

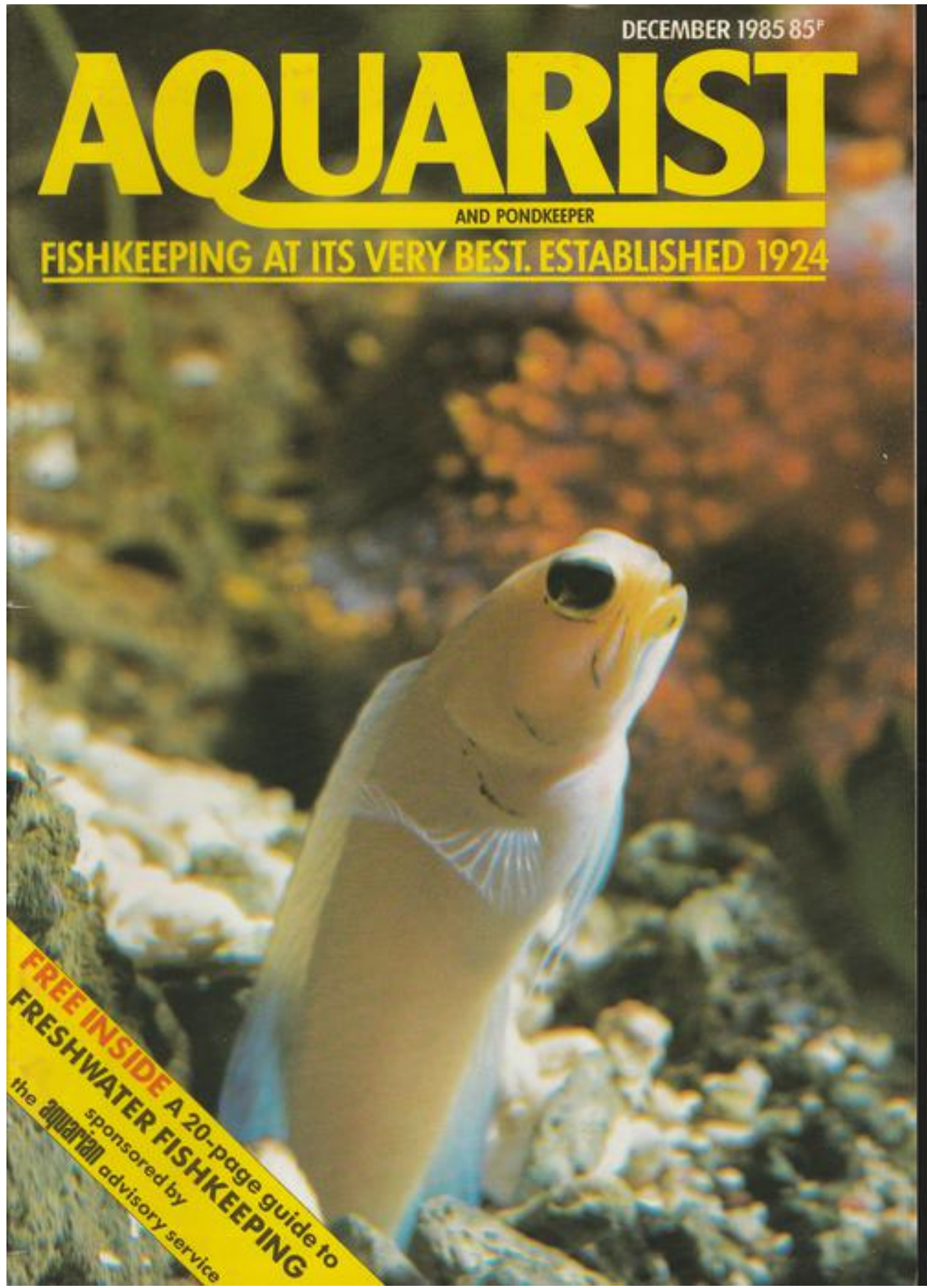
DECEMBER 1985 85¢

AQUARIST

AND PONDKEEPER

FISHKEEPING AT ITS VERY BEST. ESTABLISHED 1924

FREE INSIDE A 20-page guide to
FRESHWATER FISHKEEPING
sponsored by
the *aquarist* advisory service



Publisher
Andrew Blair
Editor
Laurence E. Perkins
Consultant Editor
John A. Dawes
Advertisement Manager
John E. Young
Production Manager
Dinah Grimes
Designer
Jonathan Newdick

Published by
Buckley Press Ltd.
58 Fleet Street
London EC4Y 1JU
Tel: 01-353 4060

Subscriptions
£14 per annum (U.K. only)
including postage. Overseas and
Airmail rates on application. All
subscriptions are payable in advance.
Cheques or International Money
order should be made payable to
Buckley Press Ltd. and sent to:
Aquarist Subscriptions
Subscriptions International Ltd.,
92 Queensway, Bletchley,
Milton Keynes MK2 2QV.
Tel: 0908 70761.

ISSN 0003-7273
Printed by Buckley Press Ltd.

Cover Story



The Yellowhead Jawfish, or Jack-in-the-Box, *Opisthognathus aurifrons*, is one of only 30 species or so which constitute the family Opisthognathidae. It is, by far, the most common of all the Jawfish species found in aquaria. It is a really beautiful fish which has the added advantage of exhibiting fascinating behaviour patterns. For a start, this interesting fish constructs a burrow into which it retreats completely when under threat. At other times, it rests with most of its body inside its burrow keeping just its golden coloured head exposed at the entrance. This is, perhaps, the only possible drawback with *O. aurifrons*, ie, its considerable beauty is not always in full view. However, other positive features more than make up for this. Prominent among these is the almost obsessive preoccupation that some specimens have concerning the arrangements of pebbles and gravel around the burrow entrance. Although Jawfishes (or Smilers—the alternative name for this family) can be, and have long been, kept quite easily in aquaria, many details of their biology remain unknown. One fact that is known is that *O. aurifrons* males incubate the eggs in their mouths until they hatch. No fry have, however, been raised successfully by marine aquarists . . . yet.

AQUARIST

AND PONDKEEPER

DECEMBER 1985 Vol. L No. 9

CONTENTS

Portrait of a Famous Aquarist	2		
Hughie Green talks of his love of aquarium fish to Eberhard Schulze.			
Language of Fishes	4		
The Grazers. John Dawes deals with herbivorous fishes.			
Christmas Books	10		
A personal choice by Ian Sellick.			
Correct Feeding (Part 2)	20		
Dr. David Ford explains why fish need vitamins, oils and proteins.			
The Skunk Botia	24		
This popular loach is discussed by Dr. Michael Benjamin.			
Toxicity of Aluminium in the Aquarium	26		
Graham Cox entreats us to avoid aluminium where it can be in contact with aquarium water.			
Marines for the Beginner (Part 2)	34		
In which Martyn Haywood offers further advice including some on undergravel filters and protein skimmers.			
	Reproductive Strategies in Cichlids	38	
From South and Central America, Africa and Asia come Cichlids with a diversity of habits highlighted here by Ian Sellick.			
European Lizards in the Garden	43		
An outdoor rather than an indoor reptiliary is to be preferred, says Julian Sims.			
Spotlight	46		
Dr. Michael Benjamin supplies the information on the Spotted Wrasse photographed by Arend van den Nieuwenhuizen.			
	Some Diseases of Aquarium Fishes	56	
Dr. Chris Andrews describes some of the ailments affecting our fishes and suggests remedial treatment.			
Wintering Goldfish	62		
Pauline Hodgkinson advises on winter care.			
B.A.F., 1985	66		
Report and Show Results by John Dawes.			
Regular features			
Tomorrow's Aquarist	14	Company Profile—Tahiti	
Coldwater Jottings	23	Aquariums	53
What's Your Opinion?	29	Meet the Societies	68
Your Questions Answered	50	News from Societies	72

Terms and Conditions

Contributions are invited and when not accepted will be returned only if accompanied by a fully stamped and addressed envelope. Manuscripts should be typewritten. No responsibility can be taken for drawings, photographs or literary contributions during transmission or in the editor's hands. In the absence of an agreement the copyright of all contributions literary, photographic or artistic belongs to Buckley Press Ltd. The Publishers accept no responsibility in respect of advertisements appearing in the magazine and the opinions expressed in editorial material or otherwise do not necessarily represent the views of the Publishers. The Publishers cannot accept liability for any loss arising from the late appearance or non-publication of any advertisement.

© Buckley Press Ltd.

A FAMOUS AQUARIST HUGHIE GREEN

Hughie Green is perhaps better known to an older generation of readers/aquarists as the TV personality who dominated the small screen in the fifties and sixties with shows like: Double your Money, Opportunity Knocks and Sky's the Limit to mention just a few, but his association with show-business goes back many more years.

At the very early age of just 14 he found himself and the theatre became his life. He played in as many as five shows a day both here in England and in America in what was known as 'Vaudeville' or 'Variety'. Variety it certainly was as he worked on shows with everyone and everything from Sophie Tucker to trained seals and dolphins. He was fascinated by them all, particularly the seals and the dolphins. "I used to swim with them in a big

tank at a show on Catalina Island in 1938. After three weeks with those amusing and highly intelligent dolphins I started to talk to fish. . . ."

Born an aquarian, his life was always to a certain extent tied up with fish. His father, the late Major Hugh Green, was in charge of supplying millions of tons of the edible variety to the Canadian Armed Forces in World War I. His mascot was a performing goldfish known as 'Maggie'. This amazing little friend answered to her name and looped the loop if any one tapped her little glass bowl. 'Maggie' was, of course, in great demand by both the press and his father's friends and was probably the only fish in the world to cross the Atlantic three times in a bowl.

His life as a professional pilot had taken him to many tropical isles and the five years spent in the Canadian Air

Force gave him a chance to land flying boats on one of the tributaries of the Amazon near a place called Belem, right at the mouth of the mighty river. After landing, natives would come and attach wheels to the hull of the flying boats in order to tow them ashore and out of the water. This was a dangerous job. The rivers and tributaries are infested with Piranhas and in order to discourage shoals of these small but deadly fish attacking the native swimmers, others in boats would encircle the flying boats and strike the water with blazing torches. This ritual kept these fish at bay. Had a shoal got through, the Piranhas would have stripped every piece of skin or every ounce of flesh off these native swimmers within seconds. "I do not like fish like these and I support any country where these fish are banned . . . yet, there are one or two people I would gladly give a Piranha as a Christmas present to be used in their bath.

"Snorkling close to the shores of the many islands visited I saw many exquisite and inquisitive little fish. All the way from Antingua in the Caribbean to Bora Bora in the Pacific I feel I have friends who, the minute I enter their kingdom, will come and say "hello stranger". The small saltwater tropical fish have the most glorious colours and markings, and though I have never owned a seawater aquarium they have always fascinated me greatly.

"My friends are tropical fish. . . . That is why I built them an eye level home more than 20 years ago in my living room high above the roar of London's Baker Street traffic. It is important to be at eye level because we like to look at each other from either side of the glass reassuring ourselves, in our own ways, that we are wanted. I mean, the point is why have friends if you don't see them? Their home fits snugly into a corner of the room, and was purpose made in perspex. It contains all the mod cons and the

"Some of my best friends are fish." Hughie Green relaxes in his London flat



EBERNARD SCHULZE

In an interview with Hughie Green, Eberhard Schulze elicits the celebrity's reasons for being an aquarist

water is kept sparklingly clean by an Eheim power filter. The plant growth is magnificent and offers many hiding places. Their water is partially changed when necessary.

"The aquarium houses dignified and sort of up-market Angels, perky and inquisitive Striped Barbs, sleek and fast-moving Red-tailed Black Sharks and many other little fish whose name I sometimes forget. All of them make great and easy-to-live-with flat mates. Unlike a dog or, I suppose for the very rich, an elephant from Harrods, taking a fish out for a walk, even a Dog-fish, is not necessary.

"However, leave them alone, and you can for a long week-end, and friendship does suffer. Opening the door on my return I always know that fins and tails will be turned against me and so with a twinge of conscience I start to call them . . . yes, they can hear. 'Hello boys and girls'. 'Hi friends' I call in my best, there is nothing wrong with the world, television voice. Their noses are all pressed against the front glass. 'How are you?' I say and having seen me, with a derisory swish of each tail they disappear behind the rocks or into the weeds to sulk. Some, of course, get over their moods quicker than others proving to me, like humans, fish personalities differ greatly. It is usually the Striped Barbs who forgive me first. I got five of them. And once I have prepared myself a home coming libation I start lightly to tap the front with my fingers. Slowly, in line astern, the little striped fellows and gals will swim out letting me know that my departure from our home has been forgiven.

"I love them all, but I am awfully fond of the small barbs who, apart from being lively, feed from and also nibble at my fingers. When they are tired, they will let me know that it is their bed-time by gathering in the front of the tank where, motionless, head down, they wait for me to turn

out the light. After a while they make their way to the darker corners behind the rocks and plants proving privacy is essential even among friends.

"The therapeutic value of piscatorial company is acknowledged by many psychiatrists. And what better way to ease tension on coming home, than to pour yourself a drink, relax, and unwind as you gaze into the tranquility of their world. Suddenly the pressure goes. You relax and why not. You are with friends. Life is, of course, not all peace and quiet on the watery side of the glass. Jealously, greed, even murder take place in their kingdom as well as, in the end, the last swim to a fishy heaven. Some of my friends have been with me above Baker Street for ten years; one giant sized Red-tailed Black Shark turned 12 before he left us for the great fish tank in the sky.

"Their health and welfare is entirely in your hands, but in a properly organised and equipped tank the joy they give in return for the effort and expense is worth the cost many times over. Some authorities believe a happy atmosphere is conducive to their longevity. I agree. Fish love the company of humans and a room full of people, is as much fun for the fish as it is for the visitors providing you don't invite some cretin who thinks it fun to see if the little fishes would like a teensy weansy drop of Martini. With regards to meals, fish are creatures of habit and though I have never seen one wearing a watch, they can certainly tell the time. 3 p.m. at our flat is meal-of-the-day time except when I go away for a few days when a large edible dissolving object, purchased from your local aquarist, takes care of their requirements. It may not be Cordon Bleu but then as a treat after my return I give them a bit of raw steak on the end of a piece of cotton and they go mad. It is Jaws in your own living room before your own eyes. There are spin-offs too from keeping fish; for example, "Would you like to come up and see my tropicals?" works far better than "How'd you like a look at my etchings?" Yes, ladies are usually fascinated. But to me, the prime spin off is the fact I share my life with friends who, when I come home tired and weary, don't nag, keep quiet and are as pleased to see me, as believe me, I am to see them. . . . Yes, some of my best friends are fish."

Press release

Home Marine goes from Strength to Strength

Home Marine Quality Fish Centre was established in 1974 as one of the first centres in England to specialise in Marine fish.

Over the years it has grown into one of England's largest specialist fish outlets with 5,000 sq ft of beautiful display and no less than 3 acres of growing and storage space. The grounds for Home Marine's success have been based on total professionalism, always offering expert advice, first class equipment and high quality livestock to all their customers. As professional Aquarists they can guarantee success by carefully selecting suitable equipment and livestock tailored to individual needs.

They have even taken fishkeeping one step further with the introduction of the 'Privileged Customer Club' which offers

new customers special deals on equipment together with seminars to teach the use of Tunze and Dupla systems, plant care and overall successful fishkeeping. All items sold at Home Marine are carefully chosen to offer optimum efficiency and their fish, both Tropical and Marine are hand selected to ensure suitability.

There is on display a large Marine aquarium full of specimen fish, a Dupla system containing high quality plants from Denmark and fully grown Tetras, as well as a Tunze invert system. Perhaps these are some of the reasons why over 3,000 people visit Home Marine at Theobalds Park Road every week. So why not go and judge for yourself their fine array of fish, plants and equipment and even become a member of their special Privileged Customer Club.

Language of fish

by John A. Dawes

The Grazers

There is a concept in ecology known as the Pyramid of Numbers which shows the relative abundance of the various organisms that, together, go to form a food chain.

The organisms which far outstrip all the others in terms of total weight (biomass) are the green plants forming the base of the pyramid. They are known as Producers, reflecting the fact that they constitute the first and most significant component on which all the other members of the pyramid depend directly or indirectly. In fact, without green plants, there would be no life, as we know it, on earth. It is they who 'capture' sunlight energy and use it to bind carbon dioxide and water together into carbohydrates, one of the basic foods that all living things require to survive. These carbohydrates are then oxidised via respiration and, as they undergo oxidation, release some of the captured energy to perform the various metabolic processes that separate living things from non-living things.

Animals cannot produce carbohydrates from carbon dioxide and water in the presence of sunlight, i.e. they cannot carry out the process of photosynthesis. But green plants can and it is because of this that they are referred to as Producers in the Pyramid of Numbers.

Some animals, the herbivores, obtain their carbohydrates by consuming plants directly. Others, the carnivores and piscivores, cannot consume plants directly but, instead, consume animals which consume plants. And so it goes on up

the pyramid, with each level generally being represented by a progressively lower number of consumers.

A typical example from the fish world would be as follows:

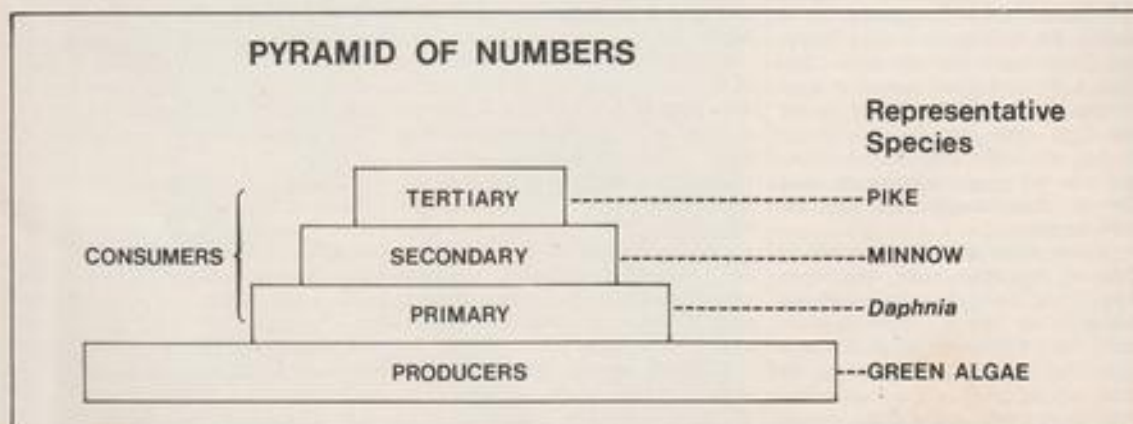
The Producers could be represented by free-floating green algae which could be eaten by, say, a *Daphnia*. The *Daphnia* becomes the Primary Consumer in this food chain. If a minnow (or any other fish for that matter) eats the *Daphnia*, the fish in question becomes a Secondary Consumer. That fish could later be eaten by a Tertiary Consumer, such as a pike. The pike, if small, could be consumed by a heron or, if large could be fished by an angler and later eaten . . . and so on. Clearly, it takes numerous free-floating algae to sustain a single *Daphnia*. Fewer, but still quite numerous, *Daphnia* would be required by a minnow. It would take even fewer minnows to feed a pike . . . etc.

It is this relationship that gives the Pyramid of Numbers its characteristic shape, particularly when biomass is substituted for actual numbers, e.g. a single *Daphnia* weighs less (has a lower biomass) than the total number of algae it eats in order to grow and survive. No matter how hard we try, we are all (humans, just as much as fish) part of this intricate relationship with all animals being dependent, at least, on the level of the pyramid directly below them for their food.

Since herbivores only have a single level below them, the green plants (Producers), it seems logical that any

feeding adaptations they possess should be finely adapted to the job they have to do, i.e. to consume plants. The same, obviously, applies to Secondary, Tertiary and other Consumers. Some of these adaptations are internal and cannot, therefore, be easily observed. However, the external ones can, and much of their 'language' is 'available' for interpretation through direct observation.

By far the best-known herbivorous fish available to hobbyists is the Sucking Loach or Chinese Algae Eater (*Gyrinocheilus aymonieri*), followed by the various Plecos (*Hypostomus* spp.), the Bristle-nosed Catfishes (*Ancistrus* spp.) and the Panaques or Sucker Catfishes (*Panaque* spp.). A considerably rarer fish is *Euchilichthys guentheri*. Yet, despite its rarity, there can be little doubt concerning either the level at which it feeds (and in which it lives) or the nature of its diet. In common with all its better-known counterparts, *Euchilichthys* has a downward-pointing sucker-type mouth which clearly indicates that it is predominantly a "solid substrate feeder". I hesitate to use the term "bottom feeder" because the crucial point is that the orientation of the mouth shows that it is designed to be in contact with solid surfaces. These could be rocks, leaves, exposed underwater roots or branches or any other submerged objects. Some of these will, obviously, have surfaces which are not parallel to the bottom of the stream or river in which the fish are found. Take a submerged branch, for example. It may well have parts of its top surface lying



parallel to the bottom. The same could apply to parts of the underside, but these would be upside-down in relation to the bottom and would require a fish to feed at this apparently unusual angle. Protuberances, plus the curvature of the branch itself, would provide other surfaces facing in as many directions as there are degrees in a compass.

What a sucker mouth tells us is that, as long as the fish can hang on, it can attach itself to a surface irrespective of whether it is aligned with the bottom of the stream or not. If that were not so, then it would be impossible for Sucking Loaches to cling to the sides of an aquarium as they so often do. They would simply fall off—and this they most certainly do not do! A sucker mouth does not, however, tell us what diet a fish has. To find essential clues concerning this, we have to look at other features, particularly the teeth. Their number, shape and distribution all carry important messages. The fish mentioned above all exhibit several shared characteristics. For instance, they all possess numerous small teeth arranged in pad-like groups which can be made to lie flat against a chosen surface simply by resting the mouth against that surface and operating the sucker mechanism. In some ways, each tooth sacrifices a little bit of its individuality, depending for efficiency on how well the 'pads' work as units.

An appreciation of just how efficient such an arrangement can be for scraping encrustations off a surface can be gained by comparing these tooth pads with a magnetic algae cleaner. These very useful aquarium accessories consist of two magnets, one covered with a smooth textile surface which is placed against the outside of the aquarium, and another covered in small, rigid, closely packed plastic 'teeth'. This second magnet is pressed on to the inside surface of the aquarium and kept in place by the attraction, through the glass, between the two magnets. As the external magnet is moved up and down, it glides over the glass, without scratching it. The internal magnet, obviously, mirrors the movement of the external one and, as it does so, its 'teeth' scrape off any encrustations which there might be on the internal surface of the glass. Transfer this notion to the world of Sucking Loaches, Plecos and Panaques and the beauty of their mouthparts immediately becomes obvious.

The vast majority of encrustations scraped off by these fish are, obviously, algae. However, many microscopic organisms, such as certain species of Protozoan (single-celled animals), are known to live among encrusting algae.



Euchilichthys guentheri. The algae-scraping "tooth pads" can be clearly seen in this specimen.

Algae eaters may, therefore, passively supplement their vegetable diet with a small, but regular, input of animal matter.

The same could be said of other predominantly herbivorous species, e.g. the various Mollies (*Poecilia sphenops*, *P. latipinna*, etc.) which spend a great deal of time cropping algae in a similar way to their terrestrial equivalents, cows, sheep, zebras and the like. Despite the huge, obvious differences between a cow and a Molly, they both exhibit remarkable similarities in the form of their plant-cropping 'equipment'. Basically, what is required is a system consisting of two straight edges which can be brought together, almost like a pair of pincers, at right angles to the vegetation which needs to be cut. If you look at the feeding arrangements possessed both by cows and Mollies, you find precisely this. And the similarities don't end there, either.

Internally, herbivores must have a digestive system capable of extracting

the maximum amount of nourishment from their relatively poor-quality food, with its hard-to-digest cellulose cell walls. Such a situation demands that ingested plant matter be made to travel the longest possible distance along the digestive tract. It will come as no surprise, therefore, to discover that herbivores, be they horses or Sucking Loaches, possess long, convoluted guts. This characteristic is so typical that it is quite possible to make statements concerning the diet of a fish even if the only evidence available is a preserved specimen of unknown identity.

I referred earlier to the possible 'passive' intake of animal matter by herbivores. Passive or not, some might argue that such fish should not be regarded as strict herbivores, but as 'partial' predators. However, the label of predator is normally reserved for those species which actively hunt for their food. Some of these will form the basis of my next article.

BOOKS FOR CHRISTMAS

General aquarium books abound; they seem to multiply with each passing year. Some very good ones that would be top of my list seem to now have largely disappeared, but if you can track down a copy of *The Living Aquarium* by Peter Hunnam (Ward-Lock £15.95), the recipient will reward you. Combining basic biology with the fundamentals of aquarium technology in a large format, well-illustrated work, the author was perhaps a little ahead of his time for the UK market. This is a readable reference work, a little patchy perhaps in content, but worthwhile.

Dick Mills seems to have a stranglehold on the UK book market, although John Dawes is catching up with two volumes that are extremely useful. John's style seems to be to go for the novel approach, to avoid the set pattern that seems to characterise books for the aquarium market. *The Freshwater Aquarium, Questions & Answers* (Robert Royce, £3.25) was the first indication of this new approach, and for those who don't have this little handbook, is still to be recommended. You wouldn't go far wrong giving it to any fishkeeper; we all ask questions, and looking up the answers directly is a simple solution. John promises next year to fill in the gap left by providing us with a book more on the fish themselves, but you'll have to wait for that one. For the Christmas market, however, another unusual paperback, and one which I think will be of value to all fishkeepers, from beginner to expert, *The Fishkeeping Yearbook 1986*, edited by John Dawes (Robert Royce, £5.95) is quite a goldmine. There are few pages of text on fish and fishkeeping, mostly article style chapters on such subjects as 'The art of freshwater tropical fishkeeping', 'The basis of fish health', 'Koi', for example, all authoritative résumés by acknowledged leaders in the appropriate fields. What the book mostly consists

A personal choice by Ian C. Sellick

of, however, is data, and lots of it. What does the FBAS do—read all about its activities. Want to join a club near you?—look in the directory of clubs and their activities. Want details of other English language fish magazines?—here they are. Any aquatic retailers or wholesalers not in their respective sections will certainly wish to be for the 1987 edition. This is a book I intend to keep a copy of in the car as well as at home. A spare afternoon in Oban? The yearbook tells me that £1.50 will get me into the Sealife Centre to view 35 coldwater marine tanks. As a first effort, I find this publication remarkable; it should get better from year to year. Could we possibly have some kind of geographical index, though, to suppliers, clubs and public aquaria?

Of the large format lavishly illustrated books currently available, I think Dick Mills' and Gwynne Vevers' *The Practical Encyclopaedia of Freshwater Tropical Aquarium Fishes* (Salamander, £9.95) the most useful. Fairly conventional in arrangement, details are given of setting up the aquarium, filter types and so on, with plants, furnishing and water being quite well covered, with step-by-step illustrations in many cases. Two hundred stunningly illustrated species are described, with generally accurate names and just enough detail to both keep the fish successfully and whet the appetite for finding out more. Fish size is shown by comparison to a silhouette 'typical' species, a tiger barb, a simple idea. Practical tips at the top of each page add interest.

The traditional approach is exemplified by Hans Frey's *The Freshwater Aquarium* (Orbis, £8). This is a German 'classic',

one of the many translated by Gwynne Vevers, that is now in its 25th edition on the continent, but is seen here (I believe) for the first time. The book looks dated, and some of the generalisations in the text don't stand up to current scrutiny: we know better nowadays than to dismiss Malawi cichlids as "mostly mouth-brooders. The males have round eye spots on the anal fin...", when both these statements are at least misleading. There are factual errors too, where careful revision of the text should have been made, especially on nomenclature. Some have been altered from older German to this English edition, but there are still lots of howlers. By and large the potted synopses of species are accurate insofar as maintenance is concerned, and the plant section is useful, but this book is not high on my list.

I suppose one could describe J. P. Gosse's *Freshwater Aquarium Fish, A Colour Guide* (David and Charles, £7.95) as a good idea that has gone sadly wrong. Several hundred species described in pictograms and often illustrated with appalling specimens does nothing to enhance fishkeeping. The author could have elected to write a little more about the fish chosen (especially as many are not covered in other books, not even specialist ones), but instead gives little diagrams that are supposed to tell you all about habits, reproduction and the like. While the pictograms seem accurate, this is nowhere near enough detail and the suggested further reading (essential in this case) is woefully out of date.

All of which is made up for by a superb series of books that should be under everyone's Christmas tree this year. Salamander's *Fishkeepers Guide To...* series is great. 120 page hardbacks at just £3.95 each, they cover the general subject and will soon expand to cover the specialist market too. The latest, *Maintaining a Healthy Aquarium* by Neville Carrington is no exception, and will certainly be on its way to a less expert fishkeeping member of my

family this Christmas as a readable explanatory guide. It is not perfect, but the general sections on water chemistry and filtration I thought good, although still perhaps a little technical for the complete novice (but how do you avoid that?). The section on growing plants is a little weak, but the brief section on improving breeding success I liked, and the section on fish diseases (with many illustrated with real photos, not artists' impressions) is sure to prove invaluable to all. The other titles in the series to look out for are Dick Mills' *The Tropical Aquarium*, and *Community Fishes*. I do wish there was slightly less overlap between the volumes, but as each must stand on its own, this is understandable. The format makes them ideal for putting in stockings too.

Tetra Books have a reputation for excellence, and their *Tropical Aquarium Fish* by Ulrich Baensch is no exception (Tetra, £5.25). There will be those who will crave Dr. Axelrod's *Atlas of Freshwater Aquarium Fishes* (TFH, £50) as the best Christmas present they could get; it is certainly impressive in both content and price (and the subject of a separate review), but for me, the best general book this Christmas has got to be *The Encyclopaedia of Underwater Life* by Keith Bannister and Andrew Campbell (Allen and Unwin, £25). Not just a book for the aquarist, this is a 300 page celebration of aquatic life for all naturalists. It deals with the whole spectrum of fish, briefly, but accurately and succinctly, with superb photography and helpful paintings. But more than this, it also covers the invertebrate life found in the sea and in freshwater. To cover the whole of aquatic life in 300 pages was always going to be a tall order, but this book does it successfully with general descriptions of each group, plus short accounts of interesting species. Whoever heard of noodle fishes, for example, before now?

The specialist book market is almost entirely dominated by TFH publications. Of their recent titles, *Rainbowfishes of Australia and Papua New Guinea* by Gerald Allen and Norbert Cross (£16.50) is outstanding and would be welcomed by any freshwater aquarist, especially as these fish are becoming available in greater variety. Although rather irrelevant to the UK aquarist, I was also very impressed by the thoroughness of Lawrence Page's *Handbook of Darters* (TFH, £24.95). I do wish TFH publications were consistent in their thoroughness and factual accuracy and illustration. Many aquarium groups are extremely poorly represented, especially considering how popular they are. Cichlids are a case in point, although Pierre

Richard's *Fishes of Lake Tanganyika* (TFH, £24.75) goes a long way to redress the balance. The moral seems to be to check the veracity of the author before you buy. Newly added to the TFH range is Jack Wootley's *Discus Handbook* (TFH, £10.50) a large format, lavishly illustrated work. A must for the discus and general cichlid enthusiast.

If you are a catfish enthusiast (or even if not), then you cannot afford to miss the opportunity this Christmas to get David Sands' *Catfishes of the World*. The final volume, number 5 in the series on Bagridae and others (Dee Bee Books, £18) carries on the improvement seen during the series. Make sure you support this laudible effort; supplements to the looseleaf books will continually keep them in date, a failing of so many books.

The Marine aquarist has plenty to choose from, or so it would appear at first sight, but practical guides seem few and far between. For the saltwater enthusiast in your life I would therefore suggest Graham Lundgaard's *Keeping Marine Fish* (Blandford, £3.95), a 'how to do it', not a 'what to keep', book. For a beginners' guide, I must again turn to Salamander. I don't normally think of Dick Mills as a marine aquarist, but his *Marine Fishes* (Salamander, £3.95) is a superb condensation of the basic tenets of how to do it, and with a well illustrated selection of fish in the 'what to keep' section. Having illustrated such a beautiful tank on page 19, however, it is a pity more space couldn't be given over to invertebrates and marine plants.

Hans Baensch's *Marine Aquarists' Manual* (Tetra, £5.95) also rates very highly, informative and superbly illustrated as always. TFH have recently published the latest addition to the series on Pacific Marine Fish with a volume on *The Fishes of California and Western Mexico*. Volume 8 in the series, at £24.75, it is a good guide, or might be better described as a pictorial survey, in large format. If you're starting from scratch, however, the series of 8 at nearly £200 requires a very benevolent Father Christmas.

If you're looking for something different for your mariner, then Leon Zann's *Living Together in the Sea* (TFH, £24.75) is an interesting, well-illustrated, often anecdotal book, that deals with symbiosis. I was certainly amazed at the range of relationships exhibited by some often rather weird creatures.

All fishkeepers, young and old, whether marine aquarists or not, like seashore books. Still available, and still valuable, is Barrett and Yonge's *Pocket Guide to the Seashore* (Collins, £5.95).

The water gardener may be forgotten

out of the pond season, but the *Stapely Book of Water Gardens* by Stanley Russell (David and Charles, £10.95) should be gift-wrapped in butyl for those contemplating digging a pond next year. Although some of the photography is a bit indifferent, the practical nature of the text makes this a must. Salamander seem to get the credits here too, with David Papworth's *Garden Ponds* (£3.95) and Dick Mills' *Coldwater Fishes* (£3.95) being practical, comprehensive and well worth the modest outlay. We get so used to books illustrated in colour these days that Dick Mills' other excursion into the field *Keeping Goldfish* (Blandford, £3.95) seems dull. It is thorough though, and adequately illustrated in black and white. Werner Ladiges' *Coldwater Fish* (Tetra, £4.99) should be added to the present pile of anyone who hasn't got this superb little volume. Stocking fillers for the water gardener could include the Wisley Handbook *Water Gardens* (Royal Horticultural Society/Cassell, £1.95), a 64 page guide, mostly to aquatic plants, or *Water Gardening* by Philip Swindells (Aurora Garden Handbooks in Association with ICI/Marshall Cavendish Books, £1.25), a 48 page colour illustrated booklet.

My choice of stocking filler for the general fishkeeper is Salamander's *Freshwater Tropical Fish Wallchart*, a colourful celebration of popular fishes with some useful text. For the younger reader (or anyone who wants a quick guide) off to the seashore next year, look out for *Collins Gem Guide to the Seashore* (£1.95), 240 miniature illustrated pages of seashore life by Rosalind Fitter and Susanna Ray.

Children's books on fish seem to be rather thin on the ground, although there are a number of seashore and pond guides. Particularly good ones are published by Usborne. TFH's poster books would also make good, reasonably priced stocking fillers for the older youngster or any beginner; colourful with a good amount of easy to read text (*Aquariums*, *Marine Aquariums*, *Tropical Fish*, *Goldfish*, all £2.95 each).

My favourite book this year? On a peripheral subject, it has got to be that stunning book on freshwater aquatic life, now available in paperback at £9.95. Gerald Thompson and Jennifer Goldney's *The Pond* (Collins/Oxford Scientific Films) is 260 plus pages of sheer enjoyment with superb photographs of all pond life (by George Bernard). It should appeal to the whole spectrum of aquarists and will no doubt revive generations of memories of cane-handled nets, jam-jars and tadpoles in the washing-up bowl.

Tomorrow's aquarist

The continuing travels of Jonathan Moss

Jonathan Moss's latest aquarium visit took him to France once more. This time, he travelled south into The Camargue and took the opportunity of visiting one of France's newest Public Aquaria, *L'Aquarium Panoramique*. As you will see from his report, it seems a place well worth visiting.

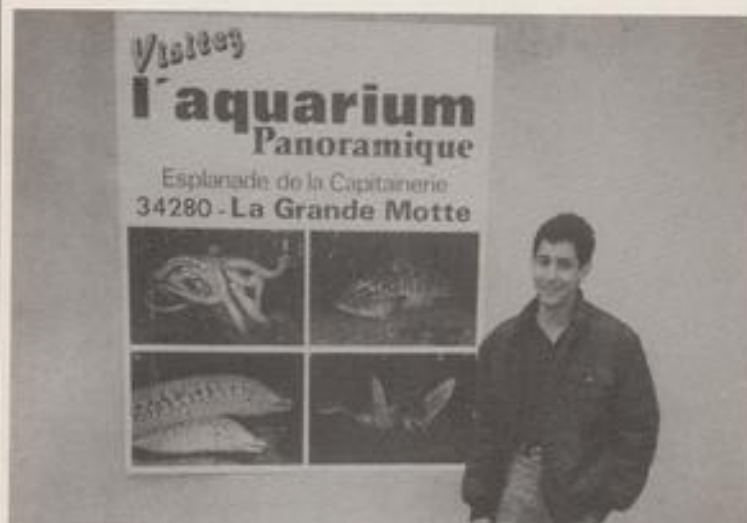
Jonathan's 'prize' from the **Tomorrow's Aquarist Fund** is an

excellent, colourful book published and kindly donated by Tetra.

"**Tropical Aquarium Fish**" is written by **Dr. Ulrich Baensch**, the founder of Tetra, and includes a wealth of information presented in a concise, attractive and professional manner.

Congratulations Jonathan and Thank you, Tetra.

L'aquarium Panoramique at La Grande Motte



"The seaside resort of La Grande Motte (in The Camargue region of southern France, near Nîmes and Montpellier) is a town with a summer population of 90,000 and a winter population of just 5,000. The Aquarium Panoramique is positioned by the harbour of this purpose-built and flourishing holiday resort. It houses over 300 invertebrates and fish and has an entrance fee, for an adult, of 17 francs (about £1.50) and, for a child, of 14 francs (about £1.20).

Purely to enter the Aquarium, the visitor has to queue for 25 minutes, a sure sign that people's desire to see a large collection of aquatic beauties is as strong as ever. Pushing open the swing

doors, it is immediately apparent that the illumination comes solely from the tanks. These were decorated to the highest standards and it was truly a pleasure to see the obvious amount of effort put in, for the upkeep of the tanks was accurately reflected in their display.

On an easy-to-read stand in front of each tank each species was given a full description, where it came from, what it fed on, its French and Latin names, its temperament and size. It was set out just like a reference book, but instead of plain pictures and photographs were live creatures in luxuriously decorated tanks.

There were, of course, several species which particularly stuck out as being out

of the ordinary. The Becasse de Mer or *Macrorhamphus*, yellow in colour and with nose-like features measuring about two inches, and the plum coloured Conger Eels, always an aquarium favourite from the waters of the Mediterranean, were two examples. The large Baliste from Angola which are found off the French coast in the warm weather and the various types of rare Gobies also gathered a large amount of the crowd.

Other impressive creatures which caught my eye were the Mediterranean Octopus, Le Poulpe, which, with tentacles stretched out, measured 80 cm. and the fearsome-looking Sea Spider, measuring a mere 20 cm in comparison.

Apart from my favourite, the very graceful-moving Turtles, the highlight of my visit was undoubtedly the *Muraena helena*. These impressive eel-like creatures had exceptionally intricate designs over all their 1.3 metres. They are found in waters from Senegal to our own British coast and have been discovered dwelling in Greek Amphoras. Although not necessarily aggressive, they have outstandingly sharp teeth. After the visit, I took my chance to visit the very well equipped souvenir shop, which sold coral as well as shell jewellery, postcards and many other items.

The Aquarium at La Grande Motte is open at the following times:

1st November to Easter 14.00 to 18.00 (closed on Mondays).

Easter to 15 June 10.00 to 12.00 and 14.00 to 18.30.

15th June to 15th September 10.00 to 12.30, 14.30 to 17.30 and 20.30 to 22.00.

15th September to 1st November 10.00 to 12.00 and 14.00 to 18.30.

The Tomorrow's Aquarist Fund

The T.A. Fund was started in October, 1985, in consultation with a number of manufacturers and suppliers who agreed to donate some of their products to help us in our efforts at encouraging new T.A. writers and 'artists' in developing their skills.

If you would like to contribute to T.A. and win a prize in so doing, please send your articles, drawings, cartoons, fishy photos, etc., to:

**Tomorrow's Aquarist,
c/o The Consultant Editor,
Aquarist & Pondkeeper,
The Butts,
Half Acre,
Brentford,
Middex, TW8 8BN.**

CORRECT FEEDING

As we evolved from fishes, it follows that our nutritional requirements are similar, including the need for certain vitamins and minerals. But although fish may require the same range of vitamins, they need larger quantities. So says Dr David Ford of Aquarian Laboratories.

Fish Nutrition

Tracing the evolution of the higher animals back through time reveals that we evolved from the fishes. Hence our nutritional requirements are similar—certain proteins and oils are essential and particular vitamins and minerals are equally needed. This is why fish is a good food for us to eat. It is no coincidence that the longest lived humans are the greatest fish eaters (the Japanese).

The amount of food needed is different, however. Humans are hot-blooded (98°F or 37°C) whereas fish are cold-blooded i.e. are equal in temperature to their surrounding water (around 75°F or 24°C for Tropicals). The fact that we are so much hotter than our surroundings means that much of our food has to be used in generating heat—up to 80% in fact. Fish do not need this life mechanism at all. Secondly, we are fighting gravity; to climb the smallest slope means burning-up lots of food-energy. Fish are supported by the water and float up and down with obvious ease and little or no energy expenditure.

Where a commercial food is used, the traditional method of preservation is by drying (or freeze drying) to remove the water. Many humans or pet diets contain up to 90% water but the dried fish foods have only 4% water. This does not matter nutritionally since fish live in water, but it does have the advantage of giving the food a long shelf life. It is bacteria and moulds that degrade foods, but such micro-organisms cannot grow where the moisture level is 4% or lower. The % edible material other than water is therefore only 10%

in "wet" foods but up to 86% in flakes. This is why just one flake is so nutritious even though it looks so small a diet for a pet fish.

Another interesting difference between our nutrition and fish, is that although the vitamins they require are exactly the same range as ours, they need much greater amounts. This probably reflects the greater sophistication of human digestion, where trace amounts can be used efficiently. One vitamin we have in common is Ascorbic Acid or Vitamin C. The latest research shows the vitamin is essential in quite large doses to avoid certain diseases in fish—and equally essential in man to avoid scurvy and possibly the common cold. (A dog does not need any Vitamin C in its diet because it can manufacture its own supply).

One of the greatest differences in requirements between humans, dogs, cats and pet fish is fat. That difference in body temperature is the reason. Surplus food is stored as fat in warm-blooded animals, where the substance is soft and fluid at 98°F or 37°C. In cold blooded fishes, that fat would set like a candle! Hence fish store their "fat" as an oil, either in internal organs or in the flesh. (Good examples are Cod Liver Oil or the flesh of Sardines).

This also means that white fat is quite unsuitable for fish. If you want to feed scraps such as beef steak, heart, liver etc. make sure all the fat is removed. Fish fed on a white fat diet still attempt to store the fat, just like oils, but it gathers in hard globules in the gut and can actually block the digestive tract killing the fish.

The Protein Story

It is often claimed that a fish food is only as good as its protein content. Many advertisements for various commercial fish foods declare protein levels in headline values. Certainly protein is essential, but if low in value the fish will just grow at a slower rate. If too high, the water gets polluted, which is much more dangerous to the fish. The reason is that proteins are all built from Nitrogen compounds. If extra protein is present, the fish digests it and uses it as an energy source, breaking the protein down to its simplest Nitrogen-containing molecule, ammonia. If a balanced diet is fed, all the protein is used for growth and repair with energy coming from the carbohydrate content of the food. Carbohydrates break down to carbon dioxide and water.

These break-down products are excreted by the fish, obviously carbon dioxide and water does not pollute the tank, but ammonia, and its derivative nitrite, do pollute the tank. What is the ideal level of protein? Research has shown 30 to 35% protein is best for adult pet fish and 35 to 40% for growing fish.

Fish farmers want rapid growth and firm flesh in their edible fish, hence they feed high protein pellets. The farms have ponds with flowing water to continuously flush the ammonia and nitrites away. This is why commercial foods such as Trout Pellets have protein values of 50, 60 or even 70% and why they are unsuitable for the home aquarium (or even small ponds). Many aquarists do use them for bog fish, my postbag is full of letters from Oscar owners saying they are fed up with daily water changes—but only mention in passing that the main diet is Trout Food.

Just to complicate matters further, the quality and digestibility of the protein is equally important. Protein is built up from component molecules called amino acids. Some amino acids are essential—that is they cannot be synthesised by the fish and must be present in the diet. Two important ones for pet fish are lysine and methionine. If these are absent, or even low, the protein levels could be 99%, but a growing fish will become a runt or even die, no matter how much is fed. Here again is an advantage of commercial flake over scrap or home-made diets, such essential elements are monitored and supplemented as necessary.

In the final part of this article next month David Ford discusses live and unusual foods.

Coldwater jottings



Stephen J. Smith

The Fishkeeping Yearbook

The hobby of coldwater fishkeeping appears to be growing in stature. Throughout the year more and more public interest has been shown in the activities of coldwater societies around the country, and the recent resurgence of interest is reflected in the publication of a much needed volume: *The Fishkeeping Yearbook 1986*.

All aspects of fishkeeping and allied activities are included within its pages (approaching 250) to provide one of the most valuable sources of reference to the fishkeeper. These include:

Publishers who provide books and magazines for hobbyists and the trade;

Societies which cater for the needs of groups of hobbyists who share a common interest;

Federations which co-ordinate the activities of societies and provide them with guidance and centralised facilities;

Shows and festivals (local, national and international) where the best and latest fish, plants and equipment are exhibited;

Private and public aquaria housing a multitude of worldwide aquatic life;

Manufacturers of aquatic equipment, foods, accessories and remedies;

Wholesalers and distributors who ensure that retail outlets are regularly and comprehensively supplied with stocks;

Importers, breeders and suppliers of fish, plants and other aquatic organisms.

In addition, a series of specially-commissioned articles with colour illustrations supplement the reference sections; and for once the coldwater scene

is no longer the 'poor relation'.

Articles on koi-keeping (in conjunction with Rodger Cleaver) and the coldwater aquarium are provided by myself, while Bill Heritage poses the question "Fishpond or Water Garden?" in which he looks not only at the pond but beyond its perimeters.

Barry James presents some useful advice on planting the aquarium, while there are some fascinating articles on tropical and marine fishkeeping and on maintaining the health of fish.

The producers of *The Fishkeeping Yearbook* are to be congratulated on their straightforward presentation of such a wide range of information. Aquarists of whatever speciality will, without doubt, find it "a constant source of reference"—an overworked phrase but never more appropriate than here.

At only £5.95 *The Fishkeeping Yearbook* is priced exactly right, and should even appeal to casual readers—perhaps even hooking them into the world of fishkeeping.

You may even find you've netted it in your own Christmas stocking!

The Fishkeeping Yearbook 1986. General Editors: John A. Dawes and Charles J. T. Copp. Published by Robert Royce Ltd., 93 Bedwardine Road, London SE19 3AY.

Open Shows

The culmination of the coldwater season—for breeders especially—is the time many fishkeepers turn to exhibiting fish in one or more of the open shows which are organised by the leading coldwater societies in the country during the Autumn.

I travelled this year to the Bristol Aquarist Society's open show in late September for two main reasons: to take part in the exhibition, which included well over 400 quality goldfish and other coldwater varieties, and to meet and chat with fellow fishkeepers.

I thoroughly enjoyed the afternoon, with some of the country's leading goldfish breeders in attendance. The show was on the whole very well organised and if you have never previously visited a fishkeeping exhibition I can thoroughly recommend a visit—and would encourage you to take part by entering your favourite fish. The experience itself is highly rewarding whether or not your fish wins a place in its section, and if you are breeding

fish these exhibitions provide a valuable opportunity to compare the best of your own young fish with those of fellow aquarists.

All the major coldwater societies organise table shows, either open or for their members. So do have a go: entry fees are usually quite nominal and details are available by contacting the societies' show secretary.

Information

There has been an excellent response to my recent article about the virus affecting coldwater fish, *Branchiomycosis*. A number of replies have also come from tropical fishkeepers, indicating similar symptoms in some of their fish. I don't think there is any call for alarm, as I believe the virus will not survive at tropical temperatures.

However, I am not scientifically-minded so please do keep your correspondence coming. For coldwater fishkeepers it looks as though the virus 'burned itself out' by mid-September, hopefully not to return! Again, the more information I can receive the better, and if you can provide any scientific assistance it would be most appreciated by all.

Overseas Contacts

One of the main aims of "Coldwater Jottings" is to help bring together people from all aspects of coldwater fishkeeping such as clubs, associations, manufacturers, retailers, etc. In pursuit of this aim I would be extremely pleased to hear from coldwater hobbyists among the overseas readership of *The Aquarist and Pondkeeper*.

I am sure that many of the procedures involved in producing quality fish in this country are quite different in other parts of the world, where climates may be more/less suited to coldwater fishkeeping, and an altogether different set of problems is presented.

If you are an overseas reader, please let me know about how you tackle the hobby and which clubs and associations, etc. are available for the enthusiast.

Greetings

Finally, I should like to wish all readers of *The Aquarist and Pondkeeper* a very Merry Christmas and a happy and successful new fishkeeping year.

An easy to keep loach from Thailand, the Skunk Botia has a number of interesting characteristics and habits here described and illustrated by Dr Michael Benjamin

Botia horae is a small (maximum length in the wild about 10cm), bottom-living teleost that is found in both swift-flowing streams and still waters, and is widely distributed in Thailand. It has been known in the aquatic trade since 1953 as Hora's loach or the skunk Botia, and is a member of the Cobitidae, a typical Old World family of teleosts. It takes its common name from the black, median (i.e. situated towards the middle) stripe that extends along the dorsal surface from the front of the snout to the base of its caudal fin, where it ends as a broad, transverse band on the caudal peduncle. Its specific name, **B. horae*, was allotted to it by Hugh McCormack Smith (in 1931), one time United States Commissioner of Fisheries and Fisheries Adviser to the Siamese Government, to mark his respect for the Indian scientist, Sunder Lal Hora, who devoted a lifetime to the study of fish. In doing this, it was clearly Smith's intention that we remember the name and the man. As *Botia horae* is well-known to many fish keepers, the enthusiast may like to know a little of Sunder Hora. He was a professional zoologist of the highest order and a most prolific writer—publishing over 400 papers in his lifetime. The ones with which I am familiar and which many others regard as his best, are on the structure and ecology of Asian fish that live in torrential mountain streams. He devoted much time to studying the adhesive devices that allow them to maintain their position on a river bed in the face of a strong current. The clarity of Hora's writing is such that many of his papers could be understood by the amateur aquarist, but

* According to Axelrod *et al.* (1983). *Exotic Tropical Fishes*. T.F.H. Publications Inc., Neptune City, it is now known as *B. morleti*. As yet I have been unable to find any reference to this in the recent scientific literature.

SKUNK BOTIA

alas, they are published in journals rarely seen by the general public (or indeed the modern academic)—e.g. Records of the Indian Museum! Hora was born in Pakistan and spent most of his working life attached to the Department of the Zoological Survey of India at Calcutta. He died, as its Director, on the 8th December 1955, shortly before he was due to retire. In one of several obituaries in leading scientific journals, his hobbies are cited as hard work and harder work. But after his first coronary (the second was fatal), he is said to have compromised with decadence by rising at 5.30 a.m.!

Botia horae is flattened from side to side, has a gently convex dorsal profile and a more horizontal ventral one.

Its mouth is small and ventrally placed, as is common in bottom-living teleosts. Its short barbels are profusely supplied with nerve fibres and packed with taste buds. Except for its black stripe and for rows of small, dark spots on the tail fin, the fish is generally a pale, yellowish-green, though some specimens (including those described by Smith, 1945) have fine, dark, cross-bands on the body, in addition to the thick band on the caudal peduncle. Other colour variations noticed by Smith (1945) include a divided, mid-dorsal stripe and a circular, light coloured spot on the dark band of the caudal peduncle. In contrast to *B. modesta*, with which it has been confused, the dorsal fin arises in front of the



Botia horae showing ventrally placed mouth with profusion of barbels and thick band on the caudal peduncle.

ventrals. There are no known external differences between the sexes.

As with other members of the family Cobitidae (except *Noemacheilus*), *Botia horae* has a bony spine beneath and in front of each eye. These bifid spines are not poisonous, and are normally flush with the body and concealed in shallow grooves. But they can be protruded at right angles to it and locked in position (which is why you should double bag these fish). We often assume that the spines of fish are solely defensive or offensive weapons, and indeed Valinski & Rigley (1981) tell us that *B. horae* have inflicted lethal, puncture-like wounds on South American catfish (*Tatia intermedia*) in their community tanks. Furthermore, snakes and fish have been seen in which the spines of partly swallowed *Botia* sp. lodged in the predator's throat and killed it (Smith, 1945). However, it is also possible that spines protect the eyes of burrowing fish, as suggested by Axelrod & Schultz (1955) for *B. macracanthus*. I have failed to discover whether the skunk *Botia* can burrow in its natural habitat, though it may dig shallow depressions. Burrowing, of course, is certainly common in the Cobitidae, and aquarists may know of the habit from the weatherfish, kuhli loach or horse-faced loach. I would be most interested to hear from anyone who has kept *B. horae*

in tanks with a soft substrate and seen them burrow.

B. horae is a territorial fish and those who keep several together will be familiar with the clicking sounds they produce when confronting each other. Similar noises are made by other *Botias* including *B. modesta*, *B. berdmorei* and *B. hymenophysa*. By contrast, a lone fish, even in a community tank, is normally quiet. The loaches stake claims on, and defend available shelters against others of the same species. According to Valinski & Rigley (1981), there are three ways in which a 'resident' fish might behave when an 'intruder' is placed in its tank. It might attack it, let the other fish see its full side profile, or make clicking noises. Attacks are frequently accompanied by clicks and rarely involve the use of barbs. Body displays may occur when the fish doesn't know whether to attack or flee. The clicks, displays and attacks are more frequent when the defended shelter is a good one, and the best shelters are those with a roof and sides. But sensibly, the defendant also considers the intruder's size! Larger threatening fish elicit fewer attacks or sounds and more lateral displays. How the sound is produced is unknown, but it seems to correlate with mouth movements. It is thus possible that the fish rubs together the microscopic horny

rasps on both its upper and lower jaws, just inside its mouth. Other *Botias* have similar rasps, and they are the type of structure that could be used for algal scraping, though I have seen no one else refer to them.

I have found them easy fish to keep. They are omnivorous and tolerate a wide variety of water conditions, though some authors specify soft to medium-hard, well-aerated water. Give them plenty of good hiding places—so that each fish has a 'home'. Flowerpots are particularly useful and your fish may spend much time with its head poking through the hole in the base. Use coarse-meshed nets to handle them; this may prevent their spines from becoming entangled in the threads.

References

- 1 Axelrod, H. R. & Schultz, L. P. (1955). Handbook of Tropical Aquarium Fishes. McGraw Hill, New York.
- 2 Smith, H. M. (1945). The freshwater fishes of Siam or Thailand. Bulletin of the U.S. National Museum No. 188. Smithsonian Institution, Washington D.C.
- 3 Valinski, W. & Rigley, L. (1981). Function of sound production by the skunk loach *Botia horae* (Pisces, Cobitidae). Z. Tierpsychol. 55, p.161-172.



ORNAMENTAL FISH CONSOLIDATORS LTD.

(IMPORTERS AND EXPORTERS OF LIVE TROPICAL FISH & AQUARIUM PRODUCTS)
371 High Street, Harlington, Hayes, Middlesex UB3 5DQ
UNITED KINGDOM
Tel: 01-897 3099. Telex: 24210

Offering WEEKLY DIRECT IMPORTS:

Freshwater Tropical Fish, Marine Fish/Invertebrates and Aquatic Plants from SINGAPORE/
BANGKOK/SRI LANKA/ PHILIPPINES/HONG KONG/SOUTH AMERICA/JAPAN.

BANGKOK

Monthly special offers available.

SOUTH AMERICAN AFRICAN FISHES

We have large selection in stock and all have been well quarantined on the premises.

ALL SHIPMENTS WILL BE COLLECTED ON MONDAYS

REPTILES: Regular shipments from Bangkok. Please ring for further information.

A Merry Christmas
and
A Happy New Year

★★ For enquiries, please contact RICHARD CHANG ★★
STRICTLY FOR TRADE ONLY.

TOXICITY OF ALUMINIUM TO FISHES

How many aquarists, asks Graham Cox, include aluminium among the metals they consider are most toxic to their fish?

Ask a thousand aquarists what metals in solution are toxic to fishes and aquatic life-forms generally and the odds are that they will only list copper, zinc, lead, brass, bronze, nickel, chromium, cadmium, mercury, tin, silver, etc. Not one in a thousand will mention aluminium or its alloys. After all—aquarium hoods and some pond-pump bodies are made of aluminium, aren't they?

In 1967-68, my Company purchased some very elegant aluminium framed tanks for use in our marine importation and quarantine department. The frames were anodised and we were assured that all tests including those conducted by an eminent foreign University, had shown that they were perfectly safe for marine-life. Very much against my better judgement we placed a large order. Within a few months we found that we were losing entire shipments of coral-fishes a few hours after unpacking them into these tanks. We subsequently found that the tie-strap, used to prevent lateral bowing of the top frame, was held in place by four stainless steel self-tapping screws. Here we had the ideal recipe for accelerated corrosion of the aluminium—a little electrolytic cell developed by the two different metals and that wonderful electrolyte, seawater, with the aluminium acting as a sacrificial anode. Independent analysis of the seawater revealed that it contained up to 2000ppm of aluminium—over 150,000 times more aluminium than occurs in natural seawater.

Such was my introduction to the problems of aluminium toxicity in aquatics. In the intervening 18 years I have had to deal many times with customer's "mystery deaths" of all types of fishes, freshwater and seawater. A frequently

common factor of all these problems is aluminium in the shape of unprotected hoods, i.e. no cover-glasses and even aluminium internal aquarium components such as dial-reading thermometers and heater-thermostat clips. A very recent 'novelty' way of introducing aluminium salts into the water is the use of special filtrant media which have a high aluminium content.

A very strange metal

Aluminium is a very strange metal in that, in common with zinc, its oxides and hydroxides are amphoteric in nature. This means that the oxides and hydroxides of aluminium will form soluble aluminium salts (Al_3^{+}) at acidic pH values, i.e. numerically below pH 7.0, but will also form soluble aluminates ($Al(OH)_4^{-}$) at alkaline pH values, i.e. numerically larger than pH 7.0. What this means in practice is that your fishes are in just as much danger from aluminium-poisoning if you maintain an acidophilic system, (i.e. one in which the water is kept at pH 5.5 to pH 6.9 for acid-loving species such as Tetras, Rasboras, Anabantids, Top Minnows, Cichlids, etc.) as they are if you maintain an alkaphilic system at pH 7 to pH 8.5 for alkali-loving fishes such as Livebearers, brackish-water species, marine fishes and invertebrates and African Rift Valley cichlids. In the cases of dissolved electrolytes such as seawater, brackish water and the specially saline waters used by Championship-seeking breeders of Livebearers, the toxicity and solubility of the aluminium and its compounds are greatly increased because of the high level of dissolved electrolytes in the water.

In their classic study of the toxicity of aluminium to fishes entitled *Alu-*

minium Pollution and Fish Toxicity, J. B. Hunter, S. L. Ross and J. Tannahill showed that aluminium compounds contained in the effluent spilling from an aluminium anodising plant into the Black Cart Water in Scotland were responsible for sudden and catastrophic losses of trout. A sample of snails on which the trout had been feeding downstream from the anodising plant was analysed and the tissues were found to contain almost 1 gram of aluminium per kg. of the snails' soft tissues. Similarly dead trout collected from Black Cart Water were found to contain on average 475 milligrams of aluminium per kilo of dry tissue. Trout from the same water which had been damaged by the aluminium but were still alive contained the lower average level of 358mg/kg. Typically, live healthy fishes caught upstream from the aluminium company's plant contained only 3.5 to 13.3 mg/kg.

Acid rain and aluminium

Some very recent work (—personal communication S. L. Ross) has strongly suggested that the absence of fish from many unbuffered lake systems on granitic soils in Scotland, Norway and Sweden may also be due to aluminium poisoning. Acid rain falling on these aluminium-rich soils may produce run-off water with more than 0.2mg/litre of dissolved aluminium which is now regarded as the critical level of dissolved aluminium for long term exposure.

Aluminium is the third most abundant element in the Earth's crust after oxygen and silicon. Notwithstanding this fact, the concentration of soluble aluminium in natural waters is normally well below 1.0mg/litre i.e. 1.0pp million and even in seawater never exceeds 0.015p.p.m. Readings many times higher than this

can be obtained from acidophilic and alkaphilic aquaria and from garden pondwater where aluminium is in contact with the water. This toxicity is greatly exacerbated by acid water, by alkaline water and by dissolved electrolytes. Another exacerbating factor which is frequently overlooked by aquarists and pondkeepers is that the pH of waters which are heavily planted by algae and higher plants and/or in which the water is green, yellow or brown due to the presence of billions of microscopic algae and diatoms, is obviously prone to considerable levels of chemical modification due to photosynthetic activity of these plants. That is to say that the aquarium or pondwater may be at pH 6.8-7.2 (i.e. relatively safe from the standpoint of its ability to dissolve aluminium compounds), during periods of low lighting intensity. However, when the lighting intensity is high, the plants and algae begin to photosynthesise their foods at a very rapid level. As they photosynthesise they deplete the water of acidic carbon dioxide and the pH can zoom up to levels in excess of pH 10 in unbuffered systems.

Aluminium poisoning and remedial action

When one realises that the percentage of aluminium compounds in soluble form increases from 5% at pH 8 up to 78% at pH 10, the effects on any fishes in such a system will be obvious to the reader. Whilst a similar increase in aluminium compound solubility also increases proportionately as the pH falls below neutrality (pH7.0), I have not been able to find any numerical data in the literature for how much it increases by at these low pH values.

There is another, if anything, even more insidious aspect of this question of aluminium toxicity. Dr. Hunter and his colleagues sent some of their experimental fishes which had actually survived exposure to various levels of aluminium solubles for post-mortem examination by Dr. R. Roberts of the Aquatic Pathology Unit of the University of Stirling. Examination revealed that exposure to even sub-lethal concentrations caused severe pathological changes as follows:

Gills proliferative changes and congestion

Brain demyelination and other damage

Liver Extensive necrosis

Kidney severe inflammatory nephrosis

Skin some evidence of hyperplasia

From the above it will be readily apparent that fishes which are not quickly killed by the toxic aluminium solubles themselves may still die some considerable time after the actual aluminium poisoning occurred.

So having identified the problem, what can we do about it? I suggest the following courses of action:

1 Hoods If made of aluminium or one of its alloys these must be immediately treated as follows:

1. A good coat of aluminium etch primer paint.
2. A coating of non-lead white undercoat paint.
3. Two good coats of white, non-lead gloss paint.

Alternatively an old aluminium hood may be discarded and replaced with one of the new plastic-coated aluminium hoods* or a stainless steel hood.

2 Cover-glasses If not fitted to the aquarium these should be immediately purchased or made up to provide as water-tight a fit as possible.

3 Internal aquarium fittings If made of aluminium or galvanised, these should immediately be thrown in the bin and replaced with stainless steel, or even better, plastic components. Please remember that galvanised items are coated with zinc, and zinc, like aluminium, is both amphoteric in nature and also extremely toxic in excess to all forms of aquatic life.

4 Filtrant media If not a straightforward traditional medium such as silica (F/W) or coral-sand/cockle-shell (S/W), ask the suppliers for an analysis.

Finally, I ask that you please remember that fishes which are exposed to sub-lethal levels of aluminium toxicity, i.e. levels of aluminium in solution which are not sufficiently high to kill the creatures within, say, 72 hours, will nonetheless have suffered such severe tissue and organ damage that they may still die several weeks or even months later—yet more so-called "mystery deaths".

* Non-toxic aluminium hoods. These new, safe and very smart plastic-coated hoods are manufactured exclusively (1985) by "Clearseal" of 38-40 Cherrywood Road, Braodsley Green, Birmingham, B9 4UD.

References

- 1 Hunter J. B., Ross S. L. and Tannahill J. Aluminium pollution and Fish Toxicity; *Jour. Instit. Water Pollut. Control*, Vol 79, 1980, 413
- 2 Freeman R. A., and Everhart, W. H. Toxicity of aluminium hydroxide complexes in neutral and basic media to rainbow trout. *Trans. Amer. Fish. Soc.*, 4, 1970, 644
- 3 Schaut, G. G. Fish catastrophes during droughts. *Jour. Amer. Water Works Assoc.* 31, 1939, 771
- 4 Jones J. R. E. The relationship between the electrolytic solution pressures of the metals and their toxicity to the stickleback (*Gasterosteus aculeatus*) *J. exp. Biol.*, 16, 1939, 425.

Next month

See **Tomorrow's Aquarist** for details of our competition entitled **Fish Names, Common, Old and New**. Tahiti Aquariums have donated splendid prizes comprising a modular stand, a Marina Aquarium and a Marina Hood for a 24 in. set-up to be awarded to the winner under 16 years of age, and the same equipment but for a 36 in. set-up for the winner over 16 years of age. Don't miss this opportunity of acquiring a brand new and sparkling setting for your favourite fishes.

Paintings and engravings on many of the tombs in Egypt have long been a source of fascination for visitors to that country but some of these artefacts are especially interesting to someone like **William Ross** who recognises cichlid species in these decorations and prefaces his article on **Tilapia, Ancient and Modern** with some references to ancient Egypt and its culture of fish for both culinary and decorative purposes.

Anabantoids comprise a popular group of fishes with aquarists and it may seem strange that an anabantoid species with a good disposition and an attractive appearance should miss out on the popularity stakes. **David Armitage**, in his article entitled **Underrated Comb-tails**, tries to redress this state of affairs.

Spotlight in January features a popular mouthbrooding cichlid which comes not from the African Lakes but from South America. An easy to breed species, the **Red Hump Geophagus** (*G. steindachneri*), is illustrated in full page colour by Bill Toney, the accompanying text coming from the pen of **Ian Sellick**.

One of the longest-growing aquarium fish is gaining a wider following although it is not commonly stocked by dealers and is sometimes difficult to obtain. In **The Good, the Big and the Beautiful**, **Allan Thompson** talks of his fondness for the only true gourami, *Ophronemus goramy* commonly, but appropriately, known as the Giant Gourami.

In Part 3 of **Correct Feeding**, **Dr. David Ford** concludes his instructive dissertation on our charges dietary requirements.

These are just a few of next month's contents but there will be much more in addition, of course, including the popular features from our regular contributors.

What's your opinion?

by B. Whiteside, B.A., A.C.P.



Welcome to the Christmas issue of *The Aquarist*. I hope that Christmas brings you everything good that you wish—and that you'll take time to drop me a few lines after the Christmas pudding. I must say I was delighted to receive a good crop of letters after my rebuke in the September issue. Like my school pupils, you obviously respond positively to the occasional prod and push!

Well, what did you think of last month's marathon relaunch of your favourite aquarium magazine? It's good to see it in newsagents' shops again—and the November issue was certainly good value for the cost.

I was pleased to receive a copy of Dr. Neville Carrington's latest book *A Fishkeeper's Guide to Maintaining a Healthy Aquarium*—especially as Neville had kindly written a dedication and signed it for me on the flyleaf. The book, beautifully produced as always by Salamander Books Ltd., Salamander House, 27 Old Gloucester Street, London WC1N 3AF, retails at only £3.95. It contains 120 pages, stretches to 20,000 words, has 14 illustrations, and 105 coloured photographs. Sections deal with: Water: the total environment; Growing healthy aquarium plants; Improving success with fishbreeding; Avoiding diseases and reducing stress; An A-Z of common pests and diseases; and additional reading. This little book, which will fit into a handbag or jacket pocket, is beautifully produced and contains a wealth of useful information. The section on diseases is particularly well done and illustrated. I have not yet had time to study the book closely but I hope to do so over the Christmas holidays. This book would make an ideal Christmas present for an aquarist friend—young or adult—or for oneself. Get one for your aquarium literature

bookshelf. It's a gift at the price.

Neville, who is managing director of Interpret Ltd., says in a letter to me: "...I have tried to point out that diseases in one's main aquariums can be largely avoided and the section on fish diseases assumes that the best diagnostic equipment available is a reasonable magnifying glass. I believe that by using no more than this it should be possible to be specific enough about the disease in order to decide upon treatment..." Buy yourself a copy and find out more for yourself. I'll be making further comments when I have read the book thoroughly.

I was pleased to receive a copy of the latest edition of *Today's Aquarium*—a quarterly publication sent to me by Mr. Eberhard Schulze, of Highgate Aquarist, London, N.6, and published by Dupla Aquariums, price £1.25. It contains many good-quality colour photographs, and a lot of interesting articles on fishes, plants, technology, etc.

Mrs. Hilda Allen, of 1 Anthony Close, Peterborough, Cambs., is General Liaison Officer of The British Koi-Keepers' Society. She writes: "Thank you for the reference in your September feature to The British Koi-Keepers' Society and its monthly magazine. At our 1985 A.G.M. it was again my pleasure to nominate *The Aquarist and Pondkeeper's* Editor, Mr. L. E. Perkins, as an Honorary Member for the 11th consecutive year. The Society is indebted to Mr. Perkins for his many courtesies, especially in the early 70s when publicity was all-important to a growing Society.

"Yes, it was I who in 1971 sent you the transparency of my koi feeding from a baby's bottle—filled, appropriately, with Heinz fish dinner. This picture gained wide publicity together with many new members at the time. Koi are indeed fascinating fish for anyone with the necessary facilities; and the B.K.K.S., which is now the largest koi-keeping society outside Japan, has always encouraged the novices to learn the rudiments of successful koi-keeping."

Number 91 Knightlow Road, Harborne, Birmingham, heads the letter I received from 13-year-old Matthew Bradby. He wrote: "Having read your article—as ever, fascinating—in the September issue I have decided to write, considering nobody wrote last month. I think your tanks in the two photographs look lovely. The last thing I would do is cut back the plants. I

have enough trouble getting mine to grow! I too have a barb tank. I find them all very resistant to the diseases which usually pick off other species. I am sorry to hear about yours.

"I was pleased to see you asked for opinions about livebearers as these are the fish that occupy most of my time, money and effort. I keep silver metallic sailfin mollies, black lyretail platies, peppered mollies, black lyretail mollies, tuxedo swords, red swords, hi-fin platies, hi-fin guppies, leopard guppies, bronzetail guppies and Mickey Mouse platies—and, of course, guppies!

"The black lyretail I bought today (7.95). She is a heavily-pregnant female so I did not need to buy a pair. The hi-fin platies are, in fact, hi-fin parrot variatus platies. They are very colourful but I don't know what parrot refers to. The Mickey Mouse platies are so called because the mark at the base of the tail looks like the head of the cartoon character. My pair have produced many young.

"I find livebearers quite susceptible to disease and I have lost several to fungus—which was not cured by standard treatments. I keep the fish in a one metre tank with gouramis, *A. garineri* and *Corydoras* cats. Recently the tank sprang a leak so we spent most of the week re-sealing it, etc. I had to put all the livebearers in my barb tank. They did not like it there at all, and one silver molly died from fungus. Now they are all back in their own tank recovering—except for the female hi-fin platy, which I failed to re-catch.

"I look forward to next month's issue, where I will turn straight to your column."

Your fish certainly have some exotic names, Matthew. I haven't bought any new fish for some time and, hence, am not up-to-date with the latest names and varieties of particular species. I suppose, if the truth were told, some dealers must invent new names for fish that look a little different from others of the same species.

It's 10th October and a small Christmas cactus plant that I grew from a cutting from my large plant several years ago is now in full bloom. The large, adult plant, which received the same outdoor treatment this so-called summer, has no signs of anything other than a very few bud tips—no larger than pencil points. I managed to get prepared hyacinths bought and planted only a week ago so I shan't expect any flowers



Left: Some of Ron Baldry's guppies
Below: Young Angel fish

from them this Christmas. Well, it's 2.00 a.m. now so I'd better stop typing and head for bed before school in the morning.

Mr. Robert Knowles resides at 916 Warwick Road, Acocks Green, Birmingham, and writes: "I have just read the September issue and I was surprised to learn that you hadn't had any letters in the previous weeks; then I thought about it for a few moments and it occurred to me that other readers must react to your column as I do; that is: I very often read it, find an interesting letter that I feel I must reply to, and then I just forget all about it. I think the main problem is that people are just too lazy to put pen to paper, myself included. I have written to you twice before; both letters were published, over a period of three years, and yet I must have read a hundred letters that have interested me.

"I don't know if you remember the *Synodontis nigricentis* that I wrote to you about before—the one that spent a few hours out of water. It is still doing well but now in a 4ft. community tank.

"Regarding thermometers and heaters: I use the stick-on digital thermometers on all my tanks and the only fault I can find with them is that they tend to obscure the top corner of the tank—or wherever you stick them. I have always used Springfield Mariner heaters. I tried another model but found that at best they lasted only six months. A Springfield Mariner that I have had in constant use for four years next month is still going strong. Is this any kind of record?"

Photograph 1 shows some guppies that belonged to my friend Ron Baldry; and photograph 2 is of some of my angelfish when they were smaller. I mentioned having moved four of the large angels into a 30 in. tank with some

gouramies. The four moved angels and the unmoved six angels are all thriving. There are suggestions from the four that were moved that they may breed—probably because they now have much more room to grow and move around.

I was interested to receive a copy of the Summer 1985 issue of The A.M.G.K. Newsletter; and if, like me, you can never work out what abbreviations mean, I'll tell you that the newsletter is produced by The Association of Midland Goldfish Keepers—founded in 1974. Membership is only £4.50 per year.

Miss Andrea Middlemiss writes from 7 Garcia Terrace, Fulwell, Sunderland, Tyne and Wear, finds digital thermometers very hard to read. She says: "It is hard to tell exactly what the temperature is exactly: it could be anything from 75-82°F. Now I use a digital and a floating one in each tank, and these enabled me to discover that the temperature is, in fact, 77°F."

Mr. John H. Jenner's home is at 49 Linzee Road, Hornsey, London N.8, and he writes: "...With regard to heaters and thermostats: I use combined

units; over the years having worked my way through Interpet, Armitage, Sicce, Uno and others I find that regardless of make they will either fail within the first week of use, or go on for years without trouble. The only disaster I have ever had was when (one) heater/stat blew and electrocuted a whole tank full of fish. The unit was over five years old at the time and the trouble seemed to be fatigue of the polycarbonate casing. Up to then it had worked perfectly..."

In general, Mr. Ray Love, of 211 Portsmouth Road, Cobham, Surrey, finds most of the equipment made by the major manufacturers to be of very high quality and very reliable. He writes: "I have only once had a heating failure and it was due to a defective thermostat which would not remain on for more than a few seconds. This resulted in the appliance switching on and off continuously. The temperature fell by only a few degrees; and as I had foolishly positioned the instrument in such a position that I could not see the neon light, the fault was only discovered when the magnetic contacts became so burnt that severe radio and television interference occurred. I had had the heater for only two months so I returned it to the manufacturer and I am pleased to say that it was replaced without question—and the replacement has given no trouble..."

Happy Christmas—and for 1986 please send me your opinions on: (a) aquarist societies; (b) cultivating specific aquarium plants; (c) photographing your fishes, plants and aquariums; (d) breeding gouramies; (e) power filters; (f) feeding marines; and (g) tortoises in winter. Please drop me a few lines. Goodbye until next time.



MARINES FOR THE BEGINNER

Martyn Haywood describes the installation of undergravel filters and protein skimmers and explains how they work

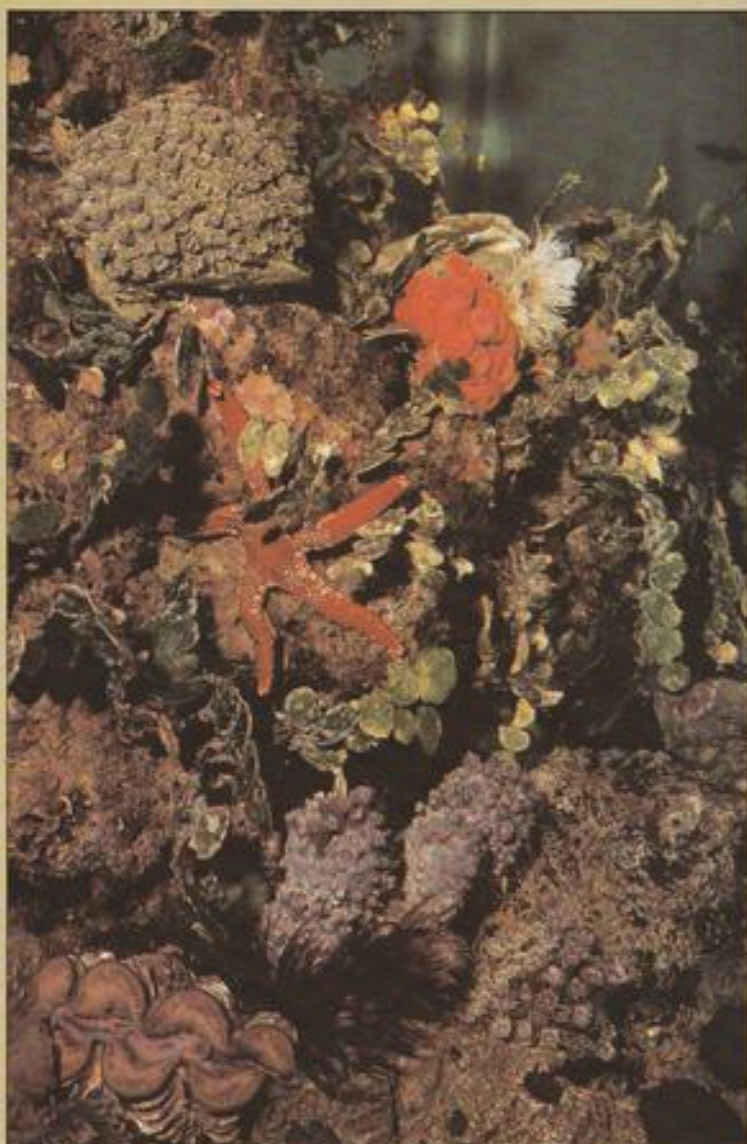
In the previous article I considered the water conditions which apply in the coral seas of the world. Probably the easiest way to simulate these in a domestic marine aquarium is with the use of undergravel filters in conjunction with air-operated protein skimmers and here I will explain their installation and working.

An undergravel filter, comprising a perforated base-plate with a vertical uplift pipe, is a deceptively simple-looking piece of apparatus but used properly can be a remarkably efficient way of filtering an aquarium.

The first requirement, particularly important with marines, is that the base plate must cover the complete floor of the tank. Any areas which are not covered will not be filtered and then there is a serious risk of anaerobic decomposition products such as hydrogen sulphide being produced. This is the gas which produces the obnoxious smell typical of stagnant ponds and in a marine system such chemicals are extremely toxic. The second consideration is the uplift itself which should be approximately an inch in diameter in all but the very largest tanks where custom-made units may be required. The uplift should be topped with a bend to enable the outflow to be directed and so produce a circulatory current within the tank to help with oxygen/carbon dioxide gas exchange. The top of the uplift should be level with the water surface.

When an air-pump operated undergravel filter fits these requirements it is capable of moving up to 200 gallons per hour through each uplift. This figure can be increased still further by using a power-head, a small but powerful, submersible electric pump on top of the uplifts.

So with the filter in place the next consideration is the substrate with which



to cover it. The aim is to use a medium which will allow free flow of water through it, which is fine enough to trap small particles of debris but will not fall through the holes in the undergravel plate, which is alkaline and has a high surface area-to-volume ratio. A base layer of an inch of coral gravel topped by two or three inches of coral sand fulfils these requirements and will allow the development of the vast numbers of beneficial bacteria which will break down the fishes' waste products. There is no point in having a deeper layer of gravel as almost all the bacterial development will be within the top two inches.

Although the biology of undergravel filters is somewhat complicated the theory is fairly straightforward: wherever a supply of oxygenated water which is

remove some saltwater and replace with more tapwater.

Now start the process of maturing the tank. This is establishing the beneficial bacteria in the filter-bed, before putting fish or other livestock in the tank, so that they are there ready to go to work when the first fish are purchased. The easiest way is with one of the commercially available maturing fluids and normally takes about two weeks. The SeaMature is added on a daily basis until a nitrite test reading of about 10 to 15 parts per million is reached. At this point discontinue use of the maturing fluid but carry on with the nitrite tests until a zero reading is achieved. Then check the pH (alkalinity) level in the tank. This should give a reading of between 8.2 and

stock the tank within days of getting that first clear nitrite reading. There is no percentage in hurrying, and equally, do not be afraid to ask questions of more experienced fishkeepers.

Which fish make suitable first introductions depends on the ultimate aim. There is no doubt that it is easier to keep either invertebrates on their own or fish without invertebrates. However, these days the mixed tank is by far the most popular. The main drawback to this system lies in the problem of treating fish diseases, as copper sulphate, one of the most useful chemicals in the marine hobbyist's armoury, will kill invertebrates. If a mixed tank is to be kept then it is important to make the early decision of where your priorities lie—keep either very few fish and lots of invertebrates or vice versa. Do not invest a great deal of money in both groups of animals unless you are prepared to set-up a hospital tank. One day the fish will contract a disease requiring copper treatment and then some very painful decisions will be needed.

It is always wisest to get a good idea of the final effect hoped for and to discuss this with a reputable dealer. Draw up a list of the animals you plan to keep and then go through it together checking compatibility, food requirements, potential sizes, invertebrate tolerance and general ease of maintenance.

Whatever the choice, effective gravel filtration will deal with the bulk of the wastes produced within the tank. However, there are certain chemicals such as long molecule proteins, albumens and phenols which it cannot cope with. These are the chemicals which give old aquarium water a yellow tinge and which, while not too dangerous in freshwater, have very deleterious effects on marines. They can be removed by very frequent water changes but a simpler, and continual means, is with an air-stripping device known as a protein skimmer.

These chemicals will stick to tiny air-bubbles and so this offers a means to rid the water of them. The skimmer generates a column of fine bubbles which attract proteins etc and the resulting foam is collected in a cup and disposed of.

Although skimmers are somewhat clumsy looking devices, and may prove slightly difficult to accommodate within the tank, their use is well worthwhile. I do not know of anyone who has bought one and regretted the decision.

The chemistry of marine aquaria is extremely complex but this brief introduction should set the beginner on the road to success with marines, to my mind, the most fascinating side of the aquatic hobby.

Left: A typical set-up for invertebrates.

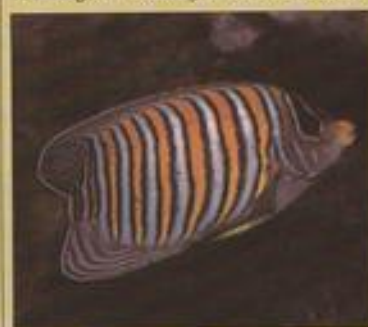
Right: A Regal Angel Fish is a suitable choice of occupant for an invertebrate set-up.

polluted with nitrogenous wastes meets a solid surface there will develop bacteria which break down those harmful pollutants into comparatively non-toxic end products. So here we have a simple way of eliminating the ammonia and subsequent nitrites to which all marines are so susceptible.

Setting-up an undergravel filtered marine system is simplicity itself. With the filters in position, spread a layer of coral gravel evenly over the baseplates—allowing approximately 10 lbs per square foot, and then cover this with coral sand to give a total depth of about three inches. Now pour in the synthetic sea-salt mix of your choice. There are several makes available but there is little to choose between any of the major brands and most aquarists use that which their supplier keeps his fish in. All of them indicate on the packets how many gallons of saltwater they make and an allowance of five gallons per cubic foot of tank capacity will prove about right to give the correct salinity.

Use cold-tapwater to fill the tank to about an inch and a half from the planned final water-level. This will leave room for rock-work, dead coral etc. Now connect up the airpump(s) or powerheads which should have about twice the output of those used for a similar sized freshwater tank, and install the heater and thermostat, set at about 78°F.

Next morning check the temperature and with the use of a simple hydrometer make sure the specific gravity is in the range 1.020 to 1.022. If it is lower then add some more salt, if higher



8.4 but if not, simply change 25% of the water for new sea-water of the correct specific gravity and temperature.

While the system is maturing it is worth giving some serious thought to the lighting over the tank. Quite what is chosen will depend largely on what animals the aquarist wishes to keep. Without doubt the best light is mercury vapour discharge bulbs which give a very intense, natural light ideal for invertebrates. Unfortunately, these are somewhat expensive and difficult to accommodate. For most purposes one full length Northlight, or even better, Tru-lite, per six inch width of tank is satisfactory. Particularly deep tanks will, however, need more lighting.

Consult your dealer

When the day arrives that the tank is ready to take livestock the aquarist should have a good idea of what he hopes to achieve, be it a fine collection of invertebrate animals with just a few fish or perhaps a collection of large, more aggressive fishes. Whatever, first consult with your dealer to check which animals will live happily together and, just as important, the order in which they should be introduced.

The worst thing a newcomer to marines can do is to rush out and fully

REPRODUCTIVE STRATEGIES IN CICHLIDS

Cichlids represent a family which exemplifies a wide range of ways of ensuring the survival of their species. By Ian Sellick

It has often been said that if you can think of a bizarre way to reproduce yourself, then that way will almost certainly be practised by a fish. Within that spectrum of reproductive modes in fishes, virtually all, with the exception of livebearing, are practised by cichlids.

There is no doubt that cichlids are

successful fish; they have colonised every tropical waterway in South and Central America, and Africa, and to do so, and in the numbers that we see today, have developed some fascinating adaptations.

If a resource is available somewhere within the physiological limitations of their range (temperature, salinity, depth, etc), then a cichlid will be using it. To

use that resource, they will have to do one of two things. First, the cichlid might "commute" to the resource, feed on it or otherwise utilise it, then go back to another location. Or, secondly, may adapt the whole way of life to living near the resource. That includes adapting the reproductive cycle to take into account any novel environmental factors, such as



high predation levels, fluctuating water levels, lack of small food, etc.

The problem that cichlids have to solve is this—how to ensure their species' population survives from one generation to the next. The basic cichlid solution is to produce relatively few large eggs and look after them for a while so that predators don't get at too many of the young until they are reasonably independent. This contrasts the situation in, e.g. most characins, where the eggs are scattered relatively indiscriminately, in large numbers, and are then ignored by parents who rely on quantity as protection against predation.

What initially sounds a simple situation, "looking after the eggs" is, in cichlids, a very diverse subject, so we will now look at the ways cichlids do it.

The primitive situation is the deposition of a mass of eggs on a substrate where the parents look after them. This can be broken down into a number of categories and, as with every other cichlid rule for the propagation of the species, will be dealt with by citing specific examples.

Egg and brood care by both parents

While this is no doubt the primitive condition in cichlids, this family of fish is such an advanced collection nowadays, that species that pair one male to one female, lay eggs on a substrate and care for the fry together are in a considerable minority. These species tend to be characterised by little sexual dimorphism as, if both parents are active in egg and brood care, there is no role specialisation to be reflected in dimorphism.

Examples of species that fall into this category are the Oscars *Astronotus ocellatus*, and the largest South American cichlid, *Cichla ocellaris*. Here, the typical pattern of behaviour is that fish will shoal while young, becoming somewhat territorial as non-reproductive adults, although such territories may be rather transient and feeding related, and will form a 'pair-bond' and defend a territory when reproductively active. Pairing may be accomplished by displays from male to female and vice-versa to determine and bring the fish into reproductive synchrony. Displays consist of butts, jerks, 'shivering' and waving of the tail laterally. Jaw-locking may occur. A suitable territory will be found and both adults engage in cleaning and preparing a substrate, in the case of the Oscar, a flat rock upon which numerous thousand eggs may be laid and cared for by both parents. On hatching, both parents share parental duties in moving fry and guarding them once free-swimming, this care lasting for a number of weeks.

The commonest variation on this

Left: *Nanochromis parilus* is a polygamous cave spawner.

Below: *Julidochromis marlieri* is a monogamous cave spawner.

Bottom: *Symphysodon* species and month old babies attaining fast

growth on a parental secretion which forms a first food which consists of a mucus secreted copiously by both parents. This feeding may persist for up to a month.



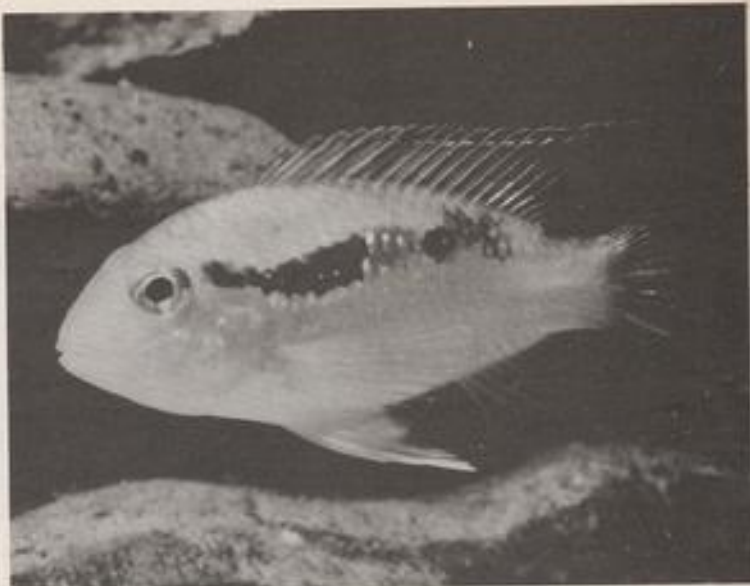
pattern, and there are series of gradations of importance of each element of behaviour (i.e. it is difficult to neatly pigeonhole fish), is for the female to be mostly concerned with the hygienic care of the eggs, while the male patrols around the territory, seeing off intruders. This development tends to go with increased sexual dimorphism, either in colour, in size, or both.

A large male that is brightly coloured will be able to see off intruders to the territory more easily; a small female can adequately care for her eggs if she has no overtly protective role (although what they lack in size, most parental females make up for in aggressiveness!). This also has physiological overtones—food input into a fish can go on growth, basal metabolism and gamete (egg and sperm) production. If you don't have to invest so much in growth, you can invest more energy in egg production, perhaps producing more large eggs than would otherwise be possible.

Examples of such fish include the *Archocentrus* species such as the convict and the Panama cichlid, *panamensis*, which generally exhibit size dimorphism as well as colour dimorphism. In the latter, males remain a beautiful green and red spangled colour, while females become more or less white with black blotches (which serve a distinct and separate function). In '*Cichlasoma festae*', females may not be much smaller than their consorts, but the male is brightly coloured in red with blue spangling, while the female is bright yellow with black stripes. This female colouration of striking black on a contrast background is common in substrate spawning cichlids, and appears to serve not only as a warning, but also as a recognition signal for the fry.

Whatever the role specialisation these fish show, they are all monogamous: one male to one female. They do not "pair bond for life", although this may well be a regimen imposed on them by their owners. Most substrate spawners will swap partners between spawns, but during any one reproductive phase will always be monogamous.

The other variation possible on the theme is where you put your eggs. It is all very well using up a lot of energy defending them on an open rock or other substrate; if you are a large cichlid like an Oscar or *Cichla* you don't worry too much, because you can keep out most potential predators. However, doing something different with your eggs is a better bet, as you can probably save some energy costs, for instance by hiding them. There are numerous substrate spawners that use alternative substrates, and are monogamous, but again, as we will see, the numbers are few in



Aequidens paraguayensis a primitive mouthbrooder with a sensible spawn site choice

comparison to others that have developed more advanced methods.

Cave spawning

Cave spawning of one sort or another is the most popular choice, and is practised by some small *Cichlasoma* types, particularly the *Archocentrus* species mentioned previously. It is also found in the African genus *Thysia*, but especially in *Steatocranus* and *Julidochromis*. The popular aquarium genus *Pelvicachromis* also exhibits monogamous cave spawning. Why do they do it? Apart from the simple act of hiding eggs in a hole to help avoid predation, as perhaps in the kribbs and their kin, it may be as a reflection of the general way of life in rocky habitats, as in *Julidochromis*, or as a means of spawning in a river where currents would otherwise be a problem, as in *Steatocranus*.

In the aquarium, these egg-hiders are often simple to breed species, but difficult to know when they've bred. While the open substrate spawners, a pair of severum for instance, will make no bones about the fact that they are going to spawn, the first the average community tank aquarist knows of the fact his kribbs have spawned is when brightly coloured mum parades her babies, now fully free-swimming, around the tank, and causes considerable chaos in the process.

Egg and brood care by one parent

In the substrate spawners, the division

of labour has already been seen to have started. Carried on to the logical extreme, females could care for completely concealed eggs rendering males rather superfluous, except for the purposes of fertilisation. As any pair bond only then needs to be transient, the male is free to go and spawn with other females, as his energy output in reproduction is thus small (providing sperm). There are a large number of harem spawning cichlids, and most of them tend to be cave spawners.

Apistogramma (or at least most of its species) are the best examples of this. Here, males have a wide ranging territory within which females have sub-territories, each assiduously guarded against conspecific females. In these areas, the male will only enter to spawn and is then driven out by the female who looks after the eggs and brood on her own, with perhaps occasional intervention by the male, who still provides a 'blanket' shelter. In the aquarium, this behaviour causes much heartache for the inexperienced dwarf cichlid enthusiast who wishes to successfully breed apistos—males must be removed after spawning, especially if small tanks are used, otherwise females will chase and kill them if they cannot get away. *Crenicaria* (from what little is known of breeding them) appear to behave in a similar fashion, as do the super little *Nanochromis* species from Central Africa.

Apart from the obviously available caves, such as among rocks, inside fallen trees and branches (a favourite

Apistogramma haunt, hence the use of coconut shells in the aquarium), and in submerged rodent burrows, another development on the cave theme is found in the Tanganyikan cichlid fauna. Here, there are a whole group of species (principally *Laeoprogus*) that habitually use empty snail shells to spawn in. The snails that are used are rather like large apple snails, so the fish consequently are rather small. As the snails measure about 1½ inches across, females may typically be about ½ inch long when sexually mature, and never get to more than 1½ inches in length themselves. They lay tiny clutches (about 25) of relatively huge eggs. Each female will take over a shell and guard it jealously; they will excavate underneath shells to turn them so that the entrance is just accessible behind a barrier of gravel. Males swim from shell to shell looking for females to spawn with, but don't seem to define territories for themselves as do *Apistos* (although they will have a 'home base' shell). They can't be said, however, to have a true harem. Because of this, females may spawn with more than one male sequentially. Females are the exclusive guardians of the fry.

There are other subtle differences in the reproductive behaviour of substrate spawning cichlids, and this is what makes the study of them so fascinating—no two species or groups of species are exactly alike. For example, among species where both parents guard the fry, what does that entail? In *Aequidens*, for example, parents will turn over leaves and otherwise disturb the substrate to help feed the brood: brood care is intensive and 'personal'. In *Telmatochromis bifrenatus* on the other hand, parents will defend the area against all comers, but let the fry do their own thing within that area.

No account of substrate spawners would be complete without mentioning orange chromides and discus. The former, one of two species of *Eretmodus*, the only Asian cichlid, live in saline lagoons in Sri Lanka. Orange chromides have been observed picking on the sides of the larger green chromides that live with them, supposedly to remove parasites. In the orange chromide, fry pick mucus from their parents' sides, and presumably derive a considerable amount of nourishment from it—typically, parent-reared chromide broods will be more successful than artificially reared ones—often 75% more fry survive.

The parental feeding of offspring is carried to its logical conclusion in the discus, *Symphysodon*, where from the moment of free-swimming, fry attach themselves to the parents' sides and feed on mucus secreted copiously by both parents. This feeding may persist for

up to a month, gradually being supplemented by other tiny food as it becomes available.

Many other species of cichlid fry have been observed to perform this behaviour, principally cichlasomines, but none do it obligatorily as do discus. No doubt two factors come into play here—an extremely compressed laterally, discoid fish has difficulty in providing the parental care practised with such ease by more conventionally shaped cichlids (picking up leaves, herding fry

“... we can give the lead to scientists by discovering bizarre reproductive traits”

into holes and hollows, etc). Secondly, the fish live typically in black water habitats where micro-organisms of a suitable kind for fry are scarce—feeding the fry directly is one way round the problem of finding food for fry, so long as you have food yourself and can secrete something suitable for the babies, you can eliminate the necessity for different stages of your life cycle to be dependent on different food sources.

Mouthbrooding

Then of course there are those cichlids that have done away with the substrate, either completely, or in part; the mouthbrooders. That this regime has been successful is reflected in the fact that by far the majority of cichlids, in terms of species numbers, are mouthbrooders.

Here again, there is a division into essentially monogamous species, and polygamous ones. The former include primitive mouthbrooders, such as *Aequidens paraguayensis* which substrate spawns in the typical manner (more or less in the open), then broods free-swimming fry after chewing them out of their eggshells. Well, more or less typical. . . . In the wild, spawns occur on leaves that can be carted around the place. An ideal answer—spawn on a substrate you can move around to protect your eggs from the vagaries of fluctuating water levels if nothing else, and move the fry around by keeping them in your mouth.

Geophagus exhibit varying degrees of development of mouthbrooding, from substrate spawning and pick up of fry only (e.g. *Geophagus jurupari*), to spawning and more or less immediate pick up of eggs (e.g. *Geophagus crassilabris* and *Geophagus steindachneri*).

Monogamous advanced mouthbrooders are a little more difficult to find, but the super little goby cichlids from Lake Tanganyika are good examples—biparental mouthbrooders of course need to be monogamous if they are to only brood their own progeny and not any other conspecifics! *Triplachrosis* is another and species of *Sarotherodon*, which may be biparental or male brooders are others.

Among polygamous mouthbrooders, both polyandry (more than one male), and polygyny (more than one female) occur, some species being sufficiently loosely attached to practice both.

In the mbuna of Lake Malawi, males of some species, especially the more aggressive ones like the *Pseudotropheus elongatus* group, have permanent territorial display sites which females come to and spawn, then go away to brood eggs that are picked up immediately. Males of all mbuna typically have such spawning territories, although they may be more or less transient.

In most *Haplochromis* and derivatives in Lake Malawi, a different system prevails. Whole areas are colonised by males building nests to which females come down from pelagic shoals to spawn. In some species, and especially in Lake Tanganyikan species such as *Cyathopharynx*, the nests can be extremely large and complex. The higher they can be built, the more prominent the male that owns it, and consequently the more likely he is to spawn with a female. This type of situation is given a name by ethologists: lek. Communal display nesting is, perhaps, more descriptive but lekking, and the verb 'to lek', is yet another one which has crept into the vocabulary and which we'll have to get used to using.

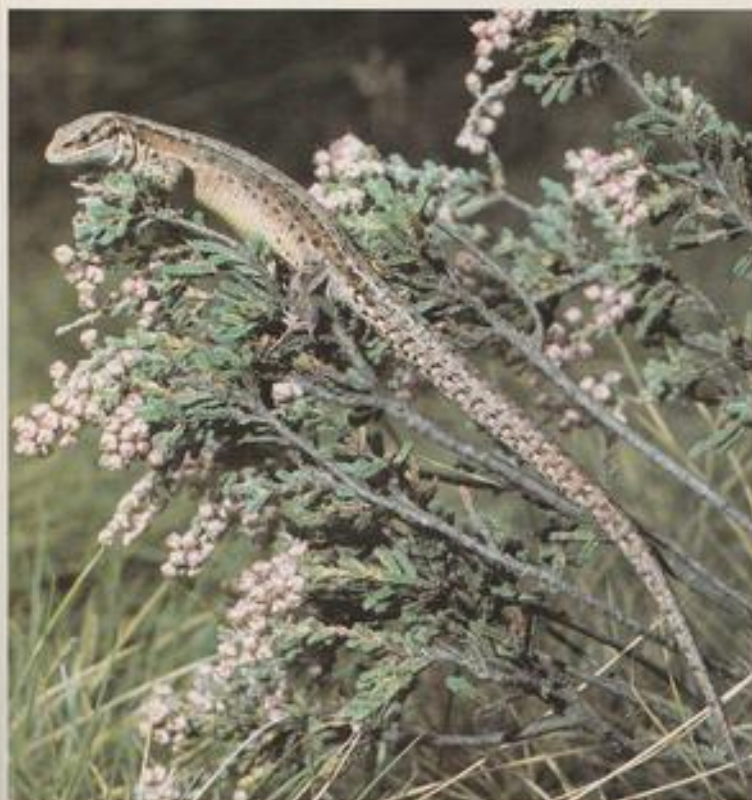
As may be surmised from the brevity of description, mouthbrooders tend to be similar in overall characteristics. Nest shape and design vary from species to species in *Haplochromis*, etc.; aggressiveness of territory defence varies in mbuna, but it remains up to Lake Tanganyika, as usual, to provide the ultimate development in mouthbrooding. *Cyprichromis* does without a substrate at all!

Cichlids are essentially bottom associated fish. Not *Cyprichromis*. It has divorced itself from the substrate completely, lives in pelagic shoals like a sardine, and spawns midwater with totally non-territorial males, catching the eggs and brooding them.

We'll never cease to be amazed at what strategies fish come up with next. As aquarists, we can give the lead to the scientists by discovering the bizarre reproductive traits. Cichlids provide quite a good proportion of these. That's what makes them so unendingly fascinating.

EUROPEAN LIZARDS FOR THE GARDEN

European lizards will prosper more if afforded proper outdoor conditions in a reptiliary with hibernaculum says Julian Sims



Common Lizard enjoying the sunshine

Lizards are reptiles—a group of vertebrate animals dependant on their surroundings for their body warmth. Sunlight provides this warmth essential to keep lizards active and incubate the eggs laid by some species.

Continental Europe gets much more sunshine per year than the British mainland. Thus lizards native to countries such as France, Italy and Spain have longer spring, summer and autumn seasons to feed, grow and reproduce. Many of the species from Southern Europe are larger than the three species native to the British Isles—excluding the Channel Islands.

There are three idigenous British lizards. The Sand Lizard (*Lacerta agilis*) is the rarest, only occurring in isolated regions mainly in Surrey, Dorset and Lancashire. Female Sand Lizards lay eggs in sunny locations—thus a cloudy summer can prevent incubation and severely limit the size of a population. The other two species are both regarded as 'live bearers' although the young are usually born enclosed in very thin membranes which they break free from immediately on leaving the female or within half an hour of being 'laid'. As the gravid female can seek and use the warmest basking sites available, a typical British summer with very variable temperatures is less critical on the internal development of these offspring than for the Sand Lizard which lays her eggs and then leaves them to develop with no further parental involvement. Thus the Common Lizard (*L. vivipara*) and the Slow-worm (*Anguis fragilis*) are widely distributed and not just limited to sunny,

sandy locations. The Common Lizard is also known as the 'Viviparous' lizard—which literally means 'live bearing'. The Slow-worm—a legless lizard, is unfortunately often mistaken for a snake, a confusion which has led to countless killings and its inevitable downfall.

Attempts have been made to introduce larger and often more colourful Continental species into mainland Britain. The two most popular choices have been Wall Lizards (*Podarcis* sp.) and the Green Lizard (*L. viridis*). Such introductions have resulted in the establishment of local colonies in southern and western counties which naturally enjoy a summer climate similar to, although shorter than, that of northern France, but warm enough to incubate lizard eggs. Colonies of Wall Lizards have been recorded in Surrey, Devon and on the Isle of Wight.

The reasons for these introductions have previously been justified by the scientific logic that Britain has been 'cheated out' of a naturally rich reptilian fauna by the flooding of the land bridge between Dover and Calais after the last ice age.

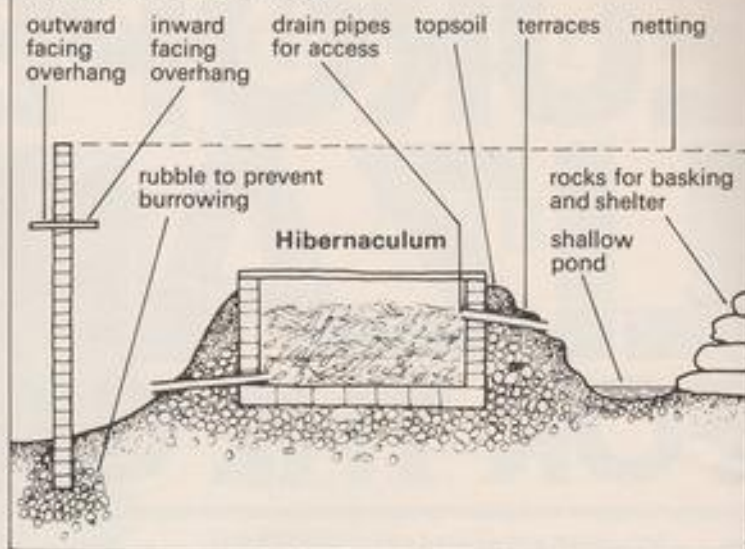
The English Channel was formed approximately 7,500 years ago by the melt water from the great ice sheet which covered northern Europe. As the climate gradually warmed up and the ice retreated north, only a few reptile species colonised mainland Britain before it became an island. The Channel prevented later mass colonisation from the Continent by other species.

However, the large and colourful European lizards are bred in captivity from stock previously imported into Britain by the Pet Trade. Lizards are very active reptiles as indicated by the Latin specific name *agilis* of the Sand Lizard. The majority of European lizards also love to bask in natural sunlight—essential for healthy metabolism. Unfortunately, too many of these magnificent reptiles are kept in small indoor vivaria and are therefore, doomed to a very short life. But European lizards do thrive in out-door reptiliaries and if the correct conditions are provided will even breed beyond the northern edge of their natural distribution. A well maintained reptiliary quickly becomes the focal point of a garden and is easy to construct.

Reptiliary construction

The reptiliary should be situated in the most sunny position possible and must not be shaded by trees or a high fence. Bearing in mind that warm lizards are very active, the dimensions should be as large as possible but not be

Plan of a reptiliary



less than 3 metres long by 2 metres wide. Good foundations need to be dug and filled with compacted rubble. These foundations are not only essential to support the boundary wall but will also prevent escape of the inmates by tunnelling activity.

The perimeter wall should be 1.25 metres high and for the sake of both appearance and durability, be constructed of good quality bricks. Larger, oblong concrete blocks or flat (not corrugated) roofing sheets can be used for more rapid construction, but these lack visual appeal and will detract from the finished result. Bricks have an additional advantage. Two courses from the top of the wall it is easy to mortar into place large, flat roofing tiles which project through the wall at right angles (90°) to both *inside* and *outside* faces. Such tiles must form a continuous and even overhang on both sides of the wall.

The purpose of the internal overhang is obvious—to prevent escape by climbing lizards. There is little point in facing the inner surface of the reptiliary wall. The long, slender digits of lizard feet with their fine claws can grip the smoothest of rendered surfaces.

Mistakenly, some brick walls have been constructed without an internal overhang but with a *smooth* strip of Formica approximately 15 cm wide to stop the climbing activity of potential escapists. The Formica strips have been screwed to the inside of the reptiliary wall 15 cm from the top to form a continuous internal barrier. Unfortunately, Formica bows outwards in the heat of the sun and lizards have actually

been aided in their escape—supported as they squeeze through the tunnel between the bowing Formica strip and the reptiliary wall. An internal overhang is much more efficient, forcing lizards to fall backwards into the enclosure.

The overhang on the outside face of the wall is essential to prevent the entry of the Brown rat (*Rattus norvegicus*) and mice. These rodents will attack reptiles, especially when they are inactive at night-time or during hibernation in winter. Good foundations of rubble under the perimeter wall will also prevent rodents entering by burrowing.

Other predators which must be guarded against include cats and birds such as Magpies (*Pica pica*), Crows (*Corvus corone*) and Gulls. The domestic cat is a major predator of lizards. Cats can jump into a reptiliary from nearby fences, garage roofs or trees—another reason for careful positioning of the reptiliary in a garden. Cats and birds can be prevented from entering the reptiliary by using anti-heron netting, as sold for garden ponds, or the plastic netting for fruit cage construction. These two types of netting have a wide enough mesh for food insects to fly through and will not cast heavy shadows in sunlight. However, the net must be firmly supported and kept taut otherwise the weight of a cat can depress the mesh to within reach of the lizards.

The hibernaculum

The central feature in the construction of a reptiliary should be a hibernating chamber or hibernaculum. This must

be built above ground level to prevent flooding and the drowning of its occupants. The chamber should be cube-shaped with walls 0.5 metres long and the floor and walls constructed of good quality bricks. Either a thick weathered slate or a large quarry tile makes an ideal flat roof. This slab must be a good fit so as to be weather proof, yet be easily removable to allow annual cleaning of the chamber and observation and checking of the awakening occupants in the Spring.

A mixture of dry bracken fronds, straw and beech leaves makes a good medium in which to hibernate. Hay must not be used because the dust and pollen grains it contains can cause respiratory problems in hibernating reptiles. The hibernating medium will need to be changed at least once a year to prevent the build-up of faeces, uric acid and fungal spores.

For the hibernating chamber to be constructed above ground level, it is best supported on a foundation of compacted rubble. A layer of rubble covered with top soil should also be banked around the brick built chamber, entry into the hibernaculum having previously been arranged via terracotta drain pipes as used for field drainage. These pipes,

35 cm long with an internal diameter of approximately 6 cm, are angled so that they lead up through the rubble and brick-work to open into the chamber. The incline will prevent driving rain or drifting snow entering the hibernaculum, yet the rough internal terracotta surface will be easily negotiated by lizards. The top soil and rubble around the hibernaculum not only mask it but, more importantly, act as additional insulation protecting the hibernating reptiles against the severe frosts of winter which would otherwise prove fatal.

Terracing and ponds

The top soil should be terraced to provide basking and egg laying sites. The thick slab on top of the hibernaculum will also prove to be a favourite basking site, acting as a heat sink. Ideally, the south facing terraces should be constructed in a crescent. Such an arrangement will ensure that sunlight is available for lizards to bask in from dawn until late evening. Additional basking sites and a variety of places to shelter can be provided in the reptiliary with large, irregular shaped stones, eg Sarsen stones, piles of smaller stones with many protective cracks and crevices,

and logs with loose bark. One or more shallow ponds can also be constructed in the reptiliary.

Concrete on a rubble foundation is a practical material, allowing the sides to be contoured around basking sites and also to be designed with gentle slopes. Such shallow depressions are essential for easy access to and egress from the water to prevent drowning. On completion, the concrete must have its toxic 'free lime' neutralised and be water-proofed with a proprietary sealant such as SILGLAZE, manufactured by Lotus and obtainable from good water garden centres. The ponds should not be constructed near the hibernaculum or perimeter walls to avoid overflowing water from a rain storm seeping into the brick-work.

The soil in the reptiliary, and especially that of the terracing, should be mixed with sharp sand—not the fine bright orange builders' sand. Sand will not only aid drainage but also improve the micro-climate. In sunlight, sandy soils warm up faster than clay soils due to the extra air they contain. Warm soil will increase the activity of lizards in the Spring, and of paramount importance in the maintenance of a breeding colony, promote egg laying later in the year.

New Technology
PREVENTION & PROTECTION POLICY

FRESH WATER PRODUCTS
Disease Diagnosis Kit Fungicide, Ichticide, Bactocide, Myxocide. Aquasore: conditioner. Aquagreen: Plant Food Water Softening and pH reducing Pillow. Complete: Hardness Test Kit pH Test Kit with pH reducer. AquaClear: Pond algae control. Ammonia Test. Aqua-Zorb: Activated Zeolite Filter Medium.

INTERMEDIATES Artemia Revolution: Shellless Brine Shrimp Eggs. Brine Shrimp Food (small + large). Oda-Zorb: for caged animals.



Send for detailed brochure
N.T. LABORATORIES LTD
Newington Enterprise Centre,
Newington, Sittingbourne, Kent.
Tel: 0795-843802

MARINE PRODUCTS
Marine Mixture: Bacterial Culture. Marine Green: for algae. Marine Trace, Marine Vita. Buff: small + large. Paracide: Parasite Control. Bactericide: Invertebrate Food, Living Reef Sea Salt, Alkalinity Reserve Kit: buffer Test. Copper Test Kit: for controlled therapy using copper. Ammonia Test: pH Test; with adjuster. Nitrite Test (also for fresh water)



Spotlight by Dr Michael Benjamin

THE SPOTTED WRASSE

The Labridae (or wrasses) are marine fish that live in the shallow coastal waters of warm and temperate seas. They are all characterised by their single dorsal fin and usually have fleshy lips and well developed teeth. They are among the most beautiful of fish and there may be marked differences in colour and even body form between juveniles and adults, males and females. Consequently, many species have been named more than once, and one should view estimates that there are over 600 known species with some scepticism. They are well known for their habit of sleeping at night and it is intriguing to note that Wheeler (1975) raises the possibility that they can dream. Many show elaborate courting and nesting behaviour and many are cleaner fishes that eat the external parasites of host fish.

If you like wrasses, can skin dive and can afford a holiday in the Hawaiian Islands, then get down to your nearest travel agent—after you've finished reading *The Aquarist* of course! For of all the families of Hawaiian reef fishes, the Labridae are the most abundant. One of the genera you might find is *Anampses*, a genus first established towards the beginning of the last century for *A. curvier*. Members of the genus are very colourful, of moderate size and flattened from side to side. They have a small mouth, fleshy lips and protruding incisor teeth in both jaws. Their bodies generally have large scales, but their heads and most of their fins are scaleless. The posterior portion of the dorsal fin is soft and the anterior portion spiny; there is no notch between the parts. The caudal fin is truncate ('blunt ended') or rounded.

Anampses chrysocephalus was one of two 'species' described for the first time by the American Ichthyologist, John

Randall (1958)—the other being *A. rubrocaudatus*. He was obliged to distinguish the two almost entirely by colour, because other features (e.g. counts of fin rays) that are often used to identify fish are of precious little help with these fellows! *A. rubrocaudatus* (from the Latin *ruber*, red; *caudatus*, tailed) has a chocolate brown body that is liberally peppered with white spots. There is one spot on every scale of the body, except dorsally (above the lateral line) where there are 2-5 smaller spots per scale. The head is also brown with white spots. These are generally small and numerous, except on the gill cover, where they resemble the larger spots on the body. The caudal fin has striking bands of white and red and the dorsal fin often has an eye-like, black spot posteriorly. *A. chrysocephalus* (from the Greek words meaning 'gold head') has an orange-brown body with green-blue spots on the scales and a brilliant orange head with shimmering blue bands and spots. There is a bright yellow zone on the back of its neck. The gill cover has a black spot, the tail and dorsal fins are dark brown (the latter with a light blue edge) and the anal fin yellow.

A. rubrocaudatus and *A. chrysocephalus* would seem to be very different fish, but are not. Some eight years after his initial findings, Randall revisited the Hawaiian Islands (reported in Randall (1972)) and was amazed to find the two 'species' courting! He had been tricked, for the fish belong to the same species, now known as *A. chrysocephalus* (the name *A. rubrocaudatus* should be dropped). The males are the ones with the orange heads and the females and juveniles have the white body spots (as do the fish in the photo). The fish change sex as they grow and the male is the 'terminal phase'—reached when the fish is about nine and a half

centimetres long. The largest male recorded by Randall was about fifteen centimetres long. So far, the species is known only from Hawaii and may have evolved from *A. melanocephalus* (a species with which the females can be confused) by geographical isolation. It is generally found in waters that are at least 50 feet deep, though young fish have been trapped in somewhat shallower places.

Sex reversal is well known in teleosts and extremely common in reef fishes, but is nevertheless quite remarkable. The fish may either start as males and develop into females, or more commonly do things the other way round, as with *A. chrysocephalus*. Perhaps even more weird are the fish that have both male and female reproductive organs at the same time, especially those that can fertilise themselves, like the small toothcarp, *Rivulus marmoratus*. The offspring of this fish are genetically identical to each other and to their single parent.

It is a pity that such a beautiful fish as *A. chrysocephalus* is rather difficult for most aquarists to find, for it is a hardy fish with no special water requirements and accepts a wide variety of foods—e.g. *Tubifex*, mosquito larvae, *daphnia*, beef heart, shell fish, shrimps and mealworms. If you are lucky enough to find one, it is reported to be happy with temperatures between 24 and 28°C.

References

- 1 Randall, J. E. (1958) Two new species of *Anampses* from the Hawaiian Islands, with notes on other labrid fishes of this genus. *J. Washington Acad. Sci.* 48:100-108.
- 2 Randall, J. E. (1972) A revision of the labrid fish genus *Anampses*. *Micronesica* 8:151-190.
- 3 Wheeler, A. (1975) *Fishes of the World*. Ferndale Editions, London.

Your questions answered

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Every query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month. Please indicate clearly on the top left hand corner of your envelope which department you wish your query to go to. All letters must be accompanied by a S.A.E. and addressed to:
Your Questions Answered, The Aquarist & Pondkeeper, The Butts, Brentford, Middlesex TW8 8BN.



TROPICAL
Dr. David Ford



COLDWATER
Arthur Boarder



PLANTS
Vivian De Thabraw



KOI
Rodger Cleaver



MARINE
Graham Cox



DISCUS
Eberhard Schulze

Coldwater

Feeding Rings

Are feeding rings necessary in a pond or tank?

I consider that they are a very important addition to the set-up of a pond or tank. Small ones are useful in the tank as they tend to keep dried food from floating all over the tank where it can drop and not be seen if uneaten. If placed in a front corner of the tank they will keep there and not move around. However in a pond it is necessary to anchor the ring near the side or it will be pushed around all over the pond and serve no useful purpose. The pond ring should be larger than the one used in a tank, about seven or eight inches in diameter will do. The ring can be secured with thread to a plant stem or other object at the pond side. Any uneaten food may then be seen quite easily but if it was allowed to drop all over the pond it would not be possible to see how much was discarded by the fishes.

Paradise Fish

In your book "Coldwater Fish-keeping" you state that you kept Paradise fish in a coldwater tank. If I can get some of these fish which have been in warm water, can I get them used to colder water so that they will live in an indoor unheated tank?

The Paradise fish, (*Macropodus opercularis*) is a very handsome fish, especially the male when in breeding condition. In my opinion there are very few fishes which can equal the wonderful colouring of this fish. They are very hardy and I have kept them in quite cold water as low as 50°F.

Koi Ponds in Winter

We are sorry to announce that, due to personal reasons, Mrs. Hilda Allen will no longer be responding to questions relating to Koi. We would like to record our thanks and appreciation for the service she has rendered over the years.

We now welcome Mr. Rodger Cleaver, Vice-President of the Midland Koi Association, who takes up the reins to answer readers' queries about Koi and their management.

I have a Lotus Flamingo pool with mixed fish including Koi and would like to know the best methods of preparing the pond for Winter. Is the best method to keep the pool ice free by heater or air pump and is it of any advantage to cover the pool with "bubble plastic?"

Also I have a biological filter and waterfall and I wondered if it is better to run those when not frozen along with the fountain or not at all.

The problem of pools freezing over

in winter is especially serious in a pool such as yours which is regarded as a small shallow pond.

In preparation for winter you must make sure that as much decaying or rotting material is removed from the pool as is practical. Pond plants should also be tidied up and dead leaves removed.

Once the pool is clean you can consider how to prevent ice from forming. Air pumps work to a certain degree but in severe winters they can freeze up. Pool heaters certainly keep a small area free from ice but they are not designed to keep the pool ice free.

The method favoured by many is to cover the pool or part of it with a frame covered with some form of translucent material. The bubble matting you mention would be very suitable. But it is no use used as it is on swimming pools, laid directly on the water surface, as this would prevent oxygen exchange taking place and eventually your fish would die.

If you decided to use frames, make sure that they are strong enough to take the weight of any snow or water they might collect. It is best, if possible, to angle the frames if possible so as to allow water, etc. to run off. I enclose some sketches to show typical covers.

As regards your filter, you must make the decision either to run it continuously or not at all. Once switched off it will need cleaning out completely before it can be switched on again, or else it will prove harmful to your fish.

If you decide to use covers then I would run the filters as this will keep your pool water in the best possible condition.

Tropical

Algae-eater

I have a 24 in. x 15 in. x 12 in. tank with a set collection of plants from Everglades. Although I do not have an algae problem do you think it would be wise to add an algae eater to my collection?

At present the fish I have are two adult angels, four small platies, one small firemouth, two *Corydoras julii* and a large *Synodontis nigrita*.

If you suggest putting an algae eater in, what is the best for the size of tank, plants and fish present?

Since you do not have an algae problem I would leave well alone. Without algae the fish may turn on your plants!

If you really want an algae eater, choose one of the family Loricariidae. These fish live in South America in fast waters (hence they have suckers to hang on to rocks) and feed by nibbling algae off stones. Examples are *Ancistrus*, *Xenocara* and the popular *Plecostomus*. Feed on Vegetable Flake food as well as your usual community fish diet.

Hole-in-Head

I have an American Sunfish (Pumpkin Seed) and at a show last Sunday the judge noticed a very small hole in its head, and I was wondering if it is unusual, the judge says he has never encountered it in coldwater fish before.

I am hoping you can give me some information, and possibly tell me what to do to cure it.

Bumps and hollows are a sign of age in fish—goldfish, for example, are particularly prone to lumps on the head. What you must examine is the actual size to check if there are any signs of infection indicating erosion. If so, use an antibiotic (your local vet can advise). If there are no signs of inflammation (reddening) or pus, leave well alone.

Good Scavenger

Could you give me any information regarding the sexing and breeding of what I believe is called 'Julie' (common name).

Any information regarding this species would be appreciated; it is one of the best scavenging fish I have come across in my four years as an avid aquarist.

Your common name quote is close—

it is 'Julie', being the common name of *Julidochromis ornatus*, also called the Yellow Julidochromis.

There are two varieties, a yellow and black coloured fish from the North of Lake Tanganyika and pale, almost white, fish from the South of the Lake.

The requirements of both varieties are typical for African Dwarf Cichlids—hard water at 25°C and caves to hide in.

It is a good community fish with no special requirements—in fact, as you have discovered, it is an effective scavenger.

The fish are easily bred—the female shows swelling with eggs. These are adhesive and laid inside the walls of a plant pot. The fry will live within the 'cave' for several weeks and can be raised on crumbled flake food.

The parents ignore their eggs and offspring—which is unusual for the Lake fishes.

Marine

I wish to start keeping marine fish in a 24 in. x 12 in. x 15 in. tank as this is all I have room for. The filtration system would be an under-gravel filter covered with 1 in. of crushed cockle-shell and 2 in.-3 in. of coral-sand.

1. Could you tell me the best pump to buy? It would also have to power a protein skimmer.

2. I already keep tropical fish and when cleaning out the tank they are put into a large plastic container. In books I've read on the subject, it says that it is best to have two marine tanks so that one can be for the fish and the other for cleaning out and quarantine/hospital. Is there any other way?

3. As the tank is so small, I only want to keep one or two fish in the tank. Could you please tell me the best selection?

1. *Zebrafish* (Yellow Tang).
2. *Rhinocanthus aculeatus* (Picasso Trigger).
3. *Lactoria cornuta* (Cowfish) and *Synchiropus splendidus* (Mandarin).
4. *Forcipiger longirostris* (Yellow Longnose Butterfly).
5. *Chelmon rostratus* (Copper Band Butterfly).
6. *Paracanthurus hepatus* (Blue Tang).
7. *Gramma loreto* (Royal Gramma) and *Oxymonacanthus longirostris* (Filefish) with some invertebrates.
8. *Echinops nebulosa* (Eel) with *Labrus viridis* (Green Wrasse).

If I am successful with marine fish

in the near future, I wish to keep one or two sharks in a tank of 3m. x 1.5m. x 1 m.

4. Could you tell me the thickness of the glass of which it would have to be built?

5. Could you tell me some species of shark and whether they are hardy and what the food would be?

6. I have about seven marine books and only one mentions sharks very briefly. Could you advise me on any books about keeping sharks?

1. *Pumps*. You would need two pumps. I would suggest a RENA 301 for the two U/G airlifts and a RENA 101 for the protein skimmer.

2. *Quarantine/Hospital tank*. The only way to avoid this additional tank is to steer clear of invertebrates completely until you can afford the spare tank. By not having invertebrates in your show tank, you will be able to use in your show tank the full range of three medications necessary to control all possible disease outbreaks.

(a) *Protozoan and fungal medication*.

(b) *Bacterial medication*.

(c) *Ectoparasites and endoparasites*.

3. *Stocking*. Of the fishes which you mention only two are suitable for such a small tank in the hands of a beginner. These are the Royal Gramma and the Picasso Trigger. The latter must be a small, juvenile specimen at about 2-3cms. in length if the Royal Gramma is to be expected to live with it. All the other species which you mention are either too large for the tank or too difficult for a beginner to keep successfully.

4. *Glass*. You would need 25 mm thick glass for the tank to be safe with a metre's depth of water in it. At 3 metres length, you would also need numerous horizontal tie straps to prevent bursting.

5. *Sharks*. The only two species of shark suitable for the home aquarium (and readily obtainable), are the Nurse Shark and the Cat Shark. Both species are very hardy in captivity and seem to be virtually disease-free. The only special culture point which must always be borne in mind is that none of the cartilaginous fishes, i.e. sharks and rays are able to survive treatment with copper-containing medications.

6. *Books*. I know of no book which deals specifically with the culture of sharks. In fact, I seriously doubt whether one will ever be written since these fascinating creatures are so hardy in captivity if given sufficient swimming space that there is very little one can write about their particular culture needs.

Company profile

Tahiti Aquariums' ten year success story

IN its ten-year life, Tahiti Aquariums has risen from "one room of a small factory, where the glass had to be unloaded, cut, ground, cleaned and assembled" and from which a maximum of 20 aquaria a day could be produced, to a whole building which has been converted into an efficient, purpose-built manufacturing unit.

There is capacity today for an output of 3000 tanks a week, a far cry from those early days and a clear indication of the ever-increasing demand that the Company is experiencing for its products.

Such are the Company's requirements for glass that it now by-passes every 'middle step' in the process and imports its own regular supplies.

Seeing a load of glass arrive and tracing its path through the factory until it emerges as a finished aquarium is a fascinating process. Aquarists who build their own tanks are well aware of all the potential pitfalls that exist, the potential danger of injury and the considerable amount of patience and skill required in tank construction. Yet, when you see real professionals at work,

it all seems so easy . . . and quick!

Of course, it helps when you have the latest equipment, such as "in-line horizontal bed, high technology cleaning machines" capable of processing over 1000 sheets of glass per hour but, in the end, basic human skill (lots of it) is required to produce a well-matched aquarium of quality.

There were examples of this in every department that we visited, but two, in particular, deserve special mention.

Dennis Tagg is thought to be "probably the best glass cutter in Manchester" by John and Steve Ratcliffe, the Tahiti Aquariums Sales and Managing Directors respectively. Seeing this craftsman at work, it is, quite honestly, difficult to think how he can be bettered. To him, skill appears to come naturally—to the outsider, it is nothing short of amazing.

Tony McGleggan and Steve O'Neil normally work together in the Fiji and Hawaii Assembly Room where they construct these smaller aquaria from the Tahiti range in a velvety smooth operation and at a speed that is unimaginable to the uninitiated.

And so it goes on throughout the factory, from department to department, under the overall supervision of Factory Manager, Dave Bruce.

Every Tahiti aquarium undergoes a five-point control check the day after it is manufactured. Once this has been completed, the distinctive Tahiti Palm Tree and Setting Sun quality control logo is affixed to each tank. The colour combination of the logo denotes the day and date of manufacture, as well as the names of the operative responsible for the tank and the quality control checker. All this information is, of course, relevant in terms of the guarantee conditions that accompany each Tahiti tank.

The Company manufactures aquaria of numerous sizes up to 6 ft. x 2 ft. x 2 ft. and in glass thicknesses up to 12mm. Orders for custom-built aquaria are also accepted but these will, of course, not carry the same guarantee conditions offered with the 'normal' Tahiti range.

The Company's aim is "to raise the quality of aquariums and aquarium furniture to the point where every home considers an aquarium as either a family



hobby or a feature in the home".

Steve Ratcliffe sees the Marina Concept as Tahiti Aquariums' biggest step forward yet in this direction. Over £350,000 has been invested in the research and development of the hood alone! Various improvements and alterations have been carried out over the past eighteen months resulting in what the Company believes to be "the only high technology hood available on the British market".

The compact design in dark brown tones in well with the cream-coloured frame of the Marina aquarium (more details about this later). Since the hood is made from injection moulded plastic, it is non-toxic to fish and is safe to handle.

Access into the aquarium is via a full-length hinged lid. The back edge of the hood has a series of push-out sections which are designed to accommodate a variety of fittings, including power filter and airline inlets/outlets, heater/stats with external adjustments and a range of clip-on external box filters (air or electrically driven).

The lighting unit sits on a bonded glass 'window' or condensation barrier which ensures that water and electrics are kept apart. The unit itself is self-contained and, therefore, houses its own integral starter, choke and fluorescent tube, the last of these supplied free. It is operated by a single switched lead which, thus, avoids the common 'spaghetti problem' so often experienced by aquarists.

The whole hood is held firmly in place on the tank by a rim around the perimeter which eliminates any risk of the unit falling into the aquarium.

The Marina Aquarium, designed to take the Marina hood, has top and bottom

frames, made of cream coloured injection moulded plastic, which are both supportive and attractive. The front and side panels are made of float glass and the floating base of 8mm reinforced glass. This floating arrangement means that the base panel is not in direct contact with the surface on which the tank is rested. Instead, it is the frame itself which makes this contact. In so doing, it provides more flexibility concerning the nature of the surface on which the tank is placed and does away with the need to use a cushioning polystyrene sheet. Even so, it is advisable to rest the tank on a smooth, level surface.

A further feature of the Marina Aquarium is that it dispenses with a strengthening bar across the back. This allows clip-on filters and other accessories to be installed easily, something that is often not possible with other aquarium designs. The support lost by the omission of the strengthening bar is counteracted through the use of thicker, stronger glass in the front, back and side panels of the tank itself.

Other items in the Marina range include a Modular Stand which comes packed in a tube and can be assembled in minutes. Adjustable feet and central legs are included on the larger models for extra stability.

Additional features of the Modular Stand consist of a tinted glass shelf and an award-winning Cabinet Conversion Kit which comes flat packed. The panels are double-sided (light/dark) so that, no matter what the room furnishings are like, the cabinet stand can be made to blend in.

Perhaps the most famous tanks in the Tahiti catalogue are those constituting the Fiji/Hawaii range. These are avail-

able in five (small) sizes and are offered by the Company as alternatives to the Goldfish bowl, as ideal first aquaria, as quarantine/hospital tanks and as accommodation for small terrapins.

Tahiti products include rigid aquarium stands, aluminium hoods (only made to order since the Company prefers to promote the plastic non-toxic Marina model), silicone sealant, silicone gun, DIY silicone repair kit, airline, siphon tubes and aquarium glass cleaner.

Ray Cauwood, the Project Manager, also has a number of exciting developments in the pipeline, some of which will be added to the Tahiti range in 1986.

Tahiti Aquariums started off modestly some ten years ago. Today, however, the Company has a nationwide network of wholesalers stretching from Scotland to Somerset. These, it is claimed, can now "distribute Tahiti products to every pet and aquatic shop in the country". Computerisation, which is already in hand, plus the introduction of extra administrative staff under the supervision of Jeanne Ratcliffe, the Office Manager, should go further towards increasing efficiency and relieving the pressure which has accompanied the Company's success.

And, speaking of success—The Tahiti Tornados, the Company's 5-a-side football team, have won the local league twice and come second once in the last three years. Watch out Manchester United—you've got competition!

Further details of all Tahiti products can be obtained from Steve Ratcliffe (Managing Director), John Ratcliffe (Sales Director) or Jeanne Ratcliffe (Office Manager) at Tahiti Aquariums, 60 Stockport Road, Ardwick, Manchester 12. Tel. 061-273 7555.

Previous page: Tahiti Aquarium's transport fleet

Right: Loading van outside the new industrial unit

Below: No. 1 Assembly room



SOME DISEASES OF AQUARIUM FISH

While prevention is, undoubtedly, better than cure, diseases can still attack fish despite all preventative measures. Dr. Chris Andrews explains how the affected specimens should be quarantined so that infection can be diagnosed and treated

The word 'disease' is much used in aquarist circles and, of course, we have all experienced outbreaks of diseases in our aquaria from time to time. Taken literally the word 'disease' means quite simply 'a lack of ease', although a rather more grand definition is 'an interruption, cessation or disorder of body functions, systems or organs'. What this means to us as aquarists is that something is not quite right with our fish, and we must be able to promptly recognise any unusual symptoms, diagnose the problem and then do something about it.

Before we mention a little about disease prevention let us divide the diseases of fish into two general groupings (see Table I). In this article we will confine our attentions to some of the infectious diseases of tropical aquarium fish, although (as will be mentioned below) sub-optimal environmental conditions can be a major factor making fish more susceptible to many infectious diseases.

Outbreaks of infectious diseases (especially when compared with certain water quality problems) often begin slowly, with only one or two fish affected. The problem may then build up over a period of days (or even weeks), with more and more fish showing symptoms or dying. In some situations, outbreaks of infectious diseases can be quite specific to a single species or a number of closely related species.

By way of contrast, a basic water quality problem like high ammonia or nitrite, or oxygen shortage, is often more sudden in its on-set and usually affects all (or most) of the fish in the tank at the same time.

Prevention

The prevention of outbreaks of disease is, or should be, the aim of all aquarists

and there are two important steps that we can all take in this direction.

To begin with, all new fish should be quarantined before they are introduced into a display tank. A quarantine tank is easy to set-up. A 12 x 8 x 8 inch aquarium, with heater-thermostat, thermometer, poly-foam filter and lid is all that is required for small fish. A plastic plant or a half flower pot will give the fish a much needed refuge, and the fish should be kept in quarantine for at least two weeks. During this time they can be observed for any symptoms of disease, and perhaps given a preventative treatment with a proprietary brand of white spot treatment (or similar broad spectrum anti-parasite chemical). It is much easier to observe and treat fish within the confines of a quarantine tank, and the whole quarantine procedure reduces the likelihood of introducing novel diseases into the set-up tank, and all the associated problems that brings.

Once the fish in quarantine are feeding well and showing no unusual symptoms, they can be released into the set-up tank. The quarantine tank and equipment should then be rinsed in very dilute household bleach, well rinsed in tap water and then stored dry until next time.

It is also important to have a completely separate set of utensils such as buckets, nets, siphon tubes, etc. for the quarantine tank, and to remember that fish disease organisms can be transferred between tanks on wet hands! Hence, personal hygiene counts too, and it is advisable to cover all skin cuts and abrasions when dealing with diseased fish, and to promptly wash hands in soap and water afterwards.

The second, and vitally important, factor in actually preventing fish diseases is correct care. Many of the diseases that affect our fish occur as low level 'latent' infections in apparently healthy

fish. However, if the fish are subjected to less than ideal tank conditions, rough handling, incorrect diet, etc. this will bring about a deterioration in their internal physiological condition. This will then permit the disease organism(s) lying dormant in or on their bodies to get the better of their normally quite efficient immune system, begin to multiply, and thus cause actual disease symptoms to develop.

Once this happens, the fish then begin shedding large numbers of the potential fish pathogens into the water, and suddenly a major disease outbreak occurs.

This concept is represented diagrammatically in Figure 1, and highlights the need to establish just what conditions your fish require and to then provide those conditions in the set-up aquarium. However, another point worthy of note is that even after successfully treating an outbreak of disease, small numbers of the organisms may go back to being latent infections in apparently healthy fish—just waiting for the aquarist to let aquarium conditions deteriorate again. As a result, aquarists must be ever watchful, and ever vigilant over tank care.

Common diseases

A number of infectious diseases of fish turn-up time and time again, are easy to diagnose, and yet still cause unnecessary losses to aquarists (see Table II).

Fish fungus (caused by fungi such as *Saprolegnia*) is a very common disease, especially on fish that are in poor conditions for some other reason (e.g. rough handling, fighting, recent spawning activity, etc.). Prompt diagnosis is vital, or the infection will rapidly develop, killing the fish in the process. Since the spores (or 'seeds') which give rise to fungus are very common in water, aquarists must learn to live with fungus as a continuous

threat to their fish—but prevent it by correct care.

Fish like mollies and certain other livebearers seem rather prone to a disease called mouth 'fungus' which is actually caused by the bacterium *Flexibacter*. This disease often occurs in recently imported fish, or in fish which are kept in unhygienic conditions. Outbreaks which fail to respond to treatment with proprietary remedies available from aquatic shops, can usually be successfully treated with antibiotics like *Terramycin* from a vet.

A number of protozoan and 'worm' (flake) parasites occur on the skin and gills of fish, and those (along with the dinoflagellate *Oodinium*) often cause diseases amongst aquarium fish.

On its own, or in conjunction with a

number of other skin and gill parasites, the white spot organism (*Ichthyophthirius*) is all too well known to aquarists. The white spot (or 'Ich') parasite lives on the skin, fins and gills of fish, and then falls away from the host to divide. Many hundreds of daughter parasites or 'swarmers' are produced, which then reinfect the same or other fish in the same tank. The life cycle can turn over very rapidly at the temperatures in a tropical aquarium, and hence this parasite can soon build-up in numbers and cause serious losses. Just about all fish are susceptible to 'Ich' and whilst the parasite is attached to the fish it is actually under the skin, and hence immune to chemical treatment. Therefore, remedies must be added to the water of the affected tank, where they will kill the

parasites as they leave the host to divide. It is only the free-living 'Ich' stages which are susceptible to chemical treatment.

Heavy infestations with tiny parasites such as *Chilodonella*, trichodinids and *Gyrodactylus* irritate the skin of the fish host, causing it to scratch against rocks and the aquarium gravel, and to increase mucus production (giving the skin a slimy, grey appearance). Consequently, this disease is also known as 'sliminess of the skin'. Fortunately, one or two treatments in the aquarium with a proprietary white spot remedy (or a similar broad-spectrum anti-parasite chemical) usually brings the problem under control. Newly imported fish, and coldwater fish in the spring, often suffer from this disease, and (rather like white spot) the parasites can rapidly build up to disease proportions in a heavily stocked tropical aquarium.

Recently imported fish, or fish that have been fighting or kept in unhygienic tank or unsuitable water conditions, may develop fin rot. This is usually related to a localised infection with an opportunistic bacterial pathogen. Prompt treatment with an acriflavine-based or phenoxethol-based proprietary remedy usually controls the disease, although for stubborn outbreaks, antibiotics available from a vet may be used. Obviously, the separation of aggressive fish, and the correction of any unsuitable tank conditions, are important for long-term control.

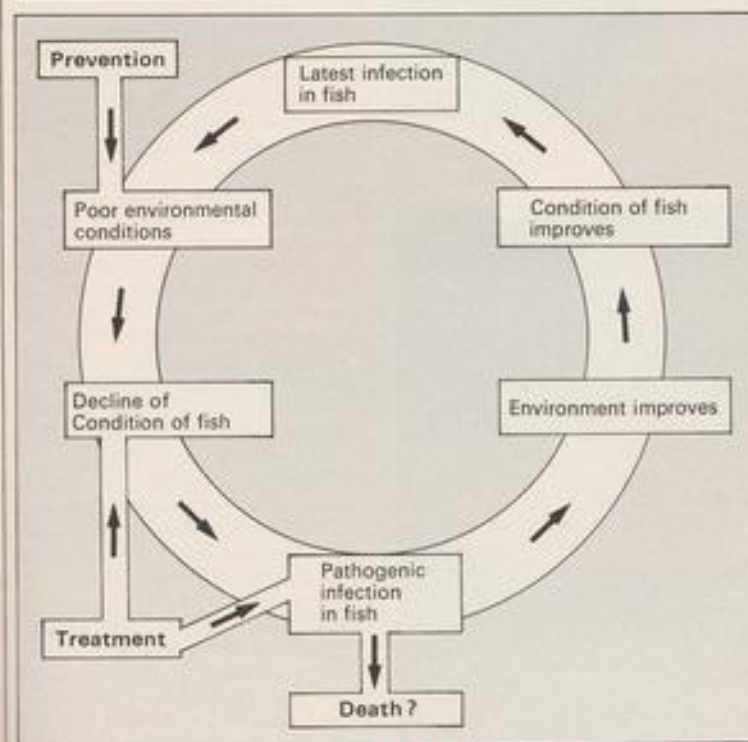
On occasions fish may also develop a more systemic bacterial infection, which extends throughout the body, and manifests itself by a loss of appetite, ulcers, raised boils, reddening at the base of the fins and at the vent. Many factors (such as recent importation, rough handling, recent spawning activity, unsuitable tank conditions, etc.) can precipitate this type of disease, and treatment can be something of a problem. The fish showing symptoms should be isolated into a separate tank, and treated using antibiotics from a vet, and a suitable anti-bacterial general fish tonic added to the water of the set-up tank. This latter exercise will reduce bacterial numbers in the aquarium water, although (for long-term control) the predisposing factors for the disease outbreak must be identified.

A disease that is probably familiar to aquarists specialising in discus and other cichlids, is hole-in-the-head disease. This disease is often brought about by poor tank conditions or inadequate diet effectively 'activating' a latent infection with the protozoan *Hexamita* parasite.

If fish have poor conditions, incorrect diet etc., diseases may appear.

Table 1 The diseases of fish

1 Infectious diseases	Caused by infections with other living agents (eg. viruses, bacteria, parasites).
2 Non-infectious diseases	Caused by physiological changes to the fish (eg. pre- or post-spawning alterations, overwintering starvation, malnutrition). Caused by adverse environmental conditions (eg. algal blooms, poor water quality, pollution).





J. CHUBB



P. SCOTT



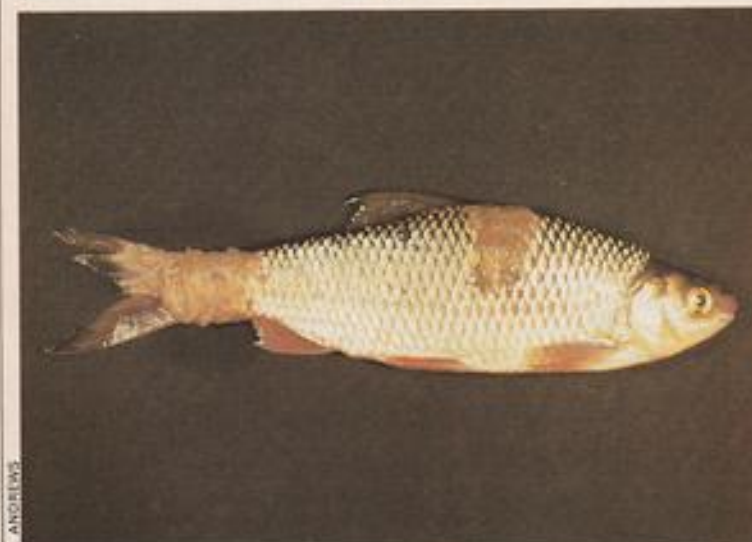
C. ANDREWS



C. ANDREWS



C. ANDREWS



C. ANDREWS

The result is the characteristic crater-like holes in the head and sides of cichlids (and gouramis), along with inappetence, pale faeces and listless behaviour. Isolation of the affected fish is recommended along with treatment with *Paranox* (from an aquarist shop) or drugs from a vet.

Rough (almost raspberry-like nodules) on the skin and fins, along with an emaciated appearance, are often signs of lymphocystis disease. This is caused by a viral infection and as such is largely untreatable. The disease often occurs in recently imported fish although it may also occur spontaneously amongst acclimated tank stocks. Fortunately, lymphocystis is not usually particularly pathogenic to tropical aquarium fish, although fish showing symptoms should be isolated from other fish if the disease appears to be spreading through a tank.

Neon tetra disease, which affects a range of fish and not just neons, is caused

Left Reading from top, left to right. Velvet (*Oodinium*) on the fin of a rosy barb.

Discus with hole-in-the-head disease. Signs of a systemic bacterial problem. Skin fluke (*Gyrodactylus*), one of the causes of sliminess of the skin. Actual size about 1 mm.

Lymphocystis on a gourami: a viral infection similar to 'fish pox'.

Fish with fungus: note fungal mat on back and tail.

by the microsporidian parasite *Platyphora*. Common in newly imported fish kept in unhygienic conditions, its passage from fish to fish may be aided by cannibalism in overcrowded tanks. Once the disease has taken hold, there is no reliable treatment and tank disinfection and refurbishment, along with restocking from an alternative source, may be necessary. In established aquaria, the prompt removal of dead and dying fish, vigorous power filtration and regular 'hoovering' of tank floor may help control an outbreak.

Treating for disease

Most good aquatic shops should stock a range of treatments suitable for combatting the majority of the common diseases which affect tropical aquarium fish. Choose a treatment which comes with full instructions for use, along with details of its active ingredients. All instructions for use must be followed closely, and remember that filtration over activated carbon, and large amounts of organic matter in the tank, will reduce the effectiveness of most treatments. Above all, remember that prevention is better than cure.

Table 2 Diagnosis, treatment and prevention of some common diseases of aquarium fish

Symptoms	Cause/Disease	Treatment and Prevention
Off-white, grey or brown patches of 'cotton wool' on skin and fins	Fish fungus (eg. <i>Saprolegnia</i>)	Add proprietary brand of fungal treatment to tank. Identify predisposing factors.
White or grey filamentous patches around mouth (especially livebearers)	Mouth 'fungus' (a bacterium, <i>Flexibacter</i>)	Isolate fish and treat with an acriflavine-based fish tonic, or antibiotics from a vet. Check tank care.
White 'sugar or salt grains' on the skin and fins; scratching against rocks.	White spot parasite (<i>Ichthyophthirius</i>)	Add proprietary brand of a white spot treatment to the affected tank. Quarantine and treat new fish; avoid live foods.
Small, yellowish dots or patches on skin and fins.	Velvet (the dinoflagellate, <i>Oodinium</i>).	Add proprietary brand of white spot or velvet treatment to the infected tank. Quarantine and treat all new fish.
Eroded edges to fins, split fins; reddening at fin base.	Localised bacterial infection causing fin rot.	Isolate fish and treat with acriflavine-based general tonic, phenoxethol-based treatment, or antibiotics from vet. Check tank care and hygiene.
Reddening at fin base and vent, ulcers, open sores, etc.	More systemic bacterial	Isolate fish and treat with antibiotics from vet. Check tank care.
Grey, opaque film to skin, some reddening to flanks, laboured 'breathing', scratching against rocks.	Various skin and gill parasites causing sliminess of the skin.	Add proprietary white spot treatment or general anti-parasite treatment to tank. Quarantine and treat new fish; check tank care.
Pale 'holes' in head or flanks (especially along lateral line). Often affects discus, other cichlids and gouramis.	'Hole-in-the-head disease' caused by <i>Hexamita</i> .	Isolate and treat with <i>Paratox</i> or drugs from vet. Check tank care; improve hygiene.
Rough nodules on skin and fins of fish, emaciated appearance.	Lymphocystis, caused by a virus.	No treatment possible. Isolate and/or destroy affected fish if disease begins to spread through stock.
Loss of colour in neons, emaciated appearance, often severe losses.	Neon tetra disease caused by the protozoan <i>Pleistophora</i> . May also affect other tetras, barbs and danios.	No treatment possible. Isolate and destroy affected fish. Clean and refurbish tank; stock with fish from alternative source.

Note Information on the use of antibiotics to treat fish diseases is contained in a leaflet available from Tetra Information Centre, P.O. Box 27, York, YO2 2ZZ.

WINTERING GOLDFISH

Most people are, I think, in agreement that the winter rest can be beneficial after which time the fish are keen to breed in the following spring. The greatest pleasure for the fishkeeper is to see his fish breed, the rewards of raising fry to adulthood is one of the greatest satisfactions our hobby can bring.

During the cold spell the fish will respond to the temperatures by showing little activity, their appetites will diminish until, should the temperatures fall below 40°F, they will refuse to feed altogether and exist in a sort of limbo. This state may last for weeks depending on water temperatures but if the fish are in good health and have fed well prior to this they can easily survive without any ill effects.

Preparation for the winter should begin about October though this will to some extent depend on in which part of the country you are situated for very often southern areas are still enjoying comparatively mild weather until later on in the season. Living in the North West, I usually find that by starting to prepare in October gives me enough time to carry out all the necessary preparations before winter sets in. Fish which have been enjoying the freedom of the garden pond are brought inside. This will give the fishkeeper a chance to inspect his stock for any sign of injury or ill health so that he can attempt to put things right before deterioration in the weather conditions. By this time I hope to have parted with any surplus stock, either of young or adults, because I try to avoid being overstocked at this point in time, maintaining only the number of fish which I assess I can overwinter safely. It is, I believe, very important not to overcrowd your fish. I hope to give ample swimming space to all my fish all year round for I am a firm believer

Below: One of the author's ponds.
Bottom: Young adult lionhead.



Bringing fish safely through the winter will be one concern in the minds of most coldwater fishkeepers particularly if, like Pauline Hodgkinson their fish are kept in tanks in the fish house where during really cold spells water temperatures can fall below freezing

that overcrowding causes stress which results in poor health and increases the chances of disease. By keeping fish in tanks we are already restricting their swimming to some degree and therefore by overcrowding we are reducing their quality of life.

The preparation for the safe wintering of young fish is carried out really from the beginning of their lives, for they are fed well, given as much space as possible so that they may grow and develop well long before the rigours of winter begin. It is important that they should have gained a size of at least two inches if they are to pass the cold months without any artificial heating.

The slim bodied varieties of goldfish are harder than the round bodied twin-tail types and can easily endure extreme weather conditions. I have often seen my Common goldfish in the pond swimming, quite unperturbed, under a thick layer of ice. However, that is not to say that the twin-tails are delicate. Some authors in the past seem to have been convinced that such varieties as the Veiltail are best kept at near tropical temperatures all year round. Most English bred stock is hardy and only a few individuals as in any other livestock, are weak and unable to tolerate low temperatures. A colleague of mine, a most capable fishkeeper, has several Veiltails which spend their entire lives in one of his ponds both summer and winter without ever having come to any harm and are remarkably fit; obviously they are from a hardy strain.

After careful inspection of the stock those that are to be wintered in the pond can be returned. It is, I think, very important to winter breeding fish and good show specimens indoors in tanks so that a watchful eye can be kept on them just in case anything should go wrong.

Some hobbyists who are intending to breed their fish the following spring

prefer to segregate the sexes during the resting period. They are of the opinion that the separation makes the fish keen to spawn in the early spring when they are re-united. I am not so convinced that this is one of the main governing factors which induces fish to spawn but I do keep an open mind on this issue.

Mature males will sport breeding tubercles on the front rays of their pectoral fins and in the height of the breeding season they develop also on the gill plates. The tubercles are white, pin-head size pimples but on occasions they can appear as a mass and thicken the leading edge of the pectorals considerably. It is not unknown for a female to develop tubercles though somewhat rare. I had a female metallic fantail some years ago which not only displayed tubercles on her pectorals but also on the first rays of her pelvic fins. Her femininity was proven as she spawned twice that same season producing some fine youngsters. Adult males usually carry the tubercles throughout the winter though somewhat subdued. It may be possible to sex the youngsters at the end of their first season. Some strains seem to mature more quickly than others and young males, though only a few months old, will already show signs of developing the tubercles and a thickening of the first rays of the pectorals.

My own tanks will have a good growth of rich green alga on the sides and base. Only the front of the tanks will be kept free of this vegetation. This is a rich source of foodstuff, easily digested, that the fish can graze upon should water temperatures rise during the cold spell.

There is always a very real risk that freezing conditions will, through ice formation on the tanks, crack the glass. Many people, bearing this in mind, install some form of heating appliance such as the type used to keep temperatures in a greenhouse above freezing. Another idea is to insulate tanks with polystyrene

sheets of approximately 1 in. thickness, while other have put their trust in plastic bubble sheeting, again popular in the conventional greenhouse. This they drape over ceiling and walls which does seem to give protection against icy conditions.

Ideally, if tanks have been previously planted up, all plants should be removed and kept separately from fish during this period. They can be replanted the following spring.

If young fish are to be wintered without mishap then they should, if they are less than two inches in body size, be protected by some sort of heating. A heater with a thermostat which has been specially adjusted so that it can be set low and will switch on if water temperatures fall below 48-50°F, is a valuable piece of equipment. Many British manufacturers will supply adjusted thermostats to their customers direct for a small extra cost.

During the weeks of autumn the fish should be fed well. Offer smaller but more frequent meals comprising as varied a diet as possible. This will build up their body fats which will keep them alive in the weeks when they go off their feed. Everyone has their own ideas about what to feed to their fish. My fish are fed *daphnia*, earth worms, brown bread and a good quality flake. I make sure that the flake is well soaked before my fish eat it by holding a pinch between my fingers under the surface of the water for a few seconds until it sinks to the bottom. This also goes some way to making sure that most of the food stays in one spot and therefore is more easily found by the fish.

Good water conditions are vital and during the time when fish are feeding heavily partial daily water changes may be necessary. During the cold spell whilst fish are not feeding only small partial changes will need to be done. I usually syphon the base of the tanks once every ten days or so but always, after any food has been offered, the waste and uneaten food is removed.

During mild spells the fish may be in search of food but caution should always be exercised as to the type of food given. It must be of the kind that is easily digested because all the fishes' bodily functions are sluggish and food which has not been fully digested may putrify and cause intestinal problems resulting in the fishes' death. *Daphnia* is a very good live food which is high in protein yet easy to digest. It will also live in the water if the fish has only a poor appetite and therefore will not pollute the tank.

Aeration is always used in my tanks helping to maintain very slight movement on the water surface and ensuring that the water has a good oxygen content.

British Aquarists Festival Report

John A. Dawes

The 34th British Aquarists Festival, Europe's largest aquatic exhibition of its kind, was staged by the Federation of Northern Aquarium Societies at Belle Vue on 2 and 3 November.

As always, large crowds (approximating 12,000) supported this major event. Despite being the last scheduled Festival of 1985, there was certainly no end-of-year feel about Belle Vue. On the contrary, it was as thriving, colourful, busy, professionally run and successful as ever.

Some of the exhibitors/competitors and their fish are, of course, very well-known on the show circuit and it was great renewing contact with them once more in Manchester.

For me, personally, it was a 'double pleasure' since I was flattered by the F.N.A.S. by being invited to present the prizes. I, therefore, had the enviable and tremendously gratifying opportunity of presenting the highly-sought-after and keenly-competed-for B.A.F. awards (decided from over 720 entries,

plus more than 20 in the Champion of Champions) to many of my 'fishy' friends. Thank you F.N.A.S. for the privilege.

Going round the trade stands, it was pleasing to see that business was brisk, much to the obvious delight of the traders who, by late Sunday afternoon, had large empty spaces on their stands and large full (albeit tired!) smiles on their faces.

Belle Vue has always been a good meeting place for friends old and new, and for aquarists and pondkeepers (sorry for the unintentional pun) of every description and inclination. This year's Festival was no exception, of course, and our Editor, Laurence Perkins, was delighted to renew his acquaintance with Dr. Wilkinson, the F.N.A.S. President during the early 1950's, and Mrs. Lee, whose husband was one of the original group responsible for organising the earliest B.A.F.'s.

If you have never been to B.A.F., take out your year planner and write yourself a reminder for 1986. We'll see you there.

Results

Highest Pointed Tableaux (Harry Penhall Memorial Trophy)

- 1st Bridgewater (Moby Dick)
- 2nd Tongham (River Scene)
- 3rd Scorpion (Organ)
- 4th Reading (Ferris Wheel and Carousel)
- 5th Darwen (Replica of Belle Vue Fairground)

Best Fish in Show

Mrs. Doris Cruickshank of C.A.G.B.
(*Barbus horstowi*)

Champion of Champions

- 1st Mr. & Mrs. Roberts of Sandgrounders (*Tilapia burtinifera*)
- 2nd Mr. & Mrs. Baldwin of Sandgrounders (*Polypterus ornatipinnis*)
- 3rd Mr. & Mrs. Goddard of Macclesfield (*Melanochromis auratus*)

Highest Pointed Society Furnished Aquarium

Halifax

Highest Pointed Individual Furnished Aquarium

P. Gibbons (Halifax)

Best Pair Fish (Bill Kelly Memorial Trophy)

T. Cruickshank (C.A.G.B.)

Highest Pointed Aquascape

D. T. Milner (Darwen)

Highest Pointed Novelty Aquascape

A. Berryman (Isle of Wight)

Highest Pointed Breeders Team

K. Buckley (Bridgewater)

Best Tropical Fish (Withy Grove Press Trophy)

D. Cruickshank (C.A.G.B.)

Best Coldwater Fish (Belle Vue Challenge Trophy)

Mr. & Mrs. Minshull (Sandgrounders)

Exhibitor with Most Awards

(Basingstoke Challenge Trophy)
K. Buckley (Bridgewater)

Tropical Furnished Aquarium (Society) (Cussions Silver Challenge Trophy)

Halifax

Coldwater Furnished Aquarium (Society)

Halifax

Tropical Furnished Aquarium (Individual) (Walter Smith Coronation Shield)

P. Gibbons (Halifax)

Coldwater Furnished Aquarium (Individual) (Edgar Chapman Memorial Trophy)

A. Woodhead (Halifax)

Marine Furnished Aquarium (Individual) (F.N.A.S. Marine Trophy)

P. Corbett (Isle of Wight)

Aquascape Furnished (Stan Taylor Memorial Trophy)

D. T. Milner (Darwen)

Novelty Aquascape (James Kelly Trophy)

A. Berryman (Isle of Wight)

Plants (F.N.A.S. Shield)

D. Shields (Halifax)

Common Goldfish and Comets (F.N.A.S. Goldfish & Comets Trophy)

D. Ford (Bracknell)

Shubunkins Bristol/London

(G.S.G.B. Silver Cup)

Mr. & Mrs. Silk (S.J.S.)

Moors & Veltails (Walter Smith Challenge Trophy)

Mr. & Mrs. Silk (S.J.S.)

Fancy Goldfish, Fantails, Orandas, Lionheads—New Varieties (Chester Cup)

Mr. & Mrs. Silk (S.J.S.)

A.O.V. Coldwater not listed above (Derby Cup)

Mr. & Mrs. Minshull (Sandgrounders)

A.V. Coldwater Pairs (Nottingham Challenge Shield)

Mr. & Mrs. Silk (S.J.S.)

Coldwater Breeders A.V. Single Tail (Hammond Trophy)

Mr. & Mrs. Silk (S.J.S.)

Coldwater Breeders A.V. Twin Tail

Mr. & Mrs. Silk (S.J.S.)

Guppies

Mr. & Mrs. Baldwin (Sandgrounders)

Mollies

P. Armstrong (Bracknell)

Platies

N. Lynch (Stanley)

Swordtails

A. Armstrong (Workington)

A.O.V. Livebearer (Lewis Trophy)

K. Buckley (Bridgewater)

A.V. Livebearer Pairs (Frazer Brunner Silver Cup)

K. Buckley (Bridgewater)

Rift Valley & Lake Cichlids

I. Legge (Tongham)

Dwarf Cichlids A.V.

Mr. & Mrs. Holden (Darwen)

Large Cichlids (F.N.A.S. Trophy)

Mr. & Mrs. Walsh (Darwen)



Above Mr. & Mrs. Roberts of Sandgrounders A.S., seen here receiving the Champion of Champions top award from our Consultant Editor, John Dawes,



had plenty to smile about at this year's Festival. Above right This impressive Moby Dick snow-scape won the coveted 1st Prize for Bridgewater A.S.

Below The "best of the best" (Champion of Champions) was this large, beautiful *Tilapia buttikoferi* owned by Mr. & Mrs. Roberts of Sandgrounders A.S.

A.V. Cichlids Pairs (National Aquarist Society Cup)
A.V. Cichlids Pairs (National Aquarist Society Cup)
G. Barton (Bracknell)

Siamese Fighters
Mr. & Mrs. Clark (A.A.G.B.)

Small Anabantids
Mr. & Mrs. Baldwin (Sandgrounders)

Large Anabantids (East Lancashire Society Trustees Trophy)
D. Armitage (A.A.G.B.)

A.V. Anabantids Pairs (F.N.A.S. Trophy)
Mr. & Mrs. Flint (A.A.G.B.)

Small Barbs (Best in Show) (F.N.A.S. Trophy)
D. Cruickshank (C.A.G.B.)

Large Barbs
H. Lake (Stanley)

A.V. Barbs Pairs (A. & P. Silver Cup)
M. Swales (Halifax)

Small Characins
Mr. & Mrs. Hodges (Scorpion)

Large Characins (F.N.A.S. Trophy)
Mr. & Mrs. Roberts (Sandgrounders)

A.V. Characins Pairs (East Lancashire Society Silver Cup)
Mr. & Mrs. MacDonald (Macclesfield)

Sharks & Foxes
Mr. & Mrs. Stevenson (Oldham)

Rasboras
Mr. & Mrs. Parr (Oldham)

Danios & Minnows (F.N.A.S. Trophy)
W. Walker (Workington)

A.V. Carp & Minnow Pairs (Warwick Shield)
K. Buckley (Bridgewater)

Corydoras & Brochis Catfish (Stan Taylor Trophy)
Mr. & Mrs. Baldwin (Sandgrounders)

A.O.V. Catfish
D. Cruickshank (C.A.G.B.)

A.V. Catfish Pairs (York Shield)
T. A. Cruickshank (C.A.G.B.)

Egg-laying Tooth Carps (F.N.A.S. Trophy)
W. Walker (Workington)

A.V. Egg-laying Tooth Carp Pairs (F.N.A.S. Silver Challenge Trophy)
B. Rowley (Bury)

Loaches (F.N.A.S. Trophy)
K. Fowler (Workington)

A.V. Loach Pairs (Durham Silver Cup)
T. & L. Marshall (Merseyside)

A.O.V. Tropical Fish not listed above (F.N.A.S. Trophy)
T. Sayers (Stanley)

A.O.V. Tropical Fish not listed Pairs (Leeds & District A.S. Rose Bowl)
D. Armitage (Buxton)

Breeders Egg-layers Group 1 (F.N.A.S. Trophy)
K. Buckley (Bridgewater)

Breeders Egg-layers Group 2
W. Drake (Bury)

Breeders Egg-layers Group 3
E. Jones (B.K.A.)

Breeders Egg-layers Group 4
K. Buckley (Bridgewater)



Breeders Livebearers Groups 1 & 2
K. Buckley (Bridgewater)

Breeders Livebearers Groups 3 & 4 (F.N.A.S. Trophy)
K. Buckley (Bridgewater)

Amphibians Non-Dangerous (Bob Tomlinson Trophy)
Mr. & Mrs. Hodges (Bury)

Aquatic Paintings 5-7 years
C. Martin (Stretford)

Aquatic Paintings 8-11 years
A. Walsh (Darwen)

Aquatic Paintings 12-16 years
T. Jones (M/C Zoological)

Aquatic Paintings over 16 years
M. Hole (Workington)

Photographs of Fish
J. Harrison (Merseyside)

Photographs of Furnished Aquaria
H. Buckley (Northwich)

Aquatic Handicrafts up to 16 years
Alt Junior School

Meet the societies

DARLINGTON & DISTRICT



AQUARISTS SOCIETY

Although Darlington & District Aquarists Society is relatively 'young', it already has an impressive programme of activities, some of which involve other clubs, e.g. Newton Aycliffe and Bishop Auckland (both already featured in Meet the Societies—January 1985 and October 1985 respectively).

D.D.A.S. was formed in September 1980 by five founder members with the aims of promoting the interests of the aquatic hobby and fostering knowledge of all aquatic life.

At first, meetings were held in members' houses. As numbers grew, various meeting places were tried out, ending in the present venue, The Hundens Lane Homing Club in Hundens Lane, Darlington.

D.D.A.S. is affiliated both to the Federation of British Aquatic Societies (F.B.A.S.) and North Eastern Federation of Aquarist Societies (N.E.F.A.S.)

and, thus, can draw on a wide range of facilities and expertise covering all aspects of the aquatic hobby.

This has already helped the Society to mount many events, including three successful Open Shows and an interesting three-way Inter-club competition with Newton Aycliffe and Bishop Auckland.

Up to quite recently, the Inter-club competition was based on five Classes of fish chosen by each of the Societies. However, this only covered less than half the number of Classes featured in the F.B.A.S. schedule. It was, therefore, decided to increase each Society's choice to eleven, thus covering all the 33 F.B.A.S. Classes. Trophies are awarded for Best Exhibitor, Winning Club, etc., making the Inter-club competition a major event (which Newton Aycliffe A.S. have won on three occasions) in these three Societies' calendars.

It is also hoped to run a similar competition with N.E.F.A.S. Societies, so if you belong to one of these, why not contact the D.D.A.S. Secretary.

Because meetings are organised every other Thursday on a consecutive basis, these will fall on the first and third Thursdays in some months, and on the

second and fourth in others. Therefore, rather than risk disappointment, it would be best for prospective members to check on the date of any particular meeting with the D.D.A.S. Secretary.

Activities run by D.D.A.S. on meeting nights include lectures by visiting speakers, quizzes and other functions, some of these being organised on a regular basis by the Society's very active Junior Members, who are also involved in compiling information sheets on individual fish for a loose-leaf binder. When this is completed, it will be incorporated into the D.D.A.S. library and made available to members.

The library facilities are provided for all members who, on payment of a small fee, can borrow books and, at the same time, help towards the purchase of new volumes.

If you live in the area and would like to find out more about D.D.A.S., the Society would be only too pleased to hear from you.

Subscription rates: Adults, £2.50; Juniors, £1.25; there is also a fee of 40p per meeting.

Apply to Mr. Kevin Rodway (Secretary), 33 Geneva Road, Darlington, Co. Durham. Tel: (0325) 487 581.



Totton Association of Fish Hobbyists

Aquatic Societies are formed for many reasons, some of the most popular being:

- 1 To fill an obvious geographical gap;
- 2 To provide a focal point for people with similar interests to exchange views and information.
- 3 To allow individual hobbyists to compete on a regular basis;
- 4 To make it possible for hobbyists to join forces with similarly minded competitors to enter fish and tableaux in the major Regional and National Shows;
- 5 To provide informal, regular, social evenings . . . and so on.

Using the above criteria, the Totton Association of Fish Hobbyists represents

a bit of an exception (in the geographical and competitive sense) in that (i) it was formed primarily to move away from the idea of regular competition between members and (ii) there are other Societies in the area.

The T.A.F.H. was formed in January 1975 with the express aim of emphasising fishkeeping as a hobby rather than as a form of competition. The main purpose of the Association is to provide a regular social evening get-together for people of similar interests where they can discuss and obtain help/advice on all aspects of tropical and coldwater fishkeeping.

Despite this emphasis, the Association does hold some competitions but, even these, are a bit different. There is, for example, a Home Furnished Aquarium Competition in which, not just the tank, but also its surroundings are taken into account. Then there is the Photographic Competition for which any aquatic subject, including ponds, can be entered. On the subject of ponds, there is the T.A.F.H. Garden Pond Competition in which a selected judge (e.g. the winner of the previous

year's competition) visits members' gardens on a certain day and selects the pond which (s)he thinks is the best.

The monthly meetings (details from the Secretary) are held in a pub, "The Station", in Station Road South, Totton, Southampton.

When we enquired what fish the Association's highly original logo was supposed to represent, the matter was discussed by several members of the committee who came up with the following:

"The Club logo is not representative of any particular fish. However, after consultation with 50% of the committee, it has been decided . . . that the Rummy Nose Tetra would be appropriate (particularly since) our monthly meetings are held in a public house!"

Subscription rates Adults, £2.50; Juniors and O.A.P's, £1.25. There is also a monthly contribution of 35p to help towards the hire of the meeting room (a free raffle ticket is issued on payment of this fee).

Apply to Andy Mason (Secretary), 14 Winfrith Way, Nursling, Nr. Southampton.

News from the societies

Kettering Tropical Fish Club

The above Club held their A.G.M. on Thursday, 17 October, and the following officers were elected: Chairman—Mr R Bryan, 29 Churchill Way, Burton Latimer, Northants. Secretary—Mr R Vickers, 43 St Johns Road, Kettering, Northants. Treasurer—Mrs S Stanforth, 79 Pennine Way, Kettering, Northants. Show Secretary—Mr R Stanforth, 79 Pennine Way, Kettering, Northants. Vice-Chairman—Mr M Such, 6 Cherry Tree Close, Desborough, Northants.

The Bracknell Aquarist Society

I am pleased to advise that our Open Show held recently was an outstanding success with near to 600 entries, making it the largest of its kind to my knowledge this year.

One reason for the success is believed to be the early publication of our schedule and the new format which gained ready acceptance. I wish to personally thank you for your support which I hope you feel was mutually beneficial. Certainly I would suggest that this initial outlay on advertising represented excellent value for money with over 1,000 schedules available for 5 months. I believe it casts aside the simple philosophy of merely providing a club subsidy.

I intend to follow the format next year, but with improvements to the text, layout and design. I would be delighted to receive critical comment and suggestions.

With regards to the Show, we had visitors from far and wide—Yeovil, Kettering, and even Sandgrounders from Southport in the North(!)

The Highest Pointed Society was Tongham A.S. The Best Fish in Show was in fact a guppy, and this is surely encouragement to the average fishkeeper.

Want to Swop?

Neville Ripley is magazine editor of Thorpe & District Aquarist Society and finds it difficult to coerce fellow club members to supply him with copy. Realising that other club magazine editors must be similarly placed, he suggests that they may care to send him articles from their magazines in return for which he will send them features from back numbers of Thorpe's magazine for them to reprint. Interested club members should write to Neville at 83 Friends Road, Norwich, Norfolk NR5 8HP or telephone Norwich (0603) 501135 after 5 pm.

Obituary

John English remembered by John A. Dawes

It is with the deepest sadness that I write these lines on behalf of all those who, like me, were fortunate enough to count Jack English as a personal friend.

Jack died unexpectedly on 21 October. His death took everyone by surprise, and left an awesome void that will never be filled. I do not intend to go through a catalogue of Jack's achievements and publications—there are far too many and, in any case, lists of achievements do not necessarily tell us a great deal about the person behind them. It is far better, I think, to talk about a few of the host of enviable qualities which Jack had in abundance and which made him so well-loved wherever he went.

Respect for this man was, and is, so great that, as soon as the news of his death became known, all (and I mean all) the major Associations and Federations unquestioningly joined together in the commissioning of a wreath which was, quite appropriately and touchingly, sculptured in the shape of a white fish. His funeral was also attended by representatives of Associations, Federations and Local Clubs from far and wide.

Jack touched everyone he met with his kindness, warmth and unselfishness.

He was always prepared to tackle any worthy task, often taking on more than was good for him. The fact is that, if a job needed doing, we could always count on Jack to have a go. It is quite true to say that he was as involved every day as any 24-hour period would allow—always doing something for the hobby—never for himself.

When Jack's longtime friend, George Liddle, approached me concerning this obituary, my reaction was that it would be a great honour but that I could never do real justice to the Jack English I knew. My feeling as I write is that I was absolutely right. How can you do

real justice to someone who was held in such deep affection by so many people? Jean MacIntosh, who along with her husband Bob and their children, was also an old, close friend, summed up how we all felt when she said that, "There are many gentlemen in fishkeeping. Jack was a gentleman and a gentle man". You are so right, Jean.

To Jack's wife, Pat, to his children and his grandchildren go our deepest sympathies. If our sense of personal loss is so great, we can only begin to imagine what your must be like. We have all lost out and we are all that much poorer.



Jack English with his granddaughter, Laura, in 1984