosus* are omnivorous; they prefer mainly livefood, but can be adapted to eat frozen foods as well. Once a fortnight, a soft lettuce leaf will do them good.

Breeding behaviour: At the very moment of writing this article, I have succeeded for the second time in breeding and raising this remarkable fish. This is probably the first time this has ever been achieved.
The surface area of the breeding tank measured 40 x 40cm (c 16 x 16in). It was filled with tapwater (13° dH and pH 6.9), the temperature was 28°C (82°F) and the tank was decorated with a small piece of peatwood densely covered in Java Moss (*Vesicularia dubyana*).
The pair's "peaceful hiding" was interrupted from time to time, with the male heavily driving the female, showing off his most beautiful colours.
The actual mating could not be observed between the dense growth, but the clear transparent eggs were seen hanging in the moss cluster. Hatching took 36 hours.

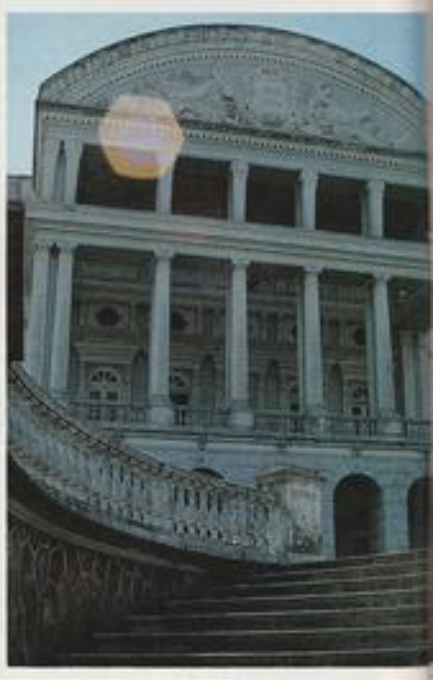
Fry food and growth: As usual, breeding is not the most difficult part of the operation, but raising the glass-splinter-like fry into young fish certainly is! They need the finest possible livefood. Therefore I cultured milk-fed *Paramecium caudatum* ("Infusoria") as an excellent substitute for the finest natural "dust-food" originating from ponds and ditches.
When the fry started to grow, decapsulated (shelless) *Artemia* (Brine Shrimp) were hatched and fed. On this diet they grew slowly but steadily, reaching about 12-15mm (0.5-0.6in) within five weeks. I then started to feed them fine, sieved *Cyclops* and now the majority of them are about 2-2.5cm (0.8-1in) long, accepting almost every kind of livefood that can pass through the jaws. Their numbers are quite amazing; there must surely still be more than 300.
Needless to say, the water in the raising tank must be refreshed quite often.

Peculiarities: In spite of their more or less rapacious appearance and behaviour, *Charax gibbosus* is a peaceful and quiet fish, **provided it is not kept together with much smaller fishes.** Accompanied by fishes of their own size, they present no problems at all.
Young fish, in particular, are a dull greyish-silvery colour and this is why not many hobbyists are really interested in this species. However, on reaching maturity and adult size, the colours change and mellow into the soft shine of old pure silverware, with a surprising light refracting ability which results in diamond-coloured spots, changing all over the body. Together with the soft-reddish fins, this makes *C. gibbosus* a very attractive fish, but, probably, only for the real "connoisseur".

AMAZON

TAPAUÁ ADVENTURE (THE MYSTERY OF THE NEON TETRA)

Heiko Bleher's latest South American expedition rekindled fond thoughts of Manaus in its heyday . . . and left some intriguing questions regarding the distribution of the Neon Tetra unanswered.



Amazon and Amazonas are two different things. The first is probably one of the most often used words today. Everyone around the globe talks and writes about its deforestation, its fires, oxygen problems, and the ozone gap resulting from this destruction.

The Amazonas, however, is the Manaus Opera House, something I am thinking of as my flight, SC 204, begins its final approach. approach.

Ever since a fish was first described as *Hyphessobrycon simulans* by Géry in 1963 and later placed into the genus *Paracheirodon*, together with the two other "most-sold" aquarium fishes, *P. axelrodi* (Cardinal Tetra) and *P. innesi* (Neon Tetra), by S. Weitzman, Jacques (Géry) has made me aware of a phenomenon: that *P. simulans* (the Blue Neon) is possibly a mimic of *P. axelrodi* and does not share the characteristics of its other two relatives. The exact locality of the Blue Neon has never been given, and nobody really knows where it occurs, except for some Brazilian fishermen. . . . But back to the Amazonas.

Good times in Manaus

Manaus 1870: "La Belle Epoque"; the rubber boom; a real Mecca; a steam locomotive pulling trams from Flores suburb all the way downtown. . . . A very special illumination system had been invented — arc lamps, giving brilliant light. There were steam boats in the docks coming from North America and Europe; the first movie theatre opened on the Continent; the first street cars; typographical print shops and daily newspapers in French, German, English, Spanish and Arabic.

Of course, the "fin-de-siècle" playboys spoke French, flaunting in the latest automobiles on the monumental avenues and having their Swiss linen shirt cuffs and collars sent to Lisboa (Portugal) to be laundered! The only thing Manaus was missing was "l'Opera de Paris".

And then, in 1896, after 12 years of construction, the phoenix-like Amazonas Opera was inaugurated with Ponchielli's "La Gioconda" by the Italian lyric company. I could just visualise this splendour. . . . This monument hosted (so they say) Enrico Caruso (singing Rigoletto), Sarah Bernhardt (reciting Racine's Phèdre) and Ana Pavlova (dancing Swan Lake). The building had French-Italian neo-classical façades, chandeliers and mirrors from Venice, staircases made of Carrara marble, and roofing tiles from Marseille (France). The steel structure for the magnificent, giant dome was made in Glasgow, covered with clay-shingles layered in flakes and sent in one single piece.

While I am daydreaming of this glorious epoch, I notice the Amazon jungle below me, much less dense than one year earlier. We are flying over hundreds of kilometres of treeless plains just south of the mother of rivers.

My eyes fall onto a topic of "**O Globo**" (Brazil's largest circulating daily): "Reabertura do Theatro Amazonas". After 87 years it is being reopened with "Carmen" and the Brazilian Symphonic Orchestra conducted by Isaac Karbtchevsky. For the facelift, the newspaper said, researchers had travelled throughout Germany to find 36,000 shingles of enamelled ceramic to restore the sheathing of the dome (they are no longer made in Marseille).

The streets which gave access to the Amazonas were covered with thousands of bricks into which latex had been mixed, so the wooden carriage wheels would roll silently and not disturb the audience during performance! After having re-done this part authentically with 74,000 bricks of the same composition, one of the engineers involved in the reconstruction said: ". . . if the car-

Bottom far left, Amazonas, the world-famous Opera House in Manaus, just before its recent facelift.
JOHN DAWES

Left above, the Cardinal Tetra *(Paracheirodon axelrodi)*. Note that the red band extends the whole length of the body.
MIKE SANDFORD

Left below, in the Neon *(Paracheirodon innesi)*, the red pigmentation only extends halfway up the body. It was this fish that formed the main focus of the expedition.
MIKE SANDFORD

Top left, aerial shot of the flooded Rio Solimoes (Amazon). The level of the water seen in the photograph is over 23 metres above normal and is the highest recorded since 1953.
HEIKO BLEHER

Centre left, Semhor Leopoldino's floating house on Lake Yapoá — base camp for our Neon-hunting sorties.
HEIKO BLEHER

Centre right, examining some early catches alongside our Hydroplane on Lake Yapoá.
HEIKO BLEHER

Top right, this light-coloured mottled Loricariid catfish is possibly new to science.
HEIKO BLEHER

riages return some time in the future, nobody will hear them. . .".

As much as I wish these old times would return, I must face the new epoch. Now it is oil and gold rush, instead of rubber. *Hevea brasiliensis* is disappearing, and Chico Mendes, the "Seringuero", one of the last of his kind, has been killed a few months ago in the fight to preserve the Amazon jungle. These races of people, living from and with the jungle — Seringueros and Indians — are vanishing from our map. So are some of the beautiful fishes.

Perplexing find

In 1963 Axelrod, Terophal, Schultz and others had collected *P. innesi* down in Tapauá on the upper Rio Purús. Only about 16 badly preserved fishes were collected; four of them went to Jacques Géry in France and the remaining 10 to Washington DC. Axelrod sent a photo along of the Neon Tetra, stating that they had been found within the creek flowing through Tapauá.

Throughout my hundreds of Brazilian collecting trips I have found that the gigantic waterway of the Amazon River is an ecological boundary for many fish. *Anostomus anostomus, Hemigrammus bleheri, Petitella georgia,* and *Parachirodon* species, just to name a few, have never been found south of it. I have caught the beautiful Amber Tetra (*Hyphessobrycon amandae*) and *Inpaichthys kerri* . . . and many others, but never a Neon Tetra. Something seemed dead wrong about this discovery. I was, however, informed by a Caboclo (Brazilian man of interior) that he saw "Neon verde" (Green Neon) north of Tapauá.

Sardis, the nicest fish exporter I know, called and confirmed that an Aztec aircraft (bi-engine) was waiting to fly me down into the pH-high (around 7.0-7.2), mosquito-infested area of the Rio Purús. Unfortunately (or fortunately!) the flying machine had lost its left engine one day before my arrival.

Cleomar Melo, the Hitler freak, and an experienced Amazon jungle pilot, offered his hydroplane as soon as he heard I was German. Cleomar is also a fish lover, has an aquarium with Angelfish (*P. scalare*), *Geophagus* and *Corydoras* and had just returned from the Rio Jaú transporting 60,000 Black Arowanas (*Osteoglossum ferreirai*). The Indians shoot the fishes of this ancient mouthbrooding family (Osteoglossidae, 2 genera in South America, 1 in Africa, 3 in Asia) with bow and arrow, and the baby fish are taken out of the mouth of the parent animal. The *Osteoglossum* are one of the Amazon people's main food-fishes.

Neon quest

We flew over Manacapuru, south-west of Manaus, a city on the southern end of a lagoon of more than 100 Km length, which hosts some of the most beautiful Discus (*Symphysodon aequifasciata haraldi*). Soon, we crossed the Rio Solimoes (Amazon River) but could not see the river-bed. As far as our eyes reached . . . water. The unbelievable floods surpassed the highest water level of this century, in 1953. Villages along the river had been completely submerged, with only the church tower showing above the surface. It is known that the Amazon River system usually carries more than 20% of all fluvial fresh water; I wondered how much it was now!

This dark, impressive catfish, collected at Lake Yapoá, is *Cheirocerus goeldii*.

The Rio Purús, with its swiftly flowing, white-coloured water, was broader than the Mississippi River. At some places below us blackwater igarapés (creeks) merged and made it look like "média" (Brazilian: milk with coffee). Two hours later we saw Lake Yapoá, located north of Tapauá. This Indian word means just what it is: big lake.

But the Indians have all disappeared. The only one living at the very southern end of the lake is Semhor Leopoldino. He owns three floating houses, which are anchored at the only peninsula, where a snow-white church with bright blue windows stands lonely in this wilderness.

This place was our stopover. During a soft waterlanding we scared lots of Jaraqui (a *Prochilodus* species) out of their morning schooling. Semhor Leopoldino with his wife and children welcomed us ashore. It is quite rare that "brancos" (white men) come to this remote place. Once a year there is a Christian festival on this peninsula, and for a few days, Indios (Indians), café com leite (black and white), Cabóclos, Mulatos e Mulatas (mixed Brazilian races) are invited, and the Cachaça (sugar cane brandy) flows non-stop.

"Um cafezinho" (small coffee) was our welcome drink, and while we were sipping on this mokka-like, sugar-sweet liquid, a spider of 15cm (6in) length fell from the palm roof onto my right shoulder. But nobody was hurt. Semhor Leopoldino said they had many of them here!

With a "canoa" (dugout) we paddled upriver, entering several "igarapé de terra firma" (creeks flowing over hard soil), but the water masses had also penetrated every corner of dense jungle here. This is totally untouched nature, Onça, Tapir, Peixe Boi (manatee), Macaco (monkey), and Sucuri (anaconda, the largest existing snake) are still ample. Jacaré (cayman) still arrive by the hundreds during the dry season to feed on the Piranhas in the "Várzea" (drying-out flooded area).

I "dug" my hand net into every possible place, and most of the time sank into soft ground. To catch a fish in the wild when the water level is so high is like finding a single fish in the Atlantic.

Spiny palm trees, similar to the "Buriti" palm, grew in the water and enhanced our way. Here in the igrapés, Semhor Leopoldino said, "Ele pegou Neon verde para o Semhor Willi muitos anos atrás". (He fished Green Neons for Semhor Willi [Schwartz] many years ago). I started to believe that there was a good chance of finding such a fish there, because both spiny water palm trees have one thing in common in that their fruit is devoured by fishes. The Buriti palm tree is one of the Cardinals' main food sources, and the one here is at least known to represent the main nutritional source for Pacú (*Colossoma brachypomum*), namely a tiny mini-coconut-like fruit only 3-4cm in diameter. The Pacú and other large fishes swallow them with one gulp.

Later I was able to seine in an area with millions of decaying leaves, and while I was bringing the 15 metre net ashore a huge spine of 20cm length of such a palm penetrated my left foot . . . leaving me with a painful and long-lasting wound.

I caught *Geophagus acuticeps*, with four centred spots, *Acarichthys heckeli*, the magnificent Amazon cichlid (both with a great number of juveniles as it was their breeding season), some gymnotids and a great number of characoids, as well as a most interesting loricariid.

Without any Neon Tetra, but sure to return during the low-water season, we flew back. In the sunset we landed on the "black waters" of the Rio Negro, the second or third largest river, near Manaus.

With "Rigoletto" in my ears and thinking about how "La Belle Epoque" might have been, and about how real adventurers like Natterer, Spix, Agassiz, Wallace or even Fitzcaraldo experienced those times in a completely unspoiled Amazon jungle, I fell asleep.

Spotlight

THE ALTUM OR HIGH BACK

Dutch aquarist **Peer Koppenaer** focuses on a very special, but rarely seen — and never bred — species of South American cichlid.
(Photograph: Arend van den Nieuwenhuizen)
(Translated by Mary Bailey)

One species is popular and often seen, while the other is neglected. One species is easy to breed, the other, remarkably, has never been bred. This is a great shame, as the species I am referring to is a special and interesting aquarium fish. These two species, both of which are known to aquarists, have a further "brother or sister"; no other species are known from the genus. You will probably already have guessed that I talking about *Pterophyllum*, the Angel. The best-known species is *P. scalare* (Lichtenstein 1823), whose equally well-known synonym is *P. eimekei* Ahl 1923.

The second species, known but unfortunately rarely kept, is *P. altum* Pellegrin 1903, and the third, rarely offered for sale, is *P. leopoldi* (Gosse 1963). This last, which, like *P. scalare*, but in contrast to *P. altum*, has large scales, is immediately recognisable by its elongated upper head profile with no snout concavity as is the case in *P. scalare*.

Unfortunately, in my view, there are many artificial forms of *P. scalare*, the most striking of which is the snake-skin variety, which has now disappeared from the trade in my country (Holland).

Distribution

Angels are inhabitants of the South American continent. The distribution of *P. scalare* is the widest, occurring in the Ucayali and Amazon basins in Peru and then eastwards as far as Belem in Brazil. It is, however, also known from the middle reaches of the Río Negro, Río Branco, and, in the north, the Río Araguia and Río Madeira. It is also found in the Rio Essequibo in British Guiana and in the Rio Oyapock which forms the eastern border of French Guiana with Brazil. Remarkably, no locality is known for this species in Surinam.

The range of *P. leopoldi* is much smaller and, so far, it is known only from the Río Solimoes (Amazonas) and the Río Rupununi. It was collected there for the first time by an expedition led by King Leopold of Belgium. The largest species, *P. altum*, is found only in the upper Río Orinoco and the Río Negro.

Although fish are frequently imported from these regions, the 'high back' (altum = high) is only rarely among them. This is a pity as there are many cichlid fans who would like to keep this fish. This species is — and I hope you will forgive me for saying so, as no insult is intended — less suitable for the ordinary aquarist, especially as it has not yet been bred. One should not be put off keeping *P. altum* even when one knows that, in nature, they may measure more than 80cm (c 32in) from the upper to the lower fin tips. The largest specimen which I have seen in a public aquarium was some 40cm (16in) and those in the photo by van den Nieuwenhuizen are some 25cm (c 10in) deep.

Coloration

Young specimens have a more slender and vertically elongated shape than half- or full-grown specimens. A colour description is superfluous as the photo shows the exact appearance of the animals. It should be noted that young specimens have a striking red dotting on the head and body.

I do not know whether this has anything to do with geographical location, but the intensity of the base colour and the stripes is very variable. The base colour can range from silvery to a fine gold-brown. The stripes may be pale (almost to invisibility) or deep dark brown to black-brown. Moreover, the stripes on a single individual will often vary in intensity of coloration depending on the mood of the animal.

If one wishes to observe changes in colouration, then one will succeed only if several specimens are kept, as *Pterophyllum*, unlike many other cichlids, typically prefer to live in small groups. They often stay close together — at least in the aquarium — but, from time to time, individuals will establish a territory and perform a striking territorial display.

This behaviour resembles that of *P. scalare* (i.e.) the fish approach each other with the body upright or at a slight angle, with the dorsal and anal fins fully spread, and the stripes, especially the first and fifth, very intensely coloured. This majestic behaviour makes these animals so impressive to each other that they do not actually harm each other; they are fish that are very willing to come to a peaceful agreement.

Accommodation

A very common error in the maintenance of *P. scalare* is that aquarists with too small an aquarium, e.g. 80 x 40 x 40cm (32 x 16 x 16in) will buy young specimens of 5-6cm (2-2.5in) high in the mistaken belief that their tank is big enough for them. This is a basic mistake that should be avoided with *P. altum*. Whether young or half-grown, Angels belong in a large aquarium — at least 100 x 50 x 60cm (39 x 18 x 24in). Just as for other fish of similar shape, the aquarium height is important. For Altums the minimum length should be 150cm (c 5ft) and attention should be given to the arrangement of the interior, as these fish like to withdraw to hiding places. Such retreats can be made using artificial wood under which they can hide. They also like a rather open planting scheme.

I have kept Altums in a tank measuring 160 x 60 x 60cm (c 63 x 24 x 24in) with a narrow band of plants (*Vallisneria gigantea*) round the edge, combined with pieces of wood and large Amazon Swords. This provided separate hiding places among the plants, but also plenty of swimming space.

Water conditions

The well-known importer, Heiko Bleher, has supplied data regarding water conditions in the native habitat of the fish imported during May and June 1972, as well as at other times. The information refers to a tributary of the Orinoco which contained clear water with a depth of some 5 metres (c 16½ft). Water hardness was 1 DH and pH 5.8-6.2.

It is well-known that many aquarium fishes have a great capacity for adapting to different water conditions, but with *P. altum*, it is better to simulate the natural habitat as closely as possible. I therefore use demineralised water (Cation/Anion system) to which some tapwater is added to give a hardness of about 2 degrees. After processing, the demineralised water is slightly acid (pH 6.6). The tapwater is about neutral — pH 7. So it is necessary to filter the water over peat until the pH drops to 6.4.

It is often recommended that the temperature be kept high, at so-called 'Discus Temperature', but I have kept Discus for years at an average temperature of 26-27°C (79-81°F) and do likewise with my Altums. This works well. The corollary of high temperatures, especially combined with poor maintenance of water quality, is rapid bacterial development and reduced oxygen content. The latter is harmful to both Discus and Altums.

Crystal-clear well-aerated water is desirable, and it is worth using a well-maintained power filter, combined with

regular partial water changes. A water change of about 15% performed every week, plus a high-turnover submersible foam filter, is ideal. The latter should be cleaned every week.

Attention to water quality is also important because fish like Altums eat a lot while growing, and the result is large quantities of wastes. If one neglects water quality, and in addition the temperature is too high, then this leads, first to loss of appetite, and then, often, to sickness. Altums are no prima donnas, but they do like a bit of pampering!

Diet

Altums will eat almost anything. They have a preference for red mosquito larvae and *Tubifex*, but they should not be given these foods exclusively, or in too large amounts, and variety should be given by way of water fleas, small insects, Mayfly larvae and glassworms, as well as deep-frozen foods such as Krill. Mine are not so keen on dried foods, except special cichlid foods which they take greedily.

If livefood is in short supply, then one can add vitamins A-D to deep-frozen food. Grindal worms and Enchytrae (white-worms) can also be introduced into the diet. It is often implied that this leads to build-up of fatty deposits, but this depends on the species of fish (Labyrinth fishes such as *Colisa* are particularly susceptible). I have known a Discus breeder who fed only Enchytrae for a long time and his Discus bred continuously. I have never detected fatty deposits in my Altums. But I feed as varied a diet as possible with one fast day per week.

Unfortunately, though, I have had no more breeding success than other aquarists with these beautiful, stately fish. This is a pity, but they have given me great pleasure for many years.

Health problems

P. altum may, of course, fall ill from time to time. If the animals have been injured, for example during catching or transportation, then fungus often grows on the wounds. This is often seen round the mouth, and is usually the result of the lights being switched on or off suddenly; *Pterophyllum* are sensitive to this and tend to race round the aquarium and may bang their mouths in the process. As soon as one notices fungus, it must be treated. One method is 0.15mg Malachite Green per litre of aquarium water. This dosage should be adhered to strictly.

Antibiotics, such as Tetracyline (Oxytetracycline) or Neomycin can be used in the war against bacterial infections. These often manifest themselves as rotting of the fins. Usually the bacteria *Aeromonas* or *Pseudomonas* are the cause. If this is noticed in time it must be treated immediately. Furamore, which is available through vets, may sometimes help.

A notorious disease is the so-called Hole-in-the-Head, which occurs, not only in Discus, but also in Angels. This disease is caused by flagellates. The disease normally does not occur if preventive measures are taken, i.e. if the recommendations for good water quality and filtration, and a varied diet, are followed.

Well maintained and fed animals have a very low susceptibility to such diseases. The corollary is that poor maintenance leads to debilitated animals, which will undoubtedly one day succumb to disease. If one notices that there are small or enlarging holes in the head and anterior back, then unfortunately, it is too late and a cure is difficult, if not impossible. The only answer may be to remove the sick fish and destroy them humanely.

Maintenance of good water quality is naturally very important, and mastery of this is a sign of an expert. Although I myself, using 30% weekly water changes, have never had any problems, it may happen that after a sudden change in the osmotic pressure of the water — the result of too large a water change — there may be red areas round the base of the pelvic fins (ventrals) and pectorals. These are small haemorrhages where the change in pressure has caused tearing of the soft skin between body and fins. This heals very quickly, in a matter of a day or two at most, but may offer an opening for a bacterial infection. For this reason a newly purchased fish, or fish from another aquarium, should not be placed in a freshly filled aquarium. It is better to wait for a week.

The Altum or High Back Angel is a very special fish . . . and therefore deserves very special care.

Reflections

by David Sands

TV critique

I suppose many of you would have seen two recent programmes linked to fishkeeping: the FLOODED FOREST, BBC 2's two-part programme on the Amazon screened in November last year (based loosely on Michael Goulding's book **The Fishes and The Forest,** and FISH PEOPLE, Channel 4's independently produced programme screened at Christmas.

1. Flooded Forest

In the first programme the fish filming was superb but, sadly, a small proportion of the almost-two-hour presentation. There was slightly annoying repetition of the limited fish filming, and terrible repetition of the programme title in the dialogue.

I was disappointed on several counts. Firstly, some of the filming appeared terribly staged and I sincerely doubt that the *Pimelodus blochii* butchered in half by Piranha and still alive was 'real'. For one thing, *Pimelodus* are shoaling species, so how come a solitary, slow-moving (drugged?) specimen waltzed into the waiting shoal of Piranha?

Secondly, the cameras were set up on the Teotonia cataract, and yet, actual film was limited to one gaffed *Goslinia* or *Brachyplatystoma* Shovel Nose Catfish.

There was much use of bird and monkey film already screened and, I must say, that apart from some superb moments with Arowana and the clear water locality, the film was a big disappointment.

Is it just me or did anyone else feel the same? I think the BBC patched together a programme that deserved much better, especially since Michael Goulding was the programme's scientific producer.

I have always thought that the world of fishes come out as getting the very poor relatives' share in natural history film time. The FLOODED FOREST was a unique opportunity lost, but I suppose we should be grateful for a small mercy.

I wanted to interest the BBC in filming aquaria, and combining it with natural filming, but the idea was lost on the head of the Natural History Unit when I wanted to compare my Tanganyikan system with the real thing!

2. Fish People

On the FISH PEOPLE programme, I have only seen and heard snippets of the film because I am writing this article *before* Christmas Eve when it will be screened.

I found myself appearing in the programme without it necessarily being the real me. It's a strange thing, but whenever TV or media people come around, I am often disappointed. It is certainly my fault because I always imagine that fishkeeping will speak for itself, and yet, it never does. I think that the media set themselves a high target and then, slowing down and delays, drop their ideal horizons as other pressures arrive.

In the programme, I found myself parroting things in my mind instead of being 'off the top' of my head. The only moment that I spoke purely *"from me"* was when I spoke about the vivid dreams I had before I travelled to South America. I had wonderful 'Temple of Doom'—like adventures in my sleep and the exotic jungle scenes were eventually matched when I collected *Corydoras barbatus* in Brazil.

I wanted to say *so* much, but I never did . . .

How do you feel about fish coverage on television? Would an English fish programme survive (or even get off the ground) like Paul Speices' **Guppies to Groupers** or **The Aquatic Maestro** from American and Canadian television?

Fish food experiment

I've been experimenting with various fish foods recently and, despite being around when David Ford and 'Aquarian' first launched 'Aquarian' Fish Foods, I had always been dedicated to other flake foods, leaning hard on frozen foods to provide a balanced diet.

David even sent me early production tubs of 'Aquarian' catfish tablet food when I first went out to Brazil in 1979, and some did become fed to wild fishes . . .

Anyway, at **AquAdventure,** I have tested several brands and 'Aquarian' marine and carnivore flakes have come out very well. I knew the flake food process at Thomas's was developed towards producing a fresher product with a bias towards the correct balance between protein and essential carbohydrates, etc, but I hadn't realised that this does make a difference.

The flake has a somewhat different texture to other flake foods and, I think, that may have put me off (more than the fish) looking twice at it. I have now found that, once fishes have adapted to it, there is a difference and some young Discus showed me what they thought about carnivore flake by mopping up all that I fed to them clean away!

I'm 'anti' livefood, although I have heard *all* the arguments 'for' from fish breeders. I have bred catfish and fed them nothing other than prepared flake and frozen shrimp. What's your opinion on the matter? Let me know.

Happy fishkeeping in the 1990's!

The cataracts at Teotonia in Brazil — given disappointing coverage in The Flooded Forest Photograph reproduced by courtesy of Junk Publishing.

THE MODERN POND

French-based aquarist and pondkeeper **Peter Cole** limbers up for the coming season with some personal thoughts and guidance on the modern garden/patio pond.
(Illustrations by the author)

With gardening becoming more and more popular, together with the growing interest in DIY and the availability of an abundance of materials, the garden pond has become a main feature in the garden landscape, to an extent where some enthusiasts, especially Koi-keepers, are building their garden around their pond.

If we contemplate, or have already decided on, the construction of a garden pond, we should be aware of the fact that one will inevitably introduce fish. Whether it will be Goldfish, Comets, Shubunkins or the king of ornamental fish, the Japanese Koi, they will all depend a great deal on us and their environment to stay in healthy condition.

This is the most important aspect, together with the size and eventual site for the pond, that will need to be kept in mind while one is making the necessary plans and decisions before actual construction.

Those who inherit a concrete pond can, armed with the knowledge, ideas and requirements needed in pond conception, quite easily modify, build-on and repair the existing structure to create a suitable habitat for their particular species of fish.

An attractive lined pond showing a pebble/stone edge.

For those who will start from scratch, pond building (as with swimming pool construction) has been revolutionised and brought into the reach of every handyman, with the introduction of the non-degenerating PVC or Butyl rubber liners — materials which are simple to use, do not dry or crack, and can be repaired easily.

THE MODERN APPROACH

Today, depending on the tastes of the individual owner, and with the need for larger water volumes, and filter systems, especially to accommodate Koi, the pond (or should we say, pool?) has taken on entirely new shapes and forms — formal or informal, raised or in-ground, oval, round, rectangular, square in shape, or whatever.

A formal pool, for example, built on a terrace, can be raised to approximately 60cm (24in), with walls built with breeze blocks and then lined with a synthetic underlay or polystyrene sheeting before laying the liner. A double wall with a space in between, can add a decorative finish and also provide added insulation to help stabilise water temperatures. An in-ground informal pool, on the other hand, can be ideally landscaped into the garden by using the soil removed during the initial construction.

Round or oval shaped pools, whether formal or informal, should have their sides as vertical as possible to give a maximum water volume and have unfussy sweeping curves that will facilitate the installation of a liner and add strength to the structure of concrete pools.

Concrete pools should be reinforced at the base and at any sharp corners. The base can be up to 30cm (12in) thick, tapering upwards at 45-70° to a thickness of approximately 15cm (6in). The interior should be rendered with 3cm (c 1⅛in) of clean soft sand and cement to which waterproofing has been added. The surface should be made smooth with the use of a damp sponge or polystyrene block. Once dry, the interior will need to be coated with an appropriate sealer, as cement is toxic to fish.

Rectangular shapes are also very popular and are in some cases easier to build than some of the above. They are also practical and contain larger water volumes (making them ideal for Koi) and have the added advantage of being easily adapted to modern surroundings.

Some early decisions

One of the first important decisions to make will be where to site the pond. With the trend and popularity of Koi-keeping continuing to escalate, the garden pond has taken on a new dimension as to its emplacement, size and shape.

Classically, a pond can easily blend into the existing landscape of a garden or, with the more modern approach, be sited near the house. A pond near the house will inevitably become a main attraction and talking point for family and visitors alike. A Koi pool can become an attractive part of an existing terrace or patio, and, practically sited, will

With appropriate pre-planning even multi-level ponds can be relatively easily built using today's wide range of materials.

also give easy access to drainage, water and electrical supplies for pumps or lighting.

Trees will shed their leaves onto the surface of a pond from summer until autumn, something that will not only deprive one of seeing one's fish but will also pollute the water. If necessary, trees should be cut back (but please do not sacrifice a tree to accommodate a pond) while a raised pond surround will prevent any leaves from neighbouring trees from finding their way onto its surface. Where possible, the surrounding edge of the pond should also be designed in such a way as to incorporate a net or, better still, a wooden framework covered with greenhouse shading, to keep the leaves out of the pond during the autumn.

The pond will need a moderate amount of sunlight; this will, in fact, be absolutely necessary if one is considering decorating the pond with marginal plants and water lilies. There will also need to be a shaded area and protection from chilling winds that could subject the water to rapid variations in temperature. A shaded area can be created by using plants, and wind protection can be found from a nearby wall or house, or a raised garden made from the earth removed during the initial construction of the pond.

Where children are concerned a shallow area should be incorporated in the pond design, preferably at the approach. This area could also incorporate a biological undergravel filter system and become an ideal feeding area for the fish. With the presence of very small children it would be wise to consider the construction of a raised formal pond or erect a sturdy fence around the perimeter of an in-ground design, as a safety measure.

Depth

The importance of water depth should not be overlooked. Not only does it add to the overall water volume that will enable one to accommodate larger fish and allow the younger members of the group to grow, but it will also provide better wintering facilities. The deeper part of the pool will stay warm enough for the fish to remain comfortable during the winter months as the bottom water will remain at a stable and suitable temperature, even if the surface freezes over.

Many fish are lost each year through lack of pool depth, not only by freezing to death but by stress caused through the rapid temperature changes during the winter, leaving the weakened fish vulnerable to the abundant growth of harmful organisms during the spring.

A Koi pool should have an overall water depth of no less than 1 metre (39in) — others should be an absolute minimum of 45cm (18in) deep, but preferably deeper.

During the warmer months of the year, Koi sometimes have the habit of jumping in the air, so to prevent them from becoming damaged, there should not be any overhanging areas around the pool. During mating, the males in the Koi group can occasionally lift the females out of the water. A minimum depth of 25cm (c 10in) between the water level and the surface area around the pool will prevent these fish from landing outside the pool.

Overall size and volume

It is better to build a pond as large as possible the first time around, for a number of reasons. For instance, not only are people liable to change their mind if the pool is too small, but more importantly, enlarging an existing pool can be difficult and, in some cases, as expensive as building a new one.

In general, large fish need a greater volume of water in proportion to their size when compared to small fish. For example, a fish of say 10cm (4in) will need a minimum of 10 litres (2.2 gal) of water, but a fish of three times that size, 30cm (12in), will require a minimum of 60 litres (13.3 gal) of water. There are, of course, many variables. Therefore a tendency to give fish more space than they require when adult, will leave enough room for the smaller fish to grow and a safe margin to enable one to add to the collection without running the risk of overstocking.

An approximate, safe rule-of-thumb is to allow about 360-370 sq cm (approx 24 sq in) of surface for every 2.5cm (1in) of fish.

LINED PONDS

The secret of success while using a liner during pond building is the addition of a layer of clean soft sand as a base and, if necessary, the lining of the walls of the pond with a synthetic underlay or polystyrene sheeting before laying the liner. This will prevent any sharp stones from penetrating the liner from underneath and thus eliminate the possibility of any leaks.

Liners can be purchased in most garden centres and come in various sizes to suit the individual requirements of the customer. Although special shapes and sizes can be made to order by the manufacturer or supplier, square, rectangular, round or even multi-levelled ponds in these forms, can all be made from a basic liner. Folds can be made and creases gently pulled out while filling the pond with water, with any creases left disappearing under the eventual growth of algae.

Butyl liner laid in position, with sealed and centred bottom drain.

After many years of application, it has been found that, under normal soil conditions, an angle of 60-90° can often be achieved without a support; the water pressure will equalise any opposing pressure sufficiently. Of course, the edges of the pond will need to be lined with stones or paving to secure the liner itself, and this, in turn, will act as reinforcement. Large flat paving stones will also help distribute any unnecessary pressure made at the edge of the pond.

Although sometimes suggested, filling the bottom of the pond with soil to accommodate plants should be approached with caution if one is going to collect fish. Some species will try to uproot plants and constantly turn over the soil while looking for food on the bottom, thus clouding the water. The cloudy water will not only deprive us from seeing our fish, but will also help block any added filter system and create premature wear inside any pump that is being used to circulate the water. Where Koi-keepers are concerned, the addition of soil will obviously prevent them from periodically cleaning the bottom of the pond.

Plants are therefore more suitably planted in the special perforated baskets available with a liberal layer of small stones on the surface helping to keep the soil and plants in place.

Some points to watch

Liner sizes are calculated as follows:

Length = 2 x depth + length, plus two overlaps of about 15cm (6in).

Width = 2 x depth + width, plus two overlaps of about 15cm (6in).

Here are some useful tips while using a liner to create a pond:

1. Allow an extra 10-15cm (4-6in) in depth when excavating to add a layer of clean soft sand and gently slope the bottom towards one area if a bottom drain is going to be used. Remove any stones protruding from the bottom or sides of the excavation to avoid leaks later. To prevent any movement under the water pressure, secure the bottom drain, if installed, in a cement base, allowing 10-15cm (4-6in) for the layer of soft sand.

2. Before unfolding the liner, remove any sharp objects from the working area; any unremovable objects can be covered temporarily.

3. Centre the liner correctly and secure with weights before commencing any further installation.

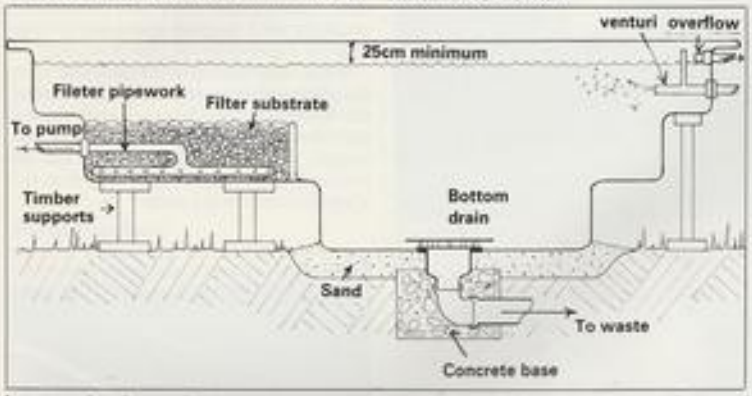
4. Use a smooth wooden plank that has rounded corners and edges to stand on if you need to work inside the pool before filling. This will avoid disturbing the sand base or damaging the liner.

5. Cut any holes needed with a pair of scissors, never use a knife (scissors are easier to control). For drains, skimmers or pipe fittings, allow a sufficient inside overlap to provide enough surface area for a good joint

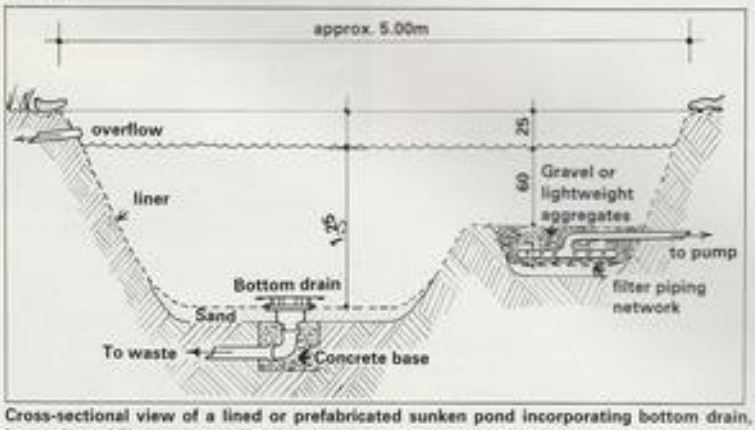
and to avoid cutting the hole too large. To allow for stretching, cut the holes required for any pipe fittings, skimmers and overflows, as you are filling the pool. At the same time, make any necessary folds and gently pull out any creases. Stop filling when the water level is 15-20cm (6-8in) below the position for each hole, secure any pipe fittings using an SP silicone mastic to ensure a perfect seal, and allow a minimum of 24 hours to dry before continuing the installation.

6 Secure the edges of the liner with large stones or slabs and use a strong plastic sheet, or, better still, an off-cut from the liner, to place under any filter installation, pumps or planting baskets that are placed inside the pool.

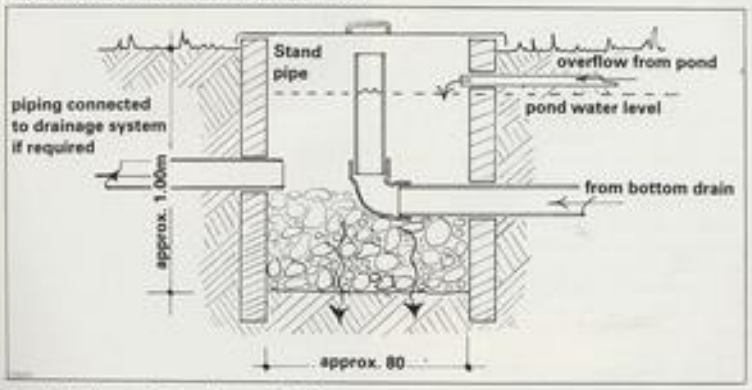
7 Allow a minimum of 24 hours before introducing any fish.



An example of a prefabricated raised pond installation with supports, drain, filter and pipework.



Cross-sectional view of a lined or prefabricated sunken pond incorporating bottom drain, internal pond filter and associated pipework.



Detailed diagram of a soak-away chamber.

Quality PVC pipes and fittings with a reasonably tight fit should be used. A smear of grease or silicone sealant around the bottom of the stand pipe will provide an excellent seal. Remove the stand pipe periodically to operate the bottom drain.

PREFABRICATED POOLS

In the past, choice in prefabricated ponds was limited to those shallow fibre-glass designs that were very good as children's paddling pools but completely unsuitable to house fish on a permanent basis.

However, we are now able to obtain fibre-glass and vacuum formed plastic ponds that are designed with fish and plants much more in mind.

In proportion to their size some models are a little more expensive if compared to the pond-building techniques previously described, but there can be the possibility of fewer hidden costs if all is well planned and carefully chosen beforehand. In fact, through these aspects alone, it is possible to make considerable savings during the installation of *any* pool.

If you have decided on purchasing a pre-formed pool, here are some important aspects that should be taken into consideration:

1 Size: Will you be able to get the pool into the garden without having to take out the front and back door frames, or by knocking down the neighbour's fence . . .?

2 If necessary, leave enough space to install an external filter system, or if required, choose a model that has been designed to adapt an internal filter. Make careful plans for pipes and fittings, and do not forget the overflow . . .!

3 Any earth from an excavation will have to be removed by skip or used to landscape the pool into the surrounding garden.

4 As for liners, to prevent penetration from underneath, a pre-formed pond will have to be settled on a layer of clean soft sand; this will also help in adjusting and ensuring that the top edges remain level.

5 Nearly all fibre-glass pools, and some plastic models, can be made free-standing with a minimum of support. This method will require some form of insulation to stabalise water temperatures. For example, if logs or bricks and stones are being used to form a wall around the surrounding edges, it would be advisable to fill in with earth or a suitable insulating material.

6 Quality fibre-glass pools are available in any colour; black would, in my opinion, be preferable to enhance the colours of the fish.

7 Make sure that the pool you have chosen is deep enough to over-winter the species of fish that you will be introducing.

CLOSING REMARKS

Concrete ponds present a different range of challenges and require techniques which fall outside the scope of an article of this length and, for this reason, have not been dealt with in detail here. However, it should be stated that, with proper planning and the application of the necessary skills, concrete ponds can be every bit as "flexible" in design and size — and as attractive — as the lined and prefabricated ones which I have concentrated on.

Happy pond building!

BEGINNER'S LUCK

The story of how 'M', **John Cuvelier's** new neighbour, built a Koi pool for £200 through expert application of the art of scrounging . . . plus more than a little help from John.

(Photographs by the author)

Rendering of the newly-dug 'hole' well underway. Note the filter chamber at the far end.

The beginner in this instance was our new neighbour who moved in last June, and the luck was the fact that HIS new neighbour at least knew something about Koi-keeping! Unlike most of the rest of us, he didn't have to learn the hard way.

Having seen our pools and fish, within a few days, 'M' and wife were committed to having their own pool, particularly once I had offered a couple of my last year's spawning just to start them off. One snag remained to be solved. Moving into a twenty-year-old house inevitably means a great deal of expense, and so, whatever type of pool they were going to have would need to be at minimum cost.

Eventually the decision was reached to settle for a simple rectangular pool edged with stone (surplus to my requirements and therefore cheap), together with a basic home-constructed gravel filter.

The method of construction chosen was one which I had already proved to be suitable for our terrain, and consisted of rendering straight onto the heavy clay excavation with a 2 : 1 sand/cement mix with Fibromix fibres added, the render thickness to be 1in. The filter chamber which was to be located at one end of the pool was to be constructed in similar manner, with the partitions being mould cast with a 1 : 1 mix with fibres. This method of construction should not be attempted in any soils other than heavy clay, or disaster will result.

Three days of heavy digging by 'M' resulted in an excavation of some 13ft x 7ft x 4ft deep. The filter excavation, also completed at the same time, was of the same width (7ft), 4ft wide but only 2ft 6in in depth.

Master scrounger

The digging over, a materials gathering session commenced. Those of you who had experience in the armed forces will, no doubt, recall that every unit had an individual skilled in scrounging. Let me introduce you to 'M', a master of his craft. Within a matter of hours there appeared on site: 1 length of 8in spun concrete pipe for a filter feed, 2 plastic baker's delivery trays for media supports, 1 length of plastic wind break to lay on said trays to support gravel, half a ton of sand (he had to buy the rest), various bits and pieces of pipework and sundries, and a great amount of tools, etc . . . from my shed!

In fact, the only things purchased were the Fibromix, cement, a plastic tank to hold a pump, and of course a pump, in this case a Grundfos Selectric. Suffice to say, the whole lot cost under £200; not bad for a 1,800-gallon pool!

Shattering construction

Anyway, Saturday dawned bright and warm and rendering commenced. Some 26 nine-gallon mixes later, I crawled back over the fence and greeted my wife who had seen nothing of me all day with the words "I'm absolutely shattered", and disappeared into the bath. It took me three days to recover.

Sunday morning saw the raw excavation filled with water (cement and concrete set much better when submerged) and after two or three days (the water having been pumped out), the laborious task of burning off the stray fibres began. This boring exercise is very necessary prior to painting a pool which has been built using Fibromix, as any stray fibres stand up razor sharp once painted, and we don't need surgical operations on our fish!

While final curing of the pool and filter chamber was underway, we set about casting the filter partitions using a simple mould built from exterior quality plywood and battens. With care, the castings can be removed from the mould after three days and allowed to cure in the open.

Pump chamber all wired up and raring to go.

Completed biological filter prior to being put into operation.

Fish shelter

One thing I did insist upon during the design discussions was the provision of some form of shelter for the future inhabitants. This took the form of a 'table' cast in Fibromix, having legs made from clay drainage pipes simply pressed into the wet cement once the casting had been made. When completed, this would also serve as a support for a couple or three baskets of water lilies and other plants. The pictures probably explain better than any description.

Needless to say, all sharp edges must be removed with a cutting wheel prior to painting and the usual precautions taken as regards stray fibres. I have already used this idea in my No. 2 pool and it has proved very acceptable to both plants and fish.

Four clay pipes and a Fibromix table — the perfect fish shelter.

Final touches

Once everything had cured and dried, three coats of Aquaseal 40 were applied (this being about the cheapest coating available) being careful to extend the paint up and under the surrounding stonework and applying extra coats around the points where pipes entered and left the construction.

The pump was the next item to be installed and this proved to be child's play compared with the previous work. Standard 1½in diameter domestic piping was used, force-fitted into a plastic water tank, the seal being completed using a glue gun. Once the pump had been installed, all joints were pressure-tested and passed 100%.

For the filter, two baker's delivery trays were placed in the chamber, leaving a 6in void below. These, in turn, were covered with a sheet of plastic windbreak to prevent gravel from dropping through, and a depth of approximately 9in of washed gravel (scrounged from yours truly) laid in position.

After the usual mutual backslapping was completed, a water meter was fitted to the hosepipe and filling commenced. Total capacity proved to be 1,756 gallons and NO LEAKS!

Following three days of circulation, a partial water change took place and, as everything tested out okay, plants and fish were added. Several weeks later, the plants had already settled in and the fish actually showed some weight gain. Stock is at present limited to 10 Koi, the largest of which is about 8in, the smallest some 3in, and four goldfish.

As the pictures show, the pool still looks somewhat clinical and certainly not my personal choice as regards shape, etc, but, it is a pool, and it was certainly cheap to build. Once a little landscaping has been carried out, who knows what it may look like?

The completed pool, with two lilies already installed at the far end (above the fish shelter) — awaiting its first fish residents.

Books

Step-by-Step with T.F.H.

Seahorses

By: Peter Giwojna
ISBN: 0 86622 485 8
Price: £1.95

Seahorses, most experts say, should be avoided by beginners — some say they should be avoided by *everyone*. Well, Peter Giwojna obviously feels differently. In his own words ". . . the Dwarf Seahorse (*Hippocampus zosterae*) is perfect for beginners".

He then proceeds to provide comprehensive advice on how this, and other species of Seahorses, can be catered for in marine aquaria. Equipment, Seahorses in the Miniature Reef, Feeding Your Seahorses, Stocking the Stable(!), Breeding and Raising, Diseases and Suggested Reading, are all chapter headings designed to help both the beginner and the established aquarist.

However strongly one might feel about the keeping of Seahorses in aquaria, the undeniable fact is that people *will* keep them. And, if they do, they need advice. Peter Giwojna does precisely this (in between frequent references to stables, stallions, herds, corrals, enclosures . . . and other such 'horsey' terms).

So, if you *do* keep Seahorses, I would strongly suggest that you obtain a copy of Peter Giwojna's 64-page book. You'll find it most helpful.

Tropical Marine Aquarium Fishes

By: Dr D W Emmens
ISBN: 0 86622 468 8
Price: £1.95

This companion to *Seahorses* is a 64-page, colourful book crammed with an amazing amount of sensible and well-presented information, including 'secrets of success', diseases, quarantine, commong species and other useful topics.

It cannot, and does not, claim to be exhaustive, but it does carry a reference to a more comprehensive book by the same author: **Marine Fishes and Invertebrates in Your Home** (T.F.H. — ISBN: 0 86622 790 3) where all manner of tropical marine topics are dealt with at length.

I found **Tropical Marine Aquarium Fishes** a very good, basic read and heartily recommend it to any newcomer to the hobby. Besides, it even carries some cautionary advice on Seahorses . . .!

John Dawes

Degen Discus

By: Bernd Degen
Published by: **T.F.H. Publications Inc**
ISBN: 0 86622 086 0
Price: £16.95

"This book is for the Discus lover and for dealers who sell Discus. It is not for the hobbyist who wants a Discus for his community tank." So says the blurb on the back cover of Bernd Degen's second Discus book.

I would agree with this statement, except for the "his" bit (is Discus-keeping *really* a male preserve?).

This large-format colourful book contains some never-before-seen pictures of Discus in all their glory, this alone being well worth the cover price. However, there's much more than this, both to inform and entertain the Discus lover — all written in Degen's direct, no-nonsense style. The result is a text that concentrates on essential detail and generally dispenses with superfluous material.

The outright beginner may have wished for more basic guidance here and there, but the established Discus-keeper will, no doubt, appreciate not having to go through all the same old stuff . . . yet again.

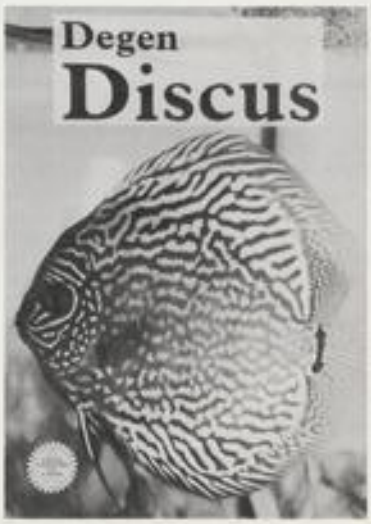
Having said this, though, I think we could have done with a few easy-to-follow charts on subjects such as water hardness and conductivity, plus a few additional explanatory notes.

For instance, in referring to 'other' types of hardness units, i.e. not German Hardness, Degen says that "All can be converted to the dH scale". Some indication of how this can be done would, in my view, seem quite appropriate.

Degen gets over the problem of the vexed question of species/sub-species/varieties quite neatly by simply saying that there are two valid species, each with sub-species. Since the vast majority of today's Discus are hybrids anyway, and since there are currently quite a few strong and contradicting views "doing the rounds" regarding the naming of some of these, Degen's statement seems quite sensible.

Degen Discus is a very useful book, dealing with a range of essential topics such as: The Culture System, Feeding Strategies, Breeding Discus, and Illnesses. It also contains some fantastic shots, including a few of commercial premises in different parts of the world, close-ups of treatment methods and long-finned varieties of Discus, plus a fair sprinkling of the author's own excellent fish . . . all attractively presented . . . and at a very reasonable price.

John Dawes



THE ELECTRIC WORLD OF ICTALURUS

Dr Andrew Allen chips in with one of his occasional fascinating insights into fish biology.

Many catfish live in muddy murky waters where the field of vision is effectively zero. How do they locate and hunt down their prey in, what is to all intents and purposes, perpetual darkness?

Well, we know, of course, that the sense of smell of catfish is — depending on the species — between two million and twelve billion times keener than ours (see my article on the **Olfactory World of Goldfish** — *A&P*, June 1987). In still, murky water, catfish are perfectly well able to home on insects, molluscs, fish, frogs, or carrion 'by nose' from many yards with unerring olfactory accuracy.

But this is not, and cannot be, the whole story, because experiments in the laboratory have shown that many catfish retain the ability to home-in on distant prey in total darkness after their barbels, nostrils and body surface have been treated with a chemical which blocks all activity in their olfactory receptors. And many catfish are able to home on distant prey in muddy *and* turbulent waters where the field of vision is effectively zero and odour plumes are dispersed, dissipated and destroyed in a chaos of turbulence.

JOHN DAVIS

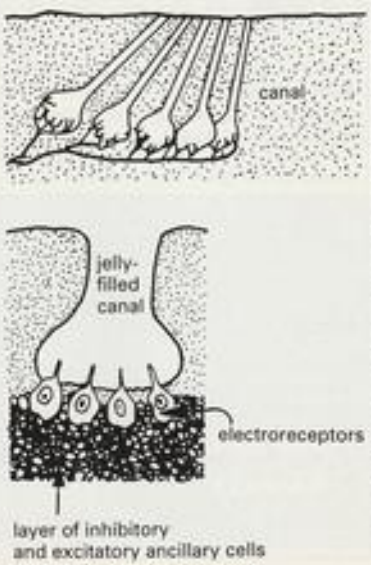
Behind this ordinary exterior, *Ictalurus nebulosus* possesses a quite extraordinary assemblage of sensory organs.

Sixth sense

The mystery of how they accomplish this remarkable feat was unmade by research showing that many (perhaps most) catfish possess a sophisticated electrical 'sixth sense'. The presence of this remarkable sense has been demonstrated in catfish of the genera *Ictalurus*, *Silurus*, and in several genera of South American catfish, but I shall confine my accounts to research on Ictalurids (small to medium-sized catfish living in lakes and rivers in North America and, as introducees, in the Loire and many other rivers of Continental Europe) carried out by my own group over the past couple of years.

Ictalurids have an electric sense — in the form of a dense patch, in some species, consisting of a highly organised pseudoretina, of electroreceptors and three categories of inhibitory and excitatory ancillary cells set on each side of the head — which detects from afar minute electric currents of less than a billionth of an ampere in the nerves and muscles of insects, molluscs, crustaceans, fish etc.

In every animal, active or at rest, or even asleep, nerves and muscles everywhere in the body are endlessly buzzing with electric messages and signals. Normally, these internal messages are quite private. But *Ictalurus* can listen in to these electric signals from up to six yards away and thus locate and home-in on prey, for example a frog, resting perfectly camouflaged on the lake or river bed, or a mollusc or crustacean buried deep in lake or river mud.



The frog believes that it is perfectly camouflaged — and to searching eyes, it is. But this catfish has no need of eyes. It 'sees' the coarse-grained, blurry outline of its prey, in a shimmering dancing electric image, on the darkest night, in the murkiest most turbulent of water, through a yard of mud, as though the darkness were daylight and the mud glass.

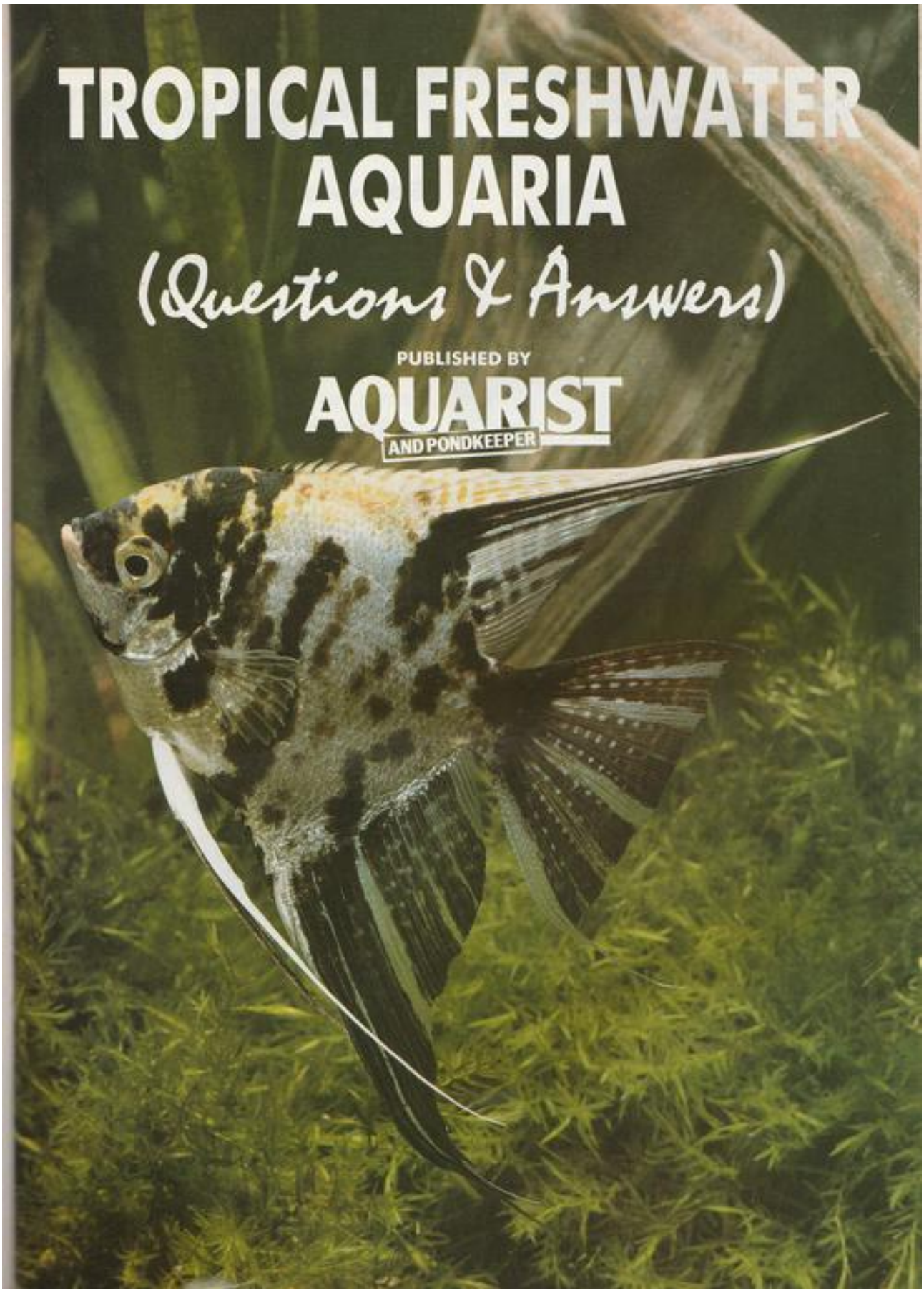
Of course, there is an even more sophisticated solution to the problem of life in murky and/or turbulent waters, namely the so-called miscalled electric echo-location found in 'weakly electric fish' such as the Elephant or Elephant Trunk Fish *Gnathonemus petersi* (Mormyrids, c 100 spp), the South American Knife Fish (also c 100 spp), and the African *Gymnarchus niloticus*.

Gymnarchus, for example, emits a constant stream of electric pulses at 3v and 280Hz to set up a standing electric field all around itself. Nearby objects distort the field and warp the lines of electric force. By monitoring the distortions of its normally symmetrical field the fish reconstructs the shape, size and identity of the object, proving beyond doubt, that you don't have to have eyes to see ... as long as evolution has equipped you to be able to do the job in some other way.

TROPICAL FRESHWATER AQUARIA

(Questions & Answers)

PUBLISHED BY
AQUARIST
AND POND KEEPER



TROPICAL FRESHWATER AQUARIA

(Questions & Answers)

PUBLISHED BY

AQUARIST AND POND KEEPER

(Cover photograph of a Marble Angel — bred by Sunshine Aquatic Farms in Florida — was taken by Harry Grier and is reproduced by kind courtesy of the Florida Tropical Fish Farms Association)

Starting up in pond or aquariumkeeping can be fraught with difficulty.

Choosing the right aquarium, buying the right equipment, fish and plants, estimating correct stocking levels, ensuring the health of fish and plants, learning how to treat diseases, or maintain an aquarium, or how to avoid pitfalls . . . These, and many others, are all vitally important questions that need to be resolved before one can reasonably expect to enjoy the many benefits, excitement and pleasure that aquarium and pondkeeping can bring.

One of the main problems in obtaining this kind of information, however, is that it is well nigh impossible to find it all in a single article. What we have therefore done is bring together all the main questions that our readers regularly ask us and invited teams of *Aquarist & Pondkeeper* contributors to provide their answers to them.

The result is a unique, and unmissable series of Question/Answer Supplements designed to cater for the needs of newcomers to our hobby, kicking off with this colourful and comprehensive **Tropical Freshwater Aquarium Supplement.**

In the course of the year, coldwater aquaria, Koi, watergardening, marine aquaria and other areas will receive similar expert attention. So, if you want all those important questions answered by people who really know what they're talking about, this is the place to start.

Then, make sure that you don't miss any of our forthcoming **Supplements** by placing a regular order for *A&P* with your local retailer, or by filling out a Subscription Application Form.

Happy reading,

John Dawes
Editor

CONTENTS

SELECTION OF FISH AND PLANTS

JOHN DAWES (Editor — *Aquarist & Pondkeeper*)

(Fish photographs — unless otherwise indicated — reproduced by kind courtesy of the Florida Tropical Fish Farms Association. Plant photographs by Barry James)

Q *Which species of fish are considered the most suitable for anyone taking up fishkeeping as a hobby?*

A A great deal has been said and written over the years on this subject. Invariably, opinions differ, and these will be reinforced or weakened according to the success or failure experienced by the new hobbyist during the early weeks.

I think that the best approach at the start is to concentrate on the 'bread-and-butter' species available at inexpensive prices. Presenting an impressive list of one hundred or more species can have an overwhelming effect, making reasonable choices difficult and problems very likely.

I have, therefore, only selected a few of the most common species and varieties and restricted my comments to their most salient features and basic requirements.

LIVEBEARERS

Guppy *(Poecilia reticulata)*

This is one of the best-known fish species (after the Goldfish). It is hardy and peaceful and is available in a bewildering array of colours and fin combinations. Guppies are livebearers, i.e. they do not lay eggs. Instead, the females give birth to fully formed fry every four or five weeks.

Geographical distribution

Widely distributed north of the Amazon (Venezuela, Trinidad, Barbados, Guyana and parts of North Brazil). In addition, it has also been introduced into other places, such as Florida, Africa and Asia, to control the larvae of disease-carrying mosquitoes.

Habitat

Ditches, streams and river tributaries.

Water requirements

Well-aerated, clean, slightly-alkaline, soft to slightly hard water at 21-26°C (70-79°F). Can tolerate a wide range of water and temperature conditions, but seems best when kept between 22-24°C (71.5-75°F) with a teaspoonful of salt added to every gallon (4·5l) of aquarium water.

Overall size

Males up to 3cm (1.2in) — females up to 6cm (2.4in) (but usually a bit smaller than this).

Food preferences

Will take a wide range of prepared, manufactured and livefoods.

Guppies are musts for a first aquarium.

Swordtail *(Xiphophorus helleri)*

There are numerous colour and fin varieties of this species, many of which have arisen from crosses with Platies (see below). As a result, relatively few Swordtails available in shops today are 'pure' in the real sense of the word.

Swordtails are attractive fast swimmers. Males may be aggressive towards each other.

Males tend to fight and should not be kept together in small aquaria.

Geographical distribution

Atlantic coast of Mexico and northern Central America (Guatemala).

Habitat

Found in a wide variety of waters, often clear and fairly fast moving.

Water requirements

Water composition is not critical, but slightly alkaline, medium-hard water at approximately 24°C (75°F) seems best. Regular partial water changes (about 1/5 every 10-14 days) will also be found beneficial.

Overall size

Males up to 10cm (4in) (excluding the sword) — females up to 12cm (4.7in). Most aquarium specimens are considerably smaller than this.

Food preferences

Will take a wide range of prepared, manufactured and livefoods.

Platy *(Xiphophorus maculatus* and *X. variatus)*

These are the two most popular species of Platy in the hobby. As in Swordtails, Guppies and Mollies, numerous controlled crosses have resulted in a wide range of colour and fin combinations. Platy males are not as aggressive as Swordtail males and can, therefore, be kept together.

Geographical distribution

X. maculatus: Central America — principally southern Mexico, Guatemala and northern Honduras.

X. variatus: Restricted to Mexico.

Habitat

Mainly in ponds and quiet waters.

Water requirements

Not critical, but neutral to slightly hard water seems to be preferred. For *X. maculatus*, the temperature range may be wider than for *X. variatus*, but both may be kept around 24°C (mid-70s°F). Some clumps of vegetation should also be provided.

Overall size

X. maculatus: Males up to 3.5cm (1.4in). Females up to 6cm (2.4in).

X. variatus: Males up to 5.5cm (2.2in). Females up to 7cm (2.8in).

Food preferences

Will take a wide range of foods. Vegetable matter should be included in their diet (suitable flakes are available).

As with most other popular livebearers, the range of Platies is forever expanding. This is a Rainbow Variatus male.

Molly *(Poecilia sphenops, P. latipinna* and *P. velifera)*

As with the other livebearers dealt with above, Mollies can be found in a range of colours and fin-modifications, e.g. Albino Lyretail Molly (a variety of *P. sphenops*). The popular short-finned Black Molly was developed from the wild (green) form of *P. sphenops*. Although Mollies are often recommended as ideal beginners' fish, most tend to suffer in the long run unless water conditions and diet are adequately controlled.

Geographical distribution

P. sphenops: Wide distribution northwards from northern South America.

P. latipinna: Mexico, South and South-east USA.

P. velifera: Mexico (mainly Yucatán).

Habitat

Moving and still fresh and brackish waters such as streams (mainly coastal), estuaries and ditches.

Water requirements

Slightly hard, alkaline water containing a teaspoonful of salt per gallon (4.5l). Temperature between 25-28°C (77-82°F).

Overall size

P. sphenops: Up to 10cm (4in).

P. latipinna: Males up to 10cm (4in). Females up to 12cm (4.7in).

P. velifera: Males (reportedly) up to 15cm (6in). Females up to 18cm (7.1in).

Food preferences

Will accept a range of prepared, manufactured and livefoods, but require a high vegetable content in their diet (suitable flakes are available commercially).

Mollies are always recommended for beginners but require special conditions for long-term survival.

EGGLAYERS

Angel *(Pterophyllum scalare)*

This is probably the best-known of all the cichlids. Several varieties are available, some with magnificent, flowing fins which grow progressively longer as the fish mature. Angelfish are often sold when quite small. However, they can grow to a substantial size and can, therefore, pose a few problems. Although they are not particularly aggressive, they will take any food item that is small enough to be swallowed. Livebearer fry and young Neons and Cardinals fit the bill perfectly!

Geographical distribution

The Amazon Basin.

Habitat

Slow-moving and still bodies of water, often with a considerable amount of overgrowth.

Water requirements

Although water conditions are not critical, Angels prefer a deep tank, heavily planted with strap-leaved plants such as *Vallisneria* and *Echinodorus*. A swimming area should also be provided. Fairly soft, neutral to slightly acid water in the region of 23-27°C (c 73-80°F) will be found suitable.

Overall size

Up to around 12cm (4.7in) in length and 15cm (6in) in height.

Food preferences

Will take a variety of prepared, manufactured and livefoods.

Opposite page top, Angels are angelic in appearance but not so in behaviour where small 'swallowable' fish are concerned.

Zebra Danio *(Brachydanio rerio)*

This is a peaceful, but active, fish which will happily associate with both smaller and larger fish without any trouble. For best effects, Zebras should be kept in shoals of six or more individuals. There is a long-finned, but weaker, variety which is best kept in aquaria not housing 'fin-nipping' species, such as Tiger Barbs.

Geographical distribution

1. The wild type comes from Eastern India, from Calcutta south-westward to Masulipatnam. 2. The long-finned variety is not found in the wild.

Habitat

Slow-moving and stationary bodies of water, drainage ditches and rice paddies.

Water requirements

Not critical, but clean well-aerated water seems to be preferred. Wide range of pH and hardness will be tolerated. Temperatures between 20-24°C (68-75.2°F) are quite adequate but may be raised to 27°C (80.6°F) for breeding the long-finned variety.

Fish like Zebras should only be kept in shoals.

Overall size

Up to 4.5cm (1.8in) for females, slightly less for males.

Food preferences

Will accept a wide range of foods, including livefoods which are small enough to be swallowed whole.

Tiger Barb *(Barbus tetrazona)*

This is a colourful, active and reasonably hardy species found in a number of colour varieties, e.g. Green and Albino. Although often recommended as suitable 'community' fish, Tiger Barbs show a tendency to nip the fins of other species, particularly if these carry long, flowing extensions. This behaviour seems less developed when small shoals of Tiger Barbs are kept together, and more pronounced when they are kept singly or in pairs.

The Tiger Barb (in all its forms) tends to be a fin nipper when kept singly or in pairs. Shoals are, therefore, recommended.

Geographical distribution
Indonesia, Borneo, Sumatra.
Habitat
Wide variety of still and flowing waters. Found in shoals.
Water requirements
Water conditions are not critical, provided extremes are avoided. Wide temperature range is tolerated, 20-29°C (68-84°F). For spawning, water conditions should be soft and slightly acid.
Overall size
Up to 7cm (2.8in). Females are fuller-bodied than males.
Food preferences
Will readily accept a wide range of prepared, manufactured and livefoods.

Dwarf Gourami *(Colisa lalia)*

There are three colour varieties of this interesting and peaceful species: the wild-type, the Blue or Neon and the Red, Sunset or Gukengi. In common with other Anabantoids, Dwarf Gouramis possess an accessory air-breathing organ called the Labyrinth (hence the other popular name for this group, the Labyrinthfishes). These fish have become so dependent on the labyrinth, that they will actually drown if prevented from surfacing for air. Gouramis and related fish are also popular because of their spawning habits which include the building of a bubblenest at the water surface.
Geographical distribution
India, particularly Bengal and Assam.
Habitat
Still waters.
Water requirements
Will tolerate a range of pH and hardness conditions but prefers relatively soft, neutral to slightly acid water. The Blue and Red varieties appear to be a bit more delicate than the wild form. Temperatures from 24-28°C (approximately 75-82°F) are preferred.
Overall size
5cm (2in) for males — females remain slightly smaller.
Food preferences
Will readily accept a wide range of prepared, manufactured and livefoods.

Several varieties of the Dwarf Gourami are now available. This is a Longfin Fire Dwarf male.

Siamese Fighting Fish *(Betta splendens)*

This is one of the most famous of all aquarium fish. Selective breeding has produced numerous colour and fin varieties, many of which bear little resemblance to the original, short-finned wild form. Despite their name, Fighters are generally peaceful towards other species. However, males are extremely aggressive towards each other and, to a lesser extent, towards females. Only single specimens of this popular Labyrinthfish should, therefore, be kept in aquaria. Specially bred 'fighting' strains are particularly aggressive and can engage in battle for hours on end.
Geographical distribution
Malaysia, Thailand, Far East.
Habitat
Quiet still waters, often with a muddy bottom; rice paddies.
Water requirements
Not critical — often kept in very small containers or jars by breeders of 'fighters'. Warm temperatures are preferred — 26-28°C (approx 79-82°F).

On no account must two male Fighters be kept together in the same aquarium — they'll just live up to their name.

Overall size
Up to 6cm (2.4in).
Food preferences
Will take most manufactured and prepared foods plus a wide selection of livefoods.

Neon Tetra *(Paracheirodon innesi)* and Cardinal Tetra *(Paracheirodon axelrodi)*

These two species have been grouped together because of their close superficial similarity which can lead to misidentification. Of the two, Cardinals are the more colourful and can be distinguished by the greater intensity and extent of the red coloration on the body. In Neons, this red coloration is confined, largely, to the posterior half of the body. As a result, Neons have a more silvery belly than Cardinals.
Geographical distribution
Both species come from South America; Cardinals from the Upper Rio Negro and Neons from the Upper Amazon.
Habitat
Small jungle pools and streams.
Water requirements
Both species prefer soft, acid water but will tolerate a wide range of conditions. Raw tapwater should be avoided unless adequately treated with dechlorinator and conditioner. Temperatures between 22-25°C (71.5-77°F) are suitable.
Overall size
Reportedly, up to 5cm (2in) for Cardinals and 4cm (1.6in) for Neons. However, the vast majority of aquarium specimens are considerably smaller than this.
Food preferences
Will accept a wide range of prepared, manufactured and livefoods (with the possible exception of *Tubifex*).

Cardinals and Neons are superficially similar, but Cardinals are more colourful. In Neons the red coloration extends only halfway down the body. Cardinals are now being bred commercially in Florida and (reportedly) in Brazil.

The most popular of all catfish is the albino form of the Bronze Corydoras.

Bronze Catfish *(Corydoras aeneus)*

Corydoras species are the most popular of the catfishes. They are active, peaceful, interesting, hardy, and possess a specially developed portion of their intestine that allows them to absorb atmospheric oxygen gulped in at the water surface. *C. aeneus* is available in normal (pigmented) and albino (non-pigmented) forms.

Geographical distribution

South America, mostly Venezuela, Trinidad and Brazil.

Habitat

Slow-moving or stationary bodies of clear water.

Water requirements

Will tolerate a wide range of conditions, provided no salt is present (or added for 'treatment' purposes). Neutral or slightly alkaline, old soft water is preferred. Temperature should be between 18-26°C (approx 64.5-79°F).

Overall size

Up to a maximum of 5.5cm (2.2in) for females — somewhat less than this for males.

Food preferences

This is a bottom feeder. Flake and tablet food should, therefore, be introduced edgeways of pre-soaked to facilitate sinking. Live-foods should be of the 'easily-caught' type, such as thoroughly cleaned *Tubifex*.

Sucking Loach *(Gyrinocheilus aymonieri)*

This species is sometimes called the Chinese Algae Eater. It is a bottom living fish with an underslung mouth which it uses to attach itself to rocks and plants. It is remarkable in that it can cling, feed and breathe simultaneously by means of specialised adaptations of the gill chamber. Some specimens, particularly older ones, can be quite aggressive towards other species.

Geographical distribution

Thailand — therefore, the *Chinese* Algae Eater is a misnomer if ever there was one.

Habitat

Often found in large numbers in clear, well-aerated waters such as flowing mountain streams.

Water requirements

Well-aerated, slightly alkaline water (though this is not critical) — well-lit to stimulate algal growth. Temperatures between 21-30°C (approx. 70-86°F) will be accepted without hardship.

Overall size

Up to 25cm (9.8in) in the wild — usually half this in aquaria. Females are more robust than males.

Food preference

A truly herbivorous species. Therefore, algae, vegetable flake or other vegetable matter, e.g. bruised lettuce or spinach leaves, must be provided.

Q *Which are the best plants to buy and what are their requirements?*

A Many aquarists experience considerable problems in cultivating plants. Although the reasons for this failure may be very difficult to pinpoint, they can usually be grouped under five main categories: unsuitable choice of plants, incorrect lighting, incorrect rooting medium, incorrect temperature and incorrect planting.

Unsuitable choice of plants

Some plants offered for aquaria are, in fact, not aquatic plants at all. Some are marsh plants, while others are straightforward terrestrial species. Therefore, sooner or later, these will die or, at best, suffer under aquarium conditions.

Incorrect lighting

Some plants grow best under strong illumination, while others prefer shady conditions. Clearly, if these are not provided, the plants will soon begin to go downhill.

Incorrect rooting medium

Even though many (most?) aquatic plants absorb nutrients through their leaves, any species which needs to obtain even a small amount of additional nourishment through its roots will suffer if this is not provided.

Incorrect temperature

Plants which are strictly 'coldwater' will not grow well under tropical conditions. The opposite, obviously, also applies. Some plants have wide temperature tolerances and can, therefore, grow both in coldwater and tropical aquaria.

Incorrect planting

Plants whose leaves arise from a crown (located just above the roots), will often die if planted too deeply. Crowns should never be covered up with gravel or any other growing medium.

The following chart may be used as a guide to some of the more common 'true' aquatic plants. Basic details which should help achieve, at least, reasonable success are also provided.

NEW YORK ZOOLOGICAL SOCIETY

Lightning-fast — and sometimes aggressive — the Sucking Loach is still one of the most commonly seen of all tropical freshwater species.

THREE POPULAR TROPICAL AQUARIUM PLANTS

The text for this article is based on:
The Freshwater Aquarium (Questions and Answers)
By: John Dawes
Published by: Robert Royce Ltd.
ISBN: 0947728 007

1. Densa (Egeria densa)

2. Cabomba sp.

3. Water Wisteria *(Hygrophila difformis)*

PLANT SUMMARY CHART

Scientific Name	Common Name	[1]Rooting Medium	[2]Temperature Range °C	[2]Temperature Range °F	[3]Water Conditions	[4]Light Requirements
1 Floating Plants						
Azolla caroliniana	Fairy Moss (but this plant is a Fern)		Up to 25	Up to 77	MH	H
Riccia fluitans	None (a Liverwort)		8-30	46-86	MH	H
Salvinia auriculata	None (a Fern)		18-28	64-82	MH	H
2 Submerged Plants						
Cabomba caroliniana	Cabomba	Loam	18-28	64-82	VS	H
Ceratophyllum demersum and *submersum*	Hornwort	No Roots	0-15	32-60	NC	NC
Cryptocoryne spp.	Crypto	Loam/Peat	17-27	62-80	S	M
Echinodorus spp.	Amazon Sword	Loam/Peat	20-28	68-82	SH	H/M
Egeria densa	Densa	NSR	Up to 21	Up to 70	MH	H/M
Eleocharis acicularis	Hair Grass	NSR	Up to 22	Up to 72	S/MH	H/M
Elodea canadensis	Elodea/Canadian	NSR	Up to 18	Up to 64	MH	H/M
Hygrophila difformis	Pondweed	NSR	20-30	68-86	S	H
Hygrophila polysperma	Water Wistaria	Loam	18-30	64-86	S/MH	H
Ludwigia natans	None	NSR	18-25	64-77	NC	H
Ludwigia palustris	None	NSR	Up to 21	Up to 70	NC	H
Myrophyllum hippuroides and *spicatum*	None Water Milfoil	NSR	Up to 25	Up to 77	S/MH	H
Sagittaria subulata	Arrowhead	Loam	15-25	53-77	MH	NC
Vallisneria spiralis and *"torta"*	Vallis/Tape Grass	Loam	10-30	50-86	MH	H
Vesicularia dubyana	Java Moss	NSR	10-30	50-86	NC	M

NOTES — [1] Rooting Medium: (i) Additional media to sand gravel which may stimulate healthy growth are indicated. (ii) NSR = No special requirements. **[2] Temperatures —** (i) Figures given are approximate. (ii) No tropical/coldwater subdivisions have been made because of the considerable overlap in temperatures that can exist between unheated home aquaria and heated ones. In general terms, plants requiring temperatures below 25°C (77°F) should be considered as 'coldwater'. **[3] Water Conditions:** VS = Very Soft. S = Soft. SH = Slightly Hard. MH = Medium Hard. NC = Hardness not critical. **[4] Lighting Requirements:** H = High. M = Medium. NC = Light intensity not critical.

THE AQUARIUM, ACCESSORIES, HEATING, LIGHTING, SETTING UP, ADD-ONS

Dr David Ford, Head of the 'Aquarian' Advisory Service
(Photographs by the author)

THE AQUARIUM

Q *I would like an aquarium but my local shop has so many types and sizes that I don't know how to choose.*

A The bigger the better, is the golden rule. Remember, fish have to swim in their own 'loo', so a tiny tank (such as a goldfish bowl) soon gets polluted, creating many problems for the fish.

If money is no object buy a complete system with built-in filtration such as a Minireef or Tunze, etc. For a plain tank get a 24x12x12in (60x30x30cm) or, better still, a 36x15x12in (90x38x30cm), with flat, square glass sides sealed with silicone sealant. Also get a plastic or coated metal hood to fit. Hoods with built-in lights (or ready-prepared to accept fluorescent tubes) are available, but they are standard sizes to fit a 24, 36 or 48in (60, 90, 120cm) tank. This is why it is best to get a standard size tank too.

The ideal support is a cabinet so that equipment can be hidden away inside. Cheaper is an angle iron frame, coated to prevent rusting. The metal stand can accommodate a second tank or a shelf for equipment. Household furniture can be used, but it must be strong because even a small 24in (60cm) tank will weigh well over 100kg (220lb).

Q *If I decide to make my own tank, what do I need?*

A Ask the glazier to supply glass with rough edges to give *final* dimensions of 24x12x12in (60x30x30cm), 36x15x12in (90x38x30cm), 48x15x15in (120x38x38cm), etc. Hold together with a smear of silicone sealer and sticky tape, then run a bead of silicone on the inside edges (Manufacturers of aquarium sealant usually provide comprehensive guidelines with their products).

Glass thickness: Mini-tanks, 4mm; 24in (60cm) tank, 6mm; 36in (90cm) tank, 10mm; 48in (120cm) tank, 12mm.

Q *Can I site the aquarium anywhere?*

A There is no point in having fish if you can't see them. The hall, spare room or bedroom are not really suitable. To enjoy fishkeeping you need to be able to sit in front of the tank and spend happy hours looking into this very different universe . . . it is good for your health too!

Avoid radiators because of the heat, and bright windows because of algae. Do not place on hi-fi speakers because of the vibrations. Do not push the stand hard against the wall because you may want to reach behind the tank to retrieve dropped items or add backing paper. A good place is where it can light up a dark corner of the living room, or the opposite corner to the television (or even in place of).

You will need easy access to a power point, with one plug and lead to a 'Cable Tidy' that feeds all the other accessories. Do not have lots of leads to an adaptor filled with plugs . . . it looks untidy and may not be safe.

The bigger the tank, the easier it is to look after.

My aquaria are located in the darkest corners of the living room — away from direct sunlight.

Many plants grow better in a sandy base — these are in white silica sand.

However, a safety plug or adaptor that cuts off the supply if there is a fault is advisable, especially if there are children about.

ACCESSORIES

Q *What accessories will I need?*

A Some items can be added later (birthdays are the best time) but essential for the first set-up are: fluorescent light(s) and starter unit(s), a heater-thermostat, a thermometer, an airpump, a metre or so of airline tubing, an airline non-return valve, airstone (big ones sink, small ones will need anchoring down), gravel or river sand (enough to fill a bucket for a 24in — 60cm tank), decoration (simulated logs are best, rocks and stones are OK if not soluble, such as granite or slate), a Cable Tidy and, last but not least, a filter system.

You must filter the water, so one of the many choices should be bought with the tank. The cheapest is a simple bubble-up box filter; next is an undergravel filter — which should be avoided if you want a well planted tank (at least, unless you can provide a deep layer of rooting medium) — but best is a power filter.

SETTING UP

Q *Having obtained all the necessary equipment, what is involved in the setting up?*

A Clean everything using elbow grease and running water. Aquarium disinfectant is available, which is safer than a domestic type. Never use soaps or detergents; any residue is deadly to fish.

The item needing most attention is the gravel or sand. Clean it in small portions by swirling in a bucket with water from a hosepipe until it is absolutely clear of fine material, otherwise your aquarium water will be cloudy for many weeks.

Fit all the equipment as per manufacturers' instructions, which should be read before the event, not after! Remember that, once the tank is filled, it cannot be moved. This is not just because of the weight, but because the stress of the water slopping about can burst a seam.

Setting up a tank with a power filter in a base unit.

Once everything is fitted, the tank can be filled. Ordinary tap water is OK; use either a bucket (and plate in the tank to stop stirring everything up) or hosepipe (flush it through first, since the chemicals that can leach out within hoses are polluting).

Once filled, the electricity can be turned on and everything left to settle down for a day or so. This gives you the chance to check the pumps and heater-thermostat, correct any problems, or replace anything faulty under its guarantee. This is one of the reasons why you must **never** buy the fish at the same time as the tank.

Q *It's 24 hours later, the water is clear and a steady 24°C (77°F) and everything is working. Can I buy some fish and plants now?*

A No.

The system is not yet mature and fish will not survive long in 'unmature' water, no matter how clean or how old it is. Mature water is full of the free-swimming *Nitrosomonas* bacteria that will convert the ammonia the fish excrete into nitrite. The filter will also be full of surface-living bacteria called *Nitrobacter* that convert this nitrite into (safer) nitrate, which you will dilute via routine partial water changes (1/4 every other week is usual).

There are several options to bring maturity to the system. For example, bacterial cultures and potential food are available to seed the tank. These will bring the maturing time down to a day or two. If you have other aquariums, or have a friend with a *healthy* tank, you can use portions of the gravel, water and even some filter material, to seed the new tank and filter.

It is even possible to feed the aquarium . . . crumble some flaked fish food and add it to the tank daily. This will be drawn into the filter and start to grow the essential nitrifying bacteria. This takes a few days longer than special cultures, of course. But you have to do *something* . . . you cannot just leave the

My tanks are "cabinet-based" with matching hood.

aquarium running without adding biological material.

To monitor how things are going use a nitrite testing kit. In fact, this is a useful addition to the "first essential" list. Again, follow the instructions and you will see the water pass through a crisis level of nitrite. When the measured value is zero (or falling rapidly towards zero), **after** the crisis value, then it is safe to add the fish and plants.

Plastic plants can look very realistic if chosen wisely and these may be added at any time. Real plants can be bought in pots to protect their roots during transplanting (just like you do with garden plants) and sand is a better medium than gravel for many species.

The plants can be bought along with the first few fish and installed while the fish are floating in their travel bag to equalise temperature.

Just get a trio of a given fish species for the first week of the mature system. Then add a few more fish at weekly intervals. Check the water with the nitrite kit; this will soon tell you if you are rushing things or overfeeding or overstocking. Do not forget the fish and plant food.

I do not advise the use of live aquatic foods because they may contain parasites ... modern commercial foods contain all the nutrition fish need.

ADD-ONS

Q *What do I want as gifts later?*

A Two nets for catching a fish for treatment, etc. Use them like a trap; don't chase a fish with one net.

An algae magnet for cleaning the front glass easily and cleanly.

Other test kits such as for ammonia and nitrate levels, pH and water hardness; useful to know if you want special fish that require a certain water chemistry.

Remedies for a medicine cupboard just in case. White Spot and Fungus cures are useful and will be needed one day, for sure.

Assuming you are feeding a standard "staple" flake food bring some variety to the fish's diet with, for example, a tin of Carnivore Flake, Conditioning Flake, Tablet Food and/or Colour Food.

Ornaments can include the expensive but attractive glass rock and, if you like them, plastic mobiles such as divers and mermaids (the fish don't mind).

You can always add another filter or upgrade the existing one, because you cannot overfilter the water.

Another heater-thermostat is useful as a stand-by, just in case.

A timer for the lights is a good buy if you have real plants — 12 hours on and 12 off at a fixed time, because plants have a daily rhythm like the rest of us.

Then get another tank for quarantine or treatment. Another for breeding. Another for raising the fry ... then fish house ...!

HEATING AND LIGHTING GUIDE

Q *What do you recommend for heater and light sizes?*

A Heaters:

24in (60cm) tank 75 to 100 watts
36in (90cm) tank 100 to 150 watts
48in (120cm) tank 150 to 200 watts

Lights:

24in (60cm) tank 1 x 15 watt tube
36in (90cm) tank 2 x 20 watt tubes
48in (120cm) tank 2 x 30 watt tubes

FURTHER DETAILS

For further information please drop me a line at the **'Aquarian' Advisory Service, PO Box 67, Elland, West Yorkshire HX5 0SJ.**

AERATION, FILTRATION, WATER CHEMISTRY, SUBSTRATE/ROOTING MEDIA, FILLING THE AQUARIUM

By DICK MILLS
(Photographs by the author)

AERATION

Q *Most books mention aeration and every dealers' tanks seems to have columns of rising bubbles. Must I have aeration in my tank?*

A Aeration ensures that enough oxygen gets into the aquarium water and that carbon dioxide is easily expelled; the columns of bubbles you've seen in dealers' tanks do not add oxygen directly but agitate the water surface, so that both gases enter and leave the water as swiftly as possible. However, as long as you have a sufficient number of healthily-growing plants in your tank, don't overcrowd the fish (nor overfeed them) you don't absolutely need to have aeration.

Q *What's the simplest way to introduce aeration into the aquarium, and what type of airpump will I need?*

A Airpumps deliver compressed air to the aquarium via a plastic (Neoprene) 'airline' tube where the airflow is broken up into bubbles by a porous block of ceramic, sintered glass or even pieces of beechwood. The bubble flow can be regulated by clamping the airline or by adjusting a flow control on the pump itself.

Most airpumps are based on an electric-vibrator design, where a vibrating arm 'pumps' a diaphragm to and fro in sympathy with the mains alternating voltage, ie, 50 times a second. Modestly-priced pumps may suffice for small aquariums, but larger models will be needed for bigger tanks or those with much deeper water levels. Rotating vane pumps, or even small compressors, are necessary for multi-tank 'fish-house' situations.

Q *Is there any other way of providing the benefits of aeration without airpumps and airstones?*

A As long as there is some means of agitating the water surface or creating a 'turnover' of water currents throughout the tank, the intake of oxygen and the expellation of carbon dioxide will be facilitated.

Power filters fitted with an auxillary aeration control will draw in extra air as filtered water is returned to the tank; alternatively, using a spraybar to direct the water flow return along the surface will also create turbulence. Incidentally, the mixture of air and water emerging from the uplifts of an air-operated undergravel filter will also assist aeration.

Pick 'n Mix coloured gravel displays are becoming quite popular and allow aquarists to make their own choices at leisure.

Aeration can also be affected through the breakdown of hydrogen peroxide (H_2O_2) into water (H_2O) and oxygen (O_2). This is done under catalytic control inside a ceramic container. The only available 'aerators' of this type are known as Oxydators.

Q *I have a number of tanks. Can I use just one large capacity airpump instead of a separate pump for each?*

A Make up a 'ring-main' of wide-bore tubing (a length of garden hose, for instance) to carry the air from a large capacity pump around the fish-room, and have the air feed to each tank dropping off from it from individual 'T' pieces.

If you use an old refrigerator compressor (standing outside the fish house) to provide large amounts of air, do remember that, in winter, it will be pumping *much colder* air into your tanks.

This is an external 'open' system — a motorised box-type filter.

Many streams, like this one in Sri Lanka, contain soft acid water and are home to many of the most popular aquarium fishes.

FILTRATION

Q *The water in my tank looks clean. Do I really need a filter?*

A Despite the best aquarium management techniques (regular partial water changes, sediment-removal, under-feeding, etc), there are plenty of invisible 'impurities' dissolved in the water that need to be removed totally, if at all possible — the routine maintenance tasks outlined earlier only keep the level of such impurities in check.

Filtration works on three levels, mechanical, chemical and biological (which our Editor prefers to call purification) although a certain amount of multiple-action occurs in all filters despite their more apparent single-action design might suggest.

Mechanical filtration simply strains out large-particle debris from the water, and filter 'wool' is ideal for this. Sponge/foam filters will also trap large amounts of debris.

Chemical filtration makes use of the fact that substances such as activated carbon have a huge surface area on which dissolved substances can become adsorbed (notice 'adsorb' not absorb): such filtering material may have the equivalent of a football pitch in adsorption area, all contained within your canister or box filter.

Simple sponge filters act both mechanically and biologically — and aerate the water as well.

Ammonia-removers such as Zeolite need to be periodically 'recharged' by soaking in saltwater when saturated, once ammonia levels start to rise again, as indicated by use of the relevant test kit.

Biological filters are really bacteria-growing areas — it's the bacteria that do the purifying work, not the plastic filter plate or the 'granules' in a trickle filter! The order of events in this type of purification is that waste products are first broken down into ammonia-based compounds as a natural process in the aquarium; subsequently, two types of bacteria in the filterbed, *Nitrosomonas* and *Nitrobacter*, turn these compounds into nitrite and then into nitrate, each progressively less toxic than original compounds.

Box and canister filters (either internal or external types) all work on mechanical and chemical principles but, once they become well established, a certain amount of bacterial purification will occur. The ceramic, or sintered-glass, rings often used in external filters, provide bacteria with immense breeding grounds and peovide excellent biological filtration within the filter body. Always rinse out filters with aquarium water to prevent damage to bacterial colonies within the filter medium.

A certain amount of mechanical straining occurs in 'down-flow' sub-gravel filters, which causes the substrate to pack down very quickly unless regularly 'gravel washed'. 'Reverse-flow' systems clog less quickly as all the dirt is filtered from the water by an external power filter *before* the water goes through the gravel. Although internal and external filters can be used intermittently, the waterflow through biological filters should never be allowed to stop, otherwise the bacterial colony will die through lack of oxygen.

Finally, as well as removing impurities from the water, filters can also **add** things to the water. A badly-neglected filter may well be washing all the previously-removed toxins back into the water; on the beneficial side, including some peat in a filter box can help to maintain acidic water conditions where necessary (see notes on pH).

Very 'bright' substrates, such as this one, make fish feel under stress — unless (like plaice) they can change their body colour accordingly.

Q *What's the difference between a Gravel Washer and a Gravel Tidy? Can these two replace 'vacuum cleaner'-type sediment remover?*

A The answer is, very nearly, but each works slightly differently. Your sediment remover is ideal for removing any detritus, a more scientific word to replace that four-letter word, 'mulm', (What else did you think I meant?!) for aquarium dirt that sits on top of the substrate.

The Gravel Washer is, basically, a wide-bore pipe, or collecting funnel, fitted to a siphon tube: dirt in the gravel can be siphoned out with the water, but the heavier gravel particles won't rise up the wide-bore tube — they fall back down again. Push the Gravel Washer well into the gravel and move it around to get the gravel really clean; this 'unclogs' the gravel so that water can flow through it more easily (for the biological filter's benefit) and plants can root more easily too.

Your 'vacuum cleaner'-type sediment remover will also remove dirt from within the gravel if used in a similar manner, but gravel will be extracted with the dirt too.

A Gravel Tidy is used merely to separate layers of dissimilar substrates for ease of future cleaning or removal. It could be used to good effect, say, to separate a thick layer of peat fibre laid over the usual substrate material or, if you have a favourite (but expensive) substrate material, such as coloured chippings (to match the rockwork), a thin layer of it could be laid over a thicker layer of less-expensive gravel, yet still remain easily separated when a total overhaul of the tank is needed.

Q *What type and size of filter should I use on my tank?*

A Always try to tailor the filter, both to the size of tank, and to the type of fishes you are keeping. For instance, a small sponge-filter would be more suitable for a Killifish collection in an 18x10x10in (45x25x25cm) tank than for a pair of heavier-feeding Oscars in a 48x15x12in (120x38x30cm) aquarium. Similarly, a powerful interior filter might create too much water movement for a small decorative Tetra tank. A well-known manufacturer has recently launched a range of filters designed for specific sizes of tanks.

Generally, a flow rate that circulates the aquarium water around three or four times an hour is about right — less for shy/timid/retiring/quiet species. Fill the filter box with differing materials — ceramic or sintered glass rings for biological filtration/purification, floss to remove suspended materials and activated carbon to remove waste materials.

Q *I make a dreadful mess cleaning out internal filters; the dirty water empties back into the tank as I lift the filter out. Help!*

A Your problem is easily solved — slip a plastic bag under the filter before you lift it out of the tank! Always rinse filter medium in *aquarium water* to prevent damaging the bacterial colony.

Q *What's the point in using a power filter and a biological filter in reverse-flow systems? It seems to be a case of doubling up the process unnecessarily.*

A In reverse-flow systems only *clean* water is pumped through the gravel (*Nitrosomonas* and *Nitrobacter* bacteria don't care which way the water flows); this means the gravel doesn't get clogged so quickly. Another advantage, especially in marine tanks, is that the upward water currents keep particles of food in suspension longer for the benefit of any filter-feeding invertebrates in the tank.

One disadvantage of reverse-flow systems is that they are not particularly efficient at aerating the water.

WATER CHEMISTRY

Q *Do I need to worry about using tapwater for my fishes? I thought that what's good enough for my dealer would be good enough for me.*

A A sound principle in general, but there are situations where you have to apply a little knowledge of water chemistry. You may buy fishes from dealers in localities whose water quality is different from your own. Here, you need to appreciate what the differences are and be able to re-acclimatise the fish to your water conditions before adding them to your main collection: a 'quarantine tank' is an ideal place to do this.

Freshwater fishes can adapt readily to new water conditions, provided they are acclimatised to them gradually. Tapwater is quite safe, providing dechlorinating treatment is practised before use.

Q *What have pH and Hardness got to do with aquarium water?*

A As pH and hardness can be looked upon as qualities of water, the real answer is: everything! However, not every aquarist need be over-worried about such things, just as long as a grasp of their importances is appreciated.

Basically, pH is a measure of whether water is acid or alkaline; Hardness is a measure of whether the water is hard or soft (dependent on the amount of dissolved salts). While the two parameters are often inter-dependent (for instance, soft water is often acid while hard water is more likely to be alkaline) they are NOT the same thing. Levels of both pH and Hardness can be assessed with TEST KITS (separate kits for each).

With the exception of African Rift Lake species (Cichlids) and Central American species (Livebearers) most fishes occur in soft (low degrees of hardness), and acidic (below 6 pH) waters: hard, alkaline water has high degrees of hardness and a pH of over 7.

ALWAYS EMBARK ON CHANGING WATER QUALITY WITH CARE AND CAUTION.

Fishes won't tolerate abrupt changes, so make small adjustments over a long period of time to allow the fish to acclimatise themselves to the new conditions without any disease-invoking stress.

An internal power filter. Note the hole for fitting a spray bar (to aid aeration).

An external canister type power filter.

SUBSTRATES/ROOTING MEDIA

Q *What sort of sand should I use in my tank? I have some ballast left over from some recent building work, will this do?*

A If you are prepared to sift it all through and remove pieces of rock, flint, etc, then it might be useful if the resultant sand particle size is not too fine (3mm is about right), but it is better, and less laborious, to use the gravel (referred to as compost, or substrate material, in some books) as supplied by your own aquarium dealer.

Q *How much substrate will I need, and how deep does it need to be?*

A Allow a bucketful per square foot (900 sq cm) of aquarium base area. Sloping the gravel upwards from front to back of the tank (say 2 to 4in — 5 to 10cm) provides both a good visual effect and a suitable rooting depth for plants: maintain the slope by inserting pieces of rock in the gravel. Terraces, to allow planting at different levels, are constructed in a similar manner.

Q *My dealer sells coloured gravels and my young son wants some for his aquarium. Will they be safe to use?*

A Aesthetic consideration apart, the main thing is to ensure that the colour doesn't leach out into the water, and testing a sample of the gravel will soon reveal this. Obviously, coloured glass 'chippings' will be quite safe in this respect, but avoid any with sharp edges.

Some fishkeepers avoid coloured gravels on principle but, if their use (along with the many 'action ornaments'), encourages youngsters into the hobby, who are we to argue?

Q *I want to set up a South American collection of fishes. Should I use any special substrate for them?*

A Use calcium-free gravel where it is desired to maintain soft water conditions. Filtering the water through peat will help to maintain correct water conditions, and a layer of peat moss on the aquarium floor will also show up the fishes' colours to good advantage.

Q *Calcium-rich gravels are supposed to be good for a high pH but won't they make the water hard as well?*

A Yes, they will, although it might be more accurate to say that such gravels act more as a 'buffer' to resist changes in pH than to raise it. If you're an African Lake Cichlid fan, these gravels will do nicely in your tanks.

AQUARIUM FILLING

Q *My tank will be sited some distance from the nearest water supply. Can I furnish and partially fill it near the sink before placing it in its final position?*

A Yes, provided you are built like Mr Universe and don't mind running the risk of giving yourself a hernia, a couple of weeks in bed with a strained back and a cracked tank too!

More realistically, tanks up to two feet (60cm) long can be dry-furnished (gravel, rocks and hardware fitted in place) before placing in their final siting if more convenient, but NEVER try to move or carry a filled, or partially-filled, tank.

Rather than carry dripping buckets around the house (particularly up and down stairs) use a hose-pipe laid on newspapers to prevent damage to carpets or polished floors; always turn off the television and radio so that your distant helper can hear your shouts to turn off the tap!

Q *There must be a simple way of filling the tank without disturbing the gravel and rock arrangements. I had thought of introducing the water down the sub-gravel uplift tube via a funnel but it looks like too long a job. Any other ideas?*

A A novel idea, but it's easier to put a layer of newspaper or a saucer on the gravel to disperse the water flow more gently and to avoid disturbing the contoured gravel.

By all means use a wide-bore siphon tube on the biological filter uplift to siphon out sub-gravel 'sludge' from time to time. Alternatively, regular use of a Gravel Washer is recommended to maintain good water flow through biological filters.

STOCKING, QUARANTINE, INTRODUCING NEW FISH, EARLY PROBLEMS, REGULAR MAINTENANCE, FEEDING, HEALTH

Dr David Pool — Tetra Information Centre
(Photographs by the author)

STOCKING

Q *How many fish can be kept in an aquarium?*

A The general rule for determining the maximum stocking level for a tropical aquarium is to allow 1 inch (2.4cm) of fish length, excluding the tail, for every 12 square inches (72cm²) of water surface area.

The surface area (= length × width of the aquarium) is critical because it is the site at which oxygen is absorbed into the water. The fish require oxygen in order to survive and if they are using more than can be absorbed across the water surface (particularly at night) they may be stressed or even killed.

A number of other factors influence the stocking level. If no filtration is used, for example, the stocking rate should be approximately halved to prevent a dangerous build-up of waste. The species of fish kept is also important, with aggressive or territorial species generally being kept at a lower density to avoid constant fighting. For large fish to behave normally they, too, should be kept in lightly stocked aquaria.

The recommended maximum stocking level should be built up gradually over a period of 6-8 weeks to avoid water quality problems (see question on early aquarium problems). It should also take account of fish growth. This may involve initially understocking the aquarium, or removing certain fish to allow the others to grow. Most importantly, avoid overstocking at all costs, as this will quickly lead to problems and probable fish deaths.

Q *How many plants should be added to the aquarium?*

A Planting densities depend largely on individual taste. Some aquarists prefer a densely planted aquarium, in which case up to 30 small plants (eg small Cryptocorynes or Dwarf Amazon Swords); or 20 medium sized plants (eg *Vallisneria* or *Hygrophilla*); or 3-6 large plants (eg Amazon Swords or large Cryptocorynes) can be added to each square foot (900cm²) of substrate.

Other aquarists prefer densely planted areas with large "free-swimming" spaces. In general, given good conditions, the plants will increase in size or numbers to fill any available space, in which case regular pruning will be necessary.

Planted aquarium. The number of plants to add depends on personal preferences, although densely planted regions with open spaces look attractive.

The individual requirements of the plants should also be considered. 'Specimen' plants, for example, should be given sufficient space to grow to their maximum potential and provide a good display. Further information on the individual requirements of plants is available in **An Interpet Guide to Aquarium Plants** by Barry James, (published by Interpet) or **AD145 — Aquatic Plants** (published by Tetra and available from the Tetra Information Centre price £1.75).

Q *How can I select healthy fish for my aquarium?*

A When acquiring any new fish for an aquarium, it is important to ensure that they are in the best possible health. Failure to do so may result in the fish you buy dying or, far

worse, the introduction of disease into an already established aquarium.

Such problems can be greatly reduced by only purchasing fish from a good quality aquatic shop (i.e.) one in which the aquaria are clean and the fish in good condition. Such shops will often quarantine all new stock, thereby further reducing the risk.

The fish themselves should show no signs of poor health. Therefore do not buy fish with obvious disease, clamped fins, emaciation, or if gasping, rubbing or behaving unusually. It is also wise to avoid fish from an aquarium in which other individuals are unhealthy.

The majority of fish should be active and searching for food, although certain bottom dwelling or nocturnal fish are an exception to this rule. Reading up on the fish you intend to buy will obviously provide invaluable information regarding its normal behaviour and appearance.

QUARANTINE

Q *Is a quarantine aquarium necessary?*

A The aim of a quarantine aquarium is to avoid the introduction of disease organisms into your display aquarium. Quarantining by the shop and careful selection by yourself will greatly reduce this risk, but it will not eliminate it. The stress of transporting and introducing a fish into a new aquarium may well weaken it and allow a disease to develop.

To remove any risk to your existing fish you should quarantine all new arrivals. The quarantine aquarium does not need to be very big (18 × 12 × 12in — 45 × 30 × 30cm — is more than adequate), and only requires a cover, heater/thermostat, foam filter and, perhaps, plastic plants. Foam filters are ideal as they can be easily cleaned and disinfected after use. A thin layer of gravel and shelter in the form of rocks or a half plantpot complete the set up.

Adding three or four hardy fish such as Swordtails is a good way to mature the aquarium and filter.

New fish should be placed in the quarantine aquarium for around two weeks. A preventative treatment with a general external parasite remedy is a good idea during this period.

The quarantine aquarium can also be used for treating unhealthy fish should problems develop in the future. If you do not have such a tank, it is advisable to treat your show aquarium with a general external parasite remedy after introducing new fish to prevent disease transmission.

INTRODUCING NEW FISH

Q *How should new fish be introduced into the aquarium?*

A New fish should be gradually introduced into the aquarium to avoid any damaging sudden changes in water quality or temperature.

Two ways of introducing fish are as follows:-

1 The bag in which the fish are purchased is floated on the top of the water for approximately 30 minutes. During this time the aquarium lights are switched off to allow the fish to settle more quickly. After 30 minutes the fish are carefully caught and released into the aquarium. The water in the bag may well have a high ammonia level, and so, should be discarded.

2 Some aquarists find that they experience problems soon after introducing new and particularly delicate fish using the above method. This may be avoided by changing 25% of the water in the bag for aquarium water. This should be undertaken after 10, 20 and 30 minutes and the fish introduced after 40 minutes.

When introducing new fish into an established aquarium it is a good idea to feed the existing inhabitants prior to the introduction, and to leave the lights off for at least 12 hours. If territorial species are

Cloudy water. Care should be taken to avoid overfeeding, particularly when the aquarium has just been set up.

COMMON DISEASES OF FISH

Fungus — a severe case on a large Char.

Fin Rot in Goldfish

White Spot — a particularly heavy infection.

present in the aquarium some of the tank decor should be moved. The fish will often then be too busy re-establishing their territories to bother with the new additions.

EARLY PROBLEMS

Q *Are there any problems which may occur in the first weeks after setting up an aquarium?*

A Most new aquaria suffer from a series of events known as the **'New Tank Syndrome'**. This 'syndrome' is typified by a rise in the levels of ammonia and nitrite within the water over the first 1-3 weeks as the aquarium and filter mature. During this period dangerous levels of these chemicals can occur, which will weaken or even kill any fish present.

To prevent such problems, it is advisable to add only a small number of hardy fish initially (e.g. barbs, danios, platies). The waste produced by these fish will help to mature the filter, but the ammonia and nitrite levels generated will not be dangerous.

Throughout this time the ammonia and nitrite levels can be monitored using a test kit. As soon as the nitrite level has fallen to a value close to 0 mg/litre more fish can be added.

The effects of the 'New Tank Syndrome' can be minimised by undertaking weekly 30% water changes for the first six weeks after setting up the aquarium. There are also a number of bacterial cultures available commercially which can be added to the filter to speed up the rate at which it matures.

In the first weeks after setting up the aquarium you may also notice problems due to incompatible fish. Such problems can be prevented by seeking the advice of your dealer before stocking the tank. The only satisfactory method of overcoming such troubles in the aquarium is to remove the offending fish.

REGULAR MAINTENANCE

Q *What maintenance is necessary to keep the aquarium in good condition?*

A Regular aquarium maintenance is, without doubt, the key to successful fishkeeping.

ROUTINE MAINTENANCE TASKS

Daily	Monthly	Occasionally
Check water temperature	Measure water quality	Thin plants
Check filter/air pump	Partial water change (every 14-21 days is best	Replace fluorescent tubes
Check fish numbers/ behaviour	Clean filter	Check electrical apparatus
Turn lights on/off	Clean tank	Clean air pump valves
Feed fish	Remove algae from glass	
	Clean condensation tray	
	Prune plants	
	Remove dead leaves	

Basic aquarium maintenance involves undertaking a partial water change at 2-3 weekly intervals. At each water change any debris accumulating in the aquarium and in the gravel should be removed. This can be achieved very successfully using a gravel cleaner. The replacement water should be at the same temperature as that in the aquarium and should be dechlorinated using a tap water conditioner.

At each partial water change the filter can also be cleaned. The use of a gravel cleaner will ensure that undergravel filters are working effectively. With box filters the filter media should be removed and quickly rinsed in old aquarium water. It is best not to use tapwater as the chlorine within it may kill the helpful filter bacteria.

FEEDING

Q *What should I feed my fish on?*

A In the aquarium the fish are reliant on the aquarist to provide them with a suitable diet. Commercially available flaked foods are the best and most convenient way to feed your fish. A staple food will provide the nutrients required for most of your fish most of the time. This should be supplemented with a colour enhancing food to encourage the brilliant coloration of tropical fish, and a vegetable based food for herbivorous species such as mollies. A good regime is to feed staple food in the morning and a colour enhancing and/or vegetable food in the evening.

Bottom dwelling fish will not rise to the surface to accept flakes and should be given a tablet food as their basic diet. Special or treat foods are also available which can be given to the fish on an occasional basis. Such foods include freeze dried livefoods, freeze dried tablets, irradiated foods and livefood.

The fish should be fed once or twice each day or as much as they will eat within 2 or 3 minutes. Dried foods are very concentrated and the quality of food eaten in this period will be sufficient for the fish. Any excess food should be removed as, if uneaten, it may pollute the water. The golden rule regarding feeding is DO NOT OVERFEED.

HEALTH

Q *What can be done if the fish become unhealthy?*

A If your aquarium is maintained in good condition and the fish are given a good diet, few problems should occur through poor health. However, problems can occur, particularly when new fish are being added to the aquarium.

The majority of problems are directly or indirectly linked to poor water quality. Such problems usually affect all of the fish, or all of those of a particular size or species; and can occur very rapidly — often overnight.

Should this be the case a large water change should be undertaken to dilute the problem, and water quality tests performed to determine the nature of the trouble.

The majority of aquarium fish diseases can be treated using one of the commercially available remedies.

The most common fish diseases are:

1 White Spot, as the name suggests, appears as pin-head sized white spots on the body and fins. The parasite causes the fish to become very irritated and then lethargic, before causing its death.

2 Fungus infections generally look like tufts of cotton wool on the body or fins of the fish. The disease organism is present in the water all of the time, but only attacks the fish when they are damaged in some way.

3 Fin Rot is a bacterial disease which attacks previously damaged fins and gradually eats away at the tissue.

Further details are available in suitable texts **Supplement** (Oct 1989) or *Aquarium Digest No. 49:* **Water Chemistry & Fish Diseases, Tetra, Lambert Court, Chestnut Avenue, Eastleigh, Hants.**

An Interpet Manual of Fish Health, by Dr Chris Andrews, Adrian Exell and Dr Neville Carrington (published by Salamander):

OUT AND ABOUT

IN AT THE DEEP END

Oasis Aquatics' proprietor **Tony Brittain** certainly wasn't thinking in half measures when he decided to launch an aquatic centre near Lutterworth in Leicestershire at the end of last year. Within just 12 weeks, and in conjunction with his daughter and son-in-law, a bare field was transformed into a covered garden paradise catering for every need of the fishkeeper and the gardener — and just in time for Christmas!

The official opening of Oasis Aquatics was performed by *Aquarist & Pondkeeper* contributor **Stephen Smith,** who stayed on throughout the day to meet members of the public and answer their aquatic queries.

Oasis is situated at Ullesthorpe, near Lutterworth, Leicestershire and, being adjacent to the M1, M6 and M69 motorways, is the ideal venue for a weekend drive, or even as a stopping-off point en-route (better than any motorway services!).

STEPHEN SMITH

This *Synodontis decorus* is one of a number of specialist varieties of tropical fish available from Oasis Aquatics. Proprietor Tony Brittain remarked, "What we haven't got, we'll get!"

STEPHEN SMITH

Without doubt, the centrepiece of Oasis Aquatics is its 7,000-gallon filtered show pool, accommodating some excellent Koi imported direct from Japan.

Centrepeice of Oasis Aquatics is a magnificent 7,000-gallon filtered Koi show pool accommodating some really excellent Koi imported direct from Japan. In addition, a comprehensive range of specialist tropical fish is displayed in over 50 show tanks. Over 25 coldwater tanks sport a range of pond fish, while future additions to the centre are expected to include a selection of high-quality Fancy Goldfish, as well as a large section catering specifically for the marine enthusiast. And, even while the opening ceremony was taking place, landscaping was under way, incoporating a selection of outdoor ponds.

The centre is supported by specialist staff who, like their proprietor, have extended their hobby to become involved in the aquatic trade. **Stephen Arman** has been involved with fishkeeping for most of his life and, for the past 10 years, has provided his aquatic expertise as a volunteer at Twycross Zoo, where he is currently refurbishing the aquatic displays.

Such experience has stood him in good stead for establishing the displays at Oasis Aquatics, and it was with some great pride that he showed off his favourite specimen, a *Synodontis decorus*, which, itself, is one of a number of specialist varieties he has introduced, such as Discus from Malawi and Tanganyika, and other Rift Valley Cichlids.

Supporting the coldwater side of the establishment is **Kevin Luckman,** whose

STEPHEN SMITH

The open-plan carpeted layout at Oasis Aquatics gives the centre a "customer-friendly" atmosphere, while a wide range of dry goods and accessories complement the impressive selection of aquatic livestock.

experience and enthusiasm with retailing Koi are a great asset. Kevin has been closely involved with setting up the Koi show-pool, complete with Spirex filtration system, which is the main focus of attention at Oasis Aquatics.

Proprietor Tony Brittain is himself a keen Koi-keeper, and sold his engineering business to embark upon the venture, which, again, has grown out of his hobby. During a rare coffee-break he remarked: "There has been a significant increase in the aquatic pet trade over the past ten years or more, and the launch of Oasis Aquatics as a specialist establishment, forming a major part of a garden complex, is proving to be a highly-popular combination."

In addition to the spectacular range of "wet" lines, Oasis Aquatics also boasts a magnificent selection of "dry" goods.

OASIS AQUATICS

The layout of the premises is first-class, with an open-plan design, carpeted floor, and everything easily "viewable". Particularly eye-catching is the range of garden stoneware manufactured by Henri Studios, while John Allan aquariums and cabinets are available from stock or can be "made to measure". In addition, Oasis boasts the most comprehensive range of Eheim filters and accessories in the Midlands.

Far too often, with some notable exceptions, aquatic retailing has been treated as an afterthought at gardening establishments. The Oasis complex sets a new standard. Such an ambitious project, launched in such a short timescale, and at an awkward time of the year, deserves every success.

Further details from: **Oasis Aquatics, Lutterworth Road, Ullesthorpe, Nr Lutterworth, Leicestershire. Tel: 0455 202585.**

***Aquarist & Pondkeeper* contributor Stephen Smith performs the ribbon-cutting ceremony at Oasis Aquatics with proprietors Tony and Mavis Brittain, foreground. Stephen Smith was on hand at Oasis throughout the day to meet customers and answer their aquatic queries.**

MINIREEF COMPETITION RESULT ON PAGE 10

Fish Town, USA

By Dick Mills

(Photographs by the author)

Like most people, I hate coming home from holidays, especially when I discover I've missed seeing a nearby fish shop or public aquarium. I've therefore got into the habit of finding out in advance where such places are — it also helps to practise surprise when you 'accidentally' discover them at the time — although I suspect my wife has got used to such events by now! **Fish Town, USA** which I visited during a recent trip to New York, nestles in the shadow of the Empire State Building (four blocks away) at 513 3rd Avenue and 34th Street.

The first thing that struck me was the music: 'boogeying on down' at the fish store was something I hadn't exactly anticipated, but it certainly made a change from the relentless bubbling of airstones. Another surprise was a large selection of coloured substrates: these were arranged in some 35 different containers, each shade available on a 'Pick 'n Mix' basis.

Plant selection was a little disappointing, with only large Amazon Swords ($15 each) and Cryptocorynes ($5 each) being in any evidence. However, beneath the rows of tanks were plenty of plastic flowering plants and the whole range of Interpet's Plantastics were available.

Fish prices appeared to be very similar to ours (for UK prices add extra 8% Tax and take off a third!) Serpae Tetras at 90 cents each, and Swordtails little more. For the specialist there were Blue Heckel Discus ($20), Alligator Gar ($15), Arowana ($10), Gold Channel Cats ($8), *Haplochromis compressiceps* ($30), *Cyrtocara ventanus* ($40 pair), Red Devil ($11).

Among the tank set-ups, there were some very attractively-priced 30-inch high tanks on a stand, complete with hood and light: these were on special offer as their dimensions meant problems with storage! Tanks are sold at approximately cost price, and people appeared to be travelling quite some distances to take advantage of this policy.

Manager Miguel Rios, Assistant Manageress Mary Young, and another satisfied customer.

Tetra foods and Eheim filters (most expensive model — $699!) were two names very much on display. One service offered at $10 was a clean-out of your power filter. **Miguel Rios,** the shop's astute manager, found that by selling isolating taps for power filters, their owners would rather bring them in for a filter medium change than do it themselves!

Despite the very colourful 'Buy Now!' signs everywhere, I must not give the impression that your money was the target all the time; many people came in for advice and none went away empty-handed.

Attractive 'Special Offer' tanks.

Miguel told me that he always put the wellbeing of the fish first, even when a fistful of dollars was being waved in his face. He tried to make sure that compatible tank-mates were offered at all times, by taking an interest in his customers' existing home set-ups.

A current scare is the 'ammonia' problem with, despite Miguel's patient explanations, many people putting ammonia-removers into their new tanks before the nitrite peak has occurred during the biological filter's maturation period. It seemed pretty clear that with all the good advice available from Miguel and his assistant **Mary Young, Fish Town USA** will have a regular list of satisfied customers for a long time to come.

News

Ornamental Fish Industry (UK) launched

OFI (UK) held its first meeting on Sunday 4 Dec 1989 at the Crest Hotel, Coventry and, despite the appalling weather conditions, the conference room was full, with 60 delegates representing retailers, importers (both retail and wholesale), consolidators, manufacturers and distributors, plus representatives from the National Farmers Union and a member of the Pet Trade and Industry Association (PTIA) Livestock Committee attending.

The main purpose of this inaugural meeting was to explain to members and visitors the reasons why OFI (UK) had been formed. With the aquatic industry under increasing pressure from the EEC, environmentalists and welfare groups, it is felt essential that the trade is represented to put forward its views on all levels of discussions with government departments and other organisations.

The NFU representative (a member of the Fisheries Committee), very clearly and concisely brought home to the whole meeting the dangers to the aquatic industry if present draft proposals before the EEC were put into effect.

An update on the discussions that had already been held between OFI and MAFF (Ministry of Agriculture Fisheries and Food) and organisations such as the World Conservation Monitering Centre and the Wild Animals Advisory Committee of the RSPCA led to a very lively debate which concluded with enthusiastic support for OFI (UK).

The management committee was expanded so that all sectors of the trade are now represented i.e. retailers, importers, consolidators, manufacturers and distributors. A Newsletter is planned in which details of the next meeting, planned for the beginning of March, will be announced.

Further details of OFI (UK) can be obtained from: **Janet Cruise** 0246-415275. **Keith Barraclough** 0274-576241, **Peter Golding** 0962-760792, **Eddie Pillinger** 051-336 7718, **Cynthia Baker** 0533-671661. **David Evans** 0293-776377, **Bruce Foden** 0484-645324, **Dave Keeley** 0509-610310, **Bernie Sleemen** 0726-883053 or **John Tice** 0327-41944.

'Sea Life' through 'Perspex'

Portsmouth Sea Life Centre have opened their long-awaited 'Tide Display' tank, constructed from 'Perspex' Acrylic supplied by Amari Plastics, Southampton.

'Perspex' Acrylic sheet, manufactured by ICI Acrylics, was chosen for its strength and clarity. Supplied by Amari Plastics in 25mm thickness, the clear 'Perspex' was cut and shaped by Havant Signs and Plastics Ltd, to specifications detailed by the Sea Life Centre.

The panels were glued to form a 'seamless' tank, with a fibreglass frame along the top edge. This results in a better looking tank, with less distortion. The tank holds 5,000 litres (c 1,100 gals) of salt water which rolls back and forth in an hourly cycle tide effect. The fish displayed in the tank include Bass, Mullet, and shoreline invertebrates, including crabs and starfish.

Designed by Mike Causer of the Sea Life Centre, Technical Unit, the tank adds to the centre's impressive collection which included a British Shark Display and the recently opened 'Octopus Encounter'.

Open from 10 am, all year (except Christmas Day) the Sea Life Centre is located on the Clarence Esplanade, Southsea.

For further information contact: **Lindsay Danks/Susan Wright, Amari Plastics Plc. Tel: 0932 854803.**

NEXT MONTH: SPECIAL KOI FEATURES

Water Decor winners

Saturday 4 November saw the presentation of prizes to the lucky winners of the various competitions held by **Water Decor** at the official opening of their Langstone Centre, on 14 October 1989.

The main prize, valued at £150, was won by **Mrs Vivien Adams** of Cwmbran who chose the complete aquarium set-up comprising 30in Gem Panavision 2000S, plus all accessories, together with a copy of **John Dawes'** book **Freshwater Aquarium Fishes** personally signed by the author.

Water Decor were pleased the prize was won by someone who had expressed in interest in setting up a tank but had never had the opportunity to do so.

Other prizes included three small Clearseal Starter Tanks with fish, plants and gravel for the best entries in the Colouring Competition. There was a tremendous response to this competition, presenting Manager **Tony Arthur** with a very difficult task selecting the winning entries. All entries were on show for the customers to admire and provided an attractive display at the shop entrance.

Vouchers to the value of £40 were also presented to the three winners of the Fish Identification Competition.

Since its official opening, Water Decor Langstone has experienced considerable growth, much of it based on the high level of customer service, plus the wide range of quality products on offer. Manager Tony Arthur is confident that this favourable trend will go on throughout 1990.

The growth which the new outlet has already experienced has also brought about an increased demand for staff. Water Decor Langstone are therefore now seeking additional full time and part time staff and Tony Arthur would be interested to hear from anyone in the South Wales area seeking a career in the expanding market of aquatic retailing. Contact Tony at **Water Decor Langstone, Hurrans Garden Centre, Catash Road, Langstone, Nr Newport, South Wales.**

Mrs Vivien Adams of Cwmbran, winner of the main competition prize offered by Water Decor at their grand opening, receives her prize from *A&P* editor John Dawes, with Manager Tony Arthur and *A&P* Koi contributor, Roger Cleaver, in attendance.

Treecircle's Koi Festival

Treecircle Ltd. have been quietly working away for almost two years to create what the company claims to be "the UK's first centre of Koi production."

The 100-acre stie now has over 5 million gallons of water currently available for Koi production, with further facilities coming on stream every week. With much of the operation up and running, Treecircles are offering a cure for Koi-keepers' mid-winter blues in the form of a Koi Festival featuring (quote) ". . . Koi, Koi and more Koi."

The weekend festival, scheduled for **24** and **25 February** will offer visitors a unique opportunity to view Treecircle's purpose-built facilities in a convivial and hospitable atmosphere. Full refreshments will be available at the event which is seen as an ideal day out for individuals, Koi sections and other societies.

Parties are particularly welcome, but organisers should register coaches in advance.

For full details contact **Barry Morgan, Treecircle Ltd., Home Farm, Hall Drive, Alsager, Cheshire. Tel. 0270 877989; Fax 0270 872131.**

Herpetology matters

By Julian Sims

Effects of Global warming

The progressive build-up of 'greenhouse gases', especially carbon dioxide and chloro-fluoro-carbons (CFCs) in the atmosphere is resulting, as we all now know, in 'global warming'. Greenhouse gases trap heat which would otherwise be radiated away from the earth's surface and out into space. One of the most often reported effects of a warmer planet Earth is the melting of the polar ice and the release of more water into the oceans. The result — rising sea levels.

In a warmer climate, sea temperatures will also increase. As water warms up it expands — another factor which will contribute to a rise in sea levels. The Climate Research Unit of the University of East Anglia predicts that sea levels will rise from between 15 to 30 centimetres (6-12in) during the next 40 years. If this is so, it will have dramatic implications for ALL the inhabitants of low-lying coastal areas and river deltas. In particular, the unique reptiles which have evolved on isolated oceanic islands and atolls will be at risk because they will not be able to escape from the flooding.

Global warming also affects weather patterns, causing some noticeable extremes. El Niño is a phenomenon of warm currents, heavy rainfall and weak trade winds which affect the tropical Pacific every two to 10 years. The El Niño which started in 1982, unusually lasted for more than a year and was the most severe ever recorded. By mid-1983, the surface temperature of the ocean around the Galápagos Islands was on average 4.3°C warmer than normal. The Marine Iguanas (*Amblyrhynchus cristatus*) of the Galápagos Islands feed on seaweeds which grow in the cold water of the Humboldt Current which swells up from the Antarctic. With the arrival of the warm water of El Niño, many of the species of seaweed the iguanas traditionally ate, died back.

Intertidal regions of the volcanic rocks of the Galápagos coast were colonised by "warm-tolerant" species of seaweed. Analysis of iguana gut contents revealed that these reptiles were unable to digest the new species of algae completely. As a result, adult iguanas lost weight and 66% of the males, together with 52% of the females, died during the 1982-83 El Niño.

Subsequently, Marine Iguanas have increased in numbers again, although population sizes have not yet returned to pre-1982 levels.

Another environmental phenomenon related to El Nino is the Southern Oscillation. This influences climatic conditions in the Great Barrier Reef region of Australia — one example being lower than normal atmospheric pressures. Research findings collected between 1974 and 1985 have revealed that fewer Green Turtles (*Chelonia mydas*) nested two years after a Southern Oscillation had occurred.

This information regarding reductions in nesting activity following climatic disturbance, will be very important in the conservation and management of wild turtle populations. In south-east Asia, turtle eggs are collected and adult turtles are caught to provide "sea foods" for human consumption. At times of reduced nesting activity, predation by humans should also be reduced to conserve wild turtle stocks.

Changes in the world's climate as a result of the greenhouse effect will impose many varied challenges on conservationists. Colonies of endangered reptiles and amphibians will have to be collected from parts of the world under greatest threat of flooding, drought or dramatic changes in prevailing temperatures. Captive breeding projects will be even more important than they are *now* in preventing the extinction of species which have very limited distributions.

Finally, one interesting side effect of global warming is the prediction that south-eastern England will develop a climate characteristic of the present Mediterranean region. Although there are many, many disadvantages associated with global warming, this amelioration will, at least, make it easier to breed certain species of lizard and chelonia in outdoor enclosures in British gardens!

Amplexus — a spawning embrace

Frogs and toads, the Anurans, have evolved some interesting strategies to cope with the slippery problem of breeding in water or in damp habitats.

With very few exceptions — six species of African toad, including *Nectophrynoides malcomi, N. occidentalis* and *Mertensophryne micranotis*, the Tailed Frog (*Ascaphus truei*) from the western United States of America and three members of the genus *Eleutherodactylus* from Central America — fertilisation of frog and toad eggs is EXTERNAL to the female's body. Prior to the release of eggs by the female, most male Anurans firmly clasp their partner in an embrace called AMPLEXUS.

In general, primitive frogs depend on INGUINAL or LUMBAR amplexus, whereas more advanced Anurans have developed an AXILLARY embrace. However, there are a variety of "modifications" according to the relative body size and shape of the two sexes.

Inguinal amplexus is where the male uses his front legs to clasp the female around her waist. This is the method employed by the Surinam Toad (*Pipa pipa*) and African Clawed Toads (*Xenopus* spp.).

Axillary amplexus normally involves the male holding the female just behind her front legs — in the "axilla". This type of amplexus is used by the frogs and toads which are native to British garden ponds, and can be seen during the spring spawning season.

As its name suggests, cephalic amplexus involves the male holding the female around her head or neck. Amplexus is not typically demonstrated by most South American Arrow Poison Frogs, possibly because their aggressive behaviour in defence of personal territory, does not favour prolonged physical contact. However, males or the species *Dendrobates tricolor* do embrace the females, albeit around the throat, at breeding time.

Some Anurans have very rounded bodies with incredibly small legs, for example, the Short-headed Frogs (*Breviceps* sp.) from Africa. Amplexus would not be possible with these "globular" shaped amphibians if it were not for the fact that the male literally becomes "glued" onto the female. The male secretes the "glue" from glands in his abdominal region and may remain attached for up to three days. This must be one of the most bizarre examples of the mating strategies developed by amphibians to ensure continuation of their species.

Male common Frog *(Rana temporaria)* demonstrating the strength of the amplexus clasp.

ENVIRONMENTAL HEALTH FOR NATIVE MARINES

(I: Temperature)

Andy Horton begins a short series of articles on the main environmental factors that affect the wellbeing of native marine aquarium fish and invertebrates

(Photographs by the author)

WHATEVER branch of marine aquariology one specialises in, it is essential to provide water and other conditions that are as near as possible to those experienced in the wild by the organisms we intend to keep.

Fish and invertebrates found in British seas can often tolerate only a narrow range of conditions. Of the numerous factors which influence the wellbeing of organisms, the main variable ones that are likely to be of most concern to aquarists are:

1. Temperature
2. Ammonia content
3. Salinity
4. Oxygen (the amount of dissolved oxygen in the water)
5. Other factors: nitrite, nitrate, pH, dissolved organic carbon (DOC), amount of swimming space, etc.

In this first article I'll be examining the importance and effects of temperature on the health of both fish and invertebrates.

About 50% of the fish and invertebrates commonly collected from British shores are unable to tolerate sustained high aquarium temperatures such as those of the summer of 1989. Among those that can withstand high temperatures, tolerance varies from species to species, depending on several factors, such as their natural distribution.

Ballan Wrasse (green, small). This fish is a member of the Lusitanian Fauna. In three years it will become too large for most aquariums.

Arctic-Boreal Fauna

1

This type of fauna includes fish and invertebrates found in the Arctic and North Sea.

Typical species of interest to the aquarist include the Viviparous Blenny (= Eelpout), *Zoarces viviparus*, the Scottish Bullhead (= Bull Rout), *Myoxocephalus scorpius*, and one of the Spider Crabs, *Hyas araneus*.

Also included in this faunal group are creatures that reach their most southerly limit of distribution in the English Channel, where the maximum surface sea temperature may reach 17°C or 19°C (C62.5-66°F) in inshore waters. They include the popular Dahlia Anemone, *Urticina felina* (= *Tealia felina*), the abundant Butterfish, *Pholis gunnellus*, the Lumpsucker fish, *Cyclopterus lumpus*, the attractive Sunstar, *Crossaster papposus*, and the organge fish with the common name of Montagu's Sea Snail, *Liparis montagui*. The Hooknose, or Pogge, *Agonus cataphractus*, from sandy shores, is also an Arctic fish.

If these species are to be kept successfully, some form of cooling the water is absolutely essential (see my article: Keep it Cool *A&P* Nov '89)

Bearded Rockling, ovigerous (full of eggs). If a male is present, the fish will discharge her eggs in the aquarium during March. Good tank conditions are important when keeping this fish. (Temperate Fauna).

Sea Anemone *Sagartia troglodytes*; orange is only one of innumerable colour varieties (Temperate Fauna).

2 Atlantic Temperate Fauna

This faunal assemblage includes fish and invertebrates found around the British Isles, with their most southerly biogeographical range in the western Atlantic, but absent from the Mediterranean Sea.

Species found on the shore throughout the summer, like the Blenny (=Shanny), *Lipophrys pholis*, can survive and breed in aquaria.

However, many of these species, although found on the shore and in pools, like the 5-Bearded Rockling, *Ciliata mustela*, the Bullhead (=Sea Scorpion), *Taurulus bubalis*, the Common Starfish, *Asterias rubens*, the Common Hermit Crab, *Pagurus bernhardus*, the Plumose Anemone, *Metridium senile*, the Shore Urchin, *Psammechinus miliaris*, and many others, are more common offshore during the hottest months.

These organisms can be kept in the larger aquariums (over 100 gallons — 450 litres). Many of them are kept successfully in Public Aquariums and in cellars and insulated garages where the temperature in the large volumes of water does not exceed 19°C (66°F). Even in an unheated room, temperatures in the smaller tanks may reach 25°C (77 °F) or more; so to ensure success, an efficient method of cooling the water is necessary.

3 Lusitanian Fauna

The fauna of the medieterranean reaches the most northerly point of distribution in the English Channel and the western coasts of Britain and Ireland. It is more varied in the number of species than those of the other categories, and includes the best fish and invertebrates for the home aquarist. In most years, these fish and invertebrates will be absent from the North Sea.

The most popular species kept in aquaria include the Rock Goby, *Gobius paganellus*, the charming Tompot Blenny, *Blennius gattorugine*, the Snakelocks Anemone, *Anemonia viridis* (=*A. sulcata*), the Cushion Star, *Asterina gibbosa*, the Cornish Sucker (Clingfish), *Lepadogaster lepadogaster*, the Corkwing Wrasse, *Crenilabrus melops*, the Hairy Crab, *Pilumnus hirtellus*, and many others.

Cooling the water is not necessary, and some of the creatures may actually die if the water gets too cold. i.e. below 9°C (48°F).

An experienced naturalist will not be surprised if some of these creatures do not fall neatly into the above three categories. The Black Goby, *Gobius niger*, other fishes of the same family, and the large Edible Crab, *Cancer pagurus*, for example, could be described as Lusitanian-Temperate, while the Red Beadlet Anemones, *Actinia equina*, can be found in both Arctic and Tropical waters.

Variable conditions

Marine biological treatises and text books of the seashore attach great significance to the ecology of the pools themselves. Twice daily, inhabited pools will be renewed with fresh seawater by the incoming tide. Pools higher up on the shore, the furthest from the sea, will also be exposed to environmental factors leading to a marked deterioration of water quality. These can include:

1) Rapid increase of temperature in pools up to 24°C (75°) or more in summer
2) Evaporation of the water, increasing the salinity
3) Dilution of the water by rainfall
4) High levels of toxic ammonia from decaying organisms
5) Falls in levels of dissolved oxygen for several reasons

This has led aquarists to conclude wrongly that, because rockpool fish and invertebrates endure harsh natural conditions, they can suffer similiar conditions in aquaria. The major error occurs because the description of what actually happens is inaccurate.

Extensive observations on the shore indicate that all of the mobile animals of most interest to the aquarist will swim, crawl or float (sea anemones) to the more favourable offshore waters, or to the pools near the low water mark that provide a more stable living environment.

In fact, during 'neap' tides, in the middle of summer, many of the mid-tidal pools will contain relatively few examples of life. These same pools will, however, be teeming with prawns and small fish around the time of the autumnal equinox.

Tolerance limits

British sea life aquarists can observe the increased metbolic and breathing rate of their fishes as the temperature increases. For a few hours, this is not harmful as these conditions are likely to occur in pools until the arrival of the incoming tide.

However, when a fish experiences sudden rises, or temperatures excedding those to which it is able to adapt physiologically, it demonstrates symptoms that indicate that it is not receiving sufficient oxygen. This is known as the 'escape response'. The affected specimen may gulp at the water surface, or even attempt to jump out of the tank. Identical behaviour is often demonstrated when levels of ammonia reach toxic proportions. In the latter case, however, the breathing tends to be more irregular. If a fish is introduced into water that is too warm, it is likely to die in a few (1 to 6) hours.

Pool underneath a small granite headland. The ability of a shore pool as a habitat for fish is dependant on many factors, e.g. size and depth. The pool shown is shallow, and despite being sheltered from the hot rays of the sun by the tor, is liable to heat up quickly during summer. Blennies were only present in the deeper pools.

Fish found in rockpools are often those which have a large distribution range. For example it is easy to understand how a fish like the Rock Goby, which can be found in the Mediterranean, is happy to live in British coastal pools during the summer. In an earlier article (*A&P*, October 1989) I explained about the tendency of the Common Blenny to leave the water during hot spells. This qualifies it as the only European fish that has ethologically adapted to the seashore and rockpool habitat. All other fish swim into deeper waters offshore if the temperature or other conditions become unfavourable.

It is interesting to note that feeding rarely occurs in the still waters of the pools, and that one of the first indications that a fish is suffering from heat stress is its refusal to feed. That is most clearly seen in the Bullhead or Sea Scorpion. Unless the temperature can be reduced in the next 12 hours or less, the fish should be returned to the sea. Rockpool fish can understandably tolerate rapid falls in temperature from 24°C (75°) to 17°C (62.5°F). It is not, however, recommended to allow this to happen in aquarium conditions.

With the possible exception of the Blenny, none of the British fish seem to be able to acclimatise permanently to temperatures more than 2°C (c3.6°F) above the maximum temperature of the seas in which they are found. (This may be as high as 28°C (82°F) for the Corkwing Wrasse, or as low as low as 17°C (62.5°F) for the Butterfish).

Symptoms of intolerance to high temperatures by invertebrates is much harder to detect. Refusal to feed is often the only sign. Dahlia and Plumose Anemones are two vulnerable species.

Fish also experience stress when the water becomes too cold. Black Bream, *Spondyliosoma cantharus*, demonstrate the opposite metabolic affects to the above, slowing down their breathing and lapsing into a coma below 10°C (50°F). *(Observation in one specimen only).* A fall in temperature of 6°C (c11°F) overnight resulted in visible signs of stress in the Grey Mullet, *Chelon labrosus*, including reddening underneath the fins.

Further reading:

Keep it Cool *A&P*, November 1989. Ammonia poisoning was briefly discussed in my **Advanced Techniques** article in *A&P* in April 1989. Later articles in this series will explore other aspects of **Environmental Health,** both in aquariums and in the sea itself.

Your questions answered

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Every query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month.

Please indicate clearly on the top left hand corner of your envelope the name of the experts to whom your query should be directed. All letters must be accompanied by a S.A.E. and addressed to:

Your Questions Answered,
The Aquarist & Pondkeeper, 9 Tufton Street,
Ashford, Kent TN23 1QN

Herpetology, Julian Sims. **Koi,** Roger Cleaver. **Tropical,** Dr. David Ford. **Coldwater,** Pauline Hodgkinson. **Plants,** Barry James. **Discus,** Eberhard Schulze. **Marine,** Graham Cox.

COLDWATER

Angling for Mirrors

I would like to get some large Mirror Carp but can't find any in my local shops. Can you help?

Also, is it possible to introduce wild-caught fish into a pond in winter?

Most local councils publish an Information booklet where you will find a list of angling clubs in your area. They normally give the address and telephone number of the secretary who may be able to put you in touch with members who will be willing to help.

You can also ask at your local library. They will have a list of local clubs, or you could call into one of the angling shops in your area who will also give you the location of your nearest angling club.

If you are successful in obtaining the type of fish you require, do not forget to keep it in a large holding tank or aquarium for several weeks before you put it into your pond. All wild-caught fishes carry parasites, so a careful watch must be undertaken and any necessary treatment given before putting them into your pond.

It is alright to put a native pond fish into your pond during winter, providing that the pond is at least 18 inches (45cm) deep, through large fish need a depth of not less than 2 feet (60cm) if they are to survive the long winter safely.

LAURENCE PERKINS

Wild-caught Mirror Carp will need an adequate period in quarantine before being introduced into a garden pond.

HERPETOLOGY

Giant tadpole

In spring 1988 I put some frogspawn from my pond in a 75-gallon cistern which I use as an "odd" livefood tank since it's full of weed, snails and other juicy creepy-crawlies.

When I cleaned out the tank in late autumn of '89 I found an enormous tadpole — its tail alone is about 2½-3in (6.4-7.6cm) long! It has rudimentary back legs but no front legs. It still has a tadpole-type mouth but its body is almost 1in (2.5cm) across. Does this happen very often?

The "giant" tadpole of the Common Frog (*Rana temporaria*) you describe is an example of NEOTENY. This prolongation of the larval state in amphibians is of two types:

(i) Total neoteny — tadpoles remain in the larval state, develop sex organs and reproduce. An example of total neoteny is the Axolotl (*Ambystoma mexicanum*) from Mexico featured in the **Spotlight on Amphibians,** pages 35 and 36, March 1989 edition of *Aquarist & Pondkeeper.*

(ii) Partial neoteny — this is a retardation of metamorphosis, often associated with an increase in size (as with your tadpole), and without the development of sex organs.

Partial neoteny occurs with the tadpoles of frogs, toads, newts and salamanders, whereas total neoteny has only been recorded among the tadpoles of newts and salamanders.

Among the amphibians which live in Britain, partial neoteny is comparatively rare but has been documented for the Common Frog (*R. temporaria*), Edible Frog (*R.esculenta*), Common Toad (*Bufo bufo*) and all three species of indigenous newt.

Frog tadpoles grow to a large size, the head and body appearing to become very "swollen". Hind limbs reach the budding stage and then cease to grow. Front legs don't develop. These "giant" tadpoles are relatively inactive and can survive for up to two years before they die. They don't undergo metamorphosis.

This is an interesting point with the specimen you describe. Iodine must be absorbed from the diet or the water in which the tadpoles live in order for the thyroid gland to make hormones to bring about metamorphosis. The necessary iodine was obviously available, otherwise the other tadpoles from the 1988 spawn would not have metamorphosed. Thus, the problem is specific to the "giant" tadpole which has a defective thryoid gland or hormone-producing system — probably the pituitary body underneath the brain. Unfortunately, as your tadpole is now over a year old, it is unlikely to survive for very much longer.

PLANTS

Polythene problem

My local dealer has offered me something which is supposed to help me grow better plants. The medium is in a polythene bag and contains fertiliser, peat, leaf-mould and other compounds. Do you think this arrangement would work?

The short answer to your question is: No, I am sure that it will not improve your plant growth at all.

In fact, I tested some of this material and found that (in some cases) water had not penetrated the bag at all via the pin-prick holes. In other bags where the water *had* entered the bag, the whole contents had decayed, giving off a foul smell when opened. I threw them on to my house plant containers as added humus.

As any good aquarium plant book will state quite clearly the heavy, concentrated use of organic matter can be hazardous to the health of both fish and plants.

DISCUS

Confused Discus keeper

I am very confused and would be grateful for your expert opinion. I have been keeping and breeding Discus for a long time and have read most things published about them in all English magazines as long as they have articles on my favourite fish.

It seems that the popularity of Discus has increased; only last August there was a article about them in TFH, showing a number of pictures of Discus exhibited at the Singapore fish exhibition. During the last few months other magazines have also carried articles on Discus. Your own article in A&P in December really got me going again.

My question is the following: In TFH, Dr Axelrod stated that the fish bred in the Far East won all the prizes and that Discus from Germany were considered below standard. The pictures shown in A&P of the Hong Kong Discus Fair '89 are also superb fish. Why have German Discus suddenly become second rate? It is even rumoured that some German breeders import Discus fish from the Far East and supply them as 'their own'.

I don't really quite know how to answer your question. It is true that German-bred Discus fish were once the 'hallmark' by which all other Discus were judged. I suppose one can say that all the well-known German breeders of late, either have stopped breeding these fish or are no longer as commercially minded as the new generation of breeders.

In the past, the well-known breeders did not supply 'bad' fish to other hobbyists or dealers; they were simply destroyed. Today it seems a bit different. Maybe the new generation of German Discus breeders are no longer interested in producing a 'perfect' animal, but rather see pound notes swimming in their tanks. In any case, why destroy a fish when somebody is bound to pay for it?

I do know know if this is the only reason, but I am sure it must be the reason for some of the breeders.

But this does not only apply to German breeders of Discus. As Dr Axelrod says in his article on **Aquarama 1989**, the Southeast Asia-born Discus varieties featured intense markings and varied body shapes; from disc-shaped, to taller than long, and elongated. Surely, an elongated Discus fish, whether bred in Germany, the Far East,

This is a Turquoise x Royal Blue High Fin Discus . . . but does that really matter, or is the quality of the fish itself more important?

or America, or anywhere else for that matter, is a 'bad fish' and ought not be shown, much less used for breeding purposes or even considered for winning a prize.

But then I suppose, standards vary. It is true that even I used to think that 'all' Discus from the Far East were bad fish and that the 'only' Discus fish of any substance came from Germany. Things have changed over the years. Although there are still 'bad' Discus coming from the Far East, many today are as good as the best German-bred Discus of the past.

After all, many of the better-known breeders in Singapore, Hong Kong, Thailand and Malaysia started with quality German-bred Discus. As they are usually favoured with better or easier conditions, such as water, food and labour, it really is not very surprising that they produce quality Discus which, in the past, could only be obtained in Germany.

As there seems to be an ever-increasing demand for Discus, even mainland China and Taiwan have started to produce Discus on a larger scale. It is said that a breeding farm in mainland China, when fully operational, will have more than 2,000 tanks. Hopefully, I will have the chance to see for myself on one of my next trips to the Far East.

Regarding your final comment, *any* successful Discus keeper or breeder will always suffer from 'nastiness' spread by others. I know because it has happened to me many times! I put it down to nothing else but a bout of jealousy.

The colour, markings or shape of a Discus is something very personal, and any hobbyist ought to buy a fish which appeals to him/her, regardless of whether it has, what I call a 'designer label', attached to it. What does it really matter who bred the fish, as long as it is of good colour, markings and shape?

TROPICAL

Difficult Tubifex

I am having difficulty obtaining a regular supply of Tubifex *worms. When I do find them, they are very expensive. Is there any information on where* Tubifex *come from? Is it possible to grow/breed them at home with a view to supplying local shops?*

Tubifex are aquatic worms that live off rotting materials and so are full of bacteria. They can also carry parasites such as White Spot and Tapeworms, waiting to infest fish.

I would not recommend their use to anyone (although there are some *Tubifex* sterilising treatments available). *Tubifex* are harvested from mud flats in rivers where there are lots of decaying matter. Attempts to culture them in captivity have failed.

There are many alternatives, such as a red garden earthworms (which carry no aquatic parasites). White worms, micro worms, vinegar eelworms, fruit flies, selected *Daphnia* and *Cyclops*, all can be cultured free of pathogens. Why risk using *Tubifex?*

Uneaten *Tubifex* worms will burrow in the gravel/sand layers and can give rise to water quality problems in the long run.

Starting with Angels

I am setting up a 36in (90cm) tank for Angels. How many fish will I be able to keep and breed in this aquarium, what water conditions do they require, and what catfish could I mix with them?

Angels, *Pterophyllum scalare*, are the most popular of all the tropical fishes. To meet the world's aquarists' demands for the fish, they are mass produced in Far Eastern, Florida (and now, to an extent, in UK) Fish Farms.

Many 'sports' occur in such farming and these are often isolated and inbred to fix the genes, giving Ghost Angels, Blushing Angels, Veiltail Angels, Silver and Gold Angels and so on. In fact, it is now rare to see the original wild *P. scalare* from the Amazon. Farmed fish will accept any good quality water and will be at home with any community species.

You specifically ask about Catfish . . . choose any of the *Corydoras* for compatibility. Your 36in (90cm) tank would accommodate a dozen Angels, but fewer if you want them to grow very large.

If you want to breed the fish, then prepare water similar to that found in the natural habitat, ie soft and acid, brown in colour and sluggish, with lots of vegetation. That means using rainwater held over peat, with very gentle filtration in the aquarium, and lots of tall aquatics for the pair to swim through.

You need to let a pair form from a shoal of the fish (preferably unrelated fish, of course; if one brood is used it gives brother x sister matings which are genetically poor). Isolate the pair and they will spawn regularly on a piece of polished slate. Use freshly hatched Brine Shrimp and then crumbled flake for the fry.

Continued on page 93

PRODUCT ROUND-UP

BY DICK MILLS

PRODUCT PROFILE: THERMOMETERS

How do you check the temperature of your aquarium water? You could conceivably dip your elbow into the water à la baby's bath, or simply put your hand flat against the front glass, but neither of these methods is as accurate as using a proper aquarium thermometer!

Thermometer technology has evolved considerably in recent years and now there are several different ways of measuring the water's temperature.

The humble **spirit-** or **mercury-filled** glass tube clipped against a printed Fahrenheit or Centigrade scale stood the hobby in good stead for many years: the slightly less-expensive spirit-filled types were typically less accurate, but providing you knew just how "out" they were, they were adequate enough for most purposes.

A typical danger with either type is that as a consequence of rough handling, or even being buffeted about the aquarium, the printed scale may become dislodged from its original position, so giving a very wrong reading; check your thermometers against a known-to-be-accurate one from time to time (or at the very outset) to ensure continuing accuracy.

The choice of floating or static types is very much a personal choice but both usually demand that you look at them from a perfectly square-on position in order to see the indicating line.

Another popular "mechanical" type (which might well be discontinued now) was the round **"Dumpy"**: a practical tip with this type was to stick it on the aquarium glass so that the indicating arm was vertical, at the 12 o'clock position, when the temperature was at the required level. This meant that any drastic deviation was easily seen — even across a crowded fish-house.

Liquid-crystal thermometers are now quite common, and the previous notes on the Dumpty can be applied equally here to round-design LCD types too. There is a slightly-different principle involved between LCD thermometers and the LCD display on a wristwatch: in the watch, the liquid crystal figures arrange themselves according to electric currents set up by the watch's time-keeping circuits, whereas the figures in the thermometer segments do not change, only the different temperature sensitive backgrounds.

There is some debate as to how accurate LCD thermometers actually are, as some may to be sensitive to external stimuli, such as direct sunshine or room temperatures, as well as the heat transmitted through the aquarium glass.

Top-of-the-market **electronic thermometers** collect the temperature information through a probe dipped in the water. This probe contains a thermo-resistive device which, according to temperature changes, alters the micro-chip based circuitry of the metering device which, in turn, causes the display to change.

It is not hard to imagine that, eventually, a common probe could conceivably collect sufficient information about *all* water conditions — temperature, pH, hardness etc — and not only display them, but also trigger off any relevant remedial measures such as switching on/off heaters, adding fresh water, pH adjusters and so on. In short, the ubiquitous micro-chip could take half the fun out of fishkeeping altogether!

HANNA INSTRUMENTS

Top of the thermometer market are electronic models which are very accurate.

NEW PRODUCT

VALLANCE

The use of the correct sealant in the manufacture of all-glass aquariums is vital, since any attempt at cutting costs by using bathroom or window glazing sealants will be doomed to failure because of the inclusion of mould retardants in their composition which may well leach out into the water and kill the fish.

VALLANCE have released a new sealant which, apart from its safe composition, will not, it is claimed, shrink or crack, and stays flexible in both fresh and salt water situations. Easy to use, fast-drying and tack-free in minutes, Aquarium Silicone is available in 310ml cartridges and retails at £3.81 inclusive of VAT. Details from:

VALLANCE & CO (Morley), Hunting Specialised Products Ltd, Sealant Division, Queens Road, Morley, Leeds LS27 0QJ. (Tel 0532 537211. Fax 0532 525829.)

VALLANCE & CO

New aquarium sealant from Vallance — adhesion without tackiness.

PRODUCT NEWS

MMR

Since its introduction two years ago, ALGARID continues to help clear ponds of blanket weed and scale and also to increase filter efficiency by coagulating very fine particles into "more-easily-collectable" portions.

Successes have included Koi ponds and quarantine tanks. Several interesting side-effects have come to light, the most notable being that ulcer-ridden Koi have shown a marked improvement, needing no further treatment for the condition following the installation of an Algarid system.

At a Ministry of Defence establishment filter resin efficiency was increased 100% after only the shortest exposure to the ceramic magnets used in Algarid filters.

MMR stress that there may be no immediate overnight "miracle effect" as their filters take time to stabilise the conditions in the pond: obviously, large ponds take longer than small ones, where blanket weed can die off within as short a period as four weeks. Algarid can also be incorporated within a UV filter system. A datapack of applications can be obtained from:

MMR Ltd, 39 Marsden Street, London NW5 3HE. (Tel 01-284 0553. Fax 01-482 3518.)

ARMITAGES

The Nimrod range of aquatic products and accessories is to be considerably extended by manufacturers **ARMITAGES** who have just announced substantial investment in a new research and development programme.

Major manufacturers of a vast range of products for the general pet care market, Armitages state that the aquatic market in the UK has developed immensely in terms of product quality and hobbyists' knowledge and experience during the last decade.

Howard Foster, Armitages' research and development manager, said: "We are now investing time, capital and resources into moving the Nimrod range of aquatic products into the 1990s and the next century".

The Nimrod range currently includes foods, heaters, air pumps, power filters, undergravel filters, ornaments, and numerous additional accessories.

Further information contact:

PATRICK NEWTON, MARKETING MANAGER, ARMITAGES PET PRODUCTS, Armitage Bros Plc, Armitage House, Mile End Road/Road Number 3, Colwick Industrial Estate, Nottingham NG4 2BA. (Tel 0602 614984. Fax 0602 617496.)

ARMITAGES PET PRODUCTS

The Nimrod range is being subjected to major new developments.

NEXT MONTH

With spring just round the corner, the March edition of *A&P* takes a closer-than-normal look at Koi in four specially commissioned features from Koi experts **John Cuvelier, Roger Cleaver, Nigel Caddock,** and our most recent Koi contributor, **David Twigg.**

Water quality, Kohaku, breeding, filtration media, news and notes are just a few of the topics tackled by our intrepid team of Koi writers.

If you are interested in Koi — you'll be interested in our March issue.

*Reptile fans watch out! There's a Green Iguana about! Well, not exactly . . . but we do have a fantastic FREE giant poster for you.

*There's also **Dr. Gareth Evans'** latest herpetological contribution — on toads this time — **Warts and All!**

*Plus the second lap of **Pat & Derek Lambert's** expedition to Mexico in search of some rather special livebearers.

*Odessa Barbs **(Jiri Palicka),** the world as seen by a Coolie (Kuhli) Loach — a witty and hardhitting article from **David Franklin,** electrical safety and the aquarist (from interpet's **Dr. Neville Carrington**), endangered species **(David Alderton)** and much, much more to tickle the palate in our packed and colourful March issue.

Make sure of getting your copy of *A&P* by placing a regular order with your local retailer or by filling in a Subscription Form.

See you in March!

YOUR QUESTIONS ANSWERED (continued from page 89)

KOI

Constipated Koi

I have been told that Epsom salts can be used to treat digestive disorders in Koi. Is this correct?

Epsom Salts, or to give them their chemical name, Magnesium Sulphate, were used in the past to treat fish suffering from constipation. Like many old treatments, it has fallen into disuse. I must admit that I have never used it on my own Koi.

The method which C Van Duijn recommends in his book **Diseases of Fishes** is to fast the fish for two days and then drop a pinch of Epsom Salt crystals into the water in the hope the fish will swallow them. As you can see it is a bit of a hit and miss technique.

A better way would be to give the crystals to the fish mixed with some form of food. The salts should be administered at a rate of 30,000ppm if using this method, according to N. Herwig in his book on treatment of fish diseases.

Having never used either, I cannot comment on how successful either would be!

MARINE

Brackish treatments

I would like some advice on which treatments/remedies to use in a brackish aquarium. Do I use freshwater, or marine, and in what strengths?

To date the fish have remained healthy and feed well and there is no problem with water, etc. I would just like to be prepared should any problems arise.

Over the last 30-odd years, I have achieved total success in the medication of sick brackish water fishes such as *Monodactylus argenteus, Monodactylus sebae, Scatophagus* spp., Puffers of several species, *Therapon jarbua,* Archerfish, etc by using the following treatment regime:

1) *BACTERIAL DISEASES* — such as Fin Rot, Body Rot, ulcers, wounds, cloudy eyes — a broad-spectrum bactericide such as Myxazin at two drops per gallon (4.5 litres) per day while necessary.

2) *PROTOZOAN DISEASES* a) *EXTERNAL* such as White Spot, Oodiniasis, Costiasis, Prymnesium, etc., — a copper-based treatment at 1 drop per gallon (4.5 litres) per day as necessary.

LAWRENCE T PERKINS

Brackish water species like *Therapon jarbua,* the Target Fish, are highly resistant to diseases, as long as water conditions are appropriate.

b) *INTERNAL* such as *Cryptobia, Bodomonas, Trypanosoma, Trypanoplasma* (ie. "sleeping sickness" and wasting diseases), *Hexamita* ("Hole-in-the-Head" disease), "Malawi Bloat", etc., a remedy such as Octozin at one tablet per 5 gallons (= 22.5 litres) on days 1, 2 and 3.

3) *FUNGAL DISEASES* — a copper-based treatment at 1 drop per gallon (4.5 litres) per day as necessary.

4) *PARASITES — INTERNAL* and *EXTERNAL* — a parasiticide as directed for the destruction of gill-flukes, body/fin flukes, fish-lice, anchor worms, cestodes, nematodes, tapeworms, etc.

Please note that brackish-water fishes are extremely disease-resistant, provided that you give them at least a 25% seawater solution to live in. This means that you should add a 5-gallon (22.5 litre) pack of a high quality sea salt in each 20 gallons (90 litres) of tapwater.

GOING DUTCH

Part 1: The Leiden School

The Dutch approach to underwater-gardening is world-famous. In this first contribution **Arie de Graaf** examines some of the Leiden School concepts of the community aquarium.

(Photograhs by the author).

Origin, History and Concept

The most famous trend in Dutch aquarium keeping is the so-called "Leiden School". The Leiden School is named after the city of Leiden where the "Hortus Botanicus" of the State University is situated.

The former manager of the greenhouses at the Hortus Botanicus was Mr Zwart, who cultivated aquatic plants in emerse conditions in the Victoria Amazonica Greenhouse. He also cultivated the same aquatic plants in a special greenhouse which contained aquaria. Mr Zwart was a keen aquarium enthusiast and his aquarium society, De Natuurvriend based in Leiden organised periodic aquarium shows in the Hortus Botanicus. People in the aquarium world therefore became aware of the Leiden School of aquarium architecture.

The principle of the "Leiden School" was based on three developments:

1. the planting of the aquarium;
2. the assortment of the plants;
3. the cultivation of the plants.

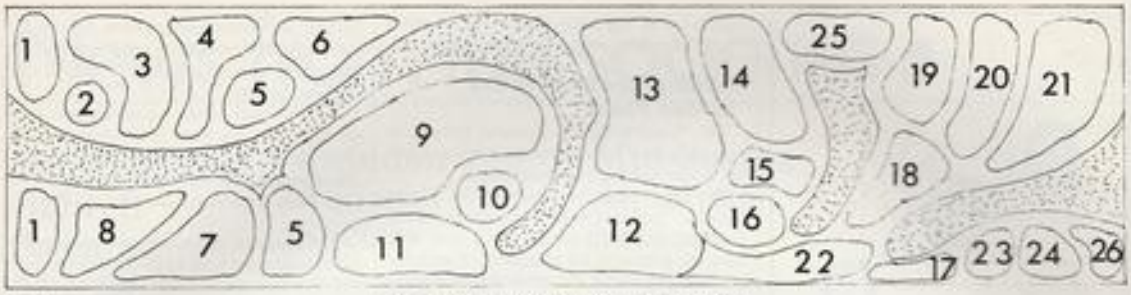
This emphasis on plants means that the planting up of bigger aquaria often requires a certain amount of construction work. One of the first pioneers who developed techniques in this "art" was J van Wezel. Before World War II he "built up" an aquarium measuring 150 x 60 x 60cm (c 60 x 24 x 24in) using smaller individual tanks and flower pots filled up with sand, lava stone and loose slices of square blocks of peat from the front glass backwards to a height of 40cm (16in) in the form of a rising construction, in which plant material was integrated. It usually took many weeks before such an aquarium was fully planted up.

As a rule the aquariums were heated by self-constructed oil heaters. In Leiden many aquarium enthusiasts had small growing sheds or greenhouses in their gardens in which many hundreds of young plants from rhizomes or cuttings were reproduced.

After the War the oil heaters disappeared and were replaced by electrically-operated bottom heaters. The use of "loose" small individual tanks and flower pots was also abandoned.

L.v.d Heuvel's spectacular Leiden School Dutch aquarium.

"Leiden Plants" (in the foreground) show up beautifully against a background of *Alternanthera reineckii*.



= Bogwood

Plan view of L.v.d. Heuvel's aquarium. See text for details.

PLANT SELECTION

1 *Microsorum pteropus* (Bl.) Ching
2 *Glyceria fluitans* (L.) R.Br.
3 *Nymphaea lotus*
4 *Hygrophila angustifolia* R. Br.
5 *Echinodorus aschersonianus* Graebner
6 *Myriophyllum hippuroides* Nutt. ex Torr. & Gray
7 *Saururus cernuus* L.
8 *Alternanthera reineckii* Briq.
9 *Hygrophila difformis*
10 *Cryptocoryne retrospiralis* (Roxburgh) Kunth
11 *Cryptocoryne beckettii* Trimen
12 *Ludwigia palustris* (L.) Ell.
13 *Cryptocoryne pontederiifolia* Schott
14 *Cryptocoryne crispatula* Engler
15 *Eichhornia natans* (Beauv.) Solms-Laub.
16 *Cryptocoryne wendtii* de Wit
17 *Cryptocoryne undulata* Wendt
18 *Nymphaea lotus*
19 *Limnophila aquatica* (Roxb.) Alst.
20 *Ammania gracilis*
21 *Lobelia cardinalis* L.
22 *Hottonia inflata* Ell.
23 *Glossostigma elatinoides*
24 *Cryptocoryne beckettii* Trimen
25 *Anubias barteri* var. *nana* (Engler) Crusio
26 *Eichhornia azurea* (Sw.) Kunth

The "Leiden Plant" – *Saururus cernuus* (Lizard's Tail) – grown emersed at the Hortus Botanicus in Leiden.

Tiger Barbs in L.v.d. Heuvel's tank, swimming in front of a splendid *Echinodorus aschersonianus* Swordplant.

The Leiden School reached its high point with the introduction of the wooden root (bogwood) since the basic idea in fitting up an aquarium according to the Leiden School also involves the use of different plant species in small and/or large groups (whether in a rising or terraced fashion or not) highlighted with a beautiful piece of "wooden root" or lava stone, flagstone or Nordic schist.

The "Leiden Plant" as an element of the Leiden School

The planting up of an aquarium fitted up according to the Leiden School consists principally of a large number of *Cryptocoryne* species and the Leiden Plant *Saururus cernuus* is as famous as the Leiden School to which it is intimately connected.

In one of the photographs the "Leiden Plant" is shown in its emerse form as it is cultivated in the Victoria Amazonica Greenhouse in the Hortus Botanicus at Leiden. The same plant is to be seen as a submerse plant in the aquarium of Mr L. M van de Heuvel from Amsterdam. Thus, the "Leiden Plant" can be used in the aquarium in a series of terraced rows in such a way that the plants at the front are little and gradually increase in height as one goes towards the back of the aquarium. This manner of planting up is characteristic of the Leiden School.

Cross-sectional view of an old-style Leiden aquarium.

The question, of course, is how to get these plants growing so beautifully. This is how it's done: Rhizomes are first left floating in a small tank. The young plants which eventually develop from the rhizomes are then planted up in an aquarium with a low water level. When the young plants grow to a size of about 2 to 3cm (0.8-1.2in) they can then be planted up in the community tank. This process obviously takes a great deal of time, patience and expertise (Mühlberg (1981) substitutes *Saururus cernuus* L., probably with *Houttuynia cordata* Thunberg).

The many species of *Cryptocoryne* which are used in an aquarium, fitted up according to the principles of the Leiden School, are cultivated in the same way as the "Leiden Plant", *Saururus cernuus*, as described above.

Calming qualities of the "Leiden Plant"

The "Leiden Plant", *Saururus cernuus*, is not only a good and beautiful aquarium plant but it also has medical properties.

The new drug "manassantin A" (from Sanskrit: "peace of mind") is a constituent of *Saururus cernuus* (Lizard's Tail) and may have the potential for treatment of patients with schizophrenia and other severe organic or emotional disturbances (based on an article by Art Latham in The Center, the Newsletter of the UF Health Science Center, Winter, 1988).

An example of the Leiden School

Because of the labour-intensive manner of cultivating Cryptocorynes and the "Leiden Plant", hardly any community tanks are fitted up according to the Leiden School nowadays.

However, some time ago my friend Frans Nijhuis and I photographed the aquarium of Mr L M van de Heuvel from Amsterdam who had a Leiden-type aquarium.

Six species of Cryptocorynes and the "Leiden Plant" were cultivated in this aquarium. Mr van de Heuvel applied the following method to feed his Cryptocorynes: "Bullets", consisting of clay with a diameter of about 2cm (0.8in) were clothed with non-coloured toilet paper. These "clothed bullets" were then put between the roots of the Cryptocorynes in the sand. In addition, the plants were also fed by means of CO_2 (carbon dioxide).

The left wall of the aquarium was overgrown with Java Fern *Microsorum pteropus* (Bl.) Ching (almost always mis-spelled as *Microsorium*) and the other walls with the Java Moss *Vesicularia dubyana* (C. Muell.) Broth.

The bottom contained an undergravel filter, connected with a 500-litre Eheim filter with incorporated heater (Thermofilter) and filled up with wadding and little pieces of ceramic pipe.

The lighting for the aquarium consists of fluorescent lamps:

TYPE	SWITCHED ON	SWITCHED OFF
Philips 82	at 7.00 hrs	at 16.00 hrs
Osram 41	at 8.00 hrs	at 16.30 hrs
Osram 41	at 9.00 hrs	at 17.15 hrs
Philips 83	at 10.00 hrs	at 18.00 hrs

Looking at the fish population of Mr van de Heuvel's aquarium one came to the conclusion that this aquarium could be seen as a representative of the "late" Leiden School.

FISH SELECTION

Aplocheilus lineatus (Cuvier & Valenciennes, 1846)
Poecilia lanpenna (Lesueur, 1821)
Chilodus punctatus punctatus Müller & Troschel, 1845
Barbus semifasciolatus semifasciolatus (Bleeker, 1955)
Corydoras melanistius melanistius Regan, 1912

News from the societies

Hucknall & Bulwell Aquarist Society

The 1990 officers of the above society are as follows:
Chairman: Tom James
Secretary: Dilys Hinton
Treasurer: Arnie Daniels
Social Secretary: Clive Hinton
Show Secretary: Bill Pottinger
Committee Rep/Sales Officer: Geoff Genders

All correspondence and enquiries should be addressed to Dilys Hinton, Secretary H.B.A.S., 45 Wollaton Avenue, Gedling, Notts NG4 4HY. Tel 0602 876657.

Swindon Aquarist Society

The new chairman of the above society is K Curtis, 78 Downton Road, Penhill, Swindon, Wilts. The new vice-chairman is M J Stanley.

Corby & District Aquarist Society

The 1990 Secretary of the above society is: Mrs S D Ward, 32 Breedon Close, Danesholme, Corby, Northants NN18 9PF.

Mid-Sussex Aquarists Society

The committee of the Mid-Sussex A.S. would like to extend sincere thanks to:

1. Keith Quick of English Water Gardens for the use of part of the garden centre as a venue for the society's Open Show.
2. 'Aquarian' for sponsoring all the first prizes.
3. The judges for all their efforts.
4. The showing members of all the societies who took part in the show.
5. All the willing helpers who contributed towards making the show such a success.

Best in Show: C Osbourne.
Best Exhibit in Show: M Smith.

For further details, please contact Bill Slade, Secretary M.-S.A.S., 6 St Andrews Road, Burgess Hill, Sussex RH15 0PQ. Tel 0444 232 347, or John Smith on 0273 602407.

Coldwater jottings

Stephen J. Smith

HOSE THAT!

Despite the bleak winter weather, thoughts are beginning to turn to the forthcoming coldwater season, and preparations — if only on paper — are being made for that ornamental pond.

No garden is complete without some form of water feature, with or without flora or fauna, providing a focus of attention, as well as movement, light and life. (Despite the attraction, however, I have been planning my own ornamental pond for some years now: it always seems to be a case of "perhaps next year....")

Siting the pond is one of the most impoetant aspects of the planning stage, as is the size and shape of the pond itself. Whatever size you choose, it is inevitably going to be too small once completed, so it is wise to add a few feet to the dimensions — it could save a great deal of trouble later on.

One of the easiest and most popular methods of marking the shape of an informal pond is by using a hosepipe. Having laid the hose in position on the lawn, the overall size and shape can viewed from an upstairs window in the context of your overall garden design, and appropriate adjustments made. Inevitably, there will be many such "tweaks", and it pays to allow this process to take place over several days, or even weeks, before committing spade to turf.

Such a ground-breaking is obviously difficult to achieve with several metres of hose under your feet — but how do mark the position of the pond without the hose in position? Easy! Simply fill the hose with water, using connectors at either end fitted with a cut-off valve. The weight of the water in the hose will, in a short period of time, leave a mark on the lawn outlining your planned pond and you can commence the task of digging out without hindrance and without losing track of the required shape.

ATTRACTION IN NEW VARIETIES

Among the highlights of my trip last year to Singapore was the "discovery" of several varieties of Fancy Goldfish which are virtually unknown in the UK. Singapore is the capital of the fishkeeping world, where hundreds of species and varieties of aquarium fish are actually *imported* for growing on in one or other of the country's scores of fish farms, before export around the world.

It was a great thrill to be welcomed by some of the country's leading "aquaculturists". In particular, **Desmond Yeoh** of **Mainland Tropical Aquariums** and **Lim Kim Kiat** of **South Island Aquarium** were first-class hosts, providing me with full reign at their fish farms in Singapore and Malaysia respectively. For this humble enthusiast, each was a fishkeeper's paradise of, quite literally, acres of ponds teeming with fish.

Now, as a specialist, I am not greatly in favour of the increasingly popular commercial practice of introducing new lines of Fancy Goldfish incorporating different combinations of characteristics of well-defined popular varieties. (Such a practice not only leads to some hideous examples of so-called "ornamental" fish, but also undoes centuries of refinement by line-breeding).

However, I was struck by some fine examples of Fancy Goldfish which display the characteristics perhaps best described as a Chocolate Pom-Pon Globe-Eye (the Chinese description is perfect but, alas, loses a great deal in its translation!).

As can be seen from the photograph, this variety of Pom-Pon sports a dorsal fin — not acceptable by the purists but, in my opinion, a worthwhile characteristic in this variety — while a Fantail-type caudal fin is balanced by the globe-eyes of the Moor and the narial bouquet of the classic Pom-Pon.

I understand from **Graham Jones** at **Rayner's Tropicals** in Hornsey, north London, that such a variety has attracted a great deal of attention, including that of specialist Goldfish-breeding enthusiasts.

The challenge for the breeder is to produce as many perfect fish as possible and, with such a balance of characteristics, this attractive variety appears to be catching on.

Even for those who don't wish to get involved in the hobby to such a great extent, it is still a pretty and unusual Goldfish variety that is worthwhile in any aquarium or pond.

This example of an attractive Chocolate Globe-Eye Pom-Pon appears to be catching on in the UK, where it has proven popular both as a display fish and as a challenge for discerning breeders. It is one of the few pleasing examples of the 'mix-and-match' varieties of Fancy Goldfish which have entered the coldwater scene over recent years.