

# AQUARIST & PONDKEEPER

JULY 1998

£2.25





JULY 1998  
VOL 63 NO 4

## AQUARIST PONDKEEPER

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PUBLISHED BY  
MJ Publications Limited,  
20 High Street, Charing, Nr.  
Ashford, Kent TN27 0HX

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PRODUCTION/  
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GUIDE/ACCOUNTS  
01233 713188

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SUBSCRIPTIONS  
Rates on application.  
All subscriptions payable in advance  
to: MJ Publications Limited,  
20 High Street, Charing,  
Nr. Ashford, Kent TN27 0HX

Litho origination by  
MB Graphics, Ashford, Kent.  
Colour reproduction by Master Scan  
Ltd., London  
Printed by Headley Brothers Limited,  
Ashford, Kent

Distributed to the Newtrade by:  
Seymour Distribution Ltd.,  
86 Newman Street,  
London W1P 3LD

ISSN 0003-7273

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COVER



**MAIN PHOTOGRAPH** Like this Emperor Dragonfly, our readers are intensely interested in aquatic matters, be it water gardening, aquatic plants, or fish from all manner of waters.  
**INSET PHOTOGRAPH** Lamprologus ocellatus, one of Lake Tanganyika's endemic fishes, employs an unusual spawning method. See inside.

**MAIN PHOTOGRAPH:** JACKIE STRUDWICK  
**INSET PHOTOGRAPH:** PETER LEWIS

COMMENT

We are always being told that, to quote our Northern friends: "There's nowt so queer as folk", but as any fishkeeper will tell you, fish run us a pretty close second. In lieu of a profound editorial waffle I offer you the following true story.

In a well known chain of retail aquatic outlets was this pair of magnificent Jaguar Cichlids which seemed well set to provide the store with a number of offspring (well, they can dream can't they?).

After waiting in anticipation for some time for the happy event to occur — it didn't of course — the pair of cichlids were duly sold to a keen cichlidophile. But after a few days something quite extraordinary happened.

Now I know what you're all thinking: "Don't tell me, they spawned in the bag on the way home or as soon as they reached their new quarters."

Oh no, the truth is far stranger than that. The fish had actually spawned whilst in the store and had left behind a shoal of youngsters. Not only that, the young had been left behind presumably as yet-to-hatch eggs in a secret spawning site.

It gets even better, for the eggs were hatched and cared for by two other cichlids in the tank. Now it gets even weirder, for the two foster/ surrogate parents were not even related — not just to the Jaguar Cichlids, but to each other!

Opportunist spawners I reckon we can cope with, but opportunist foster parents certainly throw up another twist to fish behaviour.

Ain't technology wonderful? Talking to people it seems there's no end to their ingenuity or 'lateral thinking' processes to make good use of the new toys around.

One gentleman found snapping away at a recent garden show with his digital camera was collecting ideas for a new pond; using a digital camera meant he could manipulate features from one captured shot and integrate it (or not) into another once he got the pictures on his computer screen at home.

Whilst a traditional film camera would have provided similar pictorial facts the said manipulation would not have been possible (except with scissors and a pot of paste) plus the film would have been used up — whereas he can re-use the digital camera's magnetic storage space over and over again, having transferred what's valuable to his computer.

Similarly, if you're a keen fish photographer you can easily wipe any "duff" shots by simply immediately checking them on the camera's viewing screen in "playback" mode.

However, what you save moneywise by not using film, you'll probably spend on batteries!

Still with visual matters, how about that video camera mounted underwater in a Koi pond at a well-known outlet that lets the staff (and customers) keep a check on the fish from a different angle altogether.

Jackie Phils

EDITOR

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**John Day** advises on some basic problems

PHOTOGRAPHS BY BRIAN OLIVER

A frequent problem encountered by Discus enthusiasts is that the fish stops eating

# Discus

## Disease

In my last article I referred to disease and mentioned that all Discus carry nematodes of one kind or another in the digestive tract. I must emphasise that providing that they are not in excessive numbers and remain in balance with the fish's own metabolism this should not be a problem.

Normally stress and disease go hand in hand; a most frequent problem encountered by Discus enthusiasts is that the fish stops eating, excretes slimy white faeces, has clamped fins and exhibits excessive respiratory action. This problem is one that wild-caught Discus are prone to and is usually an indication of an excessive worm infestation. If the faeces are examined under the microscope and show numerous eggs of nematodes then treatment is required.

To carry out this treatment, also referred to in my previous article, I use rock salt. I prefer to use the type that pond keepers use, which contains a pH buffer, so that while undergoing treatment the fish are not subjected to secondary infection which, in turn, allows their own immune system to combat the problem within. This treatment is not a two-day wonder cure but takes time, generally 10-14 days, providing the fish has not already reached the 'pinched in forehead' emaciated condition.

Once the fish start to improve try tempting them to eat by feeding them finely-cut raw spinach leaves and live Whiteworm, progressing eventually on to more commercialised foods.

Most Discus keepers feed frozen beef heart mixture (thawed of course!) to their fish; every so often I sprinkle a pinch of very fine, dried garlic granules to the defrosted beef heart mixture and mix in just before feeding; I believe this helps keep the intestines clean.





# Care

## Water

The most talked about subject by hobbyists is that of water quality. There are (and lucky them!) hobbyists whose areas still provide water direct from the tap which meets the desired requirements for Discus keeping in terms of pH and softness; for the rest of us, adjustments are necessary.

In my opinion there are only two realistic ways of providing ideal water, especially where breeding is contemplated. One is by the use of reverse osmosis and the other by ion exchange.

Whichever way you obtain your water no Discus keeper can avoid water changes, as this requirement goes with keeping these fish. Water quality is of paramount importance; if you are not prepared to carry out regular basic water changes my advice is don't try to keep this species!

## Water filtration

I have found that the use of a centralised system has more advantages than disadvantages when a multiple number of tanks are used. For one thing, the pH remains the same throughout and the young fish tend to grow much better.



Having a more stable set of water conditions throughout also cuts down the amount of work required than with individual tanks each with their own conditions to consider. The use of a UV steriliser in a centralised system is a must.

By linking a nitrate removing resin within my filtration system — using an appropriate canister — the water is kept nitrate free. The resin is simply recharged by using cooking salt. The all-round water condition stability, I find, helps not to restrict growth in young fish.

## Breeding

Another problem encountered by

Discus keepers is when a pair of fish spawn and, within a day or so, the eggs turn white and fungus. The following method is worth trying although the water must be within the correct parameters and no nitrites are present, which prevents the aquarium being burdened with an anti-fungus agent.

Wait at least two hours after the pair have spawned, and you are sure that the male has fertilised the eggs. Fill a test vial (or any handy test tube type of container) with 10cc of aquarium water, add four drops of methylene blue and leave to one side. Carefully remove the piece of slate (or whatever the fishes have spawned on) with the eggs and hold it over a bucket, eggs uppermost; pour the methylene blue solution

A pair of Red Alenquer.



Young Snake Skin Discus.

Three Pod Mains Water Filter System.



from the test tube very gently over the eggs but try not to dislodge them; wait until any surplus solution runs off then replace the eggs back in the aquarium in exactly the original spawning position — this time try not to upset the parents too much who should soon return to tend to their eggs as before. Of course, this treatment should be carried out as quickly as possible.

### Buying young fish

In some articles I have read it is suggested that, when buying young fish, the purchaser asks to see the parents before parting with the money. But this point will only assure you of the type of strain, not the quality or guarantee the young; judge the young on their own merits.

The first few weeks are critical for the well-being of raising viable young. Look for no defects, good shape and good size in relation to their age — and hope that honesty prevails. If allowed try placing your hand over the top of their aquarium (as if you were about to feed them); good healthy young are always on the look out for food and should respond accordingly. Always buy from reputable Discus outlets and breeders and don't be influenced by tales of 'The Real McCoy' egotistic romancers.





**Nick Dakin** advocates starting at the bottom with this popular group of marine fishes

PHOTOGRAPHS BY THE AUTHOR

# Go For a Goby!

The Lemon Goby, *Gobiodon citrinus*.



## FAMILY: GOBIIDAE

**T**o the casual observer Gobies may not initially be an overly-attractive prospect for the marine aquarium; but look a little closer ...

This extremely large family of fish (and there are well in excess of 1,500 species in both salt and freshwater environments) contains some of the most appealing and adaptable species available to the hobbyist. Gobies have a very ancient lineage and as a consequence inhabit numerous niches in freshwater, brackish and marine biotopes. Some, such as the Neon Goby (*Gobiosoma oceanops*), have become cleaner fish,

This extremely large family of fish contains some of the most appealing and adaptable species available to the hobbyist

whilst others have formed symbiotic bonds with various invertebrates. Of these, perhaps the best known are those Gobies which share the same sandy burrow as a shrimp.

An unlikely partnership? Not at all. In this relationship the keen-sighted Goby stands guard at the

burrow entrance whilst the poor-sighted shrimp excavates constantly to improve their shared home.

Should danger loom, the ever watchful Goby quickly disappears into the burrow, immediately alerting the shrimp which swiftly follows. Closer observation reveals that the shrimp is in constant touch with the Goby, quite literally! It uses its antennae to continuously feel the body of the Goby and monitor its body language. Any unusual movements are quickly registered and the shrimp makes a hasty retreat into the safety of the burrow.

How or why this relationship has come about is a mystery, but it works and provides each species with a valuable aid to survival.



## Confusion

Many people confuse Gobies and Blennies (*Blenniidae*) and, indeed, common names have been interchanged between the two families with little regard for scientific fact!

In nearly all cases the Goby is easily distinguished as it has fused pelvic fins forming a sucker-like disc which can be used as an aid to cling to vertical surfaces. In this way, Gobies are quite capable of living in areas of high turbulence. Whilst it is true that some Gobies appear to lack this suction disc closer inspection reveals that the pelvic fins are indeed joined, but closer to the body. Gobies can further be distinguished from Blennies owing to the fact that nearly all species have two separate dorsal fins. Firefish (*Nemateleotris* sp.) are often erroneously regarded as Gobies.

Although this was (inexplicably) the case up until the early 1980s Firefish have since found a permanent home in the family of Wormfishes (*Microdesmidae*) and should no longer be regarded as Gobies.

## Swim bladder

In common with Blennies Gobies do not have a swim bladder and, as a consequence, spend most of their

## GO FOR A GOBY! ... a popular group of marine fishes

time in a stationary resting position. Swimming excursions into open water are necessarily brief and carried out with a jerky action. They mostly pursue small morsels of food drifting in the current before quickly returning. This is typical Goby feeding behaviour; taking every advantage of any passing food opportunity but not actually chasing anything beyond the limits of safety.

## Sharing

Marine Gobies, in particular, are fairly gregarious and often occupy the same burrow with a mate or another individual of the same or similar species. If territories are established they are usually quite small, and, depending on the species, may be defended with vigour or in a seemingly half-hearted manner.

## Sex

Sexual differences are very

obvious in some species; for example, the male Catalina Goby (*Lythrypnus dalli*) has a greatly extended first dorsal ray which is absent in the female. Therefore, a sexed pair is easily identified and can be introduced into a suitable aquarium. The sex of many other species are not quite so obvious and to all intents and purposes, males and females are externally identical.

Successful spawnings and subsequent raising to adulthood in a captive environment have taken place with several species of Goby. The most notable being the Caribbean Neon Goby (*Gobiosoma oceanops*), which is bred commercially in the USA. Gobies are substrate spawners and it is usually the male which guards the eggs until they hatch. The larvae — for they are still too underdeveloped to be termed 'fry' — then drift off into the plankton layers to develop, before migrating back down to the sea floor as juveniles.

On a personal note, I have had spawning successes with Catalina Gobies, Neon Gobies and Orange-Spotted Gobies (*Valenciennes puellaris*). All took place in a 16 gallon single-species tank with undergravel filtration and a protein skimmer. The Catalina and Neon Gobies could be encouraged to spawn in small cave or pipe after being conditioned with plenty of live food (Brine Shrimp). The eggs are tiny and no more than specks of dust!

Yellow Goby,  
*Gobiodon*  
*okinawae*.





Unfortunately, the larvae were extremely difficult to locate, let alone feed! But the most fascinating breeding behaviour was exhibited by the Orange-Spotted Gobies. The female would lay her eggs in a half flowerpot and, after fertilising, the male would then proceed to bury the flowerpot beneath the sand, with the female still inside! The male then stood guard over the mound. I observed this behaviour several times and the female would always emerge after about seven days in the best of health. Without doubt, this must be one of the most fascinating, not to say effective, methods of fish reproduction I have ever come across.

## Feeding

Almost without exception Gobies are very easy fish to feed in the aquarium environment. They like to take food whilst it is drifting in the current and particularly enjoy live foods such as Brine Shrimp, as well as frozen Mysis and small River Shrimp. Other foods should be chosen to suit the size of the particular species.

A good variety might include: frozen Brine Shrimp, Mysis, chopped Cockle, shell meat and Squid. Many species will often accept marine flake quite readily. Two feedings every day is quite adequate; one in the morning and again in the evening. A

variety of foods will avoid dietary deficiencies which could otherwise lead to disease.

## The invertebrate tank

Most Gobies are very suitable for the marine invertebrate aquarium and will do little, or no damage. However, there are one or two exceptions that the hobbyist may want to be aware of.

Firstly, the Lemon Goby (*Gobiodon citrinus*) finds a natural home within *Acropora* sp. and other related branching hard corals. They can rub their bodies against a favoured spot and destroy the polyps on that particular branch or even cause the demise of the whole coral. If a pair are kept, spawning often occurs within the same favoured branches and once again, the coral may be damaged. There is little the marinist can do in these circumstances but it is as well to be aware of the situation if valuable branching corals are kept.

Larger Gobies often spend most of their time scooping up mouthfuls of coral sand, sieving it for small particles of food, the passing it out through the gills. Frustratingly, this sand may be expelled over sessile invertebrates, causing them some distress. Probably the most common culprit for this behaviour is the Blue-Cheek Goby (*Valenciennesa strigata*)

and once again the hobbyist should be aware of this possible disruption before attempting to introduce this particular species of fish.

Gobies do not have it all their own way, however. Many of the very small species can easily fall prey to predatory anemones and crabs, as well as Mantis and Pistol Shrimps. Neon, Catalina and Lemon Gobies in particular, may suffer an early demise through predation from this source.

## Sharing and compatibility

Most Gobies are very tolerant of others in their family and will often share an aquarium quite happily with a non-similar species. However, care must be exercised if the same, or similar, species are introduced as there might be a degree of harassment (usually chasing) from the most dominant individual.

Pairs, as we have seen, can form strong bonds and may never stray further than a few inches from each other. In common with many other species of fish, the larger the aquarium, the fewer and less intense any disputes over territory will be. The marinist will often visit his/her local retailer to find various Gobies occupying the same aquarium quite peacefully. In cases such as these species purchased from such an aquarium can be expected to live



Orange Spotted Goby,  
*Cryptocentrus* sp.



peacefully when transferred to a more permanent home.

As far as general compatibility is concerned Gobies make excellent peaceful community introductions. Care must be taken to make sure that larger fish do not regard them as a potential meal or a threat against territory. Other than that Gobies can be relied upon to be compatible with most other unrelated species.

### Helpful Gobies

We have already seen how some of the larger sand-sifting Gobies can spray grain of coral sand over sessile invertebrates and cause a minor nuisance; however, there is an upside to this type of behaviour, particularly with undergravel filter owners. Both Orange-Spotted and Blue-Cheek Gobies will constantly disturb the substrate and keep it free from compaction, as well as consuming any unwanted food particles trapped therein.

Now and again, the hobbyist will have to smooth out the substrate if the 'craters on the moon' effect is to be avoided, but this is a small price to pay for such a valuable service.

### Healthcare

Fortunately, the family Gobiidae suffer very little from common

GO FOR A GOBY! ...  
a popular group of  
marine fishes

Visit Nick Dakin's website at:  
<http://www.nickd.clara.net>

aquarium diseases. As long as water quality is good and the aquarium is neither overfed or overstocked Gobies will generally remain healthy. White Spot and Oodinium can become a problem if the fish are stressed and the aquarist should make regular inspections after a new introduction.

### Tank conditions

A 3-4ft (90-120cm) aquarium must be regarded as the minimum for community purposes, although very small species may tend to get 'lost' in a very large aquarium and will almost invariably suffer in the competition for food.

pH: 8.0-8.3  
Ammonia & Nitrites: Zero  
Nitrate: Not exceeding 25ppm, preferably less than 10ppm  
S.G: 1.020-1.024  
Temperature: 25-26°C (77-79°F)  
Efficient protein skimming and

activated carbon should be regarded as standard. An ultra-violet steriliser is very useful to prevent disease in an invertebrate aquarium. 15-20 per cent water change every two weeks. Good water circulation is essential.

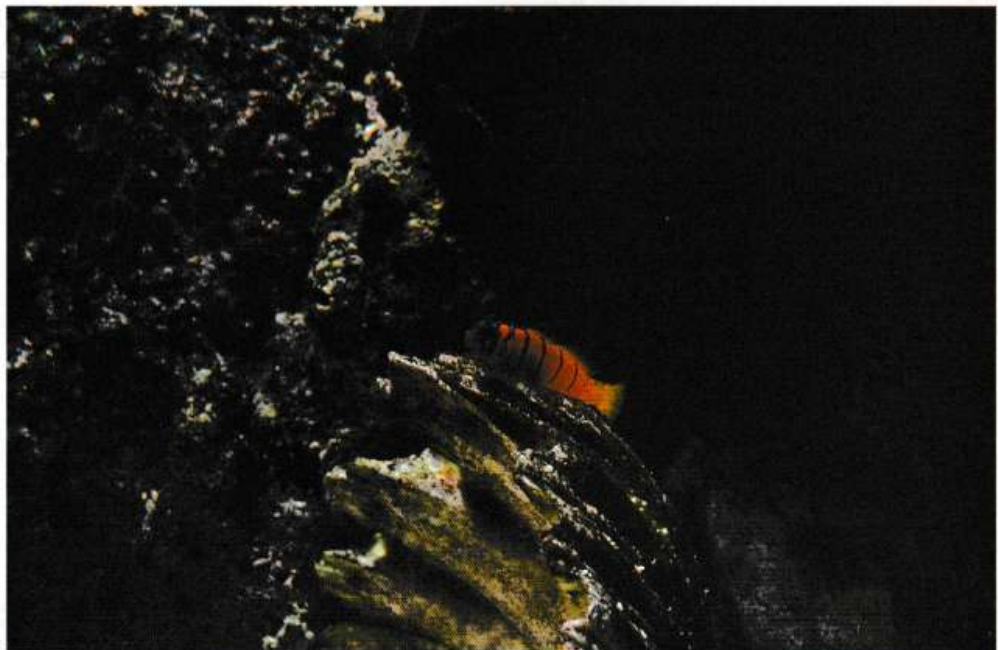
Lighting: Moderate to bright lighting is tolerated well, although some species do prefer a dimly lit area in which to retreat from time to time.

### Species and introduction

Almost without exception it is best to introduce Gobies towards the beginning. They need to establish themselves gradually without the possible attentions of more competitive fish if undue stress is to be avoided. Some of the more commonly available and desirable fish include:

- Neon Goby** (*Gobiosoma oceanops*) 1in (25mm)
- Catalina Goby** (*Lythrypnus dalli*) 1in (25mm)
- Orange-Spotted Goby** (*Valenciennes puellaris*) 4in (10cm)
- Blue-Cheek Goby** (*Valenciennes strigata*) 7in (18cm)
- Yellow Goby** (*Gobiodon okinawae*) 1.2in (30mm)
- Sulphur Goby** (*Cryptocentrus cinctus*) 4in (10cm)
- Lemon Goby** (*Gobiodon citrinus*) 1.2in (30mm)

Catalina Goby,  
*Lythrypnus dalli*.





**Roy Osmint** buzzes around the marginals to meet some dazzling visitors

PHOTOGRAPHS BY JACKIE STRUDWICK

# Hawkers, Darters and Damsels

---

They are among the very largest of insects and do possess a somewhat ferocious appearance and threatening bearing

---

The Emperor Dragonfly (*Anax imperator*), the largest of all British species.

**T**o my mind, they are among the most exciting, intriguing and exquisitely beautiful of all natural visitors to the summer water garden. At the height of a short-lived glory the often brilliant colouration of their needle-like bodies is matched only in breathtaking splendour by large diaphanous wings and dazzling speed.

Once widely recognised by such expressively popular names as 'Horse Stingers' and 'Devil's Darning Needles', appellations immediately suggestive of a certain menace. We now know these veritable jewels of the air as Dragonflies and Damselflies and realise them to be entirely harmless to us — or do we? Though few can fail to be

captivated by their stunning beauty many people often feel extremely uneasy when a large dragonfly appears in their vicinity. Such apprehension, though misplaced, is in many ways understandable. After all, they are among the very largest of insects and do possess a somewhat ferocious appearance and threatening bearing.

Their behaviour, too, is indicative of menace. If captured, for instance, they will immediately curl their abdomen round in wasp-like fashion as if to administer a powerful sting. But it is only a gesture for no sting exists. This is not to say, however, that they are harmless to all life-forms. On the contrary, dragonflies are fearsome predators equipped with strong mandibles capable of seizing and crushing prey such as



small invertebrates and even sometimes others of their own kind. These are carnivores in the truest sense.

Although the various forms of dragonflies are a delight to see hovering, darting or resting around the water garden on any warm summer's day, their presence can produce potential problems if your pond is selected as a suitable breeding site. But more about this





later! Let us then take a look at these extraordinary insects — their general make-up, behavioural characteristics and fascinating life-cycle; for, in a basic understanding of these, our appreciation and enjoyment of observing them will inevitably be enhanced.

Broadly speaking, the term dragonfly can be applied to the larger more robust species belonging to the sub-order (Anisoptera).

Whilst damselflies, altogether smaller more delicate in structure, are members of the sub-order (Zygoptera). Both groups are, however, part of the main scientific order of dragonflies (Odonata).

### **Dragonflies**

Dragonflies are in many ways

relatively primitive creatures having existed in similar form for hundreds of millions of years. The general nature and structure of varieties that visit our ponds today may not be significantly dissimilar to those that inhabited the primordial swamps and forests.

An example of this comparative primitiveness can be found in the dragonfly's flight mechanism. Despite astonishing speed and



radical adaptations and modifications

Some varieties of the larger true dragonflies are popularly referred to as Hawkers, others are known as Darters. These terms derive from, and loosely describe, a particular type of behaviour pattern.

Hawkers generally exhibit elongated cylindrically-shaped bodies and are notable for their habit of endlessly patrolling a territorial area of countryside constantly on the lookout for food and suitable partners. These are powerful flyers, often covering many miles.

Darters, on the other hand, normally smaller and broader in body, will often be seen basking in the sunshine on some favourite perch such as an overhanging twig or marginal plant. From here they will embark on frequent local forays in search of food or to ward off possible rivals, before promptly returning to base for another relaxing session in the sun.

As a rule damselflies, being altogether smaller and more delicate in structure than their true dragonfly cousins, rarely stray very far from their original breeding site. Much of their time is spent gently fluttering around the waterside vegetation and skimming just above the water surface.

### Reproductive behaviour

Although dragonflies are well known for predominantly

### HAWKERS, DARTERS AND DAMSELS ...

*Dazzling visitors to our ponds*

.....

frequencing waterside habitats the adult forms of some species can often be found in a variety of other environments. All must, however, in order to reproduce, lay their eggs in or very close to water. This is necessary so as to fulfil the essentially aquatic requirements of the larval stage.

Mature males will often visit and survey a number of potential breeding sites to determine their suitability or otherwise. Once a favourable spot is located it is likely to be rigorously defended against incursion by others of similar intention. This defence of a chosen site may continue for a week or so, after which time sexually-mature females will begin arriving from the surrounding area.

These, as in so many other examples in the natural world, are often rather drab in appearance compared to the frequently resplendent males.

Almost immediately upon arrival females identified as potentially-suitable partners will be ardently pursued by males of the same species. Remarkably, as a barrier to inter-species breeding there exists subtle physical differences among the various forms which make it possible

only for individuals of the same species to successfully mate. In most cases there will be little time lapse between mating taking place and eggs being deposited.

Some species simply release their eggs freely into the water. Others carefully place them into plants either emergent, submerged or floating. Whilst still others position them in the silt or mud on the pond bottom or water's edge.

Dragonfly eggs come in a variety of shapes and sizes dependent upon species and the nature of the hatching environment. They can, however, be placed into two categories: endophytic eggs, which are precisely deposited in plant or mud by the female using her ovipositor; exophytic eggs, which are freely-scattered in the water by the female simply submerging her abdomen just beneath the surface.

### Life cycle

Dragonflies are complex and uniquely remarkable in a number of important respects. Principal among these is the method by which they develop from ugly water-dwelling larvae into magnificent adult creatures of the air. In achieving this incredible transformation enormous physical and structural change must take place. One of the most remarkable aspects of which is a total adjustment to the respiratory mechanism enabling life-giving oxygen to be taken and absorbed into the body system from each of these completely contrasting





environments.

Eggs develop at varying rates according to species. In certain forms hatching occurs after just a few days. For others it takes a number of weeks. Whilst for some it can take many months before the prolarvae struggle free of their egg cases.

Metamorphosis in dragonflies is incomplete — that is to say, they do not pass through an immobile pupal state as, for example, in the case of butterflies. Transformation is accomplished in just three stages — egg, larva and adult or imago.

The larvae undergo a number of vital 'moultings' during development, each time effectively breaking out of their rigid skin casings to expand and fit into a new larger one. Newly-hatched larvae do not wait long before shedding their first 'overcoat'. This is followed by another dozen or so moultings over differing intervals dependent upon circumstances and species, until eventually the fully-developed larvae emerge from their aquatic environment into the air to become beautifully-coloured and decorated adult dragonflies.

Dragonfly larvae, like the adults, are carnivorous and perfectly-designed for capturing a variety of underwater prey. Some forms heavily rely on mobility to achieve this, others utilise highly-effective camouflage techniques. Though all have poorly-developed eyesight they are extremely sensitive to any kind of movement in the water. Other insect larvae (as well as young fish) are among the potential victims. This is, of course, where their presence can prove a problem to the pondkeeper hoping to breed from his or her fish stock.

Larvae possess a modified lower jaw — a formidable weapon equipped with a pair of moveable labial palps ending in vicious hooks. These can be thrust out at great speed on a hydraulically-operated arm. Prey coming within range have very little prospect of escape.

The actual duration of the larval stage varies considerably among species. It is also greatly influenced by such factors as food availability and the time of year that final emergence from the water is scheduled to take place. In most cases it will range from a few months to one or more years.

But no matter what the period, once fully developed the larvae must



leave their aquatic environment for a short life on land. And short it is — typically just a few weeks depending upon species, food supplies, weather conditions and of course predation. But generally long enough to become sexually mature, find a partner and begin the whole cycle again.

Emergence of the fully-developed larvae and final transformation into adulthood is probably the dragonfly's most vulnerable time. During this period it is extremely exposed to attack from both land and air by birds and hunting spiders. Departing the aquatic habitat is generally a fairly gradual affair.

To start with, larvae will probably move into shallower water and locate a convenient means of getting above the surface via a bank or suitably-positioned marginal plant stem. This is subsequently followed by a number of excursions into the air of progressively longer duration so as to acclimatise to the physical demands of this new, and very

different, environment.

Eventually larvae will leave the water for the final time via the chosen support. In many cases this last exit will be made undercover of darkness for protection. Before the ultimate skin can be shed it must be allowed to dry out in the daylight air. Soon a split occurs along the back of the thorax and the dragonfly commences to extricate itself. Once completely free the wings will start to unfold from their crumpled state and the body begins to extend to its full dimensions before hardening off.

The same occurs with the creature's legs which, though never really designed for walking, are vital for holding and gripping.

Soon the dragonfly will be able to take to the air and tends instinctively to head away from the waterside. In some species this may be a distance of many miles, in others just a matter of yards.

Development must now happen quickly for with a lifespan on average of just a few short weeks the insect must pass through all the usual stages of juvenility, sexual maturity, adulthood and old age in a period that for most creatures takes years.

There is still much to learn about how, and why, dragonflies are attracted to a particular body of water. But Hawkers, Darters and Damselflies are all potential visitors to the garden pond in a range of vibrant colours depending upon location and water conditions.

A more natural style pond with a good selection of marginal plants and perhaps an associated bog area supporting a range of marsh-loving species is more likely to play host to them than is the more clinical, wholly-artificial set-up. But that said, if it has that certain something, they will find it!

Inspirational sightings include the beautiful male Emperor Dragonfly (*Anax imperator*), the largest of all British species. Its dazzling enamel blue body and jewelled eyes made up of some 30,000 facets sets the pulses racing. Others include the Blue-tailed (*Ischnura elegans*), one of the UK's commonest Damselflies; the powder blue and metallic green Emerald Damsel (*Lestes sponsa*); the Common Blue Damsel (*Enallagma cyathigerum*); the Red Common Darter (*Sympetrum striolatum*); Black-tailed Skimmer (*Orthetrum cancellatum*), and many more.



**Susan Stephenson** says water quality is paramount

PHOTOGRAPH BY THE AUTHOR

# Clear, Clean Water



It can be frustrating for the attentive pondkeeper to find the waters constantly muddied. There may be several reasons for this. The fish in the pond may be responsible for muddying the water. Koi love to bury in the mud and smaller ones can be discouraged from doing this and dislodging mud (along with your plants) by laying gravel over the soil of the pond. For larger fish a protective screen placed over the soil in pots which the plants

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To maintain a healthy population of ornamental fish water quality is paramount

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grow through may be the answer.

To maintain a healthy population of ornamental fish water quality is paramount. Harsh chemicals such as

chlorine, chlorine dioxide and excess fertilisers can be harmful and must be removed. The correct pH level is also important for preventing excessive algal growth and encouraging fish.

**Chlorine dangerous to fish**

When you first stock your pond it is advisable to use a simple tester it



to determine the quality and pH of your water. You can ask your water supplier if the water is chlorinated. Chlorine is dangerous to fish as it burns their gills and causes severe stress and if they are put straight into water with chlorine they can die. Luckily chlorine disappears if the water is simply left to stand for several days before adding the fish and plants.

Because of the constant possibility of other chemicals being present in the water due to their use in water treatment processes some pondkeepers take the added precaution of using one of the available products to neutralise the toxic effects of these chemicals when tap water is used. You can also reduce the risk of water contamination with chemicals such as fertilisers by following manufacturers' instructions exactly, not using near the pond or bog garden and if you have to treat plants in the pond choosing ones guaranteed not to harm fish.

The ideal pH range for an ornamental pool is between 6.8 and 7.4. 7 is neutral while over 7 is alkaline and below 7 is acidic. The pH level can be adjusted using one of the manufactured products available. Goldfish can survive in a wider pH range than most other fish but it is still best to keep to the ideal range as with a higher pH active ammonia ions are in the water so levels of ammonia become too high. At a pH of 7 there is almost no free ammonia in the water.

### High ammonia levels can persist

Organic materials are broken down by bacteria into ammonia which turns into nitrite and then nitrate which is harmless. Usually this process is rapid so the ammonia is quickly converted to nitrite then nitrate and is not a problem but if there is too much organic matter the ammonia produced by the bacteria is not converted into nitrates so quickly and high ammonia levels can persist. High ammonia levels can also occur in new

or thoroughly cleaned ponds due to the lack of bacteria populations. It is, therefore, advisable to allow a new or renovated pond to stand for a few days before adding plants and fish.

New fishkeepers tend to overfeed fish at first which can lead to excessive organic matter in the pond causing cloudy water. This can also lead to excessive concentrations of ammonia due to too much organic matter for the nitrifying bacteria to convert.

A newly planted or stocked pool will take several weeks to settle and the water become clear. This is simply due to particles of soil, algae and organic matter taking time to settle. It takes patience but the water will slowly clear unless it is disturbed or the water changed in an effort to speed the process.

The addition of the correct number of oxygenating and floating plants will ensure the water stays healthy and clear. Natural scavengers such as water snails and tadpoles can also help to control excessive algae growth and retain crystal clear water.

Submerged plants are the single most important factor in maintaining clear water because they absorb nutrients from the water more effectively than algae and so starve them out. One clump of submerged plants per two square feet of water surface should do the job. Floating plants can also assist in keeping water clear as they block sunlight which would encourage unicellular floating algae to multiply.

Green water can sometimes be cleared by reducing the amount of fish food given so there is not organic material left floating after the fish have fed. It is ironic that some varieties of fish prefer their water to be slightly green — at about the level where you can only see them in the first foot or so, but this is not always what fishkeepers want. If you can live with this level of greenness then you might not need a filter but if you want your fish constantly on show then a filter may be the answer. Certainly for ponds which are a strong design feature and the water itself a reflective surface in the design then a filter will keep it clear and clean looking.

A filter will keep the water in a pond clear so long as the circulation level is right. It will also help the balancing and settling of a pond because it will trap waste, food and filamentous algae floating in the water.

The aim should be for the entire volume of pond water to go through the filter once every two hours. If the same pump is being used for fountains, waterfalls, etc. as well, you may need a bigger pump because lifting water to a feature puts back pressure on the pump and slows it down so some of the effect is lost.

Once you achieve the level of clarity with which you are happy then it should be easy to keep it that way as water clarity is one of the factors over which pondkeepers have most control and your slightly green or crystal clear pond should continue to give delight.







# FROGS & Friends

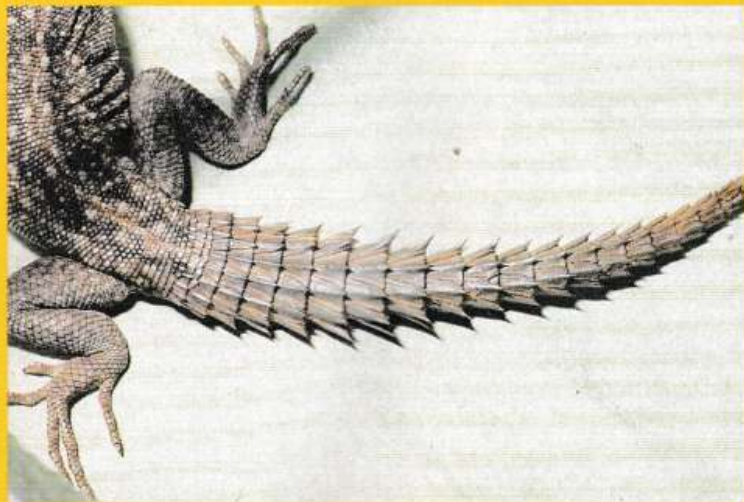
By BOB and VAL DAVIES



A bit of a mouthful? The tail of *Oplurus cyclurus*, an Iguanid from Madagascar.  
PHOTOGRAPH: BOB & VAL DAVIES

## A THORNY PROBLEM

In the constant struggle for survival among wild creatures the tail is often the part seized by an attacker as the prey turns to flee; certain fish have evolved a false eye-spot on the tail to distract a predator's attention to the less vulnerable rear end. A previous article dealt with autotomy (tail-shedding) in lizards as a common method of defence. Spines (modified scales) have been developed by various lizards as a means of protection and in several species the tail is particularly well endowed with them. In certain cases what appear to be sharp spines are actually quite flexible — Bearded Dragons (*Pogona* spp) have many such spines but if strokes towards the head the dorsal surface and tail are well supplied with smaller, sharper ones that might deter an attacker which seizes the animal from behind.



Spiny tails are useful for blocking a burrow as in the Dab Lizards (*Uromastyx* spp) or being used as a club to give a sideways swipe at a rival or predator. Long-tailed species such as Green Iguanas make effective use of the tail as a whip — although not obviously spiny the rear

edges of the scales are sharp and each can leave a distinct impression on one's face, as one of us found out — having been on the receiving end!

Spiny tails are a prominent feature in some Malagasy Iguanids of the genus *Oplurus*. When handled they may strike sideways with the tail or may rotate it against the hand (this has also been noted in *Uromastyx*). Both species have managed to produce slight damage to the skin by this manoeuvre when picked up by one hand only.

## OBSCURE FACT

Did you know that the spinal fluid of a Crocodile is poisonous? The Rain Queens (Modjadji) of the Lobedu in the northern part of South Africa drank it to commit ritual suicide when their powers of rain making began to wane. The great grandmother of the current Modjadji V was

reputedly the inspiration for Rider-Haggard's *She*.

## DANGER — HAZARDOUS CONDITIONS

Many readers will be familiar with the jumble of plugs, wires, double/triple adaptors, etc, which often grows up as a collection increases whether it is fish or reptiles. Another aquarium or vivarium — more electrical leads, more connections — a cable tidy may provide temporary relief until the next installation. Many of us must have exceeded the bounds of safety at some time. This story was not unknown at our house. Far from being the world's best electricians we were amazed at the following tale.

A local dealer sold a complete vivarium set-up. The customer phoned to say the thermostat was not working — the vivarium was overheating. Having exchanged the thermostat the same complaint was again phoned in. Unable to obtain a proper story the customer was asked to bring in the whole set-up to try and solve the problem. It turned out that the heater mat had been plugged in, the thermostat had also been plugged in but the two were not connected! The uncontrolled mat had boosted the temperature but what hadn't been realised was that the loose supply lead from the thermostat was LIVE at least when the thermostat was 'on'. One shudders to think what might have happened. Fortunately, no animals had been introduced at the time — they would have baked if they

hadn't been electrocuted and possibly the keeper might also have suffered the latter fate.

## DIARY DATES

**July 11-19** National Health Week. Various events nationwide to raise awareness of heathlands and their wildlife — guided walks, lectures, demonstrations, etc. Details from: Enquiry Service, English Nature, Northminster House, Peterborough PE1 1UA. Tel: 01733 455101.

The Field Studies Council are running various courses throughout the year including walking, photography, crafts, ecology, natural history, conservation, etc. A 42-page brochure is available from: Field Studies Council Head Office, Preston Montford, Montford Bridge, Shrewsbury SY4 1HW. Tel: 01743 850674.

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## PROLAPSES

Every spring when frogs and toads are breeding it is common to see two or more males attempting to clasp a single female — in some cases she may be the centre of attention for eight or even more males all struggling to achieve amplexus. Where a single pair are in amplexus the male may use his hindlegs to repulse rivals and research some time ago (with Toads) suggested that approaching males can judge the size of the 'sitting tenant' by the volume of his croak — smaller males tended to be deterred from further attempts, larger males persisted and often displaced a smaller specimen.

Earlier this year a female frog in our garden pond was spotted in the middle of some nine or ten males, all struggling for the mating position. Occasionally when two or three males have seized a female we have interfered by removing the surplus specimens — this is often futile as they persist in their attempts. In a normal pairing the female can reach the surface for air — pulling her smaller mate with her. More than one male hanging on can hamper this and occasionally dead females are found spawning, possibly having drowned.

In the above incident the female (recognisable by her coloration) was found floating, thin and exhausted and



Female Common Frog showing prolapsed organs.  
PHOTOGRAPH: BOB & VAL DAVIES

suffering from a prolapse — she died soon afterwards. The prolapse may have been due to the pressure of so many males although other factors may be responsible. Female reptiles and amphibians can suffer from prolapsed oviducts or intestines; males from prolapse of the hemipenes (reproductive organ). Possible causes (plus various others) include parasitic infestations,

bacterial or fungal infections, constipation or defective nerves in the tissues. In our collection over the years prolapses have been observed in a female White's Tree Frog and two female Chameleons; prolapsed hemipenes have occurred in two male Chameleons.

Prolapsed internal organs are covered with mucus membrane and dessication quickly causes damage. Contact with the substrate or other material is equally injurious. First aid treatment consists of protecting the protruding tissue with a damp bandage or sterile lubricating jelly.

Frogs can be placed in wet kitchen towel. Urgent skilled veterinary treatment is then necessary — unskilled attempts at replacing the organs are likely to do more harm than good and sometimes sutures are necessary to prevent further extrusion.

## RELATIVE NEWCOMERS

During the last two years Leaf-tailed Geckos (*Uroplatus* spp) from Madagascar have increased in popularity especially in the USA. Until recently the best known was *U. fimbriatus* which is the largest of the nine or so species. Although relatively few have been imported into Britain we know of keepers who have been successful in breeding three or four species. Breeding successes have been recorded in the USA also.

All species are well camouflaged; those known as leaf-tails have numerous fringes or lappets of skin which enable them to become practically invisible when on tree bark. Other species (sometimes referred to as flat-tails) lack these adornments but their cryptic coloration is effective — one friend who keeps them has difficulty in seeing them during the day when they are inactive. Their rather bizarre appearance causes the Malagasy to regard them with superstition especially as they are nocturnal. The behaviour of *U. fimbriatus* and *U. henkeli* when disturbed can also be disconcerting and may have engendered superstition. The head is relatively large, almost crocodilian in shape, with a wide mouth. The jaws gape to expose a bright red tongue as well as producing an intense distress call although specimens in our care have never indulged in the latter behaviour. The smaller species such



*U. phantasticus* in slough which makes it easier to spot and increases its 'ghostly' appearance.  
PHOTOGRAPH: BOB & VAL DAVIES

as *U. ebenau* and *U. phantasticus* are quite engaging little creatures. Their odd shape and large prominent eyes (typical of the genus) give them an almost alien appearance. The tailbase is quite

narrow widening out into a flattened section. The tail of *U. ebenau* is hardly worthy of the name; it is tiny enough to be almost comical. Both species are small *U. ebenau* being 7.5 to 10cm (3-4in) total length, *U. phantasticus* 9cm (3.75in).

The vivarium for *Uroplatus* must have 85 to 90 per cent relative humidity but adequate ventilation is needed to prevent stagnant conditions. A moisture retentive substrate with branches and living plants is ideal for these species. A daytime photoperiod of 12 hours is needed — adequate light is important if living plants are used and since these geckos may occasionally bask during the day a low percentage, full spectrum UVB fluorescent tube is beneficial. Maximum temperatures should not exceed 30°C (86°F) in the daytime, overnight 20-21°C (68-70°F) is ideal. Livefoods such as crickets and locusts should be dusted with multivitamin/calcium powder. A light spray in the late evening will be lapped.



**Dr Peter Lewis** describes an unusual spawning method used by one of Lake Tanganyika's endemic fishes, *Lamprologus ocellatus*

PHOTOGRAPHS BY THE AUTHOR

# Breeding the Golden Shell Dweller

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Endemic to Lake Tanganyika's Tembwe Bay, *L. ocellatus* appears to be restricted to the coastal regions where the muddy or sandy shores are littered with empty shells of the snail, *Neothauma tanganicensis*

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'Gold Morph' male.

TROPICAL



## SPECIES

*Lamprologus ocellatus* (Steindachner, 1909)

## SYNONYMS

*Julidochromis ocellatus*; *Lamprologus lestradei* (Poll, 1943)

**K**nown in Europe as the 'Frog-faced' Cichlid and in England and America as the 'Snail' or 'Golden Shell-dwelling' Cichlid its specific name translates to mean 'Eye Spot'. An inhabitant of vacant snail shells.

### Distribution

Endemic to Lake Tanganyika's Tembwe Bay, Kigoma, *L. ocellatus* appears to be restricted to the coastal regions where the muddy or sandy shores are littered with empty shells of the snail, *Neothauma tanganicensis*. *L. ocellatus* is not found north of Nyanza-Lac.

### Description

The distinctive concave outline of the snout of *L. ocellatus* has resulted in the nickname of 'Frog-faced' Dwarf Cichlid, especially among European hobbyists. The fish is a dwarf, shell-dwelling (*conchiophilic*) cichlid with a distinct, gold coloured iris to the eye, an eye spot on the operculum and a golden-cream coloured body. It is usual for the male to be more intensely coloured

### BREEDING THE GOLDEN SHELL DWELLER ...

*Lake Tanganyika's endemic fish, Lamprologus ocellatus*

than the female. Only the edges of the fins are coloured, the body of each fin being clear, speckled with blue or gold but lacking any stripe or hatch patterns. The anal fin possesses seven to nine spines, a fact which can be used to distinguish *L. ocellatus* from other similarly coloured species.

Males rarely exceed 5cm in length while the females remain slightly smaller. Larger, older males may develop a distinct 'gibbosity' or bump on their forehead, directly between their eyes, reminiscent of that characteristic of the Buffalo-head, or Humphead, Cichlid, *Steatocranus casuaricus*.

The gold form featured in this article was introduced into the hobby by Rene Krüter who discovered this variant at Nundo Point in Zambia. This colour morph has a very distinctive, intense, golden-yellow sheen to the scales along the side of the fish that making this colourful cichlid even more attractive.

In an aquarium environment my experience has been that although the gold is always present regular meals of live Brine Shrimp or similar live foods are required to keep the intensity of the colour as shown by the original, wild specimens. A

distinct feature of the golden morph is a golden brown 'skull cap' that sits across the head of the fish, between the eyes.

### Sexual dimorphism

The most distinctive feature of a mature pair of *L. ocellatus* is their size difference in that a full-grown male will be 5cm standard length while his mate is likely to be barely 4cm in length. The dorsal fin of the male golden variant *L. ocellatus* is edged with an orange-red band while that of the female is clearly paler, often white trimmed.

Further, the soft rays of the anal fin of the female are lacking in colour. Mature females are shorter in the body than males and exhibit a more rounded belly while males have longer bodies that are best described as oblong in shape.

A personal observation is that the teeth of mature males appear larger and more prominent than those of the females.

### Natural habitat

Coastal waters of Lake Tanganyika, at depths from 5-30m, with a substrate of fine sand or mud littered with the empty shells of the snail, *Neothauma tanganicensis*, which these fish inhabit as a source of both shelter from predators, one of which is the largest cichlid in the Lake, *Boulengerochromis microlepidotus*, and a site for egg laying and brood





tending by the female. The

Lake temperature remains stable year round at approximately 26.5°C. Their natural food is small invertebrates, freshwater shrimp in particular, and as such, in captivity they will relish a feeding of Cyclops, Daphnia or live Brine Shrimp.

### Water preference

In an aquarium clean, well-aerated water at a temperature of 25-28°C is preferred with a pH between 7.8 and 8.8. Hardness may vary from 500-600ppm TDS. Water changes amounting to 25 per cent every 10 to 14 days are appreciated by these otherwise undemanding shell dwelling cichlids.

### Spawning method and details

*L. ocellatus* are a colonial species in nature, a male and several females occupying a small territory, usually no more than 40cm in radius, around their chosen shells. Their digging behaviour rivals that of the larger South American cichlids and it is usual for a colony to totally rearrange the substrate around their territory to establish a mound of sand as border to their domain.

Konings (1988) in his video, *Tanganyikan Cichlids*, suggests that the motivation behind this reconstruction is to provide a rampart at the edge of their territory and also to create a

catchment area that diverts the natural flow of water and plankton, on which such shell dwellers feed, to the vicinity of their shell and their fry.

For an in-depth discussion on the living, hiding and spawning behaviour of *L. ocellatus* within the confines of a discarded shell the reader is referred to Paulo, 1986.

In the aquarium any attempt to grow rooted live plants will fail as a result of this cichlid's digging behaviour, a growth of Java Moss or Java Fern, both rootless plants that will anchor to driftwood or rocks, can be put to good use and a strong growth of these resilient plants appears to afford a sense of security to both parents and fry. Rock work can be provided but is not essential to the well being of *L. ocellatus*.

Breeding is quite straightforward and can even be accomplished with but one pair in a 55 litre aquarium with a fine substratum and several clean, empty snail shells available as both a refuge and a spawning site.

A pair can be conditioned on the usual good quality flake foods in addition to several feedings of such small live foods as newly-hatched Brine Shrimp, filtered Daphnia and Cyclops. Feeding tubifid worms is not recommended although the occasional helping of Whiteworm is appreciated.

An aquarist fortunate enough to witness the spawning act will see that the female, who may darken across the top of her body, will court the male by curling her body and tail slapping in his direction. She will then swim into her chosen shell, deposit a few eggs then retire in

order for the male who will either enter the shell also and deposit his milt or, more likely, merely deposit his milt at the mouth of the shell if it is too small for his body, such that the turbulence caused by the female reentering the shell will draw milt into the shell and thus fertilise the eggs.

Once the spawning ritual is complete the female will then spend her time fanning her pectoral fins across the entrance of the shell to ensure fresh, oxygenated water enters the shell and discouraging any itinerant snail or other unwelcome visitors from entering the shell and disturbing the spawn.

At this point the female also becomes intolerant of the male and is likely to quickly drive the male away as she would any intruder if he approaches too close to her shell. In a communal situation the male is likely to do no more than search out another female with whom to breed.

The eggs are white coloured and about 1.5mm along their largest axis. Such observations can only be made by completely and carefully destroying the shell in which spawning occurred at the risk of losing the whole spawn. Hatching occurs after 72 hours at 26°C and the fry are free swimming some four to six days later. Often the first sign of the fact that the pair has spawned is the sight of several 5mm, 14-day-old fry in the mouth of the shell chosen as refuge. On occasions I have had females who will allow fry to venture out of the shell that could have been no more than a few hours from being 'wrigglers'. It is worthy of note that the fry are not completely



**FAR LEFT**  
*Neolamprologus ocellatus*, 'Gold Morph', at entrance to shell.

**CENTRE**  
Standing guard over shell with eggs inside.

**LEFT**  
At entrance to shell with fry just visible outside shell.



colourless but sport a distinct black wedge that runs from just behind the operculum into the caudal peduncle.

A typical batch of fry is small, probably no more than 20 young. Their growth is rapid if fed newly hatched Brine Shrimp or sifted

**BREEDING THE GOLDEN SHELL DWELLER ...**

*Lake Tanganyika's endemic fish, Lamprologus-ocellatus*

.....

Daphnia as a supplement to microscopic fry food, pulverised, freeze dried Krill or freeze dried Brine Shrimp.

Owing to the confined area in which the female deposits her eggs it is most likely that fertilisation is extremely efficient and, since the



Older male showing distinct 'frontal gibbosity' on forehead.



Female at shell entrance.



young have access to the refuge of their parents' shell at all times, the survival rate of the fry is high indeed. Gradually the young become both bolder and larger and venture further from their parents shell until they are eventually evicted, after some four to six weeks, and either take up residence underneath the shell of their parents or establish their own shell and surrounding territory and begin on their own family.

Sexual maturity takes nine to 10 months to achieve, at which point the mature males should have grown to 5cm, the females being almost 5mm smaller.

### Key to successful spawning

Being typical cichlids *L. ocellatus* will often fight to the death if territorial squabbles erupt or if the aquarist attempts to establish a colony containing several pairs but an inadequate number of shells.

A sure sign that a particular fish is being shunned is the persistent evidence of this fish in one of the upper corners of the tank, this fish will not dart for cover when disturbed and will rarely be allowed to feed. To prevent the death of this

fish (usually a male) it should be removed and placed in an alternative aquarium.

Water condition is not critical but should be in the middle of the range preferred by the fish. A suitable starting point would be water at 25°C with a pH of 7.8 and a hardness of more than 8° dGH.

### Special requirements

*L. ocellatus* is an aggressive, territorial, dwarf, conchiophilic, cichlid characterised by a weak pair bond between male and female in spite of their colonial social structure.

An essential element is the provision of adequate empty snail shells of a size suitable for *L. ocellatus*. If a true colony is to be established then the aquarist must provide at least one more shell than there are fish in the tank.

It appears that *L. ocellatus* will continue breeding until the tank is saturated with offspring and mature breeding pairs. Once this stage is reached, the aquarist has to merely thin the population by taking out a few shells, which are bound to contain fish or fry, and replace them with empty shells and set up another colony in a fresh tank with the

displaced fishes as a new colony.

Spawning can often be initiated by a water change coupled with an increase in temperature by two or three degrees above the aquarium norm.

If a breeding colony containing several fish is to be established then it is recommended that at least 30 square centimetres of 'floor space' should be allowed for each male and that at least one shell is available for each adult fish in the colony. Like many similar cichlids *L. ocellatus* have adopted the practice of burying their shells until only the opening remains.

This practice is more evident with wild imports and is often a key to spawning when all else fails. That is, the tank floor should be covered with 5-7.5cm of very fine gravel, preferably clean sand, such that *L. ocellatus* may practice what comes naturally and bury their shell, the theory being this is to give added security and prevent theft by larger cichlids such as *Neolamprologus calliurus*.

### References

- Paulo, J. *Buntbarsche Bulletin*, No 117, December 1986, pp 2-10.  
Richter, H.-J. *TFH Magazine*, June 1987, pp 10-15.

ADVERTISEMENT FEATURE 

# "If you could see the chemicals in tapwater, would you still do this to your fish?"

asks Les Holliday  
Aquatics Adviser to Hagen (UK) Ltd

**Whilst our drinking water is treated by the authorities to make it absolutely safe for us to drink, it isn't good for fish. Even minute traces of chlorine can damage delicate gills, causing distress. In some areas tapwater can have chlorine levels over 75 times the acceptable limit for aquatic life! Tapwater may also contain chloramine and traces of heavy metals like iron, lead and mercury - all potentially toxic to fish.**

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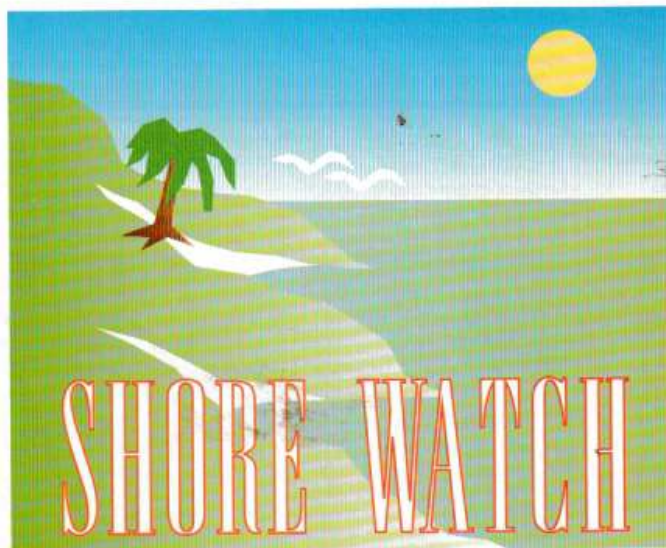


water change, always treat the water with Aqua Plus to eradicate all traces of chlorine and chloramine and neutralise metal ions before exposing fish to it. Your fish will benefit from the P.H.E. (Pure Herbal Extracts) contained in Aqua Plus too. This rich supplement of essential oils visibly reduces transport stress and has a calming effect on most fish. Transportation and handling may strip away the protective mucous coating on scales and fins leaving the fish vulnerable to lesions and disease. The unique ingredients in Aqua Plus also provide protection while their natural mucous regenerates. Developing good habits in water management is the best way to prevent problems in your aquarium, so when you think water: think Aqua Plus first.



No fish were used in the production of this photograph.





More than just pond-dipping the art and science\* of rockpooling is approached in a systematic way. It needs to be. First of all you have to arrive when the tide is out, preferably before the lowest possible point in the tidal cycle. The seaside naturalist has to consult the Tide Tables; when the tide comes the furthest up the shore, about six hours 25 minutes later it will also recede the furthest, uncovering rock pools and rocks that can be turned over to reveal the life sheltering under it or actually living on the rock itself. Be careful and return the rock in exactly the position and the same way up as you found it. If you place the rock back upside down, the attached life will perish.

### WHAT IS IT?

This is the first question that a child is likely to ask. A parent can usually satisfy the curious youngster with general answers of Crab, Snail, Prawn, Starfish, Sea Anemone, Barnacle, Hermit Crab,

*The Beadlet Anemone, Actinia equina, is found in red, greens and browns. Out of water the tentacles retract and the anemone looks like a blob of jelly.*

PHOTOGRAPH: ANDY HORTON



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.*

seaweed, fish, etc. "What is the fish called daddy?" Now things are getting decidedly tricky.

Over 40 different fish are regularly found between the tides. Any modern natural history book of British wildlife will show coloured drawings, but enthusiasts will need a specialist book. The common

fish of the shore are the sandy coloured Gobies that are left behind in shallow pools by the ebbing tide, the Blenny, or Shanny, *Lipophrys pholis*, a small green fish found under rocks, and small greenish-brown Wrasse that can be netted in pools, probably the Corkwing, *Crenilabrus melops*.



The predatory Bullhead, or Sea Scorpion, *Taurulus bubalis*, is common in most areas. But there are many other fish that are regularly found including the Rocklings, Butterfish, Pipefish and Clingfish.

Only for accurate biological recording and long term aquarium study is it important to get the exact name right. For a child's education it is really only necessary to put a general name to the animal or plant (fauna or flora).

### WHAT LIVES WHERE?

This is the best thing for the parent to know rather than repeating a list of names.

One feature that may be missed until it is pointed out is the changing nature of the shore as you move down towards the sea. The extent that the tide will move up the shore will be marked with a strandline of seaweeds and other debris on shingle and some of the rocky beaches. If this strandline is not present, the limit of the rising tide has to be deduced from the position of the Barnacles and Limpets on the rock.

These animals need



The Blenny, *Lipophrys pholis*, is a common fish on the shore during the summer.

PHOTOGRAPH: ANDY HORTON



to immerse themselves in seawater to feed, but can go for days without feeding when the tide does not come up far enough. When the tide goes out the Acorn Barnacle closes its limestone plates, and the Limpet clamps its shell hard down on to the rock to keep in the moisture until the next high tide.

As you go further down the shore the type of dominant brown seaweed changes to the Bladder Wrack, *Fucus vesiculosus*, which is easy to recognise because of the air bladders on the fronds. These keep the seaweed buoyant and nearer to the sun when submerged.

This area is known as the Middle Shore Zone. Beadlet Anemones, *Actinia equina*, will be discovered in the pools with their tentacles expanded or exposed on the rocks and groynes with their tentacles retracted and looking like a blob of jelly.

In the Lower Shore Zone the seas resemble the sea itself in terms of the vital dissolved oxygen content and other important variables like the sea temperature and salinity. The omnipresent brown seaweed in this zone is the Serrated Wrack, *Fucus serratus*, which has a saw-like edge to its frond which is easily seen when

looked for.

As you go further down towards the low tide mark the small marine life is both more varied and greater in overall numbers. If the pools are big enough the young of larger fish like the Bass, *Dicentrarchus labrax*, may become trapped, at least in the south and west, and adult Wrasse may swim in to the pools with the advancing tide and remain unaware that all around on the shore the sea has gone out.

### FAQ: IS IT A PRAWN OR A SHRIMP?

There is no absolute correct answer as both names are used for anything small and transparent and vaguely resembling an insect under water. Neither are insects but both are crustaceans related to the crabs. The one with the long legs that is found in amongst the weed in the pools is the Prawn.

The Shrimp is the sandy-coloured flattened creature that buries just below the surface of the sand.

See the BMLSS (England) Web page for photographs, illustrations and more information.

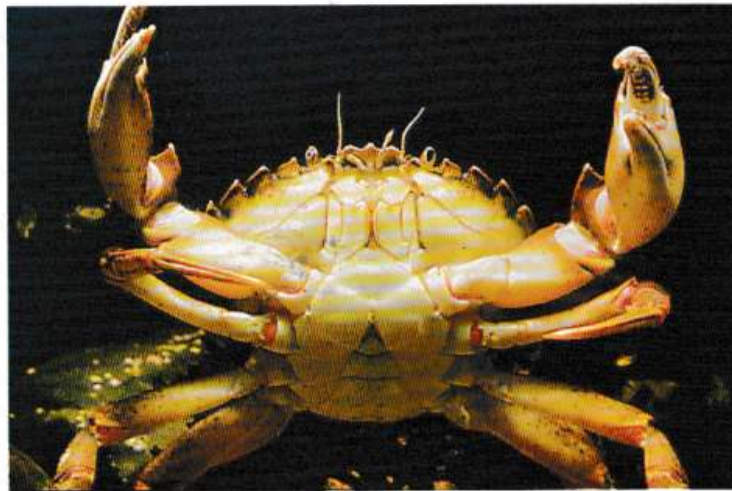
### NORWEGIAN CORAL REEF

True coral reefs are usually thought of a feature only found in shallow tropical seas. However, several miles off the southern Norwegian coast there is a true coral reef of the hard coral, *Lophelia pertusa*, on the Sula Ridge. The reef is 13km long and at depths of over 300m.

Photographs of Norwegian undersea life can be viewed on Frank Moen's World Wide Web site accessible through the BMLSS (England) Homepage.

### NOTE

\* Some people waste their time deciding whether a subject is an art or a science. This can apply to aquarium study. It is worth remembering that every great work of art or scientific invention had its origins in the observation of nature.



The Shore Crab, *Carcinus maenas*, is a highly successful inhabitant of shore because it is an aggressive feeder on a variety of inter-tidal animals: worms, shrimps, carrion, etc.

PHOTOGRAPH: ANDY HORTON

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







# Out About



## A&P views the opening of the National Marine Aquarium

PHOTOGRAPHS BY  
A&P LIBRARY

▲ TOP OF PAGE National Marine Aquarium, Plymouth.

ABOVE National Marine Aquarium Moorland Stream.

So it rained, but that didn't dampen the enthusiasm of all those invited to the preview day of the opening of Britain's latest aquatic attraction, the National Marine Aquarium at Plymouth.

You are invited to take on the guise of a young Salmon, high in its spawning waters on one of the lofty Tors on Dartmoor. Here in the highly-oxygenated water you gather strength for the downstream adventure of a lifetime travelling through rivers to the estuary and out to sea.

This journey, Moorland Stream to Estuary, actually is a physical descent through the floors of the Aquarium's building set in Sutton Harbour in the Barbican area of Plymouth.

Along each corridor (lit with airline flooring type lighting for ease of navigation) you emerge into various sections which all have their own special interests.

One great bonus is that in the early displays high up in the building natural daylight allows you to see the natural colours of the fishes,

particularly the Corkwing Wrasses as they move in and out of the seaweeds and the iridescences of the shoaling Mulletts.

The Sea Horse 'stable' is one very special highlight: here, in the Marine Conservation Centre, you can see these fascinating animals in close up and learn about their own breeding arrangements — men of a nervous disposition should brace themselves! Pipefishes are also found in this part of the Aquarium.

The large rockpool in the entrance area contains some of the largest 15-spined Sticklebacks (*Spinachia spinachia*) you are ever likely to see.

If you've never become acquainted with a Lump sucker (*Cyclopterus lumpus*) then you'll find one in the large tidal Shoreline Aquarium (complete with waves) beneath the large windows.

The Deep Reef Tank, the Museum's centrepiece, holds over half a million litres of water and a window which weighs 17 tonnes through which you can see sea life based on observations made around the Eddystone Reef which lies off the Devon Coast.

Here you'll find the living version of your fishmonger's slab — you could imagine a portion of chips around practically anything which swims past!

From the grey-blue tones of our home-grown fishes the next display is a flash of bright colour for, despite its name, the National Marine Aquarium is not just concerned with British native fishes but also gives visitors a glimpse of aquatic life both on the coral reef and in the ocean depths.

The Coral Reef is somewhere you'll have difficulty dragging marine fishkeepers away from but

just around the corner lies yet another 'must see' display — The Shark Theatre! In this equivalent of an underwater cinema, the 'mean machines' glide to and fro, constantly patrolling their beat.

Unfortunately, visitors expecting a diver/shark confrontation at feeding times are in for a disappointment; unlike the Deep Reef Tank, where divers hand-feed the fishes, here the Sharks are fed individually from the surface — as well as reducing obvious risks to the divers human intrusion is kept to a minimum so that the Sharks have as natural an existence as possible.

Like all good aquariums the National Marine Aquarium is designed from inside outwards, with the requirements of the fishes coming first. Only when this had been completed and the filtration and programming control systems installed was the needs of visitors taken into account. We are obviously the outsiders into this new undersea adventure and around 16,000 people can vouch for that as Plymouth's latest attraction opened its doors.

The National Marine Aquarium is at The Fish Quay, Plymouth, Devon PL4 0LH. Tel: 01752 600301. Fax: 01752 600593. Website: [www.national-aquarium.co.uk](http://www.national-aquarium.co.uk)

A Membership Scheme offers all year round visits (as many as you like) from £15. Open daily (except Christmas Day) from 10am to 6pm. Admission prices are £5.99 Adult, £3.99 Children, Family Ticket (two adults, two children) £17.99. There are concessions for Senior Citizens, Students, Schools and pre-booked groups.

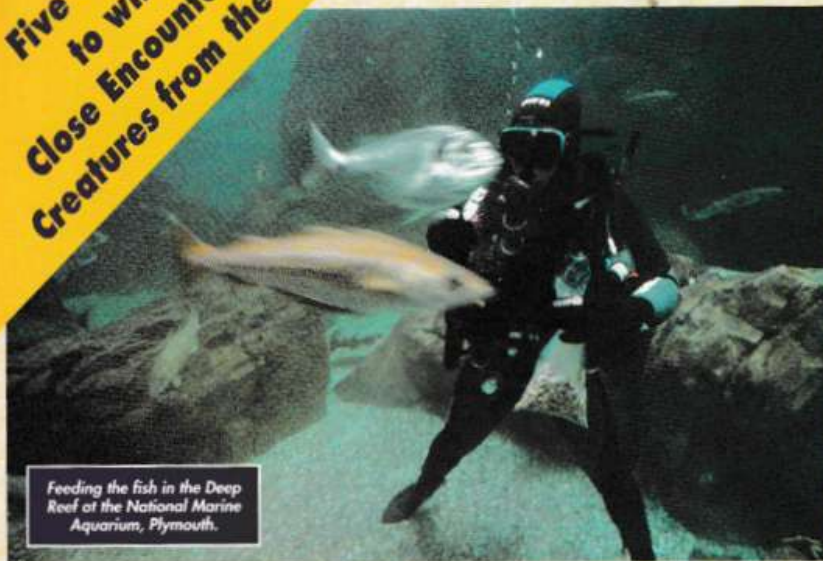
● See A&P Competition for Family Tickets in this issue.





**Five chances  
to win a  
Close Encounter with  
Creatures from the Deep!**

## NATIONAL MARINE AQUARIUM COMPETITION



Feeding the fish in the Deep Reef of the National Marine Aquarium, Plymouth.

This month we are giving away sets of family tickets to the stunning new National Marine Aquarium in Plymouth to the first five entrants who can give the correct common names to the fishy creatures' scientific names listed below.

If you are one of our lucky winners you, your partner and two children could be on your way to the West Country for an unforgettable journey through the vast oceans of the world.

The National Marine Aquarium, situated in the heart of Sutton Harbour in the historic Barbican area of Plymouth, is a world class aquarium with a mission to entertain as well as inform people about the aquatic environment through living exhibits and programmes of education, conservation and research.

During your visit you'll walk through the high Dartmoor landscape with its bubbling mountain stream, following the path of the salmon's journey, down through an estuary and out to the seashore where the 5m Wave Tank and interactive Discovery Pools allow visitors to enjoy marine life at close quarters.

You'll also see the UK's largest collection of Seahorses and learn about the ground-breaking conservation work being conducted to protect this seriously-endangered species.

The next part of the journey takes you to the huge Deep Reef Tank for a spellbinding view of hundreds of marine animals which live in the sea way down beneath the waves. Then it's on to

warmer oceans and the coral seas to see brilliantly coloured, often weird, and sometimes deadly, fish and invertebrates.

The finale is a visit to the Shark Theatre where Sand Tigers, Brown and Nurse Sharks — the world's oldest living predators — glide in over 700,000 litres of sea water, just a fin away from where you'll be standing!

The National Marine Aquarium, The Fish Quay, Plymouth, is open seven days a week from 10.00am to 6.00pm and has a Restaurant, Gift Shop and car and coach parking facilities. Ticket prices are £5.99 for an adult, £3.99 for a child, £4.99 for Senior Citizens and £17.99 for a family of four. Annual Membership is available at £25 per person or £55 for a family of four.

For further information please call Judy Ditchburn, JDPR, on 01494 882105, fax: 01494 881363, or Simon Bradley, Head of Marketing, National Marine Aquarium on 01752 600301, or fax: 01752 600593.

To enter our competition simply answer the questions below, on a postcard or sealed-down envelope, and send to: National Marine Aquarium Competition, MJ Publications Ltd, 20 High Street, Charing, Ashford, Kent TN27 0HX, to reach us by 22 August 1998.

### THE COMMON NAMES FOR THE FOLLOWING MARINE ANIMALS ARE:

*Conger conger?* .....

*Homarus gammarus?* .....

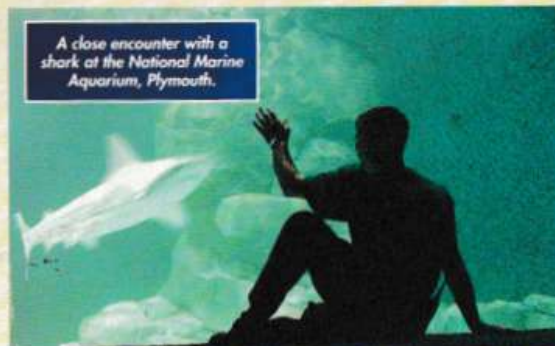
*Raja montagui?* .....

*Salmo trutta?* .....

*Solea solea?* .....



Juan Romero, curator of the National Marine Aquarium, Plymouth, in front of the Deep Reef Tank.



A close encounter with a shark at the National Marine Aquarium, Plymouth.

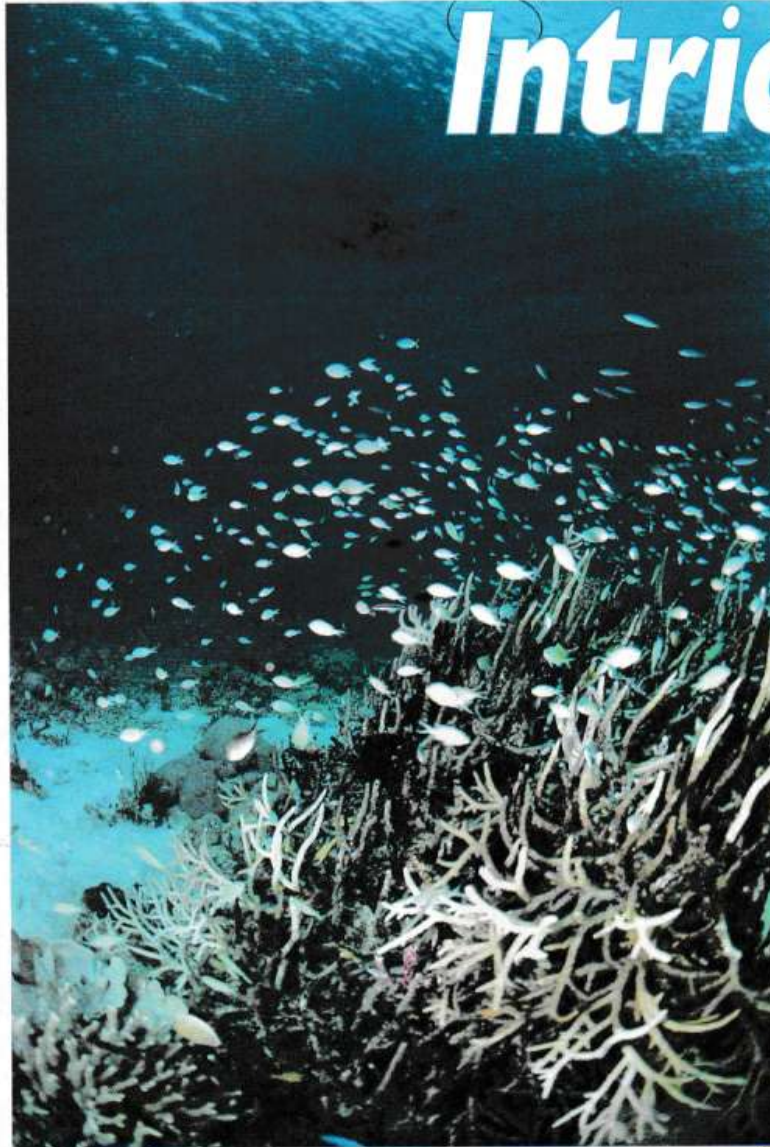


**Annie Mercier and Jean-François Hamel** investigate close aquatic relationships

PHOTOGRAPHS BY THE AUTHORS

# Intricate

Marine aquarium enthusiasts have probably witnessed several fascinating relationships since the oceans, especially coral reefs, conceal an astonishing array of symbioses



Damselfish live in close association with branching coral formations.

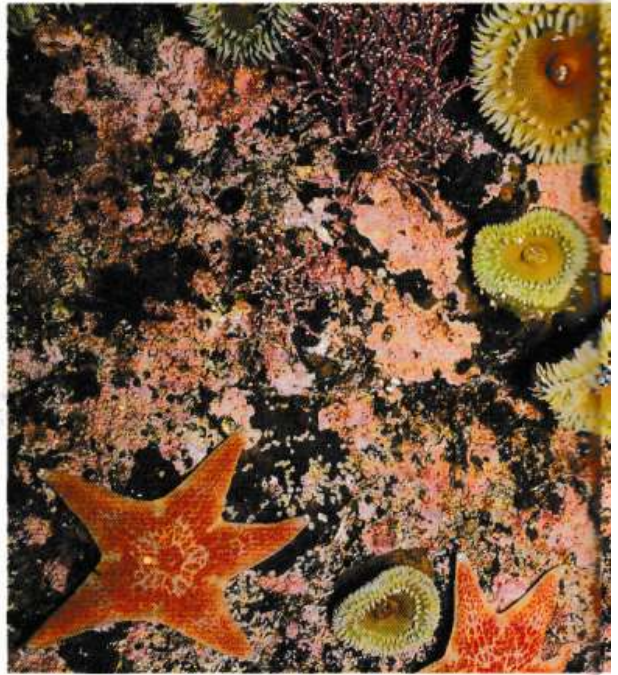
In its strictest and purest definition symbiosis occurs whenever two organisms are living together. When symbiosis is beneficial to both associates it is further defined as mutualism, when only one partner is favoured without disturbing the other it is termed commensalism and, finally, when an

organism lives at the expense of the other, it is known as parasitism.

Marine aquarium enthusiasts have probably witnessed one or several of these fascinating relationships since the oceans, especially coral reefs, conceal an astonishing array of symbioses. The often unlikely and sometime unnoticeable alliances have seduced divers, photographers,







The first example of symbiosis that usually comes to mind is that of the weird little fish that live among the sweeping tentacles of their cnidarian host. Is this relation commensal or mutualistic?

### Clownfish and Sea-anemones

How and why do they occur, what maintains their delicate balance and can they withstand the aquarium confinement? Let us try to find out.

# Symbioses

Some biologists have argued that only the fish really benefit from the association. Since they are poor swimmers Clownfish, which are also called Anemonefish, become easy prey to larger fish if they cannot dive into the safety of the tentacles. In fact, Clownfish are obligate symbionts, never occurring outside anemones in the wild, whereas host Sea-anemones do occur alone in the sea, which is why some say they gain nothing from the partnership. Nonetheless, it was found that Sea-anemones, *Entacmaea quadricolor*, fall prey to Butterflyfish when Clownfish are removed from them. Thus, that particular species evidently needs protection from its fish associates.

**BELOW** The true Clownfish, Amphiprion percula, is among the most popular clownfish on the market today.

**BELOW LEFT** Sea-anemones, *Anthopleura xantheogramma*, benefit from their symbiosis with algae mostly when they find themselves stranded during low tide.



engage in symbiosis with microscopic algae, Zooxanthellae or others. Among them you will find species of Tunicates, Ctenophores, Annelids, Echinoderms and Flatworms. Even the popular Giant Clam conceals symbiotic Zooxanthellae. Contrarily to what happens with corals and Sea-anemones, the symbiosis in the case of Giant Clams remains external.

The algae are localised not in the cells but in a specialised realm of tubules that spreads in the mantle of the mollusc. The other aspects of the relationship are somewhat similar. By the way, the electric hues of the famous clams are not imparted by the algae, as is often insinuated. The algae transmit their own golden-brown colour to the mantle while tiny platelets contained in iridophores are responsible for

### INTRICATE SYMBIOSES ... investigation of close aquatic relationships

the turquoise shades and subtle iridescence.

### Bacteria and marine animals

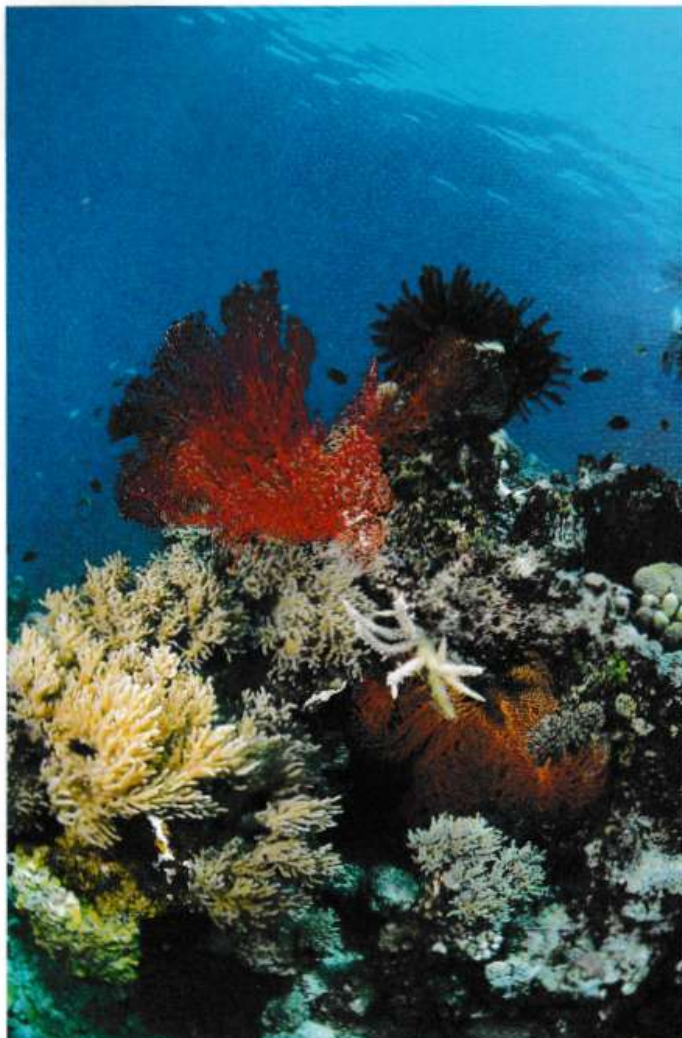
A number of deep-water creatures harbour luminescent appendages designed to protect them against predators or to attract

potential prey. Some fish from shallower habitats also use a brilliant lure to draw small organisms close to their mouth. Those subterfuges are made possible courtesy of symbiotic bacteria which are able to chemically produce light.

Bacteria are very popular symbionts in the marine world. To enumerate each of their contributions would be boring, especially since they are usually invisible to the naked eye. The above case is among the most obvious and beautiful illustration of a bacterial symbiosis.

Another one worth mentioning occurs around hydrothermal vents where bacteria living in the tissues of certain Clams and Worms enable them to process the harsh chemicals emitted by the vents as a source of energy.

In order to provide their algae partners with the proper lighting, symbiotic corals always colonise shallow waters.





## Miscellaneous

An infinite variety of symbioses occur in the sea and can eventually be brought to the aquarium. For the purpose of camouflage alone, many species have formed very profitable partnerships. Think of the famous Decorator Crabs who relentlessly prune the garden of invertebrates that grows on their carapace: a kaleidoscopic mix of Hydroids, Bryozoa and Sponges. While the crab profits from the disguise, the 'hitch-hikers' take advantage of the particulate food disseminated by the foraging crab.

A similar relationship exists between certain species of Hermit Crabs and Sea-anemones. The stature of the crab is increased by the presence of the anemone on its home shell and the stinging tentacles add to its protection. The benefit for the Cnidarian is more obscure, although some species of sea-anemones like *Calliactis miriam* are found almost exclusively on Hermit Crab shells and we can postulate it brings them mobility and an increased source of food.

Passive and slow-moving invertebrates often become shelters to small fish, molluscs or crustaceans which may be

## INTRICATE SYMBIOSES ... investigation of close aquatic relationships

commensals or parasites. Sea Cucumbers are prime targets: many species such as *Holothuria scabra* harbour Pearl Fish in their cloaca and others sometimes even the same species, host Pea Crabs in their respiratory tree. While Pearl Fish move in and out of their live cave through the anus many species of Pea Crabs are permanently

Anne-Marie Mercier and François Hamel are members of the Society for the Exploration and Valuing of the Environment (SEVE), 1003 Chemin de la Montagne, Orford (Quebec), Canada J1X 3W3.  
Tel/fax: (819) 843-7005.  
E-mail: seve@sympatico.ca

anchored in a cyst and may cause an atrophy of the host's respiratory tree.

Tiny crabs or Snapping Shrimps are often found in close association with coral colonies of the genus *Pocillopora*: whenever a Crown-of-Thorns Starfish, the famous coral-eater, comes too close, the crustaceans pinch its tube feet and make it flee from their home territory. Porcelainid crabs frequently cohabit with Clownfish in a host anemone; other tiny crustaceans are common on Echinoderms and Cnidarians. Large Jellyfish can shelter an entire microcosm of invertebrates and fish.

Finally, transitory or sporadic symbioses are infinitely diversified as they include all types of Cleaner Fish and Shrimps.

This short incursion into the strange world of symbiosis is by no means exhaustive. So many beautiful or weird combinations can be observed in the natural habitat. The aquarium hobby has contributed significantly to the comprehension of many of them throughout the years. With a good eye and a lot of patience no doubt you can observe and appreciate some of the symbiotic relationships we have presented and dozens more. Perhaps you will even discover new ones?

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Solesbridge Mill Watergardens is on a picturesque, carefully tended site by the river - the perfect setting for a family day out.

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The appearance, behaviour and size of our fish are a reflection of the care we take to make sure they are healthy and in perfect condition when they reach your pond.

We offer a large range including Goldfish, Golden Orfe, Koi Carp, Shubunkins, Golden Rudd, and Green and Golden Tench. However, we only supply varieties which are suitable for garden ponds and can cope with our climate, with many being English bred.

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Solesbridge Mill is one of the few water gardens with its own on-site nursery. This ensures we have a wide and varied range of fresh, top quality plants available all year round and can offer our customers expert advice based on our own experience of plant keeping.

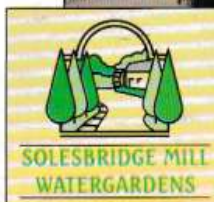
### Complete range of dry goods

We also offer a complete range of dry goods for the water gardener and we will be happy to order in anything we do not hold in stock.

### Customer care

We do everything we can to ensure we offer the highest level of customer care from giving extensive advice before you buy, to an excellent after sales service.

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Solesbridge Mill why not call in and see us  
- it's the perfect choice.



# The Aquarist 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. July 1948 threw up this selection of topics ...

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Editor Alec Fraser-Brunner came up with some historical reasons why we, in Great Britain, seem to have more ponds (or attach more attention to them) than other countries; he put it down to our feudal system which, although disrupted at aristocracy level by one Oliver Cromwell, had instilled into the common man the ambition of having his own property in a piece of land. All this was a preamble to welcoming visitors to the *A&P* Stand at the *Evening News Flower Show* at Olympia that summer where some furnished aquariums would also (it was hoped) appeal to those gardeners owning greenhouses.

Strange creatures fish, and none more so than the American Flagfish (*Jordanella floridae*) owned by a Mrs A. Burnet. Not for this fish the reputation of a pugnacious character but quite the reverse — it made a habit of rubbing up against a female Guppy! Not an isolated case, it appears, for this happened whenever there was a female Guppy around!

The virtues of floating plants were extolled in another short item by 'J. H.' (no doubt Jack Hems, a regular contributor) in respect of their value to young fry. Not just a safe haven offered by dangling roots but also a food store of microscopic live foods was to be found there too. A practical

suggestion of having shallow water, to cut down the time fry were at risk travelling to this food store/refuge, was also a useful bit of advice.

The new Hastings Aquarium opened on July 12 and provided some interesting species, notably some 'Coolie' Loaches (*Acanthopthalmus semicinctus*) the first seen since the war. An appeal for freshwater plants from local aquarists was made in order to stock the new exhibit tanks.

Members of Ilford & District A and P Society learned much about 'Live Foods' during a talk by their Chairman, Mr Mullings, and July 1948 was a particularly busy month for the Society with a visit to London Zoo Aquarium, exhibiting six aquariums at the local Horticultural Show and arranging a new meeting place, the Gants Hill Library.

Similarly busy was Southampton & D.A.S. who presented an aquarium to the local Children's Hospital and planning an exhibition at the Trades exhibition to bring the hobby to the attention of the public.

The Isle of Thanet Aquarist Club held its first meeting at the Aquarium, The Lido, Cliftonville, Margate, and subsequent meetings were at the same venue on the first Tuesday of each month.

No less than 180 show tanks were being loaned by East London Aquarists' Association

to West Surrey Pondkeepers' and Aquarists' Club for their Show, held in conjunction with the Guildford Allotment and Gardens Association over the Bank Holiday. A Committee 'deliberate decision' was made to make the Show non-competitive in order to maximise the number of 'set-ups' on display.

Still with Furnished Aquaria, the first two Classes in the Show of Exotic Fish staged by the Enterprise Aquatic Society were open for entry from any Aquarist Club. The remaining Classes were open for entry to any aquarist.

Watford Aquarists Society also joined forces with the Watford Allotment Holders' Society to stage its Annual Show.

Leeds & D.A.S. held a three day exhibition including 30 Furnished Aquaria designed particularly to attract the general public to the hobby.

Fishkeeping on a large scale was described by Dr C. F. Hickling, Fisheries Adviser to the Colonial Office. This was, in fact, a study of fish farming (of food fishes) in the Middle and Far East areas. Of particular interest was the list of 'ingredients' added to ponds to act, either directly or indirectly, by manuring action, as food for the growing fish — oil cake, cut grass, silkworm faeces among others! Fish culturists judged the productivity of ponds by examination of contained plankton and acidity of the water was judged by taste! In general breeding was not attempted, wild-caught fry (in their millions) were used for stocking. However Common Carp were bred and the Gourami, *Osphronemus olfax*, and, here again, some ingenuity was in evidence in respect of spawning media used — brushwood and coconut fibre. The risk to human health by malaria-carrying mosquitoes also likely to breed in the ponds was also noted but apparently if pond plants were kept to a minimum the fish took care of the mosquitoes.

A feature of this issue was the 'Supplement' consisting of a colour artwork portrait of *Danio malabaricus* (now *D. aequipinnatus*) by the Editor, Alec Fraser-Brunner.

## The Evening News Flower Show



# BUY LINES

## NEW PRODUCT REVIEW

### ALLSHADE

The seasonal growth of blanketweed and green water seems to be more reliable than the sunshine which is supposed to encourage it.

However, the time will come when the sun does shine but in the meantime a certain amount of UV is getting through the clouds, anyway.

Shading a pool will cut down algae growth as well as reducing wind chill and temperature fluctuations; who knows, it may also hide the pond from patrolling

herons, too.

Shadecloth, from Allshade, can fulfil all these tasks; it's made from extremely strong, durable, rot- and UV-proof high density polyethylene material which is capable of screening out between 65 and 94 per cent of harmful UV.

Protected from sun, rain and wind the stabilised conditions over your pond will maximise your fish and plant growth.

Shadecloth is available in 5m x 3m, and 10m x 3m rolls, and comes in a choice of colours — black, green,

white, dark blue, light blue and brown, and in shade factors from 30 to 85 per cent — is detergent washable, and features reinforced eyelets for easy erection.

**A&P READERS' OFFER:** Allshade are offering Shadecloth in 70 per cent black or 50 per cent green to readers of *Aquarist* and *Pondkeeper* at a reduction of at least 10 to per cent off normal prices (inc. VAT).

70 per cent black — 5m x 3m, £35; 10m x 3m, £55.

50 per cent green — 5m x 3m, £40; 10m x 3m, £60.

Postage and packing rates per order are £6 (for 72 hour delivery), £8 (48 hours) and £10 (24 hours). Personal collection is possible but prior arrangements must be made.

• Further details from: Allshade Europe, 6 Eastfield Court, Ringwood, Hampshire BH24 1US. Tel/Fax: 01425 475423.



Stay cool with shadecloth pond cover from Allshade.

### ARCADIA

The trouble with fishkeepers is they will improvise!

How many times have you heard someone brag about how something or other often quite unconnected with fishkeeping was pressed into service with some degree of success (although usually at an apparently great financial saving?)

Take lighting, for instance. Once fluorescent lamps became more popular than tungsten bulbs all manner of colour-spectra were advocated for aquarium use from quite unlikely sources.

Arcadia have now decided that it's time to stop pussyfooting around with 'make do and mend' attitudes and have launched a range of lighting specifically designed for almost everything you can think

of in the aquatic and semi-aquatic worlds of fish and herptiles.

Not, as that last sentence might have inferred, as a broad-based 'suit everything' lamp, but, as a result of research into the separate requirements of freshwater and marine fish, and reptiles, the definitive aquatic and reptile lamp range.

There are two freshwater lamps — Arcadia Original Tropical and Arcadia Freshwater; the two marine lamps are Marine White Lamp and Marine Blue Actinic, with the D3 Reptile Lamp completing the range.

Naturally, each lamp comes in several sizes to allow you to pick the right lamp for any specific requirement and tank or vivarium size.

The Reptile Lamp and Freshwater Lamp sizes start at 18in with the Marine Lamps coming in at the 24in size.

Extra sizes between these bottom sizes include 30in, 36in, 42in and 48in in most aquarium situation cases.

The Reptile Lamp's top size is 36in.

You can see these new lamps at dealers' point-of-sale positions where all the information you may need to select the correct lamp will also be available.

The trade got their first glimpse of the exciting new range at the recent Pet Index (see next month's *A&P*).

• For further information about Arcadia's full lighting range and associated equipment phone the Arcadia Sales Hotline on 0181-251 5533.

Alternatively, visit their website on <http://www.arcadia-uk.com> or write to: Arcadia House, Cairo New Road, Croydon, Surrey CR0 1XP. Tel: 0181-251 5522. Fax: 0181-251 5500.



## The Conscientious Marine Aquarist

Author: **Robert M. Fenner**

Publisher: **Microcosm**  
Price: **£35.95**  
ISBN: **1-890087-03-3**

## Natural Reef Aquariums

Author: **John H. Tullock**

Publisher: **Microcosm**  
Price: **£29.95**  
ISBN: **1-890087-01-7**

With the amount of knowledge and technological reliability available these days any aquarist teetering on the brink of going 'marine' should have no fears about plunging into the unknown alone.

In fact, the marine aspect of fishkeeping has now become so established that it can be recognised as a separate interest, not requiring previous apprenticeship of gaining practical experiences in other fishkeeping areas. Whilst this may come as a surprise to some it does mean that there will be no previous-acquired habits to be unlearned.

Both these books have much in common (apart from the same parent publisher) as you might expect from two titles covering very similar subject matter and whilst the coverage by both is extremely comprehensive, each author has seized upon a presentation that is easy to understand.

Bob Fenner has subtitled his work as 'A Commonsense Handbook' whilst John Tullock makes no bones about his being a 'Simplified Approach'. (I hope both authors will tolerate this combined review to their books as I feel both books are complementary to each other and deserve to be used together as well).

Probably the most important message in all of Bob Fenner's huge (432 pages!) book is not the 'How' but rather the 'Why?' or even 'Should we?' when it comes to keeping marines. He makes the interesting (and sobering) point that there is a wide gulf of understanding between those that catch the fish and those that keep them; quite simply, long words such as

conscientiousness and commonsense can both be replaced with a short 'best of all' — caring.

John Tullock also believes there is mileage in keeping things simple, believing biology should replace technology and, again, emphasising that a complete understanding of how all the various natural components react with (and against) each other to achieve a microcosmic balance.

John also makes an interesting early point — that with their mainly sedentary, invertebrate-based contents, reef aquariums are often easier to keep than those with fish populations whose constantly moving around activities often impinge on other fishes' territories and ideas as to how aquatic life ought to be.

Neither author is unduly impressed by the huge displays of large fishes found in public aquariums; both feel that more fascinating information can be found within the confines of the smaller home marine aquarium where individual lifestyles of both fishes and invertebrates can be examined from the comfort of your own armchair.

More importantly this home-attained 'awareness' of the delicate balance of the ecosystems involved helps enormously with conservation and humane collecting encouragement programmes.

Let's face it, even the best managed, technologically-perfect aquarium would be useless without a supply of healthy fish to fill it.

Both books are sumptuously produced and packed with information. Neither author shirks the responsibility of telling you what should not be done and produces excellent reasons for advising you so.

Bob Fenner's book, for all its comprehensiveness, might be categorised as a 'primer' (less than half is devoted to setting up, the rest is aquarium-suitable fishes and invertebrates) whilst John Tullock's work obviously takes things much further into a

specialised field.

Both accommodate all the latest system designs — Berlin, Jaubert etc — and represent the most up-to-date 'where it's at' current thinking; either work provides a highly-readable (you'll be back for more!) foundation for successful marine keeping. Commonsense and simplicity win every time.

**DICK MILLS**

## Seasons of the Whale

Author: **Erich Hoyt**

Publisher: **Whale & Dolphin Conservation Society**  
ISBN: **1-901386-03-1**

This is the story of Atlantic whales by a serious science writer; an account of whales in their natural environment with information about the oceans so that the reader can appreciate the world in which the remnants of the whale population still survive. There are 15 species of whales and a further 15 species of dolphins and porpoises in the North Atlantic Ocean.

There is lots of interesting information in this 100 page glossy paperback and I know from my experience from enquiries that this book will answer many of the questions asked. The subject matter can be found in the index.

However, the account reads more like a novel than a text book following the whales on their annual migrations. Almost every page has some of the best whale photographs I have seen in a book. After man has stopped the wholesale extermination of whales they are still threatened extensively by pollution and discarded fishing gear, and throughout the book these issues are explained in a way that promotes greater understanding rather than a scare story.

There are some vivid descriptions of the behaviour of

particular animals; one example worth looking at in the book shop is the second paragraph on page 46 beginning: "Tail flukes moving up and down ...", which is really quite cleverly written.

This is a classic book for all whale watchers and, therefore, should also appeal to all fish watchers.

**ANDY HORTON**

## Whales & Dolphins

Authors: **Mark Carwardine, Erich Hoyt, R. Ewan Fordyce, Peter Gill**

Publisher: **Harper Collins**  
Price: **£17.99**  
ISBN: **0-00-220105**

This book is the latest in the excellent new series by Collins on various subjects of the natural world.

The amount of accurate information packed into its 288 pages is astounding and it is a very good book to read to get informed about whales, dolphins and porpoises throughout the world.

Most, but not all, of the world's species are included in the identification guide that shows colour photographs of every featured species, which should be very helpful in the tricky job of identifying them.

The Harbor Porpoise, *Phocoena phocoena*, shows only the fins in a very small photograph, but most of the photographs show the whole mammal, or in the case of the large whales a substantial proportion.

The strong point of the book is the general information on the whales and dolphins and the undersea world in which they live, including conservation issues, high-tech. research (including DNA fingerprinting), the mystery of strandings, social behaviour, conservation issues, evolution and much more.

There is a chapter by Eric Hoyt of where to go to see the big whales and a bibliography and list of organisations.

Mark Carwardine is well known as an expert on cetaceans and his excellent standard of writing is maintained in this useful book.

**ANDY HORTON**

# BOOK REVIEWS



**Derek Lambert** flings his net one last time

PHOTOGRAPHS BY THE AUTHOR

# The A&P Costa Rican Quest

The sheer natural beauty of the area we drove through to reach San Isidero de la General was breathtaking.



**T**he next day dawned bright and clear. We had a pleasant breakfast before hitting the road at about 10am. Our aim today was just to drive straight through to San Isidero de El General. This drive took the better part of the day and included some spectacular areas through mountain scenery which took our breath away.

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The drive to San Isidero de El General took in some spectacular areas through mountain scenery which took our breath away

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We stopped frequently to take

photographs of the flowers, insects and other animals which added to the sheer beauty of the area. We arrived in the city just as darkness was falling but found the hotel without any problems. After checking in we moved all the fish into our room and set about looking them over and filtering the water. Despite the long drive there were few mortalities and most collections looked good and strong.



## 'Rest and Recuperation' Day

The next day was scheduled as a 'Rest and Recuperation' Day with but one location on the agenda. In last month's article I mentioned both Dave McAllister and Dan Fromme had recommended the Motel Del Sur as a base to work from, but they did so for different reasons. Dave suggested it because it was in a convenient location and a good hotel. He had used it on each of his five trips to this area in search of *Brachyrhaphis terrabensis*.

Unfortunately, he had only ever found a few small fry of this species which failed to survive the journey home. Dan, however, suggested it because it was a good fishing location in its own right. In fact, he said the Quebroda which flowed through the hotel grounds was a prime location for *Brachyrhaphis terrabensis*!

Now as an experienced fish collector I know that fish come and go from locations to a certain extent but it turned out Dave and his companions had never even found this stream through the hotel grounds. Once there I could see why — to reach it you had to go past not just one bar but two. They had just never made it far enough down the garden to see the river or remember it if they had!

## Photographed the area first

Now Arthur and I decided to leave fishing the stream until later in the day and concentrate on taking photographs of the area first. This lasted all of an hour before I saw a few fish swimming about in the stream and had to nip back to the room to gather the fishing gear. I made it into the river first (Arthur must be slowing down) and in the first sweep of the net pulled out a lovely pair of *Brachyrhaphis terrabensis*.

More followed as did a whole host of other fish. *Paeciliopsis retropinis*, *Paecilia gillii*, *Pimodella boliviana*, *Rhombia guatemalensis*, *Hyphessobrycon savagei*, *Bryconamericanus* sp. and Cichlids.

Later on I was to find out we had two species of *Brachyrhaphis* in this collection. Whilst the large bulk of them were *Brachyrhaphis terrabensis* we also caught some *Brachyrhaphis rhabdophora*. The *B. rhabdophora* had a very high dorsal fin compared to those I had seen before and this was what made me think they were all the same species.

The same thing happened years

ago to a team of German collectors but they were never discovered their mistake and actually distributed *Brachyrhaphis rhabdophora* as *Brachyrhaphis terrabensis*. To tell the species apart you need to count the dorsal fin rays. In *B. rhabdophora* there are eight to 10 whilst in *B. terrabensis* there are 12 to 14 rays. The dorsal fin also has a much longer base to it.

**BELOW**  
*Brachyrhaphis roseni* male.

**BOTTOM OF PAGE** Female *Brachyrhaphis terrabensis* from the Quebroda in the grounds of the Hotel Del Sur.





## Aquaria large enough

After a little while a security guard came over to see what was happening. He was very friendly and within a few minutes had shown me where the large catfish and cichlids could be caught. These were eaten by the local people (including the hotel guests) and made a tasty meal.

Arthur caught a few of the *Pimelodella* Catfish and, despite knowing how big they grow decided to take them home. Having worked for years with Snakeheads he has aquaria which are large enough to hold such creatures and also knows how to look after them properly. We spent much of the day fishing this stream and it was certainly all the R&R we needed. The water tests came up with pH 7.3/GH 3/KH 2.

Next day we headed south to another location for *Brachyraphis terrabensis*. This species is generally split into two forms. The rarer and harder to find one comes from the area around San Isidoro de la

## THE A&P COSTA RICAN QUEST ...

*flinging his net one last time*

General (this we already had), but the larger morph comes from further south around the town of San Vito. Dave had visited this area before but had never come across them here either.

He did, however, always travel along the main coast road and then turn inland towards San Vito. Arthur and I decided to try coming in from the other side of town along a much smaller and very pot-holed road (the four-wheel-drive helped here). The drive was a long hard slog but we arrived at the bottom end of San Vito without too many problems.

After a little searching we came across a small stream which was slow flowing (and smelled rather

high!) but we could see some fish so decided to try here first. Arthur was first in (when jumping in foul horrible streams I have definitely slowed down) and came up with a *B. terrabensis* within a few minutes. Now I joined him but the fish were few and far between.

We did come across a few small *Astyanax* youngsters but otherwise this location was a waste of time. Also the substrate seemed to be made up of 99 per cent muck and one per cent algae so in the end we gave up and moved on.

## Huge areas of Bloodworms

A little further down the road we came to the Rio Java. This was a proper river with a good current but still seemed rather polluted. Here we found huge areas of Bloodworms living in the substrate. You could collect 1 lb of the things in just a few minutes.

The Quebroda which flowed through the grounds of the Hotel Del Sur is only small but full of fish.





We also found *Brachyrhaphis terrabensis* in large quantities. Arthur also had a frustrating time trying to catch some Cichlids which he could see hiding in an undercut bank but were far too canny to be caught. The young lads who came to watch what we were doing learned a few English words they were unlikely to be taught at school! At both these locations the water tested out as pH 6.7/GH 2/KH 3.

We headed on from here through San Vito and towards the main IAH road which runs the full length of Costa Rica. Some 13km from the junction with this road we came to a little village with a large pond in a dip by the side of the road. The small splashes which broke the water surface almost constantly seemed to suggest this could be a good place to try our luck.

Arthur went down to see if he could see anything whilst I sorted out the fishing gear. A few seconds later Arthur shouted up he had managed to catch a fish without even using a net. The place had more fish

than water.

Once we tried a net we pulled hundreds of them out. When we had them in a tank we could see they were the most recently described species of Brachy — *Brachyrhaphis roseni*. This is a lovely fish with a large red dorsal fin.

### Super abundance of fish

Ivan Dibble first imported them to the UK from America some years ago and gave them the common name of Cardinal Brachy which has stayed with them ever since. With such a super abundance of fish at this location it was easy to get carried away. We soon had far too many in our collecting buckets. With care we selected a more reasonable number of medium sized fish to take home. The largest and smallest were all thrown back and even the majority of suitably sized animals had to be returned to their home.

We had just about run out of time, now, so we turned back north towards San Isidoro de la General. We hoped that we might make it back before dark but in the end we had several hours of night time driving to do before reaching the safety of the hotel. Tired but happy we sorted out the fish before retiring.

Next day we were up early. This was to be our last day's fishing in Costa Rica and we still had a number of locations we wanted to visit. One group of fish which I desperately wanted to catch were Killifish.

The *Rivulus* genus comes from all over Costa Rica and some of them are very pretty fish which would make welcome additions to my Killifish tanks back home. Throughout the trip we had visited known locations for the Costa Rican Killies but always failed to find them. Our last day I was determined to find at least one species of them.

To this end we visited different rivers and streams, many of them known locations for *Rivulus*. From my research prior to the trip I knew they were going to be found in areas of thick plant growth and probably little water current.

### Most lively Killifish habitats

These were exactly the type of conditions I had collected them in, in Mexico. So, whilst Arthur searched the open water areas I would concentrate on the most lively Killifish habitats. Throughout the day

we found lots of different Livebearers, Cichlids, Catfish and Characins.

We even found several different species of tadpole which Arthur was really interested in. We did not, however, find a single specimen of *Rivulus*. In fact, over the trip, despite visiting over 20 known locations for Killifish we did not catch a single one. Frustrating to say the least.

That evening we filtered all the fish and packed everything up ready for the journey back to San Jose. Next day we had an easy drive back to the capital followed by a nightmare drive trying to find our hotel. Next morning we decided to head straight out to the airport and return the hired car.

By doing this we would be able to relax and just concentrate on packing all the fish up ready for the flight home. The gentleman who ran the office out at the airport arranged for us to have a lift back into the city which saved a taxi fare and we soon found ourselves sitting by the pool sipping cold drinks.

About 3pm we started sorting and packing fish. This is one of the most time-consuming jobs any fish collector has to do. First of all the water from each collection has to be filtered. Then each fish has to be packed into its own bag. Then each of these bags must be placed in another bag so that if any leak the fish will survive the journey.

### Line cases with insulation

Once done all the bags have to be packed away in our suitcases. These are lined with insulation and are of the rigid type so that the fish are not crushed on the journey home. I can't remember what time we finished this job but it was the early hours of the morning when the last bag was just about fitted in and the case lid just closed down.

With a sigh of relief I lifted the covers to get into bed — and found another bag! Arthur fell about laughing which I had to open the suitcase up again and tried to find somewhere, anywhere, where I could fit the last bag.

The last thing I remember thinking that night was what a wonderful beautiful country Costa Rica is and how sad I shall be to leave it. No wonder so many people retired here or choose to come back time and time again for holidays.

I think I may well end up in this category myself, but for now, however, it was back to the English winter.





# Caught in the Net

Kathy Jinkings logs on for more Internet Fish Information

Internet buffs tend to fall into two camps. There are those who regard the first days of the net as the golden age, before crass commercialism and professional web developers got in on the act, and there is the opposing camp who think that only pages designed professionally can possibly be worth viewing. As in most such arguments, the truth lies somewhere between the two.

There are many home pages (this is my dog, this is my wife, this is my wife with the dog) which seriously beg the question as to why on earth the designer thinks anyone would be interested, but there are also lots more home pages which are well-constructed and informative, without which the web would be a lesser place.

From the other side commercial sites often deluge us with games and shockwave movies when we really wanted to just buy something, or show us the equivalent of the wife and dog home page (this is the managing director, this is the sales director, this is the managing director with the sales director).

However, many companies have produced web sites which enhance the web; that offer useful information and help to the surfer, as well as allowing them to buy the products. This month we will look at two of those sites.

The first stop is the site of a company that will be familiar to all aquarists — Tetra, which you will find at <http://www.tetra-fish.com/>. The site is clear and well-designed, although Tetra have got quite a few high-tech tricks on the site they blend in well and add to the overall effects. Many of the pictures of fish are animations but they fit in so subtly that you may not actually notice it. The little *Corydoras* catfish on the 'About Us' page is particularly cute.

On the commercial side you can find out about the company, find your local dealers (if you happen to be in America — come on Tetra, there's more to the world than the US of A!). Clicking in the reptile, aquarium or garden pond buttons leads to a section which includes a product catalogue and hobbyist information. The catalogue gives brief information about the Tetra range of products (no prices, though) plus a useful list

of FAQs about the products.

Hobbyist information for the aquarium advises on setting up and starting out (with an unsurprising bias towards Tetra products), while the care and feeding guide advises briefly on which Tetra foods are best for a selection of common fish. The think tank provides a comprehensive article on an aspect of the hobby (when I looked the subject was Rainbowfish), then follows up with a quiz to see how well you have understood the article.

The think tank archive allows you to read the articles and do the quizzes from three previous think tanks — Goldfish, the Nitrogen cycle, and Oscars.

The pond hobbyist section offers advice on building two different sorts of ponds — raised and sunken. Reptile information includes an article on the Iguana, plus the promise of more interaction in the future.

The online bookshop is in partnership with Amazon, and as a result the books on offer are from a greater range than just the Tetra Press books. The Tetra Virtual Aquarium is a lot of fun. After choosing either Goldfish or tropicals you then move on to choose the type of decor you would like.

After choosing tank size and your level of experience it is time to select the fish. These are grouped into 'aggressive', 'semi-aggressive' and 'community', but the grouping seemed a little odd. The Siamese Fighting Fish is categorised as 'aggressive', while Paradisefish and the vicious Sucking Loach make an appearance in 'community'. Agassiz's Dwarf Cichlid is characterised as 'aggressive', while the larger, and similarly-natured, Blue Acara get a place in the 'community'.

The system (supposedly) alerts you to which fish need to be kept alone or in groups (*Corydoras*, apparently, are just fine on their own), and then finally gives a page recommending food, equipment, etc., plus a picture (either moving or still) of your aquarium. This is a terrific idea, and could be extremely useful, but the fish selection could mislead some people badly. My tank comprised seven Discus, one *Corydoras*, one Tiger Barb, one Sucking Loach, and two Guppies. Don't try this at home, kids! (Anyone who doesn't know

why this tank is a total disaster area go and buy a book immediately). I did wonder whether the permitted selection of fish was due to my clicking the 'advanced' option, but going back and claiming to be a 'novice' presented exactly the same options.

Overall, the site is easy to use and fun to visit; it is only let down by the misinformation provided by the virtual aquarium. It is evidently a popular site, as indicated by the fact that the server was obviously struggling with slow response times. This is well worth a visit and shows the potential that commercial sites have for finding their way on to the bookmark list of those who are not necessarily shopping.

The Tropical Marine Centre specialise in supplying marine and tropical fish to retailers, and also UV apparatus for both domestic and commercial aquaria. At <http://www.tmc-ld.co.uk/about/about.html> they have created a web site of interest to everyone (although obviously they hope to encourage buyers). The obligatory company blurb is actually interesting here, explaining how the new fish are cared for when they arrive, and the importance of working to captive-breed fish. To this end they have an extremely high-tech hatchery which features on its own pages. There are three pages about the hatchery, so take care not to miss them. An arrow at the bottom of the page to point the way to the next section might have been a good idea. As it is if you return to the top of the page you can select the next section from the menu.

The Introduction explains the equipment used (including a short video of the fluidised sand filter at work), the operation of the hatchery. On the operation page you can read how the tiny fry are hatched and cared for as they grow, and includes two videos of adult clownfish and one of the little clownfish fry swimming together. This latter video, for some reason, appears initially as a blank screen. Click in the top left-hand corner to start the video. If you want to see the videos, try right-clicking and selecting 'load in new window', as they can take some while to download. That way you can continue reading the text while the video loads. The final section of the hatchery pages,

Research, explains about their (successful) efforts to breed Fire Shrimps, along with a selection of photos.

The fish and invertebrates section features a fish page which changes monthly. There is no archive, so visit regularly to check out each month's article. The month that I visited the subject was the Dwarf Angel, with extremely comprehensive information and superb photographs. The article finishes off with a summary and some recommended books where you could find out more about the fish. This section also features an article about live rock, explaining what it is, how it is collected, and different types. The bulletin board allows visitors to post their marine questions and help one another out.

It is quite nice to see that if someone doesn't get an answer Tropical Marine themselves answer the query. The bulletin board seems quite active, though, with visitors both posing questions and helping each other out.

The product catalogues are comprehensive with good descriptions for a wide range of products ranging from salt and skimmers to books. The pond catalogue not only lists their UV units, but also explains clearly what they do and why they are useful.

The technical data section provides useful tables of the correct parameters for your marine aquarium, and a conversion table which includes such esoteric and confusing measurements as 'teaspoons', 'tablespoons' and 'cups'.

Once again the site is clear and well-presented giving an excellent impression of the company to any putative buyers as well as offering an enjoyable half-hour or so for surfers who drop by.

Next month we will conclude our tour of the large suppliers with 'value-added' sites.

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



**Dave Garratt** outlines crucial decisions facing the beginner in setting up a marine aquarium

PHOTOGRAPHS BY A&P LIBRARY

# Fish Only ... or Fish/Inverts

An aquarium with such a growth of invertebrates needs only a few fish.

The topic is a key issue that the beginner will have to address at some point, preferably at the very start of proceedings

I have no wish to appear to be "teaching grandmother to suck eggs", hence, I would like to make the point that this article is specifically aimed at beginners. I realise many experienced aquarists have no problem keeping a mixed community but I feel such aquaria do pose problems for beginners. I believe most experienced aquarists would agree with the general premise that fish only aquaria are easier to maintain than the combination of fish and invertebrates.

The topic is a key issue that the beginner will have to address at some point, preferably at the very start of proceedings. Even experienced hobbyists can find changing an established fish only tank to be a major cause of headaches. The current residential fish may be incompatible with invertebrates, emphasising the advantage of making your choice when originally setting up the tank.

If the decision is not made at this early stage a much more difficult task awaits the beginner should they attempt to convert from fish only at a later date, without having done any forward planning as regards to livestock. To ease what is already a difficult option it pays to decide at the onset whether to pursue a fish



only or a mixed fish and invertebrate set-up.

Before deciding that a mixed tank is for you it would be wise to look at, and carefully consider, the

potential pitfalls. There will be three major stumbling blocks to success:

1. Disease treatment.
2. Water quality.
3. Compatibility problems.



## Disease treatment

The possibility of disease in any marine aquarium is highest in its early life. Even when matured, and so devoid of really dangerous products, such as ammonia and nitrite, the newly established marine tank is still a relatively harsh environment. The biological filter bed will not be at peak capacity and will, therefore, be susceptible to biological overload. The water will not have taken on the mature quality that only comes as the tank ages. We all make mistakes and the beginner will be no exception, but the more experienced aquarist is better equipped to deal with a crisis.

The early days of a tank's life, coupled to the inexperience of the beginner, add up to a time of great stress for the fish inhabiting the tank. Unfortunately stress is one of the biggest catalysts of disease outbreaks.

One of the most virulent diseases afflicting a marine tank is *Amyloodinium ocellatum* (previously known as *Oodinium*), a disease

FISH ONLY, OR  
FISH/INVERTS ...  
the dilemmas facing a  
beginner in setting up a  
marine aquarium

capable of quickly wiping out the entire tank. The only reliable treatment for this disease is copper based medications. All copper remedies are deadly to invertebrates therefore to use such a treatment would consign all the inverts to a quick demise.

Taking the invertebrates out of the tank and placing them in a second tank is not an option as the copper treatment is absorbed by any calcareous material (coral sand, coral gravel, tufa, etc) in the tank. The copper then leaches out over a long period of time rendering the tank unsuitable for inverts.

The only viable option for a disease outbreak involves a lot of work and stress to both fish and

*Oxycirrhites typos*, the Long-nosed Hawkfish, just loves perching on pieces of coral.



*Lythrypnus dalli*, the very colourful Catalina Goby.



## MARINE TIP

### FISH FOR A FISH/ INVERTEBRATE COMMUNITY TANK

Basslets; Gobies; Damselfish;  
Blennies; Tilefish; Hawkfish;  
Dwarf Wrasse; Dwarf Angels;  
Clownfish; Cardinalfish

Examples of fish from the list above could include:

Firefish (*Nemateleotris magnifica*)  
Catalina Goby (*Lythrypnus dalli*)  
Yellow Goby (*Gobiodon citrinus*)  
Neon Goby (*Gobiosoma oceanops*)  
Torpedo Goby (*Ptereleotris zebra*)  
Blue Cheek Goby (*Valenciennina strigata*)  
Bi-colour Blenny (*Ecsenius bicolor*)  
Pyjama Cardinal (*Sphaeramia nematopterus*)  
Comet Grouper (*Calloplegiops atlavels*)  
Royal Gramma (*Gramma loreto*)  
False Gramma (*Pseudochromis paccagnallae*)  
Long Nose Hawkfish (*Oxycirrhites typos*)  
Flame Hawkfish (*Neocirrhites armatus*)  
Green Chromis (*Chromis caerulea*)  
Fireball Angel (*Centropyge acanthops*)  
Cherub Angel (*Centropyge argi*)  
Banana Wrasse (*Halochoeres trispilus* or *H. chrysus*)  
Pyjama Wrasse (*Pseudocheilinus hexataenia*)  
Many Clownfish (*Amphiprion ocellaris*, *A. sebae*, *A. clarkii*, *A. kollopsis*, *A. ephippium*, *A. polymnus*)  
Many Damselfish (*D. xanthurus*, *D. aruanus*, *D. carneus*, *D. melanurus*, *D. trimaculatus*, *D. melanopus*)

Further reading: *Fishes for the Invertebrate Aquarium* by Helmut Debelius.

hobbyist, as it involves removing all of the fish to a separate treatment tank and keeping the main tank fish-free for a minimum of 21 days. This will ensure all disease spores have hatched out and died as a result of not finding a new fish host.

Even this approach may not be foolproof as although invertebrates do not suffer from White Spot they are thought to carry it. Parasitology and host/parasite/carrier relationships are a highly specialised area and my knowledge is not sufficient to suggest how long white spot may survive in a fish-free tank by means of carriage by invertebrates.

## Water quality

Many fish will tolerate high levels of nitrate especially if the levels rise slowly. Some fish will even tolerate



## MARINE TIP

### RELATIVELY 'EASY' INVERTEBRATES

Mushroom Polyps (*Rhodactis*)  
Colonial Anemone Polyps (*Zoanthus*)  
Pulse Corals (*Xenia* and *Anthelia*)  
Tubeworms (*Sabellastarte*)  
Leather Corals (*Sacrophyton*)  
Common Short Spined Urchin (*Echinometra mathaei*)  
Tiger Cowrie (*Cypraea tigris*)  
Boxing Shrimps (*Stenopus*)  
Cleaner Shrimps (*Lysmata*)  
Dancing Shrimps (*Rhinchocinetes*)  
Brittlestar (*Ophiomastix*)  
Sea Apples (*Pseudocolochirus axiologus*)  
Feather Cucumber (*Cucumaria miniata*)  
Black Cucumber (*Stichopus chloronotus*)  
Blue Starfish (*Linckia laevigata*)  
Sand Anemone (*Heteractis aurora*)  
Heteractis Anemones (*H. malu* and *H. magnifica*)

Further reading: *The Book of the Marine Aquarium* by Nick Dakin.

low levels of nitrite if they are of a transient nature. This is not true of inverts, they will slowly perish under such adverse conditions. Again, it is the newly established tank that will be at risk of nitrite poisoning. Nitrates will be high after all the activity of biological maturation, and they will continue to accumulate with time if steps, such as regular partial water changes, are not taken to reduce them.

Anyone who has edited a problem page in a magazine or performed such a service for a club will no doubt agree that overstocking is one of the commonest mistakes made by beginners (indeed, I am sure many who should know better, myself included, have at one time or other been guilty).

Overstocking leads to a more rapid decline in water quality and, therefore, places greater pressure on the livestock least equipped to deal with it, ie, the invertebrates. Fish stocking levels must therefore be lower in a mixed aquaria.

Having the discipline to keep to such stringent stocking levels is never going to be easy especially when faced with a retailer who has a host of beautiful, enticing species for sale. Age old, very basic, but remarkably effective stocking levels for fish only tanks are usually quoted thus:

*Build up slowly to a maximum of 1 in of fish per four gallon of tank water at six months from initial biological filter maturation.*

*Between six to 12 months slowly*

*increase to a maximum of 1 in of fish per two gallons.*

*Allow for growth and the final size of the species when in captivity.*

These levels may seem very restrictive and could be the reason why so many tanks are overstocked, after all, that extra fish looks so attractive and surely one more will not make any difference.

The same reasoning could then lead to an 'extra' one or even another couple. However, if these levels seem restrictive then the advice for mixed communities is positively scrooge like: *1 in of fish per six gallons of water.*

Even allowing for the fact that the number of invertebrates does not really affect the stocking levels of fish these allowances may seem very small — but they are entirely necessary.

## Compatibility problems

If overstocking appears as possibly the biggest cause of marine aquarium problems then incompatibility must also be somewhere in the top half dozen. Anyone who has watched ill-matched tank mates tear into each other will know just how viscous and deadly incompatibility can be. In a mixed tank these incompatibility problems are increased substantially.

Many fish will quite happily tuck into a nice little invertebrate on the assumption that as it forms part of its omnivorous diet you must have put it in the tank as a special treat! Omnivorous to many fish means just that, they will eat virtually anything. The reverse is true to a lesser extent, ie, there are some invertebrates that will prey upon smaller fish. A few examples that spring to mind include Mantis Shrimps, Swimming Crabs and Cerianthus Anemones. Although less expected problems can occur such as the opportunistic predatory nature of some of the giant Mushroom Polyps or larger Hermit Crabs.

Compatibility is the main reason for deciding on the type of tank you want from the beginning. The problems of compatibility can only get worse as you add more species



to your community. When you are fully stocked it is very unlikely that all of your fish will be invertebrate compatible.

If, after considering the three major problems already discussed, you are still determined to keep a mixed community it would be best to plan it from the beginning. You must impose strict selection on the species you plan to keep and adhere to strict stocking rules. With this in mind I have suggested a list of relatively trouble free, disease resistant, invertebrate compatible fish, plus a list of the easier invertebrates.

**What invertebrate aquarium would be complete without any Shrimp? This one is *Lysmata amboinensis*.**

## The classic 'exception'

Not really an exception as all the points covered above would still apply. It concerns the one image, above all others, that frequently sells marine fishkeeping to the uninitiated. I refer of course to a pair of Clownfish and their Anemone, a relationship that benefits both parties and is perhaps worthy of making an exception for. Some anemones are fairly hardy so the water quality would not be as great an issue.

Neither is incompatibility such a problem as we are only talking of a single invertebrate. Fish have the in-built sense to stay away from the stinging tentacles. Some bigger fish will have no compunction in actually making a meal of the tips of an anemone's tentacles hence they must be avoided. Triggers and large Angels are just two contenders that spring to mind.

Disease would be the biggest problem of the three I have outlined. You would have to take a chance on not introducing any disease into the tank as the anemone would definitely succumb to any copper treatments.



Many fish will 'beg' for food at every opportunity as these young Platies (right) and Mollies (far right) show.

**Linda Lewis** hopes it never happens to you!

PHOTOGRAPHS BY THE AUTHOR

# Holiday Blues

Should you get someone to come round every day and look after your fish while you holiday? There can be potential pitfalls

**W**hat should you do about your fish when you go away? Will they starve? Should you get someone to come round every day and look after them? Unless you have the good fortune to have a sensible friend who is an experienced fishkeeper you do this at your peril. The following fictionalised, but nonetheless all too possible, accounts demonstrate just some of the potential pitfalls.

## Holiday One

"There's really nothing to it. Just give them a small pinch of food every day, and they'll be fine," you say as you get into the taxi, bound for warmer climes.

On your return you are met outside the house by your concerned looking neighbour who greets you with the news that something seems to be very wrong with the fish tank. Several fish have already died, and the rest look sick.

An unpleasant smell greets you as you enter the room. One or two hardy fish remain, and the water is more like lentil soup, not the pure clear liquid you left behind, just ten short days before.

It doesn't take much detective work to discover the cause of the disaster. The almost full 25g



container of flake that you left as food is practically empty!

Much of the heated discussion that follows cannot be repeated here for fear of offending readers, but what had happened is that the caring neighbour, who had never kept a fish in his life, decided that your instruction of one pinch a day was completely wrong. "After all," he protests vehemently, "the fish kept begging for more, however many times I fed them."

## Holiday Two

Now aware that people might be tempted to be generous with the food, tiny packets are left instead,

one for every day of your absence. You can now go away, confident that overfeeding is impossible.

On your return you are met outside the house by your concerned looking neighbour who greets you with the news that something seems to be very wrong with the fish tank. Several fish have already died, and the rest look sick. Another scene of destruction greets you. Most fish are dead, others sick.

When asked, with great restraint, what went wrong, the neighbour expresses ignorance. Further questioning reveals that she had decided to turn off the lights every evening, not by pressing the switch on the starter unit, but by turning all the power off — to pump and filter, too!



### Holiday Three

This time you install a timer for the lights, leave packets of food, and strict instructions about not touching anything electrical. Once again you go away, sure, this time, that nothing can possibly go wrong.

On your return you are met outside the house by your concerned looking neighbour who greets you with the news that many of your fish have died. All that remains of your once thriving community tank are the middle and

upper water swimmers. The catfish and loach have vanished.

"What's happened to the Upside-down Catfish?" you fume.

The face of your neighbour turns pale. "Did you say Upside-down Catfish?"

"Yes."

"That doesn't mean they're SUPPOSED to swim upside down, does it?"

"YES."

"Oh."

"What do you mean — oh?"

"I came round one evening to spend a few minutes watching the fish. I'd had a bad day at work and I thought it would help me to relax."

"Yes, do go on," you whisper, a hint of mania creeping into your voice.

"When I saw some fish swimming the wrong way up I thought they were ill, so I went to the pet shop and asked what the problem could be. The assistant said it sounded like a swim bladder problem, that it was incurable, and that it would be kindest to put the fish down."

"And what about the rest of my Catfish and Loaches — the ones that should be covering the bottom of the tank?"

"I'm so sorry. I noticed that they seemed to spend all their time on the gravel. I had a Goldfish once that couldn't get off the bottom. It died soon after."

"I see, now don't tell me, let me

guess — you decided to put those down too."

### Holiday Four

Much later, when you have paid the hefty fine imposed on you for giving your bemused neighbour two lovely black eyes, you decide to entrust your fish to the care of a different friend. You write three pages of careful instructions, mainly consisting of what not to do and details of the fish's normal behaviour, make up packets of food, and once more venture off into the unknown.

On your return you are met outside the house by your friend who looks happy and confident.

You allow your spirits to rise. Maybe, this time, nothing has gone wrong. Once inside you discover that your 3ft tank is empty, apart from one very contented and exceedingly plump looking Oscar (*Astronotus ocellatus*). As you had no cichlids before you went on holiday the presence of this one comes as something of a shock, and where have all the Tetras gone — the Harlequins, the Guppies?

"Where did THAT come from?" you screech.

"He's cute, don't you think? His name is Oscar. When I saw him for sale he looked so lost and lonely





that I couldn't resist buying him. You were always saying how you kept your tank understocked in case some irresistible fish came up for sale — well, there he is."

Patience and temper gone, yet again, you explain, slowly, that the fish has not been called Oscar because he was someone's dear pet. That Oscar is simply what this kind of fish is called and that they are well known for liking nothing better than to make a meal of any other fish that they can swallow.

"So that's what happened to the other fish. Still you can always buy some more," said my ex-friend, just before his lights went out.

If the above scenarios have seemed all too possible then of course you could just do what I do when I go away. If I am away for seven days or less I do absolutely nothing. My tanks have all been established for some time so that there is at least a coating of algae for the fish to browse on if they wish to.

### The world of good

Even fish that would not touch algae if you paid them are still perfectly well, in fact the change in their feeding routine often seems to do them the world of good, so that when I get home again and resume normal feeding I am usually treated to a spawning or two, especially amongst my *Corydoras* Catfish.

### HOLIDAY BLUES ...

#### potential pitfalls of taking a well earned break

Don't be tempted to try to make it up to the fish by feeding them extra rations before you go away! Fish may eat the extra food but if it is surplus to their actual requirements it will pass straight through them without being digested, immediately causing a decline in water conditions.

If I am to be gone for a longer period then I invest in some of the food blocks that are available in all good pet shops. There are different kinds suited for absences of anything from a weekend to seven days, meaning that I can safely leave the fish for up to a fortnight with a seven-day block and seven days of no food.

If this is not good enough for you then you can always invest in a battery-operated feeder. The kind I use is called Fishmate. It delivers food either once a day over a fortnight, or twice a day over a week. The portions of food are placed in individual compartments. The important thing to watch out for with these feeders is that they must be connected to an airline. A current of air is essential or the food

will get damp and go off within a couple of days. The battery runs for a year or more so these contraptions are also ideally suited for feeding aquariums in offices and schools which might otherwise not be fed two days in every seven.

If you can't afford timers for the lights then leave them off. The fish will then be less active and consequently less hungry.

### Fend for themselves

I am going away again soon, just for five days, and will happily leave the fish to fend for themselves. Of course one thing is sure to happen — it always does. A few days before I am due to leave a pair of fish that have never spawned will decide to do so, or my various groups of *Corys* will decorate the tank glass with dozens of eggs, or my beautiful Red Swordtail will give birth to a batch of fry.

I have a group of *Corydoras panda*. When I returned from the Supreme Festival of Fishkeeping held at Weston Super Mare last November I found the imprint and some remains of eggs on the front of their tank. They have steadfastly refused to repeat this trick when I am here to do something about it!

The first thing I do upon returning home is check all my tanks and I confess I am on edge until I have done the rounds. If there was a

Growth of algae on the pot shows this to be a well established tank.





power failure while I was away the consequences would, of course, be dire, but, fortunately, such events are very rare.  
If a piece of equipment should fail

while you are away there is nothing you can do about it, and a non-fishkeeping friend would have no idea what to do. If you leave no-one in charge when you are away and

lose your fish through an equipment failure then at least you still keep your friend!  
Enjoy your holidays, and your fishkeeping.



Upside-down  
Catfish in  
NORMAL  
position!

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## Children in Shark Tunnel

Children from a Bournemouth school who have been following the construction of Europe's first Oceanarium next to Bournemouth Pier, paid a visit to Weymouth-based Aquarium Technology Ltd (ATL) to watch as acrylic tunnel sections were removed from a giant oven.

The 28 pupils from Class 3TC of St Michael's Primary School, accompanied by teacher Carol Thomas, were shown by Managing Director Nick Stantford how one of the world's largest tropical water display tunnels is moulded. Once installed in the Oceanarium the tunnel will enable visitors to watch sharks swim overhead in warm water weighing 250 metric tonnes — the equivalent of 45 double-decker buses!

The five sections, each worth thousands of pounds, are made from flat, 50mm thick clear cast acrylic. They have to be shaped in a giant gas oven at ATL for 15 hours with temperatures exceeding 110°C. Once in place they will make a 12.5m long Tropical Lagoon Tunnel, the centrepiece of the £3 million Oceanarium that is due to open in June.

"Many aquariums have tunnels but this will be the first time we have built one that has two 4m long sections with straight walls. These will give the visitors to the Oceanarium breathtaking views of the marine life from the Great Barrier Reef," says Nick Stantford, who presented the school with a highly-polished block of acrylic as a souvenir of their visit to Weymouth.

For additional information contact Nikki Hasell, Business Development Manager, Real Life Leisure Ltd (01202 311993), Kevin Turner, Manufacturing Manager, Aquarium Technology Ltd (01305 779624).

## Fishes heal again

Once again fish and aquatic life have proved to be a lifeline to recovery from a life of addiction.

Helena Burton, daughter of TV broadcaster Humphrey Burton, has used her talents, personal courage and fascination for the ocean to stabilise her life that was effectively derailed in her teens by drugs and alcohol. Although born into the world of privilege and art her inherent brightness could not help her cope with criticism and challenges by others and she was even more depressed by the success of her contemporaries.

Following treatment for drug and alcohol dependency she began to paint and her first exhibition in December 1997 was a sell-out.

Helena's second exhibition, 'Seascapes', is to be held at Space, 8 Hollywood Road, London SW10, on Wednesday, 4 June and runs until Saturday, 13 June (weekdays 5pm-9pm; Saturdays and Sundays 10am-5pm). It is a multi-media show with works in oil, indescant

paint, video and various installations.

All work is for sale with prices ranging from £50 to £1,500.

ornamentalfish.org

## Anyone for Brazil?

IFA BRASIL '98, the second International Trade Fair for Aquaculture, will take place at Expo Center Norte in Sao Paulo from 22-28 August 1998 and will be held simultaneously with VIV America Latina '98 and VIV/AFIA Feed '98 — the leading trade exhibitions for intensive animal production and processing and animal feed. All aspects of fish farming will be represented.

Full information can be obtained from the following addresses: Koninklijke Nederlandse Jaarbeurs/Royal Dutch Jaarbeurs, Postbus/PO Box 8500, 3503 RM Utrecht, Holland. Tel: +32 30 295 5662. Fax: +31 30 295 5709. e-mail: ifa.brasil@jaarbeursutrecht.nl Gessulli, Pca Sergipe 154, 18540-000 Porto Feliz SP Brasil. Tel: +55 15 262 3133. Fax: +55 15 262 3575. e-mail: gessulli@so.dglnet.com.br

## What's in a name?

OFI (UK) is no more. Long live OATA! The reason for the name change is simple — people were getting confused between the two quite similar acronyms OFI (Ornamental Fish International) and OFI (UK), the UK Ornamental Fish Industry. So, recently, the decision was taken to change the name to OATA — Ornamental Aquatic Trade Association. However, what remains unchanged is the overall aims and ambitions of the organisation which is to promote and protect the industry.

Full details of OATA can be obtained from: OATA Ltd, Unit 5, Narrow Wine Street, Trowbridge, Wiltshire BA14 8YY. Tel: 01225 777177. Fax: 01225 775523. e-mail: keith@oata.demon.co.uk Website: <http://www.ornamentalfish.org>

We are a newly formed society based in the north east of England. The society exists to promote friendship and communication, without prejudice, between all Goldfish enthusiasts and to encourage the popularity of the Goldfish in all its forms.

The society was originally formed to fill a gap which existed in the north east of England, ie, there are no societies within 150 miles which, in effect, prevented the members from taking a more active role at meetings organised by other Goldfish societies.

Meetings are held bi-monthly on the second Sunday of each

## Meet the Societies

### THE NORTH EAST GOLDFISH SOCIETY

month. The meetings commence at 2pm at the Nissan Sports and Social Club in Washington, Tyne and Wear. Meetings are scheduled for March, May, July, September and November.

We try to arrange visits to other societies and breeders between our own meetings and have a good social itinerary planned for the coming year.

At present members receive a Newsletter two weeks before each meeting informing them of future events, articles submitted by members, fish for sale and any other developments in the Goldfish hobby.

A small committee of five elected members run the society on the members' behalf, and retire annually at the AGM which is held

at our November meeting when a new committee is elected.

We have members from the United States, as well as Malaysia, and would welcome contact with anyone who has an interest in Goldfish, be they beginner or breeder.

Anyone interested can contact our Membership Secretary/Treasurer, Mr S. Anderson, Rosegill, Albany Village, Washington, Tyne and Wear NE37 1RR. Tel: 0191-415 1578.

Our next meeting is on July 5 1998 — why not come along?



# Famous Faces in Fishkeeping

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

**CA:** I began as an amateur herpetologist, catching frogs, toads and snakes around my home town of Bath, Somerset, when I was about 10 or 11 (around 1963). I used to watch all the Attenborough/Durrell/Hans and Lottie Haas TV shows and I read and re-read their books too. Remember Armand and Michaela Denis? Now I really am showing my age! In my teens I gradually became interested in more exotic reptiles and amphibians — and then fish. In the mid-60's there was quite a variety on animals available through the pet trade, in fact, during the mid-60's to early 70's I worked in two pet stores in Bath — 'King Pets' (which closed down in the late 60's) and the 'Bath Pet Shop' (which was owned by my wife's parents until quite recently). Yes, I met my wife while working in her father's store during school and college vacations!

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

**CA:** I obtained my first 'aquarium' when I was about 12 or 13. It was a large (perhaps 100 gallon) metal tank with solid sides. I half buried it in the garden and kept local species of fish that I caught when I went fishing (as well as a Goldfish I won at a fair — which cost me a small fortune 'winning' it, whereas I could have bought it from a pet store for a fraction of the cost). I knew nothing about filtration and aeration, but thankfully the fish were very hardy!

**A&P:** What are your special interests?

**CA:** I have been lucky to study in some depth a variety of aspects of fish diseases and water chemistry, in the wild, on fish farms, in home aquaria and in public aquaria. I still find the relationship between the environment of the animal and the onset of diseases and other problems extremely fascinating. There is a great book called *The Coming Plague* which was published two or three years ago. It makes the point loud and clear that humans are not above this type of relationship either. Travel is something I love to do, and I have been very fortunate to visit some very exotic places: Peruvian and Brazilian Amazon, Costa Rica, Surinam, Burundi, Dominican Republic, and so on. Many of these places are changing — almost before our very eyes — and while it is easy to preach conservation the problems that the local people have to wrestle with are daunting to say the least. And yet visiting such places is stimulating, invigorating and often very memorable.

**A&P:** Are you into breeding?

**CA:** I have bred a range of relatively common aquarium fish, and the feeling you get when you breed a species for the first time is quite special (even if others have bred it many times before). Working in public aquaria I have also been involved in developing breeding programmes for endangered species. Such programs are very important, but have to be developed strategically. The real solution is habitat-preservation and careful management of the population in the wild. However, captive breeding programmes can be very supportive to such endeavours (and together provide the much needed holistic approach to conservation).

**A&P:** Do you belong to any Aquatic Society?

**CA:** Since moving to the US about seven years ago I have not been closely involved with many aquarium clubs. While I was at the National Aquarium in Baltimore we developed a liaison



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

## This Month:

**DR CHRIS ANDREWS of the  
South Carolina Aquarium**

with the Chesapeake Marine Aquarium Club, and allowed them to meet free of charge at the aquarium. This was very popular, and was helpful in breaking down the unnecessary barriers that sometimes exist between amateur and professional fishkeepers. I personally would like to see home hobbyists working much more closely (and in a collegiate fashion) with aquarists working at public aquaria. Each has a lot to learn from the other.

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

**CA:** They are a great advertisement for the hobby, and a great way to meet up with friends and like-minded individuals.

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

**CA:** Travel, collecting and photography — and writing. I am very envious of Heiko Bleher, although I value my life too much to go on a trip with him!

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

**CA:** As soon as an animal comes into our care we have a responsibility towards it. Therefore, before obtaining it, you must have a reasonable expectation of being able to keep it alive and care for it in the long term. Hopefully, it might even breed too. Working in public aquaria I am well aware how thoughtless some hobbyists can be, expecting public aquarium staff to take fish that have (for example) grown too large for their home aquarium. Such hobbyists can also become quite indignant if questioned on why they purchased the fish in the first place! I believe that the trade (wholesalers and retailers) are at least partly to blame for this, though, and should be more pro-active in limiting the trade in some (unsuitable) species.

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

**CA:** My, my, that's a tough one. Over the last 20 years or so there has been an explosion of

good literature aimed at the fishkeeping hobby. It used to be just TFH books, but now we have Salamander, Dorling Kindersley, Tetra and many other publishers, too. When I was more involved in fishkeeping in a 'hands-on' fashion, Ramshorn's *The Complete Aquarium Encyclopedia of Tropical Freshwater Fish* (published by Phaidon, 1978) seemed to always

give me the information I wanted when all else failed. I also still enjoy flipping through *Aquarium Fish* by Don Wilkie (published by Pelham, 1986). Modesty prevents me mentioning one or two excellent books in the Salamander/Tetra list too!

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

**CA:** As we move more and more towards a technologically-orientated society fishkeeping as a hobby has to compete with computers, video games, TV, and so on. But it cannot compete on the same terms with such items of instant gratification. However, outdoor pursuits are enjoying something of a renaissance (at least in the US), and everyone is 'thinking green' these days. Therefore, I think that the hobby has to re-establish its identity and recognise the connections which exist between fish, their natural environments and environmental issues. The hobby has to be seen as something that is not only challenging and exciting, but also connected and contributing to the bigger, environmental picture. I think that this is happening with the 'herp' hobby here in the US. Obviously those promoting the hobby must also target children too, as they are the fishkeepers of tomorrow. But let's not err too much on the side of 'fishkeeping is fun' and 'fishkeeping is easy' ... it was the challenges that got me interested.

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

**CA:** These days I do not keep fish at home but I will soon have my own (public) aquarium! I see fishkeeping (at home or in a public aquarium) as a vehicle to raise awareness of — and provide opportunities for action and involvement in — aquatic conservation issues. Things are changing so rapidly in the natural world that we all need to take action. I would like more of the commercial companies deriving profit from the fishkeeping hobby become more genuinely involved in aquatic conservation in a real and substantive way. And hobbyists should demand it. "What has Company X done for aquatic conservation this year?" should be the mantra.

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

**CA:** The South Carolina Aquarium will open in late 1999 or early 2000. The building is well under construction (take a look at our web page at <http://www.scaquarium.org>), and we are busy developing our educational programmes, fundraising and putting together the animal collection. The aquarium will be a 9,500 square metre facility that takes its visitors on a journey across the state of South Carolina ('from the mountains to the sea'). All of our animals will be indigenous to South Carolina, so conservation will be an important component to our programming too. So, soon I'll have 10,000 animals from over 500 different species, and a (total) staff of about 100 working at the aquarium. Meanwhile, I've resumed my herpetological interests (there are a lot of snakes in South Carolina!), and my short term goal is to catch my own Corn Snake for a tank in my office.



## Koi

**Q** Although I have no room to keep Koi I am quite fascinated by them and extremely envious of those fishkeepers who can give these marvellous fish the conditions they require. I intend to visit some Koi Shows this year (I must be a masochist, to torture myself so much!) to learn more about Koi culture, but one thing puzzles me and that is how are such large fish transported without becoming over-stressed or even damaged — I imagine a missing scale or two is much more evident on a large Koi than on a small tropical.

**A** Obviously, owners of prizewinning Koi do all they can to minimise stress and damage risks to their fish during transportation to and from Shows. Handling the fish without too much agitation or excitement comes top of the list plus arranging its comfort during transportation, too. Double-bagged Koi are not moved using too much water — some even have their dorsal fins breaking the surface; they may be further kept inside darker wraps to keep them calm. Positioning their travelling bags across the car rather than 'forward and back' will minimise damage during braking and acceleration periods. And, of course, all Koi keepers are very careful drivers!

## Marine

**Q** I would be grateful if you could advise me where I could purchase some plastic gloves which come up to the elbow (I've looked high and low!). I have three aquariums to change — one marine reef and two tropical — the ordinary gloves are too short. I know one can leave a

tropical aquarium for two nights by putting a weekend feed block in and the aquarium lights off but what about the marine reef aquarium? Mine has five fish, a Sea-anemone and a prickly Sea-Urchin.

**A** Long plastic gloves are heavy-grade ones used in the chemical trade — you will find them listed in journals for the building trade, too. If there is a Builders' Merchants in your town they will probably have them in stock. Pro-Teck (UK) Ltd, 45 Goose Lane, Hatton, Warrington, Cheshire WA4 5PA. Tel: 01925 730006, do cotton-lined, PVC 'over the elbow' Multigloves with elasticated tops for around £6.50.

A simpler, and cheaper, alternative is to just use a plastic bin bag (perhaps one inside another — they often leak!). Fix around the wrist and high up the arm with an elastic band. To overcome buoyancy collapse the bag around your hand and arm — or even draw the air out with a drinking straw. You can handle things inside the tank quite well through the bag. It is essential to use some kind of protection if you have any cuts on your hands because aquarium waters (sea and fresh) are laden with bacteria, some of which can affect you. Sea-anemones require daily light so fit a timer to the lighting system whilst you are away. Do not add feeding blocks in marine tanks, the chemicals affect the pH. The fish will live quite happily without food for two weeks — thereafter you should get a fish-minder.

## Tropical

**Q** At the moment I am searching for an Emerald Fighting Fish, from the Betta family, but which is not a Siamese Fighting Fish; I have seen a picture of one in a magazine and would like to add one of

these to my collection have you any ideas where I can purchase one of these fish? Also, I wonder if you could answer me another question — I am sorry to be a pain — but I would like to know the gestation period of a Lyretail Molly. I have six of these now and suspect that one of them is pregnant and I am wondering if, like the Guppy, these fish are cannibalistic and will attack its own young? If this is the case I have several breeding traps but do not like using these as the room in side them is very small and I think that this causes some distress to the fish which is obviously something that I want to avoid at all costs.

**A** Emerald Fighting Fish are not regularly seen in the shops, but if you are really interested then I suggest you join the Anabantid Association of Great Britain. They have many Bettas and other rare anabantids bred by members. Their Newsletter is good, too. Contact address for the AAGB is David Armitage, 1a The Orchards, Westow, nr Malton, N. Yorks YO6 7NF. Mollies are between 30-37 days gestation — the colder the temperature the longer it takes.

Mollies are not bad cannibals, although obviously if they share with any other fish their tankmates will eat the fry. You are right not to use breeding traps, as Mollies easily get upset and abort. Lots of plants in the aquarium to give places to hide is the best idea. I don't use traps for any of my fish. If you have to, perforate an old ice cream tub and float that with some water in. These are bigger, and the mother won't eat the fry. The plant method is better, though.

## Plants

**Q** I believe there is a plant that rises and sinks in the pond.

## ASK

Whilst I am not looking for a plant with a gimmick simply for a pondside conversation piece, I am intrigued. Can you explain?

**A** The plant you are thinking about is the Water Soldier, *Stratiotes aloides*. Its spiky leaves appear to radiate from a central point and during the summer months it generally floats mostly like an iceberg — submerged with only its top breaking the surface. In autumn it sinks to the bottom and resurfaces when the warmer months return. Having said that, some reports suggest that differing water conditions may also have some effect on its chosen position in the water. The Water Soldier is an interesting plant — several extinct species have been identified from fossils and it also tends to group in one-sex groups (usually female) which makes propagation only possible from runners taken from mature plants.

## General

**Q** In this modern world is there any way new species of fish can be classified without resorting to preserving them in formalin? I would have thought that with modern technology, photographic evidence and DNA samples could provide the necessary tools of the trade.

**A** Unfortunately modern technology has also, in the case of photography, come up with the means of doctoring the evidence and would probably lead to a mass of bogus claims. One main problem is that in



# A&P

order to establish new species, full research of comparisons has to be made of all existing species which are, by tradition, kept in preservatives with (until recently one assumes) probably only an 'analogue' card-file index information as where to find the correct jar! Ideally, a 'moratorium' might be envisaged where after a certain date in the future all new specimens would be registered by

photograph and DNA samples but how it would be organised is a question for the ichthyologists rather than hobbyists. Many hobbyists might be concerned over the apparent numbers of people hauling vast numbers of species out of natural waters and plunging them into formalin (without maybe a 'humane' step along the way to anaesthetise them first); however, it is likely that the actual numbers of fishes necessarily preserved are nowhere near our suspected totals. We are planning to have an article soon on this very subject, to see what current progress has been made.

Send your queries to:  
Ask A&P, MJ Publications Ltd,  
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One of the most important aspects of building, or extending, your Koi pond is to visit as many established ponds as possible. The easiest way to do this is to join your local Koi Club as the majority of them either have 'open days' at their own members' ponds or arrange coach trips to visit ponds in other areas.

Visiting other Koi ponds will always provide ideas for your own set-up and even, in some cases, show you how not to do things! It will also give you the opportunity to talk to other Koi keepers and pick up ideas.

How often have you stated that your Koi never grow? I know I have. Why not take the opportunity during the summer months to carefully net you Koi and place them in a suitable floating basket (or bowl) so that you can measure them?

However, make sure you record the measurement and don't rely on memory! In, say, six months time you can measure them again — you'll be surprised just

how much they have (or haven't!) grown — but it's the only sure way to find out.

These days purpose-made photographic/measuring bowls can be purchased from any major koi dealer, or at many of the Show which are being held around the country.

Another practical advantage of measuring your Koi is it gives you an ideal opportunity to closely inspect your fish to ensure that there are no visible signs of infection or damage which may require treatment.



A very attractive quarantine pond belonging to Malcolm Mansfield of the East Midlands Koi Club. To the right Mike Donlan waits to video Koi for the East Midlands Photo Competition. PHOTOGRAPH: LIZ DONLAN

There are numerous Koi Clubs/Societies throughout the UK, and we will publish details of their meetings each month as (and when) we receive details. However, could I make one small plea to Publicity Officers — please ensure that you include a contact name and number to be used in conjunction with any Shows or Meetings whose details we may publish.

Copy for Koi Calendar can be sent to me c/o MJ Publications Ltd, 20 High Street, Charing, Nr. Ashford, Kent TN27 0HX, but, if more convenient, Secretaries can also send information direct by telephone on 0161-794 8282 or by fax on 0161-793 9696.

## LIZ DONLAN'S KOI CALENDAR

### SHOW CALENDAR

#### JULY

**4/5 East Pennine Section BKKS.** Open Show, Japanese Style. Heritage Centre (indoors), nr Barnsley. Contact Sheila Sanderson or Dave Scriven, 01226 740577.

**5 Lower Thameside Open Show.** Ford Sports Club, Rush Green, Romford. Contact M. Wiggett, 01702 342460.

**19 Essex Section BKKS.** Open Show. Aveley Sports Ground, Aveley, Essex.

**19 Plymouth & District.** 7th Annual Closed Show at Endsleigh Garden Centre, Ivybridge, South Devon. Three local dealers will be at the Show and if you're not 100 per cent dedicated to Koi the Garden Centre has a lot to offer with an 'Olde Worlde' restaurant.

**26 Mid-Staffs Section BKKS.** Closed Show at The Hollybush Garden Centre (Junction 11, M6) Sharesill, Cannock.

#### AUGUST

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

**9 Potteries & District.** Exhibition at Stapeley Water Gardens, Natwich, Cheshire.

**16 Scottish Section BKKS.** Closed Show, 1pm-4pm, at OKI Ltd, Cumbernauld, Central Region.

**22/23 KOI '98.** Billing Aquadrome, Northampton. General enquiries to Margaret Bishop, 01702 522388.

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

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

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

#### SEPTEMBER

**5/6 Birmingham/West Midlands Japanese Style Show.** Little Heath Nursery &

Aquatics, Burcott.

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

**6 Lower Thameside Section BKKS.** Closed Show. Venue to be advised.

**12/13 North of England Koi Chapter ZNA.** Open Show Japanese Style. Arena Sports & Social Club, Sheffield. Contact Yvonne Muse on 0114 273 7341 (day) or 0114 289 1437 (evenings).

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

**27 Northern Koi Club.** 6th Open Show Japanese Style, at Cascade Water Gardens. Show Chairman Liz Donlan, 0161 794 8282 (work), 0161 643 9107 (home).

#### OCTOBER

**10/11 Merseyside Section BKKS.** Open Show. Venue to be announced.

### KOI MEETINGS IN JULY

**1 Leicestershire Section BKKS.** Meet at Kirby Muxloe Sports Club. George Money speaks on 'Microscopes'. Contact Ray Dunkley, 0116 2771600.

**5 Nottingham & District Section BKKS.** Entertain Midlands Staffs Section BKKS. Meet at the Western Club, Hillside, Nottingham. Contact Shirley Hind on 0115 981 0923.

**5 Northern Koi Club.** Open Day at members' ponds. Contact Glynis Morgan-Davies (Membership Secretary) on 01706 218243.

**8 Merseyside Section BKKS.** Liz Donlan talks on 'Israeli Koi'. Burtonwood Brewery, Childwall Abbey, Score Lane, Liverpool, 8pm. Contact Syl Bennett, 01942 204948.

**14 Nottingham & District Section BKKS.** Open Forum. Meet at the Western Club, Hillside, Nottingham. Contact Shirley Hind on 0115 981 0923.

**15 Crouch Valley Section BKKS.** Geoff Kemp talks on 'Trips to Japan'. Contact Peter and Brenda Scott, 01375 642321.

**18 Leicestershire Section BKKS.** Pond visit. Contact Linda Hadfield (Secretary), 0116 223 7670.

**19 Northern Koi Club.** AGM at St James Hall, Vicarage Lane, off Eccles Old Road, Hope, Salford. Contact Tony McCann on 0161 794 1958.

**26 Crouch Valley Section BKKS.** Members pond visit. Contact Peter and Brenda Scott, 01375 642321.

**26 Leicestershire Section BKKS.** Entertain members of the Birmingham Section BKKS. Contact Linda Hadfield (Secretary), 0116 223 7670.



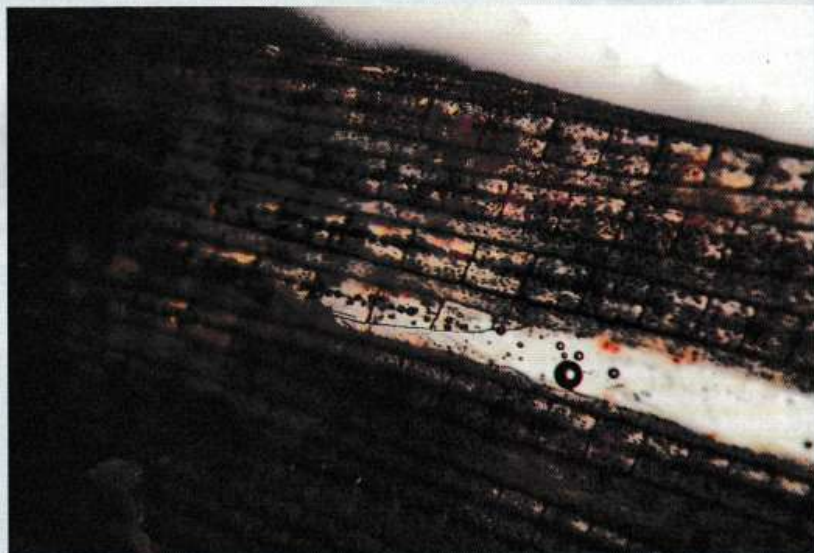
FOCUS  
NO. 1  
FISH  
HEALTH

# Diseases of Fishes

*Robert J.  
Goldstein, PhD,  
concludes his  
round-up of  
Bacterial  
Diseases*

PHOTOGRAPHS BY THE  
AUTHOR

► Contagious Gram-negative bacterial fin erosion in a blue gourami, *Trichogaster trichopterus*.



In Parts 1 and 2 of this series I discussed the Gram-negative short rods and the common diseases they cause in fishes. Other bacterial diseases of fishes are less serious in aquarium fishes, less-common, or curious in other ways. These are members of the Gram-positive and the Acid-fast bacterial groups.

### *Gram-positive Streptococci*

Uncommon in aquarium fishes the Gram-positive

Streptococci occur in native American Minnows and Trout, and a wide variety of cold and temperate marine sport and food fishes. The identification of species is unclear, and the strains so far isolated are referred to by their biochemical characteristics. The Gram-positive Streptococci are not known to be important pathogens of tropical marine or tropical freshwater aquarium fishes, but they have been found in *Tilapia* and in the Golden Shiner, an

important and widespread Bait Minnow sometimes used as a feeder fish for large cichlids.

Signs of infection are a darkening of the body, eyes clouded and both protruding (not just one), shallow ulcers on the body, and haemorrhaging of the gill covers, chin, mouth, back, peduncle, vent, and at the bases of the fins. The protruding eyes are a typical early sign of the disease.

The bacteria are ubiquitous in water and sediments and may





manifest as disease where fish are crowded and stressed. An important source is frozen marine fish meat, in which the bacteria are known to survive at least six months. An outbreak of protruding eyes (*Exophthalmia*) following feeding with a new batch of frozen fish should indicate the new food as the source. Untreated, the sick fish die and become a source of infection for healthy remaining fishes (Inglis et al., 1993).

Although Gram-positive

bacteria in most animals are readily cured with the penicillin or erythromycin groups of antibiotics, this disease has proved difficult to eradicate. Destruction of infected fish and sterilisation of the aquarium is advised.

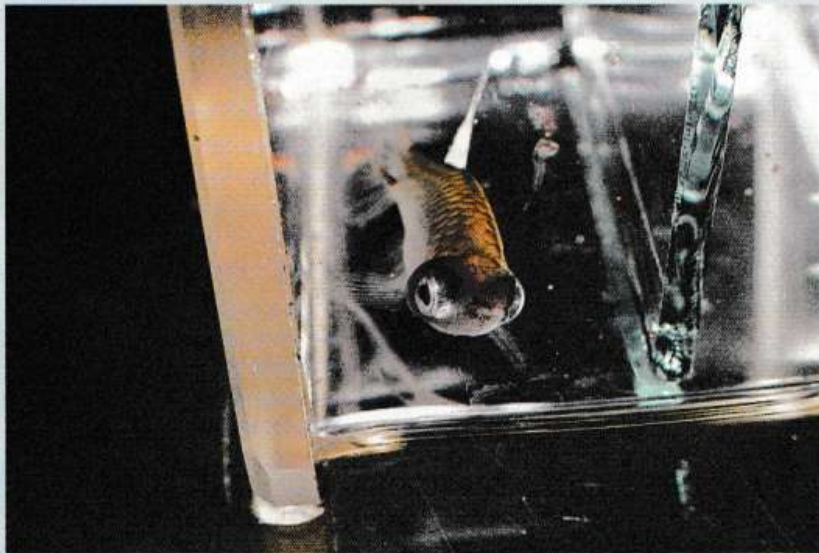
### *Other Gram-positive Fish Pathogens*

*Renibacterium salmoninarum* causes bacterial

kidney disease (BKD) in cultured salmon and is so far not known from other marine fishes or from freshwater fishes. The reservoir for the bacterium is other salmonid fishes, but it does not survive long in freshwater, sediments, or other saltwater fishes.

A characteristic is formation of enormous ulcerating holes in the muscles, a condition so far not reported from tropical fish. There may be no external symptoms, or the symptoms

◀ and ▼  
Exophthalmia in this South American *Terranatos dolichopectus* killifish was caused by gas-forming Gram-negative bacterial septicemia. Either the fish recovers through its own immune system or it dies, as did this one. Medications at this stage are ineffective.





# FOCUS NO. 10

## FISH HEALTH

### Diseases of Fishes

► These gigantic digenetic trematodes occur in the stomachs of the marine fish, *Acanthocybium solanderi*, also called the wahoo. These worms have also been found in several kinds of marlin, always in the stomach. The life cycle is unknown, but probably includes a mollusc found in sargassum weed. Looking much like leeches they are actually flatworms.

may mimic other fish diseases nonspecifically. Treatment is with erythromycin in the food, and must be continued for a long time to eliminate all parasites.

*Clostridium botulinum* is a Gram-positive, endospore-forming rod that occurs in the lower intestines of all higher animals where it lives and grows under anaerobic conditions. Some strains produce a neuromuscular toxin inducing symptoms resembling Tetanus and called Botulism or clostridial food poisoning. So far reported only from salmonids cultured in fresh water. The poisoned fish seems to progressively stiffen, until only its tail can wag. It thrusts to the surface, sinks, then wags and resurfaces, repeatedly until death.

### Acid-fast Bacteria

One important group of bacteria, consisting of the genera *Mycobacterium* and *Nocardia*, have relationships to the fungi, and a structural similarity in the large deposits of waxes in the cell walls. It is these waxes that give them their acid-fast staining properties and interferes with the Gram stain, so that they are only weakly Gram-positive, if at all. *Mycobacterium* species in man are the causative agents of Tuberculosis and Leprosy. *Nocardia* is less strongly acid-fast, and also occurs in mammals, but is not a significant mammalian or fish pathogen, and may only be an opportunistic nuisance.

*Mycobacterium marinum* infects virtually all freshwater and marine fishes, and is the most important member of the group. It can also afflict humans through abrasions and cuts, leading to ulcerating sores that last for weeks or months before disappearing. A characteristic of the mycobacteria is their extraordinarily slow growth rate. Even those called 'rapid growers' may take a week or more to grow into colonies on a culture disk, while other bacteria often form colonies within hours or a day. That's good for the fish which have time to elicit an immune response, but bad for treatment. Almost all anti-microbial drugs work by interfering with a stage of the parasite's

reproduction, such as formation of new cell wall material for the daughter cells. Because these bacteria grow so slowly, the patient needs to be kept on drugs for long periods before the bacteria are eliminated. In humans under the care of an MD that's not a problem, but it is in the aquarium of the average hobbyist. Essentially, we have no effective treatment for acid-fast bacteria other than keeping them warm, well-fed, and in high quality water (that means frequent water changes).

Although most fish are probably infected through a cut or abrasion, it's best to dump the fish to keep its carcass from being eaten and transmitting the disease in that less common manner.

The symptoms of mycobacterial infection are wounds that never heal, but don't seem to





get worse. The disease is most common on older or stressed fish whose immune system may be compromised or failing.

People can get infected by cuts while cleaning aquariums. The non-healing lesions are called fish tank mycobacterial infection or, as Al Klee put it so well years ago, 'fish tank finger'. It will go away by itself in a healthy individual, but may linger for weeks or longer. It is more common and serious in immuno-compromised people such as AIDS patients.

### ***Pathogenicity and Drug Resistance***

Pathogenicity can be inherited and transmitted from parent to daughter bacteria upon cell division. But that's not the only way pathogenicity is transmitted. We now know that the genes for pathogenicity can be transmitted across bacterial species.

How can that be? Do bacteria practice bestiality? Not really. It seems that the genes for drug resistance are often (not always) on those genetic fragments called plasmids, rather than on the bacterial circular chromosome. Bacteria can pass

on genetic mutations conferring drug resistance to unrelated bacteria. One way is by fragmenting at death; the fragments of the dead bacterium's chromosome and the particles of plasmids then being taken up by the unrelated bacterium and incorporated into its own genetic material, either as plasmid or on the chromosome (transformation).

A second way is when viruses of bacteria (bacteriophage = bacteria eating) invade a bacterial cell, and during their own multiplication pick up bacterial plasmids from the host, so that the new viruses will carry those plasmids to subsequent related or unrelated bacteria (transduction) during the next infection (Goldstein, 1997).

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

transferred to a common and important bacterial species.

That's happened in hospitals across the United States. Today, we are running out of effective antibiotics as drug-resistant strains incorporate newer genes for resistance to still more drugs.

Hospital bacteria are the melting pot, just like the USA. Eventually, almost all the bacterial species in hospitals will have all the genes conferring protection against all of today's antibiotics. This happened for lots of reasons, but the most important reason is the slovenly use of antibiotics for prophylaxis instead of saving up for when it was really needed. All we did was selectively breed drug-resistance into the bacteria.

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



◀ *Allenocotylea mcintoshii* is a polyopisthocotylean shown here on the gills of a greater amberjack, *Seriola dumerilii*, caught off the coast of North Carolina. The black pigment is part of the reproductive system of the worm. The two worms are oriented with their heads (narrow ends) to the left and reproductive organs in proximity.



## AUCTIONS & EVENTS

**5 July** Huddersfield Tropical Fish Society. Open Show and Auction, Rosythorpe High School, Nether Hall Avenue, Rosythorpe, Huddersfield. Raffle, Sideshows and Refreshments. Details from David Graydon, 36 Long Lane, Dalton, Huddersfield, HD5 9LB.

**12 July** Fair City A.S. Auction at The Scout Hall, Glenberry Road, Kirkcaldy. All enquiries to Dave Sturhouse, 01592 646565.

**12 July** Washington Aquarist Society & Pondkeepers. Auction of Fish and Equipment, Nissan Sports and Leisure Facility, Nissan Car Works, Washington, Tyne and Wear. Booking of lots 10.30am. Auction starts at 12.30pm prompt. Raffle, Bar and Refreshments available. Any lots unsold before 6pm will be returned to the vendor. For further information contact Alan Race, 0191 417 0768.

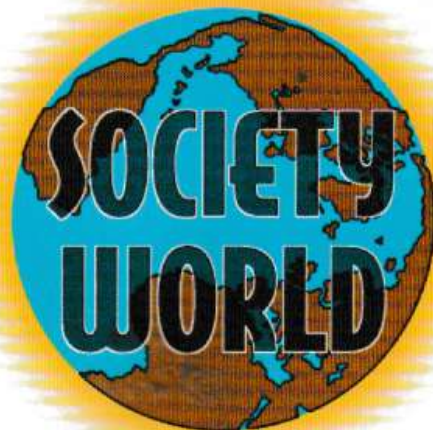
**12 July** Fair City A.S.  
**18 July** Goldfish Society of Great Britain, London City YMCA, Errol Street, Barbican, at 2.30pm. The Pitfalls of Judging Good Quality Goldfish, with examples of goldfish to demonstrate. Contact Roger Sulrick, 0181 550 1252.

**21 July** South Park Aquatic Study Society, 8pm. Wimbledon Community Centre, St Georges Road, Wimbledon SW19. Dennis Roberts talks on 'How I Keep My Fish'. Further information from Kim Seaton, 0181-641 2848.

**26 July** Oasis Fish Club Auction, 12 noon. Thompson Park Community Centre, Monkwearpath, Sunderland. Booking in of lots begins at 11am. Refreshments, Bar and Raffle. Meetings of Oasis F.C. are held at the same venue on the first Wednesday of each month. For further information about the society's activities please contact Avril Banks, 0191 384 1433.

**26 July** Oasis F.C.  
**13 September** Siltoum A.S.

**15 November** FNAS  
**22 November** Oasis F.C.



## IN MEMORIAM

As we were about to go to press we were saddened to learn of the loss of two well known aquarists:

Adrian Blake, longstanding member of Basingstoke A.S., and Terry Asquith, of Erith A.S., both passed away recently. We hope to include tributes in a future issue. Our condolences go out to their families and club members at this sad time.

## Tropical Fish Biology Seminar

The Fisheries Society of the British Isles Annual International Symposium will be held on July 13-16 1998 at the University of Southampton. The Symposium will consider all aspects of tropical fish biology, conservation and exploitation in both freshwater and marine environments. On the social side events will include a welcome reception and buffet, a dinner in the University, a barbecue and barn dance, and, on the Thursday evening, a conference dinner at a country house in the New Forest.

Amongst the subjects covered will be:

Tuesday, Evolutionary Processes, Sexual Selection and Speciation, Reproductive Behaviour of Reef Fishes and Behavioural Ecology of

Freshwater Fishes.

Wednesday, Community Processes in Marine Ecosystems and Ecological Processes in Tropical Rivers.

Thursday, Conservation and Resource Management, Conservation Genetics and Population Genetics of African Freshwater Fishes.

Friday, Workshop, Conservation and Management of African Freshwater Fishes and Workshop, Evolutionary Biology of African Freshwater Fishes.

Further information and booking forms can be obtained from: Dr George F. Turner (FSBI Symposium Organiser), Biodiversity & Ecology Division, School of Biological Sciences, University of Southampton, Bassett Crescent East, Southampton, Hampshire SO16 7PX. Tel: 01703 593217. Fax: 01703 595269/594793. e-mail: gft@soton.ac.uk Website: <http://www.soton.ac.uk/~gft>

## OPEN SHOWS AND MEETINGS

**5 July** Cats Open Show. Information from C. Ralph, 01703 560318

## SHOW DATES AND FESTIVALS

(Rule Codes: A = A of A; FB = FBAS; FN = FNAS; FS = FSAS; I = International Goldfish Standards; N = NEFAS; U = USoA; Y = YAAS)

**5 July** TV Cats (AA)

**11 July** Port Talbot A.S. (FB), Southend, Leigh & D.A.S.

**19 July** Bourmemouth A.S. (FB)

**26 July** Merseyside A.S. (FN)

**2 August** Yorkshire Koi Society (BKKS)

**9 August** Grimsby & Cleethorpes A.S., Salisbury A.S. (FB)

**16 August** KAAS Show (FB) (new date), Perth A.S. (FS)

**23 August** Glenrothes A.S. (FS)

**30 August** Swallowfield A.S. (AA), T.T.A.A. (Area Group) (FB) USA

**5 September** Bristol A.S. (I)

**6 September** Alden A.S. (YAAS), Cardiff A.S. (FB), Cramlington A.S. (FB), South London A.S. (AA), Wyle A.S. (Y)

**12 September** Hourslow A.S. (FB)

**13 September** Lincoln A.S. (Y), Mid Somerset (BKKS), Siltoum A.S. (FN), South of Scotland A.S. (FS)

**19 September** Plymouth A.S. (FB)

**20 September** Mid Sussex A.S. (FB), Otley A.S. (Y)

**27 September** Darwin A.S. (FN), Fair City A.S. (USA)

**4 October** Basingstoke A.S. (AA), Grangemouth A.S. (FS), Halifax A.S. (FN), Littlehampton & Bognor A.S. (FB)

**11 October** Doncaster A.S. (Y), Washington A.S. (FB)

**18 October** Halifax A.S. (FN), Solway A.S. (FS)

**19 October** West Cornwall A.S. (FB)

**24/25 October** British Aquarists Festival, Manchester (FN)

**30 October/1 November** Supreme Festival of Fishkeeping, Weston-super-Mare (FB)