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WINTER 1999

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Dear Readers,

Another exciting year pending with many planned events and others that will unfold later.

EDITORIAL

I am pleased to be able to announce the return of Dr. Peter Burgess as a writer of articles for us. I am sure that we can all expect some thought-provoking and 'from the heart' treatise in the coming year. Peter is also expecting his new book to be published next year, so there will be a book review to follow, I suspect.

May I express the good wishes of all fishkeepers for a speedy return to good health of two much respected and loved Federation members, Bill Rundle and Colin Pannell, who have both suffered heart problems during the last month. Good wishes are also extended to their wives and families during this time and a wish that they have their husbands home and in good health without further ado! A truly happy Christmas and New Year to all of you.

I look forward to seeing you all in the New Year and repeat my never-ending wish of "Keep the articles coming." Add this to your list of New Year Resolutions.

Sue Crew,
Editor

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25th January, 2000
at the address in the FBAS Year Book (1999) or:
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COVER PHOTO

'Mirror' Scaled
Singapore Koi

Courtesy
Roger Crew

TYNE TEES AREA ASSOCIATION OF THE FBAS 1999 SHOW

by Jane Bell

After the demise of the Tyne Tees Aquatic Festival, which was largely due to lack of trade support, it was decided by the TTAA Committee to go for the 'easier' option and hold an Open Show on the same date, 29th August, 1999 - in Darlington instead of Tynemouth.

Instead of the usual auction, it was decided to invite two speakers and to arrange a buffet lunch. The Speakers were Derek Lambert who spoke on livebearers and Graham Ash who spoke on Central and South American cichlids.

We were delighted to sell 68 tickets for the talks and buffet which was provided by a local caterer.

Luckily it was a beautiful day on Show Day (especially as the heating was not working in the venue we had chosen as it was a school and had been shut off for the holidays!). We had borrowed two gas heaters which we ran all day, but were hardly necessary.

Exhibitors came from as far and wide as Dumfries and Cheshire, Norwich and Doncaster, which resulted in 250 entries over the 37 classes.

The Championship Class was 'O', which attracted 19 entries. This was won by a local exhibitor - B. Kerrington from Caer Urfa.

The Best in Show award went to a beautiful Channa stewartii owned by Mr. and Mrs. Mogford of Castleford AS. As well as various trophies, they also received an external filter donated by BAS from whom we purchased the other prizes (pumps for first and food for second and third place winners). The Three Rivers Championship Class was won by Rob and Karen of Rainbow.

The lectures and the buffet were enjoyed by everyone who attended and in between times there were table sales from 'amateur' breeders selling their offspring, which proved a popular alternative to the usual auction.

Geoff and I had an exhausting day as usual. If I may ever offer a tip for other Societies about to hold a Show it would be not to ever let over half the Show Committee also act as Judges on the day. It makes life impossible for those who remain - a classic case of "...too many chiefs and not enough Indians".

Thanks to everyone who helped out on the day of the Show and also to those of you who travelled the many miles to be with us as exhibitors. Very best wishes to you all and we hope to see you all (and more) next year.

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MORE FAMOUS THAN...

By Tarquin Kisser

How about this then...? Something that has sent this household into turmoil just recently is a number of telephone calls; not for me, you understand. Just imagine what *would* happen if someone rang and wanted to speak to me. She'd probably say I was out! You see, She wants to be rich and famous; mind you, if She was, She might give me a big tank all to myself. That would be lovely... nothing but peace and quiet without all those other silly fish making a nuisance of themselves all the time.

Because I'm getting old I like to have a little sleep in the afternoon, but they put all the little baby fish into my tank and kids being kids they like to charge around making lots of noise and causing lots of turbulence in my tank. I wait until I think they may be having their afternoon rest, but the minute I start to doze, one of those stupid little fish decides to play. Consequently we end up with all the little ones charging around, banging into me and making lots of noise.

Taking that into consideration, I really would like Her to be rich and famous, but She never will. She will always take second place to me because no-one can ever remember Her name! I'll let you into a secret... She had a nick-name years ago that She keeps quiet about. Shall I tell you what it is... Nutty Nora... but don't forget, you didn't get that from me.

Anyway, the other day someone telephoned wanting some information on one of the FNAS events. She answered the telephone and whoever it

was on the other end obviously couldn't remember her name - and you know what they said? "Is that Tarquin's Mum?"

Ooh She was mad! She walked round for ages She did saying to Dad "I bet they couldn't remember my name, but they remembered His". Dad couldn't stop laughing. He thought it was really funny. He never answers the telephone because He says no-one ever rings him up. (That's because he hasn't got no friends.) But that's His fault; Mum keeps saying He shouldn't be so miserable. He should go out more instead of just sitting in the chair every night; but He said when He works seven days a week so She can stay at home and ruin things. He don't have no energy to go out.

He was a bit annoyed 'cos they're going on holiday soon and She's broken the camcorder. Don't know what She was doing messing with it in the bedroom (now I ask you, who would have a camcorder in the bedroom??). However, what really annoyed Him was finding the screwdriver on Her dressing table. She said She hadn't unscrewed anything, but couldn't explain why it was there.

Anyway, to get back to what I was saying... a few days after Mum got the telephone call someone else rang while Mum was in the bath so Dad had to answer it and guess what they said... "Is that Tarquin's Dad? Could I speak to his Mum, please?" Ooh, He was even more madder than She was. Kept saying "Don't people realise it's just a b**** fish?" Now I can tell that He really annoyed me because I'm not "... just a b**** fish" and if I was whose fault would it be? Not mine. How can anyone expect me to be sensible and educated

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when I live with two plebeians. (Don't know what that word means, but it looks good.)

The point I'm trying to make is this... if young fish aren't given the correct education from an early age they will grow into stupid adults. Fortunately I spent some considerable time in my more formative years living elsewhere and therefore they haven't managed to make me into a complete moron like themselves. I, in turn, am doing my best to pass on the finer points in life to the youngsters in my tank.

However, notoriety does have its drawbacks. Mum was at a Fish Show the other day and was set upon by one of those 'Judge' species. To be precise it was the Brian Species, not the little fat one, but the tall skinny one. One, I might add, featured some time back after my holiday at Mr. Chads. It appeared he was somewhat annoyed at my criticism of Judges and sent her home with a message for me, quote: "...Tell that Tarquin if he doesn't leave us Judges alone, I'll come round and hang him up by his proverbials" unquote.

For your information, Mr. Brian Judge - and any other Judges who are under the misconception that we have something called a 'proverbial' - that is something you will find extremely difficult as we don't have one! Attached to my body are fins, a head and a tail - which you Judges don't recognise. All of which reiterates my opinion of this species called 'Judge'. Not only do you require a white stick to become one; apparently you don't have to know anything at all about fish. Even Mum knew I didn't have a 'proverbial' (mind you, She had to ask!) and believe me, you can't get much thicker than her. (We have a new word in our house, you know. Mum and Dad went for a walk and saw lots of Frogs spawn in this pond. Mum never knows

what the word is She wants to use, so informed Dad that Springtime was 'Froggingtime'!) But I again digress... the Judges appear to believe that I am constantly criticising them; this isn't intentional. I admit my heart goes out to their mums and dads having to live with the thought of having bred and raised such ingoramussees. I must point out to those of you who show fish - your fish are being judged by a species who have for years been knocking off points because they can't find your fish's 'proverbial', not to mention that when they measure our bodies they completely miss our tails! Their attitude is "...forget it, it doesn't exist..." when they measure you. However, if this tail that doesn't exist is a bit tatty, you lose points?? Perhaps this is a good time to say "I rest my case, my Lord".

May I wish you all the very best for Christmas and hope that you spend all your Christmas money on your fish tanks and loads of goodies for your fish.

Just a quick joke you can tell at millennium parties.

Question: What do you call a fish with no li's?
Answer: FSSSH

Brill. ey, that'll be a real party stopper!!

By the way... when you have all these parties over the Christmas and New Year make sure you don't make too much noise around us fish and our fish tanks. Remember that we feel sound through our lateral lines and you could kill us by playing music really loud.

See you all soon
Lots of love, Tarquin Kisser XXX

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BIG DIFFERENCES by Roger Foggit

The phone rings.

"Hello!"

"Yes, hello, er, I'd like to build a pond, but I don't really know where to start can you help?"

"Certainly no problem, what sort of pond?"

"Er, I don't really know, one with water in and I want lots of fish - big fish, VERY big fish!"

"So you'll be looking at a koi pond then?"

"Koi - are they like goldfish then?"

"Well not really, let me explain..."

This type of call is similar to many which we receive at the Tetra Fishkeeping Information Centre and really summarises one of the main points to consider when planning a new pond. Just like setting up a tropical aquarium ensuring that conditions are correct for the different species of fish you want to keep, the same is true, but in a broader sense, to the pond.

This is particularly the case when planning a pond for koi.

To explain why, we really need to look at the fish themselves and compare a species which can be considered as a general garden fish, and one which requires more care and attention to its needs i.e. the koi.

The goldfish (not the credit card version) although it is quite closely related, is very different to the koi in many ways.

Firstly the maximum size of the goldfish will not generally exceed 1lb in weight and 6-8 inches in length. However the koi can quite easily exceed 7-8lbs in weight and 20 inches in length.

This makes a lot of difference when considering the ultimate size of the pond. Obviously a large fish will require much more swimming room and the pond will

be correspondingly larger. As fish do not just move in one plane so the vertical depth of the pond will also need to be greater in the koi pond than in the traditional garden pond. Generally then the koi pond starts at a minimum of eight to ten feet in length and six feet wide with a minimum depth of three feet. (Minimum of 1000 gallons in capacity). These sizes are obviously guidelines and the larger the volume the better, particularly if large numbers of fish are going to be held.

The larger volume of water also serves another function. Firstly any fluctuations in water quality are distributed evenly throughout the water, effectively "diluting" down any changes which would be greater in a smaller pond. This is particularly important in the koi pond containing large numbers of fish as the koi is a notoriously messy feeder excreting a substantial amount of waste for its body size. The effective concentration of waste products in the water at any one time is lowered the greater the volume so stabilising water conditions.

Larger volumes of water are also more stable in terms of temperature as the high specific heat capacity of water means that a large amount of energy must be supplied (increase in temperature) or released (decrease in temperature) to alter conditions.

The subject of water then brings us on nicely to another consideration and that relates to filtration of the koi-only pond.

Koi, unlike goldfish are not as hardy as you may first think and are much more sensitive to water pollution so a koi pond must have a filtration system that ensures that water quality is kept at an absolute premium at all times.

Whilst in an article of this size I could not possibly cover all the filter technology available today, in basic terms a filter performs two main functions in

any aquatic system be it pond or aquarium.

The first is to remove any suspended debris from the water which would otherwise make it cloudy and potentially break down to form ammonia and also deplete oxygen levels in the water. This is normally carried out in the small pond filter by some kind of mechanical filtration media such as small brushes or more usually expanded foam sheeting or blocks.

In the koi pond, however, due to the large volumes of water passing through the filter, other methods are now more usually used in conjunction with larger versions of the brushes and foam sheeting methods mentioned already. These normally take the form of large "vortex" units which basically act as settlement chambers. The waste collected in these chambers is then easily run to waste by opening a series of drain valves at the base of the unit.

The second function of any filtration unit is to remove harmful toxic compounds excreted into the water by the fish themselves and is carried out by bacteria which naturally occur in the aquatic environment (biological filtration). These bacteria form slime coatings on any surface in the pond and consequently the greater the surface area available to the bacteria the greater the filtration capacity. Obviously the koi keeper, because the koi pond is already quite large, does not want an enormous filtration system as well so biological filtration "media" have been developed which give a large surface area to volume ratio meaning that a huge amount of surface area for the "purifying" bacteria to colonise can be supplied in a limited space.

The whole process of filtration can be

considered as being the sewage treatment works of the pond and is essential in the koi pond which is generally highly stocked.

In the established garden pond which has a balance in terms of the numbers and biomass of fish and plants, the need for such a complex filter system is reduced as the balanced numbers of organisms in the pond allow the cycling of these harmful nutrients to take place with no build-up of products within the cycle (The nitrogen cycle). The filter in such a pond is basically there to aid the natural processes occurring in such a system and is often only used when waste production is at a maximum, i.e. during the spring summer and autumn.

However a koi pond is just that, a pond for koi and in the majority of cases the koi pond is devoid of any plants, not least because a large koi is a destructive beast and will damage and dig up most popular pond plants given half the chance. This means that one essential product of the nitrogen cycle is not removed from the water - one which is an effective plant fertiliser and in the balanced natural or garden pond is rapidly absorbed by plants causing no problems. This product is known as nitrate and as many koi keepers know is one of the favourite nutrients of one of THE major headaches of most pond owners - algae.

Nitrate on its own, although it is utilised by algae, is not the only nutrient which stimulates algal growth. Phosphate is another nutrient generated in any pond system and when both nitrate and phosphate are available as free nutrients algae have a party.

It is for this reason that another important piece of equipment is found



- the Ultra Violet Clarifier. This effectively kills the single celled algae which "bloom" in large numbers to form "green water". These dead cells are then removed by the mechanical filters mentioned earlier and the water is left crystal or "gin" clear.

Due to the build-up of nutrients which, in the fish only pond, lead to algal growth another piece of equipment that is becoming extremely popular in the koi pond system is the "vegetable filter". This is simply a channel through which water is circulated from the main pond and in it are kept fast growing plants such as water cress. As they grow these then remove some of the nitrate and phosphate from the water reducing algal growth considerably.

It is not surprising that due to the size of not only the pond but also the associated filtration system and equipment that the construction of the koi pond is not a small undertaking. In many cases the koi pond is constructed on a thick base of reinforced concrete to support the weight of the water (The water alone, in a thousand gallon pond weighs in excess of four and a half tonnes) with the sides being built of reinforced concrete blocks, covered with a concrete screed and then coated with fibreglass or lined with a flexible liner to waterproof and give the pond its good looks. During construction all the associated pipework such as bottom drains and surface feeds are all built into the overall construction so planning of where these go before you start can remove much heartache at later stages of construction.

All in all this leads to the undertaking of a koi pond being much more expensive and time consuming process than digging a hole and lining it with butyl or a preformed pond. However ask any koi keeper what he felt like

when his pond was finally finished and the fish were in place and the phrases "very satisfying" and "it's all been worth it" are commonplace.

This is just the start of the story though. With many pond filtration systems being up to half of the volume of the actual pond itself the whole project can be enormous.

And the price - well you know what they say - if you have to ask, you can't afford it!

The basic price for the average garden pond with all associated equipment, fish and plants is probably around the £400 mark for a medium sized pond. For the medium sized koi pond you can probably add another nought and you may be at just about the right figure.

However - do not despair. The koi ponds of which I talk are the Rolls Royce's of the pond world and to keep koi you do not necessarily have to go to the trouble and expense described above. Koi can be kept in a flexible lined pond and even a pre-formed pond as long as you follow the rules about giving them enough depth and space in which to swim, and ensure that the filtration system is good enough to keep water quality at a premium.

Maintenance of the koi-only pond also differs quite dramatically to that of the usual garden pond.

This is really due to the fact that in the garden pond we are really allowing nature to take its course and as long as things like silt build up do not get excessive then there is little to do apart from feeding the fish and keeping an eye on their health, trimming back plants if they require it, regular water changes and testing and the usual seasonal jobs like cleaning, keeping an area clear of ice in the cold weather and so on.

In terms of maintenance the koi pond really requires much more attention. This is because, like any "artificial" holding system things are on much more of a knife edge balance, the balance coming from careful attention to feeding, filtration, aeration and other important chores.

Daily maintenance normally includes the flushing of mechanical filters such as vortex chambers and sand filters to remove any accumulated debris before it breaks down, potentially polluting the water. This is also tied in with flushing "bottom drains" to remove accumulated silt and debris from the bottom of the pond. Feeding can also take some time in the koi pond as there are generally more hungry mouths to feed and because it is the best time of day for the koi keeper to get close to his prized specimens. Ensuring that all the associated bits of equipment are running correctly, also falls into the "daily" check routine.

Then there are the weekly chores such as water testing. Let's face it, we can't actually see what is happening in our filter so the only way of monitoring what is happening is to regularly test the water to check everything is working correctly. Health checks are also important and many an hour can be spent simply checking that each fish is at peak fitness.

Water changes also play a major part but in the koi pond these are made almost continuously as water lost through cleaning, flushing filters, etc., is regularly being added, in many cases automatically.

Although the maintenance of the koi pond may sound a little harrowing, it really only takes a few minutes each day

to carry out, giving you plenty of time to enjoy the fruits of your labour.

DON'T PANIC

by Roger Foggitt, Head of the Tetra Fishkeeping Information Centre

We fishkeepers have been afflicted with a terrible disease. Surprisingly, the symptoms of this disease often appear whenever our fish show signs of their own distress or ailment. And the name of this terrible affliction? - Blind panic!!

Although we may take all possible precautions to avoid fish health problems, ensuring that our water quality is near perfect and that we are giving the fish the best possible diet, disease, just like in any animal population, can occur. The only problem is that when it does, many of us do not think logically and simply reach for the nearest bottle of treatment without actually diagnosing the problem first. Simply adding a treatment at this stage without getting to the cause of the problem can actually do more harm than good.

Diagnosis is easy - or is it?

Many diseases which occur in our fish are actually quite easy to diagnose because they have easily identifiable symptoms. A good example of this is finrot which, although we cannot see the micro-organism (in this case a bacteria) which causes the problem, it produces characteristic symptoms of blood streaked and/or tattered 'eaten away' fins. Another classic easily identifiable problem is whitespot and

like finrot, although we cannot see the organism which causes the problem without the aid of a microscope, we can see the white cysts it produces under the skin of the fish. Larger parasites such as fish-lice and anchor worm are also easy to identify and therefore treat.

The problem with fish disease is that there is, in many cases, an underlying CAUSE to the problem and although identifying the disease is an important stage of the diagnosis procedure, this is often only half the job done. An example of this is the fishkeepers' oldest enemy, finrot.

Generally a fish has a very effective immune-defence system and whilst there are always disease organisms present in the aquarium, these are kept in check by the immune-defence system itself.

However, when a fish becomes stressed, either by poor environmental conditions or other factors such as rough handling or fighting, then the effect of the stress on the fish is that the immune system becomes compromised and the fishes defence systems against parasites are lowered. I suppose that you could liken this to the defensive 'shields' on the USS Enterprise being damaged to the extent which allows invaders full access to Captain Piquard and his crew!

Once the immune system of the fish has been compromised, then parasites can take full opportunity of this and multiply, causing disease outbreaks.

So, in the case of finrot, the problem more-often-than-not comes about because of a water quality problem.

Indeed, many fishkeepers would say that finrot is a classic indicator of water quality problems.

To summarise then, the symptoms of finrot are down to a bacterial infection causing damage to the fins; however, the underlying CAUSE is often poor water quality stressing the fish and allowing the parasite to take full advantage of the fishes resultant weakness.

This is the case with many disease problems in the aquarium. Often they are as a direct result of a stressor weakening the fish which then leads on to disease outbreak.

In fact, of all the questions on disease which we receive at the Tetra Fishkeeping Information Centre, somewhere in the region of 80-90% are as a result of an environmental (water quality) stress. This does not just necessarily mean through build-ups of pollutants such as ammonia and nitrite, but also other factors such as incorrect pH and water hardness.

Behavioural Problems

Although some diseases and parasites are easy to identify such as those already covered, the most common disease problems which are likely to lead to a Blind Panic outbreak are those which show themselves, not in an easily identifiable way, but in a behavioural change in the fish such as gasping or rubbing.

Because of the way these problems manifest themselves and because many of us have no access to a microscope or the experience to carry out skin and gill scrapes, particularly on small fish so that

we can identify the causative organism, the treatment of such problems has to take place in a step-by-step, logical way. An example of what I am talking about is the problem of fish gasping. If we are to diagnose the problem correctly then we should ask ourselves the following question: "Why is the fish gasping?" If you answered "Because of low oxygen levels" then you may be partly right, but the absolutely correct answer is: "Low levels of oxygen in the fishes blood". The low blood-oxygen level is what is causing the fish to gasp as its body is telling it that it does not have enough oxygen so head for the surface where oxygen is more plentiful!

Now ask yourself "What could cause low BLOOD OXYGEN levels?" Well again, if you answered low oxygen levels in the water then you could well be correct, but there are other causes. These include factors like high ammonia and nitrite levels causing damage to the gills resulting in a reduced ability in the fish to absorb oxygen from the water. It may also be due to gill or skin parasites which also affect the gills in a very similar manner, or indeed it may even be due to the presence of blood parasites affecting overall blood oxygen levels.

So, how do we know which one of these is the cause? Well, this is where a methodical approach has to be used to eliminate all possibilities.

Water quality would be the first check to carry out and if this is the cause, the problem corrected. If water quality is found not to be the problem then we have to assume some kind of gill or skin

parasite problem and a treatment is then carried out to eradicate them. If the problem still persists and assuming that the gills are not damaged beyond repair (which may be the case if the disease is not picked up early) then a blood parasite treatment would be the next stage of the procedure.

Follow the Pattern of the Outbreak

So, as you can see, we have to take care whenever diagnosing many disease problems. It is NOT just a matter of simply Disease, Dose, Done!

In many cases where disease outbreaks occur there is often a 'pattern' as to how they start in the aquarium and this can also help us to make a better diagnosis of the whole problem. Those disease problems which affect all of the fish in the aquarium, or all of one species suddenly and without any indication of a problem are more than likely due to an environmental stress, often water quality.

Those diseases which pass from one fish to the next indicate that the problem is infectious such as a whitespot outbreak. Those problems which just appear on one fish are likely to be non-infectious such as a growth abnormality like a bent spine.

So, diagnosing a disease problem is a careful process of elimination based on how the disease manifests itself in the aquarium and how it progresses throughout the fish population.

In ALL cases, diagnosis should follow these steps:

1. Diagnose the disease if it is easily apparent.
2. Check water quality for ammonia, nitrite, pH and water hardness.
3. Correct water quality if problems are indicated.
4. If water quality problems indicate that this is not likely to be the cause then check for other stressors such as fighting, rough handling, too rapid acclimatisation, etc.
5. Treat as necessary.
6. Take steps to PREVENT the problem re-occurring.

Diagnosing disease problems in the aquarium does not necessarily start with a disease showing itself immediately. There are much more subtle indicators of a problem before a disease breaks out. These include such things as:

1. A change in colouration in the fish which indicates stress.
2. A clamping of the fins to the body, another response to an environmental stress.
3. Lethargy.

By knowing the 'normal' behaviour of our fish, such things can be picked up early and whilst they may not always be due to the presence of a parasite or poor environmental conditions, by checking things out at this stage, you may just prevent something worse happening further down the line.

Treating - Correctly!

So, what about treatment?

Most aquarium diseases are by their very nature fairly easy to identify and therefore treat with a proprietary off-the-shelf treatment and every disease could not possibly be covered in an article of this length.

However, as long as the manufacturer's recommended dose rates are followed then most problems should react fairly quickly and the fish will recover after a short period of time.

This brings me onto my final point regarding treatment...

Every aquarium treatment is designed to be used at a concentration where it will be effective against the disease organism in question, but will not affect the fish themselves. As with any treatment, be it mammalian or aquatic, if it is given at too high a concentration it is likely to kill the host, in other words (in our case) the fish!

So, if ever you are tempted to 'add that little bit extra for good measure' then be aware that you are pushing up the concentration of the treatment where it may just begin to be an added stressor to the already stressed animal you are trying to treat! Conversely, if you are of the 'just add a little to the tank to keep things at bay' school, then you are adding the treatment at a concentration where it will have absolutely no effect on the parasite itself, other than to help build up its resistance to the treatment being used.

So, ALWAYS use a treatment at the recommended dosage, and as long as you have diagnosed things correctly and have covered all the possible options as to why your fish is ill, then disease treatment should go smoothly and your fish will recover well.

GUIDE TO DIAGNOSING COMMON AQUARIUM DISEASES

POSSIBLE SYMPTOMS	PROBABLE CAUSE(S)	TREATMENT
Cotton wool like growths on body or fins. Mouth region eaten away, often covered with cotton wool like growth.	Fish Fungus	Check for stressors, water quality, etc. Proprietary fungus aquarium treatment (tends to be secondary infection so the underlying cause must be determined)
Pinhead white spots on body or fins.	Whitespot	Check for stressors, water quality, etc. Proprietary Whitespot aquarium treatment.
Rubbing or flashing against underwater objects. Slimy coating on skin and fins. Cloudy eyes.	External protozoan parasites	Check for stressors, water quality, etc. Proprietary whitespot or parasite treatment.
Rapid gill movements or gasping at the water surface. Clamped fins. Lethargy.	Protozoan parasite gill infection, gill fluke infection or water quality.	Check for stressors, water quality, etc. Proprietary parasite/ fluke treatment. Check water quality and correct if necessary.
Fins eaten away. Blood streaked fins. (finrot) Wounds/abrasions.	Bacterial infection water quality, etc.	Check for stressors, water quality, etc. Proprietary finrot aquarium treatment.
Inflammation at the base of fins	Bacterial infection	Check for stressors, water quality, etc. Proprietary finrot aquarium treatment.
Raised scales.	Bacterial infection (dropsy)	Check for stressors, water quality, etc. Proprietary finrot aquarium treatment.
Protruding eyes.	Pop-eye possible bacterial cause.	Check for stressors, water quality, etc. Proprietary bacterial treatment.

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TOP: Supreme Championship Bench - sponsored by Interpet
ASAS MILLENNIUM DINNER, CONVENTION & OPEN SHOW
BOTTOM: ASAS Convention Open Show Bench



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ASAS MILLENNIUM DINNER, CONVENTION & OPEN SHOW

Forty-three guests from far and wide sat down to the Millennium Dinner at the Royal Beach Hotel on Southsea sea front on Saturday, 6th November, 1999. Mrs. Hylma Slade was the guest of honour and the FNAS Chairman Brian Walsh also attended. During the evening Bill Rundle presented Jack Stillwell with a beautifully carved veiltail for his work in ASAS since its formation in 1962. Brian Walsh presented Tony Tyson with the FNAS breeder's pin. During the evening we were entertained by Alan Stephens' disco.

The show held next day at the Deaf Centre in Portsmouth attracted 328 entries. Incorporated in the show was the FBAS Supreme Championship. Our photographer, Mr. Wally Ryder, took many photographs throughout the show.

The Best in Show and Best Coldwater Fish was won by Paul Whiddett with a Blue Gill sunfish. Dave McCallister won the Best Livebearer with a Xiphophorus nigrensis. The Best Egglayer was a Corydoras gosseii owned by Mr. A. Best. Roger Crew won the Best Fish in ASAS with a Hyphessobrycon socoloff which

also won the Championship Class (Ca). Gary Thwaites won the other Championship Class (L) with a Cobitis macrostigma and the Best Junior entry was won by Roger O'Grady with a Microsynadontis.

Joe Nethersell, FBAS Chairman presented the Chairman's Trophy to Hylma Slade in recognition of her and her husband's work for the Federation.

The Supreme Championship winners were presented with their trophies by FBAS President, Jack Stillwell and the ASAS prize winners with their rosettes by Hylma Slade.

Whilst the judging was taking place, Mr. Martin Munt - the Assistant Curator of the Isle of Wight Dinosaur Museum - gave a talk on fish fossils. This was followed by Mr. Brian Walsh who entertained a large audience with one of his many talks. An auction of 153 lots was conducted by Alan Stephens.

Many, many thanks to Paul Corbett our Show Secretary for his organisation, and to the judges, speakers and all those who supported us. This was a truly great weekend enjoyed by all.

Jack Stillwell
Chairman ASAS

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IT'S ALL A MATTER OF CHOICE

by Les Holliday, Hagen

Faced with a spectacular array of tanks down at the local aquatics dealer full of highly colourful freshwater tropicals, many newcomers to the hobby and lots of 'old-timers' for that matter, can quite understandably be filled with yearning. It's no wonder that many hobbyists tend to stock their tanks on an impulse buying basis such is the draw of the often dazzling display. You and I, of course, are far more disciplined and spend lots of time before making a purchase researching the coveted fish's needs. How big will it grow? Will it be compatible with its tank mates? Will my tank be suitable? These are all questions we need to ask to ensure the new fish will mesh with the surroundings in which it will be placed.

Fishkeeping is an interest which holds endless opportunities for expansion and development and whichever types of fish are your favourite you need to put all of your efforts into creating an aquarium which will meet their needs. Research is, of course, the key and it can be quite absorbing and great fun finding out what makes your favourite fish tick. A great deal of information is freely available from your dealer and there are excellent fishkeeping magazines. You will also have found that by joining an aquatic society there is always someone at hand to provide help and support.

A good basic written aquarium guide is also a good idea. This can give you lots of information all readily at your finger tips and it's not unusual for hobbyists to accumulate quite a library over

time both of basic information and more specialised gen. On the areas of the hobby that you become especially interested in.

Few books can provide all the advice and help you will need in a single volume, but the Baensch Aquarium Atlas from the Hagen library of aquarium books, albeit in three volumes, comes pretty close. This three-volume set provides a complete digest of information on freshwater fish and within the more than 3000 pages comprising the set, over 2000 fish and 300 plant species feature together with all the information needed to keep them.

Volume 1 is a reliable atlas covering all of the facets of our hobby. More than 600 popular tropical and coldwater aquarium fish are described together with 100 or more aquatic plants, each species of fish and plant accompanied by a comprehensive culture information and a full colour illustration. Choosing the right aquarium lighting, heating, filtration and setting up are all covered as well as essential information on care and maintenance. You will find this book a veritable mine of meaningful and relevant information on all of the fish popularly kept at present.

This highly comprehensive guide is further supplemented by Volume 2 which is a valuable guide for the more advanced aquarist. Here more than 850 rare fish species and 150 plants not introduced in the first volume are presented. Every fish and plant is described in precise detail and again illustrated with a full colour photograph. This volume not only includes rare fish and plants but also new recently imported fish and those which have almost been forgotten by the hobby. There is a great interest in the ever-popular catfish,



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colourful killifish and cichlids and these feature in this volume, especially new species to the volume.

The 150 plant species presented together with the 100 or so species in Volume 1 offer descriptions and accompanying photographs of a variety and range of plants never seen before.

Aquarium Atlas Volume 3 contains over 900 fish and 50 plant species not presented in the previous two volumes making the Baensch Aquarium Atlas the most complete work of its kind being sold today. All information is presented in an easily accessible form and each species' description is accompanied, in line with the other volumes, by spectacular photographs. Volume 3 is a must for all dedicated hobbyists including rare and unusual species - many of which have never before appeared in popular aquarium literature. What could only be gleaned from speciality magazines and books previously can now be found in the easily understandable format of this volume.

The Baensch Atlas series also contains an

equally comprehensive three volume set devoted to marine aquarium keeping providing information on over 3500 fish and invertebrates within the 2500 or more pages of the set. This world class Atlas of reef life provides years of inspiration and reference for the marine aquarist.

Finally, if you are a total fish fanatic you won't want to be without the Baensch Fossil Atlas which allows we aquarists to trace the lineage of our aquarium fishes to the very origin of the species and learn all about the evolutionary changes. Fish have been around for more than 420 million years and over 2000 genera of fossil fish have been discovered and described. This book has taken several years of painstaking research in museums and private collections around the world and presents the findings in an informative but easy to understand manner. Photographs of 900 fossil fish and over 200 recent descendants, plus several hundred line drawings make this an invaluable reference source for fish lovers and a jolly good read.

ARE YOU IN THE DARK WHEN IT COMES TO AQUARIUM LIGHTING?

by Les Holliday, Hagen

There has never been a greater upsurge in new aquatic products than has occurred over recent years and it's understandable that not only hobbyists can become bewildered by the huge array of alternatives from which they are able to choose, but also retailers of aquatic products can, similarly, frequently feel confused by the sheer variety and complexity of the vast product ranges currently on offer.

Aquarium lighting is a typical example where there have been dramatic changes and a sizeable increase in the range of equipment available since the old

aluminium canopy and single incandescent bulb days. The demand for a constantly increasing range of



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lighting equipment has been brought about mainly as a result of the increased range of types of aquarium keeping that hobbyists are now choosing, which has progressed from the simplest forms of cold and tropical freshwater aquarium keeping to - in recent years - highly sophisticated marine tanks and full-blown reef aquarium systems.

The popularity in so many differing forms of aquarium keeping has also created a need - not only for a correspondingly varied choice in the type of lighting, be it incandescent bulb, fluorescent tubes, mercury vapour or metal halide - but also a demand for a wider choice of specification. There has been an emphasis, for example towards higher levels of light intensity and improved colour rendition and colour temperature, especially applying to the needs of marine hobbyists keeping the more demanding marine aquarium subjects in terms of lighting, such as photosynthetic corals and invertebrates.

The increasing interest in growing plants in the freshwater tropical aquarium has also brought about a demand for high intensity lighting and effective spectral qualities. Good lighting is essential to the growth of plants and is often underestimated. Too often light levels provided are too low and luxuriant growth only comes with sufficient light.

The introduction of mercury vapour and metal halide lighting systems did a lot to answer these needs. Also because of the novelty of this new technology, initially the more traditional fluorescent tube forms of lighting became overshadowed despite some significant improvements in emerging tube light intensity and an emerging greater variety of choice of tubes of different spectral range.

After passing through this period of doldrums, fluorescent tube lighting now is starting to gain renewed popularity as it is more commonly recognised that modern fluorescent lighting is far superior to anything offered in the past and easily capable of catering to all the needs of hobbyists. High intensity fluorescent tubes have been developed with built-in reflectors that increase the intensity of light emission by 170% over conventional tube lighting and emit high quality full spectrum lighting which closely aligns to natural sunlight.

There are also tubes available that have been especially devised to simulate specific forms of lighting conditions, one type of tube even providing lighting of the photosynthetic deep marine spectrum to closely mirror the optimal blue chlorophyll absorption levels required for deep coral reef subjects.

Market leaders in this field at present are Arcadia, Interpet and Rolf C. Hagen who all offer very comprehensive ranges of quality aquarium dedicated fluorescent lighting. The Hagen range is, perhaps, the best example currently of this new generation of specialist aquarium fluorescent tube lighting and features a complete line to meet every lighting requirement. The range comprises of seven basic components, six tubes especially developed for aquarium use and one, the Repti-Glo, designed for reptiles, amphibians and birds.

SUN-GLOW is a full spectrum tube of standard intensity that emits a natural white light closely simulating full daylight. Ideal for freshwater aquarium use, fish colours appear more vivid and plants thrive.

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AQUA-GLOW is another standard intensity tube that simulates optimum wavelengths required by plants for efficient photosynthesis. This tube encourages lush plant growth and promotes colourful highlights in fish.

FLORA-GLOW provides a warm photosynthetic spectrum for all aquarium and terrarium plants. Designed to emit light at the two peaks most beneficial to photosynthesis, this standard intensity tube offers lighting that peaks at 380 to 480nm (the violet blue area of the spectrum) and 600 to 680nm, the strongest parts of the spectrum's light intensity with emphasis towards warmer orange to red.

POWER-GLO is a tube which combines high light intensity and spectral light quality to provide total illumination for living corals, marine algae and freshwater plants. Power-Glo tubes can be used to illuminate a wide range of habitats including aquariums, terrariums and vivariums.

MARINE-GLO stimulates the growth of deep reef corals and coraline algae emitting light from the visible Actinic blue spectrum. This standard intensity tube provides optimal blue chlorophyll absorption levels making marine growth vigorous and strong.

LIFE-GLO is the highest light intensity tube in the range capable of reaching deep into the aquarium. Providing full spectrum light closely simulating natural sunlight, this tube also easily meets the needs of the many reptiles and other terrarium and vivarium subjects.

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REPTI-GLO is a broad spectrum standard intensity tube that emits UVB waves converting vitamin D into vitamin D3, its active form, and promotes calcium absorption which combats common bone disorders. The full spectrum radiation from the tube produces a high CRI (Colour Rendering Index) appropriate for keeping most reptiles, amphibians and birds.

As one of the world's leading suppliers of pet equipment and accessories, Hagen is constantly seeking to improve the quality of its merchandise and their range of fluorescent tubes are the result of extensive research to provide aquarists with the light source that illuminates more effectively, lasts longer and consumes less energy than most light sources available.

The Power-Glo high intensity tube is a good example of this on-going development which, because of its high intensity output, allows one single tube to out-perform any two conventional phosphor tubes. Furthermore, the useful lifetime of a Life-Glo is almost twice as long as a conventional tube and full spectral quality is maintained throughout its whole period of use.

Further information regarding the Hagen range of fluorescent lighting is available by contacting:

Rolf C. Hagen (UK) Ltd.,
California Drive,
Whitwood Industrial Estate,
Castleford,
West Yorkshire
WF10 5QH
Telephone no: 01977-556622
Fax no: 01977-513465

KNOW YOUR LIGHTING

INTENSITY

Lux is a scientific measurement related to the intensity or amount of light a one watt source of light placed three metres away would cast on an area a metre square. Tropical daylight measured at midday without cloud cover would read approximately 100,000 lux. In shade or under cloud cover it could be reduced to as little as 10,000. Depending on such variables as turbidity and depth light beneath the water can measure between 50 and 5000 lux.

Plants readily adjust to the amount of light available and while they can be given too little light, it is nearly impossible to give too much.

Typical examples of Lux levels required by Freshwater Tropical Plants

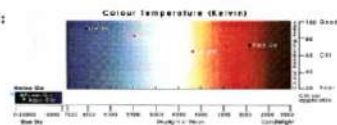
FLOATING PLANTS require a lot of light (2000 lux or more). Plants which grow just under the surface such as *Vallisneria spiralis*, *Nuphar* and other water lilies also require 2000 lux or more.

PLANTS FLOATING IN MIDDLE LEVELS do best in an aquarium with a light level from 800 to 1800 lux.

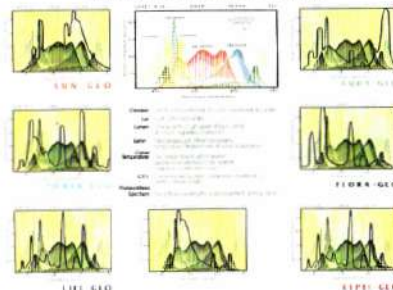
LOW GROWING PLANTS AND CRYPTOCORYNES need a minimum of 100 lux and do better at 250 to 300 lux.

KNOW YOUR LIGHTING:

COLOR TEMPERATURE



Wavelength vs % Photosynthetic Absorption



SPECTRUM (WAVELENGTH OF LIGHT)

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ISLE OF WIGHT KOI SOCIETY FIRST SHOW

by Sue Crew

Having attended my first koi show recently I can only say that it was an extremely impressive comparison for those of us who normally frequent non-koi coldwater and tropical shows.

First of all there was a £2 entrance fee which people gladly paid to visit the vats and stands which completely filled a hall.

To aid the visitor, the programme's centre pages provided a floor plan of the hall to ease negotiation of the many activities underway. Trade and craft stands almost wrestled for space with the koi vats. It was almost as though the fish came secondary to the provision of activities to bring the whole family to the show. There were some twenty craft stands and sixteen general fishkeeping and koi stands.

This was the first show of what could be expected to be a relatively small club in a rather insular community, but

nevertheless they managed to stage a two-day residential show. The experience was not made easier because of the vast numbers of club members - there are similar numbers of members in this club as we would expect to find. I suppose the real difference between the two are commitment and motivation.

The koi fraternity (if they can be termed as such) seem to be happier to spend much more money than us non-koi keepers, even though they are not any more wealthy than we are. I noted quite a few people spending £150 and more for fish from importers who had stand space at the show. Mind you, I do not want to be quoted as suggesting that commitment and motivation can be measured in how much we spend, but it does say something...

What was immediately apparent was the warmth of welcome and the fact that people from mainland societies were also helping to man key posts.

I am certainly looking forward to the second IW Koi Society Show and would suggest that everyone sample the shows of our 'cousins'.

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FISH FEEDING

by Roger Foggitt, Head of the Tetra Fishkeeping Information Centre

Once all the chores of fishkeeping are done, such as water changes, filter cleans, water quality tests and so on, it is nice to know that at the end of the day the final 'chore' of feeding is one of the most fun. Certainly it is during this time that we can actually get to watch the fish and learn a little more about their behaviour and way of life.

So, to ensure that both us and, more importantly, the fish are getting the most out of feeding time, it is vitally important to supply them with the correct diet.

This, you may think, is not normally too difficult because there are many different types of fish foods on the market today, which are easily available from your local retailer. But it is at this point that you should stop and ask, "What should I look for in a food to ensure that I am giving my fish the best possible diet?" "Does this diet satisfy all the needs of the fish?" "Does it satisfy all my needs as a fishkeeper?" and "Should I vary the diet for all the fish in my aquarium?"

Form and Function

To understand what we need to be looking for in a diet we first have to consider a little fish anatomy and fish physiology.

All animal species fall into three main 'dietary groups': they are either predominantly vegetarians feeding on plant material, algae, etc. (HERBIVORES); primarily meat eaters, feeding on animal material (CARNIVORES); or a mixture of both (OMNIVOROUS).

In the fish world there are no real true herbivorous fish, even a fish like the sucking loach (*Gyrinocheilus aymonieri*) which most of us have to keep the algae down in our tank, will feed on small crustaceans, etc., if they are available. Similarly, although there are many predominantly carnivorous fish, these will also accept and be able to digest plant material if nothing else is available to them. If we look at the digestive systems of these groups of fish, we see they are different not only in size and shape, but also in the way that they actually digest the food which they eat.

The Meat Eater

Just looking at a primarily carnivorous fish, such as the Pike Head (*Luciocephalus pulcher*) we see instantly that it is a carnivorous fish. It has a streamlined almost arrow shaped body for rapid

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swimming, with a large forward facing mouth, full of sharp teeth used for catching fast moving prey such as other fish. A carnivore such as this has a large distinct stomach and a fairly short intestine, which together, produce many digestive juices in a highly acidic environment. This acid environment is exactly what is required for the breakdown of animal flesh, which is relatively easily digested and absorbed.

The Vegetarian

Conversely, a primarily omnivorous fish, with a large proportion of plant material in its diet, such as a goldfish, has a body shape which is relatively rounded and not made for fast swimming and hunting, with its mouth placed on the underside of the head to allow the fish to graze on plant material and forage for food items such as water shrimps on the bottom of the aquarium. The digestive system of this fish is very different from the carnivore. The digestive process starts with bony plates in the throat known as pharyngeal teeth. These grind the food before it passes into the gut. There is no distinct stomach as there is in a carnivore, but the intestine is often extended, up to 3-4 times longer than the intestine of a similarly sized carnivore. There is also no acid production and the enzymes produced by this digestive system are very much different to those produced by the carnivore's. This is because cellulose-based plant material and chitin-based crustacean exoskeletons on which the goldfish feeds, are very much more difficult to digest in order to extract the goodness from them. Plant cell walls are made from materials based around a complex sugar known as cellulose. This cellulose is difficult to break down and the intestine must be long in order to give the enzymes time to digest and absorb the resulting products of the process. The same is true of the hard calcified chitinous skeletons of water shrimps and fleas on which the goldfish also feed in its natural environment.

Choosing the Correct Menu

The different groups of fish require different 'types' of food to replicate what they would feed on in the wild and what their respective digestive systems can utilise efficiently.

However, even though the fish may vary in their anatomies they all require 5 basic ingredients in their diets, but in different forms to suit their digestive systems.

These five main ingredients are:

1. Proteins - these are the 'building blocks' of all fish tissues, particularly muscle tissue. All proteins cost of smaller units known

as amino acids, produced when the protein is broken down in the gut. Of the 21 amino acids which make up proteins there are 10 which are essential for fish health and growth. Proteins can also be used as an alternative energy source if no sugars or fats are available. For a carnivorous fish, the protein should come in the form of animal, fish and crustacean-based materials. For herbivorous fish, the protein needs to be in the form of cereals, algae and vegetable protein extracts. As I have mentioned previously, most fish are not truly carnivorous or herbivorous, but omnivorous utilising both animal and vegetable materials so many diets will incorporate all the above materials to produce a 'balanced' protein content suitable for all tropical fish.

2. Fats or Oils - these, like proteins are made up of smaller molecules known as fatty acids. They are primarily stored in the tissues of the body and when needed are used as an energy source. As with proteins, fats are also incorporated into all fish tissue where they play an important role in cell structure.

3. Carbohydrates - these are more easily utilised by herbivores than carnivores and are used as an immediate energy source or stored long-term as a reserve. In many diets, carbohydrate is also termed as 'roughage or fibre' and aids the digestive processes of the carnivore and herbivore alike.

4 and 5 Vitamins and Minerals - these are complex materials essential for the maintenance of fish health and metabolic processes. They cannot be synthesised by the fish so must be added to the diet. The mineral content is often termed as the 'ash' content of the diet.

In all fish diets, the above materials must be in balance for it to be easily and effectively utilised and absorbed by the fish. A protein or fat may be incorporated into the diet but if it is not in a form which can be used by the fish then it is not worth having.

Many of the fish foods available from your retailer, have undergone careful formulation and extensive research, in the form of food trials which monitor factors such as growth rates of the fish and the amount of waste produced by the fish when being fed on a particular diet. Results from such trials give a good indication of how much of the food is being utilised by the fish and how much is wasted.

On all foods produced today, regulations state that the ingredients used in the food, the vitamin content of the food and the 'typical analysis' of the food, i.e. the protein, fat, ash, oil and moisture content, must be displayed on the side of the container so we can

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check that what we are feeding our fish is correct.

For the majority of tropical fish the analysis should be as follows:

Protein	38-48%
Fats/Oils	4-8%
Fibre	2-3%
Ash	9-12%

(For diets such as fry foods and growth foods, expect levels of the above to be higher. Fry and small fish require higher protein and higher energy foods for the first few weeks of life.)

If the correct ingredients are used in formulating the diet, the vitamin content of the diet should also be balanced. Look for supplemental Vitamins A,C (stabilised Vitamin C) and D which are extremely important in all aspects of fish metabolism and health.

Match the Food to the Fish

It is not just important to choose the correct ingredients of a diet, but also that the food is in a form which can be taken by your fish. For example it is not good practice to give a sinking pellet food to a fish which spends most of its time feeding from the surface of the water and vice versa. By studying the shape and position on the mouth of our fish we can determine what sort of food to give them.

There are three basic mouth positions of a fish:

1. An underslung (or inferior) mouth position is usually found on a fish which is a benthic or bottom feeder such as a Plecostomus.
2. A superior mouth is indicative of a fish that either feeds from the surface where the mouth is turned upwards slightly (e.g. a Guppy).
3. The mouth faces forward which indicates that the fish feeds mainly from mid-water (e.g. Discus).

It is important, therefore, that we choose the right food for the right fish.

The table overleaf gives a feeding guide for a few common freshwater tropical fish.

FISH TYPE	FLAKE FOOD	SLOW SINKING PELLET	SINKING GRANULAR PELLET
Neons, Cardinals, small Tetras	OK	OK	
Tiger Barbs, Rosy Barbs, etc.	OK		
Larger Barbs	OK	OK	
Guppies and other Livebearers	OK		
Small/medium Gouramis	OK		
Larger Gouramis	OK	OK	
Siamese Fighters	OK		
Most Dwarf Cichlids	OK		
Angelfish/medium Cichlids	OK	OK	
Larger Cichlids	OK		OK
Freshwater Sharks	OK	OK	
Corydoras Catfish	OK	OK	OK
Plecostomus (specialised Plec. foods)		OK	OK
Sucking Loach		OK	OK
Khuli Loach	OK	OK	OK
Danios, White Cloud Mountain Minnows	OK		
Killifish	OK		
Clown Loach		OK	OK
Discus	OK	OK	

There are many specialised foods available, particularly for species such as the larger Cichlids, etc., formulated for their dietary needs. The above table is a guide on which you can work.

LIVEFOODS - these are a good addition to the diet. However, true live foods can introduce disease organisms into the aquarium. It is best to opt for those which are freeze dried or frozen to avoid possible contamination. Nowadays, there is little nutritional value lost from the foods during the freezing or drying process.

N.B. When using frozen livefoods it is vitally important to thaw them totally and rinse them through, before adding them to the aquarium. Ice crystals entering a fishes digestive system can damage the lining of the gut and may also cause chilling which will stress the fish.

Livefoods can also be used when fish are reluctant to feed, perhaps after an infection or disease problem. Introducing a small amount of live food along with the usual diet of your fish often has the desired result of stimulating feeding.

This reluctance to feed can also occur in fish which have either arrived in your aquarium shortly after capture from the wild or shortly after leaving the hatchery where they were produced. Such fish are often used to feeding on a natural diet and are reluctant to feed on dried foods such as flakes and pellets. By introducing livefood along with your regular fish feed, these difficult, choosy individuals can gradually be weaned on to your own choice of food.

How Much to Feed and How Often?

This is a very commonly asked question and one which is difficult to quantify in exact terms. If you talk to a fish food nutritionist he will talk in terms of feeding each fish a percentage of their own body weight per day, but to weigh each individual fish in a four foot tank may prove slightly difficult for the hobbyist!

The main thing to avoid with any feeding schedule is not to overfeed. Overfeeding often results not only in digestive problems in the fish, but can lead to poor water quality.

Fish are by their very nature, scavengers. They will feed on as much food as you care to put in the tank at any one sitting, gorging themselves. This is obviously an advantage in the wild where food is often at a premium so the fish will feed with as much as they can, when they can.

However, in the aquarium this is not necessarily a good thing. Normally, of the food that is eaten by a fish, 80% is utilised and absorbed and 20% excreted as waste. If the fish gorges on food, the percentage of utilised food can drop to as little as 40%. This means that of the food eaten, as much as 60% is excreted as waste, which then decays in the aquarium leading to ammonia and consequently nitrite problems.

The rule then, is to attempt to replicate what happens in the fishes natural environment. As I have already stated, a fish is naturally an opportunistic feeder and will eat when food is available. In the natural world this tends to mean that the fish is eating small amounts of food all through the day. This ensures that all food ingested, is thoroughly

digested and absorbed and the fish is getting maximum benefit from the small amounts of food available. This is essential because unlike in the aquarium environment, food is at a premium and the fish must be able to extract the maximum amount of goodness from every available meal.

So, feeding little and often is the best method to employ to ensure that the food given to the fish is utilised at its maximum rate. As a general guide, feed 3 to 4 times a day (more if you have time, but decrease the amount given) with as much as the fish will take in 1-2 minutes. This is difficult when feeding sinking pellet foods such as Tetra TabiMin but work on 1 tablet per 2-3 inches of fish as a rough guide.

Night Feeders

Many fishkeepers enjoy the job of feeding their fish because it gives them the chance to get to 'know' the fish and study their behaviour. Remember though that there are some fish that are primarily nocturnal, and are only really actively hunting for food at night.

If you are unsure whether these fish are receiving enough food, add some sinking pellet food to the aquarium when the lights go off to allow these fish to feed at their leisure. Some species of Plecostomus are also reluctant to feed during the day so adding a specialised Plec food to the aquarium at this time will also ensure that these fish get their fill!

Variety is the Spice of Life!

Whatever diet you choose to feed your fish upon, it is important to add some variety to their diet. Not only in terms of foods given but also in varying feeding times and the amounts of food given. You may decide to stick to a staple food as the majority of fishkeepers do, but varying the diet and occasionally giving 'treat foods' will help to ensure that your fish are always healthy, active and colourful.

BILL RUNDLE - PLYMOUTH A.S.

Bill Rundle has recently had a heart attack, and at the time of writing is expected to spend the next ten days in hospital before being discharged to the capable care of his wife Joyce at their home.

Everyone within the fishkeeping fraternity who know and love Bill and Joyce will wish him all the very best for a speedy recovery.

SHOWING YOUR FISH

A "natural" progression from keeping fish at home is showing your fish at local and/or national fish shows. It is here that you can spend a whole day speaking to others about fish without being told you are boring! You will usually find someone who has experienced a similar problem to yours (you do usually have one if you keep fish) or she will know someone else who has. Fish shows are also a good opportunity to buy more fish and/or equipment. Part of the day will usually encompass an auction of fish and/or equipment and maybe a trip to a local fish shop. If you are really lucky you will get the opportunity for both!

Back to the actual show...

For ease of judging, fish are allocated a class dependant upon their biology. Obviously if you want to exhibit your fish you need to ensure that your fish are competitive with others of the same class. The Federation whose show rules the show you are attending is exhibiting to will be able to provide for you - for a small cost - a list of the fish, their expected size and show class. Different clubs show to different show rules, so it is wise to carry out a little research before undertaking a long journey. The show schedule will provide you with a lot of information and can be obtained free of charge from the club who are hosting the show.

You need to understand a little about how fish are judged before you can decide whether or not it is worth taking your fish out for the day. Mostly fish are judged under what is called the five twenties system. That is fish have a possible five lots of twenty points awarded. For adult fish the five sets of twenty points are awarded for: size, shape, fins, colour, condition/department.

The points for size are awarded according to what proportion of the "show size" your fish has reached. So that you can check the size of your fish before setting out you really need to purchase a refractory rule and a sizing disc.

The shape of your fish is judged against the standard for it.

The fins are judged according to their shape and condition.

Colour is judged on the standard for the fish according to its sex and maybe whether or not it is in breeding condition. Often a fish will not show its proper colours if it is stressed by the journey or is not "displaying" to the opposite sex!

Department is the overall bearing of the fish. For example, if the fish you are displaying is normally one that would live and feed from the surface but it is sat rather unhappily on the bottom of its tank in the corner it cannot be considered to be deporting very well!

Generally speaking gravel is not allowed in a show tank when exhibiting fish. The smallest tank you are allowed to use at a show is 4" x 4", but the tank size must be adequate to cater for the normal behaviour of the fish. It must also be large enough for the fish to turn round in.

Generally the tanks used to exhibit your fish must be made of glass, have clear sides and top, but have a black bottom. The show schedule will tell you about these details, or if not you should call the show secretary who will be able to advise you.

This article only outlines the very basics, but more will follow in the next issue of "Fishworld".

SINGAPORE FISH FARMS

by Roger Crew

General Information

Singapore is one of the most diverse and contrasting populations (probably) in the world.

It is ancient and it is modern; it is colourful and it is full of grey concrete; it is fast and it is slow; whatever it is it is a fabulous place to visit.

The main island of Singapore and its 57 islets sit comfortably at the foot of the Malay Peninsula a mere 85 miles north of the equator. Singapore Island is diamond-shaped and not unlike our own Isle of Wight, but slightly larger at 26 miles long

and 14 miles wide with a circumference of 85 miles. Its area is 220 square miles. If you include the offshore islands, the land area is nearly 240 square miles, but this figure is growing every day owing to the land reclamation schemes that Singapore is so proud of.

Agriculture is a diminishing vocation on the increasingly urban Singapore and

farmland currently occupies less than 15 square miles of the island. This is at least in part due to the fact that Singapore has no fresh water source of its own having to pipe in water from Malaysia.

Demographically as well as botanically Singapore is a nation of immigrants.

The only real reserve for native flora and fauna can be found at Bukit Timah Nature Reserve, which is one of the last remaining remnants of rain forest left on Singapore. Singapore is, however, a green city, but the majority of the plants it so proudly displays are immigrants to the island. Singapore has been named the Garden City with its bougainvillea lining the roadway between the airport and the city.



Singapore - a city of contrasts

Over 115 square miles of Singapore is built up into concrete apartment blocks which form the massive public housing estates, offices, shopping centres and industrial parks.

More than 80% of the 2.6 million population is Chinese. Malays are the largest minority group, with Indians the next largest, followed by a wide variety



LEFT: Plastic trays for catching livebearer fry

RIGHT: Net vats for rearing fish in



LEFT: Concrete vats for raising fish in - note net roof

of others. The people of Singapore generally enjoy the highest standard of living in Asia after Japan. Indeed, the Japanese flock to Singapore for their holidays. Employers tend to bemoan the choosy Singaporeans as employees who look down upon workplaces without air-conditioning and therefore hop from job to job.

The Fish Trip

Although Sue had planned to take this trip with me her general state had got worse overnight. She had diagnosed herself as suffering from dehydration and prescribed a day in her dark, cool bed drinking as much as possible. This meant that I had been despatched with an array of cameras, a notebook and a mini cassette recorder to gather information for this article...

One thing that I was looking forward to on this trip was the contrast between Singapore and Malaysia. What I really expected was a difference in the scale of operations with the area of Malaysia being much bigger - it is like comparing the Isle of Wight with mainland Britain. I therefore expected the Singapore farms to be very compact in comparison. The reality did not actually bear my preconceptions out. They tended to be a little smaller than the large-scale operations in Malaysia, but every inch was packed with fish.

The first farm that we visited was predominantly Guppies. This was particularly interesting as I was able to draw comparisons between this operation and that of a commercial enterprise in South Africa as one of my travelling companions was a

commercial Guppy farmer in South Africa. The essential difference that he found was that Singaporeans rely upon the fry swimming into floating mesh trays (like bread baskets) whereas he would place the adults in the tray and let the fry drop out - that seems much more logical to me as most livebearers tend to drop to the bottom at birth and then rise. The Singaporeans seemed to think that they got a much higher yield with the 'reverse flow'. Cultivation of these was almost exclusively in raised concrete vats and the water was noticeably green. In fact, on some occasions was like 'pea soup'. There were larger ponds dug out, but they were netted into smaller sections. The only protection for the vats was a form of roof-like netting some 12' above the ground. Very little plant was used at this farm, which was in direct contrast to others we had seen.

Koi Farm

This was a real surprise to me as I had not equated Singapore with the large-scale production of Koi. When we drew into the premises it did not seem to be a very large concern. It was fronted with a small car park and presented as just a long, low building, but when we went into it the offices were set to one end, with a large square pond and a gallery overlooking it at the other end. We were shown to the gallery where we were entertained with a superb buffet and soft drinks. If you look to the centre of the illustration you can see the large pyramid of canned soft drinks! What impressed me immediately was not just the undoubted quality, but the sheer size of fish on view. Fish of 3' or more were



in abundance here. When we had taken refreshment and I had recovered from the size of these fish we were shown one of the latest varieties to be cultivated to suit the domestic market (see front cover), which were koi with what I would describe as 'mirror' scales set each side of the dorsal line to enhance the view from above. These fish were bowled especially for us so that we could see them close to hand and photograph them easily.

Moving to the rear of this building the scale of the operation suddenly became fully apparent. To the right hand side I found row upon row of koi ponds, each probably 30' by 20' and the significant feature here was the use of vegetable fillers which flanked the flimsy walkways between the ponds. To the left in contrast, were five or six enormous concrete 'lakes'. The size of which could easily have

encompassed a fleet of pedalo or other small recreational boats. One of these enormous 'lakes' was empty and in this state it reminded me very much of a reservoir such as the depth. In the UK if we go over perhaps 6' deep we consider this to be exceptional. Here the water depth must have been nearer 25'. Again like the Malaysian farms, in the small amount of water remaining, one could observe the compulsory very large 'Plecostomus sp.', none seemingly smaller than 2' long. This whole section compared more favourably with an engineering works than a fish farm! This enterprise was given over in its entirety to Koi.

Farm 3

The scale of this farm dwarfed all the others I had ever visited. This farm had buildings like aircraft hangars. There was an amazing diversity of tropical



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cultivated and wild species of fish. The impressive thing here was the sheer number of species that they had managed to breed. There was an open-air lake outside which measured in hundreds of yards long rather than in single yards and it was probably about 50 yards wide. So much for land being at a premium in Singapore! It is indicative of the importance that Singapore has placed on the fish raising market that such massive tracts of land have been set aside for the purpose. This site also acted as a major consolidator and had many indoor aquaria in long rows with everything from livebearers and angels to catfish and cichlids. In short just about everything you could think of and something for everybody. We moved on from here to smaller consolidators, but they could not hold a candle to these

first three establishments. Interestingly enough the latter and smaller establishments tended to be grouped together geographically (nextdoor to each other in one road). Unlike the other true farms, the consolidators do not breed fish, they merely act as a communal collecting and shipping point. It used to always be the criticism levied by the Malaysians that all the Singaporean fish farms could do was to buy in Malaysian fish and export them as their own. At one time this was undoubtedly true, but in true entrepreneurial fashion they have moved beyond this to generate their own stocks. These trips are not only a must for the fish buff, but also for the culinary devotee (preferably with a large appetite) such was the hospitality shown to us at each stop. Although a buffet luncheon had been

advertised as part of the trip, each farm seemed to really enter into the spirit of Far Eastern hospitality, each trying to outdo each other to provide a more diverse and sumptuous array of treats as the day went on. Bear in mind, that it is considered rude not to partake and enjoy the delicacies offered!

Such was the scale of the operations we visited, that we were only able to find time to sample about half the consolidators that had been scheduled. I did not find this to be disappointing as they do not actually differ very much. It is within the specialist farms where the diversity and contrast lies. Again what seemed to be similar to the



day before - you cannot guarantee that schedules will be kept to - Far Eastern time seems to be very elastic. Time did fly, however, as the day was packed with activities and with such interesting sights to see. What is so nice is that at every stop we were treated as though we were royalty and greeted as though we were really wanted. Another aspect of the day, which was very rewarding was the friendliness and willingness to share experiences and knowledge to be found amongst the persons sharing the trip. There were three coaches full in all and on the coach that I found myself in, I had fellow aquarists from West and South Eastern Australia, Jamaica, South Africa, Bali, New Zealand, and Sri Lanka that I knew of who all equally enjoyed the trip.

So to return to earlier in this article - my expectations of the scale of the enterprises was not borne out. I would hope that some of the accompanying photographs will convey their vastness to the reader.

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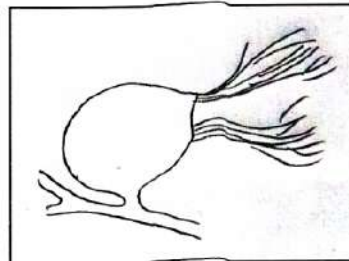
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THE BLADDERWORT - UTRICULARIA

This is a genus of the family Lentibulariaceae and the four British species (*U. vulgaris*, *U. neglecta*, *U. intermedia* and *U. minor*) are all rootless aquatic plants. Certain segments of the very finely-divided leaves are roughly oval and up to 3mm long. It is in these that tiny aquatic animals are trapped and digested. Each bladder is on a short stalk and at the end there is an opening to the inside of the bladder, guarded by a valve hinged on the inside so that it opens inwards. The valve is invariably closed to trap the tiny

insects in. From the outer surface of the valve rise a number of hairs. If the bladder is ready to accept prey, pressure from the outside on the hairs triggers the valve to open and the inward flowing water carries with it the tiny animals that it enjoys so much.

So that the mechanism can operate, there must be pressure for it to open from the inside. Whether the prey captured by the bladderwort is killed and digested by the secretion of enzymes, is doubtful. It is more likely the animal dies of starvation and is then decomposed by bacterial activity. Whatever, the plant would still be able to benefit by absorbing some of the bacterial digestion products.

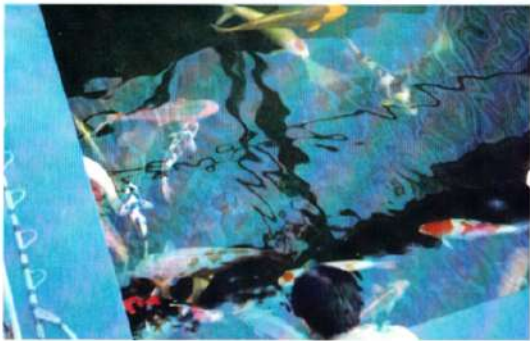


A bladder ready to receive its prey

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TOP: KAAS Convention and Open Show



BOTTOM: Singapore Koi - up to 3' long

BREEDING SUCCESS

by Henry Millar

Henry is a familiar figure to most of us in the South and South West. He is a feature of many a fish show with his table of young to pass on to other aquarists. Along with the youngsters he passes on a lot of valuable advice on how they should be kept. Henry is not merely a theorist, he has the practical ability which he is passing on to others here.

The best advice that I was ever given was to go back to nature if you want to have success with tropical fish. This advice, which still stands me in good stead some 20 years on, is all the more important if you wish to breed fish. The nearer to the wild the breeding stock is, the more exact the water conditions have to be, and in my experience the most crucial variable to get right is the water's carbonate hardness.

Hardness can, and will, have an effect on the egg hatch rate and subsequent survival rates of fry. Infusoria - the ideal first food for many small species, is found naturally occurring in stagnant or green water. Artificial substitutes such as Liquifry are excellent, but must be used in moderation if pollution of water and subsequent loss of fry is to be avoided. One useful adage to remember, since it is better to err on the cautious side

when feeding is: "Better to have few fry survive than none at all."

When attempting to select the appropriate size of food to feed, the eye size is a good guide and once fry have been reared to take brine shrimp then the easier feeding should become. The purity of water stock is very important in fry raising, and regular water changes are an absolute must. Just like athletes, if effort and dedication are put in, then the end result will prove worthwhile.

A 24" by 12" by 10" tank will prove suitable for breeding most species of up to 3" in length, but water depth will vary with species. Of the species with which I have had success, I find the Panda Corys lay comparatively large eggs, whereas Corydoras sterbae, which is a much bigger fish, produces fry no fatter than the hair on your arm attached to a pin-head sized egg sac. The young of dwarf Apistogramma cactuoides will take live brine shrimp, but you should wait until they rise up like a cloud before using this.

I hope the table included next, assists the potential breeder, but to learn the most about the subject you should join your local club or group. Please read all you can on the subject and even though a book cannot answer all the questions, you will find a significant improvement in your knowledge. Providing it does not become a chore, what better hobby could you possibly want than breeding new life and keeping species alive in the world?

FISH	PH	PPM	TEMP	EGGS	HATCH TIME	FREE SWIMMING	1 st FEED	2 nd FEED
Catfish	5.6-6.6	0.0-0.10	78F	80-150	24 hrs	4 days	infusoria	brine shrimp
Glassfish	6.0-6.6	0.0-0.20	78F	150-250	24 hrs	3 days	infusoria	infusoria
Nemo	5.6-6.6	0.0-0.10	78F	80-150	24 hrs	4 days	infusoria	brine shrimp
Bury Terra	6.4-6.6	0.55-0.85	80F	50-100	48 hrs	4 days	infusoria	brine shrimp
Pony	7.0-7.2	100-150	78F	10-77	live	birth	brine shrimp	brine shrimp
Harlequin	5.0-6.4	0.0-0.50	80F	50-70	24 hrs	3 days	infusoria	brine shrimp
Red Line	6.0-6.6	0.70-0.90	70F	200-300	48 hrs	6 days	infusoria	infusoria
Rasbora	7.0-7.2	100-150	78F	200-300	4 days	7 days	infusoria	brine shrimp
Danio	7.0-7.4	100-150	78F	100-150	48 hrs	4 days	infusoria	brine shrimp
White	7.0-7.4	100-150	78F	100-150	48 hrs	4 days	infusoria	brine shrimp
Chad	6.8-7.4	0.80-1.20	75F	20-60	5 days	3 days	infusoria	brine shrimp
Pencil Cory	7.2-7.4	150-180	70F	200-350	6 days	8 days	brine shrimp	microworm
Abbie	6.8-7.2	0.80-1.20	78F	25-100	3 days	7 days	brine shrimp	fine dafn
Cory	7.0-7.2	120-150	80F	80-150	3 days	7 days	brine shrimp	fine dafn

pH VALUE

Have you ever wondered what the pH in pH value ever stood for? These two highly important letters stand for pondus Hydrogenii which can be translated as the weight of the hydrogen.

Nowadays it is not difficult to measure pH as aquarium dealers supply special kits for this purpose. The pH can be lowered by adding very small amounts of dilute phosphoric acid (3%) to the water, but this procedure is not to be recommended for the novice. Special mixes can be purchased to save us the trouble of worrying about measuring this so carefully. When the water is already very soft, it can be acidified by adding tannins. These may be in the form of oak leaves, willow roots or nutshells or tannin. Dissolve 0.1-0.3 grams of tannin in 10 litres of water, allow it to stand for 4 days and then add to the tank.

Most aquarists would prefer to use peat or peat extract. A peat filter would be an ideal solution and should be renewed every two weeks. If the tannin levels become too great the fish may not be adversely affected, but the plants will soon begin to suffer. If this is the case the tannin levels can easily be redressed by replacing some of the water.

In the tropics a certain amount of lake and river water evaporates all the time and this water is constantly replaced by rainwater. In the aquarium some evaporation will take place, and this should be replaced by soft water, because the percentage of dissolved

salts will increase as the water evaporates. It would obviously, therefore, be wrong to add hard water as this would still further increase the salt content. When carrying out a renewal of a proportion of the water care is needed to ensure that any small bubbles introduced are not allowed to settle and remain on the fish and plants.

Whatever their natural habitat, if you want your fish to breed and to be happy in captivity you should mirror these conditions as much as you are able. The reason for this lies in the structure of the eggs and sperm, which are single cells surrounded by a very thin membrane and contain water with dissolved salts. The eggs and sperm are also surrounded by water containing dissolved salts. Thus there are two fluids separated only by a thin semi-permeable membrane. If the two fluids contain the same amount of dissolved substance there will be no movement of water from one to another. If, however, the eggs and sperm from fish that come from soft water areas are put in water with a greater concentration of dissolved substances, water will pass into the cells faster than it passes out, and then the cells will swell and burst.

If the local water is too hard it can, of course, be diluted with distilled water to reduce its hardness, but this would be an expensive process. Some aquarists travel to areas with soft water and bring it back in containers; but this is also expensive and time consuming. The best method is to remove the hardness, using water-softening equipment such as is now available on the market. This removes all the salts

and leave de-ionized water which is biologically comparable with distilled water, and its pH should be about 7. Filtration through peat will reduce the pH. In theory rainwater should also be soft and suitable for the aquarium, but nowadays in many industrial areas the water may be heavily polluted.

AT THE BEGINNING OF TIME

but not as we know it Jim!

(A quiet reflection on the past millennium or just a little longer, by Roger Crew.)

It occurs to me that the current issue of FISHWORLD will be the last to go to press as the saying goes, in 1999. For some totally unfathomable reason, some innumerate person started the nation on the road to celebrating the fact that mankind has managed to exist for what will be 2000 years since the supposed birth of Christ. It must have been a politician, only they could manage to get us to celebrate the event a year early after only 1999 years have passed. In a moment of reflection, it brought me to thinking that the subject of our hobby, Fish, have managed a little longer and that is what brought me to produce this little fishy history lesson.

Among animals, fish have achieved outstanding success. Furthermore it is believed that the earliest land vertebrates were derived from a group of extinct fishes.

The earliest known vertebrates were the Ostracodermi, which flourished in the Silurian period, about 350 million years ago. (That's 350,000 millennia which makes a celebration about 2 seem rather inconsequential.) Those Ostracodermi were fish-like animals about 30 cm long and heavily armoured with bony plates on the head and smaller scales on the rest of the body. Their mouths were small, slit like or round and they had no jaws.

The origin of true fishes first appear in fossil records and are found in Devonian rocks laid down about 320 million years ago. They were cartilaginous belonging to the Chondrichthyes and they evolved in freshwater. During the late Devonian period, there was a great migration of Chondrichthyes into the seas although freshwater representatives are found in the Mesozoic and even in Tertiary rocks. Many types of cartilaginous fish became extinct. The bony fish (Osteichthyes) are a much more important group, having given rise to the lung-fishes (Dipnoi), lobe-fins (Crossopterygii) and the ray-

fins (Actinopterygii). When the seaward migration occurred, both lung-fish and lobe-fins remained and developed nostrils allowing them to breath air at the surface. The present occurrence of Dipnoi, in Australia (Ceratodus), Africa (Protopterus) and South America (Lepidosiren) is evidence of a once wider distribution.

It is in the Crossopterygii that we find the probable ancestors of land vertebrates. Among the Crossopterygii, the most likely ancestor of terrestrial vertebrates probably belonged to the Osteoleptidoti, all of which became extinct around 200 million years ago. (One order of the Crossopterygii being the coelacanthini!)

The Actinopterygii evolved along a different path with the supporting skeleton of the fins consisting of dermal fin-rays. They still bear the relic of a lung in the swim-bladder. The use of the lung was undoubtedly an important feature in the success of the Teleostei, an order which includes most of the bony fish of today. A number of other orders of the Actinopterygii have become extinct with the exception of solitary modern representatives such as polypterus, the sturgeons of the order Acipenseroidi, the North American gar-pike Lepidosteus and bowfin Amia.

All in all then, there are quite a few modern representatives which can look back and celebrate quite a few more years than the odd millennia or so. Happy new year fish, may you survive as long again!

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JUDGES CORNER



Again we come to the end of another year. I stop to consider what has happened over the last twelve months.

There have been some considerable strides forward made by the Judges and Standards Committee.

1999 has seen more changes made to the Size Sheets than has probably ever been seen before in the history of the Federation.

We can also add to this the recent agreement with the Federation of Northern Aquatic Societies to common show sizes for fish.

BEST WISHES TO EVERYONE FOR CHRISTMAS AND THE NEW YEAR.

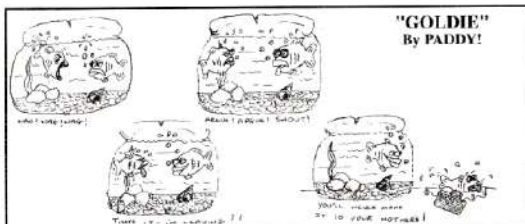
We hope to be able to make as many strides and small steps forward with your support next year.

**Colin Pannell,
9 Edwin Road,
Hastings,
East Sussex TN35 5JT**

Unfortunately just before going to press the Editor heard that Colin had been taken into hospital with an - as yet - undiagnosed heart problem.

Our sincere best wishes go to Colin, Joan and family.

We wish Colin a speedy recovery and return home.



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