JULY 1987 95p

AQUARIST

AND PONDKEEPER

FISHKEEPING AT ITS VERY BEST. ESTABLISHED 1924

FANCY GOLDFISH — special features

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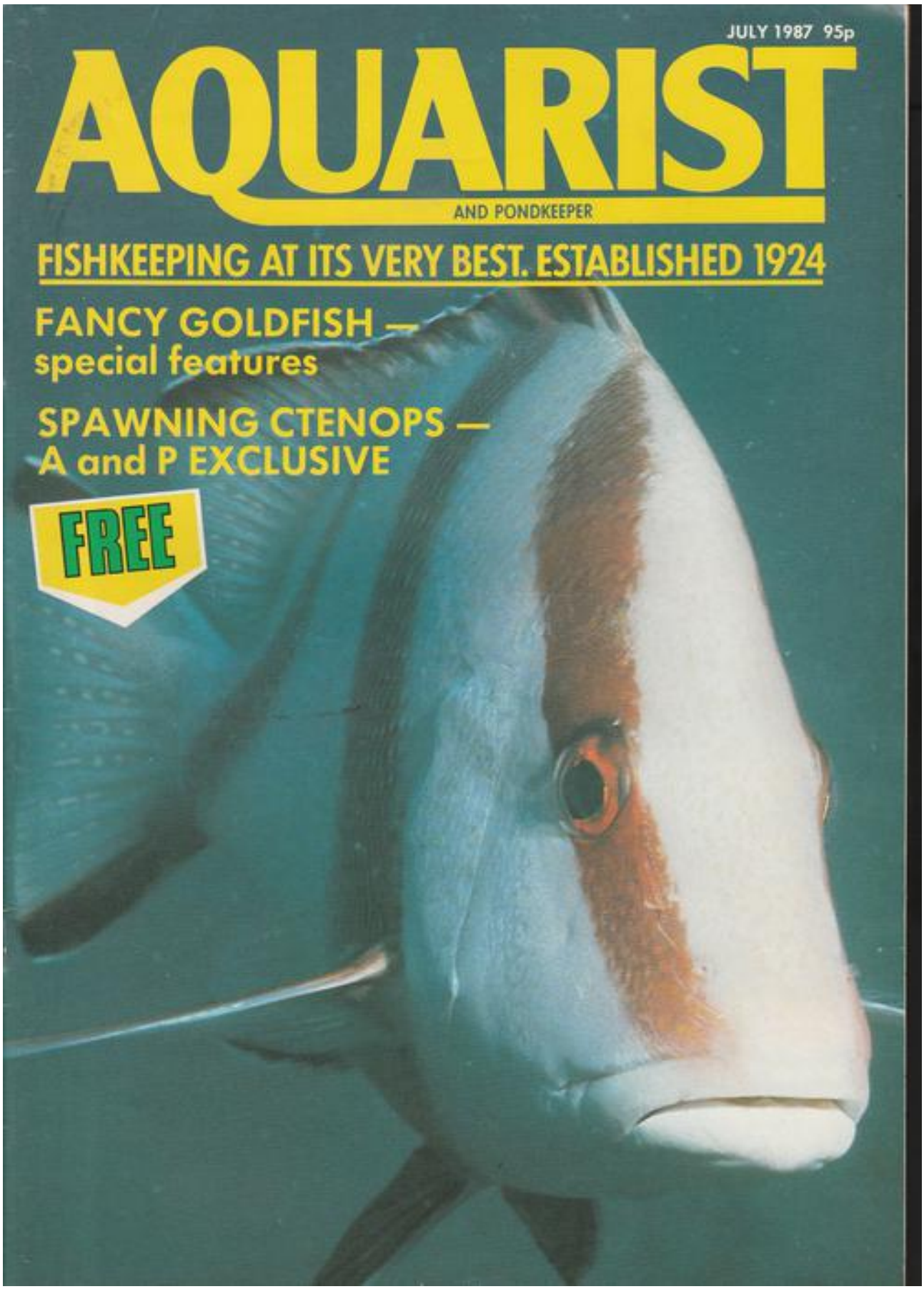

AQUARIST
AND PONDKEEPER

FISHKEEPING AT ITS VERY BEST. ESTABLISHED 1924

JULY 1987 — Vol. 52 No. 4

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Photograph:
Valerie Taylor (Ardea/London)

Despite its wide distribution in the Indian Ocean, western Pacific Ocean and Australasia, *Lutjanus sebae*, the Red Emperor or Emperor Snapper, is not a common fish. Quoted sizes for the species range from 12 in (30 cm) to 36 in (90 cm). Well-documented records indicate, though, that the second of these figures is the more accurate one. Aquarium specimens rarely exceed 10 in (25 cm) but, even so, *L. sebae* is only suitable for very large tanks. Specimens of this very attractive fish are usually offered for sale at around 1 in (2.5 cm), at which stage they can be maintained in small shoals.

PUBLISHER, Andrew Blair/**PUBLISHING DIRECTOR**, Tony Bennett/**EDITOR**, John Dawes/**ART EDITOR**, Paul Davies/**PRODUCTION MANAGER**, Christopher Benn/**ADVERTISEMENT MANAGER**, John Young/**PUBLISHED BY** Buckley Press Ltd., 58 Fleet Street, London EC4Y 1JU **TELEPHONES: ADVERTISING AND PRODUCTION** (0892 83) 5544/**ACCOUNTS** 01-583 0175 **SUBSCRIPTIONS** £15 per annum (UK) 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 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 NK20 2QV Telephone 0908 70761/**USA DISTRIBUTOR**, LEWIS BOOKS. ISSN 0003-7273 Printed by Hastings Printing Company Ltd.

PRODUCT ROUND-UP

By Dick Mills

Thanks to the overwhelming support from our friends in the Aquatic Trade (and to the fact that new products are emerging thick and fast), our 'normal service' of a thematic Product Round-up has been suspended for this month in order that the backlog of important and interesting items can be given their deserved credit. We are grateful for these blessings in disguise and hope readers and suppliers will continue to be tolerant of our efforts to get quarts into pint pots.

Part of the range of ceramic *Corydoras* and other fish from Cardavole Ceramics

Ceramic Cats — *et al*

If you dissemble the name Cardavole you end up with Dave and Carol(e), the owners of **CARDAVOLE CERAMICS**. Dave Page was a well-known judge at Societies' Open Shows a few years ago but an accident left him unable to fulfill these duties. Therapeutic exercise included Ten Pin Bowling and he coupled this interest with another — modelling ceramics — to produce his first item, a Ten Pin Bowl ashtray. More recently he has returned to his love of fishes for further modelling subjects and has a full range of *Corydoras* catfishes (£5.75) captured in clay; another well-received subject is the Tiger Barb (£5.95), and plans are well in hand for a *Botia* range — favourite fishes in Northamptonshire. Experimentation has also begun in casting 'half-models' in relief on a plaque, which could well be popular with Societies as awards at Shows. Plans are almost completed for a move to new premises in Kettering, the current address being **CARDAVOLE CERAMICS, 42 Needham Road, Stanwick, Wellingborough, Northants (Tel: 0933 622346).**

New easily-adjusted heater-stat

One of the smaller annoyances of fishkeeping is fiddling with the thermostat control, a tweak at a time, then waiting until the temperature stabilises, only to find out you've over- or under-dont it! A new aquarium **Visi-Therm** heater/thermostat from **AQUARIUM SYSTEMS** does much to alleviate this. Turning the directly adjustable control (uncluttered by a plastic or rubber cover) causes a visible red line to move up or down a combined Fahrenheit/Centigrade temperature scale, so that you can set the heat output easily. It is impossible to exceed the indicated temperature range (18-32°C, 65-89°F) by over-turning the control; each end of the range has a definite stop point. Unlike other models, the **VisiTherm** won't fall off its suction caps because the heater coils mounts are made of lightweight glass, not heavy ceramic; neither is the tube sand-filled. Suction caps and mounting clips are included. The **VisiTherm** comes in three lengths — 10in (50, 75, 100 watts), 12in (150, 200, 250 watts) and 14in (300 watts) and is specially designed to withstand the harsh conditions of saltwater aquariums, but you can use them with equal success in freshwater tanks too. Distributed by **UNDERWORLD PRODUCTS, Unit 8, Windmill Road Trading Estate, Windmill Road, Loughborough, Leics. (Tel: 0509 214618).**

A common feature of the next few products is the 'Easi-dose' dispenser bottles, enabling exact doses to be given with no mess or wastage occurring. The idea of a side-filling 10ml reservoir is so simple that you wonder why it hasn't been thought of (or introduced) before.

N.T.'s latest

Most marine aquarists appreciate the considerable differences between conditions in the ocean and even the best maintained aquarium: the aquarium has more fish/animals per unit volume of water, algae growth is much less luxuriant, trace elements are often removed from the water by concentration in some algae and invertebrates, and there is an accumulation of undesirable metabolic by-products. There is also a danger of falling pH unless the system has an underlying excess of alkalinity.

Many of the above deficiencies can be overcome with regular dosages of **Marine Multi-Plus** from **NEW TECHNOLOGY**. A single weekly application replenishes trace elements, boosts the buffering capability and provides essential nutrients for the algae. This will keep the water in tip-top condition (although it is not intended as an alternative to partial regular water changes) allowing a greater variety of organisms to develop in the aquarium. By monitoring the water conditins (use **N.T.'s Buffer Test Kit (Alkalinity), Nitrate Test Kit** and **High Range pH Test Kit**) the use of **Marine Multi-Plus** should show an increase (or maintained high stability) in alkalinity, a slower increase in nitrate level (or even a decrease, as algal growth increases), and a steady pH. Protein-skimming (foam fractionation) and efficient biological filtration used in conjunction with **Marine Multi-Plus** may help to prolong the useful life of seawater considerably. **NOTE:** excessive growths of algae can collapse spontaneously, so regular harvesting may avoid pollution.

Help at hand for pond maintenance and treatment from New Technology

N.T. have also responded to the 'pond season' by marketing 1 litre sizes of their **Easi-dose Pond Range** treatments — **Erad-Ick, Bact-Erad, Aquaclear** and **Aquasure; Bactocide** is also available in 1 litre size thus expanding the treatment potential from 1000 gallons (from the standard size) to 4000 gallons. Ever mindful of accidents caused through spillage (or inquisitive children), the standard range sizes come with inner foil heat-sealed liners, the larger sizes having child-resistant closures. Just in case you haven't noticed the well-designed colourful labels and presentation (including the easy-to-use, nylon bag packed **Aquazorb**), **N.T.** issue a free leaflet packed with information on maintaining water quality, dealing with the 'green pond', disease diagnosis and treatment, pond maintenance, seasonal action chart and advice on using the comprehensive range of **N.T.** products. It's called **SUCCESSFUL POND KEEPING, A GUIDE** and may be obtained direct (don't forget a S.A.E.) from **NEW TECHNOLOGY LABORATORIES LTD, Unit 13, Branbridges Industrial Estate, East Peckham, Tonbridge, Kent TN12 5HF (Tel: 0622 871387).**

Easi-dose pond products from Interpet

Pond life has sprung into action by now, including things that you would rather didn't, such as green water, algae and other unwanted phenomena. **INTERPET** have prepared for this annual occurrence by producing a whole range of POND TREATMENTS. **Fresh Start** is a fresh tapwater conditioner, removing chlorine and provid-

ing helpful booster colloids to protect the fish at the same time. **Green Away** will precipitate cloudy green water or suspended dirt for easy removal. **Pure Pond** can be used in two ways: in a concentrated form it makes an excellent disinfectant, while at lower strengths it is a general tonic, controlling bacterial and fungal organisms and is also effective against organisms causing ulcers. **Anti Parasite** will combat free-swimming stages of parasites such as *Chilodonella, Costia, Ichthyiophthirius,* Skin- and Gill-Flukes. **Anti Fungus and Bacteria** completes the line-up, and acts directly against body Fungus, sores and Finrot. All the above remedies are available in Standard (250ml) and Economy (1000ml) sizes, treating between 500 and 10,000 gallons (depending on remedy), and come with very comprehensive instructions for reliable, and safe, use. **INTERPET LTD, Vincent Lane, Dorking, Surrey RH4 3YX.**

News from Norwood

If you want to know what's popular on the sales front, what better source of information than the wholesaler?

NORWOOD AQUARIUM LTD keep their finger on the aquatic market's pulse and their latest News releases show that Koi are among the beneficiaries of some good products.

Tetra's Koi Sticks may sound like a martial arts aid but this long-lasting floating food has a worm-like appearance which is obviously too good to resist as far as Koi are concerned. Its lightweight composition makes the fish rise to take it, a factor appreciated by Koi owners, and two to three feedings a day won't break the bank either. The 1 litre size at £1.85 is very popular with the rising number of Koi enthusiasts but the 6 litre size at £7.95 has its own following too.

Still with Koi, the **Thorne-EMI Amphibious** range of pond pumps have gained excellent response from the public. The four models (each guaranteed for two years) have outputs ranging from 200-800 gallons/hour and are all capable of operating a fountain and waterfall; alternatively, they can be used outside of the pond to drive a filtration system to keep the water clear — a distinct advantage for Koi owners.

Rockies and Fertilisers from Everglades

Rocks doubling as biological filters provide both functional and aesthetic purposes in the aquarium. Of course, such things don't occur naturally and are the product of a technically imaginative mind. **Aquascape Rockies** are sculpted from fibre-glass and have a built-in airlift. Coloured as Sandstone, Cotswold and Black Basalt, each formation has a filter-isolated pocket in which specimen plants can be cultured. Partially buried in the aquarium substrate these useful outcrops cleverly solve the problem of combining necessary technical functions with natural-looking surroundings. The **Rockies** are distributed by **Everglades Nurseries** who have also developed a wide range of plant growth fertilisers. **Everite 1** and **Everite 2** are iron-rich substrate fertilisers: **Everite 1,** in powder form, is mixed with the first inch or so of substrate when initially aquascaping the aquarium, being topped off with two inches or more of clean gravel before filling the tank. **Everite 2** is in various-sized pellet form and is inserted at the base of individual, or clumps of, plants. Recommended where **Everite 1** has not been used, it can be supplemented with liquid **Everplant 'D'** (daily) or tablet **Everplant 'M'** (monthly) fertilising supplements. Details of **Rockies** and **Everite** fertilisers from **Everglades Nurseries, Baunton, nr Cirencester, Glouc**s (Tel: Cirencester 4656).

Accuracy over wide temperature range from Micron Electronics

Low cost wide range digital thermometer

MICRON ELECTRONICS, who have set their sights on becoming leaders in low cost thermometry, market an extremely accurate, wide-range digital thermometer. The name, **Point One,** indicates its accuracy (a resolution of 0.1°C anywhere between -50°C and +200°C) and it has the capability to read up to 1000° and beyond, but the unit automatically rescales itself to 1° when used at this extreme range. The readings are displayed on a large (12.5mm) liquid crystal readout. There are warning indications for low battery, open circuit or faulty thermocouple. Lightweight, in robust impact-resistant ABS moulded case, the unit has a coiled connecting cable enabling the sensor probe to reach any awkwardly-sited tanks easily; the PP3 battery has an estimated life of 150 hours — a lot of measurements! The price is £77.00 excluding VAT and postage. Details from **Micron Electronics Sales Office, 89 Kirkwood Road, Lewsey Farm Estate, Luton, Bedfordshire LU4 0QS (tel: Dunstable (0582) 62487).**

Disease diagnosis by personal computer

Plagued by disease diagnosis problems? If you have access to an IBM Personal Computer/XT/AT or 100% compatible, 256K RAM, 2DSDD or a hard disk system then **Aqua-Medic** diagnostic software program from **N-squared Computing** is just right for you. The software comes with a database of 100 diseases of freshwater and marine food fishes and freshwater tropical species. It also has over 200 symptoms and attributes that will assist the user in differentiating between various disease conditions. The system is expandable up to a capacity of handling 1200 diseases together with 1200 attributes. Entering the set of symptoms, physical findings and water conditions will enable the program to search for, and display, a list of diseases associated with those attributes entered in rank order according to the number of symptoms in common with each disease. You can approach the problem from another direction as the program will also list attributes associated with any disease in the program. Price is **$295.00** and details can be obtained from: **N-squared Computing, 5318 Forest Ridge Road, Silverton, Oregon 97381 USA.**

Disease diagnosis by computer from N-Squared Computing

Letters

Bubble-blowing thoughts

Being a scientist with 25 years of experience in keeping and breeding Gouramis, I was fascinated by Michael Moore's letter in the April edition of the *A & P*, in which he referred to "Bubble-less Honeys".

From my own observations and from those of many of my colleagues in the Anabantoid Association of Great Britain (AAGB), it would appear that it is not that unusual for "highly-strung" Gouramis to revert to a more primitive form of courtship and reproductive behaviour under the artificial conditions of the aquarium; mouth-brooding Chocolates may construct a bubble-nest, and bubble-nest builders may make half-hearted attempts or scatter eggs.

Occasionally, Gouramis, particularly the Honey (*Colisa chuna*) and the Dwarf (*Colisa lalia*) may not adopt the classic embrace and the female may release eggs in response to vigorous butting by the male just behind her pectoral fins.

It would seem that age, diet and environmental conditions may all have an affect. One possible explanation is that the Honeys concerned were comparatively immature; there have been a number of observations on *Trichogaster trichopterus*, the Three-spot Gourami, which suggest that nest-building improves with age and "experience".

Conditions at the water surface may have played their part, e.g. it has been reported for a number of species of the genus *Colisa* that the position of the bubble-nest may depend on the position of incandescent bulbs in relation to the water temperature; in cooler water they build closer to the light source and in warmer water further away; was surface temperature perhaps too high? From my own observations, water movement at the surface (caused by filters and pumps) can frustrate nest-building and cause scattering of eggs in a number of *Colisa* and *Trichogaster*.

Michael Moore is, by his own admission, a relatively inexperienced aquarist, yet his observations and records would be a credit to an aquarist with a lifetime of experience. It is very important that aquarists observe their fish, make detailed records and publish their observations if we are to build up a better understanding of fish behaviour. (That way his fish can read the "right books".)

Incidentally Michael, the Velvet may be caused by too much infusoria and too much light; try reducing these and raising the temperature for breeding to 86-88°F.

Dr. Derek J. Pluck
(A.A.G.B.)
Preston, Lancs.

JOHN DAWES

This is the "classic" Dwarf Gourami bubblenest . . . Yet, even this species' nesting behaviour can be adversely affected under certain conditions.

Home for Unwanted Fish

I was very interested to read the letter by Dr. C. Andrews in the December '86 issue of the *Aquarist & Pondkeeper* concerning the release of a 70cm *Pseudodoras niger* Catfish into the River Thames at Isleworth. To true, caring aquarists and animal lovers, this is very disturbing for several reasons. Firstly, it is illegal to release a fish without a proper licence; secondly, it is an act of extreme cruelty to a tropical fish. These people do nothing for the hobby.

I wonder how many people are destroying or releasing perfectly heathy fish simply because they have grown too large, or are bullying other fish, or for whatever reason.

There are many fine organisations for the well-being of other animals but there is none for fish. I would therefore like to announce to all fishkeepers who have any "problem" fish, that I have now started a "home" for them (a half-way house as it were). The fish I receive will be passed on to Zoos and Public Aquariums, etc.

I would like to stress to any sceptics who may read this that **I am not doing this for any personal gain or profit; nor am I in any way linked with the fish trade.**

I have spoken to a number of people about the project and they all agree that there is a very great need for something like it. Those people and organisations I have spoken to include, among others, the R.S.P.C.A., the World Wildlife Fund, London Zoo, Dr. C. Andrews, John Dawes, local hobbyists, clubs and retailers.

Hopefully, my decision will cut down on the amount of cruelty which large or unwanted fish go through.

As I am currently unemployed, I will not be able to buy the fish concerned; any that I receive will therefore have to be donated. So, if you have any problem fish that fit the above-mentioned description, don't destroy them — there is now a home for them. Please write and tell me what you have.

Dave Mignienne
Purley

Vote of thanks

I would like to take the opportunity through the column of your magazine to express, on behalf of the **Scottish Federation** and **S.A.F. Committee**, our sincere thanks for your continued assistance in making S.A.F. '87 a great success.

I will not attempt to report on the Show in this short letter, other than to say that reports so far have been that this has been one of the best ever, and judging by the smiles on the faces of the Traders and comments of "great weekend — see you next year", seem proof enough of their success.

Thank you once again, and may our partnership continue for many a year to come.

David Wilson
(S.A.F. Chairman)

Editor's Note:
Thank you, David, for your nice letter. We enjoyed it too and echo your feelings concerning our partnership. See you next year!

John Dawes

Anti-antibiotic views

I cannot agree with Mr Ewing's letter **"Anti-antibiotic views"** in your March '87 issue. I have found antibiotics to be of considerable use for certain bacterial infections resistant to other treatments. On the "criticisms" he makes:

1 A week's (7 days) course of antibiotic treatment is usually sufficient so they are not slow to work;

2 Antibiotics used occasionally will not create resistant strains of bacteria. They are best used in a hospital tank not more than once every six months per fish;

3 A partial two-thirds water change daily and use of a corner filter wool unit, instead of an undergravel filter, prevents toxic ammonia and nitrate build-up.

4 Perhaps I have been fortunate in finding an understanding vet who will supply me with terramycin powder at a very reasonable cost.

Provided they are used in the appropriate way antibiotics are a valuable asset.

A. Frances Dixon
Edinburgh

Size cannot be taken as an indication of fertility. The small male in this photograph of a pair of relatively young Orandas going through the "chase" stage in courtship is likely to be as fertile as any other specimen double its size.

FOCUS ON FANCY GOLDFISH

BREEDING FANCY GOLDFISH

The "rules" for breeding Fancy Goldfish in aquaria are the same as those which apply to the more basic varieties. **Pauline Hodgkinson**, who has bred both many times, gives her own personal recipe for success.

Surely the most rewarding aspect of fishkeeping is to breed and rear the fish which we collect. For those who have not yet experienced the enjoyment and the challenge of breeding Fancy Goldfish, I urge them to try.

Success does not come quickly or easily and patience plays a key part. In fact a great deal of credit must go to everyone who has managed to spawn and rear the resultant fry. Many fishkeepers have discovered that failure, either to get their fish to spawn, or to raise the fry, has proved the fact that goldfish breeding is not quite as easy as they may have previously anticipated. However, there are several reasons why failure is common and I hope to pin-point them in this article.

Early considerations

It must be remembered that goldfish do not breed true, so the young will not be like peas in a pod; they will be individuals, each differing sometimes slightly, sometimes greatly, from their brothers and sisters. Even if the intention is not to produce fish to enter into competition, the amount of time, effort and expense makes it really only viable to attempt to produce something of worth, so inter-breeding the varieties usually only results in inferior, misshapen individuals and proves to be a complete waste of resources.

Which variety to choose to breed at your first attempt is really purely a personal one. However, one point to remember is that the more exotic and further removed the chosen variety is from the original, that is to say the single tail, slim-bodied Common Goldfish, the more difficult it is to produce large numbers of good quality youngsters from a spawning.

But the advantage for the novice breeder is that these fancy types are easier to cull. Faults in the young are more easily and quickly spotted. This process of culling the fry, eliminating the badly shapen and inferior fish, is a most important part of rearing and producing good quality goldfish, for to grow and develop properly, the better specimens must have plenty of swimming space. Overcrowding is bound to spell disaster both from the point of view of the development side and the fact that, under such conditions, water quality is bound to suffer. This results in poor health and outbreaks of disease, with devastating consequences.

Pedigree is important

The adults must be carefully selected. A good choice would be fish from a well-established strain. Knowing the history of your chosen breeders is advantageous because it will take much of the possible disappointment out of the eventual end results. The parents will be carrying the genes which will dictate the type and quality of the offspring, though luck also can play a part to some degree. It will be found that the overall quality of the youngsters will vary from spawning to spawning, even from the same pair of fish, but if the parents have a good pedigree, then they will obviously be capable of producing some acceptable youngsters.

Buying into a good strain will save years of work, for much of the difficult business of creating the desired features will have already been achieved.

It is not necessary to buy show fish for breeding in the hope that they, in turn, will throw excellent young. In fact, unless they developed from a family of overall good quality, they have little, if any, chance of producing anything of their own excellence. Taking an interest in the genetics involved makes breeding more exciting, even if our

knowledge is basic and our grasp of the fundamental principles is limited.

A pair should be chosen with a view that they complement each other, avoiding those fish with obvious bad faults.

Conditioning the fish

Fish must be conditioned into breeding readiness. This entails feeding a diet high in protein. Foods such as finely chopped earthworms, small maggots (known by the name of Pinkies), *Daphnia*, and bloodworm, with additional feeds of brown bread and good quality flake, will all help to build the fishes up and into condition, ready to breed. Heavy feeding makes it absolutely essential that the living conditions are kept as clean as possible and the water maintained in the best possible state.

Some goldfish breeders prefer to separate the sexes during the conditioning period. In this, they hope that the separation will make them eager to commence to mate soon after they are re-united. They also hope that they may have more control over the timing of the spawning. However, not everyone follows this procedure, and experience will dictate which course of preparation methods the fishkeeper will follow.

As the fish come into spawning condition the females will swell with eggs and the males will begin to show the breeding tubercles on the leading rays of their pectoral fins. The males will later develop the tubercles on their gill plates. Even out of breeding condition it will be noticed that a male goldfish has a thicker leading ray to his pectoral fins, and observation through a magnifying glass can often reveal that this is also serrated (saw-edged).

Behaviour is also a tell-tale sign that your fish are preparing to spawn. They will become more active and, even if they are separated, they may swim back and forth along their tank. Young males will often chase each other if no females are present.

Spawning

Goldfish spawn in the temperature range between the high 50's°F (c. 14°C) and 70°F (21°C), though the mid to higher 60's°F (c. 18-20°C) seem to be the most generally encouraging to the fish. My own records show that most of my fish choose the mid-sixties F to breed.

When conditions are right for the fish and all the contributing factors stimulate them into spawn, they will show interest in each other with the males beginning to follow the females around the tank. At this stage the fish may go off their feed, in which case none should be offered.

The spawning tank should not be too small. I prefer to use a tank of about 36in × 12in (90 × 30cm). Choosing a small tank is a mistake because, later, when the fry hatch, they will quickly become overcrowded. Small volumes of water quickly pollute and the young fish must have good quality water in which to live, otherwise the results will be disastrous. The tank must be clean and need not contain anything other than an airstone and, if necessary, a heater to bring the temperature to that which is

FOCUS ON FANCY GOLDFISH

BILLY WHITESIDE

Irrespective of variety, male goldfish have a thickened, serrated first ray on their pectoral fins and develop white pimple-like growths (nuptial tubercles) on their gill covers during the breeding season. Both these features are visible on the "leading" specimen in the photograph.

required.

Spawning mops can be made from a variety of materials, providing that it is soft, dye-fast, and, of course, if it is a type of mesh material, it should not be too wide so that the fish do not get caught up in it and possibly damage themselves. I like to use fine-mesh plastic bags, the type used by the greengrocer to sell onions, and on occasions, oranges. These are fine and soft and, cut into narrow strips tied at the base, can be weighted by a couple of glass marbles or a suction of the type used to secure the heater to the side of the tank.

Many fish breeders like to use, at least, two males with each female in the hope that the drive will be harder and the fertilisation higher. However, the aquarist need not necessarily worry that small male fish will not be capable of producing sufficient milt — the size of the fish is by no means any indication of this factor.

In most instances the chase, or an indication that the fish are preparing to breed, will take place the day before the actual spawning. The males may give short bursts of a chase, though quickly becoming distracted. If everything continues to go well the chase will begin with more zest in the late evening and will normally continue throughout the night, increasing in vigour as dawn approaches.

If there are two or more males involved, communication between them seems to occur, with the more keen and aggressive male encouraging the others by picking at their vents then darting back to give chase to the female. If one (or more) of the males appears not to be participating, leave him until the spawning is taking place before removing him as his interest may be heightened in the later stages. If, however, he is not taking part in the actual spawning, he should be removed as he may attempt to devour the eggs as they are being laid.

As the males give chase, they peck in the region of the female's vent which stimulates her to approach the spawning medium, where she releases her eggs while the males press close and fertilise them. After releasing some of her eggs the female will dart off, only to be driven again and again to the spawning site until she is depleted. Do not be too eager to remove the adults from the spawning tank to new quarters for they may take short rests before continuing and completing the spawning act.

A spawning may continue for hours, but when the fish have at last completed their nuptials, they should be removed and placed in a tank of the same water temperature and fed generously. If they are not removed from the spawning tank, goldfish will begin to seek out and devour their own eggs.

Hatching

If the spawning temperature was lower than 70°F (21°C) a heater should be used to bring the water to that temperature. At this temperature the eggs will hatch in three to four days, which has been proven to be the idea length of incubation.

It is during this period of waiting that the aquarist always feels disheartened and apprehensive, as (s)he witnesses increasing numbers of the precious eggs turning white. These, of course, are the infertile ones. The fertile eggs pass through stages during which they become difficult to see. Because of this, there often appears to be so many dead and fungoised eggs that it can give the impression that it is pointless to continue with the spawning and that it is better to clean out the tank and start again. Resist this thought, because first impressions can be very misleading. As, later, the tiny eyes begin to show in the eggs we are always relieved to discover that, surprisingly enough, in spite of earlier fears, there are many more emerging fry. During the period the fry are in the egg, aeration should be strong to circulate water over the eggs, keeping them free of debris and helping to encourage the fry to hatch. Once they begin to leave the egg, the aeration should be decreased so that the tiny fish are not battered against the current.

The fry, which look like tiny splinters of glass, will rest on the sides and floor of the tank. During this time they will consume their yolk sacs which will sustain them for about 48 hours. After this the fry can be fed with liquid fry food available from aquatic shops and sold in easy-to-use tubes. After three or four days of liquid food they can be offered newly hatched brine shrimp and sifted *Daphnia*.

Some useful tips

If the fish appear to be in fine condition, are feeding well, yet have not given any indication that they are intending to breed, changing the position of the spawning tank so that it catches the early morning sun and increased amount of daylight, may give results. Spraying the surface of the aquarium with fresh water in late afternoon can also sometimes do the trick. Even changing partners may start things off. However, it is not a good idea to interfere too much by handling and netting the fish since this can unsettle or damage them and could deter them still further.

FOCUS ON FANCY GOLDFISH

WHAT'S IN A NAME?

Everyone is familiar with the term 'Fancy Goldfish' but we do really know what we mean when we refer to a fish being 'Fancy'? **Dick Mills** looked into this question — and came up with some very interesting answers

When we moved into our present house last summer, I was delighted to find that there was a ready-made, established pond in the garden, thus immediately elevating me to the status of both tropical and coldwater fishkeeper in one fell swoop. At the obligatory combined 'house-warming/meet the new neighbours' party, the chance remark 'I see you keep Fancy Goldfish' set me thinking. Firstly, I hadn't a clue (at that time) what fishes, if any, I had inherited and secondly what exactly was a Fancy Goldfish?

Dictionary definitions of 'fancy' include the words elegant, extravagant, fanciful, fine, imaginative, nice, ornamental. 'Fanciful' is further defined as fantastic, grotesque, unreal and whimsical. All of these can, at some time or another, be applied to fishes (or even other pet animals) — no matter what their species!

A random survey among fellow aquarists provided interesting replies, based either on practical experiences or assumptions. **"No problem there,"** said one, **"Fancy Goldfish need to be brought in for the winter."** A reasonable enough definition, I thought, at this early stage of the investigation. A second canvassed opinion took another tack: **"Just look at the tails — if they're double they're 'Fancy', if they're single they're not."** Both these evaluations have some logical basis for acceptance, except that some twintails, such as Fantails can overwinter outside, thus destroying some of the argument. Again, it would be nothing less than churlish, not to acknowledge the immense work both in time and effort that fishkeepers have expended **down the centuries** to raise, maintain and increase the stature of the Goldfish above that of its original progenitor, the drab grey-green wild form.

As with all developed breeds, the further the end-product is from the original in body form, finnage and colour, the more 'Fancy' it may become in the eyes of its supporters and this is only to be expected, although 'more exotic' might be a better term to use. Just to be perverse, I have heard it said (in all probability by a tropical fishkeeper!) that the more 'fancy' a Goldfish gets, the uglier it becomes. The only reply to that (apart from a fiery cross calling all good Goldfish-keepers to arms) is to smile sweetly and trot out the phrase about beauty being in the eye of the beholder, and that the speaker ought to be more careful before airing comments like that in public!

BILLY WHITESIDE

Few people would regard the Common Goldfish as being 'Fancy'. Yet, it is at least one step removed from the wild-type.

Orandas undoubtedly qualify as 'Fancy Goldfish'. But, where do we draw the line between 'Fancy' and 'Non-Fancy' varieties?

A third questionee said that there wasn't any doubt about it: as far as he was concerned, **all** Goldfish were fancy, no matter how near or far from the original species they had been developed. They were definitely 'unnatural' variants — even if these strains had become fixed, both physically by selective breeding and conventionally in the hearts and minds of fishkeepers. Just take a look at a wild (natural) *Carassius auratus* and compare it with the now normal (albeit cultivated) ubiquitous Common Goldfish. If further proof were needed then notice the short space of time it takes for cultivated fishes to revert to wild colours if their breeding is left uncontrolled. It seems sad that the fish that started off the whole fishkeeping movement should be saddled with such a label. On a comparative level, if a piece of beef can be dubbed **'Sir Loin'** in appreciation of a fairly base satisfaction (gluttony no doubt!), surely such an aesthetically-pleasing, living creature ought to be beatified at least! Maybe we should always refer to Goldfish as Fancy Goldfish — it would be a step in the right direction.

A final clincher, gained from yet another Dictionary and saved to the end, is that 'Fancy' (when applied to animals) is taken to mean 'bred to a special type.' So now you can all take sides, armed with this information, and continue the stimulating argument. Meanwhile, I've discovered eight fish in my pond — some dark, some gold and black, some shubunkins, some with ordinary fins and others with longer fins. Now just fancy that!

FOCUS ON FANCY GOLDFISH

THE 'LATERAL' WORLD OF THE GOLDFISH

Dr Andrew Allen describes the incredible lateral line organ of the Goldfish in his second article on the more intimate aspects of the world's most popular pet.

In addition to its sense of hearing, which serves to detect high frequency sounds and fish songs(!) in the audible range, the Goldfish has a second sound-detecting system known as the lateral line, sensitive to low frequency — ie low pitched — pressure waves in the water.

Whenever an insect nymph (or any other underwater creature) moves — or even breathes — it generates characteristic and absolutely species-specific pressure wave patterns in the water around it, in the frequency range 10-200 cycles per second (audible sounds are mainly in the higher frequency range 200-20,000 c/s). With the help of its lateral line system a goldfish can detect these pressure wave patterns, identify the nymph, and home in from several yards away.

Goldfish have quite good eyes, of course, but visibility is never very satisfactory under water, even in the clearest ponds and lakes. Light rays are scattered and absorbed far more in water than in air, which means that nymphs and worms and other small underwater invertebrates are rarely visible more than three or four yards away at the best of times. At night, at dawn and dusk, and when the water around a fish is more or less turbid — the condition usually prevailing in the eutrophic lowland pools, lakes and rivers which are the natural habitat of Goldfish and related carps (Common Carp and Koi, *Cyprinus carpio*, Crucian Carp, *Carassius carassius*, etc) — fish can see next to nothing at all. Pressure waves, on the other hand, travel through water — clear or turbid — with relatively little distortion and provide a fish with much more accurate information about the underwater world.

Whenever a goldfish moves, of course, it too generates distinctive pressure wave patterns of its own (which a lurking pike or similar underwater predator can pick up from far away — there is nothing a goldfish, or any other fish, can do about that). The returning echoes of these pressure wave patterns, bounced back from submerged roots and rocks and aquatic plants, give a fish a 'picture' of the underwater world in low frequency sound. The faster it swims the more pressure waves it generates, and the more detailed its echo-picture of the world becomes.

However dark the night or murky the water, and however fast it swims, a goldfish never bumps its head against a submerged obstacle and never collides with another fish. By listening to pressure wave echoes with its lateral line a goldfish turns the darkness of the night into a sort of hazy half-daylight around itself in which it 'sees', in a manner of speaking, the gross shapes of underwater objects. Fish species living permanently in underwater caves and deep-sea fish living down in the sunless abyssal depths of the ocean have only vestigial eyes, or no eyes at all, but are able to find their way about perfectly well in the total dark by means of a lateral line echo-sounding sense even more highly developed than that found in a goldfish.

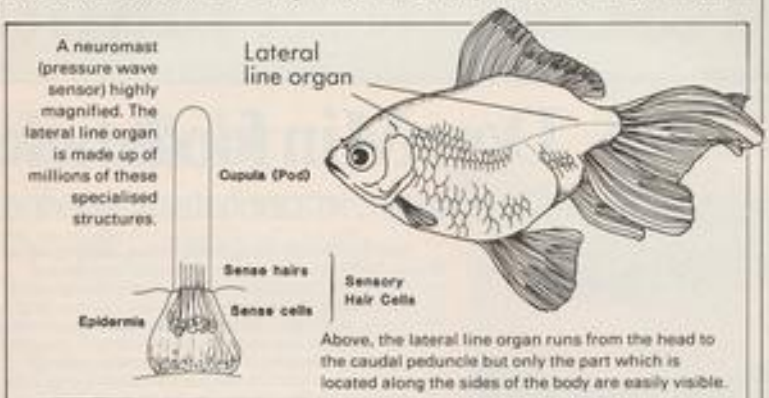
The peessure wave echo-sounding of goldfish works on much the same principle as the sonar of bats: but the bat beams out high frequency ultrasound (in the range 30,000-150,000 c/s) which gives a much "finer-grained" echo-picture of the world. Several species of fish, all marine, and also dolphins, propoises and some whales, use the same sort of high frequency sonar as bats to locate food and objects underwater — thousands of yards away, in total darkness — but the goldfish cannot do this because it lacks a sufficiently high-pitched voice (yes, Goldfish, like many other fish, *do* have voices and sing quite loudly, though fish songs are only rarely heard above water because of the peculiar reflective sound-mirror properties of the air-water interface).

The goldfish's lateral line system starts on the head as a network of tiny jelly-filled canals (discernible with a hand lens or, better still, a low power microscope), running just below the surface of the skin. Behind the head the canals join together to form a broad 'lateral line' running down each side of the body.

Within the lateral line canal system are millions of pressure wave sensors called neuromasts, each composed of a tiny pod, or cupola, with a fine sensory hair cell inside. Low-pitched sound vibrations and pressure waves from the water pass through pores in the thin layer of skin overlying the lateral line, and push the hair cells in one direction or another, causing them to fire off a volley of electric signals to the brain.

The hair cells are amazingly sensitive to minute changes in water pressure. A hair cell will fire a signal to the brain when its tip is moved through a distance of 100 picometres (a picometre is a trillionth of a metre; ie a million million millionth of a metre) by a pressure wave in the water. 100 picometres is roughly the diameter of an atom.

To the casual onlooker the lateral line organ of a fish appears as no more than a neatly arranged (but quite unspectacular) line of dots running along the side of the body. As this article demonstrates, those little dots are anything **but** unspectacular, particularly in the delicate and highly complex job they do and in the remarkable capabilities that they confer on their owners.



Above, the lateral line organ runs from the head to the caudal peduncle but only the part which is located along the sides of the body are easily visible.

This Lionhead's remarkable lateral line is visible as no more than a quite unremarkable white longitudinal line which appears to begin somewhere behind the head and ends at the tail (Photograph: Pauline Hodgkinson).

FOCUS ON FANCY GOLDFISH

NEW STRAINS ADD VARIETY

Recent years have seen the introduction of an ever-increasing number of varieties of Fancy Goldfish into the UK, along with the popularisation of some "older" ones. **Stephen Smith** focuses his attention on five of the newer types and one which, only now is becoming firmly established in the hobby, despite its many outstanding qualities.

H. TISBURY & SONS

One of the main attractions of Fancy Goldfish is the seemingly infinite varieties available for the hobbyist and enthusiast alike.

Despite this vast range, however, only a selection of varieties have achieved the status of individual recognition in the major Goldfish society standards.

FOR GOLDFISH KEEPERS

GARY LEWIS

GARY LEWIS

Above, the colouring and finnage of the Jikin is perfectly illustrated in these examples
Left, the Tosakin is an elegant variety best viewed from above
Right, the Hamamishiki is a most attractive fish, incorporating "traditional" gold colouring with the scaling and finnage of the Pearlscale, while two "bubbles" are situated above the eyes

The reason for this is fairly simple: until Goldfish keepers demonstrate a demand in significant numbers for a particular strain, it would be pointless for a society show to have individual classes in its schedule for every Goldfish strain.

This is perfectly reasonable, as such a situation would hardly lead to improvement of standards when, say, only one or two exhibitors show in a particular class.

A particular example of how standards of fish can be improved is presented by the Bristol Shubunkin.

This is a highly popular Fancy Goldfish which improves in standard every year as a result of the dedication invested in this particular strain by enthusiastic breeders.

But there was a time — and it was only

STEPHEN SMITH

Although not yet "coloured", these young Jikins show the characteristic formation of the caudal fins, which should be fully divided and as perpendicular to the body-line as possible

FOCUS ON FANCY GOLDFISH

three decades ago — when the Bristol Shubunkin as it is recognised today had not yet been evolved.

So it is creditable that a new generation of Goldfish keepers is emerging who, while fully recognising the importance of the "traditional" Goldfish strains, are providing inspiration to the hobby by introducing new and interesting variations of *Carassius auratus*.

BEAUTY

To many Goldfish enthusiasts, some of these strains may appear somewhat "against the grain" incorporating, as they do, characteristics which breeders of traditional varieties may have rejected for years from their own spawnings.

However, beauty can only ever be within the eye of the beholder and, if some of the "new" Goldfish varieties do achieve widespread popularity, who can say that these are any less valid than the "traditional" Lionhead, Oranda, or Shubunkin, for example.

So let's take a closer look at some of the strains of Fancy Goldfish recently introduced to the hobby, and which are becoming increasingly popular in the UK.

Who knows, within the next three decades, some of these varieties could even become as established as the Bristol Shubunkin itself has over the last three decades.

THE TOSAKIN

I really must start with this variety, as it has been around for many years, though previously extremely rare in this country.

Despite my introductory comments, the Tosakin is even included within the standards of one or two Goldfish societies.

Frank Orme, in his book **"Fancy Goldfish Culture"**, suggested that the Tosakin "is probably a sport from the Ryukin", though the resemblance, if any, is only in the slight "hump" on the back, behind the head.

Where the Ryukin mimics an "overfinned" Fantail with a humped back, the Tosakin is fairly shallow in the body. However, its best aspect is from above, unlike the majority of traditional round-bodied Fancy Goldfish varieties.

From this position, the full grace and splendour of the caudal fins of the Tosakin can be fully appreciated: with hardly any division of the caudal fins, the lower lobes are greatly exaggerated and flow forwards alongside the body of the fish, which is usually a metallic orange in colour.

THE JIKIN

If the Tosakin is one of my favourites of the "new" varieties, the Jikin must run a very close second indeed.

Already a number of these metallic fish with cigar-shaped bodies have been bred in this country — their main challenge to the serious Goldfish breeder being twofold:

i) the spectacular bright orange finnage and lips contrasting with the metallic white colouring of the Jikin's body; and

ii) The caudal fins which are square-ended and paired — in perfect specimens almost perpendicular to the line of the body.

Highly selective breeding and skilful selection of fry is required in order to develop even near-perfect Jikins. In addition, the patience of the most dedicated breeder is stretched as, in common with several specialist varieties of Goldfish, decolouring from the natural olive-brown could take several years to complete in this country.

THE HAMANISHIKI

Pronounced **"Ham-an-ish-kee"**, this is a fascinating newcomer to the scene, sporting different features of a number of "traditional" Goldfish varieties.

The body of the Hamanishiki resembles perfectly that of a Pearlscale, with "Fantail-type" finnage and their characteristic convex scales. The head, however, might at first glance be confused with that of a poor-specimen Lionhead. Closer inspection reveals that the "hood" is indeed made up of two bubbles on the fish's "forehead".

All of which makes for a most attractive fish.

According to Goldfish enthusiast Gary Lewis, who has been instrumental in introducing some of the new varieties of Fancy Goldfish into Britain, the Hamanishiki has been developed over a period of up to 15 years and has been officially accepted by the Japanese Goldfish associations.

"It's development apparently began by crossing a high-head pearlscale with a bubble-eye," said Gary. From these first offspring, specimens with a good-shaped bubble on the head were inbred until, after about two years or so, the bubbles began to appear on the top of the head, above the eyes.

"Refinement over the following ten years enabled the Haminishiki ("High head bubble pearl scale") to become fixed as a new variety of Fancy Goldfish."

CROSSBREEDING GOLDFISH

I should stress that indiscriminate cross-breeding of Fancy Goldfish by hobbyists will, on the whole, serve no real purpose to the species. The "new" varieties described above have themselves resulted, not as one-off freaks, but as the product of several years of painstaking selective breeding.

Many Goldfish keepers I know, gain a great deal of pleasure and satisfaction in trying to perfect their own favourite strains — some of them now quite traditional.

I feel sure it will not be long before large numbers of, hopefully good quality, Jikins and Hamanishikis are to be seen on the show bench alongside Shubunkins and Orandas.

THE COURTSHIP OF *CTE*

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

First-ever photographic record of the courtship behaviour of *Ctenops nobilis* (see text for details).

ENOPS NOBILIS

David Armitage of the **Anabantoid Association of Great Britain** follows up his discovery that *Ctenops nobilis* is a mouthbrooder with the first report to be published concerning the courtship and spawning bevaviour of this challenging species. Photographs by the author.

When I attempted to summarise our knowledge of this pugnacious species in the August 1986 *'Aquarist and Pondkeeper'* I mentioned that nothing was known of its breeding behaviour. Subsequently, in the November 1986 letters column, I was able to announce my discovery of its mouthbrooding ability. A little later, I heard that Chris and Denise Brook had also found one of their fish with a mouthful of eggs.

A fortnight after that discovery I was able to watch the courtship ritual which my half-grown (2 inch) fish were to repeat many times in the afternoons and evenings throughout September and October 1986. So predictable was the routine, that I was able to take sufficient notes and photographs to form the basis of this article which I hope will be interesting to hobbyists and useful to ethologists. The slides were taken without flash, to avoid disturbing the fish, using 200 ASA film under 12W of fluorescent light. This supplemented the 40W of tungsten bulbs which normally illuminated the thickly planted, unfiltered 24in x 12in x 15in (60 x 30 x 38cm) tank with a gravel base at 72-75°F (22-24°C).

The courtship progressed as follows:

1. One fish became deeply marbled and stood, head up, before the other with its body slightly flexed.
2. The second fish lay just below the water surface with flattened fins and adopted a dull, chocolate brown uniform. (Fig. 1)
3. The marbled fish then swam up to the other and touched its partner's chin or gill cover with its mouth. (Fig. 2)
4. Upon this contact, the passive partner began to tremble violently.
5. The marbled fish then swam under the other's belly, along the flank and curved itself over the back in the trial spawning embrace (Fig. 3).

This was not the end of the affair however, because the routine did not always go so smoothly. Once in every five runs or so, the passive partner would stir itself, flare its fins and open its mouth as though roaring (Fig. 4). This would appear to cool the ardour of its active mate and temporarily halted the attempted spawning run.

Although I did not observe egg release and the picking up of the eggs, inevitably, after 1-3 days of courtship, the passive fish would disappear toward the back of the tank. Here it would be observed, lying quietly, hidden among the weeds (Fig. 5), "chewing" the eggs, usually just before it took a breath of air. This fish brooded eggs on four occasions for between seven and 14 days. As I have reported earlier, on the first occasion it was disturbed, it spat out and immediately picked up again, four large white eggs. Obviously, I preferred brooding to take its natural course, but on the 5th occasion, I tried and failed to get the fish to relinquish the eggs. Later, Steve Clark, the *Betta* enthusiast, informed me that mouthbrooders usually spit out their eggs when placed in shallow water.

You will notice I don't refer to male or female, as I never actually saw egg release in the several dozen false spawnings I watched. It would be easy to assume the active partner was male and the passive one female. Indeed, the aggressive displays I noted between presumed males inclines me to this view. Nevertheless, we should remember that in the mouthbrooding *Bettas*, the female is the active partner and the males brood the eggs. On the other hand, in the case of the Chocolate Gourami, *Sphaerichthys*, convention states that the female does the job.

Initially, I held the view that the mouthbrooding of *Ctenops* was indicative of an evolutionary link between *Trichopsis* (the Croaking Gourami) and *Sphaerichthys*. However, some of the elements of courtship — for instance the chin touching and 'roaring' are very reminiscent of the behaviour of mouthbrooding *Bettas*.

Sadly, I have now lost all my *C. nobilis* without raising any young; the last pair died after only nine and 11 months in captivity. Their predilliction for leaping leaves them open to mouth damage and subsequent infection when they strike the cover glass. They also seem susceptible to a wide range of normally latent aquarium pathogens, which hardier species can resist. I must admit to the belief that, like many delicate species, such as the Chocolate Gourami, they would be best left in their natural habitat, until we learn enough to allow them to be realiably bred en-masse for the hobby.

Further information from: The Anabantoid Association, c/o 143 Military Road, Colchester, Essex CO1 2AT.

News

'RSPCA TODAY' Goes Quarterly

RSPCA TODAY, the Society's official news magazine, has gone quarterly. The latest issue includes features on the transit of animals, the "Save Our Snakes" campaign and the impact of new animal experimentation legislation. It also includes a round-up of Inspectorate, Branch and Overseas News.

"**RSPCA TODAY** is the official voice of the Society and provides a vital forum for keeping the public informed about the work of the Charity," said RSPCA Director of Press and Public Relations, **Mike Smithson.** "The increased frequency of publication will enable us to keep readers updated on campaigns, concerns and other vital issues."

The magazine has a circulation of over 30,000. It is available free to RSPCA members or on a subscription basis for £2 a year from **RSPCA, Causeway, Horsham, Sussex RH12 1HG. Tel: (0403) 64181.**

New publication on successful Toad Tunnel

A new **Fauna & Flora Preservation Society** publication, *Toads on Roads*, has been launched with an announcement that thousands of toads have used the **ACO Polymer Toad Tunnel** at Henley-on-Thames, since it was opened last month by Lord Skelmersdale at Britain's first toad tunnel (see NEWS in the June issue of *A & P*).

Toads on Roads has been published with funding from **ACO Polymer Products Ltd.** It will inform local authorities, other road and land managers and the general public worldwide about the **Toads on Roads** campaign, and is expected to be particularly useful in Britain, Germany and the USA.

Toads on Roads is available, price **£1.95** including P&P, from **FFPS, 8-12 Camden High Street, London NW1 0JH.**

Shark first for Underwater World

We are pleased to publish the following important piece of news which we received just before going to press:

"**Underwater World**, at Birdworld, Farnham, Surrey, have had five Philippine Ground Sharks (*Chiloscyllium griseum*) — two females and three males — since February 1985 when they were specially imported from Artis Zoo, Amsterdam, Netherlands. The specimens are light brown and bottom-dwelling, measure 60cm to 70cm in length and are housed in a 12,500 litre tank.

On 11 April, the sharks laid their first egg at about 12.30 pm. By the time it was retrieved from the tank at 1.30 pm, there were two more eggs. Since then, no fewer than twenty nine eggs have been laid, out of which twenty one were found to be fertile. The eggs are about 5cm long by 2.5cm, have a horny texture (tough but not brittle) and are of a flattened, oblong shape. They are opaque brown colour with silk-like threads attached to their sides.

Developing Philippine Ground Shark egg. The two-day old embryo appears as a tiny "pimple" on top of the yolk.

UNDERWATER WORLD

The eggs are on display in a small tank next to the shark aquarium. Developing embryos can be seen, ranging in age from a few days old (at which stage they appear as a small pimple on the yolk sac, as in the photograph), to some measuring 50mm in length.

Other successes at **Underwater World** this year include the breeding of *Farlowella acus.*, *Sturisoma* sp., Whiptail Catfish (*Rineloricaria filamentosa*), Peppered Corydoras (*Corydoras paleatus*) and Australian Rainbows (*Melanotaenia 'nigrans'*). The young of all these can be seen on display.

On the marine side, regular spawnings are being achieved with Tomato Clownfish (*Amphiprion frenatus*), Domino Damselfish (*Dascyllus trimaculatus*) and Humbug Damsels (*Dascyllus aruanus*), as well as with another Amphiprion-type Clownfish."

For further details, contact: **Dave Harvey, Underwater World at Birdworld Bird Park and Garden, Holt Pound, Nr Farnham, Surrey GU10 4LD. Tel: Bentley (0420) 22140.**

Harrods date for TFH competition winner

As reported in May, the **TFH Spring Book Competition** (which we ran in March) drew a tremendous response from our readers. The winner, **Daniel Bennett** from Derbyshire, subsequently travelled down to London to receive his prize, courtesy of **TFH.**

TFH

Our picture shows Daniel receiving his autographed copy of *Dr Axelrod's Atlas* from **Janet Hardy,** director of **TFH Publications Ltd.** The presentation took place at **Harrods** impeccably-run Pet Department, by kind permission of **Ms Rita Stratta.**

21-year-old Daniel has been an active fishkeeper since the age of 5. He is also an expert on lizards and is in the process of writing a book on monitor lizards. As a result, he is planning to visit 15 leading European Zoos to photograph monitors and is hoping for sponsorship to enable him to travel to Australia.

Books

Another winner from Salamander

A Fishkeepers Guide to Livebearing Fishes
By: Dr. Peter W. Scott
ISBN: 086101 281X
Price: **£4.95**
Published by: Salamander

Salamander Books' Fishkeeper's Guides have been cruising along in top gear for some time now, and the latest release, **Livebearing Fishes** by Peter W. Scott, not only continues the trend but manages to change up into overdrive.

A few years ago the thought of filling a book on Livebearers would have been greeted with some degree of scepticism, but such interest has been generated in recent times (together with information from specialist aquarists) that the main problem was probably what to leave out! A provisional count of the number of genera reached over twenty, well before the numerous *Poecilia* and *Xiphophorus* species came along.

You would be wrong to think that the book is merely a gallery of species, for the first half of the work thoroughly examines the whole aspect of keeping livebearing fishes: what they are (the differences between oviparous, ovoviviparous and viviparous fishes are clearly explained), their aquarium needs and how to provide them, how to furnish their aquarium and how to feed them.

The two main chapters are Breeding and Genetics, and Health Care; each is dealt with extremely comprehensively, as Peter Scott brings to the text the authoritative weight and thoroughness of the professional veterinarian. Very detailed information is given on the different developments of fry within five females of contrasting genera during the gestation period; similarly, genetic engineering is explained with equal exactness, but never with 'too-technical-forme' language. Considering the author's qualifications, the quality of the section on Health Care (disease diagnosis, prevention and cure) is never less than excellent.

The species guide is presented in alphabetical order under family names: included are expected species such as *Anableps*, *Jenynsia* and *Xenotoca* alongside perhaps unfamiliar *Characodon*, *Ilyodon*, *Normorhamphus*, *Skiffia* and the newcomer *Poeciliopsis scarlli*. The genus *Xiphophorus* is sub-divided into Helleri, Maculatus and Montezuma groupings and includes details on *X. cortezi*, *Z. couchianus*, *X. milleri*, *X. pygmaeus* and *X. xiphidium* in addition to the ordinary (?) Platies, *X. maculatus* and *X. variatus*.

Naturally, Salamander doesn't put a foot wrong in the quality of presentation but, like the person who complains about the Rolls Royce clock, I have to admit to being disappointed at there only being a **picture** of *Priapella intermedia*, but then, I did wonder at what would be left out didn't I? Whether you are into livebearers or not, this book deserves a place on your bookshelf — you even get change from a fiver!

Dick Mills

Three Mouthwatering Offerings From Immel Publishing

1. Red Sea Reef Fishes

By: Dr John E. Randall
ISBN: 0 907151-04-3
Price: **£32.00**

The aim of this book, as stated in the Introduction, is "to provide the means for the identification of the most common reef fishes that a snorkeler or diver might encounter in the Red Sea".

In reality, its relevance is much wider than this, as any marine aquarist will discover the moment (s)he opens the book. All the well-known Red Sea species, including, of course, many also found elsewhere, are illustrated by full-colour photographs and described, along with a multitude of other less-well-known species, and some, such as *Amphiprion bicinctus* (the Twobar Anemonefish) which are endemic to the Red Sea and the Gulf of Aden.

Not every single fish is represented, of course, but then, what book could ever do this? It would have been nice, even so, to have seen a reference to the fascinating Toadfish, *Rickertia*, and a photograph of the highly colourful (red/orange) Anglers (Frogfish) of the genus *Antennarius* (although other less colourful species are included).

These are no more than extremely mild quibbles, which are more than adequately squashed by the excellence and quantity of the material which is included. A more substantial quibble, which some of those who buy this book may well notice, is the omission of all reference to Israel — even the map of the region avoids mentioning the country.

In summary, **Red Sea Reef Fishes** is an extraordinarily good book which will give hours of pleasure to anyone who delves within its pages. If you are a diver, you will also benefit from the smaller, waterproof **Diver's Guide to Red Sea Fishes** — also available from Immel.

2. Red Sea Invertebrates

By: Dr. Peter Vine
ISBN: 0 907151-11-6
Price: **£39.50**

This substantial volume can be regarded very much as a "sister" book to **Red Sea Reef Fishes** — and what a fantastic sister it is!

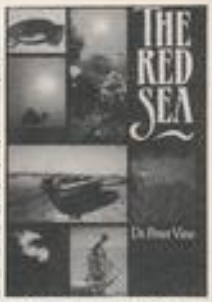
It represents what, without doubt, must be the most comprehensive, well-presented and documented book on the subject ever published.

Whatever is not covered in the form of photographs, seems to have been tackled by means of artwork, charts and Tables.

According to the author, "This book is a testimony to the incredible abundance of species which occur in its (the Red Sea's) waters."

The price is, I admit, a bit off-putting. Yet, I fail to see how you could survive without this book if you are at all interested in the Red Sea and its unbelievably diverse and spectacular fauna.

3. The Red Sea



By: Dr. Peter Vine,
ISBN: 0 907151-10-8
Price: **£24.00**

This third title is, as its title implies, a more general book which aims to introduce the reader to the Red Sea in all its aspects. These range from the fish and invertebrates themselves, to the "Red Sea" people, and their activities, navigation (including wrecks), birds and much more.

The photography is just as good as in the other books reviewed above, while the text is, because of its very nature, much more readable. In other words, **The Red Sea** is an excellent book to read when you don't need to identify or check up on an individual species.

Even so, there is a great deal of information on all sorts of Red Sea life, including some very interesting bits here and there. For instance, did you know that some types of '*Tilapia*', well-known as **freshwater** fish farmed widely in many countries, are being reared in floating cages in the Red Sea at salinities as high as 42 parts salt per thousand (42‰)? "Normal" salinity for other seas is only 30-34‰!

This book is yet another one of those which would enhance any collection.

All three books are currently being distributed by **Tropicure Products Ltd.** (although other potential distributors were being lined up at the time of going to press).

Tropicure Products Ltd.,
The Headlands,
Scotland Lane,
Horsforth,
Leeds LS18 5HX

John Dawes

News from the societies

Obituary: (Cliff Spence) A Tribute to a Dedicated Man

On 11 May, the aquatic hobby was deprived of a great friend and advocate with the sudden passing of **Cliff Spence.** Cliff will be sadly missed by many people in all parts of the country, none more than by **North Avon Aquarist Society** for whom he was Chairman for many years, and (recently) its Secretary.

Cliff was responsible for staging the society's 1st Open Show in 1980 — just one example of his eye for firsts, either by his own initiation or by his support. Ironically, he carried out the duties as Show Secretary for the society's 8th Open Show on 8 May of this year, a fitting tribute to the man, contributing as usual to the hobby he loved.

He always contributed with great devotion to his programme engagements, and other supportive efforts shown to other clubs, festivals and events up and down the country. Few aquarists, if any, came into contact with Cliff without gaining some knowledge, which he willing imparted, many remaining to recognise his face but being unaware of his name.

This is the sort of fellow he was — quite unassuming, but very sincere; never prepared to accept incorrect authority statements in the hobby, and always prepared to say so.

We who knew him well, consider it to have been a privilege. He will be difficult, if not impossible, to replace, and most certainly be very sadly missed.

Bob Cummins
North Avon Aquarist Society

N.E.F.A.S. Inter-Club Show

The third Inter-Club Show held by the **North-East Federation of Aquarists Societies** was held at the Billingham Community Centre on 22 March.

Clubs competing were: Billingham, Whitby, Redcar and Darlington. 140 fish were benched and judged. **Redcar** won for the third year running with 81 points, followed by **Billingham** (54) and **Whitby** (26). The **Best Fish in Show** was an *Apistogramma cacatuoides* owned by **S. King** (Redcar F.C.) who was also the individual exhibitor to gain the most points (51).

N.E.F.A.S. would like to extend sincere thanks to everyone involved both in organising and in taking part in the Show.

Oldham & District Aquarist Society

Oldham & D.A.S. held a highly successful Open Show on 19 April at The Music Room, Werneth Park, Oldham.

In order to widen involvement, judges were invited from the A.ofA., F.B.A.S., N.E.F.A.S., F.N.A.S. and Y.A.A.S. In addition, literature was provided for sale to visitors both by the F.B.A.S. and F.N.A.S.

The **Best in Show** trophy was won by **Mr & Mrs Baldwin** of **Sandgrounders** with a *Barbus oligolepis*. The *Aquarist & Pondkeeper* prize for the **Best Coldwater Fish** went to **Mr & Mrs D. Silk** of S.J.S. Sincere thanks to all concerned.

Surrey Marine Aquarist Society

The photograph used in the March 1987 item on Surrey Marine Aquarist Society was published by courtesy of **Birdworld,** Farnham, Surrey.

Surrey Marine apologise for having overlooked the crediting of the source and are grateful to Birdworld for allowing the society to "adopt" the photograph in question as its emblem.

For further details of S.M.A.S., contact the Secretary, Jan Sanders, on (073 72) 22921.

Borders District Aquarist Club

This brand new society will meet fortnightly (on Wednesdays) at the Selkirk Old Library, Chapel Street, Selkirk. Meetings will start at 7.30 pm, and will be open to all fishkeepers, ranging from freshwater tropical hobbyists to native marine aquarists. Club outings and talks on all aspects of fishkeeping are currently being arranged. Anyone interested in joining this society (or requiring further information) should contact: Tony Brimson, Greenkeepers House, Selkirk Golf Club, Hawick Road, Selkirk, TD7 4NW.

Reigate & Redhill Aquarist Society

The following members were elected to the committee of the above society at the annual AGM.

Chairman: Syd Fewtrell (Horley 786078)
Secretary/PRO: Margaret Carbutt (Reigate 41413)
Treasurer: Dick Gush (Redhill 65152)

Meetings of the society are held on the first and third Monday of the month at Strawson Hall, Albert Road, Horley, Surrey, starting at 8.00 p.m. For further details of the full range of activities provided by R.R.A.S., contact the secretary.

Diary dates

Port Talbot & District Aquarist Society
The P.T. & D.A.S. 17th annual Open Show will take place on **Sunday 12 July** at Taibach Youth Centre, Port Talbot. Schedules and details from John Egan, 53 Pentre Afan, Baglan Moors, Port Talbot, West Glam., SA12 7RN.

Reading & District Aquarist Society
The 1987 R. & D.A.S. Open Show will be staged at the Southcote Youth Club, Coronation Square, Southcote, Reading, on **12 July**. For further information, contact the Secretary, Mrs Janet Tonna, 19 Eskin Close, Tilehurst, Reading, Berks. RG3 4DT.

Bridgewater Aquarist Society
B.A.S. will be holding their Annual Open Show on **12 July** at the Beesley Community Centre, Greenleach Lane, Worsley, Manchester. Benching: 11.30 am to 1.00 pm. Judging: from 1.15 pm. Further details are available from M. Hole (Show Secretary), 21 Wichbrook Road, Little Hulton, Worsley, Manchester.

Billingham Aquarists Society
The B.A.S. 1987 Open Show will be judged according to N.E.F.A.S. Rules and will take place on **Sunday 19 July** at the Billingham Community Centre. More information from the Show Secretary, E. Bennison, on Hartlepool 233814.

Phoenix Aquarium Society, Blackpool
The annual Open Show of the above society will be held at St John Vianney School, Glastonbury Avenue, Blackpool, on **Sunday 19 July.** All enquiries to Mrs. G. Redman (Secretary). Tel: Blackpool 32265.

Sandgrounders' Aquatic Society
The 17th Annual Open Show and Grand Auction of S.A.S. will be held on **Sunday 26 July** at Meols Cop High School, Meols Cop Road, Southport. Schedules available on receipt of a 10in × 8in S.A.E. from B. Baldwin (Show Secretary), 10 Olive Grove, Southport. Tel: (0704) 43384.

Dorchester Aquarist Society
The D.A.S. 7th Open Show will be held at the Boys Brigade Hall, Weymouth Avenue, Dorchester, Dorset, on **Sunday 2 August**. 34 classes, each with its own trophy, as well as several special awards. For details and schedules, contact Barry Symes (Show Secretary), No. 3 Arnhem Green, Dorchester, Dorset DT1 2PS. Tel: (0305) 62817.

Spotlight

THE OLD WIFE *(Enoplosus armatus)*

Tracking down the little-known and dramatically patterned Old Wife presented **Gordon Kay** with one of his stiffest challenges to date. The results of his extensive search probably constitute the most comprehensive account of this species ever published in an aquarium magazine.

Photographs: **David Allison**

Most marine aquarists are initially drawn to their section of the hobby by the magnificent colour and patterns of the coralfishes. No-one but the most die-hard freshwater fishkeeper could deny the appeal of the yellows and blues, stripes and spots of the Angels, Butterflies, Wrasses and Tangs — to the extent that coralfishes are kept almost to the exclusion of any other seawater fish. However, there are some marine fishes originating from temperate zones which can be every bit as attractive as their tropical cousins and one such species is *Enoplosus armatus* — the Old Wife — the only species in the family Enoplosidae.

Hailing from the coasts of Southern Australia, Tasmania and New South Wales, the Old Wife is similar in shape to the Chaetodontidae (the Butterflies) but differs in several respects. First, it sports two distinct, well-developed dorsal fins, the first of which carries several long spines. The pelvic fins are also long and large with a strong spine. The body is deep and laterally compressed, with the head finishing in a pointed snout, and the colour is a distinctive silvery white with eight dark-brown bands and pinkish-red fins. The maximum size in the wild is around nine inches but, of course, nothing like this would be attained in captivity.

This fish is found in large shoals at depths of five to thirty metres, inhabiting rocky reef areas, under rock overhangs and wharfs, and also in kelp beds. Despite this schooling habit, the Old Wife will form a close relationship with a single mate during the breeding season. The natural diet of *Enoplosus* consists of crustacea and small worms. It is apparently a good fish to eat, although it is not commercially exploited — mainly because the rocky areas over which it lives make trawling impossible. Having said that, there have been rare reports of trawlermen catching the Old Wife at depths of eighty-eight metres.

The information we have on this species' natural history will provide several pointers with regard to its culture in the aquarium. For a start, because of its gregarious nature, *Enoplosus* should not be kept singly and, in fact, single specimens will not fare well at all. Perhaps three in a good sized tank is about right. As far as I can ascertain, mixing with other species presents no undue problem.

Unfortunately, *Enoplosus* doesn't ship very well and so the aquarist should ensure that (s)he buys only specimens which are completely settled into aquarium life. In addition, if this acclimatisation is achieved in Australia, before the long journey to Europe, then so much the better. Remember that in the wild this fish lives in temperate waters, at temperatures of between 50-60 degrees F, and so cannot tolerate very high temperatures in the aquarium. However, the Old Wife can be kept happily in the low 70's without too much fuss and so may be mixed with tropical species. Again, this adjustment to new temperatures will, of course, be part of correct acclimatisation.

During the hours of full daylight, *Enoplosus* tends not to be very active but comes to life in the half-light of dawn and dusk. Feeding should therefore be carried out when the aquarium lights are being turned on and off. First offerings for new acquisitions should be live shrimps, followed later by frozen *Mysis* and brineshrimp, bloodworm, etc., then flake foods and a small proportion of vegetable matter. As with most seawater species, a good growth of green algae would be a great help.

So little is known about the reproductive habits of this fish that anything I write here must, inevitably, be pure speculation. However, in my opinion, if you are interested in breeding fish — and I always am — then it could well be worth housing six or so in a large aquarium, then waiting to see if they pair off naturally. Of course, the maintenance of other species in the same aquarium would be out of the question.

I can see that *Enoplosus armatus* would not be everyone's cup of tea but, if you can get your hands on them, a small group of this hardy, attractive species would well repay the time and effort involved. I could never pretend that they are easy to keep but, once settled, correct care and feeding will result in years of pleasure for their owner.

SHOW REPORT

S.A.F. HONOUR THEIR PRESIDENT AND SHOW MANAGER

By Dr. David Ford,
Head of 'Aquarian' Laboratories

The Scottish Aquarist Festival was held for the 14th year at Motherwell's Civic Theatre on the weekend of 16-17 May, 1987.

To celebrate his 14 years as Show Manager, **Steve Naismith** was presented with an engraved bowl in Caithness Glass. **Jimmy Sinclair,** the past President of F.S.A.S. was also given a Certificate as Honorary President for life. These awards were for just two of a team of devoted aquarists who have staged Scotland's annual event since 1973.

This year's event had fewer trade stands but more tableaux. The largest tableau was **Aquarian's "Learning Maze",** from its successful appearances at the Yorkshire Aquarist Festival in Doncaster, the British Aquarist Festival in Belle Vue, the Aquarian Fishkeeping Exhibition at Sandown and the Aquarium Week at London Zoo. This display took visitors through a maze of tanks to illustrate the many facets of our hobby — Coldwater, Tropical, Marine, Breeder, Livebearer and Cichlid.

Aquarian also had their Advisory Service with free Guides and Bulletins and their team of experts was on hand to answer questions.

Our peripatetic Editor, **John Dawes,** gave the annual S.A.F. lecture with a slide show of his eventful journeys up the Amazon last year.

The trade stands included **T. Brown & Sons** with 12 aquaria of tank-bred tropicals. **Belton Fish Farm** also sold pet fish but from a bank of 54 tanks. **Rolf C. Hagen (UK) Ltd.,** showed off their giant 403 power filter with a 10ft high tube filled with Methylene Blue solution. **Underworld Products** had their many more unusual U.S.A. and German imports. **Anglo Aquarium Plants** had hundreds of varieties of tropical and coldwater, marginal and aquatic plants. **Northern Discus** sold their range of Discus including Red, Blue, and Brilliant Turquoise, Royal Green, Heckel and Brown varieties.

DAVID FORD

DAVID FORD

Right, Steve Naismith (wearing the suit) receives his special award from S.A.F. Chairman, Dave Wilson.
Above, There are just some of the highly coveted trophies competed for every year at S.A.F.

David Nicholson's **Aqua-Charm** display of tanks set in antique style furniture were for sale. So too were dozens of Cornish Bogwood pieces by **Ornamental Wood.** The longest trade stand was **LMB Aquatics and Pets Ltd.,** with 60 feet of dry goods and 30 tanks of fish. These fish included 23 types of Malawi and Tanganyikan Cichlids and no less than 50 of the rare *Ctenops nobilis* anabantoids — at only £8.50 each. Not so cheap were the Blue Rainbows *Melanotaenia lacustris* at £40 a pair. LMB were also selling marine fish and had a large crocodile (actually a Cayman) for a "guess the weight" competition. **Tropicure** had their large stand groaning under 1000 books in 350 different titles. **Campbell Water Gardens** were also at the show with Koi up to 12in long for sale.

The 15 Tableaux were as ingenious as ever. The winner was **Scorpion A.S.** despite being the smallest! A cartoon scene of an Octopus with arms moving to a Beatles record performed perfectly for the judges — but the motor burnt-out for the rest of the show. Second was the **Edinburgh Pondkeepers A.S.** with a complete Disco Unit with two turntables, flashing lights and Disco music. The third winner was **Muirhouse & District A.S.** with a model of the S.A.F. show itself with miniature copies of the winning tableaux from previous years. Fourth was **Larkhall & District A.S.** with a larger than life size telephone kiosk with a real pay phone, and fifth was **Grangemouth A.S.'s** full-size garden shed with 26 mini-aquaria instead of windows.

The other tableaux included a 10-foot model oil tanker with live fish as freight by **Alexandria A.S.** and a freightline of 15 tanks by **Dunfermline & District A.S.. Paisley A.S.** presented their water-mill and **Lanarkshire A.S.** placed their fish in a black cauldron on (painted) flames. The **Scottish A.S.** had the often used Dalek and Tardis scene but included a life size model Dr Who. **Stirling A.S., S.J.S., Workington & District A.S., Clyde A.S.** and **Cumbernauld A.S.** all presented winning fish in many ways.

The LMB-sponsored Scottish **Supreme Champion** was a *Botia sidthimunki* and **Best in Show** was a *Cichlasoma umbriferum,* both owned by members of **Workington & District A.S., Ken Fowler** and **John Grahame** respectively.

The National Societies at the show were B.K.A. (Fife Group), S.L.A.G. (UK) — Scottish Area Group, B.C.A. (with nine tanks of Cichlids), A.A.G.B. (Central Scottish Group) and the Federation of Scottish Aquarist Societies itself.

Despite the show clashing with both the Scottish and F.A. Cup Finals, the exhibition was always busy without being crowded — several thousand visitors attended over the weekend. Well done S.A.F.!

FULL RESULTS NEXT MONTH

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 the name of the expert to whom your query should be directed.* All letters must be accompanied by a S.A.E. and addressed to:
Your Questions Answered, The Aquarist & Pondkeeper, Buckley Press Ltd, 58 Fleet Street, London, EC4Y 1JU

TROPICAL
Dr David Ford

COLDWATER
Pauline Hodgkinson

PLANTS
Barry James

KOI
Roger Cleaver

MARINE
Graham Cox

DISCUS
Eberhard Schulze

Koi

Tank-breeding

I have achieved considerable success breeding Goldfish indoors and am keen to attempt to do the same with Koi. Are Koi as "easy" as other coldwater fish?

Although I have read of this being done, it is not a method I would recommend to anyone. Koi need to be about three years old to breed and, at such a time, if they have not been stunted, they should be at least 12in in length. Usually two or three males are put in with one female. As the spawning behaviour is very boisterous, breeding in a fish tank (unless it was exceptionally large) would result in very badly damaged Koi, which is something nobody wants to see.

Small pond problems

I have a 6-in Koi which I hope to transfer from a tank to an outside pond measuring 3ft × 2½ft × 1½ft. I would also like to add other fish. How large are my fish likely to grow?

The size of pool you mention is not very large and is not ideal for your Koi, especially if you put other fish in with it. The problems of small pools are the same as those with small tanks (ie) the water conditions are difficult to maintain, particularly if the pool is heavily stocked. Filtration will help but the main secret is not to overcrowd the pool in the first place. A pool of the size you say should only house three or, at the outside, four fish. With this small number and plenty of plant growth then the fish should do well, even without any filtration.

Tropical

Scat obsession

I would be very grateful for some advice on how to keep Scats. I have always been fascinated by them (even obsessed!). I have repeatedly tried to keep them without success. I would also like to know if Scats have been bred in aquaria.

Scatophagus argus is generally available in two varieties, the Spotted Scat and the Tiger Scat. Both require saltwater when adult, but this must be hard, alkaline water too. Do not just use common salt, but add seasalt mixtures prepared for marine fishkeepers. If your local water is soft and acidic, make it hard and alkaline with a Cichlid Salt mix before including the salt.

L.E. PERKINS

***Scatophagus argus* — this is the spotted variety.**

These fish live in fresh water when young but migrate to the sea as they age. Therefore, only use a little salt if the Scats are young fish — 1 teaspoon per gallon. This level may be doubled as the fish age.

Scats must also have fresh vegetables in their diet, so add a lettuce leaf, occasional spinach or spare aquatic plants. The basic diet, however, is carnivorous.

If these three essentials are observed the fish should grow quite large (6 or 7 inches) and live for many years. No, there are no reports of tank breeding — or even sexing the fish.

Oil slick problems

I am having trouble controlling the formation of what looks like a layer of oily scum or greasy particles on the surface of the water in my tanks. As I empty a tank, the "particles" slide down the glass itself. My aerator seems to break up the film but it only re-forms once I switch it off. Your advice is urgently needed.

The scum on your water surface is almost certainly oil-based. This could be from flake food with a high fish-oil content, or from aerosol sprays, smokers, or even the air!

The chemical structure of oil allows it to spread out on the surface of water until it is only one molecule thick, so although it is visible (or the dust trapped on it), the amount is minute and will not harm the fish.

To remove it just lay a sheet of newspaper on the surface and immediately draw it off again — any oil is absorbed by the paper. To prevent recurrence, get the surface moving, either by an aerator (as you noted) or by a spray-bar attachment to a power filter.

Coldwater

Poisonous plants

My garden has a 12-foot high laurel hedge at the back and a 6-foot conifer one at the front. Away from there, the site is fully exposed. Would the laurel and conifer leaves poison the water? If I have to install my pond away from the hedges, will the available site be too open?

Laurel, laburnum, holly and rhododendron leaves and berries are very poisonous to fish and, therefore, a pond should not be situated close to such shrubs.

An open site need not be a great problem because with adequate surface cover, such as that given by plants with large floating leaves like the water lily, enough shade can be given to avoid too many peoblems.

Swan Mussel habits

I recently bought three Swan Mussels which I am housing in a 36in x 15in x 12in aquarium. I know very little about them and would therefore be grateful if you would give me some information about their feeding and breeding habits.

The Swan Mussel, *Anodonta cygnaea* (the most common species of freshwater mussel) breathes and feeds by drawing a current of water into the gill area which is situated within

Swan Mussel (23cm)

Three species of freshwater mussels can be found in the coldwater hobby, the most common by far, being the largest of the lot, the Swan Mussel at 23cm. The other two species are the Duck Mussel and the Painter's Mussel both of which only reach 10cm in length.

the valves. The water is passed through the gills, allowing oxygen to be extracted and trapping small animal life and algae for food. The water is then expelled through a second siphon. Swan Mussels need a bed of mud to move around on. They also like to partly submerge in the mud when not moving by pushing themselves with their muscular foot.

Females produce about a million eggs which they keep within a brood pouch in the region of the gill. There they remain for several months and develop into larval forms called glochidia. In spring these tiny creatures are ejected into the water, where they attach themselves to fish. The skin of the fish then grows over them forming a cyst. The larva feeds as a parasite on its host until it changes into a young mussel, when it will fall away after breaking free of the cyst.

The Bitterling, a most delightful little fish, uses the Swan Mussel to breed. This is a most interesting and very fascinating procedure and so you might even consider adding some of these fish to your tank.

Marine
Multi-coloured algal problem

I have a 72in x 18in x 18in marine tank which has been set up for about 4 months. I have 3 Clowns, 1 Damsel, 1 Cleaner and 1 Trigger. My equipment is an Eheim 2015 power filter, 1 Fluval 302 power filter and 2 Aquaclear 400 power-heads operating with U/G filter plates. My lighting is 2 x 65 watts "Northlight" and 1 x 65 watts "Gro-Lux". Temperature is 76°F; pH is 8.3; Nitrite 0. My problem is excessive algal growth. On the front of the tank it is brown, on the back it is green, and on the bottom and on the coral it looks black but it is dark green and slimy to touch. When I clean the tank, the growth is back in 3-4 days. It looks bad. Could you tell me if there is something I could put in the tank to control it?

The algal problems which you describe are caused by one or more of the following:
(i) an inadequate level of dissolved oxygen;
(ii) inadequate lighting intensity — especially at the red end of the spectrum;
(iii) over-feeding;
(iv) not enough of the larger algae such as *Caulerpa* species, *Halimeda*, *Codium*, etc., to deplete the level of dissolved algal nutrients in the seawater.

Aeration — In view of the plethora of water-moving equipment you have in the aquarium, I find it hard to believe that the water could be oxygen-deficient. However, if correction of the other 3 factors listed above fails to provide a remedy, you may have to consider installing a powerful air-pump to operate a wooden micro-diffuser or plastic long-life diffuser. Please note that pumice-type air diffusers choke solid within a few days in seawater.

Lighting — If you do not intend to keep "living-rock", invertebrates and the higher algae in this aquarium then you already have too much light on it. I would remove one of the "Northlight" tubes and keep it as a spare tube to replace the used one in six months time. When switched on for 12-14 hours each day, fluorescent tubes only have a useful life of around 6 months. If, on the other hand, you do intend eventually to make your tank into a *"complete sea aquarium"*, ie, a living community of coralfishes, "living rock" invertebratos and the larger algae, or, in other words, a miniature living coral reef within your own home, then you will have to increase the lighting by one more 65-watt "Gro-Lux" tube.

Feeding — Please always follow the golden rules of fish feeding:
1. Never allow even *one* uneaten morsel of food to reach the bottom of the aquarium: bottom-feeders soon learn to feed at the surface.
2. Give only one minerly feed once each day.
3. Match the food particle size to the mouth size of the fish.
4. Use as wide a variety of foods as possible.

Discus
Redox explained

I have lately come across the term REDOX measurement in fishkeeping. Unfortunately, I can find no reference in any of my literature and would be grateful if you could explain it to me.

The term Redox is made up from the two words: reduction and oxidation. It measures the values in milli-volts. The greater the values, as expressed in mV, the better the level of oxidation in the water, and, therefore, the cleaner the water. Drinking water has an average level of approx 300 milli-volts. A newly set-up aquarium will initially have a low reading (until the bacteria become established). The reading will then go up to about 350 to 400. When adding food, for example, the milli-volt reading will drop almost instantly.

Redox measuring is comparatively new to the hobby in England, although such units have been available to aquarists on the Continent for some years. These units are now also slowly becoming available here but are still very expensive and are really only used by the specialist keeper of certain kinds of aquarium fish.

A Redox measuring unit consists of an amplifier and an electrode. Electrodes need very careful calibration and cleaning. In fact, they must be installed in such a way that they will not get soiled by the dirt from the aquarium water, or algae, through light. Also, using dye-based medication in the water will make electrodes inoperative.

Although a Redox measuring unit is a very useful measuring device, it can only really be recommended to the specialist who then is capable of making use of the information.

PARASOLS AND PLATINUMS

When (if?) the sun shines hot and long this summer, spare a thought for your Koi — they, too, can suffer from sunburn! **John Cuvelier** explores this common, but rarely described, problem.

In some ways, Koi-keepers are their fishes' worst enemies! Because we insist on ultra clear water so as to reap the full visual impact of our colourful pets, we do lay them open to attack from an unusual, and in this country, a fairly rare enemy, the sun!

I first came across this phenomenon some years ago during one of our rare hot summers, when a couple of predominantly white Koi in my pool suddenly developed what can only be described as a red rash! The usual panic stations ensued with horrific thoughts of viral or bacterial infections wiping out the whole of my collection. After studying all the books I had, and identifying from colour pictures that my fish were suffering from every disease under the sun (ouch)! I decided there was only one thing for it and bagged up the worst affected fish, a 28 inch Kohaku, for a trip across the Pennines to see Doc' Waddington! at In-Filtration Ltd.

My memory is a little hazy after such a long time, but I think 'Waddy' had just returned from Japan having learned among other things that Koi can be afflicted with **sunburn!** Anyway, a course of antibiotic injections eventually cured this particular fish (at that time we didn't know any different and it was a case of the blind leading the blind!).

Nowadays of course, we know better and restrict antibiotics to the more serious afflictions (or at least we should!). The occasional case of sunburn which has crossed my path since those days, have been very simply treated by means of painting the affected area with one of the better known antiseptic/disinfectant compounds such as Malachite Green or Mercurochrome in solution. (50mg per pint of water for the former, which **must** be Zinc-free, and a 2% solution of the latter, both are obtainable ready-mixed from most dealers).

The principal enemy of a Koi affected by sunburn is of course fungus, the spores of which are ready and waiting in every pool to attack **any** type of skin soreness. Regular application of the above solutions will keep this nuisance at bay. Should it already have made an appearance, simply wipe it gently off in the direction the scales lie.

JOHN DAVIES

Kohakus (this is a very healthy specimen photographed at Kent Koi Koi), are at high risk in brilliant sunshine

JOHN CUVELIER

Platinum Ogon — a variety which is much at risk from sunburn

As with any ailment, **Prevention is better than cure.** This is why I advocate in almost every article that some cover **must** be provided within the pool for your Koi! Fish are far from being stupid and will happily take shelter in the shade if some is available. An even better idea if you can bear to do it, is to maintain a slight greenness in the water as the ultra-violet content in sunlight is immediately neutralised. A plentiful growth of water lilies is another excellent preventative though these are difficult to establish in the classic Koi pool.

The odd aspect of sunburn is that it only appears to affect fish having large areas of white skin, such as Kohaku, Purachina, Platinum, etc. etc. I've no doubt that a fish biologist could offer a simple explanation for this peculiarity, but I'm just a simple soul and cannot help you there! However, it is obviously something to do with pigmentation when you think about it, because in our own case, it is only the white-skinned races who suffer.

It should, of course, go without saying that should any of your fish start displaying symptoms of sunburn, you should immediately install some means of giving shade to at least half the surface area of your pool. It's absolutely pointless to treat the symptoms and at the same time allow the fish to swim around in full sunlight. A quick and reasonably cheap method is to use some 'Greenhouse Shading' material obtained from any garden centre. This net-like material can be draped over a simple framework and removed when not in use.

A more permanent alternative which will, at the same time, enhance the appearance of any pool, would be a pergola constructed to cover the whole pool or even just a part of it. With the aid of a few 'hooks and eyes', shading material could be quickly hung up and removed as required.

Those Koi-keepers who always seem to have trouble with blanket weed and other unwanted pests, would also find a dramatic improvement in water clarity should they adopt this idea. Whichever route you take, just remember, there ain't no way you can provide a Koi with a parasol!

THE EMERALD CHALLENGE

David Sands suggests a technique which may prove successful in breeding, these challenging cousins of the Bronze Catfish. (See Page 50). (All photographs by the author).

Top, *Brochis splendens* adults have up to 12 dorsal rays (*Corydoras* have 7). This species is widely distributed in South America, in particular the Peruvian and Brazilian Amazon. *B. splendens* is the best-known of the three *Brochis* species.

Above, *Brochis splendens* (Castelnau, 1855) juvenile. When these delightfully patterned young *Brochis* first appeared on the market, most fishkeepers believed them to be a new species of *Corydoras* because of the dorsal fin pattern, absent in the adult.

Left, *Brochis multiradiatus* (Orces-Villagomez, 1960) the second species of the genus to be discovered. It was originally thought to be less widespread than *Brochis splendens* but is now known from Brazil, Peru and Ecuador. This species can be recognised by its long snout and the high dorsal ray count of up to 18 rays.

Above, *Brochis britskii* Nijssen and Isbrucker, 1983 is the most recent discovery and the least distributed on current records.

THE EMERALD CHALLENGE

See page 49

Almost fifty species of *Corydoras* (seven dorsal rays) have been bred in aquaria. *Brochis* (up to twenty dorsal rays), the Emerald Catfishes, are constantly being compared with their family 'cousins', especially *Corydoras aeneus*, yet unlike *Corydoras*, they are very rarely spawned in aquaria.

The two genera share the family Callichthyidae with the smaller *Aspidoras* and the larger *Callichthys*, *Dianema* and *Hoplosternum*. All have been spawned in aquaria, apart from the enigmatic *Dianema* species, *Dianema longibarbis* and *Dianema urostriata*, neither of which has yet been bred by fishkeepers. *Dianema* appear in body shape to be half-way between *Hoplosternum* and *Corydoras* but, as yet, it is not known if they are bubblenest breeders like *Callichthys* and *Hoplosternum*, or simple egglayers like *Corydoras*. *Brochis* are not readily spawned, yet, they are almost always available in South American imports.

Brochis species

There are three species of *Brochis* known. The oldest scientifically, and the most common species known is *Brochis splendens*, adult at three inches/75mm, from Peru and Brazil, which is frequently referred to as *Brochis coeruleus* in literature. *Brochis multiradiatus*, adult at four inches/100mm, from Ecuador and Peru, is known as the Hognosed Catfish and the newcomer, *Brochis britzkii*, adult at just under four inches/90mm, is a Brazilian green, red-finned species that is half-way between the other two in size and finnage. All three species would seem to have a preference for the *deeper* water of the smaller river tributaries. At least, that is where the catchers find them. I suspect they, like *Corydoras*, go into the shallows, among the flooded grasses to spawn.

Aquarium and feeding requirements

At first it was asked: do *Brochis* need precise water conditions or drastic pH changes, or is it simply that aquarists do not keep enough mature specimens together in isolation from the standard community aquarium? These days many fishkeepers buy breeding stock in reasonable numbers although it is not unusual for fishkeepers to attempt prematurely to breed catfishes that are still immature. This article assumes that the aquarist has or will attempt spawning *Brochis* only when they are mature. Adult total length sizes (including the tail) given above are supplied to assist in this.

The fish breeder's maxim is **"provide fish with the right conditions: (a) enough space, (b) good filtration and (c) correct feeding, and breeding chances will be enchanced."**

(A) South American water conditions vary between the extremes of the seasons although it is invariably soft. The pH can be low (4.8 and lower) but in the rainy season, when freshwater flooding occurs, the pH is more likely to be neutral. Water temperatures will fluctuate between the deeper and shallower areas and between the warmer (dry) season and the cooler (rain) season. In my opinion, the hardness is the most important factor to control. The ideal chemistry should be: pH 6.8 to 7.5, water hardness between 2 and 5 degrees of general hardness and the temperature, until inducement of spawning, between 80 to 85 degrees Fahrenheit.

(B) These days filtration is not a problem. There are internal power filters, sponge and box filters and undergravel filters. Providing the filters are not new (ie) fish and water have existed alongside the filters for over six weeks, it is a personal choice as to which is best. Sponges and filter media such as wool should always be washed in aquarium water.

(C) What constitutes *correct feeding* is an open fishkeeping debate. In addition to the staple flake diet most catfishes enjoy live Tubifex, but many aquarists are hesitant to use it because of the reported high bacteria loads and unwanted leeches which can accompany the worms. A healthy alternative is earthworms, chopped up fine and washed. I have found them acceptable to all catfish although small catfishes such as *Corydoras*, *Brochis* and *Dianema* might prefer chopped Tubifex initially, but alternatives are best in the long-term for captive health. Live bloodworm — the larval stage of a fly — could also be an alternative food but it would prove expensive if it could not be purchased loose. One problem with bloodworm is that it has a hard shell-like exterior which certain fish find difficult to digest. Finally, blended beef heart (raw without *any* fat) with an added green food such as spinach, peas or dandelion leaves can be used as a supplement to the staple diet. A combination of all the above would be ideal and, I should add, that the benefits of flake food as the staple diet should not be overlooked. Flake food has many of the required vitamin and protein elements mixed in.

Sexing and spawning

Sexing *Brochis* is one of the major problems. None of the normal sexing methods are successful. Ventral fins may be broader on females and the latter sex tends to be larger or longer in the body. If a group is kept together there is a good chance that a pair will develop even though they might be difficult to determine. The few spawning accounts I know about suggest *Brochis*, just like *Corydoras*, spawn in pairs.

The greatest misconception about spawning *Corydoras* is that they spawn in groups. Several pairs might spawn together but they spawn in pairs. Breeders frequently put the male ratio higher (two males to one female) to ensure a high percentage of egg fertilisation. Larger Callichthyids, *Hoplosternum* and *Callichthys*, spawn in pairs and other individuals in the breeding aquarium would disturb them. This may be the key; select a pair and isolate them from the main group. Keeping a group together to bring them into breeding condition is however, in order and may help settle them down.

Set the pair(*) up in the average water conditions discussed in (a). Allow the fish at least a week or two to settle in the new surroundings. No lighting, apart from natural daylight (morning and daytime), is required and, if possible, do not disturb the fish other than what is absolutely necessary. The aquarium should be at least 24 inches or more deep. A spawning mop, smooth, rounded pebbles and a large piece of Java Fern should be included. The bottom of the aquarium should be covered with a light scattering of sand or gravel. Natural spawnings occur between September and February so this is the time to start the project.

Brochis britzkii are at home in the deeper, clear well-planted waters of the Brazilian Mato Grosso. It might be pertinent, therefore, if breeding this species is to be attempted, to include a long free-floating plant such as *Elodea* and have the water at a reasonable depth.

After a month of good feeding and small partial water changes the first spawning attempt can be made. Collect rainwater and aerate vigorously for several hours and then complete a 75% water change which should reduce the temperature drastically and soften the water. It may be important to allow the water level to be lower than before the water change. If you live in an industrial area, allow the rain to fall for an hour before collecting and, if your tapwater is hard, the breeding aquarium should already contain some rainwater. If this does not stimulate an increase in general activity, wait a three-week period and repeat the exercise.

Brochis spawn in the same way as *Corydoras*, although they produce a greater number of eggs. Unwritten records suggest egg numbers can be in the hundreds. If you should be lucky enough to find that your *Brochis* have spawned remove the parents back to the community aquarium and place the eggs in breeding nets in the spawning tank until they are large enough to release into shallow (12 inch or less) aquarium water.

With *Brochis britzkii* and *Brochis multiradiatus* selling at £50.00 each, the effort would be more than just worthwhile!

* The pair might be the best that can be determined; a large female-like specimen and a smaller, more slender male-like specimen.

Naturalist's noteb

Haemoglobin-less Icefish

Antarctic icefish are unique among vertebrates in having no functional haemoglobin. They "breathe" by transporting oxygen in direct solution in their plasma. It is part of their adaptations to polar seas being studied, as I mentioned last year, at St Andrew's and Bangor Universities and Leicester Polytechnic.

Studies at Bangor find their gill-arches well developed with circulation to the pectoral muscles. They meet the problem of low temperatures by limiting their periods of activity, compared with the low metabolic rates when resting.

New Amoebae

Amoeba proteus is probably the best-known and most researched of microscopical waterlife. Sixteen strains from seven countries were examined for structural form by the Institute of Terrestrial Ecology's Cambridge centre for culturing algae and protozoa, and by Leningrad Institute of Cytology. They were found to comprise 10 species in 6 genera, including a new genus. Reclassification of our old friend *Amoeba* into several species with previously unrecognised close relationships was further tested against strains from USA and USSR.

Daily tadpole shoaling migrations

350 Common Toads from Ainsdale (Southport) nature reserve were released recently into ditches and ponds at Martin Mere, already with a population of frogs. It will reduce the pressure on Ainsdale's Natterjacks, which spawn later.

A friend of mine spent four years studying the shoaling of Common Toad tadpoles in the pools on Ainsdale dunes, in which they differed from Natterjacks. Shoaling may be some defence against predators, or to conserve heat-loss in cold water; but there is a daily movement in response to the light and warmth of the changing position of the sun.

At first light, tightly packed tadpoles, like a swarm of bees in the deepest water, slowly move SE. By 6 am they form an elongated W-E crescent in mid-water, heading S-SE. By 10 am several swarms (like fish-shoals) join into a large shoal, up to 10,000, an inch or two below the surface on the south side of the pool. By noon, all are on the southern fringe, leaders often pushed on to the sandy bank, and orientating west. Early in the afternoon, movement slows down and the leaders return towards deeper water in one narrow swarm of thousands. By 5 pm the motionless swarm begins spiralling in a ribbon towards the surface, where they are active and move NE into a circle. The leaders may settle on the sandy bottom before, finally, the clockwise movement brings them back into deep water, where they started.

Tough leeches

An Inverness reader (see "Geometric" leeches — June Letters page) whose Koi went sick with attacks of the leech *Piscicola geometra* attaching its large and strong discs had up to 25 leeches on a fish. He found leeches and their small furry-like egg-cocoons on his fountain. Leeches are a common problem with coldwater natives and this may have been introduced with the Koi, or by gulls, duck or other birds.

We used to remove skin and gill-leeches with 1 in 2,000 formalin for 15 mins, or by 5 to 15 mins immersion in 2% Lysol; but these are harmful to fish exposed too long. Ponds were cleared of them by first removing fish, then using a 1 in 500 solution of quicklime for 5 seconds. Salt-solutions and potassium permanganate may check adult leeches, but not their egg-cocoons.

Leeches resist several acids and caustics, chlorines, bromines and sulphurs, especially the stronger strains inhabiting drains. Several years ago, the aquarium at Edinburgh Zoo had one discovered thriving in a drain at Grangemouth dyeworks.

Elliott and Mann's small book on British leeches is for identification, not control.

ook

by Eric Hardy

Above, early morning (3am) — tightly packed bee-like swarm of toad tadpoles in the deepest water
Left, after 4am the swarm thins out and many tadpoles slip back towards deeper water

Three families attach egg-cocoons to stones and plants under water, while one broods them in a depression in its lower body.

Fish-leeches like *Piscicola* are camouflaged, attached to plants, sticking out to contact passing fish. Common *Piscicola* may attach to gills or even inside the fish's mouth, and is very active if caught. It prefers very fresh or running water and deep lakes. Others in still waters feed on shellfish and aquatic insects.

Current and recent herpetological research

From the nesting behaviour of the American Dusky Salamander, whose female takes great care of her eggs, and the climbing abilities of American Green and Slimy Salamanders, to tube-feeding of frogs and toads, amphibians and reptiles afford continuous opportunities for study. The use of chemical cues by tadpoles to detect predatory fish, female sex pheromone scents used by female lizards to lure males, sharp-toothed catfish preying upon Puff Adders and how snakes and legless lizards both produced hinged teeth for hard-bodied prey in their convergent evolution, are among several recent researches. The Golden Gecko, believed extinct, has been rediscovered in the Eastern Ghats of India's Andrha Pradesh. A rare black or melanic form of the Nose-horned Viper has been found in Rumania.

Parthenogensis (sexless reproduction of infertile females from females) is mostly known among invertebrate greenfly, sawfly and lower animals. Holmback, at Santiago Zoo, has been studying it in the lizard *Lepidophyma falvimaculata*.

Kaufmann, at the University of Florida, has been observing the newly-discovered foraging technique in which Wood-turtles catch earthworms by stomping around, a habit more typical of gulls, etc, catching cockles and worms on the beach. In Japan, Nakamoto and Toriba have successfully hatched eggs of the Eraba Sea-snake, *Pseudolaticauda semifasciata* in an incubator.

In Sweden, Madsen and Niklasson at Lund University proved multiple paternity in the Common Adder and, at Chicago University, Schwenk and Bell observed the chameleon-like tongue extension in an agamid lizard, *Phrynocephalus helioscopus*.

Coldwater jottings

Stephen J. Smith

Beginning with a bowl

The goldfish bowl is probably the world's most popular aquarium. Most of us started our hobby — whether coldwater, tropical or even marine fishkeeping — with a goldfish and bowl.

My own passion for keeping coldwater fish, particularly Fancy Goldfish, began at the tender age of six — and I still have and treasure that very first goldfish bowl!

I have often referred to the goldfish bowl in these columns as a "spherical torture chamber". And not without good reason!

All too many fairground fish have met an untimely death in such a vessel, having been starved of oxygen and smothered with food. However, with proper care and attention, even a glass bowl can become the perfect environment for a small goldfish.

Two golden rules are: i) **Only half-fill the bowl with water,** to allow maximum exchange of oxygen and toxic gases; and ii) **Do not overfeed.** Even a small pinch of flake food, for example, will provide enough nourishment for a goldfish for at least a day (it is even a good idea to give the fish a rest from feeding on one day of the week).

Try this for size

A very attractive goldfish bowl which is specially designed to provide maximum surface area has been introduced by **Ampthill Aquatics.**

I was extremely impressed with the very attractive "lozenge" shape of this bowl when I came across Ampthill's stand at the **British Pet Industry Exhibition** at Harrogate recently.

According to proprietor **Mike Allen** (pictured) the all-glass vessel will retail at around the £20 mark. I was most impressed with it, and reckon that it should encourage a whole new generation of fishkeepers to get more out of the pleasurable pursuit of fishkeeping.

STEPHEN SMITH

Mike Allen of Ampthill Aquatics with the new-type Goldfish bowl which is being distributed by his company.

Freshen up your filter

Of interest to all fishkeepers — and would particularly suit people with goldfish in bowls — is the use of activated zeolite to help keep water fresh.

It can take several weeks for a filter to mature naturally, while in the meantime harmful nitrites and ammonia are building up and causing stress to fish.

Such toxic matter can be chemically removed by adding a small amount of activated zeolites to pond filters, aquarium power filters or even directly into the water.

Never will fairground fish have been so well accommodated!

Show in style

If you are a regular exhibitor at any of the numerous coldwater shows held around the country, a bag of zeolite with each transportation container will help your show fish reach the bench in fine fettle.

While on the subject of shows, don't forget to remind your club secretary to let me know when your coldwater show will be held so that we can consider it for **Coldwater Jottings.**

Brought to book

Without doubt one of the greatest advantages for any newcomer to the coldwater scene is the plethora of reference material available.

Aquarist and Pondkeeper itself is extremely active in supporting the coldwater interest. Not only with **Coldwater Jottings,** but also with special supplements and features devoted to specific aspects of keeping coldwater fish.

In addition, new books are being introduced onto the scene almost monthly, as interest in Goldfish, Koi, and other varieties increases.

One of the favourite books for those who want to get more out of keeping Goldfish is Frank Orme's **'Fancy Goldfish Culture',** which provides practical advice on all aspects of the hobby, even including the building your own fish-house.

Harvey and Hems **'The Goldfish'** is another favourite and, although beginning to look a little outdated, is an extremely useful reference.

New titles are reviewed regularly in *Aquarist and Pondkeeper* — often within these very columns. And although there is no substitute for practical experience, the newcomer is well-advised to "bone-up" on some of the best ways of looking after the coldwater species: such preliminary research could well pay dividends in the future.

My own collection of coldwater titles includes one which has travelled from the other side of the world — an Australian publication from 1933 titled **'The Cult of the Goldfish'** by T. C. Roughley.

It is interesting to note that the major varieties of Fancy Goldfish have changed little between then and now — but the quality of some of the fish pictured in **'The Cult of the Goldfish'** is among the best I have seen in any publication.

WINNERS

TREASURES OF THE TROPIC SEAS

René Catala's spectacular book, donated by the publishers, Facts on File Ltd., has been won by:
Mr G. Chandler, 32 Gruffydd Drive, Churchill Park, Caerphilly, Mid Glamorgan.
Mr Chandler's card was the first one drawn from the massive pile of entries bearing the correct answers:
1. Noumea Aquarium 2. Spider Crabs 3. *Lactoria cornuta*

'ATLANTIS' POWER FILTER AND HEATER/STAT COMPETITION

This month's lucky 'Atlantis' winner is:
Mr P. Law, 13 Gandalf's Ride, South Woodham Ferrers, Chelmsford, Essex CM3 5WX
Over 60% of competitors got the questions right. Were you among them? The answers were:
1. 600 litres per hour 2. Cold water
3. Amps 4. No.
Congratulations to both winners who will shortly be receiving their prizes from the sponsors to whom we extend our most sincere thanks for their support. We also have to thank you for your tremendous and encouraging support.

Tomorrow's aquarist

Shop Window Competition sponsored by Interpet Ltd.

FIRST PRIZE
Kerry Loring

SECOND PRIZE
Jonathan Hornby

THIRD PRIZE
Bryn Williams

In March we asked under-sixteen readers to submit fictional 'advertisements' for aquatic shops in return for the chance to win some exciting prizes from **Interpet Ltd.** Our May page carried the names of the winners and now you can see how difficult you made things! The entries were of such a high standard, we were hard put to decide on our winners . . .

Kerry Loring won first prize with her eye-catching humour . . .

Jonathan Hornby won the 'title' fight for second place!

. . . And for sheer content and hard work, third prize went to **Bryn Williams.**

We would also like to give a special mention to a couple of readers who submitted entries too good to pass by without comment. **James Crawshaw** thought up a novel way of introducing beginners to the hobby: **"For trial period only, plastic tanks, plastic fish, plastic plants, plus, for those nervous mothers, dry water"!** And eleven-year-old **Colette McAllister** sent us a simple design for a shop window, bearing the outline of a fish with huge mouth agape, in which ran the slogan: **"Come look inside — you're sure to get hooked".** Thank you, James and Colette, for your entries — they made us laugh.

Thanks, indeed, to all of you who entered the competition. Congratulations to our three winners and a very special "Thank you" to **Interpet Ltd.** for providing such generous prizes.

The Self-Help Club

This new club, aimed at bringing the experience of our readers to a wider audience, is well and truly off the ground. We have several letters in the pipeline, all from readers who would like to share the successes and failures of their interest with you. This month, we're featuring a letter from **Mr J. Dutton** of **Radcliffe, Lancashire.** He writes:

"Dear all at *A & P*,

As a relative newcomer to fishkeeping, I was browsing through the magazine rack in the newsagents when I came across a copy of your magazine. On returning home, I read it avidly from cover to cover.

My first purchase was a three-foot tank and I decided to keep Cichlids — but which ones? Eventually I bought a large pair of Jewel Cichlids (*Hemichromis bimaculatus*) which had been bred at Chester Zoo.

After five weeks, and a steady temperature of 80°F, the fish spawned on a large flat rock. It was covered with eggs. On the third day, not one egg to be seen! I assumed the fish had eaten them. How wrong I was. Unbeknown to me, the parents had removed them and, from behind a log, there emerged a wriggling mass . . . This was the beginning of a fantastic cycle.

The fish began intensive care of their progeny. Together, they pursued any stragglers and sucked them into their mouths. These fry were duly spat back into the shoal; not one youngster was overlooked. The fry are now six weeks old — and growing rapidly.

I removed the parents to another tank where, lo and behold, these prolific fish have had another shoal of young. Any schools or fellow aquarists who live in my area and would like some Jewel Cichlids — Help!

Finally, thanks, *A & P*.

Keep up a truly superb magazine."

We have written to Mr. Dutton, giving him the address of the **Federation of Northern Aquarium Societies,** should he still need an outlet for his young Jewel Cichlids. However, if you live in his area and would like to contact him, write to us.

Your letter interested us, Mr. Dutton (forgive the formality but we didn't get your first name), as Jewel Cichlids are not usually recommended for beginners. They can be aggressive fish and need relatively large tanks. However, since you are having such success with these Cichlids, we thought you might be interested in learning more about them. In **'The Complete Aquarium Encyclopaedia of Tropical Freshwater Fish',** Dr. J. D. Van Ramshorst writes: "It is evident that *Hemichromis bimaculatus* is very intelligent and amateurs interested in this species' ability in problem solving should read the relevant chapter in the distinguished naturalist Konrad Loeenz's **'King Solomon's Ring'.** It looks like you not only have prolific breeders — and very attentive parents — but possible Mastermind candidates as well!