FISHKEEPERS' AND WATER GARDENERS'

BULLETIN

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PICTURE: *Scobiancistrus aureatus*

See article on page 30

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Fellow Fish keepers,

To all our readers, we wish you a Happy New Year.

It does not seem a year ago that I took on the job as Editor for twelve months to finish the term of the previous Editor.

It has been quite a challenge and I hope the content has been enjoyable.

My grateful thanks goes to the Trade who have supported the magazine both with their articles and advertorials.

I must give my grateful thanks to Les Pearce, for his production of the magazine.

Wishing you peace at Christmas.

Peter Furze
Editor.

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IT'S RAINING CATS AND FRY

by Bob Berdoulay

Reproduced from www.aquarticles.com

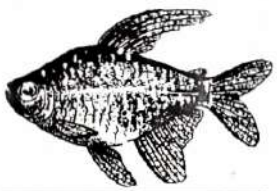
Originally published in *Gravel Gossip*, Diamond State Aquarium Society, Delaware City, USA

You know the old saying, "It never rains but it pours." Boy! Sometimes it really does. It's August 2003 and if you live in the Delaware Valley you know it has been raining forever (not really, but quite a bit). I have been phasing myself slowly out of the fish breeding part of the hobby, but do keep a few favourite Corydoras catfish to fool around with. At a couple of this Spring's DSAS fish auctions I could not resist buying two types of tetras, Diamonds and Flames. I placed them in my 55-gallon community tank that had some Corys and some Black tetras. I usually quarantine my new purchases but these came from Joe Kazmica who, I know, raises clean fish. I thought about separating out the species later to attempt breeding, but to tell the truth I didn't remember my own plans. I think forgetting is becoming a habit as I get older.

Three months later (August 2003) while feeding the fish I noticed that the Diamond tetras were spewing eggs all over the tank. The next day it was the Flame tetras' turn. I couldn't believe it, this tank was in no way near the conditions that the books say favour tetra spawning. I decided that if the fish were this eager I would give them a chance to breed in conditions where I might be able to raise the fry. I set up two 10-gallon tanks with water from the community tank and lots of Java moss in each. Each tank had a piece of plastic needlepoint mat fitted to the size of the tank and slightly raised off the bottom plus a well aged sponge filter.

I placed the plumpest females in the tanks first and fed them heavily with brine shrimp nauplii and flake food. A week later they looked gravid so I added the males. The next day the Diamonds displayed and showed some signs of a courtship routine and spawned two days later. The Flames didn't seem interested in each other and there was not any sign that they intended to spawn. But, lo and behold, the Black tetras in the community tank were spawning like crazy. Now I know this doesn't seem like a big deal, since Blacks are supposed to be one of the easiest tetras to spawn, but my Blacks were over four years old. I transferred a female and two males to a separate 10-gallon tank set up the same way as I had done for the other tetras. Within 15 minutes they were spawning in the Java moss. I really was interested to see if the spawn from these aged Blacks would be fertile. When the fish stopped spawning I removed the parents from the Diamond and Black tanks.

Within twenty-four hours both the Diamonds and the Blacks hatched out. The fry were very small and thin, they looked to be all eyes and yolk sacs. I wasn't worried about feeding since they had their yolk sacs and the Java moss and sponge filter were loaded with microorganisms. By day six most of the fry were free swimming and searching among the moss for food. I began feeding them Brine Shrimp Direct's "Golden Pearls" (size 20-80 microns) mixed first in some tank water. Two days later I started them on brine shrimp nauplii. Both types of tetra fry gobbled them like candy and you could see their bellies swell with the orange coloration of the nauplii.



Diamond Tetra
Moenkhausia pittieri

The day after I started the tetra fry on nauplii my long-finned zebra danios spawned, two female guppies I had put in one of my show tanks to break it in threw about 35 young, my Rams spawned, and both Panda and Bronze cats were depositing eggs all over their tanks. I don't know if this summer's weather is causing my fish to act like they're on an aphrodisiac, but I have never had so many spawns occur at the same time especially now since I'm trying to limit the number of tanks I have running. I am now growing out fry from Diamond tetras (*Moenkhausia pittieri*), Black tetras (*Gymnocorymbus ternetzi*), Zebra danios (*Brachydanio rerio*), Guppies (*Poecilia reticulata*), Panda cats (*Corydoras panda*), and Bronze cats (Corydoras aeneus). The Flame tetras (*Hyphessobrycon flammeus*) never did spawn again, at least at this writing, and the Rams (*Microgeophagus ramirezi*), I believe, ate their eggs. These I will keep trying to get to spawn and let you know if I am successful. I will also write a more detailed article on each of the fish that have spawned.

For those of you who might want to know the parameters of my tank water, except for the Rams' tank, all my tanks are kept at 76-78 °F, with a pH of 7.0, and have soft water; all are well planted and I use loads of Java moss in the spawning tanks.

PS - Since writing the original article I have had *Corydoras hatatus* spawn, and the Rams spawned again. To add to it my *Anubias barteri* plant flowered. And I thought May was the merry, merry month.

CHEMICAL FILTRATION IN SHOW TANKS

By Peter Burgess (Aquarian Advisory Service)
and John Egan (Port Talbot Aquarists' Society)

This two-part article describes a simple way to maintain healthy water conditions in show tanks and other short-term holding facilities. In Part One, Peter discusses water quality and filtration methods, including some basic information for the benefit of novice fish-keepers and exhibitors. Part Two is an account of John's experiences with chemical filtration in show tanks and holding tanks.

PART ONE:
FISH + WATER = CHEMICAL CHANGES

By Dr Peter Burgess

Let's consider the chemical changes that occur when a fish is placed in an unfiltered aquarium. Initially, the water conditions in the aquarium may be perfect, but within a short period of time the water chemistry will begin to alter as a result of the fish's metabolic activities, such as respiration and excretion (see diagram). //Peter: the fish diagram is at end of piece – PB// The overall effect is a deterioration in water quality which, if not addressed, will ultimately harm the fish. Even relatively small chemical changes can affect the fish's deportment and colour, and result in a show fish being down-pointed.

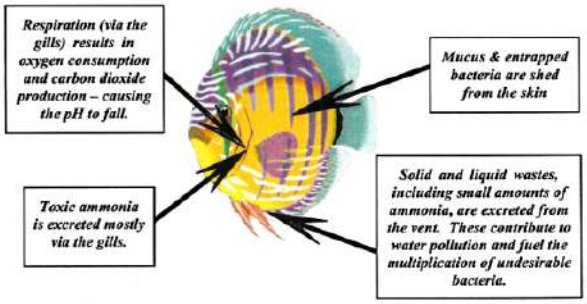
Ammonia
Ammonia is a waste product of protein digestion. About 70 per cent of the fish's ammonia wastes are excreted via the gills, the remainder being excreted via the kidneys along with the urine. Ammonia is invisible in water.

The build-up of ammonia wastes is a major concern when housing fish in unfiltered systems, especially small volume aquariums such as show tanks. As most fish-keepers will know, if ammonia levels are allowed to rise, this can have detrimental effects on the fish. Low levels of ammonia can irritate and damage the fins and gills whereas very high levels are life-threatening. The rate of ammonia build-up depends on many factors, notably the size of fish relative to the water volume. In small aquariums, where there is minimal dilution effect, ammonia can reach significant levels within a matter of hours.

Ammonia toxicity and pH
The toxicity of ammonia to fish increases with the pH and temperature of the water. Of these two influencing factors, pH has the greatest effect. For example, any ammonia present in a show tank containing slightly alkaline water (pH 7.5) will be roughly ten times more toxic than that present in a slightly acid (pH 6.5) tank. That's bad news if you exhibit species that require alkaline conditions!

Ammonia removal by biological filtration
In the home aquarium we generally install a biological filter to prevent the accumulation of toxic ammonia in the water. Biological filters (or bio-filters for short) function by sustaining vast colonies of bacteria within the filter medium. It is these friendly "nitrifying" bacteria that convert the fish's ammonia wastes into less toxic nitrite and then to relatively non-toxic nitrate. Of course, when you buy a bio-filter from the shop it won't come pre-seeded with these important bacteria. Instead, the filter has to be switched on in the aquarium and allowed to "mature". We can define filter maturation as the gradual process by which the filter becomes fully colonised with nitrifying bacteria. This process can take 2 weeks or more, being slower at lower water temperatures. A lengthy maturation period means that we cannot install a new bio-filter in a show tank and expect it to instantly cope with the fish's ammonia wastes. By the time the filter was anywhere near mature, the show would be long over! The new bio-filter might, however, function "mechanically" (by removing suspended particles from the water); the aquarium water may therefore appear healthy and crystal clear, even though it could be harbouring deadly levels of ammonia.

Filter bacteria need oxygen
One solution to the problem might be to borrow a mature bio-filter from an established aquarium and install this in the show tank. However this method presents logistic problems. A major problem lies with the filter bacteria's need for a constant flow of oxygenated water. Filter bacteria, like fish, require oxygen to survive. Once we switch off



a biological filter, the cessation of water flow through the filter chamber starves the bacteria of vital oxygen (and food). Within just a couple of hours the bacteria begin to die off. Hence, we cannot simply unplug a mature bio-filter, transport it long distances to a fish show and expect it to work with 100 per cent efficiency. Even if we transport the bio-filter in a bucket of aquarium water, many filter bacteria are likely to die as a result of inadequate water movement through the filter medium. Some fish-keepers overcome this by aerating the submersed bio-filter using a low voltage air-pump plugged into the cigarette-lighter socket of a car – but it's a bit of a palaver! Relying on bio-filtration at fish shows is therefore risky.

So what's the answer? Well, how about using chemical filtration in show tanks?

Chemical filtration
We have already mentioned two main types of filtration:

- Biological (involving nitrifying bacteria)
- Mechanical (physical removal of solid wastes and other particulate matter).

The third type is chemical filtration. As its name suggests, this relies on chemical agents that deal with one or more undesirable substances in the water, such as ammonia, nitrite, nitrate, phenols, and heavy metals. Some of these chemical filters work by removing undesirable substances from the water, whereas others form reactions that neutralise or "lock-up" the noxious substances, rendering them harmless to fish (that's how the product "Ammo-Lock" got its name). There are also "ion-exchange" (IEX) resins that basically swap noxious chemicals for harmless ones. Unlike bio-filters, these chemical filters work instantly.

Fish-keepers have been using chemical filtration media for decades, notably "activated carbon" that was routinely added to the once-popular air-driven box filters. Of course, we still use activated carbon today. In recent years, advances in aquarium technology have yielded new and highly efficient chemical filtration media that deal with a wide range of toxic substances and pollutants. Many chemical filters are commercially available as chemical-impregnated pads or pouches, so they can easily be inserted within the chamber of a conventional bio-filter. Nowadays, even small internal bio-filters (such as the Rena Filstar i1) come with an optional "extension canister" that houses a chemical filter cartridge. Chemical filtration media can also be placed in traditional air-driven box and corner filters. Chemical filtration is therefore perfectly suited for use in temporary housing systems, such as show tanks, hospital tanks and quarantine units.

In part two, top fish exhibitor John Egan evaluates two chemical media for use in his show tanks and temporary holding tanks.

PART 2: EVALUATING CHEMICAL FILTRATION MEDIA IN SHOW TANKS

By John Egan

Two chemical filtration products were evaluated during last year's Festival of Fishkeeping at Bracklesham Bay. These were Nitra-Zorb™ and Ammo-Chips®. The product information below is taken from the manufacturer's information leaflets:

- Nitra-Zorb™. This is composed of natural and synthetic ion-exchange resins, conveniently packaged in pouch form. Nitra-Zorb™ continually removes ammonia, nitrite and nitrate from the water. The product can be fully recharged about 4 to 8 times: immerse the pouch for 2 hours in a warm salt solution (see manufacturer's instructions for recharging details). For freshwater systems only.

- Ammo-Chips®. This product is composed of an ammonia-removing resin, formulated as large granules ("chips"). Ammo-Chips® can normally be recharged 4 to 8 times. For freshwater systems only.

The Bracklesham study

I "road-tested" chemical filtration media on three tanks at Bracklesham, one used for showing fish, the other two as holding tanks.

My three tank set-ups are described below:

1) Show tank (for 8 inch cichlid).
Dimensions: 18 x 15 x 12 inches.
Tank design: I used a show tank with a side-chamber, similar to that shown in the FBAS Judges and Standards News Sheet, number 1-04. //Peter: Hopefully Dick can supply the J&S diagram, as he did for the website pieces- PB//.

Filtration and heating: A standard air-driven corner filter was placed in the tank's side-chamber. The filter contained one pouch of Nitra-Zorb™ (3.7 oz/105g) plus four tablespoons of Ammo-Chips®. The side chamber also housed a small internal power filter and a 50 watt heater-stat. No water changes were made.

2) Two holding tanks (for my danios, rasboras and characins)
Dimensions: 24 x 12 x 12 (holding eight 2-3 inch fish) and 18 x 10 x 10 (holding six 2-3 inch fish). These tanks had drilled Perspex partitions.
Filtration and heating: I used a standard air-driven corner filter. This contained half the contents of a Nitra-Zorb™ pouch plus 4 tablespoons of Ammo-Chips®. Each tank also had a small internal power filter connected to a spray bar, plus a 50 watt heater-stat. No water changes were made.

Note: It is important that the Nitra-Zorb™ and Ammo-Chips® are rinsed thoroughly before use, otherwise the water will turn cloudy!

Results
I tested the nitrate, nitrite and ammonia levels in all three tanks. The water tests were made at 24 hours (to represent a 1 day show) and 48 hours (to represent a 2 day/weekend show). All 3 tanks gave the same readings, as follows:

Note: The results are given in milligrams per litre (mg/L) which is the same as "parts per million" (ppm).

WATER TEST	BEGINNING	AFTER 24 HRS.	AFTER 48 HRS.
NITRATE	Below 12.5*	Below 12.5	Below 12.5
NITRITE	Not Tested	Below 0.1	Below 0.1
AMMONIA	Not Tested	Zero	Zero

*Water tested for nitrate before filling the tank.

Comparing filtered versus unfiltered systems

Using identical tank systems, I compared the effects of: No filtration vs. Nitra-Zorb™ alone vs. Ammo-Chips® alone.

Results after 48 hours

WATER TEST	Unfiltered (No chemical media)	Nitra-Zorb™ only.	Ammo-Chips® only
NITRATE	Below 12.5*	Below 12.5	Below 12.5
NITRITE	Not Tested	Below 0.1	Below 0.1
AMMONIA	Not Tested	Zero	Zero

Conclusions
In my view, an advantage of using chemical filtration is that it can easily be installed in the show tanks, and also in temporary holding tanks at the accommodation (such as in my chalet at Bracklesham) – a definite advantage over biological filtration. The media are also rechargeable, which saves on cost. By using these chemical filtration media, it wasn't necessary to make water changes during the weekend show – this was a first in my experience!

In addition to Bracklesham, I have also used this method of filtration at two other weekend shows: the Isle of Wight Open Show and BAF (British Aquarist Festival, Manchester). Over these 2-day shows there was no deterioration or damage to the fish's fins. These filtration media had no effect on pH.

As shown in my comparative study, the best results are achieved when using a combination of Nitra-Zorb™ plus Ammo-Chips®.

Want to know more?
For more information about chemical filtration, you can write to Peter Burgess at the Aquarian Advisory Service, PO Box 5059, Melton Mowbray, Leicestershire LE14 4ZN. Or email your enquiry directly to Peter: AquaticsDoctor@aol.com

BROCHIS SPLENDENS

By Don Kinyon - Reproduced from *Aquarticles.com*

Brochis are catfish from South America closely related to the *Corydoras*. The *Brochis splendens* is one of the most commonly available of the species and was first described in 1855 by Castelnau. They come from the Amazon, Rio Ucayali, Rio Ambiyacu and tributaries. Most of their habitat consists of soft, acidic, slower-moving waters that contain a good amount of vegetation.

Brochis splendens, as all the *Brochis*, generally attain a larger size than their *Corydoras* cousins. This species can grow to 3 1/2". One of the other differences is that *Brochis* species have more rays in the dorsal fin than the *Corydoras*. The basic body shape is higher and more laterally compressed.

This particular species can be from an attractive emerald green to almost solid black, depending on its mood and surroundings. The snout is long, bringing to mind the long-nosed Corys, such as *barbatus* or *sensui*. The belly of the fish is white to pale orange and fins clear to mud-brown.

I rescued five of these fish from a not-to-be-named pet store because it didn't look like they would last more than a few days in the conditions they were being kept under. Within a few weeks, two of the fish had died anyway, but the others seemed to respond to clean water and a variety of foods, even though their barbels were eroded and their pectoral fins were a little shorter than they should have been.

The three that remained looked to be two males and a female, so I planned on setting them up for breeding at some time in the future. For the time being, they were housed in a 30-gallon community tank along with some *Corydoras* species, *Bunocephalus* catfish, some *Rasbora* species, and Endler's livebearers. Foods consisted of live, frozen and dry prepared, given twice a day. Water changes were once weekly, usually about 35 percent, with tap water: pH of 7.4 and a total hardness of 140 parts per million.

One evening while feeding the fish, I noticed some small eggs along the top third of the glass, most of which were near the surface of the water. After observing the tank for a while, it was clear that I had missed the spawning and the fish weren't going to let me in on whose eggs were on the glass. I scraped all the eggs that I could find from the tank with a razor blade and put them into a small plastic tub for hatching. About one inch of water, a little acriflavin, some Java moss and an air stone seem to work very well with *Corydoras*, and that's what I had assumed the eggs were from, so it's the set-up I used.

The eggs were tiny, at least as small as eggs of the diminutive *Corydoras pygmaeus*, and numbered about forty. I kept watch on them and removed any that went bad, and in four days they started to hatch. About thirty fry were present when all the eggs had hatched. The youngsters were about an eighth of an inch long, and looked pretty much like an egg with a tail. They didn't start to eat until they were three days hatched.

The young catfish stayed in the plastic tub until they were about three weeks old and about three eighths of an inch in length. They grew steadily on a diet mostly of micro worms, with an occasional feeding of baby brine shrimp.

Feedings were twice daily, as were ninety-percent water changes. I found it best to be careful not to change the water level, and therefore the pressure, too suddenly: it seems to have an ill effect on the baby cats, sending them into a shock-like state, and even killing some of the young.

By this time they had outgrown their container and needed a more permanent home. I had just moved some larger *Corydoras* fry from a 15-gallon tank, so it was available to be used. I emptied the tank and cleaned it, adding just enough new water to equal the one-inch level of the plastic tub. When the tub was dumped into the tank it raised the level a little, but not enough to hurt the fish. An air stone kept the water circulating and oxygenated. Instead of water changes, the fish got new water added once daily at about three quarters of a gallon each time until the level was sufficient to add a sponge filter to the set-up.

I had suspected that the eggs had been left there by some of the *Corydoras similis* in the tank that I had hoped would spawn, and by the time the fry were four weeks old I was sure that this was the case. They developed an oversized dorsal fin, which was a dark orange colour with white edging. The other fins and the eyes matched its colour. The body was silver with black markings, and the belly gold. Not exactly a perfect match for the adult *similis*, but so dissimilar to any other fish in the tank that it had to be related just by the process of elimination.

A week or two later, the juvenile fish were eating some of the same foods as adult catfish: live, frozen, and freeze-dried or flake, chopped into smaller pieces. The young fish were growing well now and looking more bizarre by the day. The oversized dorsal fin just continued to grow faster than the rest of the fish, and the colours were starting to change again. The dark orange in the fins got brighter, the upper body was mottled silver and black, and the lower

body iridescent green. At this point I had no idea what these fish were.

At ten weeks, the snouts of the fry started to develop a definite pointed shape and I started to suspect the fish were *Brochis*. Some of the odd coloration faded to a shiny green and

the growth of the fish started to catch up with that of the dorsal fin. The youngsters ate all the same foods as the adults by now and always seemed to be ravenous. They grew very quickly at this age and were over an inch long.

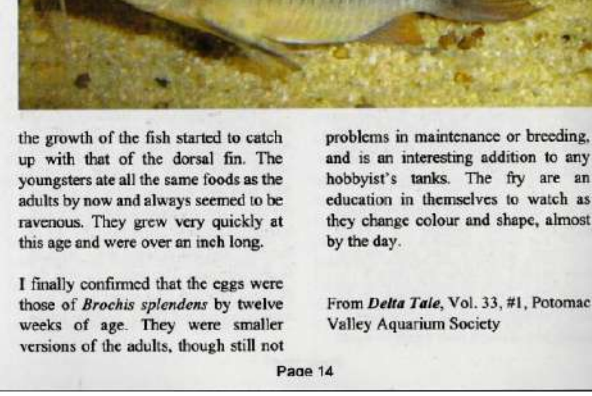
I finally confirmed that the eggs were those of *Brochis splendens* by twelve weeks of age. They were smaller versions of the adults, though still not quite the same coloration. A little of the speckling was still evident, and the dorsal, anal, and ventral fins were still orange-brown, but fading quickly.

I can recommend this fish to anyone for a community tank, species tank, or breeding scheme, as it offers no real problems in maintenance or breeding, and is an interesting addition to any hobbyist's tanks. The fry are an education in themselves to watch as they change colour and shape, almost by the day.

From *Delta Tale*, Vol. 33, #1, Potomac Valley Aquarium Society

KNOW YOUR FISH

Porthole Catfish - ***Dianema longibarbis***



Common Name:	Porthole Catfish
Scientific Name:	*Dianema longibarbis*
Where found:	Brazil and Peru
Characteristics:	Body and fins shaped as illustrated. The basic body colour is a greyish brown shading slightly darker towards the dorsal contour, lighter on the belly. Dark spots are present on the head and body - the smallest being on the head, the largest on the lateral line, giving this species its common name of 'Porthole Catfish'. All fins shaded pale tan.
Remarks:	*Dianema longibarbis* is slightly deeper in the body than its close relative *Dianema urostriata* and is easily distinguished by the absence of stripes on the caudal. The fish carries two pairs of barbels.
FBAS Show Class:	'G'

SETTING NEW STANDARDS IN FILTRATION

By Les Holliday, Hagen

One of the main essentials in any form of aquaria keeping is good control over the water quality, which depends to a high degree on the capability and efficiency of the filter. Ideally a good filter should be able to easily handle a number of tasks. These would include mechanical, biological and chemical filtration, a means of managing the water chemistry, a contribution towards oxygenating the water and help in creating water movement in the form of tank currents. Whilst this may seem to be a pretty tall order for some forms of filtration, currently the simplest way of ensuring these needs in one simple package is to invest in a high performance external canister filter.

External canister filters have come a long way since they were first introduced over 30 years ago and are still growing in popularity due to the innovative way that top manufacturers have continuously developed the market leading products using high standards of design, technology and manufacturing processes. The Hagen range of Fluval external filters were the first on the market back in 1975 when the company introduced a 3-stage canister filter which, due to continuous development, has endured over the years making it the UK's favourite filter up to the present day.

As an aquatic industry consultant, I get to have a cool time testing aquatic products from the big manufacturers, a process where I not only research and test the claims relating to their use, reliability and performance standards, but also handling-ability from the point of view of the average hobbyist user. Recently it was quite exciting therefore, to be given the opportunity to look over a whole new generation of Fluval external filters from Hagen as they launch their new-upgraded 05 range.

For aquaria from 100L to 400L/20gal to 80gal there was no better range of external filters than the former Fluval 04 range. These well-known and reliable filters bristled with features, including a high output motor, engineered for top performance and energy efficiency, multistage filtration ability and what's more, they were simple to operate and maintain. The new 05 range though, I was reliably informed by Hagen would leave me even more impressed, as it offers improvements in all areas. Take the range of sizes, which has now been extended with the Fluval FX5, a big powerful filter for tanks up to 1500L/330gal, incorporating features offered only by the best pressurised pond filters in the past. This large capacity multi stage external filter system boasts Smart Pump Technology controlled by a microchip which constantly monitors the pump to ensure powerful output and energy efficiency and also manages the FX5 self-starting feature allowing any build up of trapped air within the filtration system to be evacuated. On a 24 hour cycle the pump will pause and allow trapped air

to escape, ensuring ultimate filtration efficiency at all times. The remainder of the 05 range have the advantage of being upgrades on earlier models and further refinements include, improved rim connector design, easy to use pre-assembled main parts, an updated intake strainer and preloaded filter trays with media arranged in the right order.

Using my own criteria for deciding what makes a good filter I first looked at the ability of each of the filters in the 05 range to deliver the tasks I listed earlier. The first basic function, mechanical filtration, is handled on a similar basis in all models using large foam pre-filters to trap particular waste products as well as other suspended matter from the water and prevent clogging of biological and chemical filter media. The FX5 has each of the media baskets lined with a foam insert for effective mechanical pre-filtering and the rest of the filters in the range are supplied with two large, separately housed, foam inserts. Each of the designs, due to the large volume and expansive surface area of the mechanical filter material, promote good water flow efficiency and also offer the bonus of reduced frequency of maintenance.

The biological and chemical

stages in these filters are housed in independent modules and it is easy to make the choice as to how much space should be devoted to each type of media, allowing multiple options and really precise management of the filtration processes. The lift out stack of media baskets in the FX5 are roomy and easily accessible as are the pull out media modules in the other filters in the range. This offers an unparalleled level of flexibility allowing the combination of up to eight unique media custom configurations to suit the desired filtration objectives of any aquarium.

Hagen developed BioMax as their main form of biological media a number of years ago and it performs very well in canister filters. The complex pore system of the BioMax ceramic rings provide a massive area for beneficial bacterial to colonise and the tubular shape of the rings allow ideal water flow throughout the media permitting optimal contact time for efficient biological contact. There is also evidence that shows that in the finer recesses of this filter material anaerobic bacteria, which require low oxygen environments, are able to thrive so BioMax not only reduces ammonia and nitrite, but can also help in eliminating nitrates. To ensure maximum benefit from this media over a range of conditions, the 05 filter range offers further pre-filter material options in the form of Fluval Pre-Filter, chemically inert ceramic rings designed to capture larger solids and Fluval Polishing Pads, which are uniquely designed to fit Fluval canister filters. These come in two grades, an extra thick micro-fine polyester pad for capturing micro particles and a finer thinner pad for maintaining water clarity.

What is really evident though is that the true power of the Fluval canister filter system is the broad range of media available for use in the numerous media placement areas. Chemical filtrant absorbers based on activated carbon (Fluval Carbon and Zeo-Carb) are available, together with ion-exchanging media such as Fluval Ammonia Remover, as well as products like, Fluval Peat Granules that can be used to chemically modify water chemistry. Three brand new products recently introduced as the Fluval Lab Series range include, Fluval Opti-Carb, a high capacity media employing ion exchange elements and synthetic organic removal resins, plus research grade carbon to produce a powerful adsorbent water polishing media, Fluval Phosphate Remover which rapidly adsorbs large quantities of phosphate, silicate and dissolved organics and Fluval Nitrate Remover another high capacity ion exchanger which efficiently removes nitrate and eliminates toxic nitrite in a matter of hours. The Lab Series of premium grade medias open much wider prospects for the Fluval canister filter range as supplementary or stand alone filters for multiple applications in freshwater, marine, and reef aquariums.

An area often overlooked is the value of the various types of filter in terms of oxygenating the water by surface agitation and creating beneficial currents in the aquarium. Canister

filters usually employ quite powerful motors and produce a strong continuous flow of purified water. I found the Fluval 05 range particularly good at fulfilling these functions designed as they are with adjustable output nozzle flared to allow water to be dispersed in multiple directions, efficiently agitating the water and creating currents which help break down wastes and prevent them from settling.

The Fuval 05 range therefore, by my standards, performs very well in all of the tasks making up my criteria for a good filter. But how does it score in handle-ability? There is no doubt that 30 years of development has paid off in this area, as the whole range functions very well. The Fluval FX5 and all of the other canister filters in the range,

FLUVAL 305

are particularly robust and reinforced with glass fibre to provide quality and durability.

The lift lock clamps on the Fluval 05 range and chunky lid fasteners on the FX5 are strong and durable whilst easy to operate. Preparing any of these filters for use is simple due to pre-assembly of most of the parts and accessories. Well written user manuals supplemented by a DVD, provide clear assembly instructions and also explain the quick trouble-free maintenance features, plus how to get the best from these high performance canister filters. Features that impress me most about the filters in this range are the Instant Prime Function on each type of filter which avoids the hassle of manual siphoning and the Aqua Stop valves which create an air and water tight seal that permits hosing to be disconnected without breaking the vacuum, thus allowing the filter to be started up again after routine maintenance without the need for further priming. Perhaps the Smart Pump Technology incorporated only in the FX5 at present, is the most prominent new development in providing optimal filter performance. This self-priming device offers plug in and start convenience, employing an electronic chip to continuously monitor the pump. Impeller speed and force are constantly measured to ensure powerful output and energy efficiency and any build up of trapped air is automatically liberated. In all areas, it seems, Hagen are setting new standards in filtration with this new user friendly, technically advanced external canister filter range.

AQUARIUM PLANTS

By David Hulse of Tetra

One of the finest sights in fish keeping is a well planted tropical aquarium. Lush growth of many different species of plants dominates the aquascape and small colourful shoaling fish dart happily amongst the plant growth. Many fishkeepers aspire to keep this kind of aquarium, and simply add plants into their own tanks often with fairly disappointing results – some species grow but that lush carpet of vibrant colours and vigorous growth is seldom achieved.

The reason for this is that plants have completely different environmental requirements to fish. A successful fish keeper will have mastered the art of water quality maintenance, feeding the fish a complete and varied diet and may well have had several successful spawnings. However, to successfully keep plants, a whole new area of husbandry must be learnt, new demands understood and provided and new challenges met.

Although aquatic plants have been cultured in outdoor pools for hundreds of years, it is only in fairly recent times that tropical species have been cultivated in indoor aquaria. The upsurge in interest in tropical aquatic plants has been lead primarily by Dutch and German aquarists but with 'aquarium gardeners' from many other countries contributing valuable knowledge and experience. This, coupled with the recent trends towards 'biotope' aquaria, where a strict selection of plants and fish from a specific geographical location are aquascaped to mimic the exact microcosm, has made aquatic plants and their associated equipment, big business.

So what are the requirements of aquarium plants? First and foremost, you need a tank!

Aquarium requirements.

There is no specific ideal type of aquarium for plants, but when we take their environmental requirements into account, we can rule a few tank types out. A shallow tank will be better than a deep tank. Shallower water will allow better light penetration to the plant leaves maximising photosynthesis. However, the tank should not be so shallow that the plants vertical growth is stunted. An ideal tank depth would be around 18" for most plants, but taller plants may need a deeper tank to prevent poor development of growth.
The hood of the tank should also allow sufficient lighting to be fitted to power the photosynthesis of the plants. Otherwise the area above the tank should allow installation of modern pendant lighting.

So we have chosen a suitable tank, deep enough to allow the largest plants to grow to their natural size but not so

deep that light penetration is an issue. We now need to install a planting substrate, to anchor the roots of the plants and provide them with essential nutrients.

Substrate

One of the many common misconceptions about aquatic plants in aquaria is that the roots of the plant can be simply shoved into the gravel. There the plants will get their nutrients from the fish's faeces and the water itself. Unfortunately, this is simply not the case. A few hardy varieties may struggle through and barely survive in this situation but most plants will simply die without a proper nutrient rich substrate in which to anchor their roots.

Most plants obtain the bulk of their nutrients through the roots, so the composition of the planting substrate is absolutely vital and is one of the key factors in a successful planted aquarium.

There are many planting substrates available; most are designed to be sandwiched between a lower layer of silver sand and an upper layer of inert sand or fine gravel. The experts at Tetra's laboratories in Germany have developed **Tetra Plant Complete**

Substrate. This substrate is rich in humic substances and nutrients, especially iron. Humic substances encourage the development of beneficial micro-organisms that fix nutrients, making them more available to plants. In addition they complex nutrients in the water and substrate, making it easier for plants to absorb them. To install the substrate add a 2cm deep layer of CompleteSubstrate to the base of the aquarium, and then cover with 2-3cm of aquarium gravel, ideally a pea gravel of 1-3mm diameter.
To further improve the performance of a planting substrate, a cable heater should be installed under the substrate. This is a coil of low wattage cable heater, the energy from which creates minute convection currents in the substrate which help to distribute nutrients and oxygen. The slight warming of the roots also encourages plant growth. As these heaters are such low wattage, they have little impact on the overall tank temperature and can thus be left on permanently; however, they are an alternative to traditional aquarium heater-thermostats, where roughly 10 watts of power per gallon (4.54 L) is required to maintain a stable tank temperature.

So with the tank chosen and the planting substrate installed we now need to select a filter for the tank. Again common wisdom of filtration for fish dominated systems is of little relevance when considering a filter for a plant dominated tank.

Choosing a filter

A filtration system is the essential piece of equipment on a planted tank just like any other aquarium. Firstly do not use undergravel filtration, aquarium plants do not appreciate a fast flow of water over their roots, and the fine particles of a proper planting substrate do not lend themselves to UG filtration. An external canister filter such as a TetraTec EX is ideal; being sited outside the tank routine maintenance can be performed without disturbing the plant growth. The size of the filter should enable the tank volume to cycle once every hour (roughly double the time required for a fish dominated aquarium), this enables solid waste such as fish faeces and fragments of decaying plant to become trapped in the mechanical stage of the filter and fish-toxic ammonia is converted to nitrate in the biological stage.

The biological demands of a plant tank filter are not as crucial as in a fish dominated system. The plants use ammonia as a source of nitrogenous nutrient putting less load on the biofilter bacteria. Also the vigorous flow created by the outlet of the filter is not appreciated by the plants that prefer stiller water. Finally the vigorous aeration created by surface outlets of filters such as spray bars or venturis leads to the loss of dissolved carbon dioxide from the water – as we shall see below, plentiful carbon dioxide is another crucial requirement of aquarium plants.

Our planted aquarium is taking shape, we have installed the substrate and selected a suitable filter, we now need to consider lighting. Whereas the demands of the lighting in a fish based aquarium are to simply illuminate the fish, highlight colours and set a diurnal rhythm, the selection of the correct type of lighting is the most crucial factor in a planted tank. The light powers the photosynthetic process which drives the plant, installation of the wrong type of lighting will impede plant growth in a comparable way that offering the wrong diet will cause malnourishment of your fish.

Lighting

Plants are dependant on light to drive the photosynthesis of sugars in the cells of their green leaves and stems. In nature the source of this light is of course, the sun, in the aquarium, however we must provide the light. The type of illumination for the plants is utterly crucial, different bulbs will emit light of different wavelengths. Only short wavelength, high energy UV – blue light, can penetrate the water to deeper levels, whereas weak energy, long wavelength red light cannot penetrate far into the water. The consequence of this is that aquatic plants use primarily blue light and to maximise efficiency, red light to power their photosynthesis. Thus the light source above the tank must emit light with peaks in the blue and red areas of the spectrum. Fluorescent strip lights are the most common light sources for aquaria and planted tank varieties with the required spectral output are readily available. Deeper tanks or certain very bright light plants may need a more powerful light source such as metal halide or mercury vapour lamps.

An aquarium with a suitable planting substrate and plentiful lighting can still experience stunted plant growth if dissolved carbon dioxide (CO_2) is limited in the tank. This gas is released into the water as a by product of the respiration of the fish, plant and micro-organisms in the tank. During photosynthesis, CO_2 and water are converted to simple sugars and oxygen, if this essential gas is limited in the water, then the plants obtain their carbon from the dissolved bicarbonates (measured as KH), from the water. This can have potentially disastrous consequences as these alkaline bicarbonates are crucial in buffering the tank against dangerous pH changes.

To prevent this lowering of aquarium KH, we must supply the aquarium plants with sufficient CO_2. The TetraPlant CO_2 Optimat is a simple piece of apparatus for adding CO_2 gas in a pressurised can via a diffuser into the tank. A squirt of CO_2 into the diffuser will release the vital gas into the water for the plants as required all day. As the gas level in the diffuser empties (i.e. the water level rises), another squirt of CO_2 will refill it – simple! The gas only needs to be added to the water in the daytime as this is when the plants are photosynthesising. Aeration via airpumps or excessive surface movement by filter outlets should be avoided as explained above, because this will simply strip out the precious gas.

The aquarium gardener should be careful not to add to much CO_2 to the tank in the belief that it will further enhance photosynthesis. Excessive CO_2 will dissolve in the water as carbonic acid which will lower the pH of the tank water creating hazardous conditions for the fish and plants. The exact level to maintain in the tank depends on the pH and KH of the water. As a very rough estimation the optimum lies between 5 and 15 mg/l CO_2 and a maximum of 20 mg/l should not be exceeded.

In addition to CO_2 dosing the planted tank will benefit hugely from the addition of plant fertilisers. These can come in a liquid form (such as TetraPlant PlantaMin), which is dosed into the water or a solid pellet form which is applied directly to the area around plant roots (TetraPlant Crypto). These fertilisers replenish vital micronutrients which are lost in the water as the growing plants strip them out. No aquatic plant fertiliser should ever contain nitrates or phosphates, (as seen in terrestrial plant fertilisers). These nutrients are always present in any aquarium, and are often present to excess, where they encourage nuisance algae.

Thus we have had a basic introduction to the world of aquarium gardening. We have seen that many of the central principles of keeping fish healthy in aquaria are turned on their heads when we consider the demand of aquatic plants. To conclude this article however we should briefly discuss the best types of fish for a planted aquarium, as it is only when contrasted by the beauty of the fish that we can appreciate the true splendour of a well planted aquarium.

Obviously fish for the planted aquarium should not be herbivorous! However, certain algivorous species are useful 'housekeepers' in the planted tank. Siamese Flying Foxes (*Crossocheilus siamensis*), for example feed on the microalage that can carpet plant leaves thereby inhibiting photosynthesis. Their feeding technique of delicately picking the algae off does not cause any damage to the plant. Compare this to the rasping teeth ridden suckermouth of the *Plecostomus* catfish which can harm plants by rasping the waxy cuticle from the leaves – plecos are surprisingly undesirable occupants of the planted aquarium.

Other fish occupants of the planted tank should be small and non-substrate shifting. Most Tetra's make ideal planted tank occupants as do most livebearers. Small gouramies are ideal as their air-breathing labyrinth organs enable them to tolerate the lower oxygen conditions found in the planted tank. Finally delicate bottom feeders such as corydoras species are useful for cleaning remnants of organic debris from the substrate surface, as are Clown Loach (*Botia macracantha*), which offer the added bonus of eating troublesome snails.

HAYLING ISLAND

What They Said

Karen Youngs (Editor, Practical Fishkeeping Magazine):

I found this year's Festival of Fishkeeping and Water Gardening Weekend a really enjoyable event. It was well-organised and very busy with plenty to see and everyone we spoke to was very happy about the whole show. One visitor we met had travelled from Belfast for the event and thought the trip had been well worthwhile.

This year there was a fabulous new Discus show which offered visitors the chance to see some truly stunning Discus with many different strains on display.

There was a goldfish show with some lovely entries – and it gave visitors the opportunity to view some of the less commonly available varieties like Wakin, Jikin and Tosakin along with some stunning London and Bristol Shubunkins. It was also great to be reminded how magnificent a really good quality common goldfish can look.

Other fish being shown over the weekend included Koi, with some truly superb fish on view, catfish and entries for the 'Hagen Masters' Open Show, British Open, and FBAS 'Supreme Championship' Finals.

There were lots of other fish to see at the show, including some of the less commonly available species. The Anabantoid Association of Great Britain had some *Betta simplex, B. persephone, B. foersci,* wild type *B. splendens* and crowntail fighters, along with some *Macropodus erythropterus* on their stand, for example.

There were plenty of lectures to go to, including David Lim on Discus strain development, Heiko Bleher with one lecture on general fishkeeping and another on Discus and Jeffrey Tan on general fishkeeping. Dr David Ford and Rupert Bridges from Tetra also lectured.

There were quite a few trade stands plus some furnished aquariums and water gardening displays and a nice marine display tank on the Aqua Medic stand. It would be great to get a bit more on the marine side for next year's show. There was also a lovely display of reptiles and amphibians.

This show offered a great opportunity to talk fishkeeping with lots of like-minded people, see loads of fabulous fish, share information, get/give advice and even talk to the manufacturers who make some of the products we use every day. Definitely one for the diary next year!

practical fishkeeping MAGAZINE
www.practicalfishkeeping.co.uk

UK DISCUS CHAMPIONSHIPS 2005

By Dougall Stewart (President & Founder, UK Discus Association)

The 15th & 16th October saw the inauguration the UK Discus Association 'Open' and 'Supreme' Discus Championships. The Championships formed part of the highly successful FBAS Festival of Fishkeeping Weekend which was held on Haying Island, Havant, UK.

The show was well attended and included the international presence of: Jeffrey Tan, the President of the Discus Society of Malaysia and international show winner and judge; Tony Tan, International Exhibitor and show winner; Heiko Bleher; intrepid ichthyologist and David Lim of Fishio tribe and international judge & breeder extraordinaire.

In total there were 45 tanks of discus entered into the show. Tony Tan won a first, second and 3rd place in the 'Open' and went on win the prestigious 'Supreme Champion' trophy. John Dempsie of Leicester Discus won 3rd place in the open and went on to win 'Tropical World's Best UK Discus 2005 award' with a stunning scarlet spotted discus. Full details of classes and winners are included here.

Best Discus Fish in the UK	Class	Position
John Dempsie (Leicester Discus)	Spotted	1
Supreme Champions	**Class**	**Position**
Tony Tan (IP Discus)	Spotted	1
Tony Tan (IP Discus)	Spotted	2
John Dempsie (Leicester Discus)	Spotted	3
Open	**Class**	**Position**
Bob Grainger (WRG Discus)	Solid Blue	1
Chris Ingham (Plymouth Discus)	Solid Blue	2
Paul Lucas (Discus South)	Solid Blue	3
Paul Lucas (Discus South)	Solid Red	1
Tony Tan (IP Discus)	Spotted	1
Tony Tan (IP Discus)	Spotted	2
John Dempsie (Leicester Discus)	Spotted	3
Paul Lucas (Discus South)	Striped	1
S. Fellowfield (Private Entry)	Striped	2
Paul Lucas (Discus South)	Striped	3
Pete Daniels (Private Entry)	Wild	1
Pete Daniels (Private Entry)	Wild	2
Pete Daniels (Private Entry)	Wild	3
Tony Tan (IP Discus)	Open	1
Paul Lucas (Discus South)	Open	2
Chris Ingham (Plymouth Discus)	Open	3

Tony Tan

Winner of the Open Class.

Picture by Dougall Stewart

John Dempsie's Scarlet Spotted

4th place in the Spotted Class.

Picture by Dougall Stewart

The UKDA would like to thank all those that supported the competition and would like invite hobbyists, professionals, traders and international exhibitors to reserve their entries for the forthcoming 2006 championships.

SOUTHERN COUNTIES CATFISH RESCUE SOCIETY

OPEN SHOW REPORT - by Chris Ralph

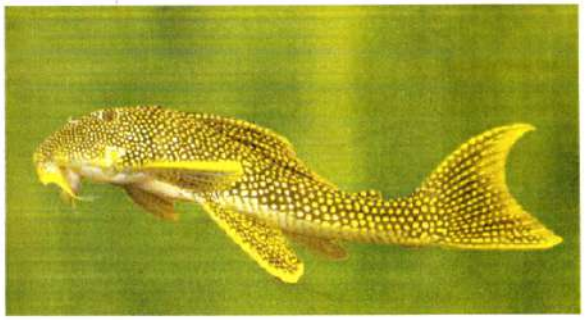
Festival of Fishkeeping, Hayling Island, 15 October 2005.

The Southern Counties Catfish Rescue Society held their annual catfish only show at the Festival of Fishkeeping. The show was very kindly sponsored by Aquarian and I would like to offer my thanks to Liz Clayton-Jones, Dr David Ford and Dr Peter Burgess for their continued support. I would also like to take this opportunity to congratulate Aquarian on their 30th anniversary. Once again I would like to extend my thanks to the FBAS for inviting us to the Festival of Fishkeeping. Personally I think that this event improves year on year, and I have to say that the Hayling Island venue is a good choice.

There were a total of 54 exhibits and a total of 20 exhibitors on the day. I would just like to add my thanks to the judges Brian Walsh and John Edwards. The results of the show are as follows:

The Best Fish in Show results:

Best Fish in Show - L14 *Scobiancistrus aureatus* owned by John Egan
Second Best Fish in Show – L128 *Ancistrinae spp* Blue Spot owned by John Egan
Third Best Fish in Show – *Pseudomystus stenomus* owned by Marilyn Egan



Picture - BEST IN SHOW - Scobiancistrus aureatus owned by John Egan

[illegible]	Winner	Exhibit	Pts.
1. *Aspidoras*	Clive Walker	*Aspidoras fuscoguttatus*	78
2. *Brochis*	Alan Best	*Brochis multiradiatus*	81
3. *Corydoras* up to 55mm	Roy Chapman	*Corydoras nanus*	78
4. *Corydoras* over 55mm	Alan Best	Corydoras seussi	84
6. AOV *Callichthyidae*	Arthur Marshall	*Dianema urostriata*	71
8. *Auchenipteridae*	Chris Ralph	*Tatia galaxies*	78
9. *Bagridae* etc.	Marylin Egan	*Pseudomystus stenomus*	83
10. *Doradidae*	Roy Chapman	*Agamyxis pectinifrons*	74
11. *Loricariidae* up to 130mm	Roy Chapman	*Parotocinclus maculicauda*	84
12. *Loricariidae* over 130mm	Chris Ralph	*Rineloricaria lefevrei*	67
13. L&LDA-Nos up to 130mm	John Egan	L128 *Ancistrinae spp* Blue Spot	84
14. L&LDA-Nos over 130mm	John Egan	*Scobiancistrus aureatus*	85
15. *Mochokidae* up to 130mm	Roy Davies	*Microsynodontis batesi*	76
16. *Mochokidae* over 130mm	Roy Davies	*Synodontis angelicus*	80
17. *Pimelodidae* up to 100mm	Roy Davies	*Microglanis iheringi*	85
18. *Pimelodidae* over 100mm	Roy Chapman	*Pimelodus pictus*	79
20. AOV Catfish	Chris Ralph	*Kryptopterus macrocephalus*	77
21. Unidentified	Chris Ralph	*Rineloricaria spp costroi*	69
22. Pairs *Corydoras*	Roy Chapman	Corydoras habrosus	77
23. Pairs AOV Catfish	Chris Ralph	*Megalechis personata*	73

Once again my thanks to everyone involved with the show. I look forward to seeing you all next year.

Yours in fishkeeping,
Chris Ralph

A GOLDFISH SOCIETY OF GREAT BRITAIN VIEW

By Michael Pepper, PRO Goldfish Soc. Of Great Britain

The provision of adequate space and access to a good quality water supply are pre requisites for any successful goldfish show – and we got this in 'buckets full' at Hayling Island. Whilst our 'pitch' at Bracklesham had improved over the years, our facilities at Hayling were a great improvement. Now we have adequate space for staging/benching/judging and viewing, and room for meeting with 'friends,' for what has become the biggest 'end of season' social gathering for goldfish enthusiasts in the UK.

As in previous years we also attracted new members at Hayling.

Exhibitors in the GSGB Open Show on Saturday represented all but one of the 'Nationwide' (the Goldfish Standards Body in the UK) Member Societies, namely, the GSGB, Bristol Aquarist Society, Northern Goldfish and Pondkeepers Society, Association of Midlands Goldfish Keepers, North East Goldfish Society and the South Park Aquatic Study Society.

In all 170 entries, making 'Hayling' probably the second largest goldfish show in the UK, and certainly the most convenient so far as access, and enabling both residents and day visitors to pop in and out over the two day duration.

With our enlarged space we were able to extend the number of exhibition fish – so that they could be 'viewed from the top' – which is how they are judged in their Countries of origin, namely China and Japan.

We are indebted not only to the hard work of the small army of volunteers who made the show happen, but also the continued support of both our colleagues from the Koi Society, for the provision of 'clean' water and to Aquarian for sponsoring the GSGB Show and providing excellent fish food prizes.

And the winners were:

ADULTS

Common Goldfish/Comet – 1. R Allum, 2, 3 and 4 – Ian Mildon
Bristol Shubunkin – 1, 2, 3 and 4 – Tony Roberts
London Shubunkin – 1 and 3 – Don Smith, 2 – Ian Mildon, 4 – Eric Franklin
Fantail – 1 – Eric Franklin, 2 – Ted Binstead, 3 and 4 – Marilyn Mildon
Oranda – 1 and 2 – John Parker, 3 – Dean Roberts, 4 – Arthur Marshall
Veiltail – 1 and 2 –Ron King, 3 – Derek Mills, 4 – Terry Boniface
Pearlscale/Globe-eye/Broadtail Moor – 1 Margaret King, 2 – Dean Roberts, 3 – Pat Davies, 4 – Arthur Marshall
Lionhead – 1 – Graham Edwards, 2 and 4 Derek Seymour, 3 – John Parker
Bubble-eye – 1, 2, 3 and 4 – Dudley Turner

Celestial/Pom Pon – 1 and 2 – Ian Mildon
Any Non-Nationwide Standard Variety – 1 – Don Smith, 2 and 4 – John Parker, 3 – Eric Hutchinson

SINGLE ENTRY BREEDERS'

Common Goldfish/Comet – 1, 2, 3 and 4 Eric Franklin
Bristol Shubunkin – 1, 2 and 3 – Tony Roberts, 4 – Pat Davies
London Shubunkin – 1, 2, 3 and 4 - Don Smith
Oranda – 1, 2, 3 and 4 – Tony Roberts
Veiltail – 1 and 3 Ron King, 2 and 4 – Tony Roberts
Pearlscale/Globe-eye/Broadtaill Moor – 1, 2, 3 and 4 – Margaret King
Lionhead – 1, 2 and 3 – Derek Seymour
Celestial/Pom Pon – 1 – Dudley Turner, 2 – Ian Mildon
Any Non-Nationwide Standard Variety – 1 and 2 – Don Smith, 3 and 4 – John Parker

We must congratulate Ray King for not just running the Adult and Breeders class for veiltails but for providing such spectacular specimens – the judges were unanimous in their decision and it was a joy to watch these fish over the weekend.

Membership enquiries are always welcomed – contact myself on 01903 815734 or email pepperaf@fishofflowers.freeserve.co.uk

BELOW ARE PRINTED THE ANSWERS TO THE AQUARIAN QUIZ WHICH WAS PRINTED IN THE LAST ISSUE

Answers to the AQUARIAN quiz:

1. Swordtail
2. India
3. David
4. Argulus
5. Hardness
6. Rasbora
7. Ammonia
8. Swimbladder
9. Pimafix
10. Ink
11. Fungus
12. Everglades

The first letter of each of the 12 answers:

SIDAHRASPIFE

The 12 letters are rearranged to spell:

PARADISE FISH

A LETTER RECEIVED FROM MR TONY ROBERTS OF THE GSGB

Queslett Road
Great Barr
Birmingham

Dear Slim Peter,

I would like to thank everyone of the Show Committee for a truly great show at this year's festival, also the army of helpers who worked throughout the festival in a quiet and efficient way.
This Festival took me back 35 years to the shows at Belleview and Bingley Hall Birmingham, where you had all aspects of the aquatic hobby working in union to attract the public.

Could this be the beginning for the hobby in general?
You have got the Show & the Place to attract the general public where a lot of future hobbyists will come from.

The only disappointment was the late opening of the Fish Show Section on Sunday, was not viewable until late in the afternoon, can we overcome this problem for future shows, Could the Public view the fish while the Judging is taking place. This has been the practice at Koi Shows for a number of years.

On behalf of friends and colleagues of the Goldfish Hobby I'd like to thank you once again.

Kind Regards

Tony Roberts