AQUARIST & POND KEEPER

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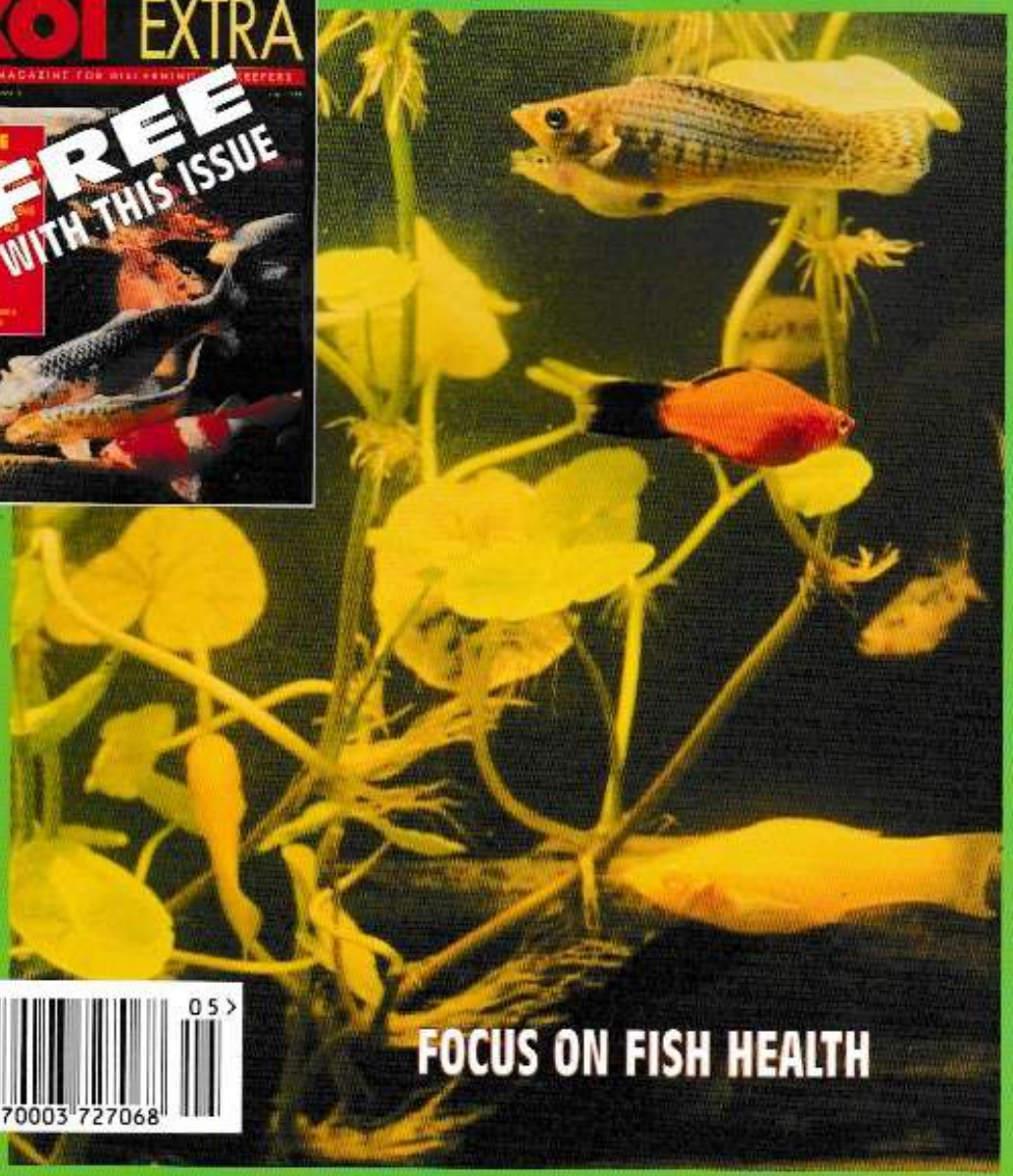

FOCUS ON FISH HEALTH

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REGULARS

COVER

If you are about to comment upon the poor health of the fish in our cover shot, it was chosen quite deliberately to illustrate the main Focus theme for this month — Fish Health. Unfortunately, everything in the aquarium isn't always ideal and we take a long look at health problems and how to deal with them in this issue.

PHOTOGRAPH: COURTESY OF TETRA

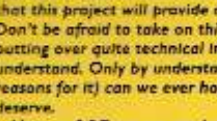
COMMENT

I'm afraid that this month, wherever you look in this issue or in the associated KOI EXTRA, there's going to be a bit of doom and gloom. This is because in our 'Focus' this month we are concentrating on fish health problems, a subject that is also pondered over elsewhere as it concerns Koi.

However, whilst the subject be one that is, hopefully, not one that will affect the majority of readers' fishes for an exactly popular topic of conversation, such setbacks need to be faced or anticipated. Should you notice some symptom or other in your fishes then deciding then to do something about it is obviously the best course of action, but if you feel you are not capable of arriving at a positive diagnosis within a short space of time then your fishes may well be doomed.

Forewarned is forearmed, as they say, so this month we are beginning a major series on Fish Diseases which will explain quite precisely what these diseases are, their causes and (happily for us) the most modern and effective treatments. You can bet money on the fact that some unfortunate fishes will fall foul of the disease that is described in a later issue, but it is hoped that this project will provide a basic grounding for use in the future. Don't be afraid to take on this series, the author has a knack of putting over quite technical information in a way that we all can understand. Only by understanding exactly what is going on (and the reasons for it) can we ever hope to give our fishes the lifestyle they deserve.

Here at A&P we are not intimidated by out of the ordinary things and we are particularly pleased to present a group of fishes which may be unfamiliar to you and which come from a usually-neglected (in terms of aquatic literature coverage anyway) area — South Africa. This part of the African continent seems to have existed in the shadow of its northern 'stars' from the Rift Valley Lakes and eastern and western rivers and swamps for too long — maybe we can unlock a few more secrets in the future.



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FOCUS ON
FISH
HEALTH

Are You Kill Your Fish

Linda Lewis points an accusing finger at YOU!

PHOTOGRAPHS BY THE AUTHOR

▶ Some fish ALWAYS look eager for food.

The first time you pick up a book on fish diseases can induce panic. There are so many disfiguring and fatal illnesses, all just waiting to attack your precious fish. Then, when you look at your aquarium, it's easy to imagine all kinds of symptoms. Does that catfish have drooping fins, there's a piece missing out

ting

?

of a Danio's dorsal fin, will it lead to Fungus, are those marks White Spot?

I remember those days well. I must have spent a fortune on every kind of remedy. Now, I use very little in the way of medication. What's changed? I have. Experience has taught me that most of the problems suffered by my fish were: (a) so minor they could have been left to clear up by themselves; (b) caused directly or indirectly by me; or (c) (and this is now most often the case in my tanks) simply the result of the advanced age of the fish themselves.

I'll take a brief look at this last situation first. Many of the smaller tropical fish only live for a few years — say three, maybe four, as an average. As they reach the end of their natural lifespan they become weaker and more frail, just like humans. They may develop humps and the older they get the more susceptible they become to infections and diseases. An outbreak of White Spot in young healthy fish is easily treated, but to an old fish, it may just prove too much. To lose a fish to age is natural. Next time you find a fish dead, ask yourself the question, how long have I had it? You may be surprised to find that answer is several years.

What about problems that if left alone will clear up by themselves? Judging this comes with experience, however, things like minor damage to fins are a safe bet. So long as the fish is in good health, and water quality is good, the fin will grow back. Even the sensitive barbels of a *Corydoras* catfish will recover to some extent. The new set of whiskers may not be as good as the original, but a surprising amount of regeneration is possible.

Isolation or Removal? The Choice Has To Be Made

If you do decide to treat a

▲ Loss of this female *C. aeneus'* barbels did not stop her spawning.

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Are You Killing Your Fish?

fish, then the choice has to be made between removing it to an isolation tank, or treating the whole aquarium. Sometimes, the very fact of catching and transferring a fish can hasten its demise due to the stress involved. A case in point here is the Silver Hatchetfish. Buy a group of these that look in perfect health when they're in the shop, get them home, and within a day or so, they will almost certainly have developed White Spot. If they are in a quarantine tank, and you treat them, they may become ill again as soon as you move them to their permanent home.

Then you either have to treat the whole tank, or remove the Hatchets and start the whole process again! The cycle could go on being repeated ad infinitum. I got round this problem by letting the shop quarantine the fish for me. Then I could put them straight into their permanent quarters.

When the White Spot inevitably struck I treated the whole tank. Although all the Hatchets were affected none of the other fish suffered at all for they were in good health, and had not just suffered the stress of a move.

Fishkeepers themselves pose the biggest threat to fish health. The first and easiest trap to fall into is that of overfeeding. Some fish — Livebearers and Goldfish spring to mind — will come to the front of the tank and beg for food as if they are on the verge of starvation, no matter how often you feed them. How can we resist them? It is difficult, but we must try. In the wild, a fish does not know where its next meal is coming from so when food is available it eats — hungry or not. Any food that is excess to requirements will pass through the fish's body undigested. In a fast-flowing river or huge lake this is not a problem. In a small tank it can quickly lead to pollution and a fatally dangerous rise in nitrite levels.

Different Species Eat at Different Rates

There are bound to be arguments, but where several people share a home it is best to have just one who feeds the fish. Failing this a rota can be set up. Everyone loves to feed fish, but not everyone has the same idea of a 'pinch of flake'! Even if you are not overfeeding there are other potential pitfalls.

Different species of fish eat at different rates. Compare a shoal of Neons with a Platy, or a species of *Corydoras* with an Upside-down Catfish, a Harlequin with a Penguin Fish. In each case the first named fish is a dainty eater — one piece of flake or worm dealt with at a time, carefully swallowed

▼ Upside down cats gorge until they swell.

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FISH HEALTH

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before the next is taken. The second named species simply grab as much food as they can, and take in four times the amount. Not surprisingly, this can mean that less forward fish are left hungry and bottom feeders may be left waiting for food that never arrives.

Getting round this problem is easy. Divide the food into four portions, thus giving all the fish four chances, or put some food in at each end of the tank at the same time, or better still, feed two different types of food. However fast a *Danio* is, it cannot scoop up all the flake and catch all the *Daphnia*!

As you all know by now there is always an exception in fishkeeping. Overfeeding may cause trouble for most kinds of fish but with the Kissing Gourami the reverse is often true. These fish need to be fed at least two or three times a day or they will not grow properly or thrive.

Too much food, or the lack of it, may be a big killer but stress is arguably responsible for more fish deaths than anything else. Stress lowers a fish's resistance making it more open to infection, and less able to fight off illness. A little stress is inevitable and does no harm. Prolonged exposure to stress does the damage.

Some stressors are easy to identify — being chased round the tank by a net is one! Others are less obvious. Try for a moment imagining that you are a fish. You are small, and are used to living in a huge shoal. Suddenly you are alone, or with just one or two companions. You are confined in a small space. A fish five times bigger than you approaches. Stress. It makes no matter that the big fish is a vegetarian. The small fish doesn't know that. It spends all its time keeping out of the way, and as a result misses out on its fair share of food, gradually becoming weaker.

Provide Plenty of Cover

Take another example. You are a female Siamese Fighter. It takes you five days to mature your eggs. The male is ready to mate and keeps trying to get you to join him but you're not ready, and, worse still, there's nowhere to hide. If you're not killed by the impatient male you will certainly be weakened by the high level of stress. Providing plenty of cover in the form of plants and rockwork (both can be either real or plastic) gives harassed fish a place to hide or to rest. Knowing that there is cover that it can retreat to will also help to turn any very shy fish into a bolder one.

Sudden changes in water conditions also create stress. One potentially-lethal problem can be caused by using a faulty heater. It may be working, but instead of allowing the temperature to vary by just one or two degrees it may allow much larger

▼ Hatchets need top waters to be relatively quiet if they are to settle.

variations. The smaller the tank the more harm this will do as the fish are exposed to daily (or more frequent) temperature fluctuations they simply would not encounter in the wild. A similar problem can be caused by siting a tank in a window where the heat of the sun can raise the water temperature to stressful levels.

Being too enthusiastic in your tank maintenance can also cause problems. When I was first introduced to fishkeeping I was told to rinse out the filter sponge under the tap, and to replace the sponge every six months. The chemicals in tap water can kill the beneficial bacteria that are needed if the filter media is to do its job. Throw all the sponge away and the bacteria go too. The solution is simple. Rinse out the filter in water removed from the tank when you are doing a partial water change and replace just half the sponge at a time.

Often fish die within days of being bought. They may have been perfectly healthy, in which case their demise has probably been caused by a sudden change in water conditions. Take a fish that has been living in soft, acid water. Transfer it to hard, alkaline water and the shock will be enough to kill it. Most fish can be acclimatised to different conditions, but time is needed in order to make the changes gradually.

Stick With Fish that Suit your Kind of Water

Always check with the retailer what conditions the fish have been used to. Unless you are determined to put yourself to a lot of trouble it pays to stick with fish that suit your kind of water. It's best not to assume that, for example, Swordtails are being kept in alkaline conditions for the breeder may have raised the fry in acid water to suit local conditions. Test the water yourself if you're uncertain.

However hard we may try we cannot reproduce totally natural conditions for our fish. However, if we pay attention to the requirements of individual species we can at least remove much of the unnecessary stress in their lives.

▼ Kissing Gouramis — unusual in that they can easily be underfed.

Frederick Ellis shows how to provide cover for your pond

PHOTOGRAPHS BY THE AUTHOR

Constructing a Pond Pergola

The completed pergola providing cover for the pond.

Frequent raids by herons on the garden pond ensured the resident fish lived in a state of constant trepidation and some disappeared, never to be seen again. The dummy heron fooled no-one, and the floating duck was equally unimpressive. In the end, the only way to ensure the survival of the Koi Carp and other piscean inhabitants of the pond was to cover it with netting. This certainly worked, but was unsightly and spoilt the beauty of the pond area.

The pergola idea came into being as a result of herons spotting the pond during their flight overhead, and if it could be disguised part of the battle would be won.

Constructing a Pond Pergola

It was believed part of the trouble was the herons spotting the pond during their flight overhead between reservoirs, and if the pond could be disguised part of the battle would be won. The pergola idea came into being, but on contacting a professional about the work the response was less than enthusiastic. Apparently, pergolas don't go over ponds!

PLANS TAKE SHAPE

It was then that DIY plans for the pond pergola started to take shape. First a sketch of the pond area was made (by an artistic daughter), and the uprights were added to the sketch to see how it would look, the idea being to leave large gaps at the side of the pond nearest the house to give an open aspect.

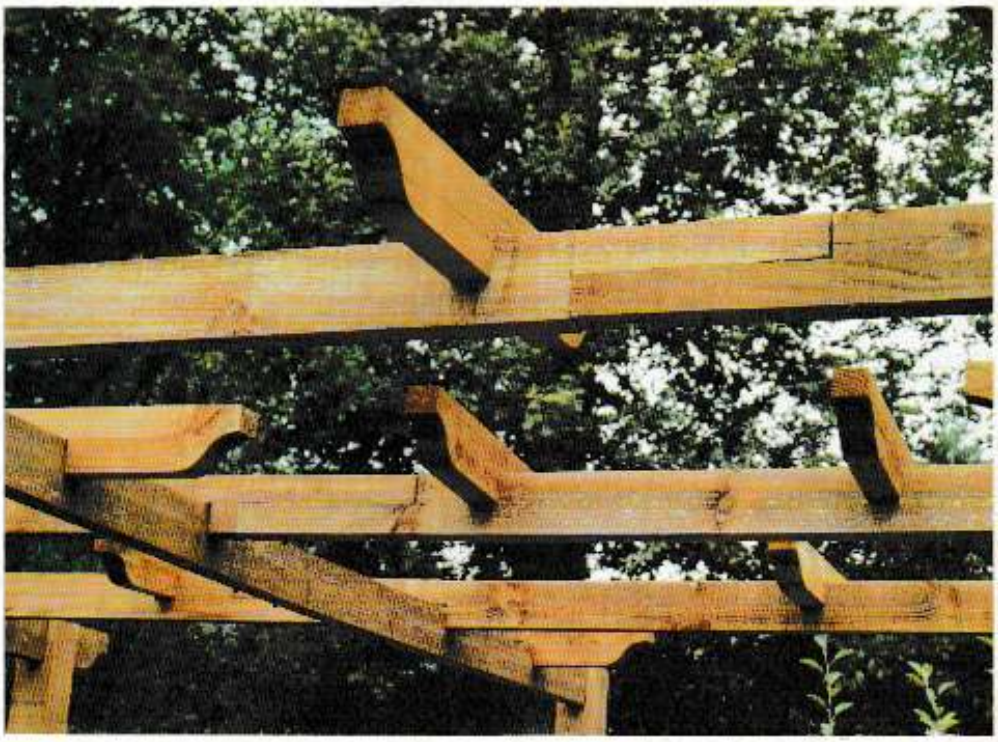
Satisfied that the structure would not look too bulky or out of place, the work began. The timber came from a local garden centre, supplied by Forest Fencing Limited, being part of their Forest Pergola System. Nine 9ft 4in x 4in slotted uprights, two 9ft 4in x 2in rafter/crossbeams, six 8ft rafter/crossbeams and three 6ft rafter/crossbeams were ordered. The width of the pond was such that longer rafter/crossbeams were needed, but 9ft was the maximum length available. This problem was solved by butt-jointing rafters together, securing the joint with 5in steel coach bolts.

The first job was to dig out nine holes 1½ft deep to house the uprights. Before concreting these in place it was essential to place the rafter/crossbeams in position to ensure the slots in the top of the uprights were correctly aligned. A spirit level and a builder's mate (the wife) were helpful in ensuring the posts were truly vertical when cemented in. Then the rafters/crossbeams, previously cut to the right lengths and joined where necessary, were slotted into place. Beams running the length of the pond were also butt-jointed, and laid across the top. Where they crossed the beams running crossways slots were cut to add extra security to the construction.

Finally, 21 2ft mini-rafters were purchased to add the finishing touch and the job was complete. The work

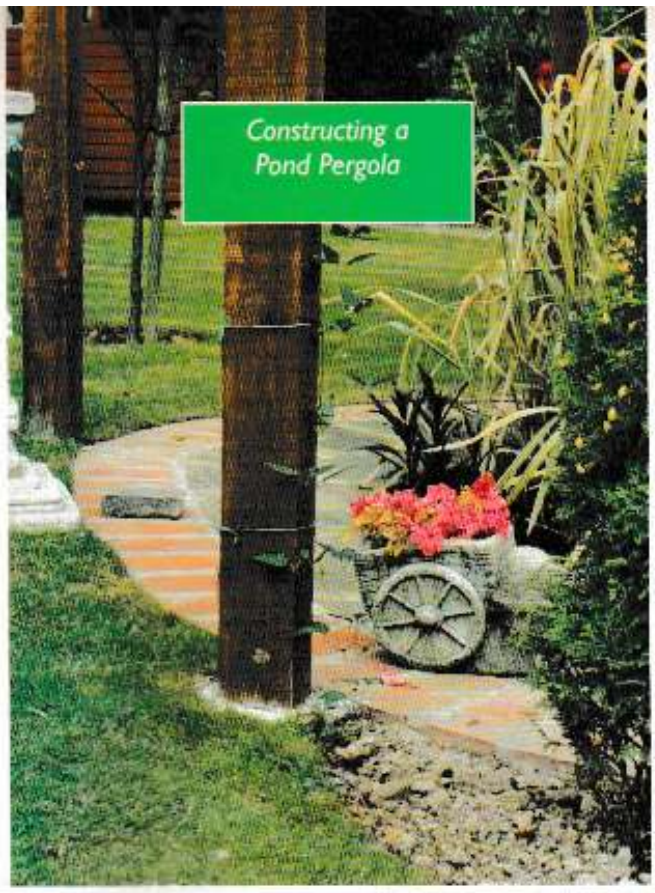
COST OF PERGOLA SYSTEM — VAT INCLUSIVE

Item	Cost Each	Quantity	Total
9ft 4in x 4in Slotted Upright	£14.99	9	£134.91
9ft 4in x 2in Rafter/Crossbeam	£8.29	2	£16.58
8ft 4in x 2in Rafter/Crossbeam	£7.15	6	£42.90
6ft 4in x 2in Rafter/Crossbeam	£6.59	3	£19.77
21 2ft Mini Rafters	£2.49	21	£52.29
		TOTAL	£266.45



The problem of needing a longer span than the maximum 9ft rafter length provided was overcome by butt-jointing together, finally securing the joint with a 5in steel coach bolt.

Constructing a Pond Pergola



Evergreen plants, such as Clematis (shown here), can be trained over the structure to give greater protection.

was spread over two weeks, as when you are past retirement age it doesn't pay to hurry! However, the main time element is in fixing the uprights and allowing the cement to go off, and the woodwork which included joining the rafters/cross-beams together and cutting slots out of the rafters running lengthways.

The garden centre were offering a 20 per cent discount on purchases over £200, so be prepared to negotiate on prices! Incidental costs include concrete, coach-bolts and climbing plants.

FINISHING TOUCHES

Evergreen plants including Clematis and Jasmine will be trained over the structure to give greater protection from prying eyes (and beaks!) and as an extra precaution small brass hooks were placed on the inside of the posts, so whenever we go away a 2ft high net is looped from post to post to prevent any 'walk-in' intruders.

Further information on Forest Pergola Systems (brochure also gives line drawings of the different components) can be obtained from: Forest Fencing Ltd, Stanford Court, Stanford Bridge, Nr Worcester WR6 6SR. Tel: 0886 812451.

Dave Garratt considers these graceful but difficult beauties

PHOTOGRAPHS BY A&P LIBRARY UNLESS OTHERWISE STATED

Butterflyfish

INTRODUCTION

The Butterflyfish belongs to a family of over 100 species, known as the Chaetodontidae. The vast majority are found in shallow tropical waters of less than 70ft. Many show striking colour patterns that may change as the fish matures. However, these maturity-linked colour variations and striking patterns are not demonstrated as prominently as in their close cousins the Angelfish. They are a family of delicate, graceful fish that constantly exhibit a browsing/grazing nature.

Unfortunately no Butterflyfish can be considered as easy to maintain in a home aquarium and they are certainly not for the inexperienced beginner. There is, however, a wide variation in their sensitivity and adaptability to an aquarium diet. In the hands of the aquarist some are much hardier than others. I will use this factor as the basis for the comparative nature of this article, choosing three categories suggesting varying chances of success within the aquarium. Similar species to the one featured are listed at the end of each review. The similarity only refers to an equality of hardiness in captivity. The species may be widely different in shape, size and behaviour but will present similar hopes of success to the featured species.

THREADFIN BUTTERFLYFISH (*Chaetodon auriga*)

Category: Easy. Easy is something of a misnomer as no Butterflyfish can be truly regarded as easy. However, this category presents the aquarist with his/her best chance of acclimatising and successfully keeping a Butterflyfish.

Size, Origin and Availability: A readily available species from the Indo-Pacific. A Red Sea sub-species exists but is rarely seen within the hobby. Reaches 7in in the wild but is limited to 3-4in in captivity.

Feeding Habits: A constant browser with omnivorous habits that include coral polyps, algae and small invertebrates. Will usually adapt to take a varied aquarium diet that should include Brine Shrimp and specialised frozen foods.

Aquarium Needs: An active, but shy, species that requires plenty of swimming space and many hideaways into which it can retreat. Tank-

No Butterflyfish can be considered as easy to maintain in a home aquarium and they are certainly not recommended for the beginner.

A couple of Butterflyfish — Saddle-backed Butterflyfish, *C. falcula* (top) and the Long-nosed Butterflyfish, *Forcipiger longirostris* (bottom).

mates must be of a similar nature, as like most Butterflyfish the Threadfin cannot compete with over boisterous rivals. Excellent tank maintenance and water quality is required.

Compatibility: Peaceful towards other fish including other Butterflyfishes. However, as with most marine fish it is not be recommended with its own species and caution must also be exercised with similarly marked or coloured species. Because of its fondness for coral polyps it cannot be trusted in a mixed aquarium containing them.

Hardiness in Captivity: Because a suitable diet can be provided within the aquarium this species is one of the easiest Butterflyfishes to keep in captivity. However, hardiness is a relative term and no Butterflyfish is suitable for the beginner. The basic aquarium needs mentioned earlier must be met in full.

Similar Species: *C. vagabundus* (Vagabond Butterflyfish), *C. lunula* (Racoon Butterflyfish), *C. kleini*, *Heniochus acuminatus* (Wimplefish), *Hemitaurichthys zoster* (Black Pyramid Butterflyfish).

THE PAKISTANI BUTTERFLYFISH
(*Chaetodon collare*)

Category: Unpredictable. Butterflyfishes in this category lead to many conflicting reports as to their ability to acclimatise to aquarium life.

Suggestions have been made that the geographical origin and/or habitat of the fish may play a role. Other suggestions revolve around diet and water parameters.

Size, Origin and Availability: A readily available species with a widespread distribution across the Indian Ocean. Reaches 6in in the wild but is limited to 4in in captivity.

Feeding Habits: Like most Butterflyfishes it is a constant browser seeking out coral polyps, algae and small invertebrates. Like the other species mentioned later, eg. the Pearlscale, it may be too reliant on its natural diet and unable to adapt to an aquarium diet. A wide variety of commercial foods, especially formulae containing coral sponges and plankton, must be tried.

Aquarium Needs: Butterflyfishes — and this species is no exception — require plenty of swimming space and many retreats to provide shelter. It goes without saying that excellent water quality is of paramount importance. As is the case with many of the more delicate fish we keep small juvenile specimens will acclimatise to captivity more readily than larger mature fish.

Compatibility: The Pakistani Butterflyfish is not as shy and retiring as some of its cousins and may show aggressive tendencies. This aggression may be directed towards other fish (including other Butterflyfishes) and it will not tolerate its own species. Its fondness for coral polyps means it cannot be trusted in an aquarium containing them.

Hardiness in Captivity: As already stated this is a subject of general disagreement within the hobby. Some hobbyists have successfully kept them whilst others remain convinced of their unsuitability for captivity. The next section lists many species falling into this area of uncertain prospects with regards to success for the hobbyist.

Similar Species: *C. ephippium* (Saddleback Butterflyfish), *C. falcula*, *C. semilarvatus* (Addis Butterflyfish), Pearlscale Butterflyfishes (four similar species of *C. chrysurus*, *C. xanthurus*, *C. mertensii*, *C. paucifasciatus*).

COPPERBAND BUTTERFLYFISH
(*Chelmon rostratus*)

Category: Impossible! I can already hear the voices of disagreement against my categorisation of this very popular Butterflyfish. But, stop and think — how many aquarists have you known who have kept this species alive for more than six months? My own answer is a solitary one out of at least a score of captive specimens.

Arabian Butterflyfish, Chaetodon melapterus, from the Red Sea and Indian Ocean.

Size, Origin and Availability: Although still fairly common it is not seen in dealers' tanks in anything like the numbers it used to be, perhaps aquarists are getting wise to its problems. Found in the Indo-Pacific and the Red Sea. Reaches 6in in the wild but is limited to 4in in captivity.

Feeding Habits: A constant browser amongst coral polyps as it looks for algae and small invertebrates. However, in view of its usual slow aquarium demise its diet could be more complex than we realise. Other 'impossible' species are reliant on their natural coral polyp and sponge diets which cannot be readily catered for in captivity.

Aquarium Needs: All Butterflyfishes are renowned for requiring excellent water conditions. In addition to dietary problems the demise of some of these 'impossible' species may perhaps be due to an undetected deficiency in our water management?

Compatibility: Will not tolerate its own species. The coral browsing nature of the Copperband and the natural diet of coral polyps found in the other species means they cannot be trusted in an aquarium containing them.

Hardiness in Captivity: I think I have already made my point regarding hardiness. These species are just not suited for captivity and it is really a crime to take them from the reef. Whilst you may not agree with this statement as regards the Copperband I believe the other species leave little room for disagreement.

Other Similarly 'Impossible' Species: *C. meyeri* (Meyer's Butterflyfish), *C. octofasciatus* (Eight-banded Butterflyfish), *C. ornatissimus* (Ornate Butterflyfish), *C. trifascialis* (Chevron Butterflyfish), *C. trifasciatus* (Rainbow Butterflyfish), *C. austriacus*, *C. bennetti* (Bennett's Butterflyfish), *C. larvatus* (Red-faced Butterflyfish), *C. melapterus* (Arabian Butterflyfish), *C. triangulum*.

ABOVE
Pakistani Butterflyfish, *Chaetodon collare*.
PHOTO: LINDA LEWIS

LEFT
Addis Butterflyfish, *C. semilarvatus*, also from the Red Sea.

FOCUS ON
FISH
HEALTH

Diseases of Fishes

Robert J. Goldstein, PhD,

begins a major series with an introduction to bacterial diseases

PHOTOGRAPHS BY THE AUTHOR

▶ Rod shaped bacteria. The purple colour after the final stage of the Gram staining procedure indicates these to be Gram-positive rods, common in the environment. Vibrio (not illustrated here) are curved rods that would stain Gram-negative.

▶ A characteristic of some pathogenic Gram-negative bacteria is the production of gas in lesions, easily smelled when the lesion of a large fish is punctured. In a small fish, as in this *Terranotas dolichopterus* from South America, gas may force the eyeball outward from the socket.

The number and variety of bacteria is breathtaking, and even a college course cannot begin to cover the myriad groups. I used to teach one, and I know. Some common bacteria like *Streptococcus* can be harmless, or can produce a mild human disease like strep throat or a deadly disease like liquefying fasciatus. The same is true for fish bacteria. Most are harmless, and many are beneficial. Only a few are important disease agents. The world's bacteria are important for many reasons, so let's consider their diversity and importance to the world beyond your fish tank.

Bacteria (ium = singular; ia = plural) are single-celled living creatures neither animal nor plant. They differ from higher forms of life in the structure and substructure of their cell.

Inside the cell, there isn't any nice, neat nucleus enclosed in a nuclear membrane and containing pairs of stick-shaped chromosomes. Instead, the nuclear material is scattered through the cytoplasm within the cell. Bacterial genes are not on pairs of stick-shaped chromosomes. Instead, most of the genes are arranged on an elongate, single, ultra-thin circular chromosome somewhere in that cytoplasm. Also within that cytoplasm are genetic fragments packed into almost invisible structures called plasmids. More on plasmids later, because they're important.

A most important characteristic of bacteria is the structure of the cell wall. The walls of bacteria fall into just a few categories, identified by their reactions to some stains we'll describe later. When a bacterium divides to form two daughter bacteria it must make new cytoplasm, internal parts, and — most important for antibiotic therapy — new cell wall material. Thus, most of our antibiotics work through their ability to interfere with cell wall synthesis or their ability to penetrate one of the three types of wall to get inside and interfere with a biochemical pathway essential to bacterial survival and reproduction.

Table 1. Major Bacterial Groups (after Holt, et al, 1994).

Group 1	Spiral Bacteria or Spirochetes
Group 2	Motile Aerobic or Microaerophilic, Gram-Negative Spirals or Curved Rods.
Group 3	Usually Nonmotile Gram-Negative Curved Rods.
Group 4	Aerobic/Microaerophilic Gram-Negative Rods and Cocci.
Group 5	Facultatively Anaerobic Gram-Negative Rods.
Group 6	Gram-Negative, Anaerobic, Straight, Curved, or Spiral Bacteria.
Group 7	Sulfur Reducing Bacteria.
Group 8	Anaerobic Gram-Negative Cocci.
Group 9	Rickettsias and Chlamydias.
Group 10	Anaerobic Photosynthesizers.
Group 11	Aerobic Photosynthesizers.
Group 12	Sulphur, Manganese, Iron, Ammonia, and Nitrite Oxidising Bacteria.
Group 13	Budding and Branched Bacteria.
Group 14	Encased Bacteria.
Group 15	Nonphotosynthetic, Nonfruiting, Gliding Bacteria.
Group 16	Fruiting, Gliding Myxobacteria.
Group 17	Gram-Positive Cocci.
Group 18	Spore-forming Gram-Positive Rods and Cocci.
Group 19	Regular Non-spore-forming Gram-Positive Rods.
Group 20	Irregular Non-spore-forming Gram-Positive Rods.
Group 21	Mycobacteria (Acid-Fast Bacteria).
Groups 22-29	Actinomycetes (fungus-like bacteria).
Group 30	Mycoplasmas (Modern Bacteria Without Cell Walls).
Group 31	Methane-Producing Bacteria.
Group 32	Ancient Sulfate Reducing Bacteria.
Group 33	Halobacteria (Salt Bacteria).
Group 34	Ancient Bacteria Without Cell Wall.
Group 35	Hot Vent Sulfur Bactena.

Since bacteria don't have bones, feathers, blood, teeth, leaves, bark, nuts, pollen, or a fossil record, we don't classify them the way we classify animals and plants, that is, in an evolutionary arrangement that reflects relationships and common ancestries. Bacteria are too small, and have too few parts (if you can call them

▼ This shallow, bloody lesion on an African *Nothobranchius* annual killifish is characteristic of *Aeromonas* or *Pseudomonas* infection.

FOCUS ON

FISH HEALTH

Diseases of Fishes

parts). They do have shapes (more or less constant) and they do have pretty constant reactions to a few chemical dyes that we call specific bacterial stains, related to the structure of their cell walls. A couple of those stains are the acid-fast stain and the Gram stain. These 'stains' are really staining procedures consisting of a number of steps. The value of these stains is that they divide bacteria into a few major groups with many properties in common, most importantly, the susceptibility to classes of antimicrobial drugs. The majority of fish diseases are caused by bacteria with similar cell walls, and a similar reaction to the Gram stain that classifies them as Gram-negative.

Bacteria also differ in what they can grow on (or 'eat'). You've seen decomposing vegetables and meat, sour milk, and rotting fruit. That's all due to different kinds of bacteria that can digest substances in these foods. As they digest the foods, they emit waste liquids, gases or acids. It can also happen in canned goods, because some bacteria are anaerobic, while most of the ones we know need oxygen just as much as we do. Knowing all this, microbiologists (that's not tiny biologists but biologists that study tiny creatures) can classify bacteria by what they look like, what they grow upon, and what waste products they emit. If this were a college class, I'd say that bacteria can be broadly classed by shapes and staining characteristics, and then more specifically by whether they have this or that enzyme system capable of fermenting a sugar, producing an acid, eliciting a gas, dissolving a substance in their growth medium, multiplying in the presence or absence of air, and growing at a particular temperature or in a particular concentration of salt. (Aren't you glad you didn't go to college to become a microbiologist?)

Confusing? You bet. But bacteriologists are, if nothing else, sticklers for detail and have agreed upon a system of classifying bacteria by all these properties. The bacteriologist's handbook to the subject is called Bergey's Manual of Determinative Bacteriology, and has been around ever since the birth of the science.

Today, bacteriologists recognize 45 groups of bacteria, each group containing numerous genera, species, and strains with distinctive properties. To illustrate just a few see Table 1.

Most of the bacteria that produce aquarium fish diseases are Gram-negative and located in Table 1's Group 4 (*Pseudomonas, Alteromonas*), Group 5 (*Vibrio, Aeromonas*), Group 15 (*Flexibacter, Cytophaga*). Some others are Acid-fast and they are in Group 21 (*Mycobacterium*), which is related to the fungi. Many of the bacteria in these groups affect coldwater and marine sport and commercial fishes (Inglis, et al. 1993) as well as aquarium fishes. They produce diseases variously called *Columnaris*, Gill Disease,

▶ Fin rot in this Blue Gourami (*Trichogaster trichopterus*) was cleared up with Furanace, a synthetic antimicrobial drug.

FOCUS ON

FISH HEALTH

Diseases of Fishes

Fin Rot, Septicemia, Dropsy, Furunculosis, and some other exotic names, but many bacteria can cause similar appearing diseases.

Aquarium fishes are susceptible to only about a couple of dozen pathogenic (disease-producing) species. The properties that make bacteria pathogenic (invasiveness, disease producing, resistance to the immune system, drug resistance) are associated more with strains (races) than with the species of bacteria. Thus, you can have pathogenic strains of many kinds of bacteria, but within one kind of bacteria (even a kind known capable of causing disease), the majority of strains are harmless.

All Antibiotics are not the Same

Antibiotics generally work only on Gram-negative bacteria, Gram-positive bacteria, or Acid-fast bacteria. Aquarists get antibiotics from pet stores, but is this wise? Industry suppliers purchase antibiotics in bulk from drug manufacturers and repackage them for the aquarium trade. In some cases, these drugs may be expired, with little if any antimicrobial activity. Does the package provide an expiration date? Would you buy undated milk? How certain are you of your diagnosis? How can you choose the best medicament? Your veterinarian can confirm the diagnosis, determine the appropriate treatment, and prescribe the most effective medications, including those not available over the counter. Cost of a vet visit and prescription? What are your fish worth?

Pathogenicity and Drug Resistance

Pathogenicity can be inherited and transmitted from parent to daughter bacteria upon cell division. But that's not the only way pathogenicity is transmitted. We now know that the genes for pathogenicity can be transmitted across bacterial species. How can that be? Do bacteria practice bestiality? Not really. It seems that the genes for drug resistance are often (not always) on those genetic fragments called plasmids, rather than on the bacterial circular chromosome. Bacteria can pass on genetic mutations conferring drug resistance to unrelated bacteria. One way is by fragmenting at death, the fragments of the dead bacterium's chromosome and the particles of plasmids then being taken up by the unrelated bacterium and incorporated into its own genetic material, either as plasmid or on the chromosome (transformation). A second way is when viruses of bacteria (bacteriophage = bacteria eating) invade a bacterial cell, and during their own multiplication pick up bacterial plasmids from the host, so that the new viruses will carry those plasmids to subsequent related or unrelated bacteria (transduction) during the next infection (Goldstein, 1997).

If this is confusing, just remember the bottom line. Through transformation or transduction, resistance to a specific drug can be transferred not only to a bacterium's progeny, but also from one type of bacterium to another. That just underlines how dangerous it is to allow drug resistance to occur at all, even on an obscure type of bacterium. If the drug resistance gene has survival value, that resistance may not stay solely with the obscure bacterial species but may be transferred to a common and important bacterial species.

That's happened in hospitals across the United States. Today, we are running out of effective antibiotics as drug resistant strains incorporate newer genes for resistance to still more drugs. Hospital bacteria are the melting pot, just like the USA. Eventually, almost all the bacterial species in hospitals will have all the genes conferring protection against all of today's antibiotics. This happened for lots of reasons, but the most important reason is the slovenly use of antibiotics for prophylaxis instead of saving up for when it was really needed. All we did was selectively breed drug-resistance into the bacteria.

To prevent drug resistant strains from arising, use an antibiotic only when it is the most likely one to work, use it at its maximum dose for a short time only, and use it in combination with one or two other highly effective antibiotics. The quicker you can wipe out a small population of bacteria, the more likely you are to wipe out a disease. The longer you expose bacteria to a sub-lethal dose, the more likely it is that the bacterial population will respond with drug-resistant mutants that then replace all others in the population.

References

Goldstein, R. J. 1997. Marine Reef Aquarium Handbook. Barron's, Hauppauge, NY. 198 pp.

Holt, J. G., N. R. Krieg, P. H. A. Sneath, J. T. Staley, and S. T. Williams. 1994.

Bergey's Manual of Determinative Bacteriology. Ninth Edition. Williams & Wilkins, Baltimore, MD. 787 pp.

Inglis, V., R. J. Roberts, and N. R. Bromage. 1993. Bacterial Diseases of Fish. John Wiley & Sons, NY. 312 pp.

Noga, E. J. 1995. Fish Disease — Diagnosis and Treatment. Mosby, St. Louis. 367 pp.

SHORE WATCH

BY
ANDY HORTON

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

In February this year I received a telephone call from Chris Gilbertson at the Mevagissey Marine Aquarium about a mystery fish that was trapped in a net at a depth of 40m off the Cornish coast. Unfortunately, the fish was dead, but it turned out to be the most interesting fish that I had ever received a report about.

WHAT SPECIES WAS IT?

If the commercial fishermen report an unusual fish or other animal trapped in a net or pot you can bet on it that it is certainly interesting, especially if they cannot put a name to it.

Chris explained that the fish resembled a Bass, *Dicentrarchus labrax*, but it obviously was not this common shoaling fish because the scales and teeth were different, and the inside of the mouth was coloured salmon-pink. This last observation quickly enabled me to put a name to the fish as *Argyrosomus regius*, which has been given the common name of Meagre in the popular guides. A quick count of the nine first dorsal fin rays and I was 99 per cent sure of the correct identification. There is always the risk that there is a similar species that is almost identical but not included in the book. The fish weighed about 1.6kg. It was inspected at the New National Aquarium in Plymouth and a positive identification was made.

DRUMFISH

The Meagre is the only member of the family of fishes Sciaenidae, known as the Drums that could conceivably be found in British seas. Fishes in the Drum family are distinguished by their ability to make a drumming noise by the rapid vibration of muscles adjacent to the swim bladder, which acts as a resonator (similar to a trombone). The deep rumbling sounds of the Meagre can be heard at up to 30m away. It will also be heard when the fish is removed from the water. The noise this fish makes has also given it common names of Croaker, Bubbler and Sea-sheep.

The small burrowing crustacean Axius stirhynchus can snap its largest claw to transmit a sound like breaking glass, which is rather disconcerting to the aquarist. PHOTO: ANDY HORTON

SOUND PRODUCERS

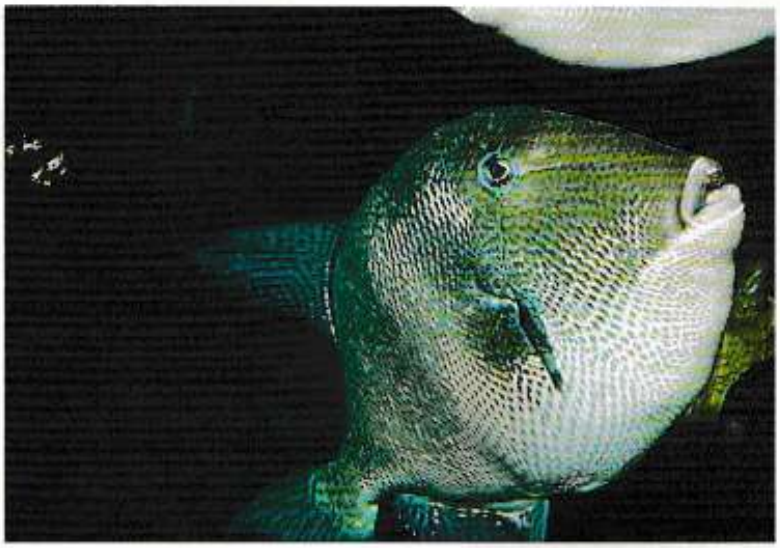
It is not a 'silent world' beneath the waves. Sound travels through water about five times as efficiently as it is transmitted in air. There are many other examples of fish that transmit sounds, notably the Gurnard family Triglidae, that makes a grunting noise by special muscles joined to its swim bladder. Gurnards are common in British seas.

Drumfishes are found in the warmer seas and there are at least 160 different species. With the

right audio software you can even hear some species on the Internet. They were recorded when spawning at Pamlico Sound, North Carolina. The URL is: http://ecuvax.cis.ecu.edu/~ugpullin/drumming.html

It is not only fish that makes sounds. Dolphins emit incessant sonar clicks as they search for food or navigate through the shallows, and who could forget the haunting melodies of the Humpback Whales?

Pistol Shrimps, Alphaeidae, use the power of their snapping claws to capture their prey. The right claw produces sufficient sound waves to stun small animals.



Previously regarded as an uncommon vagrant, Triggerfish, Balistes capriscus, have been seen quite often in the English Channel during the last decade.
PHOTO: ANDY HORTON

UNUSUAL FISH

Why do I regard the Meagre as an extra special discovery? Its rarity is an important consideration. In the vast expanse of the oceans, any unfamiliar discovery can be dubbed a rarity. This can occur when the fish is at the edge of its range, like the Comber, *Serranus cabrilla*, commoner in seas south of the British Isles, but possibly breeding in the English Channel. Also, the Boar Fish, *Capros aper*, as pretty little fish that is not caught by normal fishing practices, may be locally common in water over 100m deep. Both these fish have been caught in the last few years and put on display at the Aquarium in the harbour at Mevagissey on the south coast of Cornwall. Other unusual fish are vagrants, often shoaling fish like the Atlantic Bonito, *Sarda sarda*. A specimen of this fish got caught up in a Mackerel shoal migrating north and was caught by an angler in July 1996 off southwest Wales.

RARE MARINE FISH

Which fish are extremely rare? The first one that comes to mind is the Atlantic Sturgeon, *Acipenser sturio*, which is now so rarely caught that the experts now doubt whether it ever bred in the gravel reaches of the largest British rivers.

The Meagre Drumfish, also called the Shade-fish, is not quite in this category as the fish may still be common off the African Mediterranean and Atlantic coasts. It is still a magnificent fish. The one caught off Cornwall was only a juvenile. Adult fish can attain a length of 1.9m and weights of 48kg (100lb). It is also a fine sporting fish and extremely good eating. Because it is reported to inhabit shallow seas it may have been overfished off the European coast centuries ago. I would be interested to know if this fish is well known to fishermen and scientists in the Mediterranean. It is so rare in British seas that there are no angling records. A few specimens were caught in the North Sea during the 19th century.

Gurnards are able to emit grunts using muscles joined to the swim bladder.
PHOTO: ANDY HORTON

REPORTS

The British Marine Life Study Society is interested in reports of all interesting fish and other marine creatures from around the British Isles. Notable fish reports in the last few years include both species of Sea Horse from the English Channel, as well as unfamiliar fish like the Red-band Fish *Cepola rubescens*, the Tadpole Fish *Raniceps raninus*, and the Giant Goby, *Gobius cobitis*. Reports are posted on the BMLSS (England) web site at the URL below.

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

ASK A&P

Marine

Q I have a 40 gallon marine aquarium that has been established for 6 months. The stocking level has purposely been kept very light to allow the tank to develop slowly. The current stock, which has been in the tank since it first matured, consists of: a pair of Fiji Damsels, a Bi-colour Blenny and a six lined Wrasse. Recently I attempted to add a Dragon Wrasse and a Common Clown. Unfortunately, World War III broke out as the larger Damsel incessantly attacked the two newcomers, despite the fact that they were bigger than the Damsel! Can you offer any advice as I am concerned about any future additions to the tank.

A *Damsels have many attractions for the beginner in so far as they are small, colourful, active, easy to feed and very hardy. Unfortunately, as you have experienced, these advantages come at a price, ie, they often exhibit aggressive behaviour. Size does not seem to bother them and they will intimidate bigger, more peaceful fish. Even if the Damsel is small and does not inflict much physical damage its aggressive actions can intimidate other fish to the extent of preventing them from feeding. The worst cases can be so severe as to cause the eventual demise of the other fish through stress. A number of remedies can be tried :*

a- The tank can be covered with a heavy blanket for 24 to 48 hours to enforce a period of calm in the hope that when normal lighting is restored the Damsel will be disorientated enough to have forgotten the new arrival — but don't bank on it!

b: A tank divider can be used to segregate the aggressor. Ensure the aggressor is penned into the smaller portion of the tank.

c: Try removing the aggressive Damsel for a couple of weeks, to upset its dominant role, allowing peace to ensue when you return it to the main tank.

d: If all else fails either the aggressor or the victim will have to be returned to the dealer.

Remember, there will always be some aggression towards newcomers but this should fade as the new hierarchy establishes itself. The Dragon Wrasse was a poor choice as a tank-mate as it is a delicate, peaceful fish, ill equipped to cope with a mean-minded Damsel. Dwarf Angels can generally look after themselves and do not usually stand being bullied by anything. Clownfish are well-equipped to cope without too much difficulty if they have their natural retreat of a Sea-anemone at hand. Much larger fish, for example, Tangs, are not generally too concerned about Damsels and will usually begin to return as good as they get and not suffer too much. Other completely unrelated fish that do not spend a great deal of time in a free swimming mode may well be ignored by the Damsel, eg, Cardinals, Blennies, Gobies and Hawkfish.

Coldwater

Q I have an outdoor pond (Goldfish, Shubunkins) which has been established for around three years. I have just discovered that the pond is infested with Leeches, which covered two fish I introduced within minutes. Do you have any advice on how to rid my pond of these? They have killed all my fish!

A *I am sorry to hear about the loss of your fish; unfortunately, parasites such as these can easily be introduced on plants or with live food, and once in are not so easy to get out. Many ponds will have one or two Leeches and the owner will never notice a problem; in others like yours the infestation can reach horrific proportions. If you have any fish left, try placing them in a 3.5 per cent salt bath for an hour, which will cause any attached Leeches to drop off. This is only going to deal with half the problem, though, as the pond itself will be full of eggs. You can treat the pond with a proprietary insecticide from your aquatic shop, but the eggs are very resistant and you may need to treat the pond several times; to be effective these need to be strong chemicals and your fish may react adversely. Ironically, if you really mean that ALL your fish have been killed it makes it a little easier for you; drain the pond completely, throw away any water plants, and leave it dry for a week. This will kill all the Leeches and you can start again. If you do still have some fish, I would still recommend this course of action, but you will have to temporarily rehouse the fish. Large containers will be suitable for the refugees provided you change the water to stop it becoming foul. Ensure that all the fish are treated with the salt bath treatment before you put them back, or the cycle will simply start again. I hope this helps; there is no reason why the problem should recur provided you are careful about where you buy plants and consider switching from live foods to the frozen variety.*

Tropical

Q I am writing in regards to *Plecostomus aculeatus*, the Bristlenose Catfish. Could you tell me please if it is suitable for my 30in community tank and if, when these fish are fully grown between 4-6in, they will attack the other fish in my tank or will they be a menace?

A *Plecostomus is a name no longer used for the catfishes — in fact P. aculeatus is not even a Bristlenose. There are several Bristlenose Catfishes — the most common one is* Ancistrus temminckii *(but now renamed A. dolichopterus). A South American catfish (mostly from Brazil), a pair can be distinguished by the smaller, less branched bristles of the female and an antler in the male. They only grow to four or five inches.*

A peaceful fish that likes to hide among tree branches and roots or stone caves. The base should be sandy (use children's play sand) and the water soft to medium hard but slightly acidic (store some rainwater over peat) at 25°C. However, when breeding, the males can be aggressive and fight among themselves (they lock bristles), but with just a breeding pair there will not be this problem.

The fish are used to running water in the wild and they lay eggs on overhanging roots, so use a power filter to give a flow and add bogwood in a down-hanging *position. Feed vegetable matter (mashed peas, scalded lettuce, herbivore flake) and occasional larvae (frozen or dried). Bright lighting will encourage algal growth for the fish to browse on.*

The female lays large orange-coloured eggs which the male guards for a week to 10 days, when the parents may be removed. The hatched fry can be fed skinned and mashed boiled peas.

Otherwise, just one Bristlenose will make a useful addition to any community tank, the fish will clear excess algae much better than the usual Sucking Loaches or Chinese Algae Eaters (or even 'Plecos') sold for this purpose.

Send your queries to:
Ask A&P,
MJ Publications Ltd,
20 High Street, Charing,
Kent TN27 0HX

FOCUS ON
FISH
HEALTH

Don't Panic!

Roger Foggitt suggests we first diagnose ourselves before we look at our fish

PHOTOGRAPHS COURTESY OF TETRA

◀ Picture showing clamped fins.

FOCUS ON

FISH HEALTH

Don't Panic!

We fishkeepers have been inflicted 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 which allows invaders full access to Captain Picard 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

▶ The picture shows a Discus displaying finrot.

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 onto 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 to 90 per cent 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.

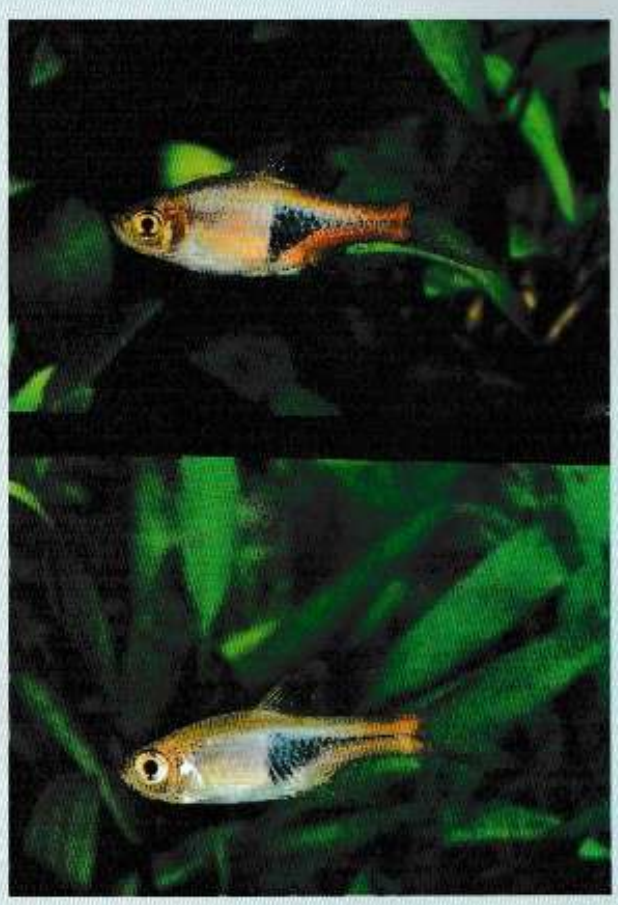
Because of the way these problems manifest themselves and because many of us have no access to a microscope or the experience to carry out skin and gill scrapes, particularly on small fish so that we can identify the causative organism, the treatment of such problems has to take place in a step-by-step, 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 well be correct but let me ask you another question? Low oxygen levels where? If you have now answered 'in the water', then you may be partly right but the actual correct answer is — low oxygen levels 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.

Firstly, 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



◀ Picture showing colour difference of fishes in good and poor water quality conditions.

FOCUS ON

FISH HEALTH

Don't Panic!

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 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. An example of this is Finrot.

Those diseases which pass from one fish to the next to the next indicate that the problem is infectious such as a Whitespot outbreak. And those problems which may 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.

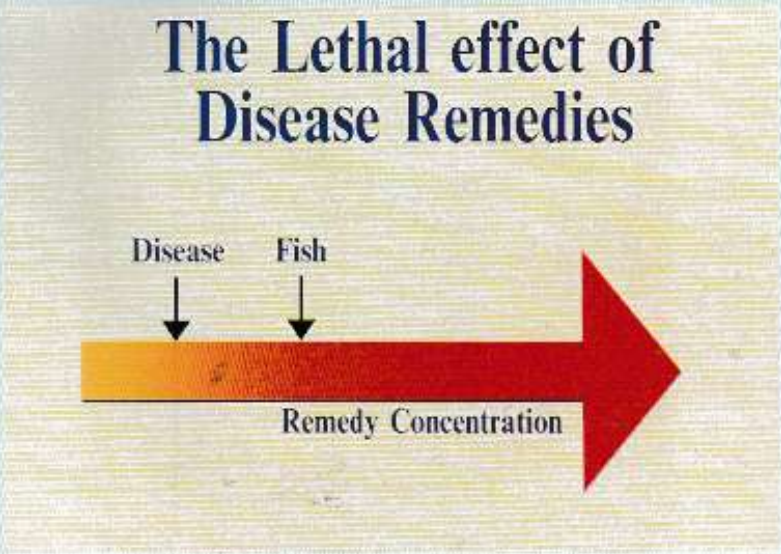
1. Diagnose the disease if it is easily apparent.
2. Check water quality for ammonia, nitrite, pH and water hardness.
3. Correct water quality if problems are indicated.
4. If water quality problems indicate that this is not likely to be the cause then check for other stressors such as fighting, rough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

Diagnosing disease problems in the aquarium does not necessarily start with a disease showing itself immediately. There are other much more subtle indicators of a problem before a disease breaks out. These include such things as: (a) a change in colouration in the fish which indicates stress; (b) a clamping of the fins to the body, another response to an environmental stress; (c) 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



▶ Cycle showing the lethal effect of disease remedies.

FOCUS ON

FISH HEALTH

Don't Panic!

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 manufacturers' recommended dose rates are followed then most problems should react fairly quickly and the fish will recover after a short period of time. Which really brings me on to 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 for why your fish are ill, then disease treatment should go smoothly and your fish will recover well.

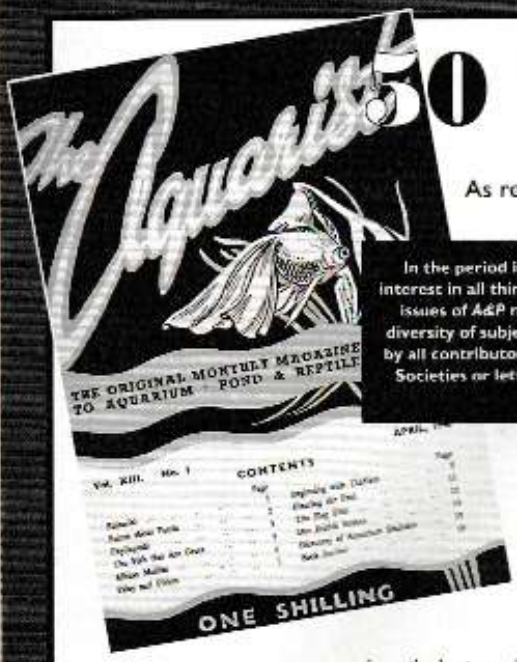
A GUIDE TO DIAGNOSING COMMON AQUARIUM DISEASES

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 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 OR 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 Wounds/abrasions Inflammation at the base of fins Raised scales Protruding eyes	*BACTERIAL INFECTION (FINROT)* *BACTERIAL INFECTION* *BACTERIAL INFECTION (DROPSY)* *POP-EYE — POSSIBLE BACTERIAL CAUSE*	Check for stressors, water quality, etc. Proprietary finrot aquarium treatment Proprietary bacterial treatment

ROGER FOGGITT IS HEAD OF THE TETRA FISHKEEPING INFORMATION CENTRE

50 Years Ago ...

As recounted by Editor **Dick Mills**



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

With many aquarists 'dreaming the dream' and expecting to continue their hobby and get paid for it by turning it into a business, the May 1948 editorial gently poured cold water on most of these aspirations. It described quite succinctly the expectations thus:

"All one has to do is to persuade an expert to pass on the cream of the experience he has gained laboriously over many years, set aquaria at a cost of, say, ten pounds, buy a pair of fishes at about two pounds, breed them, sell 200 offspring at ten shillings (to undercut the original dealer) and decide what to do with the 88 pounds profit. In practice, things are very different. There is no substitute for personal experience, and that must be obtained the hard way. Without that experience consistent success with fishkeeping is very improbable."

However, fish breeding prowess was not dismissed out of hand and those that had the talent were encouraged to supply livestock to dealers who were still just beginning to emerge from the business damge of the war.

It must have been the start of the silly season, for there was a novel way of destroying Diving Beetles and Water Boatmen in the pond. Using a 4ft length of ½in metal tube as a blowpipe, you could soon, apparently, with a bit of practice, become adept at blasting 'the crustiest of *Dytiscus*' out of the water and yet the projectile used (hips, seed heads or peas) would soon become spent within 4m of water and not harm any nearby fish.

Aren't fish funny? Mr H. J. Brooker had done all the right things to spawn his Zebra Danios — separated the sexes, fed copious amounts of live foods and earthworms — but when the sexes were united although spawning actions were observed no resultant fry were forthcoming. As the author was an invalid he transferred the fish to a small, well planted 18x10x10in tank in his bedroom near a window. The fish were fed only dried food. Guess what? (As if you need to be told). On a dull, overcast and thundery April morning the Zebras performed right before his eyes with so much vigour that one female got trapped in a floating worm feeder! Although no spawn was saved the author was quite philosophical about being confined to bed — it gave him more time to watch the fish!

A pair of Rudd took the Best in Coldwater section at the Annual Suffolk Aquarists & Pondkeepers' Association Show held in Ipswich. In addition to tropicals there were also a marine display of four tanks plus amphibian and reptile classes, the winner of the latter being a Diamond Python (a regular exhibit over many years standing apparently). The quality of the plants was quite poor compared to other shows but the Junior section came in for praise for both enthusiasm and number of entries.

A novel alternative to a feeding ring. A box (made from perspex) is placed in the tank so that its open top is above water level; added food is concentrated in one place, fish swim in the front opening and any uneaten food is easily siphoned out (or simply lifted out with the box. Legs are optional as the box can easily be sat on the base of the tank.

Two newsletters came in for special mention; those from Nottingham Aquarists and Southend, Leigh & District A.S.

A National Aquarium and Water Garden Exhibition was announced for June to take place at the Royal Horticultural Hall, Vincent Square, London.

An optimistic advertisement stated: "There is a dearth of variety in our fish stock at the moment. Plenty of fish, but not the many types we have been able to offer in the past. Bear with us — the shortage is only temporary. If we haven't the fish you require, it will soon be in stock. Our breeders are busy and will shortly satisfy all needs." This brings us back to where we came in!

Jim Cambray hopes it's not too late to save these fishes

PHOTOGRAPHS BY THE AUTHOR

The Cape G

A Small Fish with an Exciting Past ...

The author collecting Cape Galaxias at a newly discovered site on the Kouga River system.

The Galaxiidae exhibit their greatest diversity in Australia, where over half of the species are found.

Members of the family Galaxiidae are elongate, tubular, scaleless fishes which are related to the salmoniforms. Galaxiidae species only occur in the Southern Hemisphere and consist of six genera with over 40 species. Their relationships are currently under revision. The distribution of the members of this family has intrigued biogeographers for some time. This is because they are widespread in the southern temperate zone, occurring in Australia, Tasmania, New Caledonia, Lord Howe Island, New Zealand, Chatham Islands, Auckland Islands, Campbell Island, Patagonia, Falkland Islands and in South Africa. The genus *Galaxias* is known to be southern circum-temperate and are mainly confined to temperate fresh waters. There is only one species in Africa, the Cape Galaxias (*Galaxias zebratus*). The good African name, zebratus, is due to its striping which varies from one population to the next. The Galaxiidae exhibit their greatest diversity in Australia where over half of the species are found.

Some members of the family return to the sea as larval fish, whereas my observations confirm that the Cape Galaxias can remain in freshwater for their entire life-cycle. The nearest relative of *Galaxias zebratus* is thought to be *Brachygalaxias bullocki* from Chile. On a trip to Germany in March 1995 I had the pleasure of meeting Dr Klaus Busse, Curator of the Fish Collection at the Alexander Koenig Museum in Bonn. He has worked on the South American galaxiid species and has a very innovative aquarium set up in his home allowing his galaxiids the opportunity to migrate from fresh to saltwater. I do not have to allow for migration of the Cape Galaxias but I

alaxias:

But What of the Future?

am very keen on breeding the species to study their early life history. Hopefully I will be able to share their breeding behaviour with you in a future issue.

TWO THEORIES

When South America, Africa and Australia were joined together in prehistory, before the continents began to drift apart, the land mass was known as Gondwanaoland. The distribution of the Galaxiidae fits a Gondwanoid pattern and *Galaxias zebratus* is the only freshwater fish in the Cape likely to be of a Gondwanoid form. Two theories that may explain the present day distribution have led to a wide range of disputes about the geographical history of these fishes. Some authors favour dispersal by ocean currents, others regard them as part of the great hypothetical pan-austral Gondwanaland biota and some workers believe their distribution to be connected with the Mesozoic fragmentation of Gondwanaland. In these respects the Cape Galaxias are the most interesting form in the Cape freshwater fish fauna, from their marine ancestry and the speculations about their origins.

In 1943 K. H. Barnard wrote that the distribution of Galaxias in the South West Cape suggested a marine ancestry during the Tertiary epoch following which there was an adaptation to a fluviatile habitat with gradual penetration inland with the cutting back of the streams. B. I. Balinsky in 1962 noted that the 'temperate' fauna in southern Africa 'is nothing else but the relic of the Gondwana fauna'. It is interesting that there are similarities of galaxiid distributions with those of Gondwanian earthworms, midges, parastacid crayfishes, freshwater mussels and birds. It is, therefore, possible that these were all part of the biota that was fragmented with the land masses they inhabited. This can be argued to be pure speculation since the distribution of such families as the galaxiids looks Gondwanian but in the Galaxiidae some species have marine life history phases. Oceanic dispersal could explain the broad southern temperate ranges of the

Scenic view of a typical small stream lined with spectacular fynbos where the Cape Galaxias still occur.

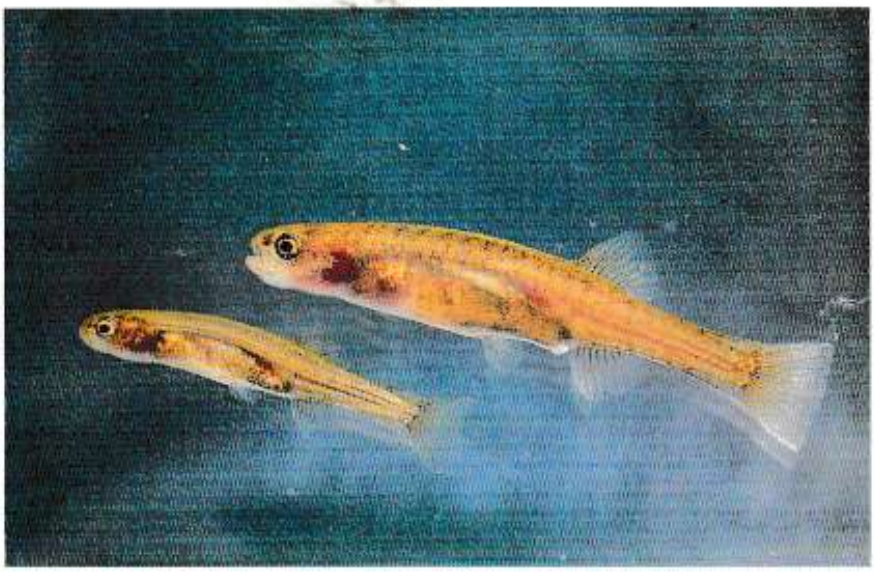
Galaxiidae and several other families. This controversy continues. Recent work on the genetics of the Galaxiidae suggests that *Brachygalaxias* and *Galaxias zebratus* are in an ancient freshwater group.

The Cape Galaxias was originally described from the Cape Flats near Cape Town by the French Count Castelnau in 1861. Since then it has been recorded from a number of coastal rivers from the Keurbooms (south coast) to the Olifants River system in the Western Cape at the southern tip of the African continent. Until surveys in 1995 *Galaxias zebratus* had not been collected from

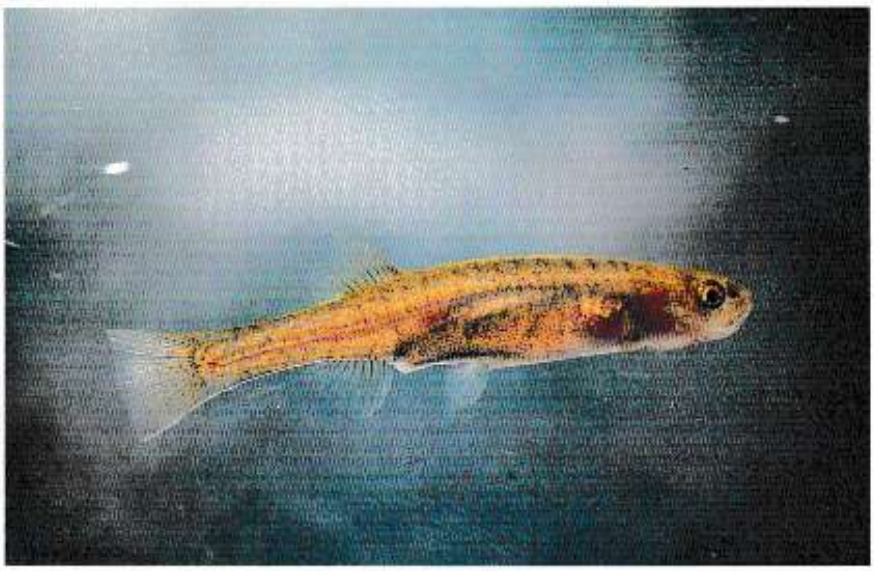
The Cape Galaxias

the Krom or the Gamtoos River systems. The first record came from the Krom River in March 1995, collected by Roger Smith. Knowing that the Krom River was connected to the Gamtoos River system some 60 to 100 million years ago, I predicted that there should be Cape Galaxias in the upper tributaries of the Gamtoos River. In September 1995 myself and my colleagues Dr Anton Bok and Roger Smith surveyed several Gamtoos tributaries and collected, much to our delight, new distribution records for the Cape Galaxias. This, indeed, was exciting, using predictive science and actually coming up with the species. However, there is still the possibility that they are not gondwanoid but were dispersed by ocean currents at some later date. Our recent collections from the Krom and Gamtoos river systems therefore extends the known distribution of this freshwater fish species eastwards by several river systems.

A male (below) and female Cape Galaxias from the Krom River.



A female Cape Galaxias.



LIFE HISTORY OF THIS FASCINATING SPECIES

I became interested in *Galaxias zebratus* some time ago but only recently have been able to study aspects of the life history of this fascinating species. The Cape Galaxias is small, growing to a maximum of 75mm in total length. Very little is known of the biology or life history of the species. There have been several general studies. An individual fish was said to live for about ten years in an aquarium although other reports say three years. They are said to be hardy fish in the wild which inhabit a wide range of both water and temperature conditions. In aquaria they can be difficult to keep as they do not easily take flake food but readily feed on live daphnia. In the wild Cape Galaxias feed on small drifting insects and this would be why they so rapidly adapt to aquaria conditions if fed on live daphnia. If one has a ready source of live zooplankton then one will have little problem keeping this species. Klaus Busse feeds his South American galaxiids frozen bloodworms which they readily devour.

SECRETIVE FISHES

The Cape Galaxias from the Krom River have a cryptic colouration, pale brown with slight vertical barring and transparent, with red gills, heart and vertebral column visible. They are small fish, rarely being above 60mm in length in this population. The Galaxiidae generally are secretive fishes which quickly dart under rocks if threatened. Various authors have noted their ability to exist in large numbers undetected. This was very true for *Galaxias zebratus* which has gone undetected in both the Krom and Gamtoos River systems until recently. In the wild I have often observed the smaller larval and juvenile Cape Galaxias feeding during the day in shallow backwaters. The relatively long, slender bodies of the young fish make them easy to identify from other small fish such as minnows. The larger, mature fish are more difficult to observe and stay near cover on the bottom, under rocks or in vegetation.

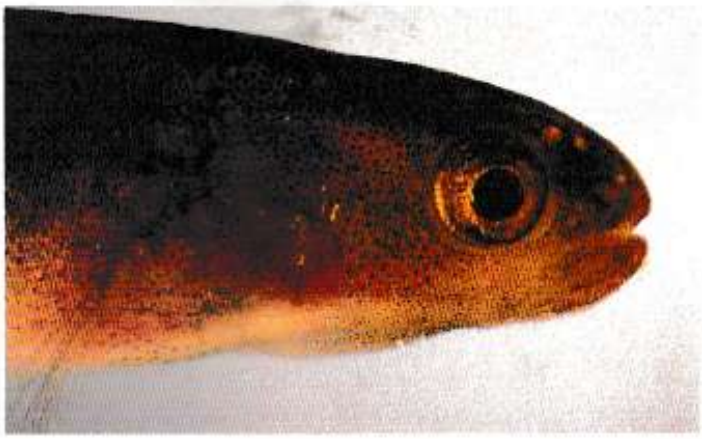
Some authors say they spawn during spring or summer while others say they may spawn almost all year round. My own studies to date have shown that they can breed in May/June (winter) and in the spring. Some of the galaxiid species in Australia spawn in late winter and early spring. In previous studies *Galaxias zebratus* have been found to have demersal, relatively large eggs numbering about 30 to 40 with the number probably rarely exceeding 50. The fish mature at 38 to 40mm and the maximum length varies from one locality to the next. The Cape Galaxias, therefore, has few eggs. In the Australian galaxiids the adaptation to a totally freshwater habitat also involved the evolution of a smaller complement of larger eggs which may be what has happened to the Cape Galaxias. Dr R. M. McDowall has done extensive research on the galaxiids, noted that there were two distinct galaxiid life history patterns in New Zealand. One group of species have a large number of small to moderate sized eggs, spawn in autumn or early winter with the newly hatched larvae being carried to sea and in the following spring the juveniles migrate back into freshwater. The other group have fewer and larger eggs and complete their life history in freshwater. The life history of the species in this latter group would possibly be similar to the Cape Galaxias.

MAIN PREDATOR

In my study area in the Krom River on the farm, 'Opening', owned by Ray and Marilyn Ritter, there are no other fish species present. The main predator of the Cape Galaxias are probably dragonfly nymphs, which are abundant. Because of the small size of even adult Cape Galaxias they could fall prey to the nymphs throughout their entire life cycle. In an aquarium a dragonfly nymph rapidly devoured Cape Galaxias up to 50mm in length, but this is the natural enemy with which the species has evolved. Alien fish, dams and water abstraction threaten what remains of these important populations of Cape Galaxias.

Introductions of alien fish species such as the North American bass, *Micropterus dolomieu* and trout, *Oncorhynchus mykiss*, are constant threats to the small remaining populations of this interesting little species with its possible Gondwanoid links. It is thus time to ensure the survival of the small populations of this species. In my studies on the life history aspects of the Cape Galaxias I hope to make more people aware of this cryptic fish so that after being around for so many millions of years it will not become extinct due to the short term interest of introducing alien angling species which are now causing havoc in many rivers around the globe. Introduced trout have been reported to be a major threat to populations of galaxiids in New Zealand and Australia. It is, indeed, a time for conservation.

Often the scenery where the Cape Galaxias occur is superb, with a Cape Fold mountain backdrop and the surrounding area near the stream covered with lovely fynbos. Ericas, proteas including a dark red king protea (*Protea cynaroides*), a variety of spectacular flowering bulbous plants, many delightful species of pelargoniums, forests of tree ferns and many other exciting forms of plants. It is one of the highlights of my monthly field trips to take some time to explore what new flowers are in bloom that month in the scenic Langkloof Valley. The Cape Galaxias and the clear flowing streams and beautiful vegetation are part of our global natural heritage. It deserves to be conserved for future generations to explore and enjoy.



Head view of a Cape Galaxias.

The first major event of the year was held at Shirley Aquatics at the end of March which featured a Tategoi Competition (Koi with future potential) and a Koi Auction. The Auction itself had to be seen to be believed — a large framed marquee had been hired, complete with tiered seating down both sides, an excellent PA system and a brilliant auctioneer.

However, the thing which most impressed me was the way the Koi were presented for viewing. Firstly, all the Koi were exhibited in 3m vats with polaroid photographs (complete with Lot Number) placed above each vat. Once the Auction started each Koi was placed into a large all-glass tank, sat on a trolley, and then carefully wheeled up and down the centre aisle for all prospective bidders to see. The main advantage of this was that everyone could see the Koi from all angles to ensure that there were no sores, etc, below the lateral line — a simple but effective idea.

I know that many Koi Clubs have auctions throughout the year and I would strongly advocate that auction organisers think along these lines.

SHOW CALENDAR

MAY

2/3 International Koi Show. Bletchley Leisure & Exhibition Centre, Princes Way, Bletchley, Milton Keynes. Organised by Ddy Koi, 01922 493290.

9/10 Norwich Section BKKS. 2nd Open Show Japanese Style and Craft Fayre. Held under full cover in the Exhibition Building, Royal Norfolk Showground, Costessey, nr Norwich, Norfolk. Saturday Lectures. Sunday Question & Answer Debate with Panel of Experts. Free Car, Coach and overnight Caravan Parking. Show details from Glyn Bowman, 01328 851695. Hotel Accommodation/Dinner Dance package details from Jenny Allen, 01603 452932.

23/24 CANCELLED Merseyside Section BKKS. Japanese Style Open Show & Craft Fayre.

24/25 South Hants Section BKKS. Open Show. South Downs College. Contact George Rooney on 01420 473169.

30/31 North Herts & District. 2nd Closed Show. Queensway Hall, Dunstable, Beds. Staged in conjunction with Fishworld '98 event.

JUNE

6/7 Worthing & District BKKS. 6th Open Show, Worthing Rugby Ground, Roundstone Lane, Angmering, West Sussex.

6/7 Yorkshire Section BKKS. Open Show, Lotherton Hall, Leeds.

13/14 Crouch Valley Section BKKS. Open Show. Barleylands Farm, Billericay, Essex.

13/14 Kennet Valley Section BKKS. Open Show. Donnington Grove Country Club, Newbury, Berkshire.

21 Suffolk & North Essex BKKS. Closed Show. Langaham Community Centre & Recreation Ground, nr Colchester, Essex.

27/28 Middlesex & Surrey Border Section BKKS. Open Show. Kempton Park Racecourse. Show Chairman Terry Hill, 0181 397 8471.

JULY

4/5 East Pennine Section BKKS. Open Show (Indoors). Japanese Style. The Heritage Centre, Elsecar, nr Barnsley. Information from Sheila Sanderson, 01226740577, or Dave Scriven, 01226 740577.

AUGUST

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

22/23 KOI '98 BKKS NATIONAL SHOW. Billing Aquadrome, Northampton.

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

29/30 West Wales Section BKKS. 6th Annual Closed Show to be within the Llanelli Flower Festival, Peoples Park, Llanelli, Dyfed.

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

SEPTEMBER

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

12/13 North of England Koi Chapter (ZNA) Open Show. Japanese Style. Arena Sports & Social Club, Sheffield. Contact Yvonne Muse, 0114 2737341 (day) or 0114 289 1437 (evenings).

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

27 Northern Koi Club Open Show. Japanese Style. Cascade Water Gardens, Radcliffe, Manchester. Show Chairman Liz Donlan, 0161 794 8282 (office), 0161 643 9107 (home).

KOI MEETINGS IN MAY

3 Nottingham & District Section BKKS. Entertain Suffolk and Essex Section BKKS. Meet at the Western Club, Hillside, Nottingham. Contact Shirley Hind on 0115 981 0923.

6 Leicestershire Section BKKS. Meet at Kirby Muxloe Sports Club. Contact Ray Dunkley, 0116 2771600.

12 Nottingham & District Section BKKS. Craig Baldwin (Koi Nutrition). Meet at the Western Club, off Derby Road, Hillside, Nottingham. Contact Shirley Hind on 0115 981 0923.

13 Merseyside Section BKKS. AGM at The Rocket (a Greenalls Inn) at the end of the M62 in Liverpool at 7.45pm. Contact Syl Bennett, 01942 20498.

13 South Hants Section BKKS. Meet in Denmead Church Hall, 8pm. Contact George Rooney on 01420 473169.

17 Nottingham & District Section BKKS. Trip to visit Mid-Staffs ponds. Meet at the Western Club, Hillside, Nottingham. Contact Shirley Hind on 0115 981 0923.

17 Northern Koi Club. St James Hall, Vicarage Lane, off Eccles Old Road, Hope, Salford. Peter Waddington of Infiltration. Contact Glynnis Morgan-Davies, 01706 218243.

23-25 Northern Koi Club. Weekend trip to Germany. Contact Tony McCann on 0161 794 1958.

31 Northern Koi Club. Annual Koi Auction to be held at Klassic Koi, Leigh. Contact Liz Donlan on 0161 794 8282.

There are numerous Koi Clubs/Societies throughout the UK, and we will publish details of their meetings each month as (and when) we receive details. However, could I make one small plea to Publicity Officers — please ensure that you include a contact name and number to be used in conjunction with any Shows or Meetings whose details we may publish. Copy for Koi Calendar can be sent to me c/o MJ Publications Ltd, 10 High Street, Charing, Nr. Ashford, Kent TN27 0HX, but, if more convenient, Secretaries can also send information direct by telephone on 0161-794 8282 or by fax on 0161-793 9696.

Having finally planned and packed **Derek Lambert** *is on his way*

PHOTOGRAPHS BY THE AUTHOR

The A&P Costa

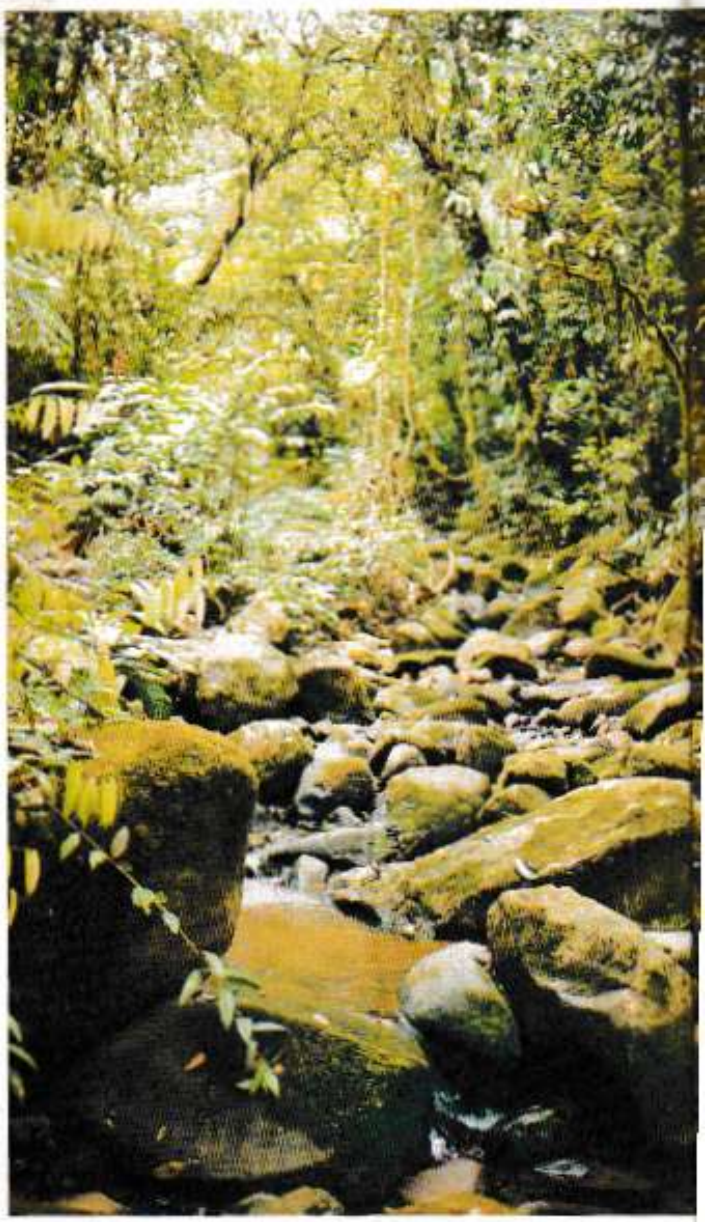
Finally the day arrived when we would leave for Costa Rica. Late at night on 8 February 1998 Arthur arrived after having a wee celebration for his birthday. We hit the sack at about 2am. Three hours later we dragged ourselves out of bed, loaded the car and headed for the local railway station. Pat (my mother) drove us to the station and left us to catch the first train of the day. Unfortunately, that train did not arrive but the next one did and there was enough slack in the itinerary to cope with the delay.

After another two trains, two planes and a taxi ride we arrived at the Hotel Irazu on the outskirts of San Jose some 23 hours later. Apart from the non-appearance of the first train everything had gone to schedule. Well almost everything.

When booking in at Gatwick we were told the luggage would be checked all the way and we would not see it again until Costa Rica. The security people told us, however, that the luggage would need collecting in Houston and hand carried through customs. The stewardess on the plane repeated this information so we waited at the baggage claim point where all but one case arrived.

On enquiry in Houston we were told that none of our luggage should have been sent out and it would have to be returned to the plane in time for the flight. On arrival in Costa Rica we waited anxiously for the luggage and were really pleased to see all the cases arrive safely. The transportation of luggage when flights are not direct can be a worrying experience.

When we arrived at the hotel, which I had pre-booked via the Internet, I went to check in. It turned out the wonderful Internet was not so wonderful after all because the reservation had never arrived. Luckily, they had rooms available and we finally had a good night's sleep.



About 18km from Balsa we crossed a small stream and decided to stop and fish. No aquatic plants grew here and the jungle overhung it creating dense patches of shade. Here we caught some beautiful Orange-finned Flashers, *Priapichthys annectens* (pictured far right).

Rican Quest

4x4S IN HIGH DEMAND

Next morning we started trying to arrange car hire for the bulk of the trip and discovered 4x4's were in very high demand. Eventually we managed to arrange for a firm to pick us up next morning to sort out the paperwork, etc. They never turned up and despite our original plan of flying out to Tortuguero we decided to stay put until we had sorted out the car. This turned out for the best because the flight booking via the Internet hadn't been received either! Later that day we took a taxi back out to the airport and visited all the car hire firms in turn. At the last but one office they said they had a 4x4 available. We finally left San Jose around lunch time on the 11th. A 4x4 vehicle is essential if you are expecting to travel along some of the roads (tracks) that we were planning to use.

Our first base was to be near Arenal in the north of the country about four hours drive away at most. Once we left the area around San Jose we drove though some truly breathtakingly beautiful countryside. All along these lovely country lanes were wild flowers in a myriad of colours and the land flowed away from us in all directions in a series of green hills and pastures dotted with trees.

SHEER BEAUTY OF THE COUNTRY

Patches of wild jungle interspersed this landscape serving to remind us that we were in Central America and not Switzerland. Once over our initial astonishment at the sheer beauty of this country we started to notice brooks, streams and rivers which flowed across the landscape everywhere we turned. Eventually, despite having a fairly long drive ahead of us, we just had to stop to fish.

This happened about 18km from Balsa where we crossed a small stream. Here it flowed down a gentle slope over a boulder strewn mud and grit substrate. No aquatic plants grew here and the jungle overhung it creating dense patches of shade. It was obvious that this stream became a raging torrent during the rainy season but at this time of year it had a slow to moderate current. Here we caught some beautiful Orange-finned Flashers, *Priapichthys annectens*. These were prolific at this location and seemed in really good condition. Despite wanting this species we

decided to return these fish to their home and collect some of the southern form which was supposed to have much better colour.

Before leaving we tested the water's pH, GH, and KH. Then using different bottles of test solutions we rechecked the results. These were confirmed as pH6.7, KH2 and GH0. This sort of very soft, slightly acidic water is normally associated with Killifish not Livebearers. Still, at least there were no Mollies in it!

Our next stopping place was at Jabillos. Here we found a much wider stream with a small tributary flowing into it. Once again the substrate was mud, grit and boulders and there was little in the way of aquatic plants. Here we caught some Crayfish, two different species of Cichlid (these came from under an undercut bank), *Alfaro cultratus* (found where the water current was strongest) and *Poecilia gillii* (found everywhere). Once again the water testing proved interesting. A pH7.4, KH3 and GH3 meant the water was very soft but slightly alkaline. This is an odd combination and to find Mollies (*Poecilia gillii*) in very soft water was even stranger. Still at least it wasn't acidic like the previous location because as everyone knows Mollies need hard alkaline water with some salt in it to thrive but these Mollies certainly seemed to be thriving.

The A&P Costa Rican Quest

That night we reached our base in this area of Costa Rica just as the sun was setting. This was a hotel just on the outskirts of Tanque. As we were dining in the restaurant we watched a huge flock of Egrets settle down in their roosting tree for the night. This tree leant over a stagnant looking pool about 50m from the restaurant which looked like a good place to do a little fishing — until Arthur was told it contained Crocodiles!

FISHING PROVED POOR

Next morning we headed northwards along highway 35 towards Nicaragua. Between the town of Acapulco and Los Chiles we saw a pond on the right hand side of the road. To reach it we had to climb over a barbed wire fence and struggle through a bog. Once there the fishing proved very poor but Arthur chatted to a young lad who directed him to a pool further upstream where the fishing was better. Here Arthur caught two different types of Cichlid and a lovely large frog. These he brought back to the car (walking around the fence further up the road rather than over it) and we photographed and filmed them.

When he was returning them to their pool, instead of going the long route, he tried climbing over the barbed wire fence again but this time it gave way under him. I could see he had hurt himself and indeed he had punctured a vein and the blood was squirting out 8in from his leg!

I slung everything back in the car and was ready to take Arthur to the nearest hospital by the time he finally made it back to the car. Of course, this happened on the one day when the first aid kit had been left back at the hotel so we used a towel as a bandage and within a few minutes the bleeding had stopped. Arthur, despite my protests, decided to carry on with the days fishing.

Further along the same highway we came to a proper river (without barbed wire) which crossed the road and we fished here. Once again two species of Cichlid were taken but *Poecilia gillii* occurred here as well. At both these sites the water was found to be pH 6.5, KH2 and GH0. Now we had Mollies being caught in very soft and acidic water ideal for Discus! So much for all the old preconceptions.

Moving on from this site we

Our next stopping place was at Jabillos. Here we found a much wider stream with a small tributary flowing into it. Here we caught some Crayfish, two different species of Cichlid (these came from under an undercut bank), *Alfaro cultratus* (found where the water current was strongest) and Poecilia gillii (found everywhere).

Two Cichlids taken from (picture above) just south of Los Chilles and (picture below) at Los Chilles.

continued northwards towards the Nicaraguan border. Our aim was to fish the Rio Frio which flowed into the Lago de Nicaragua. According to the map the road became a dirt track which doubled back on itself and crossed the river just the other side of Los Chiles. Unfortunately, reality and the map had little in common and we ended up on a dirt track heading for the wrong side of the border. Fortunately the Costa Rican home guard (they have no army as such) turned us back before we went too far and gave us directions to the river. This proved a total waste of time in the end because it had a very steep bank at this point and we couldn't even get down to the water, let alone try to catch any fish in it.

LOVELY RIFFLE HABITAT

The next day out we headed for Lake Arenal itself. After several disappointing locations we found a stream flowing into Laguna de Arenal 1km from Tileran. This was a lovely riffle habitat with areas of slow water movement where leaves had settled over much of the substrate and other parts where the water flowed with a strong current. This location proved to be full of fish. Amongst the rocks we came across Cichlids, in fast moving water *Poecilia gillii* abounded, whilst in slower flowing water *Brachyrhaphis rhabdophora* predominated. Once we started shuffling around in the leaf litter we started catching some lovely little catfish. These were probably *Rhamdia guatemalensis* which is one of the smaller catfish coming from this area. The water

tested out at pH7.2, KH3 and GH4.

Continuing on past Laguna de Arenal we went through the town of Canas and turned northwards on highway 1. Very soon we came to a large wide river with fast flowing water. With a great care Arthur and I waded into the water and started fishing. This proved very difficult in such fast moving open water but we did come up with some Characins, *Astynax fasciata*, Convict Cichlids, *Poecilia gillii* and *Poeciliopsis turrubarensis*. There were certainly other fish present but they were always just that little bit too fast or far away for our nets. The water tests turned up the hardest water so far (but it was still soft) at KH7 and GH6 but the pH of 8 seemed very high.

You may have noticed I have been careful not to mention exactly what Cichlids we caught at most of these locations. That is because we did not take a copy of Donald Conkel's book *Cichlids of North & Central America*. Arthur knows a fair bit about Cichlids and before we went we were confident he could identify most of what we found. The reality, however, is there are over 20 species of Cichlids which come from this country and many of them look very similar! If we had had a copy of this book with us we might have been able to say with more certainty just which fish we were catching but at the time we had to leave the naming until we returned home.

The A&P Costa Rican Quest

PARTS OF THE ROAD FALLEN AWAY

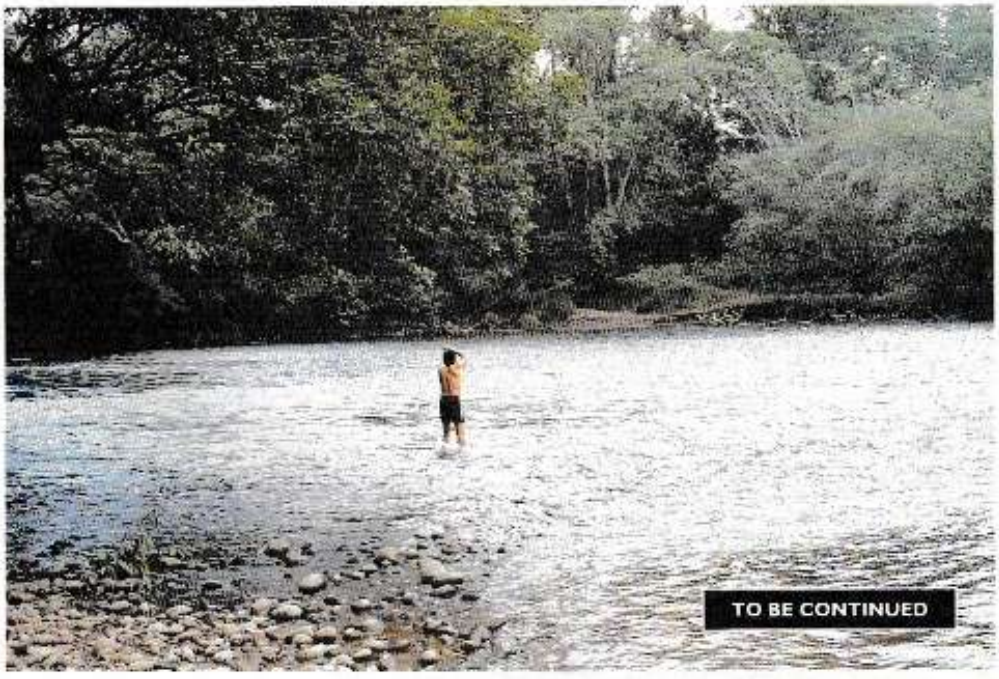
We realised, at this point, that we had dallied too long and were unable to make it all the way back before dark. In fact Arthur drove around Laguna de Arenal at night with huge potholes everywhere and parts of the road completely fallen away. A nightmare experience and the price we had to pay for becoming too engrossed in fishing and forgetting the time.

Our time in the north was now at an end and we had to head across to the Atlantic coast and drive down to the southeastern tip of Costa Rica. Here we would make a base at a hotel just outside of Limon. This drive took us past a number of important locations but none more so than the Rio Sarapiqui just outside of Puerto Viejo. A fish lives here which was a very high priority on my list. It belongs to the same group as Rainbows and if nothing else I wanted to obtain a photograph of it for my new book on Rainbowfish. The fish concerned was *Atherinella chogresi* and I know from my research that G. Musser had collected this fish here on 11 July 1962.

MY ELUSIVE RAINBOWFISH

This location proved to be a very wide and fast flowing river, which once again made fishing difficult. In the end it was me who had most luck here using a very fast swipe of the net to try to catch fish which I could see swimming around just within reach. Most of these turned out to be *Brachyrhaphis parismina* but there was a fair smattering of Mollies, Cichlids, *Alfaro cultratus* and *Astynax fasciata* as well. Finally, I caught my Rainbowfish after an hour or so of fishing. The water tests came up with pH7.2 KH3 and GH3 which was just about the average for the whole expedition.

Moving on from here we travelled straight down to Limon and reached the hotel just as it was becoming dark. This hotel was called the Maribu Caribe and it was recommended to us by Dave McAllister who has visited this country five times in the past. The view over the sea along the coastline was absolutely stunning and the rooms are spread throughout the grounds in little bungalows. A beautiful place which was to be our base for the next four nights.



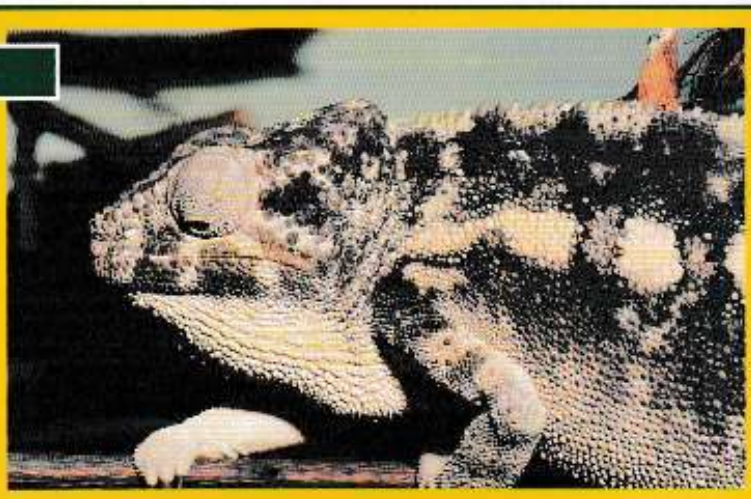
The Rio Sarapiqui just outside of Puerto Viejo. One of the Central American Rainbowfish occurs here — *Atherinella chogresi*. We also found *Brachyrhaphis parismina* Mollies, Cichlids, *Alfaro cultratus* and *Astynax fasciata* as well.

TO BE CONTINUED

FROGS & Friends

By BOB and VAL DAVIES

HERP FACT FILE



A female Panther Chameleon was kept by a friend with a Day Gecko. Both come from Madagascar, require similar temperatures, humidity and food. However, a length of the Chameleon's tongue was bitten off when both went for the same Cricket — unable to eat, and severely stressed, the Chameleon died.

PHOTO: BOB & VAL DAVIES

When a friend of ours was running a pet shop his assistant, who was more familiar with snakes than other Reptiles and Amphibians would often phone to say that a customer has such and such a Lizard and since he/she had a large vivarium they wanted something to 'go with it'. More often than not we recommended not mixing animals.

Many keepers having set up a vivarium start to visualise a group of Lizards or Amphibians to create a picturesque, 'natural' scene. Some imagine that a single specimen is 'lonely' and needs company. Although it is not entirely impossible to mix species several problems are involved. Many creatures lead a fairly solitary life apart from mating time and tend to regard others as enemies or prey. This can lead to aggression, even cannibalism. A prime consideration is the type of habitat. In a large supermarket-type establishment we recently spotted a Leopard Gecko and a young Water Dragon housed together in fairly humid conditions which suited the latter only; reptiles which need dry conditions, such as the Leopard Gecko, soon develop skin and respiratory problems if kept damp. Other factors such as day and night temperatures and type of substrate are also important.

When snakes are kept together there is the possibility that if two specimens seize the same food item one may carry on eating eventually ingesting the other. Certain snakes, especially King Snakes (*Lampropeltis* spp.) regard other snakes as prey — in the breeding season females produce a scent which induces mating rather than predation. Disparate size can produce cannibalism, bullying or simply intimidation. The latter can be caused simply by mere presence — the smaller specimen being too afraid to feed. Even with a single species of Lizard males are aggressive and territorial but in some cases females can be aggressive to other females or would-be suitors when not in breeding condition — Blue-tongued Skinks are a good example; unwilling females can inflict severe damage on the male.

A few Lizards, such as Bearded Dragons, do live communally in the wild and form heirarchies but a large space is needed if this is to be attempted. Newts and Salamanders can generally be kept in groups (of the same species). The former, in their aquatic stage, may bite off each others' legs thinking they are food but these regenerate. It is worth noting that some amphibian tadpoles and larvae are cannibalistic and need to be reared individually. Amphibians are generally better suited to living in groups although there are exceptions such as Horned Frogs (*Ceratophrys* spp.) and African Bullfrogs (*Pixycephalis* spp.) which regard almost anything as prey and have attempted to eat companions of practically equal size. Even with amphibians the sex ratio needs consideration. Breeding is often stimulated by a surplus of males but too many can sometimes cause problems.

Mixing species of any kind also poses problems of immunity (in both Reptiles and Amphibians). Specimens from one area may carry disease organisms to which they are immune — introducing specimens from another area, which may not be immune, can be fatal.

In the past we have had numerous phone calls where people have set up a mixed collection of Frogs such as wild-caught Mantellas and captive-bred Arrow-Poison Frogs (*Dendrobatid* spp.) thinking a mixed group of colourful Frogs in a planted vivarium would be an attractive feature. The Arrow Frogs succumbed — being captive-bred they lacked immunity to many organisms. Wild-caught Mantellas may carry organisms to which they are immune and some species are thought to be toxic. Whether the toxicity or lack of immunity caused the demise of the Arrow Frogs is not clear but it happened frequently.

To conclude: in most cases it is better not to mix. Numbers and sex ratios should be appropriate for a particular species and it is better to remove eggs/young. Hybridisation and in-breeding are also possibilities but should be avoided.

THE AMPHIBIAN CHORUS

Barking Frog (Hyla gratiosa) from the USA, so named because of its call — a number of males could cause problems.
PHOTO: BOB & VAL DAVIES

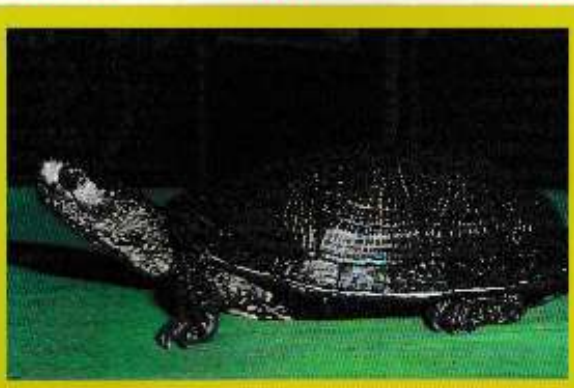
When choosing a species it is advisable to consider its effect on the rest of the family and your neighbours. A number of television programmes have featured the effects of undesirable neighbours and there are numerous examples of where domestic poultry have caused upset due to Cocks crowing in the early hours. In some cases the unfortunate keepers have been forced to get rid of them.

When we kept European Green Treefrogs (*Hyla arborea*) in a converted greenhouse we were finally so embarrassed by the noise that we gave them away. We never actually had any complaints although we were occasionally asked what the noise was. During most of the summer the males made a substantial racket audible at the top of the road on a quiet evening. We fervently hoped that neighbours had their televisions turned up loud!

Likewise we abandoned keeping White's Treefrogs (*Litoria caerulea*) because of their vocal abilities. These were kept in the house and annoyed no one apart from ourselves. The vacuum cleaner often sparked them off, as did certain music on the radio or television, electric drills and various other noises. After we had gone to bed the chorus would begin — easily audible upstairs. Nothing would stop it until their vivarium was completely covered to plunge them into total darkness.

Although the noise during the day did not disturb us, night time was a different matter. The situation grew desperate when we were looking after a friend's collection which contained three male White's Treefrogs. Combined with our males the result was bedlam. You need extremely thick, sound-insulated walls to keep this species — or a very large house where they are isolated at a suitable distance. Nowadays, we stick to species whose call is fairly low. There are a number of species with a loud call and since it is often advisable to have several males to provide competition to stimulate breeding it is as well to check before purchase.

MEMORY LANE



European Terrapin (Emys orbicularis). Hardly a suitable companion for an Alligator.
PHOTO: BOB & VAL DAVIES

Reading '50 Years Ago' in recent issues brought back some memories of early days especially the item in February describing the renovation of old aquaria. The common 'fish tank' was usually recommended for keeping Reptiles and Amphibians. Indeed many people still use them today, although DIY is popular and a variety of custom built vivaria are available.

One old book in our collection dealt mainly with temperate species which needed no additional heat but for one or two which needed higher temperatures it suggested replacing the base glass with roofing slate and heating the interior by means of an oil lamp, adjusted to provide the desired temperature. Such a set-up must have required almost constant attention, especially when outside temperatures varied, to avoid cooking the unfortunate inhabitants.

For many years, until the advent of electronic thermostats, keepers used the bi-metallic strip aquarium thermostats connected to a domestic light bulb to provide heat and light. More than one keeper experienced a disaster when the thermostat stuck in the 'on' position and many specimens must have been baffled by the constant on/off lighting.

It is little wonder that many purchases were short-lived and breeding was rare. The advent of modern equipment and increased knowledge on dietary needs together with the development of a range of commercial livefoods vastly improved the successful keeping of previously 'impossible' species. Thankfully, there is a large amount of informative literature available nowadays. Two of our old books describe Terrapins as 'nocturnal' — in one the author came to this conclusion because his Red-ears had been housed in a bucket in the neighbouring bedroom and had kept him awake with their constant banging against the sides of the bucket!

In another book baby American Alligators were suggested as suitable subjects — the recommended housing was a 36x24x24in (90x60x60cm) aquarium divided equally into land and water. 'Suitable companions' were 'European Terrapins' and 'Land Tortoises' (in such a small area!).

The Tortoise would probably have finished up in the water and in any case would have suffered from the wet conditions caused by the other inhabitants climbing onto the land. The author stated a growth rate of one foot per year for the Alligator but did not suggest what to do when it outgrew the tank which wouldn't be very long. The Terrapin would have to be a very small specimen and would no doubt soon attract the attention of its voracious companion. As we said, things have moved on!

OUTDOORS

The early spawning in our garden pond was retarded by cooler, cloudy weather. Also, the position of the pond and the low trajectory of the sun means that, in early Spring the pond receives sunlight for only part of the day. The dark colouration of eggs is important for the absorption of sunlight to provide warmth for development. A similar effect was seen on the growth of Dandelions which were in full flower in early March. Those in the garden which we use for herbivorous species were barely visible.

A to Z of plants

By
DICK MILLS

PHOTOGRAPH BY
KEITH LAMBERT

O FOR OXYGENATORS

Well, here we are again, with reminiscences of December's *A&P* when finding species according to the latter in question (then 'K') also posed a problem. In order to keep this column's integrity reasonably intact, both in consistency and content, I am offering a more general subject this month which is particularly apt as the group of plants in question, the so-called 'oxygenators,' should just about be getting their act together in the pond.

It's almost easy to feel sorry for plants classed in this catch all category as, first of all, they are usually simply labelled as 'weed' at retail outlets and secondly, as we shall see, their actual contribution to the pond's overall oxygen levels is hardly worthwhile and not so life saving as some traditional reports might lead us to believe!

The theory goes as follows: under the influence of sunshine, aquatic plants photosynthesise in the same way as terrestrial species. Photosynthesis is the process by which plants use light to build up carbohydrates. For photosynthesis to occur the plant must possess chlorophyll and must have a supply of carbon dioxide and water. During this process in daylight oxygen is given off as a by product although far more is automatically absorbed into the water at the pond's surface. It might be more accurate then to suggest that the greater benefit of action by the aquatic plants is to reduce the amount of carbon dioxide in the water rather than to add extra oxygen.

This photosynthesis can obviously affect water chemistry and tests taken in early morning can be different to those taken at the end of a long sunny day. In the morning, due to the presence of carbon dioxide produced in plant respiration (as well as by that of the fish) pH levels may show a slight decrease (towards acidic) whereas later in the day when carbon dioxide has been taken up by plants a slight rise in pH can occur. It is, therefore, quite important that any water testing is done approximately at the same time of day in order to retain consistency of testing and not be led to the wrong conclusions by quite logical changes in readings.

Returning to the plants themselves, most 'oxygenators' tend to be the faster-growing, fine leaved species such as *Elodea*, *Egeria*, *Lagarosiphon*, *Ceratophyllum*, *Myriophyllum* and so on. All these species have one or two things in common — they all should be able to grow faster than fish can eat them but they can all be overpowered by Blanketweed in a very short space of time.

As far as cultivation is concerned very little deliberate action is needed by the pondkeeper; only at the start when introducing them into the pond is some consideration needed. Throwing bundles of lead-weighted bunches into the coldest, darkest part of the pond on a late winter morning is hardly conducive to rapid growth. Far better to put the new bunches into shallower water where they will catch all the daylight that is available and where the water temperature is likely to be warmest.

Once they show signs of growth then they can be allowed into the main part of the pond to do their valuable work in keeping the pond water well and truly (and naturally) conditioned.

Final Note: For those readers who may have been browsing through their plant books there is indeed an 'O' species or two. *Orontium aquaticum* is probably the best known with its yellow tipped white peduncle or flowering spike held above the water; Ottelia, a relative of *Vallisneria*, is a species which may flourish in the aquarium although *O. alismoides* (a rather brittle plant) is reported to need long periods of light. The genus, which is also reported as being an 'annual,' includes some 40 species but none appear to widely involved in the hobby. Of course, the most famous water-grown 'O' species is *Oryzia*, the ubiquitous Rice, staple diet of Asia.

Orontium aquaticum.

WINNER'S CORNER

SEABRAY AQUARIUM & CABINET WINNER

The winner of our rather prolonged Seabray Aquarium Competition (*A&P*, December 1997 and February 1998), is MR G. KREEGER, 1 THE BRACKENS, BUSH HILL PARK, ENFIELD, MIDDLESEX EN1 2JY. Seabray will be contacting the winner to arrange collection of the fabulous new design Dolphin Aquarium and Cabinet.

NISHIKIGOI BOOK WINNERS

The winners of Nigel Caddock's sumptuously-illustrated book, 'Still Waters', are: Mr T. E. Critchlow, Leyland, Lancashire, and Mr J. Calver, Witcham, Ely, Cambridgeshire. Copies of 'Still Waters' will be forwarded from Nigel Caddock in the very near future.

To Quarantine — or Not?

FOCUS ON FISH HEALTH

Dave Garratt debates this important subject

PHOTOGRAPHS BY A&P LIBRARY

We must all have heard the saying 'prevention is better than cure'. The logical argument for the aquarist must surely be: if prevention is universally recognised as being better than cure, the one sure-fire route to prevention would be to not add any disease to our tanks. To achieve this all we need do is quarantine any livestock for the requisite length of time (usually quoted as 14 to 21 days), thereby ensuring the fish has no disease before adding it to our show tank.

So if quarantine is so effective why do so few of us bother with it? Perhaps the process is too difficult to set up and follow through? Are their other major drawbacks to employing this procedure?

The Quarantine Tank

You will only be buying one or two fish at a time (unless you have a very large tank and a bank balance to match!) so the quarantine tank will generally be quite small, perhaps 15-20 gallons or so.

During the quarantine

◀ Would you want to risk introducing disease into this set-up?

FOCUS ON

FISH HEALTH

To Quarantine — Or Not?

period you may need to treat the fish for disease and this is where the first problem arises. A fully furnished tank with conventional under gravel filtration is not conducive to treatment, neither is a completely bare treatment tank. The ideal probably lies between these two extremes, ie, a sparse tank with a filtration system suited to treatment if, and when, required.

The effectiveness of treatments can be diminished by dead coral used for tank decoration, coral sand, coral gravel and other calcareous material, because they have the ability to adsorb chemicals. Conversely, bacterial filter beds can be impaired by some treatments. A sparsely-furnished tank with the odd piece of slate, or a flower pot or two, provides an easier option. Filtration can be provided from an internal or external power filter, packed with suitable non-calcareous material, giving mechanical and biological filtration. Carbon or resins cannot be used as they will remove any medications. Subdued lighting, and, more importantly, a gradual increase/decrease in power when the lights come on or go off, will prevent photo shock.

The water parameters of your tank lead to our second dilemma. Ideally if these parameters were the same as your main tank then the livestock would just need acclimatising once, ie, from the water they arrived in to your quarantine water. However, for reasons of disease treatment, it may be necessary to have the parameters of your quarantine tank slightly different than your show tank. For example, raising the tank temperature to 80-85°C will speed up the life-cycle of some parasites and consequently shorten the length of quarantine required. Also, many parasites will not survive as well at lower Specific Gravities e.g. 1016-1018. These are much lower than the levels of 1022-1024 that are usually maintained in show tanks.

The Quarantine Period

The quarantine period, of up to 21 days, gives the aquarist time to observe the fish in a quiet, peaceful environment. You can try out a number of foods and watch the behavioural pattern of the fish whilst looking for any signs of trouble. The first signs of disease usually manifest as a change in behaviour. The fish may take to sulking in a corner of the tank, generally look 'off-colour' and may refuse to feed. The fish may scratch or 'flash' at rockwork or the base of the aquarium as if trying to remove an irritation. More obvious signs of disease come with ragged fins, inflamed gills, ulceration or spots on the fins, body or gills.

What Are We Hoping to Achieve?

By quarantining a fish we are hoping to prevent any communicable diseases being added to the main aquarium. To most hobbyists this means avoiding the parasite that is potentially the most destructive and dangerous to captive marine fish. Such a parasite is usually considered to be *Amyloodinium ocellatum* (previously known as Oodinium).

In their natural habitat fish are often found with a few cysts of this parasite, but with the factors of vast dilution, fish movement and the existence of Cleanerfish, the parasite is held in check. However, in the close confines of an aquarium the parasite can quickly complete its life-cycle and multiply at a tremendous rate, thus overwhelming the original carrier fish and passing quickly to its tank-mates.

Other infectious parasites such as Cryptocaryon or Gill-flukes can also be a problem but, if diagnosed during quarantine can be readily treated by copper-based treatments. Some hobbyists will give preventative courses of treatment during quarantine even if the parasite is not obviously present.

Secondly, the hobbyist hopes to avoid adding any bacterial pathogens. In a well-maintained tank with healthy livestock bacteria are not usually a problem, but there are bacteria that can cause acute disease in fish. Bacterial disease is generally more difficult to diagnose and although dyes such as Myxazin can be successful some cases will require antibiotics. Antibacterial treatments unless given as an injection will probable require a separate treatment tank. Antibiotic supplies and advice on their usage should be available from a vet.

Finally, even if the fish has a non-communicable disease, the ordeal of its capture and transport may have weakened it to such an extent that other diseases may manifest themselves a few days later.

Quarantine — The Sure-Fire Way to a Disease Free Tank?

The simple answer to this

question is no, quarantine cannot guarantee such a utopian ideal. Disease is not just brought in by fish, it can arrive via invertebrates, water from dealers' tanks, and living rock. Invertebrates may be totally immune to the disease but they can still bring it into a tank.

Finally, your healthy new addition that you have faithfully quarantined, or a healthy resident of your main tank, may be carrying many disease organisms without any ill effects. However, if something changes, perhaps even only the stress levels caused by the addition of a new fish, these diseases can be triggered. What you are doing by quarantining is stacking the odds more heavily in your favour, so no, quarantine is not a guarantee, but it is a good insurance policy.

Problems of Quarantining

By far the biggest argument you will come across against quarantine is that of increased stress levels for your new purchases. You are subjecting them to two bouts of acclimatisation, into the quarantine tank and later into the main tank. The counter argument would suggest that by ensuring a peaceful three week settling in period, with no competition, the new fish will be stronger and better equipped to stand the rigours of the move to the main tank.

Quarantining is often seen as an extra burden on the aquarist in terms of time, money and physical space. I freely, but with a fair degree of shame, admit that I rarely use quarantine myself. I should do and I can offer no logical argument for not doing so. I rely on the fact that I do not buy on impulse, nor buy until the fish has been in the dealer's tank for at least a week, and I only buy from two reputable and knowledgeable sources. In short, I take the lazy route (and generally get away with it!) but I do not recommend it.

Of course this only applies to any fish-only tanks that I have kept. I do not rely on such a risky approach for my mixed fish/invertebrate aquaria. If you have a problem in a fish-only tank the old standby of a copper-based treatment almost always does the trick. No such option is open to the mixed tank aquarist, where the copper would quickly prove lethal to all the invertebrates.

Alternatives to Quarantine

Other methods of disease prevention consist of treatment baths, the freshwater bath and the Formalin bath.

The freshwater bath relies on the fact that parasites will rupture under the osmotic shock of freshwater long before a fish will experience any harmful effects. The fish is given a two-minute freshwater bath before it is added to your main tank. To lessen the shock to the fish the freshwater must be at the same temperature and pH as your tank water. If the fish does go into severe shock it must be removed immediately. The fish must be lifted from the freshwater by hand or with a net into the main tank so as not to add any parasite-contaminated freshwater to your main tank.

The Formalin bath, a treatment for parasitic infestation, can also be used as preventative measure for new additions. You add 1ml of formalin (Formalin being 38 per cent Formaldehyde) to a gallon of your aquarium water. This bath needs to be kept well aerated throughout the treatment as Formalin reduces the oxygen content of the water. The fish is placed in this bath for 30 minutes to one hour, under careful observation in case of undue stress. Again, lift out the fish by hand or with a net and place in the main tank. Formaldehyde is a pretty obnoxious chemical, keep it off your skin, well away from your eyes and do not inhale any vapours.

Conclusions

- Quarantine, whilst not a guarantee, is without doubt the way towards a disease free show tank.
- It may be onerous on the aquarist but it is well worth the trouble.
- For a mixed fish/invertebrate system it is essential.
- The benefits far outweigh any concerns about extra stress levels on the newcomers.
- The two baths mentioned earlier, whilst being better than nothing, are no substitute for quarantine.

▼ You can't rely on Cleanerfish to clear up all the parasites for you.

Caught in the Net

Kathy Jinkings goes cyberspace Lake-trawling

Last month we started our look around the sites devoted to the fascinating cichlids with some of the many Discus pages on the net; this month we will be continuing the cichlid theme further with the variety of cichlids from the African Great Lakes. These are deservedly popular with fish keepers, being beautiful and interesting as well as regarding the hard water that comes out of most of our taps as an ideal living environment!

A good place to start browsing this month's topic can be found at **http://www.provide.net/~cj5/fish.html**, the African Cichlid primer. This is a site with lots of good information for anyone who wants to know a little more about the fish they've seen in the shop. This is a personal home page, and is written from the real experiences of an aquarist with Lake Malawi fishes.

For further information about Malawi and its fish visit **http://www.badgerstate.com/JAWS/faqs/malawi.htm** for a run down on Starting Out with Malawi Cichlids. This is a part of the huge JAWS (Just Aquaria Web Site) page, which has been reviewed in these pages before. From here you could meander off into the wealth of information on the JAWS site, or stick with the Malawi theme and pay a visit to the General Care Sheet for Malawi Cichlids at **http://www.vtek.chalmers.se/~v95oloha/malawi_care/general.htm.** To find out about the lake itself point your browser to the World Wide Fund for Nature Lake Malawi Page at **http://www.panda.org/climate/parks/dr_i_park3.htm**, where you will find out about some of the problems facing the Lake and the fish who are dependent on Lake Malawi for their survival.

To examine the Malawi fish in more depth visit the Cichlid Fishes of Lake Malawi, Africa, at **http://www.comix.com/~mko/mufishes.htm** opens with a home page showing a picture that amply illustrates how stunning these fish can be, and continues with a mass of comprehensive information for the devotee. The FAQ (frequently asked questions) comes up with an informative range of not only questions but answers too, ranging from the starting point of 'what is a cichlid?' and moving on to discuss their social behaviour, anatomy, and the geography and composition of Lake Malawi itself.

Checklists of the species can be used to look up fish either by scientific name or colour pattern, leading to a picture of the species, and also the literature where that species was described, and a further section describes some the species present in the lake that are non-endemic to the region.

To round off your understanding of the fishes of Lake Malawi some of the non-cichlid fish are also described, and finally, as an added bonus, there are a selection of photographs of the Lake from space. For Malawi fans this site is a terrific resource and although it certainly does not shrink from presenting the science behind the hobby is well worth visiting for anyone interested in really finding out more about these fish. The links page leads on to a range of further sites, including 'blockbusters', and smaller pages dealing with very specific themes.

One of these, Female Choice in Rock Dwelling Cichlids, at **http://www.psu.edu/dept/cac/viz/vproj/cichlids.html**, is worth a visit. It describes the researchers' efforts to discover more about the behaviour of Malawi cichlids by using a computer to simulate male fish, and identify the female's responses to their pictures. You can see the movies used on the site, but be aware that they are large files and may take some while to download.

Aquanet, at **http://www.aquanet.de/english/**, is a large site with lots of information. The topic button on the main page leads you to an excellent collection of articles, including an excellent article about the Malawis, as well as information about lots of other fishes for us to turn our attention to.

Bypassing, for this month, articles on the Kuhli Loach and West African Blockhead, as well as the other many features of Aquanet (which you can discover for yourself while you're visiting) the other articles lead us neatly on to Lake Tanganyika, another of the African Great Lakes with an equally unique and fascinating population of cichlids. Even those not convinced of the wholesale delights of cichlids might well be tempted to devote a small (or large!) tank to the delightful *Lamprologus ocellatus*, who is the subject of another of the AquaNet articles (and an upcoming A&P article, too (Ed). The information about this little fish, who makes its home inside discarded shells, will be of interest to everyone. *Julidochromis ornatus* and *Neolamprologus buscheri* are of more specialist interest to the true Tanganyikan fan, and both of these get the Aquanet treatment in comprehensive and enjoyable articles.

If you live in the South West of England you might like to try joining the South West Malawi and Tanganyikan Fishkeeping Club, devoted to the care of these fish. You'll find their club information on the club pages of AquaNet. Before moving on check out their cichlid news group, which you can access from a button on the page.

French readers should check out Tanganyika cichlids, at **http://tanganyika.netliberte.org/**; even if you can't read French the pictures are well worth looking at, and a wide variety can be found in the photo gallery. Get there by clicking the words on the home page picture and then clicking the photo gallery pictures. All the photos are listed by scientific name, which is the same in any language, and there are lots of them! If you can cope with the French, the site includes articles dealing with a variety of themes, such as the different species and varieties of 'Julies', taxonomic confusion, a fascinating article explaining why different variant populations have arisen in different areas of the Lake, and much more.

The Lake Tanganyika Fisheries Research page, at **http://titan.glo.be/eric.coenen/**, contains links to lots of interesting information about Tanganyikans. This is a site that deals with scientific material, and apart from the striking(!) background makes no pretensions to be anything else. The article on the Lake Tanganyika research project makes interesting reading, explaining simply the high level of research being carried out in the Lake, but you'll need to get the Adobe Acrobat reader to be able to see it. If you haven't got one, try a download from **http://www.shareware.com**, as you'll find it useful for other things as well.

One of the most striking and popular Tanganyikans is *Cyphotilapia frontosa*, and you can find a whole site dedicated to this fish at **http://www.geocities.com/Heartland/6826/**. These pages are put together by a fan who explains that this is the 'best cichlid you can ever own' and his enthusiasm and knowledge make for an excellent site, with photos of the fish, descriptions of its behaviour both naturally and in the aquarium, and all about Lake Tanganyika itself. The little pop-up advert that appears whenever you get to the front page appears to be a hazard of Geocities, where this page is hosted; close it as soon as it appears or you'll be spending time downloading adverts.

Supposedly there is a Lake Tanganyika Cichlid home page at **http://www.cichlids.com**, but this site proved totally unobtainable, which is a shame as many other pages make reference to it. If anyone knows where it has gone I will be happy to take a look at the site another month.

Finally, on the subject of Lake Tanganyika, the page at **http://www.cco.caltech.edu/~aquaria/krib/Fish/tanganyikans.html**, Fish From Lake Tanganyika, is a part of the large Krib site, and contains extracts from email conversations about Tanganyikans. After you've read this page take a look at the rest of the site, which contains a wide range of information from this month's cichlid topic to mermes and much more.

Next month we will be rounding off our examination of cichlid sites on the Net.

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

FOCUS ON
FISH
HEALTH

A Policy of Prevention

Roy Osmint gives guidance in avoiding problems in advance

PART 1: The Environment

A healthy aquarium; good disease prevention can keep it that way.
PHOTOGRAPH: A&C LIBRARY

FOCUS ON

FISH HEALTH

A Policy of Prevention

Pick up any general fishkeeping textbook and the chances are it will contain a section dealing quite extensively with the somewhat unpalatable subject of fish disease. Indeed, if the publication lays claim to being at all comprehensive in its coverage of the hobby such a chapter could hardly realistically be omitted!

Among its pages will be detailed descriptions of the numerous diseases and disorders to which potentially our fishes might succumb. Often graphically illustrated with images of pitiable specimens so effected, their grotesquely deformed, emaciated and ulcerated bodies providing clear examples of what can happen when things go wrong. Clearly, to the aquarist, this type of advice provides a reservoir of vital reference information which will in many cases go a long way in helping to identify, correctly diagnose and hopefully successfully treat a range of common (and not so common) ailments and conditions.

From the perspective of the fishkeeping newcomer, however, such a catalogue of latent problems seemingly waiting to ravage their fishes will frequently and understandably be perceived as both daunting and dispiriting. In many cases to be misinterpreted to suggest that the whole business of keeping healthy fishes in captivity is fraught with previously unrealized difficulties.

Extremely Fortunate

In fact I have often mused that it is probably extremely fortunate for the hobby that publishers usually incorporate this kind of information towards the back of their books. If the reverse were the case I fear many would be recruits might have their enthusiasm irretrievably dampened before getting the opportunity to experience the true joy and relatively trouble-free nature of fishkeeping.

I am, of course, in no way suggesting that these diseases and disorders are not a potential and continual threat — they are! Nor am I endeavouring to minimise the effect they can have on both individual fish and communities. But the matter does need to be kept in context; generally speaking fishes are pretty healthy, resilient and adaptable creatures provided they are afforded favourable care and conditions.

Identify and Diagnose at an Early Stage

Many of the more commonly seen fish diseases often respond well to modern treatments provided that problems are identified and correctly diagnosed at an early stage. Some of the rarer forms can prove more difficult to deal with but even here effective remedies are sometimes available. But by far the best method of combatting disease is to not get it in the first place. The old adage 'Prevention is better than cure' is as relevant and important to aquatic life in this respect as to any other. So, is it actually realistically conceivable that disease among your fishes can be prevented? The answer must of course be no — not absolutely! But there is nevertheless much that can be done to minimise the chances. By consciously pursuing a disciplined prevention policy you can significantly weight the balance in your favour and go a long way to ensuring that in most cases your fishes win the battle against disease and enjoy happy and healthy lives. Let us then take a straightforward and entirely logical look at what we need to do to bring this situation about.

An obvious prerequisite to implementing and following a diseases prevention policy is a sound appreciation of the circumstances and reasons why fishes are likely to become particularly susceptible to disease in the first place.

Although the diseases themselves can be complex, many and varied, the conditions and situations under which fishes become more exposed to infection can be more simply described. It therefore follows that by taking positive steps to avoid these conditions occurring or developing, opportunity for disease to gain a hold can be radically reduced.

Water

The principal element in a fish's environment is clearly water. This not only provides its life support system but also represents an entire atmosphere. It will, therefore, come as no surprise that the overall quality of this essential element is as crucial to fish health as clean atmospheric air is to terrestrial animals.

In this context it must always be remembered that clarity of water does not in itself necessarily indicate quality of water. An aquarium might contain sparkling aesthetically-pleasing water which, on the face of it, appears in excellent condition. But this is not always the case for it can, under certain circumstances, invisibly harbour extremely harmful pollutants, threatening potentially-serious health consequences upon its

inhabitants.

But vital though water is we cannot consider it in total isolation for there are two other elements that in association fundamentally contribute to a fish's state of health. In broad terms these can be described as factors relating to the fish itself and the natural presence in the water of disease-causing organisms (pathogens).

All is likely to be well so long as these three elements remain in balance and a favourable biological equilibrium is maintained. Things start to go wrong where one or more become altered, as for example where a fish's resistance is lowered as a result of stress through inadequate or inappropriate diet, poor quality water or when disease is inadvertently introduced from a remote source.

In a natural habitat this delicate balance will, under normal circumstances be well maintained by Nature. But within the confined conditions of an aquarium this is obviously not the case and the responsibility falls entirely upon the aquarist. The whole thing becomes more critical when one contemplates the artificially high stocking levels of captive fishes. No natural body of water would ever have to support such a dense fish population when considered as a ratio to water volume.

Our water management practices and general fishkeeping husbandry are therefore crucial to establishing and maintaining this vital tripartite balance. How we approach it and the level of attention to detail afforded will determine the health of our fishes and quite simply spell the difference between probable success and certain failure.

Water Quality

In order to comply with stringent health regulations Water Companies are obliged to treat tap water in various ways in order to bring it up to the required standard for human consumption. This includes the introduction of certain chemicals such as chlorine. Whereas these additives render the water fit for drinking and are thus intended to protect our health, to fishes they are often toxic to various degrees and can consequently pose a threat to it.

It is, therefore, a wise precaution when drawing water for aquatic use to take steps to neutralise the chemical effects. The most straightforward method is to simply add one of the readily available dechlorinating and conditioning agents which are extremely effective in this respect. Chlorine will, in fact, naturally dissipate of its own accord if the water is left to stand for about 24 hours particularly if vigorous aeration is provided.

Care should also be taken to avoid problems associated with metal poisoning a toxin to which fishes are particularly susceptible. This can occur when water becomes contaminated by the pipes through which it travels and stands. The previously-mentioned tapwater conditioner will help prevent some of the worst effects but it is nevertheless a sensible rule to always run the tap for a while so as to eliminate water that may have been languishing in the pipes, especially overnight. Also do not use for this purpose water taken directly from the hot water tap as it can become contaminated by copper from the tank in which it has been stored and heated.

In general, water from the tap will prove perfectly satisfactory for most fishkeeping applications. Even if you ignore all the advice given I am not saying that your fishes will automatically or necessarily come to harm - they may not! But this article is all about prevention. By adopting a few simple precautionary habits you can potentially save yourself and your fishes much anguish.

Continually preserving quality water in the aquarium must always remain a prime objective if healthy conditions are to be maintained.

After all within this enclosed world where the effects of wind, rain and water movement are not a factor, Nature's own cleaning and purification processes cannot operate. The natural laws that determine and govern the cycle of organic matter, however, are still at work stimulated by the presence of animals, plants, bacteria and fungi, so an efficient alternative must be used to keep the water sweet and everything in balance.

Filters provide the answer — or at least part of the answer!

Modern filtration systems are capable of performing a variety of functions in helping to achieve and maintain stable and healthy conditions in addition to the generally-recognised one of keeping the water clear by removing suspended particulate. Depending upon the type and its method of operation — chemical, mechanical and biological — filtration can all be achieved and utilised to help clean, purify and in some cases alter the composition of the water. It is extremely important to select the filter system or systems best suited to the intended application so as to derive maximum advantage from it. Like most things they all tend to have plus and minus points.

Further information and advice on the various systems readily available can be obtained from all reputable dealers and fishkeeping textbooks. The subject is also frequently dealt with in detail through the pages of this magazine.

One thing that must always be remembered, however, is that no matter what filtration method is chosen for whatever situation it is not a 'panacea for all ills' and must certainly never be regarded as a substitute for sound and disciplined tank maintenance and proper water management practices. Only when used in conjunction with frequent partial water changes and the regular, manual, removal of uneaten food, decaying plant matter and other accumulated detritus in the aquarium will the filter significantly contribute to keeping the all important biological balance and thus fulfil its function in our overall disease prevention policy.

NEXT MONTH:

THE FISH

Annie Mercier & Jean François Hamel conclude setting up a really coldwater aquarium

PHOTOGRAPHS BY THE AUTHORS UNLESS OTHERWISE STATED

Hosting a Nord

A first Nordic aquarium should probably be focussed on rocky habitats which offer some of the most spectacular landscapes.

If you want to be truthful to the natural habitat you should probably document yourself or, better yet, take a trip towards the northern coasts of Europe or North America. Once you have seen or read about the cold marine ecosystem you will be ready to reproduce it in your home.

THE AQUARIUM

A first Nordic aquarium should probably be focussed on rocky habitats which offer some of the most spectacular landscapes. The rocks and boulders are usually overcrowded with an infinite variety of colourful organisms. They are a good choice if you want to implant sessile animals such as Sea Anemones, Bryozoa, Tunicates, Hydrozoa, Sponges and Encrusting Algae. They are favourites of Mussels, Barnacles and Periwinkles as well. Irregular rocks, mainly composed of inert material such as granite, silicate, etc, form the best substrates. When you collect them in the wild they should be cleaned before use except if you have the chance to collect them in the cold marine environment.

THE CRITTERS

Before going further you must understand what are the characteristics and requirements of the marine invertebrates that will make the most part of your aquarium. Again, the rocky bottom probably gives you the widest range of possibilities. The first colonisers of boulders are the sponges and encrusting algae; they can transform a dull rock, collected from your back yard, into a splendid red, pink and green tapestry within a few months. A seashore rock is often already well decorated. You will soon find small larvae, protozoan and copepods crawling on the surfaces. Molluscs such as Mussels and Oysters are quite easy to maintain. You can often buy them alive in fish markets if you do not have access to the shore. Crabs and Lobsters can also be purchased that way. Those animals will probably bring along other smaller organisms such as Hydrozoa and Bryozoa fixed on their shells or carapaces.

If you have the opportunity, do not hesitate to be original and keep a delicately pink soft coral in your tank. Yes, there are corals in very cold waters, but only soft ones and therefore no reefs. Shrimps, Sea Anemones, Sea Urchins and Sea Stars are also good guests. If you have the space, you could make room for a small, sandy area between the rocks, where digging species can grow at ease: Clams, Tubeworms, some small Sea Cucumbers and Sea Stars. Pelagic creatures can also light up your aquarium. Ctenophores, Jellyfish and pelagic Shrimps all contribute to a fantastic

ic-Polar Aquarium

decorum. What about fish? Fish in Nordic waters are for the most part dull in appearance or even cryptic. Think of the Flounders, Sea Ravens, Eels, Sculpin Fish, Skates and Rock Gunnels. Still, some are more flamboyant like the Monkfish and Lumpfish and you might want to incorporate small specimens into your aquarium. Be careful, though, they might attack the colour invertebrates or even engulf each other.

Unfortunately, cold water species are not very common on the market. We like to think that it is a good thing: only the convinced and resourceful aquarists will keep them, and thus the ecosystems will not be depleted for nothing. You may some time purchase interesting species from specialised suppliers operating in northern latitudes or even from scientific institutions.

FEEDING

Different groups of marine invertebrates have different needs. Pelagic or benthic, carnivores and herbivores cohabit in many habitats. A dominant portion of species usually feeds on plankton: algae and small animals in suspension in the water column. Among the largest specimens that can fit at ease in your aquarium, you will find sea cucumbers, sea anemones and soft corals that catch their prey with their tentacles and bring them to their mouth. As for tunicates, mussels and sponges, they almost continuously filter the water to extract phytoplankton and other organic particles. If you want to provide those animals with enough food, you might consider rearing phytoplankton in continuous cultures. For instance, *Chaetoceros*, *Thalassiosira* and *Coscinodiscus* are three kinds of pelagic diatoms found in the North Atlantic. They form the base of the food chain and are fairly easy to maintain. Other species of algae like *Monocrysis* and *Isocrysis* can be given to your coldwater guests, but, of course, they won't live for long in your aquarium since they are used to warmer temperatures. Otherwise, you can buy *Spirulina* (a dried species of phytoplankton) from specialised stores or even blend spinach with sea water and dispatch the solution as you would a phytoplankton culture: drop by drop, continuously or in small batches at intervals. The first alternative is surely better since many organisms feed only at night. Finally, frozen phytoplankton is available on the market, but at a cost that makes you think twice about feeding your hosts year-long in this way.

Zooplankton feeders can also be provided with fresh cultures, but maintenance of live *Artemia salina*, for instance, is quite demanding. The periodical addition of small crustaceans like Amphipods or Mysids in the aquarium is probably better suited, especially if you live near the sea. Frozen or dried food is also acceptable to most organisms.

Some marine invertebrates prefer to feed on the bottom. Beware of their particularly destructive habits. Sea Urchins, for instance, are formidable grazers and they can clean an algae-covered substrate in no time. Nudibranchs, Hermit and Decorator Crabs will take bites at soft-bodied animals like soft coral, Tunicates and worms. Sponges and Mussels have to bear the attack of carnivorous Sea Stars *Henricia* sp. and *Leptasterias* sp., respectively. In other words, you have to be well organised and documented if you want numerous sorts of invertebrates to cohabit in your tank and stay there. Or else, be sure to provide each one with enough food to make them forget about their neighbours!

THE SYSTEM

WATER QUALITY

Natural sea water filtered with diatomaceous earth, to remove the excess of dead and live organic material, is by far the best choice. Of course, not everyone has access to the ocean and artificial sea water is a good alternative, provided you follow a few rules. Salinity should be adjusted between 25-35 ppt, depending on the species you maintain. Do not rely on instruments made to evaluate the density of tropical water: they are not calibrated properly (less salt is needed to obtain the same salinity/density in cold water). Ideally, the artificial sea water should be left to stand in the aquarium for about two to three months, so that life can begin to establish itself. Remember that in near freezing water, the microbial populations take longer to multiply than in warm tropical water. Cold water favours oxygen dissolution so

Hosting a Nordic-Polar Aquarium

your aquarium will not necessitate a thorough agitation. The turbulence created by the filtration and refrigerating systems should be sufficient, although the surface has to be clean to promote gas exchanges.

Because they are used to a rich environment, maintaining cold water invertebrates can bring important amounts of detritus (uneaten food particles, faeces) which are likely to pollute the water if a proper filtration is not maintained. Avoid undergravel filters because they are not well suited for endobenthic invertebrates and difficult to conciliate with fine substrate. It could be a good idea to host a few scavengers like Hermit Crabs, Whelks, Polychaetes or Amphipods.

LIGHT

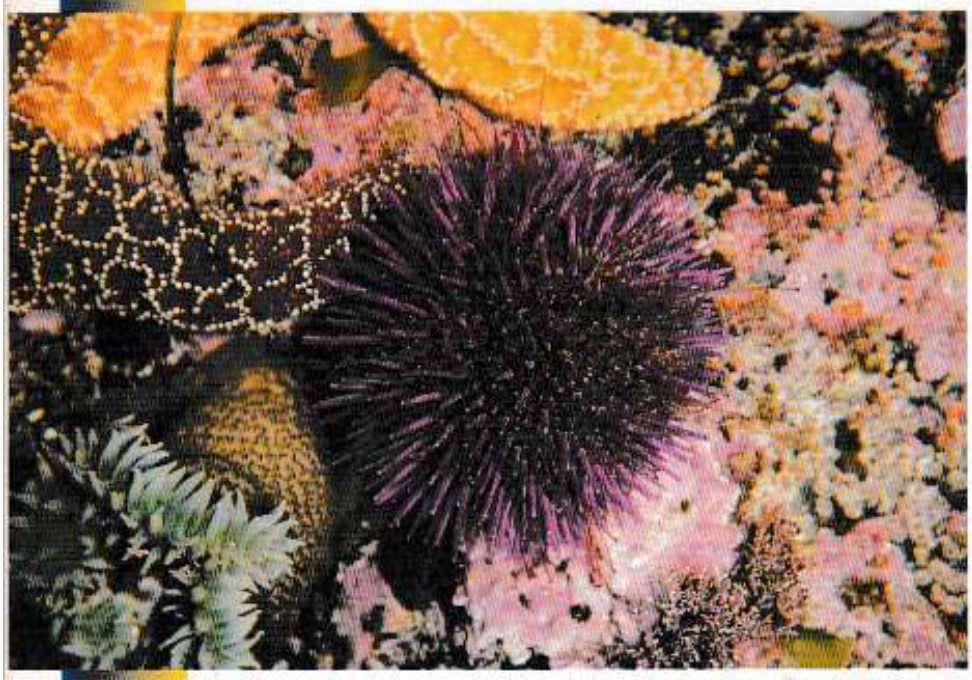
Most preferred marine critters are collected at depths varying from 0 to 30m. Even though these organisms come from shallow habitats, they are not submitted to excessively bright light. Remember that the transparency of the water is not that of a tropical lagoon, because the temperate and cold seas are richer and much more productive. At 15m everything appears grey or blue and only bright light can bring on the true colours of the organisms. Consequently, it is better to respect the habitats of our guests and not expose them to excessive illumination. Fluorescent light is better than incandescent light since it will not produce as much heat (you will have enough problems as it is to maintain the water at its coldest). The organisms should receive about 5-10mmol s^{-1} m^{-2} of light with eight to 10 hours of illumination daily. If you have an important vegetable cover, you will need a more powerful system to promote their growth, such as the one provided to freshwater plants.

REFRIGERATION

Refrigeration is probably the most demanding and touchy component of your cold marine system. Ideally, the temperature has to be maintained between 2 and 4°C, and this can be achieved with several methods. The first alternative is to purchase a compressor, from old refrigerators or freezers. You will cautiously cover the tubing with an epoxy paint and include it in a spacious filtration system. This kind of compressor can easily refrigerate a small volume of water (40 litres or less) for a long time. Second, if you have a freezer (–20°C) at your disposal, you can place stainless steel tubing (about 1cm in diameter) in it and circulate the water of your aquarium with the help of a heavy duty pump. The speed of the flow will determine the temperature. Of course, this kind of system in space consuming and the sea water can freeze in the tubes and cause the circulation to stop, provoking a rapid raise of temperature. You must be vigilant. Third, if you are keeping organisms that are found in tide pools, they should tolerate a more temperate environment. You may use running water to refrigerate the tubing instead of a freezer. But you must get the annual temperature profile of your tap water before engaging in this type of technique, to make sure it can always refrigerate your tubes. You should also think of the environmental and pecuniary costs. Finally, a wide variety of commercially available chilling systems are available. They are reliable and costly. If you can afford them they provide the easiest solution.

THE PAINS

By far the commonest problem you will face is condensation on the glass of your aquarium, especially if it is exposed to warm temperatures. It goes without saying that you should choose the coolest room of your home to display such an aquarium. You can then save on energy and headaches. Condensation problems cause the tank to drip and can be hard on the surrounding floor and furniture. The phenomenon usually appears as soon as there is a difference of more than 5°C between the water and ambient temperature. Placing your aquarium in a well ventilated corner and covering all the sides (except the front) with Styrofoam is a good idea. The front of the tank can also be designed in an advantageous fashion: use a double glass wall with a spacing of 1cm, pierce two small holes (about 5mm) to place an air tube at each extremity of the tank. A pump can circulate the air through a silicate filter to dry the environment between the walls and prevent condensation. If you use a simple wall for the front of your aquarium place a fan in front of it. This should eliminate condensation but can be a bit cumbersome or noisy.



The Purple Sea Urchin, Strongylocentrotus purpuratus, from the American West Coast.

You should be on the lookout for a few minor health problems if you want to witness beautiful phenomena such as healthy feeding and reproduction in your aquarium. Although we have not seen them very often in 15 years of experience protozoan or crustacean parasites can infest the reproductive tissues of some Echinoderms and Gastropods. It is impossible to get rid of them. A much more common problem comes from the wounds that the animals can inflict on one another or receive at the time of collection. Some organisms like Sea Anemones can regenerate torn or lost body parts, but others are more fragile, especially those that come from deep waters. Be cautious with Ophiuroids and Sea Stars: some species have a tendency to release one or many arms when they are wounded or uncomfortable (a process called autotomy).

As we have already discussed the choice of compatible guests is essential if you want to enjoy their presence in your aquarium. You have to understand that these animals are used to a much more spacious territory. Overcrowding is never a good idea anyway. It would be a mistake to put certain species together: deadly mixes include Crabs with Tubeworms, Whelks with Sea Stars and Macrophytes with Green Sea Urchins. More appropriate is a blend of sessile animals such as Sea Anemones, Soft Corals, Sponges, Tunicates and Bryozoa which can make a colourful spectacle. You might even throw in a few Gastropods and Bivalves. If you would rather keep more active specimens a choice of Sea Urchins, Sea Stars and Sea Cucumbers can work out, or Crabs with Shrimps, Ophiuroids and Nudibranchs. Just don't mix mutually exclusive species or ferocious predators with their prey. Also provide shy animals with a few hiding spots if you do not want to overstress them. As for fish, they usually go well with invertebrates, but be sure to give them enough space.

REPRODUCTION

Two types of reproductive strategies can be observed among marine invertebrates. Asexual reproduction includes budding, fragmentation, binary scission and never involves gamete (sperm and egg) synthesis. Sea Anemones often display such rapid ways of multiplying, although they can also reproduce sexually. Sexual reproduction can be achieved by releasing gametes in the water with subsequent pelagic development of the embryos. Broadcasters of this kind can be found among Echinoderms, like Sea Urchins and in several species of bivalves. Their eggs are minute and invisible to the human eye. Internal fertilisation is another alternative, displayed by Whelks among others. *Buccinum* and *Nucella* accumulate sperm in a special chamber during copulation, and use it to later fertilise their eggs which will be deposited in capsules on the substrate.

Nudibranchs reproduce in a similar fashion and their string of eggs resembles white lace spread between rocks or among algae. The Sea Star, *Leptasterias poloris*, lays its eggs on the rock surfaces or glass walls and coils its arms around them to brood for five to six months. The pinwheel shape of the brooder is easily recognisable and if the mother chose the front wall of the aquarium you can observe the eggs (over 1mm in diameter, bright yellow) and the embryos that eventually develop into young Sea Stars. Other Sea Stars and Sea Anemones will internally brood their young and release them when the time comes.

Although some reproductive behaviours can occur spontaneously if you are lucky others are more tricky to initiate. They can be triggered by simulating the natural phytoplanktonic spring bloom, or the increasing photoperiod and temperature during early summer. Sea Urchins and Sea Cucumbers can be sensitive to such factors. Spawning cues of Nordic marine invertebrates are diversified, and sometimes come from a mix of conditions that are not yet well understood. We are still working to determine some of them. Perhaps you will be lucky enough to discover a few tricks of your own.

TAKING ON THE CHALLENGE

As you see keeping a Nordic aquarium is not what you would call easy and completely worry free, but a well designed system will be self-maintaining and become your pride and joy. Isn't a new challenge what the serious and inventive aquarium hobbyist is looking for! Facing the northern breeze is perhaps what you need to rekindle or feed the flame of your passion for aquariums. Remember that cold horizons can hide unsuspected and exciting features that are just waiting to be explored.

The nudibranch, *Hermissenda crassicornis*, makes a colourful guest in the aquarium.

Nick Dakin looks at Blennies and their suitability for the tropical marine aquarium

PHOTOGRAPH BY THE AUTHOR

Bold Blennies

The Scooter Blenny, P. tommincki.

FAMILY: Blennnidae

Sooner or later the serious marine aquarist cannot fail to come upon these endlessly fascinating and endearing group of fishes. Their curious habits and occasional brightly coloured appearance have continued to make them a firm favourite with reef and fish-only keepers alike.

Blennies are found in seas all over the world. They are particularly abundant in tropical, sub-tropical and temperate waters. Indeed, there are over 300 species included in the family Blennidae alone, with another 400 in closely associated genera. The largest rarely exceed 10cm in length and are therefore ideally suited for life in the aquarium. Newcomers will find the majority of specimens an ideal first choice and many can be recommended without hesitation.

Newcomers will find the majority of Blennies an ideal first choice and many can be recommended without hesitation.

CONFUSION

Although it is not of great importance to the average hobbyist, blennies and gobies are often confused as they share many similar characteristics. For example, many members of both families are bottom-dwellers and tend to occupy a cave or burrow for protection.

However, they are easily distinguished as the pelvic fins of the gobies are fused together to form a sucker-like disc, enabling them to 'perch' on vertical, or even overhanging surfaces. Whilst blennies are also versatile their pelvic fins are distinctly separate and they tend to rest on horizontal surfaces where they can get a good view of the surrounding area.

Making full use of their ability to move each eye independently predators are soon spotted and the fish can quickly retire to the safety of its chosen burrow or crevice.

But there are exceptions in all things and to this type of behaviour. For instance, the Scooter Blenny (*Petroscirtes tommincki*) has no burrow, it merely freezes when threatened and relies on its highly camouflaged body for protection. On a more macabre note, the Sabre-

Toothed Blenny (*Aspidontus taeniatus*) is a free-swimming species that mimics the colouration of the common Cleaner Wrasse (*Labroides dimidiatus*). Unlike the Cleaner Wrasse the Sabre-Toothed Blenny has far from friendly intentions! No sooner has it gained the confidence of another fish fully expecting to be cleaned of parasites than it tears off a piece of flesh instead!

Obviously, this does not make a good introduction to the marine aquarium if tankmates are to remain in good condition! Fortunately, the Sabre-Toothed Blenny is reasonably easy to distinguish from the true Cleaner Wrasse because it has a distinctly shark-like underslung mouth and is generally not quite as brightly coloured as the true Cleaner Wrasse.

FEEDING VARIATION

Being such a large family of fish feeding methods vary widely from substrate browsers, algae eaters, plankton feeders and flesh eaters as we have seen. However, by far the largest group are the plankton feeders who tend to perch on a convenient outcrop and dart out to grab any tasty morsel that happens to drift by carried in the current.

In the aquarium blennies have very catholic tastes and will readily take frozen or live brineshrimp as well as other finely chopped pieces of marine fare. Most species will also eagerly take marine flake.

BREEDING

Most blennies spawn in a cave or burrow. The males generally take the responsibility of guarding the eggs until they hatch. The newly hatched larvae subsequently make their way to the surface plankton layers to feed until they are mature enough to descend to the sea floor.

It is possible to positively sex a number of species and these will quite often pair up and spawn in the aquarium. Eggs are frequently laid in barnacle shells and guarded by the male. Unfortunately, the larvae are extremely difficult to rear in captivity, even though for some time professional breeders have been trying.

TERRITORIALITY

Blennies are largely territorial by nature and are loathe to tolerate the same, or similar, species in the same aquarium (excluding where true pairs have been identified). There are, of course, exceptions here but a mixture of blennies in the same aquarium is not a guaranteed recipe for success. Unrelated families are nearly always ignored and although they are inquisitive fish blennies invariably get on well with species that present no threat to them.

DECORATION

It is essential that the blenny be made to feel at home by providing plenty of rockwork, built up into high points where the fish can perch and observe the scene. Large barnacles are appreciated as convenient retreats during the day and night-time. Sparsely decorated aquaria should be avoided as they will tend to stress the fish.

INVERTEBRATE COMPATIBILITY

The vast majority of blennies are entirely compatible with both mobile and sessile invertebrates. They are highly disease resistant and substrate browsers often keep potential plagues of amphipods and copepods under control. Some species even graze on hair algae, although they rarely provide an efficient solution to that particular marine aquarium bug-bear.

AQUARIUM CONDITIONS

An aquaria of 36x12x15in or larger are satisfactory. Ammonia: Zero. Nitrite: Zero. Nitrates: 25ppm or less. pH: 8.0-8.3. S.G.: 1.019-1.025. Temperature: 25-26°C (77-79°F).

POPULAR SPECIES

Scooter Blenny (*Petroscirtes temminckii*)
Bicolor Blenny (*Ecsenius bicolor*)
Midas Blenny (*Ecsenius midas*)
Redlip Blenny (*Ophioblennius atlanticus*)
Algae Blenny (*Salarius fasciatus*)
Smith's Blenny (*Meiacanthus smithii*)
Forktail Blenny (*Meiacanthus atrodorsalis*)
Oualan Forktail Blenny (*Meiacanthus oualanensis*)

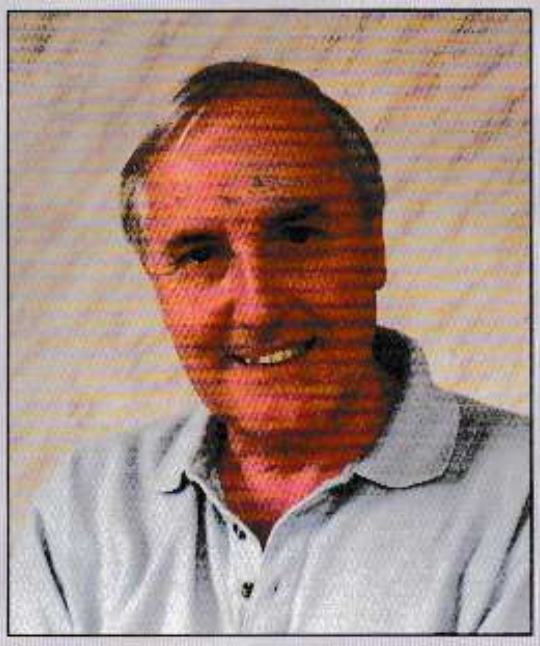
VISIT NICK DAKIN'S WEB SITE AT:
http://www.nickd.clara.net/

Regular water changes of about 15 to 20 per cent every two weeks are essential to good health. Vigorous water circulation is also appreciated. Protein skimming and activated carbon should be seen as standard. Lighting is largely unimportant as blennies will adapt to almost any scenario, whether it be an intensely lit invertebrate tank or a moderately illuminated fish-only set-up.

DISEASES

Blennies are not prone to any particular diseases common to the marine aquarium. However, they are intolerant of poor water conditions and will soon succumb as a response to bad husbandry.

Famous Faces in Fishkeeping



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

This Month:

DICK MILLS, A&P EDITOR, DECIDES IT'S TIME TO COME CLEAN!

A&P: How long have you been in fishkeeping and what started you off?

DM: I've been in fishkeeping proper since the middle 1960s when I couldn't breed Angelfish successfully and joined the local Society in order to find out why!

A&P: Can you remember your first aquarium and what you kept in it?

DM: It was a tall 18in or so battery jar made from moulded glass and had one fish in it, a Silver Rudd called Horace plus a sprig of Watercress. It sat on the front window sill for years, long before I got 'serious'. My first proper aquarium was my reward for passing the 11+ examination; it was a substitute for my first choice — a bicycle — which my parents wouldn't let me have. It was a 'Blue Waltl' aquarium — coldwater, with three Shubunkins being kept in nothing more than an upgraded, glazed biscuit tin with a light on top!

A&P: What are your special interests?

DM: I have more than a soft spot for Angelfish, furnished aquariums and fish photography and I always try to 'accidentally' come across public aquariums when we go on holiday.

A&P: Are you into breeding?

DM: Not especially, but I have managed a few species when I had more time!

A&P: Do you belong to any Aquatic Society.

DM: Yes. I am a member of Hounslow & District A.S.

A&P: What do you think about Fish Shows?

DM: I like to think they serve a purpose in encouraging the general public to consider taking up the hobby. They should be a great 'shop window' for fishkeeping but with so many more alternative attractions on offer it looks as though we are only preaching to the converted.

A&P: If money was no object what aspect of the hobby would you like to follow?

DM: I think I'd take the easy route on one hand and have a beautiful aquarium and cabinet set up in my home but also take some holidays in far off places where I could see fish in their own environment, or maybe accompany some exporters in their catching trips. If I could only perfect my photographic and computer techniques then I could imagine getting into producing CD ROMS for fishkeepers.

A&P: What fish would you never keep and why?

DM: I must concur with several of our previous 'Faces' and say that any species requiring conditions (or space) beyond my ability to provide them would have to be on the 'Not Wanted' list. I'm not too keen on any man-made 'albino', long-finned or 'painted' varieties, either.

A&P: What's your favourite aquarium book?

DM: Never ask any Editor such a dangerous question! However, Jack Heins & George Harvey's books were always a delight to read for their sheer literary merit. Gunter Sterba's volumes represented sound scientific facts and practical information whilst today's Baensch Atlases have very few rivals.

A&P: How do you think fishkeeping is keeping up with other modern day attractions?

DM: Sad to say I think it is slipping behind, despite the numbers of fantastic new aquariums about to open. There is a serious shortage of youngsters staying with the hobby long term. Unfortunately, too, in this modern age, fishkeeping has no immediate newsworthy 'hook' or sensationalism to attract media coverage. Perhaps we should look toward inclusion into other animal keeping events to help keep our interests in the public's gaze?

A&P: What do you get from fishkeeping that keeps you interested?

DM: It's a quiet, clean and absorbing interest. You can set your own levels of involvement, there are no 'pedigree' lines to result in demarcation levels between species (or owners!) and the social scene is as friendly as you could wish to find — even at prize giving.

A&P: What's next in your fishkeeping plans?

DM: Apart from getting the next issue of A&P out on time, probably moving my small pond.

Meet the Societies

BOURNEMOUTH COMMUNITY FISHKEEPING CLUB

Bournemouth has had a fish club since 1947 when the first meeting was held in a hotel in the town. Since then, as with many clubs, it has had to change with the times, due to a dwindling membership. The most recent change was the name. It was felt that The Bournemouth Aquarist Society was a bit too formal, and perhaps a bit frightening to new people who wanted to learn more. Therefore, we are now the Bournemouth Community Fishkeeping Club, which we feel gives a more modern and social image. This, along with a concerted PR effort, including advertising meetings on BBC Radio Solent's information exchange, and local shops, seems to have helped in increasing membership.

However, the club does not want to forget its past and the roles that former members have played in its success, some of whom were show judges and other high ranking officials in national societies.

There is a wide range of age groups, interests and abilities in the club. We have a strong junior membership who between them keep Discus, Community Tropicals and Marines. Among the adult members there is a wide diversity of interests within the sphere of fishkeeping encompassing Koi keepers, Livebearers, Cichlid and Catfish fanatics, as well as beginners who have community systems. We have a couple of members who have formal qualifications from Sparsholt College and who can help and advise other members with any fishy problems they may have.

The club meets on the second Friday of every month at Kinson Community Centre at 8pm. The meetings usually consist of speakers on various subjects, videos and the occasional outing. One eagerly awaited event is an outing for a behind the scenes look at the new Bournemouth Oceanarium,. which opens in July. However, the major club event of the year will be our 29th Open Show which is to be held on 19 July 1998. Further details for this will follow in the club columns. Other outings are planned for this summer, including tours of fish outlets in other areas of the south.

Despite the upturn in the club's fortunes recently like all clubs we need you, the fishkeeping public, to come and join us. So, forget Bournemouth's image of blue rinses, candy floss and knotted hankies and come along to a progressive and young at heart club, where there is always a warm welcome whatever your interest.

New Visitor Attraction for Bournemouth

Opening in July 1998 the state of the art £3 million Bournemouth Oceanarium can be found adjacent to the central pier. It is one of the most exciting tourist projects to be developed in the region and is destined to be one of the most innovative aquariums in the UK today.

Featuring an international display of aquatic life, complemented by associated floral displays, visitors are taken on a worldwide voyage of discovery through eight countries and three oceans. All displays will be presented in context with their natural environment. From the deep, dark depths of the Atlantic Ocean to the colourful natural life of the Barrier Reef, from tiny, beautiful coral fish, to the more menacing creatures of the deep, the Bournemouth Oceanarium will truly show the visitor a very different world beneath the waves.

The company behind the innovative project is The Real Live Leisure Company Limited, whose directors have unparalleled experience in the construction and operation of marine life centres.

Ian Cunningham, Real Live Director, said: "This is one of our most ambitious projects and will be unique to Bournemouth. It will feature some of the world's most exotic and unusual species of fish.

"We have a real commitment to conservation and we can promise our visitors some quite amazing displays showing the rich variety of marine life. It will be colourful, entertaining and provide a spectacular awareness of the aquatic environment."

Stephen Godsall, Bournemouth's Director of Leisure and Tourism, welcomes the scheme. "The Oceanarium is another exciting and innovative project that continues the regeneration of Bournemouth's seafront," he said.

"The all round appeal of such an attraction will ensure that the Oceanarium is a real benefit to the Town's tourism industry — enjoyed by both visitors and residents alike."

Issued by The Real Live Leisure Company Limited. For more details call Nikki Hasell on 01202 311993.

OLD GOLD — Advice to Keep your Goldfish Living Longer

The recent media hunt for the longest living Goldfish has shown that some can live far beyond the expectations of most people!

"We certainly know of one Goldfish called 'Tish' who is 41 now," commented Dr David Pool of Tetra — world leaders in fish and pond care. "Tish's owner wrote to us a few years ago because she had always fed Tish on Tetra fish food, and she wondered if he was the oldest living Goldfish in the country," he continued.

Tish is still swimming strong in Yorkshire and he will be 42 in July this year. Some of the recent media reports show that Goldfish can live certainly beyond 20 years old, and maybe even up to 50 years!

Goldfish owners everywhere can keep their fish living longer by following some simple advice from Tetra.

When choosing Goldfish, always buy from a reputable aquarist shop. Look for fish that are active, have outspread fins and show no signs of disease; Don't overfeed them. Only feed your fish two or three times per day, with enough food that will be consumed within a few minutes with a good quality food such as Tetraf in Goldfish Flakes (Tish's favourite food!). They should rise eagerly to the surface at each feeding time — if they don't they are probably overfed; If you are planning to go away for a few days, don't worry. Goldfish can look after themselves for short periods of time, like weekends. If your trip will take a bit longer than a few days just ask a friend or neighbour to pop in and feed them from time to time.

Tetra are world leaders in fish care, having spent more than 40 years developing a whole range of products with top quality ingredients to give your goldfish a long and happy life. For your free booklet on how to go about keeping Goldfish write to Tetra, 'Keeping Goldfish is Fun', PO Box 1025, Nailsea, Bristol, BS48 4FX.

Tetra have recently moved to different premises. Their new address is: Tetra, Mitchell House, Southampton Road, Eastleigh, Hampshire SO50 9XD. Tel: 10703 620500. Fax: 01703 629810.

Aquaculture Students Connect to the Industry

A visit to the recent Aquaculture International Exhibition and Conference in Glasgow provided a group of postgraduate students, enrolled on Scottish Agricultural College's Postgraduate DiplomaMSc in Aquaculture Business Management Course (AquaBM) with an opportunity to make direct contact with the aquaculture industry. This visit, together with a one week study tour and industry-related project work, contributes to the overall objectives of the course which aims to meet the increasing need of the industry for employees with practical business skills backed up by a sound understanding of basic principles. With graduations imminent and finding work high on their list of priorities, the students took advantage of contacts at the conference to assess the job market.

The students have also been provided with help in identifying career opportunities through a Careers and Opportunities Day held recently at SAC in Aberdeen with aquaculture and fisheries-related businesses and organisations attending. With 90 per cent of SAC's graduating aquaculture students going on to full-time employment or continuing in education there is clear evidence of the reciprocal support that exists between aquaculture education at SAC and the aquaculture industry.

During their study tour of the aquaculture industry in Scotland students increased their understanding of the 'real' workings of the industry, from the hatchery to the supermarket shelf. They saw the newest in Smolt production technology at Strathaird's re-circulation unit on Skye, were shown how one of the industry pioneers at Ardessie Salmon has coped with the ever increasing competitiveness of salmon on-growing, and heard success stories on fish processing development from Isle of Skye Seafoods.

One of the major elements of the AquaBM year of study is the research project. Students are encouraged to develop research theses to benefit the industry in some way. The titles of the projects included The Technical and Economic Feasibility of a Scallop Hatchery; A Review of UK Salmon Exporting to the European Union; Current Status and Future Prospects of Aquaculture in Northern Ireland; The Future for Triploid Salmonids in Scotland; Comparative Study of Quality Assurance and Food Safety Regulations in the fish processing sector in Greece and the UK.

For further information on the Aquaculture Business Management course, or other courses run at SAC, contact: Roy Sutherland, Management Division, SAC, Craibstone Estate, Bucksburn, Aberdeen AB21 9YA.
Tel: 01224 711000.
Fax: 01224 711270.
e-mail: r.sutherland@ab.sac.ac.uk

BUY LINES

NEW PRODUCT REVIEW

CYPRIO

If what puts you off pond filters is their all too obvious presence by the waterside, Cyprio's new pump-fed Bioforce range could well be the answer.

Illustrated is the Bioforce 500 UVC combining pressurised filtration through foam with an integral ultra-violet clarifier. It can be buried to lid level anywhere around your pond and will do a great job on green water while the open-cell foam works away biologically. It even has an auto de-sludge, powered by the pump.

Aimed at the owner of the smaller pond who wants trouble-free filtration Bioforce is a highly-flexible option. Three models, for 250, 500 and 1,000 gallon set-ups, are available with or without built-in UVC. Alternatively, a UVC upgrade kit will convert the basic filter to the higher specification if you later decide that's what your pond needs.

Because water is forced under pressure through the foam the medium is able to take up far more dirt before it needs cleaning. So don't let its size deceive you; Bioforce is a real little workhorse.

The first product from the joint research and development team of Hozelock and Cyprio it is purpose-built to be as safe as it is efficient.

The new Cyprio solids-handling pump, Clearforce, is recommended as the other half of the package: it even has a creature-friendly outer housing so that frogs, toads and newts (not to mention fish fry) won't tangle with the impeller.

The Bioforce 500 UVC retails at £99.99, but prices start at £29.99 for the plain Bioforce 250.

• Further information from Cyprio on 01778 344502.

The Bioforce 500 UVC pump-fed pond filter.

INTERPET

Interpet, the UK's leading pond product manufacturer, has added two new products — Barrel Feature Clear and Feature Flora Boost — to its highly-successful water feature care range.

Interpet was one of the first to recognise the rapidly-growing marketplace for stand-alone water features such as half-barrels, ornamental fountains and pebble pools. The Interpet Consumer Helpline also identified that these unique self-contained feature environments had their own range of care problems.

Interpet research scientists set about developing appropriate solutions to the water feature problems identified in their market surveys. The water feature care range was the result.

Feature Clear prevents unsightly (and often smelly) algae, fungus and bacterial slime in the water due to the rich nutrient levels and unbalanced nature of ornamental water features.

Feature Anti-Foam resolves unsightly problems caused by the build-up of organic material in the small, enclosed water feature environment.

New for 1998 Barrel Feature Clear resolves the specific bio-fouling problems common in barrel water features due to the high levels of nutrients leeching out of the wooden alcohol barrels into the water.

Also new for 1998 Feature Flora Boost is designed to replace rapidly depleted essential macro- and micro-nutrients for aquatic plants growing in water features. Like plants in hanging baskets, aquatic plants in water features need frequent feeding to achieve the best display.

All the water care treatments are designed to be used monthly, and are supplied in 250ml easy-dose bottles which treat 625 litres (137 gallons); a season's use for the average water feature.

The 250ml Water Feature Care Range all retails at £4.29, and are now available at most good pet/aquatic shops and Garden Centres.

• Further information from: Interpet, Vincent Lane, Dorking, Surrey RH4 3YX. Tel: 01306 881033. Fax: 01306 885009.

New additions to the Interpet water feature care range.

BUY LINES

NEW PRODUCT REVIEW

ALPHA AQUARIUM

Aqua Medic have released new products for 1998. The Turbofiotor 5000 is a protein skimmer for aquaria up to 5,000 litres. A feature of the design is the incorporation of the Aqua Medic Needle Wheel which, revolving at 3,000rpm, cuts up the air bubbles into smaller pieces for even better mixture. The position of inlet and outlet ensures maximum contact time. The skimmer is available in three versions — Baby, Single and Twin — with capabilities of servicing up to 2,000, 3,500 and 5,000 litres, respectively. It comes as no surprise that big performance requires a big skimmer and the overall heights are 48in for Baby and 78in for the Single and Twin models.

The Care Programme for the saltwater aquarium consists of Reef Life Calcium, Reef Life Strontium, Reef Life Iodine and Reef Life Trace — all additives, the latter three will treat a 400 litre aquarium for up to three months.

- Further information on these, and other Aqua Medic products can be obtained from: Alpha Aquarium, 62 High Road, Byfleet, Surrey KT14 7QL.
Tel: 01952 353600.
Fax: 01952 249718.

CONCEPT RESEARCH

As it's now into the "open season" for fish hunting Herons, news of Heronwatch, an effective Heron-deterrent, must be welcomed. Whilst damaging plants or any of your pond-surrounding features can be pretty annoying, a departing Heron with £200 worth of Koi impaled on its beak is enough to get you considering illegal action, such as reaching for Grandpa's WW2 souvenir service revolver!

The neat and unobtrusive motion sensor from Concept Research will respond to a Heron's movement up to 40ft away and gives off a series of high frequency sounds which soon puts it to flight. The range and volume of the unit are adjustable and although it will work both day and night, you can set it to turn off automatically when it gets dark and on again when daylight returns. The unit is totally weatherproof and battery-, or mains-operated. Not only that, it comes with £200 worth of free insurance for your fish when your pond is protected by Heronwatch. Placing Heronwatch by your pond makes it a Heron-free zone.

- For further information or for details of your nearest stockist contact: Concept Research, Carrington House, 37 Upper Kings Street, Royston, Herts SG8 9AZ.
Tel: 01763 244266.
Fax: 01763 249248.

SOCIETY WORLD

Fishworld '98

As the date draws nearer to Fishworld '98 its organisers, the Federation of British Aquarist Societies, would like to make it clear exactly what is going on at the event, bearing in mind that many readers of *A&P* might not know what an Open Show is!

Put quite simply Fishworld '98 is a tropical and coldwater fishkeeping event in which many aspects of the whole fishkeeping scene will be on view. There will be added trade support this year, so visitors can find out about all the latest developments in the hobby, come and see the Pond Displays — there'll be more than one type; if you like Koi then you'll be in for a treat with the North Herts Section's Closed Show; everyone likes a winner and there'll be plenty of them qualifying for entry in the British Open in which only the very best

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OPEN SHOWS AND MEETINGS

5 May Gloucestershire A.S. Club visit to World of Water, Gloucestershire. The Society meets at 7.30pm in the Tamworth Lodge, Tewkesbury Road, Gloucester, on the first Tuesday of each month. For more information contact Andy on 01452 379948.

10 May Four Lane Ends A.S. (FLEAS) will be holding their 3rd Annual Open Show and Auction at the Balliol Youth Centre, Chesters Avenue, Long Benton, Newcastle-upon-Tyne. Show details from Dave Charlton on 0191 215 1933.

15/17 May Goldfishmania '98, Harcourt Sands Holiday Camp, near Ryde, Isle of Wight. Tickets £65 per adult and £39 for juniors, and information from Les Pearce, 44 Weeks Road, Ryde, Isle of Wight PO33 2TL. Tel. 01983 615575.

16 May GGGB Meeting, London City YMCA, Errol Street, London. 2.30pm 'Fish Foods' Mr Mike Bell and Mr Mike [illegible].

16 May Gloucestershire A.S. Club visit to Birmingham Sea Life Centre, including look behind the scenes. Plus visit to Shirley Aquatics, Solihull.

19 May South Park Aquatic Study Society. 8pm. Wimbledon Community Centre, St. Georges Road, Wimbledon SW19. Final arrangements for the Open Show and [illegible]. Further information from Ken Seaton, 0181-641 2848.

24 May Farnham A.S. Open Show. Information from A. Pearce, 01252 25686.

31 May National Junior Fishkeepers Association Open Show: Fishworld '98, Queensway Hall, Dunstable, Beds. Contact John Pell on 01634 389362.

14 June Bracknell A.S. Open Show and Auction. Priestwood Community Centre, off Stoney Road, Bracknell, Berkshire. Specialist Societies in attendance. Killifish Display by BKA Southern Area. Viviparous. Booking of Lots for Auction on day. Show details available from Terry 01344 452485, or Keith 01189 732871.

Viviparous Celebrates 10 Years

The national society that caters for aquarists who keep or study Livebearer Fishes is called "Viviparous". Now 10 years old the society has over 200 members, with a quarterly magazine and a two-day symposium held annually.

Celebrating this year's 10th anniversary were 35 members at the Chesterfield Hotel and Exhibition Centre on Saturday and Sunday, March 7 and 8 1998. Lectures were given by the famous German scientist and aquarist Manfred Myers who showed slides and live examples of the beautiful but rare *Micropoecilia* spp.

Viviparous Chairman Derek Lambert showed slides of the flora and fauna of Costa Rica from his recent visit, sponsored by *Aquarist & Pondkeeper*. The after-dinner speaker Aquarian's Dr David Ford who recalled the fun side of fishkeeping. There was also an Open Show with 50 entries of Livebearing Fishes.

Anyone interested in the Livebearers, from Guppies to Sharks, can join the Society by sending the annual fee of £8 to Pat Lambert, North Side, Spridlington Road, Faldingworth, Market Rasen, Lincs LN8 3SQ.

Picture below shows Derek Lambert presenting Manfred Myer's wife Kornelia with a bouquet at the Viviparous Dinner.

PHOTOGRAPH: DAVID FORD

SHOW DATES AND FESTIVALS

(Rule Codes: A - A of A, FB - FBAS, FN - FNAS, FS - FSGS, I - International Goldfish Standards, N - NEFAS, U - USciA, Y - YAAS)

10 May Corby A.S. (FB)
17 May CAST 98 (FN), IOW A.S. [illegible] (FB)
24 May Hutton A.S. (FN)
30/31 May Fishworld '98, Dunstable (FB)
31 May [illegible] A.S. (FN)
6 June S.T.A.S.S. (Coldwater) (I)
7 June Derby & D.A. (YAAS); Erith A.S. (FB)
13 June Bracknell A.S. (FB)
14 June Castleford A.S. (Y); Tameside A.S. (FN)
28 June St Helens A.S. (FN); York & D.A.S. (Y)
11 July Port Talbot A.S. (FB); Southend, Leigh & D.A.S.
18 July [illegible] A.S. (FB)
26 July Merseyside A.S. (FN)
2 August Yorkshire Koi Society (BKKS)
9 August Grimsby & Cleethorpes A.S.; Salisbury A.S. (FB)
16 August KAAS Show (FB)
23 August [illegible] A.S. (FS); KAAS Show (FB)
30 August L.L.A.A. (Area Group) (FB)
6 September Alfreton A.S. (YAAS); Cardiff A.S. (FB); Darlington A.S. (FN)
12 September Hounslow A.S. (FB)
13 September Mid Somerset (BKKS); [illegible] A.S. (FN)
20 September Mid Sussex A.S. (FB)
27 September Darwen A.S. (FN); Fair City A.S. (USA)
4 October [illegible] A.S. (FN); Littlehampton & Bognor A.S. (FB)
11 October Washington A.S. (FB)
18 October Selsey A.S. (FS)
24/25 October British Aquarium Festival, Manchester (FN)
30 October/1 November Supreme Festival of Fishkeeping, Weston-super-Mare (FB)

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fish can win. For the competitively keen, show-minded readers (others look away now!) the FBAS Trophy Classes for Fishworld '98 will be Class D (Cichlids), and Class G (Catfish), so, if you're into these fishes, there'll be plenty to interest you at the show.

Catching them young (aquarists, not fish!) is very important these days and there will be at least two opportunities to see the youngsters in action — they've got their own show, for a start, plus many of them will be entering in a qualifying round of the Junior Tetra Quiz, as they prepare for the final to be held at Weston later in the year.

For your chance to join in any qualifying round of the competition please write for a Tetra Quiz Application Form to: NJFA Secretary, John Pell, 33 Lakewood Drive, Wigmore, Gillingham, Kent ME8 0NS.

Remaining with the Juniors — they still have time to enter the exciting Laguna Junior Fishkeeper's Pond Design Competition, as part of the Federation's 60th anniversary year. All they have to do is to submit designs for a garden pond which will not only be suitable for fish but also attract other aquatic or insect life. The two best designs (subject to practicability, nothing too complex, please!) will be featured on the FBAS display at this year's Hampton Court Palace Flower Show to be held in July.

The complete pond together with its surrounding plants, marginals and/or bog garden must fit within an area of 6m by 4m. Provision should be made for pump, filtration, etc, in the design.

Please send your designs (plan and side elevation) sketches, with dimensions, planting layout, etc), to: Junior Pond Designs, c/o Peter Furze, 9 Upton Road, Hounslow, Middlesex TW3 3HP.

SOCIETY WORLD

AUCTIONS

1 May Ryedale A.S. Auction of Fish and Accessories. Pickering Quiz Tv 60s Club, Pickering, North Yorkshire. Bookings in at 10am. Auction begins at 12.30pm. To prebook Lots, or for further information about the Auction, and the Society's other activities, please contact David Marshall, 01751 477715.

7 June Grangemouth A.S.
10 June F.L.E.A.S.
12 June Doncaster & D.A.S.
21 June C.A.S.T. 88
28 June York A.S.
12 July W.A.S.P.
26 July Oasis F.C.
13 September Silktown A.S.
18 September Doncaster & D.A.S.
8 November Merseyside A.S.
13 November Doncaster & D.A.S.
15 November FNAS
22 November Oasis F.C.

ATTENTION SOCIETIES!

Due to a recent vandal attack it is possible that some Societies will not have received their quarterly mail drop from the FBAS or it may have arrived in a damaged state. If either is the case please contact the FBAS General Secretary immediately at the address below: Adrian Dempsey, 194 Greenhill Road, Greenhill, Herne Bay, Kent CT6 7RS.

NEXT MONTH

MARINE

Nick Dakin introduces some prickly customers, **Sea Urchins.**

Dave Garratt has some **Rarely Seen Marines** a group of unusual or less-commonly available fish for you.

POND

A Leaky Concrete Pond poses no problems for Dr David Ford.

TROPICAL

Bob Goldstein continues his overview of **Diseases of Fishes.**

Iggy Tavares turns **Hatchet Man** in his Back to Basics series. ▼

Another of our popular extras — **FOCUS ... on AQUARIUM EQUIPMENT, features in the June A&P**

▼

... Including various topics of interest: FILTRATION, EQUIPMENT DISASTERS, LIGHTING, SYSTEM AQUARIUMS

KOI EXTRA

In this month's magazine Bernice Brewster gets out her multiplication tables and looks at ***Koi Breeding;*** *Nicky Phipps traces Koi supply routes in* ***All Roads Lead To Your Pond;*** *Barry Goodwin advises getting into a basic routine with* ***Koi Care;*** *and Richard Friend inscrutably sets out to seek what's around with his review of* ***Pondside Ornaments and Decoration***

John Day does it his way with **Discus.** ▲

Are Your Fish In Touch With Each Other? Linda Lewis wonders what they're saying.

Sailfin Mollies. Ever wondered why those big dorsal fins don't grow? Ronny Lundkvist may have the answer.

Derek Lambert with more discoveries on his **Costa Rica Quest.**

COLDWATER

WHAT'S NEW IN POND EQUIPMENT AT ***PET INDEX '98***