

AQUARIST & PONDKEEPER

SEPTEMBER 1997

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SEPTEMBER 1997
VOL 62 NO 6

AQUARIST PONDKEEPER

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PUBLISHED BY
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Ashford, Kent TN24 8ET

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SUBSCRIPTIONS
Rates on application.
All subscriptions payable in advance to
MJ Publications Limited,
Caxton House, Wellesley Road,
Ashford, Kent TN24 8ET

Originated by
MJ Publications Ltd.,
Ashford, Kent
Colour reproduction by Ashford
Scanning Ltd., Ashford, Kent
Printed by Headley Brothers Limited,
Ashford, Kent

Distributed to the Newsstand by:
UMD Ltd., Tabernacle Street,
London EC2A 4BN

ISSN 0003-7273

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These magnificent Variatus Platies show features that are a far cry from those of their natural ancestors, thanks to intensive (and patient) breeding programmes by dedicated aquarists.

(PHOTO: M.F. & C. REDDING)



COVER

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Despite modern trends which now sees much of the coldwater fishkeeping being active all year round, the fact that the nights are drawing in will give rise to the general impression that the indoor fishkeeping season is about to be although, by the same token, there is no reason why this aspect should not also be regarded as a year round activity, too.

The creation of an indoor aquarium besides being more 'convenient' also possibly makes fishkeeping more accessible by virtue of a relatively smaller financial outlay being required to say nothing of a lot less physical effort! Having been (in a previous 'life') very well acquainted with Dr Who's Tardis with its internal dimensions being traditionally much larger than its exterior ones, I can readily come to terms with the expanded horizons that fishkeeping offers from the comfort of a comfy armchair — where else can you travel the whole wide world of underwater flora and fauna for so little effort?

If you are a newcomer to the hobby you have a lot to experience and learn; if you are already well established and know your infusoria from your exophthalmus there's no need to feel set in your ways, for there are always fresh avenues to explore.

Within these pages you will find modern thoughts on current practices but we do throw in some reminders of the past to show that maybe we have not come as far as we might have presumed. Of particular interest, just to prove a point about (or to contradict) our apparent obsession with fishkeeping 'seasons' there is the designated Pond Week from the 19th to the 23rd of this month where much will be done to maintain our dwindling ponds and wetlands and to preserve natural habitats for our own native wet wildlife.

Please do your bit to help out — and don't forget to tell us about your triumphs and achievements.

John Mills

EDITOR

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COMMENT

Kathy Jinkings uncovers a wealth of information about all kinds of livebearing fishes

PHOTOGRAPHS BY M. P. & C. FIEDNOIR

Livebearers Unrelated

Gambusia, a notorious fin nipper, is widely used for mosquito control.

No one would guess from the average shop that there are nearly 930 different species of livebearer.

The 'family' of livebearers is probably one of the best known in the aquatic hobby, and one of the most subject to misconceptions. Many people, when asked what livebearers are, will confidently report that they all belong to the 'guppy family', all breed like rabbits, and if pressed will explain that they are an evolutionary adaptation that is 'better' and therefore higher up the tree of life than the egglayers. This information makes it easy to slot them into a convenient niche. It's a shame that it is simply untrue.

A quick tour round the shops asking for livebearers will result in a large haul of Guppies, Platies, Mollies, Swordtails and or ... Guppies. And more guppies. No one would guess from the average shop that there are nearly 930 different species of livebearer, spread among 54 different families of fish. The



relationship to Guppies for many of these is about as tenuous as suggesting that horses are closely related to porcupines.

For the purposes of aquarists, many of these are out of the reach of all but large commercial aquaria, and some are not possible even for them. These are the marine livebearers, which include some of the oldest surviving fish species on the planet—so much for a recent evolutionary advance!

FAMOUS ANCIENT FISH

One of the most famous of these ancient fishes is the Coelacanth, *Latimeria chalumnae*, which was long known only from fossils and thought to be extinct. In 1938, however, a specimen about 1.5m long was spotted among a fish catch on the dockside by a Curator of the East London Museum in South Africa. She

rs - the 'Family'



realised that the fish was something special but, unfortunately, it was already beginning to smell, so the specimen was rushed back to the museum, wrapped in sacking, in an unsuspecting taxicab! The Coelacanth arose in the Devonian period, about 380 million years ago. Since they live very deep in the sea, and are not suitable for aquaria, not much is known about these fish, but they certainly have internal fertilisation, and carry the eggs inside until

they hatch, giving birth to live fry. Each of the eggs is about the size of a large orange to start with, and during the pregnancy the fry can increase in weight by up to 43 per cent!

The Sharks, which first appeared in the seas about 400 million years ago, have many livebearing representatives among them. It is worth noting that our first two examples are as far away from each other in terms of relationships as it is

possible to get — the Coelacanth is a Bony Fish, while the Sharks are members of a totally different group — Cartilaginous Fishes, where the skeleton is made up of tough gristle. Among the Sharks there are Sharks that observe the 'traditional' method of egg-laying, and others, such as the Blue Shark, that give birth to fully-formed young. They practice internal fertilization, and the males have 'claspers' attached to the pelvic fins, with which the sperm is inserted

The best known of the livebearers, the Guppy, *Poecilia reticulata*.



directly into the female.

Internal fertilisation is often assumed to be part and parcel of livebearing, but this is not in fact the case. While all livebearers practice internal fertilisation there are many other fish that also fertilise

Livebearers — the Unrelated 'Family'

internally, but later lay eggs. The Swordtail Characin, *Corypoma nisei*,

fertilises the eggs internally but later deposits them to hatch alone. Even stranger is the Ricefish or Medaka, *Oryzias latipes*. Unable to make up its mind, this species usually fertilises the eggs externally, but can on occasion make



The Swordtail, *Xiphophorus helleri*.



The Platy, *Xiphophorus maculatus*.

use of internal fertilisation. When the eggs are laid they remain attached like a small bunch of grapes, until brushed off on plants as the fish swims through them.

BEST KNOWN LIVEBEARER

Of all the livebearers familiar to aquarists the Guppy must be the best known. This beautiful little fish is hardy and breeds easily in the aquarium, and there must be few aquarists who haven't had a few Guppies at one time or another. We are now so used to seeing shoals of brightly-coloured Guppies with beautiful fins in varying shapes that many people may not realise that the intensive breeding of the brightly-coloured Guppies that we know today did not become widespread until the 1960s. At this time the Guppy was a prized tank inhabitant, and referred to as the 'King of the Aquarium'. A letter in *Aquarist and Pondkeeper* from 1960 complains that in an Open Show of the time there were 11 classes for Guppies and only ten classes for everything else! The original wild Guppy is now a rarity in our tanks, although not in the wild, as this hardy little fish has been introduced to many areas, either accidentally or as a form of mosquito control. There is even a documented breeding population of Guppies in England, living and thriving near a heated effluent outlet running into the River Lee in Essex.

The Guppy is a member of the Poeciliidae, a large group of related livebearers which include the Mollys, as well as the slightly less familiar Limias, Knife Livebearers, Girardinus, and the Xiphophorus species (Swordtails and Platies). Although all these are members of the Poeciliidae, this is a very large group and is scientifically divided into a number of genera. These different genera are not really very close in biological terms, and although hybrids between them may have been recorded, these have proved sterile. The usual 'quick criterion' for being closely related is the ability to produce viable hybrid offspring, i.e. those that can breed and produce their own offspring.

TOUGH, HARDY FISH

They do, however, share a number of characteristics — as a rule they are tough, hardy fish, and members of the family have adapted

Livebearers — the Unrelated 'Family'

and adjusted to live in some most inhospitable places. A variety of molly from Tabasco in Mexico, *Poecilia sulphuraria*, thrives in sulphur-laden water at a temperature of 84°F (29°C) in which no plants will grow except algae.

Because of their hardiness, and a general ability to produce large numbers of fry in a short space of time, some members of the family are widely used for mosquito control, especially the Guppy and *Gambusia affinis*. Unfortunately, these fish do their job so well that the native species don't get much of a look in, especially with *Gambusia*, which is a notably vicious fin-nipper, a determined predator of fish fry, and has a libido based on the 'if it moves' principle. This latter trait has contributed to the near demise of one of its close relatives, the Big Bend *Gambusia*, *G. gozei*. Listed as endangered in 1967 a conservation project saved the Big Bend *Gambusia* in the nick of time. Someone with foresight had taken two males and one female from the Rio Grande Village population in 1956, and all Big Bend *Gambusias* today are descended from this trio. The Gila Topminnow, *Poeciliopsis occidentalis occidentalis* is another livebearer which has suffered from the attentions of the voracious *Gambusia*. Its continued existence is probably solely due to a rescue plan, which introduced individuals to the Red-rock Game Reserve in America, after it was eliminated from its historic home in the Gila river and was in severe decline in the Rio Yaqui. Another population in Frisco Hot Springs in New Mexico was eradicated in the early 1950s. These two sad stories give the lie to the idea that all livebearers are fantastically efficient reproduction machines. Some are, but their victims have often been other livebearer species.

MODIFIED ANAL FIN

All the males of the Poeciliidae are equipped with a gonopodium, which is a modification to the anal fin. The gonopodium looks like a long stiff rod, but is actually still composed of all the normal fin rays. In fry the fins are the same shape as ordinary fins, and the rays clamp together as the males mature. This fin is used to insert into the female for fertilisation. The modifications to the fin don't end with just forming it into a

long rod — each different species has developed its own different array of minuscule hooks, spines and claws, which can be

used to identify the fish with a microscope. The gonopodium can be moved on a 'hinge' by the fish, and when he is ready to mate the fin swings forward instead of lying back along the belly. Sometimes man's adjustment of nature by breeding for ornate fin developments can lead to the fish being unable to use it for the purpose for which it was intended. The Berlin-type Guppy has such long fins that fertilisation is impossible, and must be done artificially, and in some other types with long fins American breeders anaesthetise the female to give the male a chance of mating successfully.

Once mating has occurred, the embryos grow to maturity inside the female. Guppy fry actually weigh less than the egg from which they developed, so all the Guppy female does is retain the eggs inside her. She puts no further effort into their development other than acting as a protective housing.

SEVERAL BROODS AT ONCE

One of the Mosquitofish, *Heterandria formosa*, does a lot better by its developing brood. They are also members of the Poeciliidae, but are only remotely related to the guppies within that family, and belong to the genus *Heterandria*. Their fry are actually 3,900 per cent heavier when born than the original egg! Mother Mosquitofish expend a considerable amount of energy on their developing young. Not only do they supply nutrients to the fry, enabling them to grow bigger before being born, but keep several broods of fry on the go at once, at different stages of development. *Heterandria formosa* can have up to nine broods at different stages of growth.

Productivity is increased further in the Poeciliids, by their ability to store sperm. Once a female has mated the unused sperm survives within her, and can be used to fertilise new batches of eggs as they mature. These adaptations undoubtedly make for efficient livebearers, but other families have evolved separately and produce the same end results by very different processes and adaptations.

TO BE CONCLUDED
NEXT MONTH

Stephen J. Smith serves up sensible advice on feeding pond fish

PHOTOGRAPH BY A&P LIBRARY

Food for Thought



One of the most important aspects of fishkeeping — yet one which is most overlooked — is that of feeding your fish. The popular phrase: "You are what you eat", applies equally to fish. Feed them properly and your fish will thrive; feed them poorly and your fish will become susceptible to ailments, and will eventually die.

Unfortunately, food is the last thing people think about when acquiring a fish. Hundreds, nay thousands, of pounds are spent on the pond and its equipment; filter

Unfortunately, food is the last thing people think about when acquiring a fish.

systems are, seemingly, the main topic of conversation among enthusiastic Koi-keepers; tens, hundreds, even thousands of pounds are spent on the fish themselves; but what of the very sustenance of those fish — their food?

NATURAL FOODS

Sit by your pond for just half an hour on a warm summer's afternoon, and you will see a myriad varieties of insects hovering around and even flying into the water. Perhaps you will even see your favourite fish strike at an unsuspecting Mosquito as it dances just above the water surface. Here is nature providing its own natural diet for your fish — and in abundance. Even those Mayflies and Dragonflies are contributing to the menu by laying eggs which will soon turn into larvae and provide a

further tasty titbit for your fish.

'God's gift to fish-keepers' is the Common, or Garden, Worm. Whenever I am working on my garden I can never resist dropping small red worms into the pond and seeing which fish will get it first — they will even fight over it! Worms are rich in protein, and it is worth cultivating them by laying a newspaper in a damp corner of your garden. Lift it up every morning and you are likely to find breakfast for fish! (Avoid feeding those worms which are slightly green in colour and sometimes have a band around them — they will be discarded by the fish and will serve only to pollute your pond.)

A further natural food which is especially popular with Goldfish keepers is Daphnia — commonly known as the Water Flea. Daphnia can be collected from natural ponds, but do ensure that there are no fish present in the pond (thus there will be no fish parasites as they will not survive without a host). Even then, use your supply to start your own culture by in order to provide your fish with a continuous supply. Indeed, not all retailers who sell Daphnia take the necessary precautions to ensure that your supply is

Food for Thought

'clean', so it is also worthwhile to quarantine any which is purchased.

The outer shell (or carapace) of Daphnia is rich in calcium, while the fish also benefit from a laxative effect from feeding with Daphnia, so it is an ideal natural supplement to feeding with proprietary foods. Daphnia is also an ideal food for raising fry.

A further popular natural food is the Bloodworm, which is a bright red larvae of Chironomid Midges (they are the tiny insect which swarms and hovers over your pond at night) and the Bloodworm can often be found in the silt at the bottom of ponds. Brine Shrimp (*Artemia salina*) is also a good natural food for fish and can be cultivated easily from eggs bought at pet and aquatic retailers. Newly-hatched Brine Shrimp are a perfect 'first food' for fry.

enables your fish to come to the surface so that you can see them; and you can even 'train' your Koi — and even Goldfish — to

feed from your fingers!

Specialist foods, such as wheatgerm and even high-digestible foods, are also popular among enthusiasts. Many Koi-keepers like to feed their fish with wheatgerm as the colder months approach, simply because they believe that this type of food is more easily digested than the high-protein summer foods. The use of wheatgerm has, of course, always been considered important; however, a high-digestibility food has many benefits over wheatgerm cereal foods, mainly being more digestible, thus giving rise to fewer water quality problems, and providing a lesser strain upon the filter. A further benefit is that this food can be fed at lower temperatures enabling you to feed your fish virtually all year round.

PROPRIETARY FOODS

What should we feed our fish with? There are flake foods, pellet foods (floating and sinking), foods for pond fish, Koi, Goldfish, high-digestible foods, wheatgerm foods, round ones, square ones, hoops, sticks ... the list goes on! Little wonder that people become confused when they visit their aquatic retailer and have to choose just what to feed their fish with.

The answer is relatively simple. My personal advice would be always to go for a brand name you know (it's the same when you buy a bar of chocolate or a breakfast cereal for yourself) — and I always tend to steer clear of the cheapest. Having said that the majority of propriety fish foods available will provide a good balance of ingredients to ensure that your fish will receive all the essential vitamins and nutrients which your fish require.

As to the type (or shape) of food you should use, that is entirely up to you and your fish. Many people tend to prefer a floating pellet, which

HOW MUCH TO FEED

One of the joys of keeping pond fish, especially Koi, is that they learn to regard your approach as 'feeding time', and will even feed quite readily from your fingers! During the summer it is quite acceptable to feed your fish a little and often — right throughout the day. It is at this time that they are building up reserves to help them through the following winter, as well as conditioning for spawning.

Be careful to ensure that you administer only sufficient food for consumption within five or ten minutes of each feeding session, otherwise uneaten food may pollute the pond. Also, ensure that the pond is maintained in a clean condition — the more you feed then the more mess the fish will produce!

However, with the onset of Autumn, it is time to reduce feeding to only once a day, preferably in the mornings, and I usually stop feeding my fish from early November. It is quite tempting to feed your fish on a sunny day in the winter when the fish rise to the surface, but resist that temptation! I will leave feeding until the onset of spring, when the waters have begun to increase in temperature and the fish can digest the food properly. Even then it is a case of once a day, until the beginning May, when feeding can be undertaken twice a day and increasing into the summer months. On the hottest days of August you will find your fish eating continuously!

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Dave Garratt looks at — well, you've guessed it!

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Shedding Light on Li

Aquaria can range from fish only set-ups to mixed communities of fish and invertebrates requiring simple to very demanding lighting requirements.

What would appear, on the surface, to be an apparently simple topic, i.e. the lighting of a marine aquarium, in fact proves to be a minefield of differing, and even controversial opinions. Much of the confusion or disagreement stems from the wide availability of differing types of lighting and the use to which they may be put. I have deliberately kept away from introducing scientific definitions, such as lux and lumens, in an attempt to simplify matters within the confines of a single article. References are listed for further reading and I would urge anyone contemplating lighting a new aquarium, particularly a reef type, to read either Lundegaard, Moe or some similar text.

Aquaria can be fish only set-ups with simple lighting needs, or they can be all manner of mixed communities of fish and invertebrates, including some with very demanding lighting requirements.

Therefore, the type of aquarium must ultimately decide any lighting options. I would suggest there are three main types of aquaria to consider. They are looked at in greater detail later in this article:



1. Fish only, or fish plus invertebrates that are not dependent on intense lighting.
2. Mixed community of fish and light-loving invertebrates.
3. Reef aquaria with invertebrates that are dependent on intense, full-spectrum lighting.

TYPES OF LIGHTING

Ignoring natural light (the best but uncontrollable) and tungsten bulbs (numerous disadvantages) we are

left with four types of lighting that are generally available to the marine aquarist: (a) Fluorescent tubes; (b) Mercury vapour; (c) Metal halide; (d) Actinic tubes.

(a) Fluorescent tubes

There are a wide variety of tubes available, from simple warm white to specialist tubes aimed specifically at the marine market. There are tubes with spectrums closely resembling natural daylight, tubes that are rich in the blue end of the spectrum (called actinics) and tubes with a 50/50 mixture of actinic/ daylight. By

Some ghting!



using a variety of tubes it is possible to achieve full spectrum lighting.

Fluorescent tubes are cool running and therefore do not lead to the problem of excessive heat build-up within the confines of the tank hood. The more basic tubes are inexpensive whilst the more versatile types can be costly. All the tubes require an appropriate control unit. They are inexpensive to run and fairly long lasting but their output can drastically fall with age, without it being easily noticed.

They are available in a number of wattages and this determines the

length of the tube: 3ft=30 watt; 4ft=40 watt; 5ft=65 watt.

Fluorescent tube technology has advanced greatly over the last few years. Some tubes are designed to deliver full output for the duration of their life at which point they promptly fail, meaning there is no decision to make as to when to replace the bulb due to falling output. Some newer tubes now show very little power loss with age. Others show increased efficiency leading to better power to wattage ratios, improved spectral range, or even built-in reflectors.

An internal reflector ensures the maximum amount of light penetrates the water. You can achieve a similar effect with any tube by using highly polished external reflectors.

The major drawback is the usual lack of space to house sufficient tubes above the tank to provide intense enough lighting for some invertebrates. Even with reflectors they may not have the power to penetrate the depths of tanks 24in or more deep.

(b) Mercury vapour

These are spotlight type lamps

For left and above
invertebrates
have a wide
range of colours.

supplied as a pendant light. They have built-in reflectors or are reliant on an external reflector to get maximum efficiency from the bulbs. They are available as 80 or 120 watt units and produce an intense light capable of penetrating deep tanks. They are cheap to run as the bulbs are efficient and the ballast uses very little electricity. I can personally vouch for their success with the higher algae *Caulerpa*, *Rhodactis* Mushroom polyps, anemones and some soft corals such as Leather Corals.

They do have a number of disadvantages. The bulbs are long-lived but can suffer a drastic fall-off of output as they age, leading to regular replacement of the bulbs. Because of the perceptions of the human eye to light the aquarist is unable to detect this fall-off of power. The replacement bulbs for the lights currently

Shedding Some Light on Lighting!

on the market are a fraction of the price of replacements for older types. Therefore, although they will probably need renewing annually the cost is not the major stumbling block it used to be.

Having used these lamps myself I can vouch for a particular annoyance. The ballast unit emits a high pitched hum that may be intrusive if the owner has that rare commodity, i.e. an otherwise silent marine system. The noise also transmits very clearly upwards through the ceiling on which the light is attached. The bulb delivers a broad spectrum that may however, need enhancing by the addition of blue wavelengths. As the bulb ages the light can appear to

take on a dingy yellow hue.

(c) Metal halide

These exceptionally powerful bulbs are usually found as a pendant type system at 150 or 250 watts.

They are the most intense lights available to the aquarist and are ideal for deep tanks. Like mercury vapour they can also suffer with falling output and need replacing on an annual basis at a hefty cost.

Considering their initial purchase costs they are a very expensive lighting option.

Metal halides generate a great deal of heat and may need cooling fans to be installed above the tank to prevent overheating. Like mercury vapour there is a similar noise problem from the large ballast. They emit a high ultra-violet output that can damage the human eye and therefore they need to be shielded.

Many aquarists would consider them to be essential for invertebrates that require intense lighting. Such species are often found in reef aquariums and include hard corals and clams.

(d) Actinics

These fluorescent tubes are an inexpensive way of supplying light of blue and ultra-violet wavelengths, an area that may be deficient in most types of lighting. Invertebrates with high light requirements would seem to benefit from such a light source. The tubes should not be directly looked at due to the harmful nature of the ultra-violet light. The tube with the 03 designation is the best type for marine tanks.

THE CRUX OF THE MATTER: HOW MUCH LIGHT?

This must be one of the most frequently asked questions in the entire marine hobby, perhaps because the answer is never definitive and tends to generate many other side issues. These include topics relating to type of lights, type of tubes, running costs, replacement costs, the livestock involved, spectrum required, colour temperatures, intensity and efficiency.

I believe the starting point **MUST** be the livestock, after all the object is to successfully keep them healthy. The issues should not be about discover-

Plano-algae require bright light.



Tubeworms look better under good lighting.



ing exactly which tube highlights the blue circle around the eye of a *Comptosia* Angel or which tube your dealer is currently selling as a special.

Therefore, I will concentrate on making suggestions concerning the three types of tank referred to earlier.

LIGHTING SPECIFIC TANK SET-UPS

1: Fish only

The lighting in this type of tank is generally for aesthetic reasons as fish are not particularly dependent on lighting intensity. Indeed some species such as Squirrelfish, Soldierfish, Cardinalfish and Lionfish will prefer subdued lighting. Lighting for the tank can be chosen to suit the eye of the aquarist and rockwork can be positioned to give shady recesses.

Natural daylight has a colour temperature of 5500°K, meaning that at this temperature colours appear at their most natural to the human eye. Light with a temperature below this level will have a red cast, whilst temperature above will have a blue cast. It follows that any lighting giving a colour temperature of 5,000 to 6000°K would be show fish colouration at its most pleasing to the aquarist.

Some lights have a colour rendering index quoted. If this figure is between 90 to 100 then the colours within the tank will appear, to the human eye, as they would in natural sunlight. However, to maintain this natural and pleasing effect it is still necessary to have sufficient intensity.

My suggestions for a fish only tank would be:

Two fluorescent tubes, of similar length to the tank for tanks up to 12in deep, assuming a maximum width of 18in. Depending on the efficiency of the tubes chosen the number would need to be increased to three or four for tanks up to 24in deep, or for wider tanks. Tanks deeper than this could require alternative lighting methods.

Should the aquarist wish to grow higher algae, such as *Caulerpa*, for the overall benefit of the tank or for herbivorous fish to browse on, then the lighting will feature much more prominently. From personal experience I can vouch for *Caulerpa* growing in a 30x24x18in deep tank under 140W mercury vapour and three x 24in fluorescent tubes, one of which was an actinic 03.

2: Fish/invertebrate community

Some invertebrates have little

requirement for high intensity lighting, in fact it is necessary to provide shady overhangs for them to thrive. Crabs, Shrimps and Tubeworms spring to mind. However, many aquarists desire other invertebrates that require high intensity, full spectrum lighting. Some, such as Anemones and Mushroom polyps, require the high intensity light to nurture the *Zooxanthellae* algae, that grow within their tissues, and are vital for their survival. Other invertebrates need the lighting to give good algae growths on which to browse, eg, Sea Urchins, and Cowries.

Tanks such as these will require similar light levels to those suggested above for the 'Caulerpa tank'.

3: Reef tanks

These tanks will have all manner of invertebrates, some of which will be absolutely dependent on full spectrum, very intense lighting. They may include soft corals, clams, anemones and hard corals. The best way to provide such intensity is metal halide lighting supplemented with actinic 03 tubes. Metal halides need to be suspended at least 12in above the water surface to overcome overheating problems and to ensure the light falls over a reasonable area of the water surface. Naturally, as the height of the lamp is increased the intensity of light entering the tank diminishes. Most aquarists ensure that the their light requiring invertebrates are placed within a two square foot area

directly under the metal halide and raised on rock-work towards the top of the tank. Experimentation to find the ideal position for each species is essential. Unless the aquarist can afford metal halides for every two foot of tank length the rest of the tank should be lit with the newer types of fluorescent tubes and actinic 03.

I would like to conclude with a number of general tips on the topics that apply regardless of the type of lighting in use.

1. Use reflectors to cut down on light scatter and increase the amount of light actually entering the water. This simple measure will quickly pay for itself in terms of available light per £ of electricity spent!

2. Cover glasses are essential to prevent a potentially disastrous mix of water splashes and hot lights. These cover glasses must be kept very clean to allow maximum penetration of light into the tank.

3. Ensure electrical safety through tight fitting end caps for fluorescent tubes. Personally I would NEVER run an aquarium without the entire unit being protected by a circuit breaker.

4. Night lights are unnecessary but it is wise not to suddenly plunge your tank into total darkness or full light. Ensure room lights are turned on before tank lights and are left on for a while after the tank lights go off. Alternatively, use a very low wattage light before and after the main lighting period to prevent the stress of photo-shock.

5. Keep to a constant lighting duration with full lighting intensity for 10 hours a day, with a gradual build-up and decline of intensity for an hour or two either end of this peak lighting period. Aquarists with reef tanks may well devise a far more sophisticated lighting pattern aimed to mimic the sun rising, reaching full intensity, then fading to sunset.

REFERENCES

Other lighting suggestions can be found in:

Keeping Marine Fish, Graham Lundquist, pp 24-34. Blandford Press, 1985. ISBN 0 7137 1507 3.

Mixature Reef Aquarium in Your Home, Dr C. W. Emmens, pp 28-38. TFH, 1989. ISBN 0 8662 661 3.

The Interpet Manual of Marine Invertebrates, Martin Hayward and Sue Walls, pp 6063. Salamander, 1989. ISBN 0 86101 474 X.

For a deeper understanding of lighting including explanations of lux, lumens, wavelengths, spectrum, etc:

The Marine Aquarium Reference, Martin A. Mole Jr, Green Turtle Publications, 1989. ISBN 0 939960 05 2.

TABLE OF APPROXIMATE COSTS

A. For a 24in fluorescent tube

Basic marine tube	£9-£11
Full spectrum tube	£17
Actinic 03	£8-£10
Full spectrum with internal reflector	£21
30 per cent daylight + 30 per cent Actinic	£23
30 per cent daylight + 30 per cent Actinic + internal reflector	£28
External reflector	£4
30 watt control unit	£11

B. Mercury vapour

80 watt mercury vapour pendant	£90
125 watt mercury vapour pendant	£95
80 or 125 watt replacement bulb	£10

C. Metal halide

150 watt metal halide pendant	£180-£200
250 watt metal halide pendant	£160-£200
150 watt replacement bulb	£70
250 watt replacement bulb	£90

For a further review of the many commercially available products contact any reputable dealer or use the adverts that regularly appear in A&P.

Chris Rosam concludes this series with fertilisers and carbon dioxide treatment.

PHOTOGRAPHS BY THE AUTHOR

The Plant-Friendly Aquarium

PART THREE

The plant friendly aquarium will be able to support a variety of aquatic plants, not to mention fish. But one should ensure that the fish are also plant friendly.



Anyone who has grown, or tried to grow, aquarium plants will be aware of the plethora of plant fertilisers available. Nearly all claim to be the answer to plant growth problems, but as we have seen they make up only part of the picture, albeit an important one. They come in differing forms, mainly liquids or dissolvable tablets or a combination of both. The manufacturers' recommendations with regard to the frequency of use can vary considerably from daily to weekly or monthly.

There are examples of flourishing plants that have never been fertilised which apparently gain all they need from the waste products of the fish they share a tank with. However, this kind of 'balance' normally only occurs fortuitously. For the most

We should expect to have to add fertilisers that contain the trace elements needed by plants not normally derived from fish waste products.

part we should expect to have to add fertilisers that contain the trace elements needed by plants that are not normally derived from the waste products of fish.

In selecting a fertiliser, or fertiliser system, it is worth trying to find out a little more about its composition. For example, fertilisers that contain nitrogen or phosphates should be avoided as nitrogen in the form of nitrate and ammonium are not likely

to be in short supply. Nor is phosphate.

Trace elements such as iron, magnesium, manganese, fluoride, boron and sodium to name but a few are more likely to be absent, and, therefore, must be added if their shortage is not to dictate plant development.

Iron has been shown to be an important element to plants, without which photosynthesis is unable to take place. Whilst only required at a low dosage (0.1mg/litre) iron is extremely volatile in the aquarium environment as it is quickly oxygenated into a form known as trivalent making it unavailable to plants. Only when it is in its bivalent form can it be absorbed and used by plants.

Fortunately iron can be 'chelated' with other chemicals to prevent oxidation and the problem has been solved, even so iron preparations do

need to be added routinely. When iron is absent the plant leaves take on a pale green complexion, or in some plants become transparent in patches. The small *Echinodorus* species are often the first to show such symptoms, and are often considered 'indicator plants'. Test kits are available to test for iron levels, and these should be used periodically as an over-supply of iron can also cause problems, although this is unlikely if the manufacturer's instructions are followed.

It is advisable to purchase all fertilisers and gravel additives from one manufacturer to ensure that no gaps, or over-supply exists.

CARBON DIOXIDE (CO₂)

If all the steps so far described have been fol-

Good conditions for plants normally means good conditions for fish. Soft, neutral pH water will be appreciated by many fish such as the Red Tailed Shark (*Epiplatys spilargenteus bicolor*), as well as most plants.



The low growing species of *Echinodorus* are often referred to as iron indicator plants, as any shortage of this element will soon cause transparent patches to appear in the leaves, as can be seen in the close up picture above.



lowed and the aquarium is well illuminated for 12 hours per day (for anyone unsure about the correct lighting of plants please see A&P, February 1995), and results are still indifferent, although hopefully improved, it is likely that a shortage of carbon dioxide exists. CO₂ is one of the essential elements required by plants and once again its shortage will dictate development. Just as a combustion engine needs a mixture of petrol and air, plants need a mixture of light and CO₂. Engines do not run well on full choke for long, and plants do not grow well on strong lighting for long if not provided with CO₂.

The controlled diffusion of CO₂ into the aquarium has not only the advantage of providing your plants with a basic essential element, but can also adjust the pH of the water which may be advantageous to acidophilic fish and plants.

I would suspect that aquarists are put off using carbon dioxide diffusion systems as they appear both expensive and complex. However, I believe they need be neither and I shall describe the system I have used successfully for several years later in this article.

HOW CAN CO₂ BE ADDED TO THE AQUARIUM?

In setting up a CO₂ diffusion system let us consider in what form CO₂ is made available.

Firstly, it can easily be manufactured at home. Anyone who has made wine or beer at home will know that the gas released by fermentation is CO₂. If a winemaking demijohn is filled with water, 2lb of sugar and some brewer's yeast, the resulting fermentation will be sufficient to supply a 100 litre tank for a couple of weeks.

All that is needed is a modified demijohn bung to accept an air line run to a diffusion bell jar (described later). The disadvantage of this simple system is that one is never sure when the fermentation is complete and when it is another (already fermenting) jar will need to be at hand.

CO₂ is also used extensively for firefighting and is bottled into many different sizes of pressurised metal bottles. Their size is normally determined by its weight when full of gas. This is the form most convenient to the aquarist.

The CO₂ system I use consists of a 1.1kg reconditioned fire extinguisher cylinder, a commercially-available control valve and a diffusion bell made from glass and silicon

The Plant-Friendly Aquarium

sealant. The total cost of the system was approximately £40. Discovering where to obtain the fire extinguisher cylinder requires a bit of effort! Firstly, look through the Yellow Pages and find the name of a company who supplies and refills CO₂ fire extinguishers. Once you have this information approach the company with a view to obtaining a secondhand, reconditioned cylinder fitted with a wheel valve.

Make sure the cylinder is pressure tested. The firm should advise you of the date when the cylinder requires retesting. Mine cost £10. Larger cylinders may be available to you if you have space and are of course advantageous as they require refilling

less often, but expect to pay more.

DIFFUSION CONTROL

Next, you will need a valve to regulate the rate gas is released from the bottle. I use the Dupla 1000 valve which fits directly to the wheel valve connection on top of the CO₂ bottle. An air line with a non-return valve is then run to the diffusion bell jar which ensures the correct quantity of CO₂ is diffused at a constant rate. Both Dennerle and Bioplast companies currently market a suitable valve.

It is important that the amount of gas diffused into the water is carefully controlled as if over supplied not only will the water's pH plummet, but your fish will be in great



Hardy plants such as *Echinodorus amazonicus*, can tolerate a variety of conditions, but will only develop fully in ideal conditions.

danger. Diffusion stones, as used normally with aerators, cannot be used as the amount of gas diffused is impossible to control and is also very wasteful of CO_2 . What is needed is a simple diffusion bell which is basically an upturned vessel filled with gas of a specific surface area for your particular tank volume and the carbonate hardness of your water. Any CO_2 which is over supplied is harmlessly lost to the atmosphere.

CO_2 dissolves very easily into water, but is also easily lost back into the atmosphere from the water. Carbonate hardness has the ability to bind up CO_2 ; the harder the water the more it is capable of binding added CO_2 . It is necessary to add enough CO_2 to the point where some of it remains free and becomes available to the plants. If required, adjust the pH. Hence the relationship between the water's KH value and the surface area of the diffusion bell jar. The other variable is the aquarium volume; obviously the larger the volume of water, the greater amount of gas required (see Figure 1).

From the graph you can calculate the size of diffusion bell jar required, ie, by finding your tank volume on the vertical axis and running a horizontal line to meet your particular water KH. Then drop a vertical line to the horizontal scale which will tell you the surface area required.

SETTING UP AND OPERATION

The bell jar is made like a miniature all glass tank approximately 2-3cm deep and water tight. Fix to the inside wall of the bell jar a right-angle air line fitting using silicon

The Plant-Friendly Aquarium

cement. The pipe from the cylinder will be connected to this. The bell jar can be made from glass or clear plastic as preferred.

The bell jar is then located by means of suckers or hangers to the top of the tank with the open part of the bell jar just below the water level. The bell jar should be placed in a position where water is moving, eg, near a filter outlet. With the pipes connected and the regulator valve attached to the wheel valve, diffusion can commence. Firstly, close the regulator valve and open the wheel valve about one full turn, then very slowly open the regulator valve. Shortly after bubbles will be seen entering the bell jar which will soon fill. Adjust the valve until a bubble occasionally overflows into atmosphere, say once every 15-20 minutes. The pH will then require to be checked daily, or better still, fit a continuous pH tester as manufactured by Dupla or Dennerle. Within a day or so you should have a neutral pH if your water is normally alkaline.

If the water in your area is soft and under 4 KH it is advisable that you increase the KH to 4 or above. Below this figure the water has little buffering capacity and is very unstable when CO_2 is added.

OXYGEN PROVISION

If you keep your fish stock to a reasonable level the oxygen provided by your plants will be more than sufficient for your fish. With reasonable fish stock levels aerators should not be used nor should water

be sprayed over the water surface from spray bar returns from power filters as both these measures, whilst undoubtedly helping oxygen levels, both drive carbon dioxide out of the water and back to the atmosphere.

Following the addition of CO_2 and provided your lighting levels are sufficiently intense, after the lighting has been on for four to five hours you should see oxygen bubbles forming on the underside of leaves, increased growth and development of the plants should be noticeable.

CONCLUSION

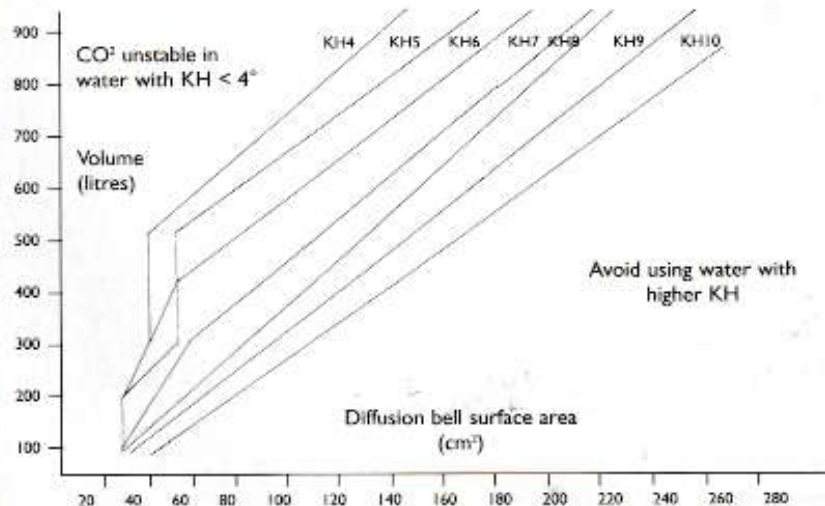
We in Britain seem to have been slow in embracing the use of CO_2 to fertilise our plants, whilst the continentals have done so for many years and have been producing beautifully-planted aquariums rarely seen in this country. So why not try it — I think you will find the results worth the investment.

I hope that these articles have shown that success with aquarium plants need not be pot luck, nor that it is vital to purchase expensive and complicated equipment. In many cases it may only be necessary to re-evaluate the way in which an aquarium is set up. Remember — a tank with healthy plants will invariably house healthy fish.

RECOMMENDED READING

The Complete Book of Aquarium Plants, by Robert Allgayer and Jacques Teton. Published by Ward Lock.
The Optimum Aquarium, by Kasper Horst and Horst Kipper. Published by Aqua Documenta.
 For sheer inspiration — *Nature Aquarium World*, by Takashi Amano. Published by TFH.

Figure 1.



Nick Dakin focuses on another popular marine family

PHOTOGRAPHS BY THE AUTHOR

Try a Tang!



The Regal Tang, *Paracanthurus hepatus*.

Family: ACANTHURIDAE

Popular marine fishkeeping could well be described as an 'infant' hobby, being barely 2½ decades old, but during that period a visit to almost any marine retailer in the country would virtually guarantee a sighting of at least one species of Tang residing in the stock tanks. This is certainly no coincidence as Tangs are some of the most popular tropical marine fish, not only in this country, but with marinists throughout the world. In common with so many other coral reef fishes, bright colouration coupled with interesting markings and fascinating behavioural patterns make for an irresistible combination.

Tangs are some of the most popular tropical marine fish, not only in this country but with marinists throughout the world.

A TANG BY ANY OTHER NAME

Tangs are also widely known as surgeonfish owing to a scalpel-like spine either side of the caudal peduncle. These potentially vicious features are normally compressed into the body but can be erected

and locked, much like flick-knives, for use in disputes with other fish. Hobbyists are also warned to take every care when netting these fish as a nasty wound can often result if mishandled.

Family: ACANTHURIDAE

Tangs belong to a very distinctive family of fishes known as Acanthuridae. Each species share many common features such as an unmistakably oval-shaped, laterally-compressed body and eyes positioned high on a sharply rising forehead. There are 32 species currently known to science of which only four are found in the Atlantic Ocean.

Although they will occasionally eat meaty marine fare Tangs are almost exclusively herbivores in the wild.



The Powder Blue Tang, *Acanthurus leucostemon*.

Here they can be found in large, often mixed shoals, grazing on the algae-covered rocks within areas of strong wave action and tidal activity. Being powerful swimmers they have little trouble eating and fighting strong, oxygen-rich currents at the same time. Indeed, it is the high oxygen content of the water that gives their muscles the ability to work so efficiently and access feeding areas normally beyond the reach of other fish.

Even though shoaling is the norm in the wild closer examination reveals that each individual occupies a small feeding patch that it will vigorously defend from its neighbour. As a consequence, Tangs are generally very territorial within the aquarium environment, especially where members of their own species are

concerned. Given enough space though, several specimens of markedly different species can occupy a suitably large aquarium. Tanks approaching 8ft in length are ideal for a mixed population and serious disputes rarely occur in such spacious quarters. On the other hand, several specimens forced to share a 3ft tank are likely to be very stressed leading to constant fights and disease. Having said that the majority of Tangs are normally very peaceful fish, rarely bothering other unrelated tankmates.

Some of the most popular Tangs that are readily available to the marine aquarists include:

THE YELLOW TANG (*Zebrosoma flavescens*) Probably the

most commonly seen Tang in dealers' and hobbyists' tanks alike. This completely yellow fish will attain 6in in large aquaria. Being relatively resistant to Whitespot and Oodinium it is often introduced into mixed invertebrate/fish tanks to control algae.

THE REGAL TANG (*Paracanthurus nepotus*) is a strikingly blue species with black and yellow markings. Being quite small 10cm (4in), and peaceful, it is possible to keep this species in small shoals, where space allows.

THE BLUE TANG (*Acanthurus coeruleus*) is a Caribbean species that is yellow when juvenile, turning blue as the fish matures. It is not difficult to keep but can be a bully.



The Yellow Tang, *Zebrosoma flavescens*.

THE LIPSTICK TANG (*Naso lituratus*) is capable of reaching a very respectable 25.4cm (10in) in the aquarium and, therefore, requires spacious quarters. It takes its common name from its bright orange lips. A peaceful species.

THE PYJAMA TANG (*Acanthurus lineatus*) is a personal favourite. It is easy to keep and brightly marked with a yellow, blue and black striped pattern.

THE POWDER BLUE TANG (*Acanthurus leucosternon*) is a very attractive species and highly popular with hobbyists. Be warned that unless given good water quality and a roomy aquarium it will constantly be the subject of Whitespot.

THE ACHILLES TANG (*Acanthurus achilles*) is a striking but a difficult fish to maintain and best left to experienced hobbyists.

THE CHEVRON TANG (*Ctenochaetus hawaiiensis*) has become more widely available over recent

years. It is a very attractive orange and deep brown coloured fish with chevron bars on the body

(hence the common name). Excellent water conditions are essential as is a roomy aquarium.

THE EMPEROR TANG (*Zebromma xanthurum*) is almost entirely blue/purple, but it does have a bright yellow tail. A beautiful appearance and limited availability have made this a very desirable species (not to say expensive!). It is a very peaceful fish that does well under optimum water conditions.

Several other species worth considering include: The Goldrim Tang/Powder Brown (*Acanthurus glaucopareus*); The Zebra/Sohal Tang (*Acanthurus sohal*); The Sailfin Tang (*Zebromma veliferum*).

THE MOORISH IDOL

It will come as a surprise to many that the Moorish Idol (*Zanclus spp.*) is a very close relative of Surgeonfish but it lacks the blades on the caudal peduncle. Even though it is very common in the wild and easy to catch, its noticeable absence from sale tanks is due solely to the great difficulty in maintaining this species in captivity for any period of time.

REEF TANK COMPATIBLE?

Being herbivorous grazers mariculturists often introduce Tangs into the reef aquarium in an effort to reduce unwanted growths of algae. The effectiveness of this 'natural' control method is often highly variable and maintaining such fish frequently brings its own problems!

Most Tangs are susceptible to Whitespot and Oodinium and the effective treatment of such diseases in the presence of invertebrates can be fraught with difficulty. Copper-based medications are often required to treat parasitic ailments effectively and such treatments are lethal to all invertebrates. Whilst Tangs do no harm to invertebrates as such adding them to a mixed invertebrate/fish tank requires care-

ful preparation beforehand. One way to reduce the risk of infection is to install an ultra-violet steriliser to the filtration system. In this way any free-swimming parasites coming into contact with the light will be destroyed.

GENERAL HEALTH

When making a potential purchase, the individual should be studied carefully. Tangs should have clear eyes and the body must be free from holes, blotches or blemishes, particularly in the head and lateral line areas. Fins must be intact and the fish should be alert and very active. Avoid fish which are constantly flicking against rocks or other objects. Pinched-in stomachs are a sign that the fish has not yet recovered from shipping and should be temporarily avoided.

Head and lateral line erosion (HLE) is a particularly prevalent in certain species of Tang, especially where the aquarium is overstocked or the fish is being constantly stressed by bullying. Poor water quality will also encourage this visually-disturbing disease. An improvement in environmental conditions will often encourage a steady recovery. There is no proprietary treatment as such.

FEEDING

Algae is, of course, a firm favourite but most tanks are quickly depleted and suitable substitutes must be found. Blanched lettuce or spinach leaves make an excellent alternative. Additionally, Tangs will eat just about any marine fare including Brine Shrimp, Mysis, Squid and flake.

IDEAL CONDITIONS

Preferably an established tank of not less than 120cm (4ft) and 205 litres (45 gallons).

Avoid freshly maturated, brand new set-ups, that are devoid of grazing potential.

pH: 8.1-8.3. Ammonia and Nitrite: Zero. Temperature: 25-26°C (77-79°F). Nitrates: 20ppm or less total NO₃. S.G.: 1.021-1.024. Dissolved Oxygen: 6-7ppm. Water Changes: 15-25 per cent every fortnight using high quality filtered water. Efficient biological filtration, protein skimming and activated carbon as standard. Lighting: Intense lighting is essential for the growth of micro and macro-algae on which the fish will graze.

The Lipstick Tang, *Naso lituratus*.





DAVID TWIGG'S
KOI
CALENDAR

Autumn considerations: The best of the summer is over, daylight length is shortening and consequently unheated ponds will be getting cooler. The feeding regime will be modified accordingly by the gradual reduction in quantity of food given and you may wish to consider adding some wheatgerm based food into the diet. Weatherwise, however, September can be a funny month with some really hot spells so it may be a case of careful observation of your Koi and weather forecasts to get the balance right.

If you have some form of heat available for your pond and you are not one of those people who keep it on all year round it is worth considering switching it on around now to help minimise these potential water temperature swings caused by our unpredictable weather. This procedure also helps to lengthen our 'summer' for the Koi and the consequently longer eating season improves their condition going into winter.

Club membership: Since starting this column in 1990 I have communicated with many Koi keepers around the world and many 'clubs' send me their newsletters or magazines so that I may pass on details of their meetings and other events they organise to you the reader.

These newsletters contain articles written by Koi keepers for Koi keepers, so, if you are not a member of such an organisation why not give joining a thought? Membership helps to make the hobby one that can be participated in all year round and certainly provides a wealth of expertise to call upon should an unfortunate situation arise that seems to be outside one's own capabilities.

The largest body of Koi keepers in the UK is the British Koi Keepers Society. This is comprised of 'sections' around the country that meet on a regular basis, usually once a month. If you did not join the BKKS at the National Show at Billing Aquadrome last month and you want some winter

reading material (a monthly A4 size magazine) then maybe you would like to give Membership Secretary Pip Ostell a call on 0116 2609707, she will, I am sure, give you all the details you require to become a participating Koi keeper.

Purchase of new Koi: In a couple of months time dealers will be bringing the new crop of Koi back from Japan to their UK premises where they will be eagerly examined in detail by Koi enthusiasts from across the country. If a purchase is made it is becoming increasingly important to place the Koi into a properly filtered quarantine set-up for some weeks before introducing the fish into an established pond system. Have you a set-up that could cater for such a purchase? If not then it may well be worth looking at the possibility of building such a system so that you have it running in readiness for that often unintentional or unexpected, purchase of a new pet.

A new fish, in unfamiliar surroundings, is likely to be 'skittish' until it becomes used to close human contact so please ensure any quarantine arrangement you build is without any protrusions into the pond and if possible all corners should be rounded such as to minimise any chance of physical damage during acclimatisation. Volume of water and amount of filtration of any quarantine set-up should obviously be sufficient for the size of Koi placed in it; too little water for too large a fish will only add to the stress that the fish will already have suffered in catching and transportation and may allow an organism that the fish would normally cope with quite naturally to cause problems that would otherwise be avoided.

It is now becoming more popular to heat quarantine water so that the fish may recover from their journey more rapidly, food can be consumed and should any parasite or bacterial problem exist it will become apparent fairly quickly and hopefully proper treatment will mean that the new acquisition can be placed into the main pond in a good state of health at the earliest possible time. Be aware of the temperature from which the Koi has come and slowly increase quarantine water temperature over a few days to prevent stress from that source. A phone call to the dealer from whom you plan to buy a new Koi will establish his water temperature and you should be able to adjust yours to a similar temperature before you collect your fish.

**KOI MEETINGS
IN SEPTEMBER**

3 Leicestershire Section BKKS. Preparation for Show

with Dave Rowell and 'Preparing for Winter' with Nigel Ostell. Meet at Kirby Muskeo Sports Club. Contact Ray Dunkley, 0116 2771600.

6/7 South of England Koi Club (ZNA). 3rd Open Show (Japanese Style) at Botley Park Hotel & Country Club. Contact Tony Price on 01706 261085.

7 Leicestershire Section BKKS. Closed Show at Farmworld, Garfres Road, Leicester. Contact Ray Dunkley, 0116 2771600.

7 Nottingham & District Section BKKS. Entertainment members from North East Section BKKS. Contact Shirley Hind on 0115 981 0923.

8 Northants Section BKKS. Meet at Saints Sports and Social Club, Northampton. Contact Albert Day on 01604 407361.

9 Nottingham & District Section BKKS. Kate McGill, speaks on Koi Appreciation. Meet at the Western Club, Hillside, Nottingham. Contact Shirley Hind on 0115 981 0923.

10 South Hants Section BKKS. Terry Hill speaks on 'Pond Construction' in Denmes Church Hall, 8pm. Contact George Rooney on 01420 473169.

13/14 ZNA North of England Chapter. 2nd Open Show (Japanese Style) at Avesta Sports and Social Club, Bawtry Road, Sheffield. Contact John Timmis on 01226 289507.

13/14 Nottingham & District Section BKKS. Closed Show. Contact Shirley Hind on 0115 981 0923.

13/14 Mid-Somerset Section BKKS. Closed Show. Part of Countryside Cavalcade, Mendip Hall 2, The Royal Bath & West Showground, Shepton Mallet.

14 Merseyside Section BKKS. Coach trip to North Wales. Section BKKS. Contact Phil Adamson on 0151 287 9911.

20 Leicestershire Section BKKS. Evening pond visit. Contact Ray Dunkley, 0116 2771600.

21 Northern Koi Club. Speaker is Dave Dyson. Meeting at George Carnall Leisure Centre, Urmston, Manchester. Contact Tony on 0161 794 1958.

28 Worthing & District Section BKKS. Autumn Auction at The Scout Hall, East Preston, West Sussex. Fish for sale from 10am. Auction starts 12 noon. Contact Mike Gunn on 01903 763493.

28 Merseyside Section BKKS. Autumn Koi auction at Infiltration. Contact Phil Adamson on 0151

All Koi keepers are welcomed to the events mentioned in this Calendar (an entry fee may be payable) and further details can be obtained from the contact telephone number quoted alongside the diary entry. My thanks go to all Koi Club Secretaries or 'PROs' and others who send me their latest calendar for inclusion in this column. If your club is not mentioned and you would like it to be, please write to me via the Editor at NU Publications Ltd, Caxton House, Wellesley Road, Ashford, Kent, TN24 8ET. Although I do my best to ensure all events are mentioned it may be that some information, which arrives a little late, misses my deadline. To minimise the chance of this occurring you may find it more convenient to fax me direct on 01926 403500. This request also applies to dealers with special events, auctions, etc. I look forward to hearing from you.

287 9911.

30 Avon Section BKKS. Christmas Quiz, 2.30 pm, The New Friends Hall, Stapleton, Bristol. Contact Sandra Lane on 0117 9491061.

**KOI SHOWS
IN 1997**

OCTOBER

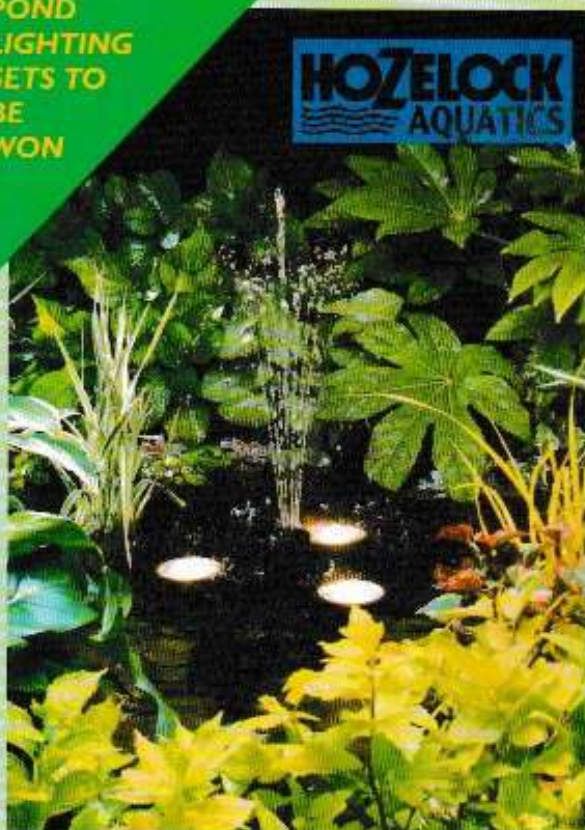
18/19 East Pennine Section BKKS. Autumn Open Show. Indoors at the Heritage Centre, Elsecar, Near Barnsley.



This magnificent Sanke belonging to Bill Oakley took Grand Champion award at the BKKS National Show Koi '97 at Billing Aquadrome over the weekend of 9/10 August. Full results next month.

PHOTO: DAVID TWIGG

5 HOZELOCK POND LIGHTING SETS TO BE WON



A&P and Hozelock, one of the UK's largest manufacturers of garden accessories

and pondkeeping equipment, have joined forces to provide readers with the opportunity to win one of five Hozelock pond light sets in a prize competition worth £500.

Hozelock's award-winning pond light system includes a three light starter set which is extremely versatile and to which up to three additional light units can be added. The system can be installed anywhere in the pond, and incorporates a bracket hub for installation onto a pond pump so that the lights can be moved to shine up through the fountain. Also included is a 24 volt transformer and 7.5m (25ft) of low-voltage cable.

Each light unit is weighted so that the lights can be submerged individually, or the non-toxic weights can be removed to enable the lights to float. A further alternative is provided by the use of brackets incorporated into the design allowing the lights to be mounted to a solid surface underwater.

The system has a two year guarantee, is compatible with Hozelock's garden lighting system, and a range of interchangeable coloured lenses is also available.

Richard Bradley, marketing

manager of Hozelock Aquatics, explained that the pond light system is easy to install and is the next logical step for hobbyists and water gardeners after installing a pond pump. "Many people choose a pump simply to operate a fountain or cascade, and the pond light system provides an added dimension to the ornamental pool. The system is excellent value for money and has proven extremely popular for a host of reasons: it can be fitted in a

matter of minutes, is safe and inexpensive to run, and extra lights can be added in moments to further enhance any water feature."

Why use low-voltage?

The use of low voltage equipment — such as pond pumps and lights — is becoming increasingly popular as consumers appreciate more the advantages of economy and safety which low-voltage equipment provides.

The use of low-voltage equipment not only helps to reduce risks presented by mains voltage, but such equipment is also more economical to install. Wiring to a transformer is easy: Hozelock transformers have been designed to ensure that any DIY installer can safely connect a pump or lights to the transformer supplied. No armoured cable is necessary and, if the pet dog does happen to chew through the cable for example, it will be perfectly safe.

To win a Hozelock Pond Lighting Starter Set just answer the three following questions:

Q1. What is the next logical step for hobbyists after installing a pond pump?

Q2. How many alternative uses of the lights are there?

Q3. How many lights make up a Lighting Starter Set?

Send your answers on a postcard, or sealed down envelope, to: **HOZELOCK COMPETITION (AP10), MJ Publications Ltd, Caxton House, Wellesley Road, Ashford, Kent TN24 8ET, to arrive no later than 17 October 1997. Each of the first five correct sets of answers drawn will receive a Hozelock Pond Lighting Starter Set. Names of winners, who will receive their prizes direct from Hozelock in due course, will be published in a future issue of A&P.**



Dr Joseph Smartt re-examines an old myth

PHOTOGRAPH BY M.-P. & C. PIEDNOIR

The Balanced Aquarium

The balanced aquarium is as natural a system as can be created on a small scale and in it the two vitally important elements, carbon and nitrogen, are being recycled naturally.

The idea of the balanced aquarium is to create as far as possible a system, which apart from generating its own food supply, is self-sustaining more or less indefinitely. It was only with the development post-war of a variety of filter systems that the idea fell out of favour, yet it has much to recommend it and its principles and practices merit being reconsidered and re-evaluated.

The balanced aquarium is as natural a system as can be created on a small scale and in it the two vitally important elements, carbon and nitrogen, are being recycled naturally. The carbon dioxide produced by respiration of all the living components of the system is used by the plants present in photosynthesis. The ammonia released in the metabolism of proteins is oxidised by aerobic bacteria to produce first nitrites then nitrates. These are then taken up by plants and, in combination with the carbo-



Lanced Revisited

hydrate produced in photosynthesis, proteins are synthesised which form the building blocks of the living material of the plants and animals of the system. The question can be asked: 'What are the shortcomings of the system?' The answer is that while there was no problem with the carbon cycle the nitrogen cycle was generally proceeding at too slow a rate and that there was a tendency for ammonia and nitrites which are toxic materials to accumulate. The development of filter systems which speeded up the processes of detoxification of ammonia and nitrites through activity of aerobic bacteria *Nitrosomonas* and *Nitrobacter* relieved this bottleneck. The consequence of this was not in fact the refinement of the balanced system but its virtual abandonment.

ANAEROBIC FILTRATION DEVELOP- MENT

Filtration systems certainly overcome the detoxification problem and enabled a greater population density of fish to be maintained in aquarium (and pond)

systems. The immediate result of this was that nitrate accumulation occurred and when use of plants had been discontinued this caused concern. The development of supplementary anaerobic filtration in which nitrate was converted to nitrogen, however, completed the cycle. These systems, using sintered glass as a medium for the support of anaerobic bacteria under appropriate environmental conditions, were an effective supplement for the aerobic bacteria. The principle behind the operation of sintered glass filters is that the fissures in the material penetrate it deeply when it is immersed in water that part of the fissure near the surface is well oxygenated and is able to support the light of aerobic bacteria.

When these are established in sufficient number they absorb oxygen which might otherwise diffuse into deeper parts of the fissure and produce anaerobic conditions in which anaerobic bacteria convert nitrates to nitrogen.

UNDERGRAVEL FILTRATION

It is, perhaps, appropriate at this juncture to say something about the operation of aerobic filtration systems. The size of the system must be adequate to deal with ammonia and nitrate as they are produced so that when an adequate system is established these substances should be barely detectable. Since it is relatively innocuous nitrate levels are less critical and can be controlled by anaerobic filtration, adsorption by charcoal or ion exchange resins or

by maintaining active plant growth in the system to take it up to support the growth.

In principle all aerobic systems of biological filtration depend on passing water over or through a medium which supports the growth of aerobic bacteria. The efficiency of filtration depends on density of the bacterial population, the surface area of the medium on which the bacterial population is growing and the rate of flow of water over the medium. These are variables and can be manipulated to improve the effectiveness of the overall operation. In considering the operation of the simplest system (and the least expensive) namely undergravel filtration, we can easily manipulate the surface area of the medium by selection of the size grade of the gravel. There are a number of considerations which influence this, the smaller the size of individual gravel particles the greater will be its surface area but resistance to water flow will be greater and the level of aeration less. Importantly, the medium will tend to clog more quickly with the smaller particle size. With larger sizes water flow will be easier, the level of oxygen higher, the bacteria will operate effectively and achieve a high density per unit area of surface but the total surface area will be relatively lower.

STOCKING RATE

A final consideration, if Goldfish are to be kept, is that the size of gravel should be such that it is either significantly smaller than the mouth of the fish so that gravel taken up in the course of browsing does not

tend to stick in the mouth or, it is much larger, and cannot be taken up in the first place. Some considerable distress can be caused to fish and their keepers when particles of gravel lodge in the mouth. These can usually be moved with forceps without great difficulty by a vet or an experienced fish keeper but there is no doubt that the inexperienced could harm their fish in attempting this.

Smaller surface areas of a gravel medium can be compensated for by increasing the rate of water flow. This can be carried out by increasing the rate of air flow if an air pump is used to maintain circulation or, if a greater rate is required, then a powerhead can be used. The under-gravel system is the simplest but least intensive system of filtration and this should be borne in mind when deciding on stocking rate. I have found that use of the traditional rules of thumb should be followed for small fish (3in in length or longer) and the extra carrying capacity which is generated by the system enables fish to put on growth and very importantly if the system should break down (as is the nature of any system!) then very little harm is done. The system can be as nearly 'fail-safe' as can reasonably be

The Balanced Aquarium Revisited

expected and it will be low in maintenance, it is possible to keep such systems going almost indefinitely. It will be necessary from time to time to have a total clear out; this should be done if the condition of the fish in general shows a decline or if water tests show that the system is no longer functioning as it should. If water quality is good and the fish are fit and healthy then the system in which they are living should not be disturbed on the principle that: 'If it ain't broke, don't fix it!'

ARTIFICIAL MEDIA

However, if in doubt, the welfare of the fish is paramount and then the change should be made.

Intensification of biological filtration can be achieved by the use of artificial media. These include sponges which illustrate the principle of providing enormously increased surface areas for bacterial establishment and they can easily be cleaned by squeezing and washing to prevent clogging. The clogging problem can be overcome in intensive systems by having a pre-filter which removes suspended particulates. This intensification of filtration requires regular attention to ensure continued functioning and it means that time which might be spent in observation and enjoyment of the fish is taken up with housekeeping. Intensive systems are, however, necessary for those who wish to increase their fish numbers while limited for space; they are, it must be admitted, essential for most breeders, especially of Goldfish, who may have to produce and raise thousands of young fish to stand a reasonable chance of being able to select for the highest quality.

Filter units can be very simple, in which each tank is an independent unit, but where very large numbers of fish are kept in numerous separate tanks, then filtration may be centralised. Many breeders, on a relatively small scale, operate such systems and commercial breeders and stockists use these as often as not. This

does, however, enormously increase the element of risk.

Risks in the centralised system concern loss of water quality if the system fails and spread of infections and parasites if there should be an outbreak in any component unit. This requires the use of sterilisation techniques commonly using ultra-violet lamps to prevent and control any such outbreaks. The time requirement to maintain such systems (as well as their cost) is considerable and for amateur fish-keeping members of the working population, meeting the demands of one's time could be difficult and reduce if not destroy any pleasure from this pursuit.

Nitrogen is of course not the only element that is cycled in the aquatic environment of the fish we keep. Phosphorus, calcium, magnesium, sodium and potassium are all common elements present in significant concentrations. High concentrations of phosphate can in conjunction with nitrate give rise to algal blooms (green water) which are undesirable. Concentrations of these elements (which are plant nutrients in the main) can be achieved by growing the plants in the water or bypassing the water through a filter bed on which Watercress or some similar plant is being grown. In conditions where rapid growth is occurring not only will nitrate be taken but also phosphate and the other plant nutrients, thus controlling in the simplest way possible the problem of the excess accumulation of these elements.

THE MORAL OF THIS TALE

The technological alternative to this is the use of water softeners, ion-exchange resins and the like which will tend to produce a watery environment for our fish approaching demineralised, if not distilled, water in quality. The danger of this is that too much in the way of minerals would be removed.

The moral of this whole tale is that doing things in the most natural way possible is not only cheaper but in many ways it is more effective and relatively risk free. It could be argued that in turning its back on the ideal of the balanced aquarium fish-keepers have jettisoned the baby as well as the bath water. An additional advantage is that natural systems can take care of subtle aspects of the aquatic environment of which we are barely, if at all, aware and which we would find difficult, if not practically impossible, to control.



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Iggy Tavares finds the species still a firm favourite

PHOTOGRAPHS BY THE AUTHOR USING A PENTAX Z-20 CAMERA

Back to Basics:

The Zebra



The Leopard Danio — long finned strain.

Popular freshwater tropicals are usually colourful fish that one might consider for a community aquarium. The Zebra Danio is such a fish, which when kept in a shoal form is an active, gregarious and colourful spectacle.

Brachydanio rerio (Hamilton-Buchanan, 1822), the Zebra Danio, originates from the east coast of India and Bengal, where it is found in relatively fast flowing streams. A possible mutation of the Zebra Danio is the Leopard Danio, *Brachydanio frankei*, although there are conflicting reports that it is a separate species which come from Thailand.

Zebra Danios are silvery gold,

The Zebra Danio, when kept in shoal form, is an active, gregarious and colourful species.

with five metallic blue horizontal stripes which run from behind the gills into the tail. The anal fin is also striped. The Leopard Danio's silvery pink body is covered with blue spots which extend into the anal and caudal fins. Both fish being popular and prolific breeders, lend themselves to strain fixing, and hence long-finned and gold varieties are also available. I purchased all my

Danios from Morden Aquatics, London.

THE AQUARIUM SET-UP

A shoal of six or more Zebra Danios do well in a community tank containing other small fish.

This could be a modest two foot aquarium or better still a three foot or four foot one. A well planted aquarium is always a delight to observe, as the fish chase each other in and out of the greenery.

Other suitable companions are other small shoaling fish. These include the smaller Barbs such as Tiger Barbs (see A&P, June 1996)

a



Danio

The Zebra Danio
— long finned
strain.

and Rosy Barbs and medium sized Tetras such as Serpae Tetras (A&P, March 1997) and Black Widows. Smaller Tetras such as Neons and Cardinals (A&P, December 1996) could get bullied by the Zebra Danios.

I feed my Danios a basic diet of TetraMin flake with an occasional treat of frozen Bloodworm or live Daphnia all of which are greedily consumed. The Danios have an amazing appetite and are able to put the food away at a tremendous rate compared to the slower feeding Tetras.

BREEDING AND RAISING FRY

Zebra Danios are prolific egg scatterers which enjoy eating their own eggs. In the community aquarium you may occasionally observe males chasing females which are then driven into the plants where the female releases her eggs and the male his milt. These are soon eaten by all the other fish in the aquarium. Zebra and Leopard Danios cross breed, but it is probably best to keep the two species apart.

For breeding mature male and female Danios should be separated for at least a week, during which time they are well fed. A small bare tank fitted with a raised small holed plastic mesh is prepared and filled with water maintained at 78 to 80°F. Alternatively, the bare tank should have a clump of Java Moss. A pair or two males and a female are placed in

the small tank at night, and usually spawn the next morning, after which they are removed. The majority of eggs fall to the bottom of the tank, through the grid or into the Java Moss, out of reach of the greedy parents. The eggs hatch within 24 to 36 hours but no attempt should be made to feed until the fry are free swimming two days or so later. First foods consist of an infusoria culture. This is easily prepared by placing a crushed lettuce leaf in a gallon of water sited on a sunny window sill. A week later the whole concoction starts to clear and is teeming with microscopic life, observable under a microscope, and ideal first food for tiny fish fry. As the fry grow they will be able to take crushed TetraMin flake. They need to be moved to larger tanks as they grow to prevent stunting.

CONCLUSIONS

Zebra Danios are colourful, active, hardy, peaceful and cheap. They are relatively long-lived (two years) and are easy to breed. Because of all their attributes, apart from forming a splendid display in a community tank, I tend to use Zebra Danios in all sorts of set-ups. Since they are hardy I tend to introduce them first when starting a new tank which allows useful nitrifying bacteria to start up their colonies, before introducing more sensitive and expensive fish. I also use Danios with Dwarf Cichlids where the Danios can act as dither and target fish.

Because they are not shy and fast

swimmers they are perfect for this job. Moreover, because they are hardy they can be used with hard water Dwarf Tanganyikan Cichlids and soft water South American Dwarf Cichlids. Finally, Zebra Danios are a fun fish which give endless hours of pleasure with their antics.

FACT FILE

Scientific Name: *Brachydanio rerio*

Common Name: Zebra Danio

Distribution: East coast of India and Bengal

Size: Male and female 2in (5cm) TL

AQUARIUM CARE

Aquarium size: 36x12x15in (90x30x37.5cm)

Aquarium decoration: Well planted aquarium (real or plastic plants)

Temperature: 26-28°C

Water: Optimally soft (pH 7.0, 5°DH approximately)

Diet: TetraMin flake, some live or frozen food

Alex Stephenson dips his toe into the Goldfish Showing Scene

PHOTOGRAPH BY A&P LIBRARY

Showing Interest

Fish Shows, broadly speaking, can be divided into two types: Mixed Shows and Specialist Shows.

If you are a goldfish enthusiast and you show your fish, then most of what is to follow will be familiar. If not, then perhaps it might encourage you to give it a try.

Fish Shows, broadly speaking, can be divided into two types. First there are the Mixed Shows, organised by clubs catering for all aspects of the hobby, these will have Classes for just about every sort of fish, tropical, coldwater and even marine. The second type are the Specialist Shows, which are staged by Societies concentrating on a particular species or group of fishes — Cichlids, Catfish, Killifish, etc.

The all encompassing mixed shows are, of course, great fun but they do present a couple of problems for the Goldfish keeper. For instance, it is normal practice for exhibitors to provide not only the fish but also the Show-tanks and water. As a good sized Goldfish requires a relatively large tank this means quite a lot of water. I find it helpful if my wife accompanies me to these events as she is very good at carting water buckets about! I must show her how to use the yoke I bought her to make the job easier.

FRIENDLY AND INFORMAL

Another point to consider is that these shows usually provide just two



One of the advantages of this kind of Show is that your fish will be competing with others of its own kind. With sometimes as many as 40 Classes all of the popular varieties will have their own section. Competition at this level can be very keen so, in most cases, the quality of exhibits is high.

classes for Goldfish, one for all the Single-tailed varieties and one for all the Twin-tails. It has to be said, some exhibitors dislike Comets competing with Shubunkins, and Lion-heads with Veil-tails but the results can be interesting.

Shows of this kind are friendly and informal so you can usually just turn up on the day with your fish and equipment, fill in an entry form, and 'bench' your fish. Don't be concerned about not knowing what to do, there is always plenty of help and assistance.

Specialist Goldfish shows are a little different. For these events you need to enter your fish in advance. The usual format is to obtain a Show Schedule, fill in the entry form and send it to the Show Secretary prior to the closing date. This allows the organisation to produce a Show Catalogue and to provide water filled tanks ready to receive your fish on the day of the show. All this is not as stuffy as it sounds, you will still find everyone there very helpful and friendly.

LEARN MORE

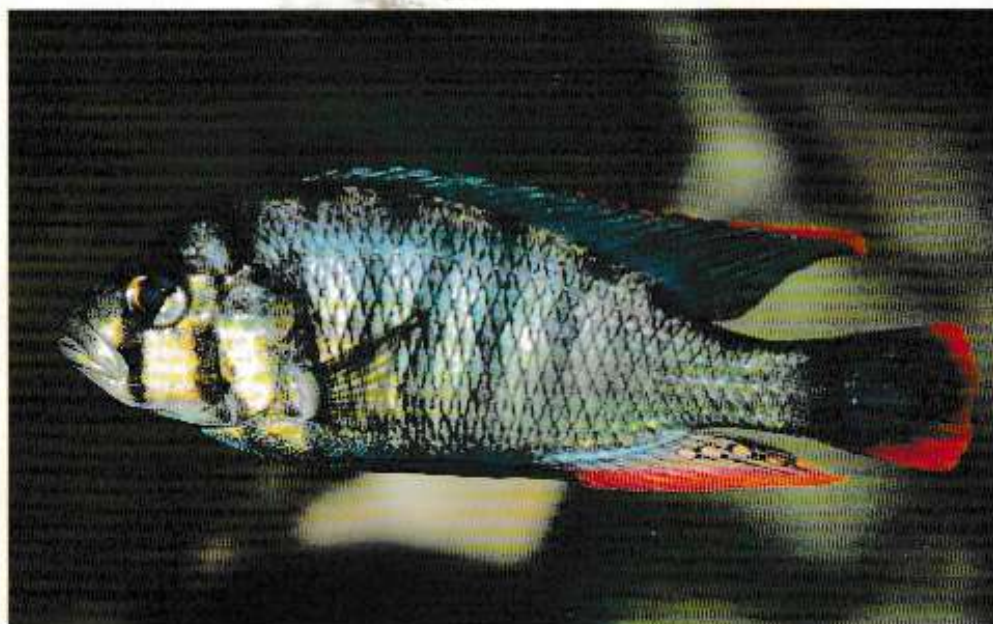
Anyone wishing to learn more about Goldfish in general, or some variety in particular, will find a wealth of knowledge and experience among the exhibitors, many of whom are also breeders. Should your ambition be to obtain some useful brood stock then these breeders are exactly the people you need to talk to. All in all, there are many good reasons why I would recommend the serious enthusiast to attend one of these Shows. Better still, why not join one of the Goldfish Societies! No matter what your level of experience, if you are interested, you will be made very welcome.

USEFUL ADDRESSES
GOLDFISH SOCIETY OF GREAT BRITAIN: PRO, Janet O'Daly, 140 Ardingly Drive, Goring-on-Sea, Sussex BN12 4TP. Member Secretary, Roger Saltrick, 38 Herent Drive, Clayhall, Romford, Essex IG5 0HE.
NORTHERN GOLDFISH & POND-KEEPERS SOCIETY: S. W. Moores, 19 Manley Road, Sale, Cheshire M33 4EG.

Linda Lewis looks at all the things fish can do with their fins

PHOTOGRAPHS BY THE AUTHOR

FINTASTI



Red-tailed Gichlid, *Malesochromis nigricans*, with egg spots on anal fin.

Fins are the fish equivalent to our limbs. We have two arms and two legs while the 'average' fish has seven fins. These come in two paired sets — pelvic fins which are located on the underside of the fish towards the front, plus pectoral fins found behind the fish's head. The other fins are the back (or dorsal), the tail (or caudal) and the anal fin (on the underside of the fish, but towards the back).

Fortunately there is no such thing as an average fish. Some have an extra, apparently useless, fin known as the adipose, as seen in many Tetras. Others have more than one dorsal fin. In the opposite direction there are Seahorses and Knifefish where one or more fins are totally absent or even joined up to form

Fish vary not only in the numbers of fins that they have but in the use to which they put them.

one continuous fin.

Fish vary not only in the number of fins that they have but in the use to which they put them.

VITAL ROLE IN BREEDING

People can pick up a tool if they want to do a special job. Fish have to use their fins, with the result that they have, over thousands of years,

evolved into all kinds of shapes and sizes, and are used for much more than just swimming. Some of those uses are looked at here.

Fins play a vital role in breeding for many fish. They are often used in courting. Many fish display to rivals, and potential partners, with spread fins; the Swordtail Characin has spoon-shaped appendages on the end of the pectoral fins which are waved about like flags to signal his intentions towards the female. Others, such as Corydoras catfish, use their fins throughout the entire process.

First the male uses his fins to touch and stimulate his mate into spawning by stroking the back of her head. Then, once the fish have adopted the 'T' position, the male holds the female by gripping her barbels with his pectoral fins. Next

C!

the female releases her eggs into a pouch formed by her pelvic fins, and carries them while she selects a suitable site on which to deposit them. Although this may take several minutes, and more than a dozen eggs may be carried, few are ever dropped.

Mouthbrooding cichlids put fins to another use in breeding. Where the female is the 'brooder', the male usually has fake egg spots on his anal fin. These resemble the real thing very closely, both in size and colour. The female lays her eggs, then collects them into her mouth for brooding. She then notices the 'eggs' on the male's fin and tries to pick them up too. This is the male's signal to release his sperm ensuring that the female will take in some sperm as she tries to pick up the 'lost' eggs, so fertilising the eggs she is carrying.

Livebearers have a modified fin to ensure that egg meets sperm. The male's anal fin is formed into a tube, known as a gonopodium. Sperm flows along the tube directly to the female ensuring a very high rate of fertilisation.

After breeding the next most important thing in a fish's life is eating! Fins can help here, too. Deep-sea Angler Fish use a rod and line, complete with a wriggling worm-like bait, to lure prey within range. This is an extreme example of a modified fin, this time the dorsal, being put to a specialised use. Lionfish (Pterois volitans and relatives) also catch their prey but in a more straightforward manner. They stretch out their enlarged wing-like pectoral fins and use these to slowly herd their victim into a corner. The Gourami fishes have modified pelvic fins which are equipped with taste buds at their tips, which are used to locate food in turbid waters.

A much more widespread use of fins is in defence. Numerous species have the ability to lock their fins into an erect position. This has the effect of making the fish look larger which may make a predator think again. It



also makes the fish much harder, and rather more uncomfortable, to swallow so that next time round easier prey may be selected. Several different types of fish have this ability including many Catfish, Sticklebacks and, of course, the Trigger Fish (Family Balistidae) which goes one step further. Once locked, the fish's dorsal fin can only be released by depressing the trigger, something no predator can do once the fish is lodged safely into a crevice or cave.

Potentially more dangerous to humans are those hundreds of species of fish that have turned the spiny rays of some fins into containers for poison. These include the Stonefish and Greater Weever

Fish. A few cases are reported every year of the agony suffered by unfortunate bathers or divers who have accidentally stepped on one. Luckily for us, this mainly occurs outside the UK.

Lion or Turkey Fish, Pterois volitans, fins spread to 'herd' prey.

PRIMITIVE LEGS

The popular Lion or Turkey fish (Pterois volitans) must also be treated with great respect. The spiny rays of its dorsal fin carry a toxin that will cause terrible pain to be suffered by anyone unlucky enough to come into contact with them.

Fins are, of course, used for swimming but some fish are not

Siamese Fighters have been bred to improve the beauty of their fins.



satisfied with this and use their fins as primitive legs on which they walk. The humble Blenny uses its strong pectoral fins to move from rock pool to rock pool, whilst Mudskippers spend much of their time out of the water walking on their fins.

Other fish also leave the water, but this time to avoid predators. They do this by travelling through the air for long distances. This usually confuses the pursuer and allows their escape. Flying Fish are

Fintastic!

the best known example, but they really do little more than glide. When swimming, they keep their pectoral fins folded, and close to their body, but as they break the surface, these huge fins are spread out allowing the fish to glide through the air for distances sometimes exceeding 100m.

THE ABILITY TO STAY STILL

Something closer to true flight is seen in the Hatchetfish (*Gasteropelecus leviss*, *Carnegiella strigata* and others). Their unusual shape has resulted from the development of an enlarged shoulder girdle which has powerful muscles attached to it. These muscles enable Hatchetfish to beat their pectoral fins rapidly, like wings. This can carry them through the air for distances of several metres — a very good reason why a lid is an essential item on any tank containing Hatchetfish.

In other environments the most important thing for a fish may be the ability to stay still, and not to be swept away by strong water currents. Fins again provide the answer. Clingfish and Gobies have fused their pectoral and pelvic fins into a sucker which they use to keep a tight grip, however rough the water. Remoras use a similar idea to attach themselves to the body of a Shark. This time the sucker is formed from a dorsal fin and is ridged, like the foot of a Gecko, to give it a firm grip.

USEFUL AND BEAUTIFUL

Attached to a Shark they have no need to waste energy swimming, and are simply carried to feeding grounds by their host.

Dwarf Gourami spreads fins to display. Puffers are modified fins.



Female C. penaei using pouched pectoral fins to carry 13 eggs.



Besides being useful fins can be beautiful, too, particularly if their size and colour can be enhanced by selective breeding. When thousands of fry are raised, every now and then one or two will appear that are different from the rest. If these can be separated and

Fintastic!

raised they may form the basis of a new variety. As a result, many species of fish are now available in

'long-finned' forms, for example, Zebra Danies, Black Widow Tetras, and even Butterfly Koi. In the wild these fish would soon die out being slower and unable to compete effectively in the race for food and mates.

Fins are useful from our point of view, too. They allow us to tell how a fish is feeling. A fish that normally swims with fins held out stiffly may be ill, or be being bullied if it begins to keep its fins folded flat. As a general rule, when buying fish look for a tank where all the fish are swimming with erect fins and you should not go far wrong (but this doesn't always apply to marine fish which often swim normally with closed fins).

So, fins can be used as wings, fishing rods, weapons, or legs. Besides being functional, they are often beautiful, too — fintastic indeed!



Underside of Thornback Ray showing greatly enlarged pectoral fins.

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Out of 24 algae treatments tested throughout last summer on especially set up ponds containing nutrient-rich water seeded with algae and blanketweed, Gardening Which Buying Guide recommended TetraPond AlgoFin Plus to control blanketweed and TetraPond AlgoRem for the treatment of green water algae.

Tetra has already seen an increase in demand for algae treatments this year due to the summer's excessive rainfall which would certainly have washed large amounts of nutrients (particularly fertilisers)

into garden ponds which, combined with the warm weather, means algae growth is rife.

TetraPond AlgoFin Plus is available in three sizes — 250ml for 1,100 gallons, 500ml for 2,200 gallons and 3 litres for 13,200 gallons. TetraPond AlgoRem comes in two sizes: 250ml for 1,100 gallons and 500ml for 2,200 gallons.

• Further details from: TETRA, Lambert Court, Chestnut Avenue, Eastleigh, Hampshire SO53 3JZ. Tel: 01703 620500. Fax: 01702 629810.

quality nutritional value and all the necessary proteins offered by the food. Also, because they can feed so readily, the fish become more confident around feeding time and so reward the fishkeeper by appearing more often, too.

So what's good for smaller pond fish is also good for

NEW PRODUCT REVIEW



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TetraPond AlgoFin Plus and TetraPond AlgoRem, recommended by Gardening Which to control blanketweed and green water algae.

BUY LINES

NEW PRODUCT REVIEW

stores.

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• Details of Phoenix products from PHOENIX 2000 FISH FOODS, Brookhill Road, Brookhill Industrial Estate, Poxton, Nottingham NG16 6NS. Tel: 01773 580501. Fax: 01773 580264.

WATERLIFE RESEARCH

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• Further details from: WATERLIFE RESEARCH INDUSTRIES LTD, 476 Bath Road, Longford, West Drayton, Middlesex UB7 0ED. Tel: 01753 682487/685696. Fax: 01753 685437.

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hits the streets. The POND PRIDE WATER TREATMENT, from King British, consists of bacteria — harmless to fish, plants and other pond life — which out compete the blanketweed and algae for nutrients in the water. After treatment, small lamps and a powdery film appears on the water surface subsequently forming small white colonies on the pond floor. The treatment is easy to use (a measuring spoon and full instructions are included) and needs to be done over several days, followed by a repeat treatment (if necessary) every six weeks or so. Two sizes of treatment are available — one for 500 gallons and one for 1,000 gallons.

• Full details from: KING BRITISH AQUARIUM ACCESSORIES, Haydiffe Lane, Bradford, West Yorkshire BD5 9ET. Tel: 01274 576241. Fax: 01274 521245.

OASE

The new BIOSYS 3 System from OASE provides natural methods in maintaining clear, healthy ponds by destroying harmful algae and pollution and by raising oxygen levels.

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to convert toxic ammonia into nitrite then nitrate with excess being converted into nitrogen.

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Further new Oase products will be on view at the 1997 GLEE Exhibition at the NEC next month.

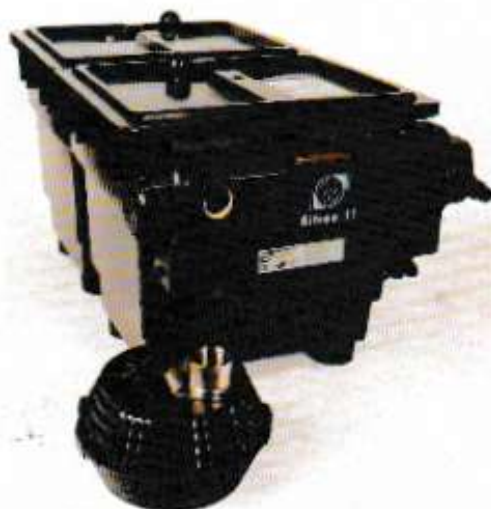
• Details from: OASE (UK) LTD, 3 Telford Gate, West Portway Industrial Estate, Andover, Hants SP10 3SF. Tel: 01264 333225. Fax: 01264 333226.

INTERPET

The Interpet range of PRIME external filters has been increased with the addition of the PRIME 30 model suitable for aquariums up to 99 gallons and coming complete with all media — bio-media, carbon filter foam and wool. To suit its 198 gph output it features larger taps and pipes; these larger fittings have also been added to the Prime 10 and 20 models.

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

The Oase BIOSYS 3 comprising Biotec Filter, Biron UVCM and Aquamax Filter Pump.





FROGS & Friends

By BOB and VAL DAVIES



HERP FACT FILE

RIGIDITY AND FLEXIBILITY

The protective shell of Chelonians (Tortoises, Turtles and Terrapins) is a unique feature among vertebrates having evolved over 200 million years ago. Turtles with recognisable shells suddenly appear in the fossil record along with the earliest Dinosaurs. These early Chelonians had both and were unable to withdraw the head — both features having been later modified in modern species. So effective was the shell that it has remained the distinctive feature of all species to the present day, although with varying adaptations.

Consisting of two parts, the upper shell (carapace) and the lower shell (plastron) are joined together by a bony ridge which extends from the plastron. The shell of young specimens is relatively soft — protection increases with age, to compensate young of certain species have spring protrusions which provide some defence, a good example being the Spring or Cogwheel Turtle (*Heosemys* spp.) of SE Asia. The effectiveness of the shell has provided longevity of the line while diversification has been limited — all Chelonians being basically similar in body plan although shells can be hard and bony or soft and leathery. The height of the shell varies, usually (but not always) being flatter in more aquatic species, one exception is the Florida Red bellied Turtle which has developed a higher, thicker carapace; this is generally thought to be a response to predation by Alligators which inhabit the same regions.

One feature of diversification is development in some species of a hinged plastron; hinging of the carapace is unique to the Hinged-back Tortoises (*Galapago* spp.) of Africa. Movement of the plastron can vary from slight flexibility to distinct hinges which enable complete closure of



Box Turtle: the hinged plastron turns the shell into an impregnable box.
PHOTO: BOB & VAL DAVIES

the shell. This is an obvious advantage for defence but it may also protect against desiccation in hot, dry weather as it tends to occur in more terrestrial species. Occasionally two hinges may be present as in the American Mud Turtles (*Kinosternon* spp.) — in close relative the Musk Turtle (*Strognoschelus*) has only one hinge which is not as easily discernible. Plastral hinges occur in species as far apart as the USA and Asia. They tend not to be apparent in young

specimens, usually developing with age.

Hinging also occurs in some Sidewick Terrapins, the Hinged Sidewick (*Pseudemys*) can close the anterior half of the plastron although this feature is lacking in the related genus *Pseudemys*. Partial hinging, facilitated by ligamentous rather than bony connections between carapace and plastron, is seen in species such as the Asian Leaf Turtle (*Cyclemys dentata*) and neotropical Wood Turtles (*Rhinoclemmys* spp.) but closure of the carapace is not possible — this flexibility may be necessary to enable the passage of the large, rather brittle eggs. In some species it exists only in mature females, eg. Spring Turtles (*Heosemys* spp.) and Tricentrate Turtles (*Melanochelys triocentrate*).

Possibly the best example of hinging, and the most familiar as they are commonly imported, is that of the American Box Turtles (*Terrapene* spp.) which when disturbed can tightly close both ends of the carapace giving complete protection, hence the common name; in some specimens it may not even be possible to insert a knife between the two shells. The closure in this case could possibly also protect against dehydration since, although mainly terrestrial, they seem to prefer slightly damp situations of often burrowing into damp soil in hot conditions.

OUTDOORS — DO FROGS BASK?

Amphibians, unlike many reptiles, do not usually bask, their moist skins do not normally take kindly to sunlight although certain treefrog species (*Hyla*) and the African Gecko Treefrog (*Chironomantis xerampeltra*) can withstand long periods exposed to hot sunlight, changing colour as temperature increases. Our Common Frog (*Rana temporaria*) is often to be found,

outside the breeding season, hiding during daylight sometimes well away from their breeding pond. The specimens in our garden pond, after spawning, usually cluster among the bases of marginal plants and remain there through the summer days often angled towards the sun's rays. After several extremely dull, wet days, incidentally around Midsummer's Day, we returned home one afternoon (the sun had finally come out) to see frogs all enjoying the sun on the stones surrounding the pond.

We counted 15, a few of which were actually on the flags of the path which had warmed up considerably.

CONSERVATION MATTERS

Great Crested Newts

A recent report from the British Herpetological Society's Conservation Committee (Spring 1997) claims an estimated annual decrease in Britain's Great Crested Newt (*Triturus*

cristatus) population of 1.4 — 2 per cent. Various reasons for the decline are given but a major factor is the loss of ponds. English Nature had estimated that 182,000 British ponds have been lost since the 1940s. Other reasons for decline include modern farming methods, pollution, toxic effects of agrochemicals and urban development.

The Great Crested Newt is a protected species but studies indicate that the reduction in population is still occurring, and

in spite of legal protection it seems that permission to develop areas containing them is still granted although the creatures are occasionally relocated. The Government has produced an outline action plan but how this will operate or be funded is not clear.

At the present time the species is more widespread than our other endangered reptiles; the Natterjack Toad, the Smooth Snake and the Sand Lizard which all have very restricted distribution.

However, if the present trend continues the Great Crested Newt could eventually share the same fate.

Footnote: Since pollution is a relevant factor you can help Newts and other creatures by reporting pollution incidents to the Environment Agency on Freephone 0800 807060.

Useful Addresses

The following may prove useful to readers wanting information on reptiles and amphibians or other wildlife and such topics as wildlife pond and conservation.

Leaflets, charts etc — BBC Wildlife Walkchart: The Perfect Pond for Wildlife (from BBC Wildlife, Price £4.99).

Garden Ponds as Amphibian Sanctuaries. Leaflet issued by the British Herpetological Society, c/o ZSL, Regent's Park, London NW1 4RY. Price 50p plus SAE.

Free Publications

Amphibian and Reptile Conservation: A Guide to Various Organisations from Frog Life, Titton House, Bramfield, Halesworth, Suffolk IP19 9AE.

Managing Ponds for Wildlife, available from English Nature. Tele link 01329 668600.

Details of County Wildlife Trusts and WATCH (a national wildlife organisation for children) obtainable from Wildlife Trusts, The Green, Witham Park, Waterside South, Lincdn. LN5 7JR.

Pond Conservation Activities — British Trust for Conservation Volunteers (for active involvement). Write to BTCV, 36 St Mary Street, Wallingford, Oxfordshire OX10 0EU.

NOTE: In the August issue of A&P, we gave notice of the 9th ANNUAL IHS FAIR & INTERNATIONAL SYMPOSIUM, 13 and 14 September 1997. Fortunately for drivers, the venue for the Altrincham Community Sports Centre, Walsall is much nearer the motorway than we led readers to believe — it's only

LEGLESS TOADS

In June, the Daily Express carried the story of the discovery of 200 dead Common Toads (*Bufo bufo*) on the banks of the River Esk in Scotland. Each one had its hind legs sliced off. The Veterinary Pathologist at the Zoological Society in London inspected the remains of some of the Toads and concluded that they were killed by human(s) with a taste for frogs legs even though the Common Toad is not usually used in cooking. Apparently frogs' legs are difficult to get in Britain, in Paris they sell for £30 a kilo.

Since the Wildlife and Countryside Act gives protection to the Common Toad only against unlicensed sale no offence has been committed. However if the Toads were not 'humanely



Common Toad — are its legs the latest gourmet fashion?

PHOTO: BOB & VAL DAVIES

dispatched prior to removal of limbs then it is possible to prosecute offenders under the Cruelty to Animals Act. A final point — it would be interesting to know if cooking eradicates traces of Bufo toxin that may be present in the flesh of the Toad's legs. (Source: Natterjack, Newsletter of the BHS).

ANOTHER MADAGASCAN JEWEL

The number of species of Chameleon and Day Gecko (*Phelsuma*) being exported from Madagascar has been limited. Concern has also

been expressed that some species of Mantella frogs whose numbers are small and habitat restricted should also be conserved. It was interesting to see, therefore, some months ago, a little known species of frog arrive from the island.

Scaphiophryne gottliebii (no common name) is a very conspicuously-coloured frog. The back is covered with a large pinkish red patch which is surrounded by green with black markings. The sides and legs are white with black bands on the wrists and hind legs.

Measuring 3.5cm females are slightly larger than the males. When disturbed the frogs inflate. Since their native habitat is rocky mountains this species needs to be kept slightly drier than Mantellas.

The triangular shaped tips of the fingers and toes suggest that they may well climb although in our vivarium they have shown little inclination to do so. Nothing is recorded about its breeding habits but the related species *Scaphiophryne nana* (a forest dweller) in a friend's collection burrowed some 6in (15cm) into the substrate and produced spawn which was unfortunately not fertilized as the eggs developed fungus. It is possible that, if fertile, as eggs develop the burrows flood with heavy rain enabling the tadpoles to swim out into pools.



Scaphiophryne gottliebii, an uncommon import from Madagascar. The reason for its stunning colouration is unknown — it may or may not be toxic.

PHOTO: BOB & VAL DAVIES

two mile from Junction 10 on the M6 and not 12 miles as we had shown! Open 10.30 am to 4.00 pm both days. Entrance to the Fair £2 adults, 50p children (members and non-members). Speakers at the Symposium include: Sandra Barnett from the National Aquarium in Baltimore — Arboreal Iguanas and Dendrobates; Bob Clarke (USA) — breeder of rare Boid snakes; Bernd Eidenmuller, Germany —

breeder of Monitor Lizards; Richard Gibson, Jersey Zoo — breeder of the world's rarest snake; Paul Rowley, Liverpool School of Tropical Medicine — Venomous Snakes. Entrance to the Symposium is £5 for members and must be pre-booked.

For details of IHS membership and the Show write to: Membership Secretary, 15 Barnett Lane, Wordsley, West Midlands, DY8 5PZ.

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Roy Osmint falls for the black and orange character fish

PHOTOGRAPHS BY THE AUTHOR

The Charismatic Clown



As well as being one of the most strikingly colourful of all freshwater tropical fishes, the Clown Loach, sometimes referred to as the Tiger Botia (*Botia macracantha*), additionally possesses the kind of innate charm and endearing personality that seldom fails to captivate and which individualises it from all other species. From its seemingly rather thoughtful, slightly melancholy expression suggesting a certain bewildered innocence, to the unconventionality of its often bizarre behaviour this is a character that in every way lives up to its popular name.

The Clown Loach is without doubt the most spectacular and widely seen of all the true Loaches found in aquaria. A member of the family Cobitidae of the genus *Botia* it is a distant relative of the common Minnow from the largest of all freshwater groups Cyprinidae. Although this species was first described to science almost a century and a half ago it was not until the mid-1930s that it was introduced to the fish fanciers of Europe where it was greeted with understandable enthusiasm.

AN OBJECTIVE TO STRIVE FOR

In its native habitat of Sumatra, Borneo and the Malay Peninsula the Clown prefers the quieter backwaters and tributaries of rivers and streams, away from the main force of the current, where it can leisurely explore for the worm-like food to which it is particularly partial. This diet is frequently supplemented by decomposing vegetable matter. In these ideal circumstances the fish can attain a length of some 30cm but within the confines of the average aquarium it is unlikely to reach anything like this size.

Where aquarium conditions are entirely favourable large specimens can be raised these are truly magnificent and an objective well worth striving for. At

The Clown Loach is without doubt the most spectacular and widely seen of all the true Loaches found in aquaria.

any growth stage a group of nicely-conditioned Clowns are a delight but I feel that size particularly suits these fishes and heightens their striking beauty and intrinsic charm greatly, making them, in my opinion, one of the most impressive, desirable and entertaining of all the popular aquarium species.

In theory Clown Loaches, like most captive fishes, will grow in relation to and in harmony with the dimensions of the container in which they are housed. In practice, however, this species sometimes seems unwilling to follow this axiom and even when provided with spacious accommodation and other apparently ideal conditions do not necessarily develop beyond modest size. In any event growth is likely to be relatively slow as this fish enjoys quite a lengthy life-span by comparison to many others, its growth development is consequently protracted over this period.

A shoal of healthy juveniles in a large, well furnished and planted aquarium that provides plenty of hiding places as well as free-swim-

ming areas undoubtedly offers the best chances of success in this respect. Plenty of varied nutritious live foods, or its direct substitute, should be considered essential as is the need for a high standard of water quality through regular partial water changes. To enable the fish to more easily exercise its natural inclination to dig down into the substrate this should be of a softish medium and terraced in varying depths.

AN ELEMENT OF LUCK

If you provide favourable conditions there is no reason why above average or even outstanding fishes cannot be reared. But there is it seems an element of luck involved for if that certain indefinable quality is absent full growth potential may not be achieved. I have long been of the view that in some cases this limitation on maximum growth attainment may, at least in part, be predetermined by factors concerned in the fish's earliest care, handling and transportation and is, therefore, in this respect likely to be outside the control of the aquarist. There can be no doubt that early life experience can and does affect later development and Clowns being a species that generally do not reproduce in captivity may well suffer greater traumas during this delicate stage than other more easily and locally-



bred subjects. In any case even if these lovely creatures do not always reach the size hoped for they will still make an enchanting display and it is always well worth the effort to provide circumstances in which there is at least the possibility of achieving something outstanding.

The Clown Loach's overall body design is ideal for dwelling on the bottom, characterised by the markedly inferior (downward-pointing) mouth and straight belly. Its brilliant colouration, however, is rather untypical of bottom-dwellers in general which, although frequently display intricate markings and patterning for camouflage purposes, invariably lack such intense pigmentation.

AMUSING ANTICS

In actual fact this fish does not restrict itself to the bottom and will often be seen swimming contentedly at all levels of the tank. There are few more pleasing sights, I think, than a group of healthy, well-acclimatised Clowns cruising in procession around a tastefully-furnished aquarium inquisitively investigating every nook and cranny and engaging in the amusing and entertaining antics for which it is so aptly named.

These spectacular fishes have a rather thickset moderately elongated body which is also slightly laterally compressed. The head is large and from the thick fleshy lips extend four pairs of barbels, those on the lower jaw being very small and delicate. In terms of colour the Clown Loach is unmistakable: its gloriously bright orange-red body being traversed by three contrasting broad wedged-shaped black bands which give a matt velvety-like appearance. The first of these bands runs across the top of the head and through the eyes angled forward. The second is vertically over the central body area and passes immediately in front of the high dorsal fin with the third covering a section of the caudal peduncle as well as encroaching onto the dorsal and anal fins. The pectoral, pelvic and caudal fins are reddish in colour with the sections of the dorsal and anal fins not affected by the dark bands displaying a yellow hue.

In common with other members of the group Clown Loaches carry a hinged spine located in a depression beneath each eye. These are quite small but extremely sharp and are capable of inflicting considerable damage. The spines are often raised as a warning to other fishes especially when territory is under dispute

The Charismatic Clown

or when it otherwise feels threatened. The aquarist, too, should treat these tiny weapons with respect when handling the fish for they can cause a painful injury, moreover they easily become entangled in the mesh of a net with resultant damage or stress to the fish itself.

In many instances this will be the uninitiated fishkeeper's first encounter with the subocular spines as in desperation they frantically endeavour to extricate a prized specimen.

A GREGARIOUS CREATURE

Although this species tends to be rather timid and shy it is generally speaking less so than many other Loaches seen in aquaria. Once it becomes established in conditions in which it feels comfortable, initial timidity soon vanishes and it becomes an active and inquisitive member of the community.

The Clown Loach is a fundamentally gregarious creature by nature and is at its best only when in the company of its own kind — a group of five or six being in my view the minimum number required to create a balanced shoal. Herein frequently lies the problem for this attractive and extremely desirable fish also tends to be quite expensive to purchase and for this reason is often acquired singly, to add a splash of colour and interest to an aquarium of other compatible varieties.

This situation, though perfectly understandable, should be avoided as it will all too often result in a lone fish disappointingly cowering out of sight in some secluded area of the tank looking completely miserable.

The Clown, true to its name, is a bit of an eccentric character and often gets up to some strange and sometimes apparently alarming antics. It will at times be observed perhaps lying on its side under a overhanging rock, standing on its head in a corner or assuming any number of other unorthodox postures. To those hobbyists unaccustomed to the Clown Loach's unusual behaviour (and even in some cases to those that are), it is extremely easy to misinterpret certain of these poses as a sign of distress or even that the fish has died — after all, in most other species a fish prostrate on its side totally motionless on the bottom would certainly indicate this. Many

an uninitiated fishkeeper when sadly going in with the net to remove an apparently lifeless form, has suddenly discovered to their great relief that the body is in fact very far from expired as the fish darts away with nothing worse than having had its siesta unceremoniously interrupted.

The Clown Loach has a very smooth skin devoid of the usual scales, this is sometimes put forward as a possible reason why the species seems particularly susceptible to attack from White Spot disease. Infection often occurs immediately following transportation, a period of quarantine in an observation tank prior to introducing the newcomers to the main aquarium is, therefore, an especially wise precaution with this fish.

Should the disease develop swift action and great care must be exercised in treating it as some recognised chemical remedies that are completely reliable and successful on most fish varieties may not be suitable for the treatment of Clowns. Because of the smooth matt body surface preparations containing deep dyes such as methylene blue, can, if administered strongly penetrate the skin and enter the body system with possibly fatal consequences. For this reason it may be generally safer to combat White Spot disease in this species without the use of chemicals.

FREQUENT WATER CHANGES

This can usually be achieved quite successfully particularly when the condition is identified at an early stage. Firstly the water in the treatment tank should be gradually raised to around 90°F and vigorously aerated. The higher temperature causes the parasites to reach maturity more quickly after which time they leave the host fish and become free-swimming. The water must be changed very frequently during the period of treatment and for about five days after the fish appears clean. If the infestation is detected whilst the Clowns are in the main aquarium they can be removed and a proprietary chemical remedy added to the main tank. Do not reintroduce the Clowns until the chemical presence has been greatly reduced through partial water changes.

The Clown Loach is a delightful, strikingly beautiful fish with an appealing manner and amusing antics which makes a distinguished addition to any aquarium. Given favourable conditions it will provide a source of enduring pleasure and interest.

HYGROPHILA

Most aquarists are familiar with this species, although some more senior hobbyists may be surprised by the inclusion in this family of one of the members. The genus *Hygrophila* is a member of the Acanthaceae whose members prefer wet and boggy conditions; most grow emerse but the genus under discussion is quite able to thrive entirely submerged.



HYGROPHILA CORYMBOSA (Blume) Lindau

Giant *Hygrophila*
Synonym: *Nomaphila stricta*

Description: Of the two '*Hygrophila*' species well known to aquarists this is the larger, more 'woody' one. The large, broad lanceolate leaves are carried opposite each other in pairs reasonably near to each other up the thickened stem. The leaf colour is a pleasant bright green with a paler underside. Should the plant raise itself (or be allowed to grow out of the water) the resulting flowers are a light purple violet colour and the leaves become hairy.

Distribution: Southeast Asia.

Cultivation and Propagation: In general very little needs to be done to make this plant thrive in the aquarium, apart from giving it reasonably strong lighting. It propagates very easily from cuttings and provides plenty of space filling bushy areas.

HYGROPHILA POLYSPERMA Anders

Dwarf *Hygrophila*

Description: The pale-green lanceolate leaves are proportionally much smaller than those of the previous species but are arranged in exactly the same format. Again the underside of the leaf may be lighter, or even silvery, than the upper surface.

Distribution: India.

Cultivation and Propagation: This is another undemanding species which reacts well to good lighting and frequent pruning.

Sections of stem will root if replanted in the substrate. A brown-red form is also available.

HYGROPHILA DIFFORMIS (Linnaeus) Blume

Water Wisteria
Synonym: *Synnema triflorum*

Water Wisteria has long been known by its synonym but it is indeed a member of this family. The surprise, or lack of belief, in this plant's position in this family, is probably due to the entirely different structure of its leaves.

Description: The bright green leaves are again held in opposite pairs on a somewhat fleshy stem which injures easily. The main feature of the broad, pinnate leaves is the fine indentations or 'Cheese Plant' like slits which divide up the leaf edging. However, this appears to be dependent upon the amount of light reaching the plant as plants grown in poor lighting lack this feature. A variegated form, having darker leaves with yellow veining has been reported.

Distribution: Southeast Asia.

Cultivation and Propagation: With good lighting this plant provides excellent bushy growth, especially under frequent trimming; individual leaves floated on the surface throw out rootlets which soon take once buried in the substrate.

A to Z of plants

By
DICK
MILLS

PHOTOGRAPH BY
M. P. & C.
PIEDROUX



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Lesley McLeod describes her dream holiday

PHOTOGRAPHS BY THE AUTHOR

La Bella Margarita

SPECIAL



Morro
Blanco.

Holidays — my husband and I decided we needed one yesterday so last September we booked a two week 'all inclusive' break to the island of Margarita.

Margarita is the most southerly of the Caribbean islands with a South American heart and soul. It lies 20

Margarita is the most southerly of the Caribbean Islands with a South American heart and soul.

miles off the coast of Venezuela and approximately 200 miles west of Trinidad and Tobago. With a surface area of 395 square miles and a population of 320,000 inhabitants, Margarita is no doubt the largest Venezuelan island. There is an abundance of beautiful beaches mainly deserted.

The sea, a tantalising luminous blue colour with a constant temperature of

La Bella Margarita



The pier at La Restinga where most of the fish were caught.

Typical mangrove at La Restinga.



73°C, is a bather's paradise. The villages consist of shanty shacks linked to each other and the main towns by a network of mostly unmade roads. The villagers are quiet, somewhat bewildered by the intrusion of modern day communications and the developing tourist industry. The towns are bright, noisy, and colourful, with a bargain to be bartered for on every street corner. The interior of the island, with its wild and beautiful mountains and areas set aside as National Parks, are a vision enjoyed by the islanders and visitors alike. At least, that was the general picture we were able to glean from the travel agents and books from the local library, before our holiday started.

Essential Bits and Pieces

As I had been

allocated the supreme job of chief suitcase packer I was rather curious about the weight of our hand luggage especially since we had not even been through 'Duty Free'. On questioning my husband he assured me that it was only a few essential bits and pieces. These were: Two fishing nets; six batteries; one air pump; roll of plastic bags; and fish food.

Not what I'd have thought of as being essential.

Our journey to 'paradise' started from Edinburgh Airport, shuttle down to Manchester — overnight at one of the local hotels, then flight to London and onwards to Margarita. The flight time from Gatwick was eight and a half hours. Luckily we had a window seat, a definite must for an insomniac husband.

We arrived at our hotel rather tired but eager to explore. The Flamingo Beach Hotel is situated in a village called Pampatar — specifically chosen because of its fishing harbour. As I unpacked our luggage, the mandatory telescopic fishing rod and two boxes were hidden under a pile of my husband's T shirts, hopefully no more surprises! The accommodation was fantastic and so it was with great ease that we slipped into a routine of walking, eating, drinking, sunning, swimming, eating and drinking again.

Three days into the holiday and the only fish I had seen were grilled over an open fire served with garlic and cream. Delicious! On December 6 (my husband assures me the date is essential) we went to the west of the island to an area called La Restinga with another couple. La Restinga is a narrow strip of land that joins the Eastern and Western sides of Margarita. It is one of the famous National Parks.

We travelled there by taxi and arranged to meet the driver on our return when the park closed at 4.30pm. He arranged a boat for us and introduced us to the boatman.

"Look — FISH," my husband whispered in a reverent tone normally reserved for church or a funeral. Well, it had to happen eventually but as the boatman was waiting we boarded our boat on the promise of — "we will look later". The journey took us through winding canals and expansive lakes.

A Haven of Serenity

The wooden boat was piloted by a boatman who grew up in the area. As he steered the boat through the water we could easily see the schools of colourful fish, oysters clinging to the roots of the mangrove trees and starfish through the clear water. In the trees above Pelicans waited patiently to skim the surface for an afternoon snack. Truly, nature at its most beautiful — a haven of serenity.

We disembarked on to an old wooden pier where our boatman and others idly passed their time awaiting the return of their charges after picnicking at the nearby beaches and coves.

As the water at the pier was shallow we clearly could see brightly-coloured fish varying in size from the smallest fry to fish measuring nearly 3in. We purposefully left the beach half an hour early to allow my husband to further investigate the fish at the pier. As I held the rucksack and the plastic bags he made his way to-ing and fro-ing between the shore and the pier with a net in both hands, a sight to behold. Within a matter of minutes he was successful in catching approximately 20 fish — identity unknown. With a happy husband, and a bagful of frantic fish, we left, leaving another idyllic setting behind. The date as I mentioned earlier was December 6 so we still had eight days left of our holiday.

Keeping the fish alive was his main

concern. Back at our hotel he emptied our room waste paper bin, cleaned it out, added the fish with the water in which they had been caught. He then added about 25 per cent volume of fresh water (the fresh water came from the complementary bottle from the hotel). He did this to increase the volume of the water. After setting up the pump and placing his new fish tank above the room minibar I went in search of our maid. I beckoned her into our room and showed her the fish in the bucket. I often wonder what she thought, as my knowledge of Spanish includes pleasantries and numbers. I could not explain what or why we had them, she just smiled and shrugged her shoulders — ignorance is bliss!

POECILIA PICTA

The daily ritual began, one bottle of aqua diluted with the same volume of



The Parakeets at Morro Blanco.

sea water. As he had no filters (did not manage to pack one) a daily water change ensured that the water was fresh and clean. He also started feeding them with flake and tablet food and, thankfully, because of the air conditioning system, I never even heard the pump (one of my pet hates, excuse the pun). He was able at this point to distinguish two species of fish that he thought were *Poecilia picta* and a *Poecilia* sp.

Our holiday continued blissfully. On a couple of occasions he did remark that he would have liked to go back and get more fish, on such occasions I was completely deaf.

As our holiday was almost over we planned our last few days meticulously. One of our last trips was on the world's fastest ocean cruising catamaran, the 'Catatumbo'. As well as being the fastest catamaran it is indeed one of the largest at 71ft long and the mast the height of a 10 storey building. It easily skimmed the waves with speeds up to 30 knots. Our trip was to the Isle of Coche.

The crew dropped anchor about one mile from the coast of the island. The yacht was virtually a floating beach anchored over the corals and marine life.

Before we went snorkelling we were given our instructions: "Watch out for the yellow coral, it burns," and: "The sea urchins sting if trodden on."

Armed with this advice we slipped into our snorkelling gear and toppled overboard. At the deepest point the sea only came up to waist height. As the fish swam through the coral brushing against our bodies, under our stomachs and through our thighs, it made one feel like an inquisitive intruder sailing the unspoilt beauty. With stripes, vivid colours, speckles, singly, in schools, fry and mature the mares swam and fed in front of us. Sea Urchins and Seahorses, Octopus and colourful coral seemed to emphasise the saying: "Water is the true element of the pure and beautiful."

La Bella Margarita

Another trip we undertook was exploring the rugged west side of Margarita. On this occasion we had the use of a luxurious jeep with the added attraction of a mini bar. From the splendour of the Macanao Peninsula we had a bird's eye view of the island. For lunch we stopped at a restaurant in Morro Blanco beside the sea. Whilst waiting for lunch we were entertained by the wild parakeets and we watched humming birds as they hovered extracting nectar from the profusion of wild flowers. The restaurant steps led down to the beach and to the left was a small pool that lay in a dried (at that time) river bed. Naturally, my husband was keen to investigate. So as I enjoyed my rum punch he headed off to the pool. Much to his excitement the pool was jumping with activity, the Fiddler Crabs were in abundance, skimming across the sand with such grace. More to the point there were fish in the pool he was convinced were Killies.

A New Species of Killifish

After a lovely lunch and now armed with nets and plastic bags we went off to catch some of the fish — easy as pie, or at least I thought. In temperatures exceeding 100°C and the sun blistering our Celtic fair skin we ran, sneaked up, crawled, crouched, tiptoed and eventually ambushed the pool to no avail. We caught not one single fish. We were deflated! They outswam and most definitely outsmarted us an every attempt to catch them. Since our return home he has learned that a new species of Killifish has been discovered and he is certain that was what we were trying to catch. "Nae luck!"

We departed from Morro Blanco empty-handed. The guide on the tour informed us that there is no natural source of fresh water on the island. This would explain the lack of fresh water pools. All the water for human consumption has to be piped over from the mainland. So with this new information his hopes of getting any more fish were very slim. However, on our last day we made a special trip by taxi back to La Restinga. We only went as far as the pier before we saw numerous fish. This time he had more success than his previous fishing expedition,

in less than half an hour he caught 30 fish. The locals were highly amused watching him lying on the pier catching nets full of fish. Back at the hotel I left him to sort out his newest catch while I bathed in the sun for a last top up of the freckles.

Air Pressure Fright

In preparation of our trip home he stopped feeding the fish a couple of days before to stop them producing waste. On the morning of our departure he double-bagged all the fish putting approximately ten in each bag, he then placed them in a 'Coca-Cola cool bag'. Unfortunately, due to the distribution of the luggage I was left carrying the 'Coca Cola cool bag' with the words: "Don't swing or knock the bag" ringing in my ears.

You may well ask: "How did they get through Customs?" Well, armed with an Import Licence and numerous enormous smiles we managed to get through five security checks and three x-rays without any harm coming to the fish. In fact, the customs officers were more interested in my hashed suitcase than their wildlife being exported to a country unknown. Once we found our seats on the plane the red cool bag was placed gently between my feet for the flight home. In the excitement of take off I completely forgot about the air pressure but soon panicked when I felt, and then saw, the bag visibly swell to nearly twice its original size. Throughout all the flights and take offs constant checks were made to ensure that there were no obvious signs of distress. To my complete amazement all but one of the fish survived the journey.

The next hurdle for our precious fish was the extreme cold on arriving back in Scotland — 2°C. I am certain my husband expected me to remove my jumper so that he could add further insulation to the 'cool bag'. No chance! Some 28 hours after leaving Margarita we arrived home exhausted. I was left to unpack a fortnight's holiday clothes and other various items whilst he disappeared with his precious fish to his fish hut. After such a long time travelling he floated each bag of fish for approximately 30 minutes. He ensured that the salinity and the pH were exactly the same as the conditions they were in throughout the journey.

That's the end of my little story except the fish are *Poecilia picta* and *Poecilia vivipara* — they are constantly breeding and he keeps running out of tank space. If anyone is interested in taking them all away I would certainly be delighted. I am busy planning our next holiday with care and hope to go to Las Vegas. I've been told it's in the DESERT!

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Neil Frank continues dealing with Furry Beard or Brush Algae

PHOTOGRAPHS BY THE AUTHOR

Control of Freshwater

PART TWO

Generally, the more light the faster the plant growth, and with more plants the faster the nutrient concentrations are depleted.

Following on from last month's methods of eliminating the Red Algae right from the start (prevention rather than cure!) I'll continue with 'treatment methods' in existing aquariums.

MANAGE THE RATE OF NUTRIENT UPTAKE

This is another way to control excess iron and other water soluble nutrients. This is where lighting and plant density come in — generally the more light, the faster the plant growth and with more plants, the faster the nutrient concentrations are depleted. Sufficient light is need for good plant growth and, generally-speaking, growth will increase with more intense light. Because actively growing plants will soak up nutrients from the water column, this helps to starve algae. Although it is also a good idea to avoid introducing excess nutrients a heavily-planted tank will make it difficult for any



extra to remain around for long. Regular water changes are also important to avoid nutrient buildups.

In heavily planted tanks with few fishes or ones that are fed lightly, it may be possible to develop a nitrogen deficiency. This will cause plant growth to slow down and allow some algae to start to get the upper hand. Perhaps this situation can also benefit Red Algae. When this occurs nitrogen supplements may be needed to re-establish the nutrient balance and permit plants to out compete algae.

It is important to plant heavily to permit plants to out compete algae, especially in a new set-up. It is even more important to use healthy plants. Sometimes plants are weakened during transit from the grower to the aquarist so newly-purchased plants may take a while to become acclimatised. They will not be growing quickly and soaking up nutrients if they are not in good condition. It is best to know the source of your plants and get them from the actual grower (perhaps yourself) rather than through a wholesaler. I also like

Red Algae in r Aquariumia



to obtain them when they first arrive at the aquarium shop before they have a chance to pick up any new algae or have their roots damaged from an additional planting.

MAINTAIN A DENSELY PLANTED AQUARIUM

Among all the strategies mentioned above a common solution is a tank of healthy, actively growing plants. Many aquarists report disappearance of certain algae, including Red Algae in heavily planted tanks with healthy, actively growing plants. So, nutrient management may be the means to the desirable end, but may

not be the actual mechanism for the outcome. The types and density of plants may in fact be the reason for eliminating, discouraging or resisting Red Algae (and other algae).

Some plants, both slow and fast growing, appear to be more prone to Red Algae attacks than others. I recall one moderately planted tank with the Red Algae covering slow-growing Anubias and the new leaves of faster growing *Echinodorus bleheri*, but not on the relatively slower *Cryptocoryne affinis*.

Plants are known to introduce chemicals which can inhibit the growth of other plant species or certain algae. These defensive compounds, called allelochemicals, build up over time and may also be responsible for failure of some higher plants in an otherwise healthy plant tank. Therefore, with a heavily planted tank and patience, you may

see Red Algae disappear on its own.

CONSIDER CO₂

Another nutrient which may be related to the sustenance of Red Algae is inorganic carbon.

This exists in the aquarium as dissolved CO₂, bicarbonate or carbonates. The equilibrium of these carbon species depend on pH. Free CO₂ becomes available at pH less than 8.0 and predominates when pH is less than 6.5. In my experience I have only seen Red Algae in low alkalinity, low pH conditions. Tanks with calcareous substrates will push the carbonate equilibrium from CO₂ to HCO₃⁻ and Red Algae seem to diminish. Accordingly I used to

see beard and brush algae in my moderately planted South American cichlid tanks, but never in the Tanganyikan tanks with their crushed coral substrate. It seems that Red Algae may be among those algae and water plants that can only utilise free CO₂.

On the other hand, several sources suggest that adding CO₂ will help eliminate Red Algae.

Although this first appears to be a contradiction to my hypothesis I believe this method is effective because CO₂ injection helps to increase the rate of plant growth. As mentioned earlier, with a large density of plants and bright light, the plants will suck up dissolved nutrients (or release allelochemicals) and cause algae to subside. The same effect can be accomplished by CO₂ obtained from aquatic organisms or decomposition of organic matter.

◀ One of the best defenses is a good offence. Have a densely planted tank with proper light and nutrients (including CO₂), start with algae-free plants and include Siamese Algae Eaters (*Crossocheilus siamensis*).

◀ Fast growing plants like *Hygrophila polysperma* will suck nutrients out of the water and make it more difficult for algae to thrive.

Hydrogen peroxide and enzymes are also said to control algae. I believe this is due to a similar effect — increased bacterial growth, which provides the potential benefit of increasing CO₂ concentrations. I should note that at the time I had Red Algae in the South American cichlid tank I was adding any CO₂ and did not have an organic substrate.

UTILISE ALGAE EATERS

The next major strategy for algae control involves algae eaters. First and foremost is the Siamese Algae-Eater (*Crossocheilus siamensis*), perhaps the only known fish to eat Red Algae. As with all algae eating fishes it is best to introduce them into an aquarium before Red Algae becomes established — preferably, when the tank is first set up. Feeding should be minimised during this stage so that the SAE and other algae-eaters will be trained to seek out algae as their source of nourishment. In an established tank a small school of these fish will also help out and can quickly eliminate mature Red Algae from your tank. A second animal in the arena of Hair Algae control are Shrimps. The Yumato-numa-ebi, the Japanese Marsh Shrimp (*Coridina japonica*) is used almost exclusively in Japan and Taiwan for algae control. These creatures which are native to Asian waters are mentioned in Amano's great book *Nature Aquarium World* and are a more colourful alternative to our native Glass- or Grass-Shrimp. Amano says the Yumato numa ebi is the best algae eater.

Coridina and similar *Neocaridina* species are not yet available in the US. Our Freshwater Shrimps are called Glass- or Grass-Shrimps (*Palaeomonetes* sp.). They are also native to Europe. Glass-Shrimps can be found in aquarium shops and fisherman's bait stores. I have used both the Yumato-numa-ebi and Glass-Shrimps and can personally report success with Hair Algae. To be effective the Shrimps must be used in large numbers, not allowed to eat preferred fish food and obviously can't be used in tanks with certain hungry fishes! When needed to control algae in such tanks add lots of Shrimps at night. They will work on the algae while the fish sleep and then the fish can have a snack in the morning. If used in a tank where the only source of food is plants and algae, they may start on the plants when detritus and other food supplies disappear.

Copper will kill Red Algae. However, I only suggest this measure as a

Control of Red Algae in Freshwater Aquaria

treatment of last resort.

USE CHEMICAL CONTROLS

Although I first discussed algicides in 1986/7 these chemicals have been used to control algae for a long time. Unlike other algicides sold for aquarium use (eg. simazine), copper will kill red algae. Unfortunately, it will also harm some aquarium plants (eg. *Myriophyllum* and *Vallisneria*), so it should be used with caution. However, the treatment will not harm many desirable aquatic plants including *Echinodorus* (Swordplants), *Cryptocoryne* (Crypts), *Anubias*, *Microsorum* (Java Fern) and many others. The major advantage to the copper treatment is that the tank does not have to be dismantled and disinfected — the plants, rocks, gravel can be all left in place. In addition some plants (Crypts) actually seem to benefit from the slug of copper while many other sensitive algae succumb to the treatment. The only thing that should generally be removed are the fishes.

To effect the treatment, copper concentration should be maintained at 0.5 ppm for 7-10 days. The copper can be added as copper sulfate solution or as other copper compounds. There are several aquarium products which can be used including the medicines designed to kill *Oodinium*, a parasitic algae. A Copper Test Kit is needed to be sure the needed concentration levels are up and more copper may be needed after the first day because plants and other organics will absorb or bind with the chemical. To reduce dissolved organics, it can also help to first pre-filter the water with carbon or do a large water change prior to adding copper in order to improve the effectiveness of the treatment. In general, the fishes should be removed and only returned after the copper concentration is again below detection limits. This is especially important for Cyprinids and Live-bearers which are particularly sensitive to copper. The same is true for Snails and other invertebrates. Some fishes, including cichlids, are relatively tolerant to copper and may be allowed to remain in the aquarium if difficult to net out.

SUMMARY

I have presented several methods for preventing or eliminating Red

Algae. The principle methods are: pretreatment of plants with bleach, reduction of water column nutrients, lots of healthy actively growing plants, algae-eating animals and copper algicide. Although this provides the rest of the (current) story, it may not be my final word!

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Most of the previous information was already discussed in *The Aquatic Gardener* (TAG), publication of the Aquatic Gardeners Association. Neil has been TAG editor since 1990. This material has also been bantered about on the Internet. Readers who are interested in getting access to some of the best information on aquatic plants are invited to join the AGA and to also participate in the Internet discussion news groups, eg. <rec.aquaria.freshwater.plants> and the plant mailing list. To subscribe to the digest format aquatic plant mailing list send a message containing 'subscribe aquatic-plants' to <majordomo@actwin.com>. The latter discussions are archived at: <<http://www.actwin.com/fish/aquatic-plants/index.cgi>>. Information about the AGA can be found at the AGA website: <<http://www.cco.caltech.edu/~aquaria/AGA/>>.

AQUARIST

THE ORIGINAL MONTHLY
MAGAZINE DEVOTED TO
LOVE OF THE
AQUARIUM



Editor Alec Frazer-Brunner took great delight (chuckling in his beard) in welcoming to the circle of A&P contributors a one Miss Margery G. Elwin, B.Sc., who had up until this time 'distinguished herself for many years as the Editor of a contemporary journal which has challenged our position in the aquatic field. It is a tribute to her ability that we have been kept on our toes. Now, for reasons of her own, she is disassociating herself from that task, and her knowledge and experience is available to our readers.'

An article described the breeding of Beacon Fish which, it was hoped, would help those who possess the few specimens in the country to increase the supply. Although one of

50 Years Ago ...

As recounted by Editor Dick Mills

In the period immediately after the war the increase of interest in all things aquatic was rapid. Looking through past issues of A&P makes interesting reading not only for the diversity of subjects raised but for the apparent enthusiasm by all contributors whether they be authors, reporters from Societies or letters from readers. August 1947 threw up this selection of topics ...

hosts to members from Grimsby, Halifax and Sheffield Societies at their exhibition which 'was to demonstrate to the public that our hobby was not only interesting but also a decorative addition to the home

At a Nottingham and District Aquarist Society meeting Mr Renshaw of Lincoln brought along a collection of tropical rarities — shown in a large planted aquarium. These included Neon Tetras, Glowlights, Harlequins, Black

the commonest of pre-war 'tropicals' it would have been unfamiliar to many readers in 1947 and it was made the subject of a two-colour supplementary plate.

Croydon Aquarist Society staged a 'garden party meeting' at a the residence of Mr and Mrs Housfield with over 75 members present. Mr Housfield's ponds were very well known in the district and the invitation to view them was always considered to be a privilege. Laid out in a cloverleaf pattern the ponds took over 11 tons of concrete to build and featured an observation well sunk seven feet below ground. The ponds were lit (before fuel cuts) by a 25 volt circuit at water level.

Leeds and District Aquarist Society played

Mollies and Widows, etc. The Society staged an exhibition of tropical and coldwater fishes in conjunction with the Nottingham Journal Flower Show.

Members of The Twenty Club had a pleasant surprise when the President, Mr Fraser-Brunner, introduced two distinguished visitors from California — the Misses Joyce and Marilyn Van Hoosear.

They had arrived on the *Queen Elizabeth* only the day before and our President had been giving them their first glimpse of London. Being prominent members of the San Francisco Aquarium Society the twin sisters were able to give a full and enthusiastic account of the hobby in the land of peaches.

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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.

Low tides at the beginning of September may be the last opportunity the rockpooter has to get down to the shore before the autumnal gales make a visit inhospitable.

The long tides that recede uncovering areas of the sea bed that are submerged for most of the year mean that September can often be a rewarding month. Wrasse and other small fish that have hatched earlier in the year will have grown a few centimetres since August, but there will be less of them. Only the fittest and strongest will survive in the sea where large fish relentlessly devour smaller prey.

OVERCROWDING

By September the rockpooter-aquarist may find that his, or her, tanks are getting crowded. August is usually the month when the small fish and other animals between the tides are found in the greatest numbers and greatest variety. The aquarist should be very strict and collect only what he has room for. There are two hazards. Firstly, an overcrowded bucket can cause the fish to suffocate on the journey home. Even more seriously, an

overcrowded aquarium can result in the demise of all its inhabitants.

Stocking levels can be on a par with a tropical aquaria for the smaller rock pool fish, but with plenty of aeration. I use a supplementary powerhead to agitate the surface water. However, the fish collected in

August will have grown by September and some may be nearly double the size. This will mean that they need to be stocked at levels a quarter of what they were the previous month. There is the temptation to introduce into the aquarium further captures during September. Be very careful and

*Juvenile Corkwing Wrasse, **Crenilabrus melops**, are common in the south-west in the large over shore pools during autumn. By the following year, a single specimen will require a 50 gallon (230 litre) aquarium. Corkwing attack rivals of the same sex in aquaria.*

PHOTO: ANDY HORTON



heed on the side of caution.

I have known aquarists introduce masses of Prawns during September, partly as live food, only to see many of the larger fish that were meant to eat the Prawns suffer. The Prawns were blamed for introducing disease, but the ailments probably arose from an overcrowded tank, with a shortfall in dissolved oxygen and excess ammonia and nitrite levels contributing to the ill health.

MARINE AQUARIA

Hopefully, the best way to become a better marine aquarist would be to learn by other people's mistakes. Like any other subject, the hobby of aquaria, or science of

aquariology, involves a mixture of learning by books, or apprenticeship, experience allied by thinking, or applying the fruits of your education and observations.

There are two names to look out for in books on marine aquaria: Dick Mills for the newcomer to the hobby, and Stephen Spotte for advanced study. There are a few other writers to look out for as well, but the object of the column this month is to ▶

◀ make some further suggestions for reading outside the aquarium field.

Books about the sea and oceanography can give the aquarist an insight in the chemistry and physics of the oceans and the multitude of marine animals. Even more useful are books on the animals themselves and books on marine biology. If you keep crabs in aquaria, a book about these crustaceans will explain aspects of their life cycle, involving the moult, or ecdysis when the crab has to shed its old shell, or exoskeleton, so that it can grow.

DOGMATISM AND ASSUMPTIONS

Beware of drawing simple conclusions from inadequate evidence! Test kits are invaluable for monitoring the conditions in aquaria, but are much less useful in diagnosing problems.

Let us examine a typical problem encountered by a beginner. Diligently reading all the books and installing the most advanced equipment, the aquarium thrives for a year and then one of the fish dies. The aquarist checks the ammonia, nitrite and nitrate readings and find that the nitrates in the tanks measuring a whopping 500mg/l. He concludes that an excess in nitrates is the problem, changes the water and installs a nitrate filter. The problem disappears and the remaining fish continue to thrive.

The aquarist may then conclude that this particular fish is intolerant of high nitrates and this was the reason for its death. Alas, although



The Dogwhelk, *Nucella lapillus*, feeding on a mussel. This gastropod is usually white or a purple-grey, but orange and striped specimens occur. The ridges on the inside of the operculum (shell opening) present on old Dogwhelks are called 'teeth' but are not used for feeding.

PHOTO: ANDY HORTON

this may have been in the case, it is no means the only possibility or even the most likely reason. As the tank matures and becomes established, lots of other biological events occur of which the build up of the biomass in the aquarium should be evaluated.

Bacteria and small organisms

multiple in the filter bed and on rocks and other surfaces and all these organisms use of up valuable oxygen. The aquarist could equally conclude that the fish died because of a shortfall of dissolved oxygen, but there are lots of other reasons like stress and inadequate nutrition that could be responsible.

The Edible Crab, *Cancer pagurus*, has to shed its old shell so that the new one underneath can grow bigger. At first the new shell is soft until it can incorporate minerals from the seawater. The crab must hide under rocks until the new shell hardens.

PHOTO: ANDY HORTON



DOGWHELK

The Dogwhelk, *Nucella lapillus*, is a carnivorous marine snail that is common on rocky shores where it feeds on acorn barnacles by smothering this sessile crustacean, and attacks and eats mussels by boring a hole in the hard shell and sucking out the rich orange flesh.

The Dogwhelk can be kept in aquaria where it can be observed feeding. This marine snail comes in different colours but many of them are all white or a dirty grey-

purple in colour. A white specimen in my tank fed on a mussel and in the succeeding weeks turned grey. Can I conclude the obvious that the Dogwhelk changed colour because of what it ate? The answer is no! I can suggest it as a hypothesis, but the mussel may have changed colour for other environmental reasons or because of a genetic inheritance? Further study is necessary.

Further Dogwhelks were introduced and most of these did not change colour. Is there something in the pigment in the flesh of the mussel that causes the colour change?

The results were inconclusive. There is still a lot to be learned about the life on the seashore.

MARINE AQUARIUM BOOKS

Interpret
Encyclopaedia of Marine Aquaria, by Dick Mills (Selamander).
Marine Aquarium Keeping, by Stephen Spotts (John Wiley & Sons).

The British Marine Life Study Society will help readers who have any difficulties or wish to pursue their interest in the marine life around the British Isles. The first enquiry will be answered free of any charge, but please enclose a SAE. For more information write to: Andy Horton, British Marine Life Study Society, Glaucus House, 14 Corbyn Crescent, Shoreham-by-Sea, Sussex. BN43 6PQ. Email: 106127.206@CompuServe. Internet URL: <http://ourworld.compuServe.com/homepages/BMLSS/homepage.htm> (England) Internet URL: <http://www.ed.ac.uk/~evah01/bmlss.htm> for BMLSS (Scotland).

Alex Stephenson discusses safeguarding the watery environment

GRAPHICS BY THE AUTHOR

Case for the Prosecution

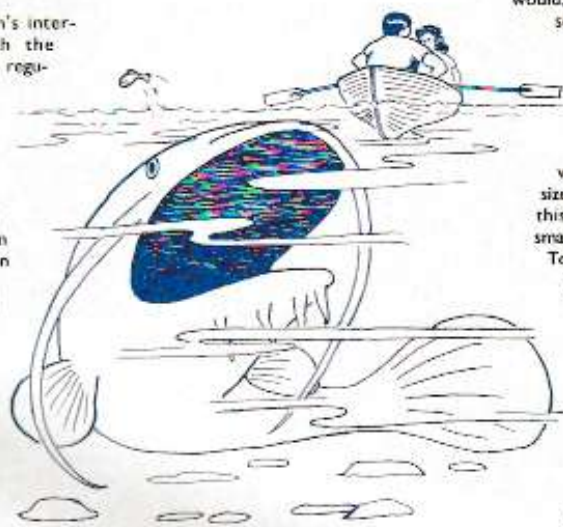
Subjects relating to Man's interference with the natural world regularly receive attention. The Editorial in A&P, March 1993, raised one concerning the introduction of some fish species to foreign areas. We know this can have a dramatic effect on the local populations.

Some will say all movements of this kind are wrong, as the possible outcomes cannot be foreseen. In this respect they are quite right. Those who do support fish immigration will argue that it is done for the best reasons; in many cases this must also be true. Why else would responsible people go to all that trouble?

IF LAWS EXISTED

From responsible people it's a very short step to irresponsible people; I think that there's a suspicion that private interests could be involved on occasions. Even if laws existed to prevent the movement of all fish, these laws would still be broken. On a much smaller scale countless individuals are guilty of species redistribution.

Many years ago a park lake in Kent was drained for landscaping work; in addition to the usual native fish species found there were some



Those who do support fish immigration will argue that it is done for the best reasons.

definite 'foreigners' — amongst these aliens were a number of very fine Catfish, *Amieus nebulosus*. No doubt these had once been purchased to provide company for the family Goldfish. Having eaten the Goldfish they were promptly expelled, sentenced it seems, to go forth and multiply in the local boating lake — which they did, rejoicing.

Liberation of pets, both intentional and unintentional, is a cause of species relocation worldwide. If the British climate was a little kinder we

would, no doubt, have colonies of so-called 'tropical fish' cropping up all over the place. This has happened at least once to my knowledge. A short stretch of river in Yorkshire, which received a factory's warm water discharge, supported a sizeable assortment of 'trops'. All this is, of course, only a very small part of a very big picture.

To get some idea of what could happen in the fish world I think it may be worth looking at what we have done with land animals.

Ever since Man began to travel he has taken his animals with him; for instance, the early Aborigines are thought to have introduced the Dingo to Australia. This is believed to have caused the extinction of several bird species. Since then all sorts of things have been let loose in this land by well-meaning people — dogs, cats, camels and cattle and, of course, sheep. Whether this is a good thing or not probably depends on your viewpoint. Australians might regard the Dingo as a pest, but see sheep as a valuable asset. Incidentally, sheep farming on a large scale meant water had to be provided in dry areas. This scarce commodity was much appreciated by the native kangaroos, whose numbers increased accordingly. We do occasionally provide accidental benefits for some species here and there.

LOSS OF HABITAT

Farming, urban expansion, mining, deforestation and so on have all

played a major part in what is called loss of habitat. Add to this the various mindless actions, such as the virtual wipeout of the North American Bison, and it is easy to see how we are rapidly changing the world. Despite a lot of noble words atrocities of this kind still continue. Fish have been lucky so far, probably because Man is only just getting around to them.

As an aquarist, or herpetologist, you obviously have an interest in living things. This interest hopefully extends beyond the fish tank or vivarium to the natural world as a whole. We are encouraged these days to be environmentally conscious. To some this just means recycling old bottles. Even an environmentally-comatose idiot like me knows that fundamental changes will be necessary if anything is to improve.

OVERALL VIEW

So how did the world get into this state anyway? Well, for what it may be worth let me give you a simplistic version from my simplistic mind. To get the overall view leave your body in the armchair and cast your thoughts into space. Now find a nice, life-supporting planet, one which revolves around an insignificant star on the outer fringe of a minor galaxy.

Choose a suitable life form, then educate it to the point where its knowledge outweighs its intelligence. Ensure a belligerent manner, and you



could have a creature capable of dominating and overrunning its world. Such an animal deserves a name — let's call it 'Man'. Right, now you've got the 'big picture'. Mankind's influence on the world goes much further than mere interference, further even than the wilful slaughter of certain species and the total disregard of others. So far he has managed to spoil, in one way or another, huge chunks of land, a high percentage of accessible freshwater, large areas of seawater and most of the air. His ability to change the shape of things to come is only surpassed by his ignorance of the likely consequences. All this might sound a bit radical but it's true just the same.

LIMITING FACTORS

In a situation where one species dominates there are usually limiting factors such as available food, disease, natural disasters, etc. Up until now *Homo sapiens* has managed to overcome these things, unfortunately only too often at the expense of all other

flora and fauna. The result is an unchecked, ever-expanding human population with ever-increasing demands. Just how long this can go on for is a subject presently occupying the minds of some very concerned people.

BUILT-IN MOTIVATION

Not all of mankind is unthinking — there are a lot of rational beings out there. The trouble is it's easy to be concerned about wide issues when you are well fed and have a roof over your head. If you are struggling to survive, everything else 'goes out of the window'.

All species, including humans, have a built-in motivation to survive and reproduce. Man, in his evolutionary short career, appears to have exploited this talent to the full. All he has to do now is make the necessary adjustments to ensure his continued existence and, at the same time, improve the quality of it.

Scientists say many dinosaur species prospered with little modification for several million years — but then their requirements were modest. If our record to date is anything to go by you might say that having a human in charge of conservation is like having Nero in charge of Entertainments!

Footnote: As the title suggests this is a very brief and simplified outline of Man versus The World. Perhaps someone would care to put the case for the defence?

◀ Do you remember that bit about the meek inheriting the Earth?

How 'Max' takes the pressure off handling polluted water

OASE's new AQUAMAX pond filter pumps offer high throughput (up to 150 l/min, or 1979 gph) at lowest possible operating pressure, which in turn means less than HALF the energy requirements of submersibles and longer trouble-free life in handling polluted water (up to 8mm particle size).

Features are the stainless-steel-housed split-shaft motor, the "chopping" action of the completely new twin-blade impeller and the extra-large strainer which totally encloses the pump — reducing cleaning frequency.



For the name of your nearest stockist, call
OASE (UK) Ltd's Telephone Hotline

01264 333225



News Desk ... News Desk



Sparsholt College — An Exceptional Report

According to the Further Education Funding Council's College Inspection, Sparsholt College 'has developed several innovative programmes which have quickly gained a national reputation for their quality'.

Inspection results put Sparsholt College, the largest specialist College of the land-based industries in the Further Education Sector, amongst the most highly-graded of the 450 FE Colleges in England. Out of 13 areas graded eight were given Grade 1's and five were given Grade 2's — all above average. In their report the Inspectors commented on the high general standard of teaching, particularly in practical aspects, with most students completing their studies and achieving good examination results. During the inspection at the College, near Winchester, the Inspectors attended 103 separate teaching sessions and reported that the staff are highly committed to their students and take an active part in student activities.

Other areas which received especially high praise and given Grade 1's were the governance and management of the College and also the learning support available to the students. The Inspectors said that senior managers and governors share a vision for the College which is ambitious and realistic, with strategic planning and quality procedures, developed over many years, which were mature and effective.

The ready access to learning support was noted as helping students to succeed with their courses and subsequent careers.

The Chairman of the College Governors, the Viscount Fitzharris and the College Principal, Dr Len Norman, jointly congratulated the staff in all Departments and Sections for their professionalism, commitment and consistent hard work which led to the excellent grades. Commenting further, Lord Fitzharris wrote: 'These stunning results are not really a surprise when one considers the professionalism and dedication that is constantly on display at Sparsholt, but it is wonderful to have these grades which simply confirm we are amongst the best — eight x 1's and five x 2's. Very well done!'

The reputation of Sparsholt College as a centre of excellence for the study in land-based industries has been based on favourable word-of-mouth comments and Press response. The FEFC inspection report confirms the College as one of the most highly-graded in the country and it is small wonder that recruitment to Courses is described as 'booyant'.

Dr Len Norman commented that he was delighted with the Inspectors' Report. In particular that they had recorded that 'the College is well managed; that students were enthusiastic about their studies; and that staff enjoyed working at the College and contributed to its success'. He went on to say that the Report confirms the high standards that have been achieved at Sparsholt College over many years.

For details contact: Dave Alderson, Director of Marketing, Sparsholt College Hampshire, Sparsholt, Winchester SO21 2NF. Tel: 01962 797215/776441. Fax: 01962 776587.

Competition Winners

Congratulations to the winners of the Aquarian Special Edition Anniversary Wrist Watch Competition (A&P, May 1997):

If I Won the Lottery by Peter Cairn of Ashford, Middlesex.

It is Saturday evening and I have just hurt my arm punching the air as I got all six numbers! It's £2 million!

After visiting Australia and the Great Barrier Reef I would have a trip up the Amazon — just to say I've been. Then a bigger house with a living room large enough to house a 12x2x2ft aquarium along one wall at sitting down level, because this will beat sitting down to dinner by candlelight!

The tank will be on a cupboard built to take a filter system that takes fish water out and clean, purified water back in, with good water movement. The aquascape would be an Amazon River Section based on what I had seen on my Amazon trip. The outlet would have a connection to the garden where waste water would be used for the garden plants.

The fish would be mainly Cardinals, striped Angels, Discus, some Neons and Corys. I would have the plants growing out at each end to make a true riverbank appearance, with overhead hanging dichroic lamps for lush growth. An autofeeder would be used with some hand feeding (with AQUARIAN, of course).

Oh! Hang on a minute, it was last week's coupon ... Oh well, there's always next week.

Dr David Ford remarks: This was chosen as the winner because it paints a great picture of an Amazonian scene aquarium, particularly with the phrase: "It beats sitting down to dinner by candlelight." Also, ecology is not forgotten ("waste water into the garden") despite Peter's wealth. The grammar is difficult ("would have") but appropriate, especially as it turns out to be the wrong Lottery ticket.

Runner up was Mrs Pantazopoulos of Athens, Greece, who wanted a tropical seawater aquarium that filled both the house and garden, something that may be possible in Greece, but not in the UK, even with the Lottery millions!

Congratulations to Peter Cairn and Rena Pantazopoulos, both of

whom have been sent an AQUARIAN 21 Years Anniversary Wrist Watch.

Cites Changes

From 1 June new European Regulations on the implementation of CITES (Convention on International Trade in Endangered Species) introduced a number of changes affecting the import and sale of exotic pets.

In future these species will be classified according to one of four categories as follows:

Annex A — CITES Appendix I and other endangered species, for which commercial trade is prohibited.

Annex B — CITES Appendix II and other vulnerable species for which commercial trade may be permitted provided certain conservation criteria are met.

Annex C — CITES Appendix III species, other than those for which Member States have entered a reservation.

Annex D — certain commonly-traded non-CITES species listed for monitoring purposes.

Annexes A and B also contain a number of non-CITES species considered to need the same level of protection. Animals formerly included in the endangered list such as Pangolins (*Marmis* spp) or Birds of paradise (*Paradisaeidae* spp), but now listed in Annexes B or C, may be traded freely and are not subject to the sale and marking controls outlined subsequently.

With effect from 1 July 1997, following the introduction of the new EU wildlife regulation on 1 June, when the new EU wildlife trade regulation comes into force, applicants for permits to import or export species covered by the regulation will be required to pay a fee.

Copies of the relevant Annexes and further guidance on these Regulations can be obtained from the enquiries desk, whose address is: CITES Enquiries Desk, Department of the Environment, Room 8/22 Tollgate House, Houlton Street, Bristol BS2 9DJ. Tel: 0117 987 8749. Fax: 0117 987 8206.

News Desk ... News Desk ...

Pond Week '97

Dozens of ponds in the south east of England which are in danger of being lost to the community will be saved during Pond Week '97, one of the biggest wetland conservation projects in Britain, which is held on September 13 to 28.

Pond Week '97 is again being sponsored by Southern Water in partnership with the British Trust for Conservation Volunteers (BTCV). To celebrate its 10th year a bigger campaign than usual is being mounted in the county to save ponds and their related wildlife.

Preliminary surveys reveal that many ponds are deteriorating due to low water levels, silt or being choked by overgrown trees and plants. Others have been lost due to neglect.

Dr David Bellamy, an avid Pond Week supporter says: "Ponds are disappearing at an alarming rate and with them a rich variety of wildlife ... by taking part in practical projects like Pond Week we can all help conserve our local ponds or create new ones. Together we can ensure that ponds remain rich habitats for our native

wildlife. Half of Britain's ponds have disappeared in the past 50 years and more than 9,000 are still being lost annually. Ponds are not only an important part of our national heritage, but a vital habitat for over 30 per cent of our natural flora and fauna.

Since Pond Week began ten years ago some 600 ponds in the south east have been saved, restored or created. This year it is hoped to save more than 100 ponds with voluntary help in Kent, East and West Sussex, Hampshire and the Isle of Wight, against the 70 projects undertaken last year.

PONDS AND VOLUNTEERS WANTED

If you feel that a pond near you needs restoration, and you have the owner's permission, contact BTCV (see below) and they will send you an information pack and an easy



to complete survey form. It can be anywhere where the ecology is at risk — village, park, town or farm!

HOW YOU CAN JOIN A POND WEEK PROJECT

Last year more than 1,000 people in the Southern Water region donned their waders, rolled up their sleeves and helped remove debris and silt from ponds. They also helped repair banks or to cut back shrubs and trees. The atmosphere on these projects is excellent — full of community spirit and family fun.

ABOUT PONDS

Ponds support some of our most endearing wildlife such as water snails, frogs, newts and fish. They are home to a wide variety of varied plant species such as lilies that attract endangered dragonflies and provide hunting areas for bats. They are also 'waterholes' for

hedgehogs, rabbits and water voles, garden birds and ducks, while their moist banks nurture a wide variety of reeds, rushes and flowers such as iris. Full information on pond flora and fauna supplied on request.

For further information please contact Stuart Hydrop on 01372 460111 (office) or 0181 898 2419 (home) and E-mail 101752.2041@CompuServe.com.

Readers interested in saving a pond can write to BTCV for an information pack and survey form or join one of the 400 local volunteer groups in the region affiliated to BTCV. Southern Water's sponsorship supports BTCV's pond restoration programmes and also provides free information packs that include leaflets ranging from how to identify species to 'how to create and manage one's own community or garden pond', and the conservation of ponds. If you would like copies of these leaflets write to: Edna Walker, BTCV, Southwater Country Park, Cripplegate Lane, Southwater, West Sussex RH13 7UN.

TetraMin COMPETITION

Win a Tub of TetraMin — with 20% extra FREE

TetraMin — the world's leading flaked food for tropical fish for over 40 years now has 20 per cent extra free!

The special promotional packs are available now, with 63g of food for the price of 52g (11g free!).

TetraMin has a unique combination of 40 high quality ingredients which have all been carefully chosen to reproduce the complex diet that tropical fish would normally enjoy in their natural habitat. Removed from their natural environment and maintained under aquarium conditions, fish become dependent upon aquarists to provide them with a balanced diet. That is why Tetra has a

continuous research and development programme aimed at providing fish with a mix of proteins, fats,



carbohydrates, vitamins and minerals — all in correct amounts.

The overall benefits of feeding a nutritionally balanced diet will be seen in the health, vitality, colouration and resistance to disease of your fish.

To win one of 24 tubs of 63g TetraMin (including 20 per cent extra free), simply complete the Word Search and

send it with your name and address to: Dept TetraMin 20 per cent, Tetra Competition, PO Box 2162, Bourne-mouth BH2 5ZA, to arrive no later than 10 October 1997. The first

24 correct entries to be drawn will each receive a special tub of TetraMin.



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Caught in the Net

Kathy Jinkings trawls in another catch from Cyberspace

Livebearers, in the form of Guppies or Platies, are often the first tropical fish that a novice aquarist keeps, and for many the initial introduction develops into a lifelong interest. The popularity of these fish is reflected in a wide range of sites on the Internet. The first stop for British enthusiasts has to be the Viviparous page at <http://home.clara.net/xenotoca/>. This is the home page of the British Livebearer Club, and their pages include information not only on the Club and its activities, but is a good source of information on a range of livebearers, including commoner species and some that are more unusual. Plants suitable for livebearer aquaria are also featured. This information is given as plant and fish 'of the month' so regular readers know where to go for the new information, while new visitors can browse through pages from past months.

Poecilia Scandinavica is the home page of a livebearer association spanning the Scandinavian countries. The page mostly consists of society information, but there is a good page of photos featuring some of the more unusual livebearers: *Characodon*, *Zoogenericus* and more in the same vein.

Although many people move on to other species the Guppy deserves a place in the tanks of novices and experts alike. Although the initial fish shop purchase is often a 'mongrel' hybrid, Guppies at their finest can be seen and admired on the Japanese Guppy Photo Home page at <http://www.yo.rim.or.jp/~hac/photo01e.html>. The spectacular specimens here will make you look at the Guppy in a new light!

If, while buying fish, you have ever wondered where they came from, then take a look at Tropical Fish Culture in Singapore, at <http://www.science.nus.sg/~sbs/fish/index.html>. The Guppy section is a long article covering the history of the Guppy and how they came to be popular, the reasons behind Singapore's prominence in the fish-breeding market, and how they breed and rear Guppies commercially. Right at the bottom is an arrow (that you might miss if you aren't looking for it) which leads to a set of photographs of the different Guppies. Although nothing tells you so, clicking on one of the little photos on either of the pages gets you a big full-screen version. Other fish sections deal with Gouramis, Discus, Fighting Fish, Angel Fish, and there are sections on live foods as well as an extremely detailed section on fish nutrition. This site is highly recommended, and it will take you a while to read all the pages.

The Laurel Lake Guppy hatchery (aren't Guppies just born?) is at <http://www.guppies.com> and is an extremely ambitious site. It's still under construction, but there's plenty here to look at already. The Guppy facts pages include comprehensive information on breeding and genetics (explained in a way that makes it easy to understand), water quality, diseases, and more. There's a Guppy photo gallery with photos ranging from excellent to 'black fish at night' type shots. The gallery works by clicking on the name of the variety you want to see. The library promises to be extremely comprehensive — unfortunately the hundred or so articles listed have not yet been posted, but should be well worth reading when they are. Guppy Help is an

interactive forum page, which looks as though the readers are very active. You can look through this to see what problems other people have had, and either leave a plea for help yourself or try and help out one of the others. This site is good now, and when they've finished posting all the promised stuff will be one of the best Guppy sites on the net.

Swordtails seem to be popular subjects for scientific research, and Gil Rosenthal is studying the preferences of female Swordtails when it comes to choosing mates. You can read about his work at <http://uts.cc.utexas.edu/~ryanlab/gil.html>, and see the computer animations he used to delude the females! His work is still in progress, but if you are interested on your first visit you can bookmark it and check back to see how his results are shaping up. Steve Kazianis' Xiphophorus Home Page, at <http://sprd1.mdacc.tmc.edu/skazianis/mainpage.html> is written by a scientist, not a programmer, so the look of the pages isn't that polished, and the pictures illustrating the main pages are somewhat grainy. That shouldn't deter you from having a look at some of the pictures on the photo page, which are much better. These pages are from a cancer research centre, so it's all serious stuff, but there is a large amount of information about wild Swordtails and Platies scattered throughout the pages. The Xiphophorus Genetic Stock Centre page is particularly interesting (it's at the bottom of the links page, strangely since it is actually a page on the same site).

Many livebearers are endangered in the wild, and two case studies, on *Skiffia francesae* and *Xenoporphus*

capitatus, can be read in the Aquatic Conservation Network journal at <http://www.compmore.net/~dstaff/acn/vol4no3.html#06>. If you find this issue interesting, you can browse through the rest of the ACN site at <http://www.acn.ca/acnhome.html>.

Finally, a site which I found while surfing, which has absolutely nothing to do with livebearers, and a limited amount to do with fish. If your humour tends to the cynical, check out Fish Talk with Uncle Bill, at <http://www.fishtalk.com/>.

Doubtless you will be relieved to be informed that 'Uncle Bill' has started accepting all major credit cards! Once past the relief of finding that you can easily give Uncle Bill money, you can have fun tracking down information about fish, interspersed with delights such as how to make Uncle Bill's Banana Bread, or you could join his band of authors who are 'willing to work for nothing and enjoy it'. To be fair, the articles about fish here are quite good, and are updated regularly. When I visited they included 'Moving Your Aquarium' and 'Up the Rio Negro with Uncle Bill' with photographs. Once you get into the site it is well worth looking at, but the front page gives a, possibly erroneous, strange impression of Uncle Bill!

Next month we will be having a look at the interactive world of MUDs, especially the Fishroom.

Kathy can be contacted at kathy@ckfc.demon.co.uk and the British Aquatic Resource Centre can be found at <http://www.ckfc.demon.co.uk>

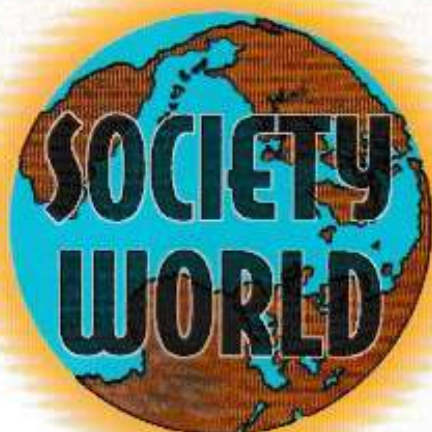
Northern Area Catfish Group

The NACG is holding its Open Show on 21 September 1997, exactly 16 years to the day that the Group held its first Open Show, on 21 September 1981, when the group was an Area Branch of the Catfish Association of Great Britain. Since then the CAGB has ceased to exist and the NACG has become the main Catfish Society in Great Britain with members from all parts of the British Isles and other countries.

There are 27 Classes for the Catfish enthusiast, which are judged to the NACG Standards (and includes I. and C. numbers), with four cards and prizes in each Class. All entries are judged.

There is also an Information Display, Photo Competition, Auction and Canteen with hot

and cold food and drink on sale for those who will have travelled a fair distance.



Further details can be obtained from: Show Secretary, Brian Walsh, Tel. 01254 776567; Chairman, Trevor Morris, Tel: 01942 242386.

expertise, from junior to expert), will be featured at the Show which is open each day, from 10am.

Cyprio Competition Winners

We have pleasure in announcing the winners of the Cyprio Competition which appeared in the June 1997 issue of A&P.

FIRST PRIZE: Hydra Odyssey Statuary and Pump, V. R. Arderton (Fareham); **SECOND PRIZE:** Cyprio-Gard Heron-Scarer, Geoffrey Fawkes (Manchester); **FOUR RUNNERS-UP:** Cyprio-Vac to each, S. Harker (Warrington), A. T. Clague (Bordon), R. Amphlett (Hounslow), M. F. Oakley (Spalding).

All prizewinners will be notified in due course direct from Cyprio.

DIARY DATES

SEPTEMBER

2 Gloucestershire A.S. Bell & Gavel, Castle Meadow, St Oswalds Road, Gloucester. Open Forum and Quiz. More information from Andy 01452 372948 or Christina 01342 526435.

6 Bristol Aquarists Society. Clubmaster Fish Show & Auction. St Ambrose Church Hall, Stafford Road, Whitland, Stroud G50 7BA. Auction begins 1pm. Show Hall opens to public 9am. Details from R. A. Jones, 169 Bath Road, Longwell Green, Bristol BS18 6GB. Tel: 0117 949 1447.

6 Gloucestershire A.S. Day Trip to London Aquarists and Row Gardens. Coach funded by Society for all members. Entry fees and all other costs payable by individual. More information from Andy 01452 272938 or Christina 01342 526428.

7 Wyke Show Society. 15th Annual Open Show, Spring Bank, Community Centre, Spring Bank, Hill. More details from Owen, 01452 446043.

9 York & District A.S. Punch Bowl Inn, Leather Street, York. Quiz, Lecture & Quiz by Dr David Eyre. Free admission, non members welcome. For more information contact Alan 01904 414272. Don't forget - we want to exchange Newsletters with other Societies!

14 Siltown Show Team. 4th Open Show & Bring and Buy. Sunday Birmingham Community Centre, Handford Road, Birmingham. Seadogart. Entries 20p. Banching 11am-12.30pm. Public admission 20p from 12pm. Information Julie Laxton 01625 427582.

27 Northern Goldfish & Pondkeepers Society. Open Show. Trinity United Reformed Church, Delamere Road, Altrincham, Cheshire. Judging to nationwide Goldfish standards. Information, 0161 969 7567.

28 Fair City A.S. Fair Inver Club Open Show. Tulloch Institute, Grind Road, Perth. Doors open 10.30am. Auction 1.30pm. (USA Show Rules apply). Contact J. R. Hobson 01738 635527.

OCTOBER

1 Portsmouth A.S. Open. Buckland Community Centre, Malpas Road, Portsmouth. Andy Hutton, Addy's Share Watch summer, will present 'Naive Marine Aquaria'. Admission £1 per FBAS/ASAS Society and £1 per visitor for the evening. Further information from Doreen 01705 818904.

12 Clacton F.K.C. Auction of Fish, Plants and Aquarium associated Equipment. Booking Entry Hall, Clacton. Booking-in 10am. Auction begins 12 noon. Fifteen per cent from sales to Club Funds. Refreshments, Raffle, etc. Further information from Mick Miller, 01255 424065.

Mid Atlantic Koi Club

The Mid Atlantic Koi Club's 9th Annual Koi Show is scheduled for 3-5 October 1997 at Longwood Gardens in Kennett Square, PA, which is just south of Philadelphia, PA.

For more information, contact Show Chairman Debby Hester at (703) 548-2164 or dhester791@aol.com

Late Breaking News for Fishworld '97

As we go to press, news has been released of extra Koi-related attractions at the Fishworld '97 to be held at the Queensway Hall, Dunstable, over the weekend of 30-31 August 1997.

The Koi Show, organised by the North Herts Section of the BBKS, has been designated as the 'Laguna Supreme' to reflect the support given to the show by Rolf C. Hagen.

In addition an illustrated presentation on Koi will be delivered by Alan Rogers, Chairman of the British Koi Keepers Society, which should be eagerly awaited by both newcomers and experts alike.

All areas of fishkeeping interests (for all levels of

OPEN SHOWS

(B = Bred, A = A of A, FB = FBAS, FN = FNAS, IS = ISAS, I = International Goldfish Standards, N = NEIAS, U = USGA, Y = VAAS)

6 September Bristol A.S. (B)

7 September Wyke Show Society (Y)

13 September Hounslow A.S. (FB)

14 September Siltown Show Team (FN)

21 September NACG (FN)

27 September Northern Goldfish & Pondkeepers Society (I)

28 September Darwin A.S. (FB)

3/6 October Scottish Aquarists International

Fishkeeping Festival, Wendenwood World, Apr

5 October Halifax A.S. (FN)

12 October W.A.S.P. (FB)

19 October Solihull A.S. (FB)

19 October West Cornwall Fishkeepers (FB)

25/26 October British Aquarists Festival,

George Corneil Leisure Centre, Manchester (FN)

31 October/2 November Supreme Festival of Fishkeeping,

Wiston

1 November National Junior Fishkeeping Open Show (FB)

2 November Supreme Championship & Open Show (FB)