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AQUARIST

AND PONDKEEPER

The Magazine for Fishkeepers



**Tropical Freshwater
Aquarium Fishes**

*** Spawning the CLEANER WRASSE**
SPOTLIGHT—**the Red Piranha**



COVER STORY *Photo by M. Gilroy*

Cichlid classification, as members of the British Cichlid Association will vouch for, is in a "dynamic" state at the moment. Many of the well-known (and not-so-well-known) species have recently been coming under close scrutiny with proposed major revisions of nomenclature becoming quite common events. It will, therefore, be some time before the dust settles and the new names suggested become commonplace (if ever!). One of the species that has been subjected to investigation and possible renaming is the Convict Cichlid (*Cichlasoma nigrofasciatum*), otherwise known as the Congo or Zebra Cichlid. In 1983, it was suggested by Sven Kullander in "A Revision of the South American Cichlid Genus *Cichlasoma* (Teleostei: Cichlidae)", that the Convict should be reclassified as *Archocentrus nigrofasciatus*. However, this proposal has not yet gained universal acceptance. Time will tell. The Convict originates from Central America, has no stringent water requirements, will tolerate a wide range of temperatures, i.e. from below 20°C to above 26°C, and will accept all foods. It is a pugnacious species which lays its eggs on a vigorously defended prepared site and will guard the young against all comers. In addition to the "wild-type", there is a golden aquarium form not found in nature.

CONTENTS

18

Your Questions Answered

Queries received from readers are answered by our experts

22

Outside Enclosures for Terrapins

Julian Sims, M.Sc. suggests a summer time airing for these chelonians

27

Spawning the Cleaner Wrasse:

First reported spawning of *Labroides dimidiatus* as witnessed by A. S. Bashford, B.Sc.

30

Commentary

Roy Pinks on specialists

31

Freshwater Tropical Aquarium Fishes (A Question of Popularity)

Why are the old favourites still popular? What dictates popularity? These and other thoughts are enlarged upon by John Dawes in our colour feature.

35

Coldwater Jottings

Stephen Smith talks of the National Pet Show, the year's first spawnings and hot summer nights

38

Language of Fishes

In "Split Responsibilities", John Dawes discusses some of the characteristics of fish in which males and females play differing parental roles

40

Spotlight

The problems of Piranha classification, with special reference to the Red Piranha, are examined by John Dawes

43

Meet the Societies

Two B.A.S.'s this month—Birtley Aquarist Society and Bracknell Aquarist Society

44

What is Your Opinion?

Billy Whiteside comments on views expressed by readers

47

Tomorrow's Aquarist

Jonathan Moss reports on his visit to the famous Aquarium at Monte Carlo

48

Scottish Aquarist Festival 1985

A report of this major event North of the Border by David Ford

50

From a Naturalist's Notebook

Eric Hardy discusses public marine reserves

51

Company Profile

A & P visits Martyn Haywood's Reflections Aquatic Centre in Aldershot, Hants.

53

Diary Dates:

Forthcoming Society fixtures

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Your questions answered...

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

**Your Questions Answered, The Aquarist & Pondkeeper,
The Butts, Brentford, Middlesex TW8 8BN.**

TROPICAL



Dr. David Ford

Tropical



cichlid hybrids...

I cannot find any information about a fish I have got; it is called (*Neotroplus nematopus*) it is about five inches long, with what appears to be protruding red teeth. I have had this fish three months and have been successful in mating it with a female black and white striped Convict.

I have 18 young fish now four weeks old. What I would like to know is what do I call these fish and what colour if any will they turn out.

Can you give me any information about (*Neotroplus nematopus*) assuming that the spelling is correct?

Yes, your spelling of *Neotroplus nematopus* is correct. The fish has no common name—it originates from Nicaragua, South America, where it is found in great shoals in their Great Lakes.

The fish is mainly vegetarian—the red teeth you mention are plates for rasping algae from rocks. It accepts all foods, especially Vegetable Flake. It prefers hard water, slightly alkaline and well aerated, but is generally undemanding and easy to keep.



The Convict Cichlid, *Cichlasoma nigrofasciatum*

The fish breed readily and have unusually strong parental instincts. In fact they will adopt other species fry. This may be what has happened with your Striped Convict (*Cichlasoma nigrofasciatum*). Hybridisation is possible, of course, both fish originate from South America. If so you can only call it a *Cichlasoma x Neotroplus* hybrid and what develops is unpredictable. If you find all the fry grow resembling Striped Convicts—and you have no male—then it could be a case of parthenogenesis. The female lays her eggs and although the milt from the male is also present, fertilisation does not occur. The milt can trigger cell division, so fry do form but they are all females identical to mother.

It will be interesting to see what fish you raise.

shops and aquaria in Scotland...

We are going to Scotland for our holidays, and as I'm interested in Tropical and Coldwater fish, I wondered if you could name a few places we could visit as we're touring around. We are going via York up to Aberdeen if that is any help.

When you reach York you can visit a tropical fish shop: Ebor Aquatics, 60 Blossom Street on the Leeds Road from the centre of town. They stock coldwater and marines too.

None of the many museums in York have public aquaria.

In Glasgow there is a zoo with a few small tanks of fish. The Edinburgh Zoo closed their aquarium a few years ago. There is not even a zoo any more in Aberdeen.

Local aquarium shops include: Aquarist Rendervost, 6 & 7 Clifton Road, Aberdeen. Aquarama, 8 Middlefield, Puirig Leith Walk, Edinburgh. Coral Reef Aquarium, 34 Paisley Road, West Glasgow. D & G Tropicals, 592 London Road, Glasgow.

The only public aquarium is the "Seaworld" at Oban—details are: Sealife Centre, Barcaldine, Oban, Argyle. Open 1st April to 31st October, 9 till 6 every day. 9 till 8 in July and August, £1.50 adults, 90p children. They exhibit local sealife including Seals. There are no ornamental fish such as Tropicals. D.F.

Coldwater



bream in pond...

I have a garden pond with goldfish and wonder if some Bream would do well there?

The Bream, (*Abramis brama*) is not a good fish for a garden pond. It likes to keep near the bottom and unless the water is very clear it may not be seen. Bream can grow very large, I saw one caught in a Tring reservoir which weighed 9 lbs 11 oz, and one of 12 lbs 14 oz, was also caught there.

unsafe water...

I had two goldfish in a tank, 24 in x 8 in x 8 in, and they died after a week or two, but seemed quite healthy when I got them. I then bought two Moors, two Comets and two goldfish, which appeared perfectly healthy. They started acting strangely, dashing about and then sinking motionless to the bottom. The goldfish would

THE AQUARIST

COLDWATER

Arthur Boarder

PLANTS

Vivian De Thabrew

KOI

Hilda Allen

MARINE

Graham Cox

DISCUS

Eberhard Schulze

jump out of the water and hit its head on the hood. Eventually they all died. I had put an aerator and heater in the tank. What went wrong please?

Providing the fishes were healthy when you obtained them I can only think that there must be something wrong with the water. It may have a dangerous level of minerals, such as copper, lead or lime. Contact your local water board for information as to this possibility. You state that you added an aerator and heater, and so there might be a leak of electricity in the tank. I have seen fishes acting very strangely when such a thing has happened. Goldfish varieties need no artificial heat in an indoor tank. You did state the size of the tank, which appears to be a strange size and is only capable of holding eight inches length of fish, excluding the tail. You may be getting the water for the tank through copper pipes, and this could poison the water, especially if the pipes are fairly new.

Although the tank has a small surface area I do not think that it would cause the fishes to act as stated and insufficient space is usually a more gradual killer, the larger fishes dying first, until the correct ratio is obtained.

breeding lionheads . . .

After having kept and bred goldfish in an outdoor pond for 27 years I now wish to breed Lionheads in indoor aquariums. Is there any special point to watch for when setting up my breeding stock, as I would like to go in for exhibition fishes?

When obtaining your breeding stock there are a few very important points to look for. First of all do not have any fish which shows any irregularity in the curve over the back. Some will show a protuberance where the dorsal fin would be in an ordinary goldfish.



This Japanese type Lionhead (Rancho) has a smooth dorsal profile and shows potentially good hood development

Another failing is when the hood is only showing on the upper part of the head. A good specimen should have the hood well developed and covering the gill plates as well. However, this will only show up in fishes which have matured and is not likely to be very prominent in fishes under two years of age. This makes the breeding of such fishes more time consuming than that of goldfish varieties which do not have the hood. As to colour, this is a matter of individual choice as they may be obtained in all gold, all silver or a mixture of both. Silver fish with a red head are preferred by some aquarists.

breeding fancy goldfish . . .

If I take the eggs from my pond fish and hatch and rear them under cover, when should I be able to put them in the pond with the parent fish?

If the young fishes are from any of the types with flowing finnage, then it is better to keep them under cover for the winter and then return them when the pond water gets warmer. The sizes of the young fishes will depend on the time of year when they were hatched and the rate of growth. The latter depends on the temperature of their water and the amount of food they have eaten. Any young fishes reared without warmth, would be better kept inside for the winter. Early hatched fishes reared under warm conditions could be two or three times as large as any which were reared without artificial warmth.

A.B.

Plants



unwanted 'moss' . . .

Could you please help me with my plants—they are covered with a moss (see plant enclosed). The tank is 48 in. x 18 in. x 18 in., the light and two 4 ft. power-twist lights are on from 5.30 in the morning to 9.30 at night. There is no plant food in the tank. Water change is 20 gallons a month. The filter bed is 3 ft. deep and is only gravel. The tank is filtered by two centrifugal pumps.

The 'moss' you complain of is, in fact, a type of hairy green algae. The short answer to your problem is that you are giving your plants far too much light, which will not only encourage the growth of algae in the tank, but also generally weaken the plants, as you are forcing their growth so that they will shoot up rapidly, and just as rapidly die down again, as excessive

artificial light and/or heat will weaken and eventually destroy their delicate cell-structure. The first thing to do, therefore, is to reduce your lighting period to a maximum of 8 to 10 hours per day. Further, if your tank also receives natural daylight, you may even find it necessary to reduce the intensity of your lighting to one 40 watt tube. You could experiment with this.

Gravel alone is not sufficient as a planting medium. Most plants require certain quantities of nutritious matter. Putting a layer of peat under the gravel would help overcome this deficiency, and would further help maintain the water at a slightly acidic condition (which most aquatic plants prefer). Therefore, I suggest you try to grow your plants by providing generally beneficial conditions, such as slightly acid, soft water, a temperature of 70°-76°F and the lighting conditions I have suggested. If you follow this you should have healthier plants which are better able to withstand attacks from algae, pests and diseases. You should also not need to change your water nearly so often, as there will be considerably less algae and less detritus from rapidly rotting plants. A certain amount of debris in a tank is no bad thing, either, as it acts as a natural fertiliser for the plants and provides additional food for the fish. **V.T.**

Koi

mixed collection...

I always hoped to have a few Koi in my mixed collection of pond fish which include goldfish, shubunkins, orfe, rudd and tench. However, the small Koi I have bought during the past two years have all died and I am undecided whether to try any more Koi this year, the other fish are all right.

There is no reason why Koi should not live with goldfish, etc., and I would suggest that any losses of Koi within a month or two of purchase are most likely due to extreme stress following many handlings, rapid changes in temperature and varying quality of water, from which numerous Koi do not recover. Latent internal diseases are also a problem, but these may be

detected by the obvious appearance or behaviour of the fish on display, and none should be bought that are not actively swimming about or do not have a good full shape.

Small Koi are especially vulnerable to prolonged stress and if possible I would advise the purchase of Koi in the 6 to 8 inch size, these have a better chance of survival.

Koi are not really more delicate and difficult to keep than goldfish, and provided your pond is not overstocked I would advise you to shop around for your next purchases. **H.A.**

Marine

brackish water species...

I intend shortly to set up a 3 foot or 4 foot tank in which I wish to keep *Scatophagus argus* (Scats), *Monodactylus argenteus* (Monos) and Puffers (*Tetraodon* spp.).

1. Are there any other similar-sized and attractive species which I could keep with the species mentioned above?

2. Is it possible to grow plants in the tank with these fishes?

1. All the fishes which you mention are normally looked upon as brackish water fishes. That is to say they are fishes which, although in nature being found in pure freshwater, brackish water and the full-strength seawater of the coral-reef, in aquarium conditions are, for a variety of reasons, best kept in brackish water, i.e. tapwater to which the correct amount of 'Pondsal' has been added. In order to both maintain the pH of this brackish water in the ideal alkaline region of 7.8-8.3 (—not as critical as when keeping coralfishes), and to generate the astronomically huge numbers of nitrifying bacteria needed to guarantee a total absence of toxic nitrites, you will need a high-powered undergravel filter covered first with a 1 in. layer of cockleshell and then with a 2 in.-3 in. layer of coral-sand. Owing to the depth of filter-bed needed and the extremely active swimming habit of almost all brackish water fishes, I strongly suggest that you buy at least a 48 in. x 15 in.

x 18 in. tank, i.e. a tank of at least 18 in. vertical depth. If your budget will run to it, a 48 in. x 18 in. x 24 in. tank of 75 Imperial gallons gross capacity would be even better. My oft-repeated strictures over the last 25 years, urging potential marine aquarists not to buy small tanks for a first essay into coralfish-keeping, is almost as valid when applied to brackish fishkeeping.

Other suitable species are:

- (i) *Triacanthus brevirostris* — the beautiful little brackish filefish.
- (ii) *Therapon jarbua*—the energetic Targetfish.



Therapon jarbua

- (iii) *Etoplus maculatus/nurantensis*—Orange and Silver Chromides.

and

- (iv) *Gobius virens*—the fascinating little brackish goby.

The last named species, apart from being very intelligent and full of fun, is a good bottom-feeder and is thus an excellent insurance policy against the occasional accidental overfeed—something we all do from time to time! I know that Chromides are usually looked upon as tropical freshwater fish, but until you've seen specimens kept under brackish conditions, you've never really seen these fish in their full vigour and beauty. You might also like to try adding a pair of jumbo-sized Sailfin Mollies, (—the green or black species, NOT the almost blind golden variety), but please make sure that they're at least as large as the other fishes or they might be bullied.

2. **Plants:** I'm afraid that no plants would do well at the salinity necessary to keep the fishes happy—and in any case almost all the species which we've mentioned above love to nibble at plants. You will do much better to stick to attractive rockwork, bogwood and the more realistic plastic plants of which there are now some excellent species-imitations available. **G.C.**

Discus



basic advice...

Having kept tropical fish for a number of years I would now like to try and keep and possibly breed discus fish. I have always been fascinated by these fish but many of my fish-keeping friends have told me that they are very difficult to look after and do not live for very long. However, I am determined to set up a special tank for these fish and will do everything you suggest; just to prove my friends wrong!

I intend to purchase a new 3 to 4 foot tank approx 12 to 15 inches wide and 15 inches high. The tank will be fitted with a power filter and I also will install the OTP system if you agree. My water from the tap has a hardness of 12 GH but a pH of over 7.5. I intend to start with a few Greens, Blues and Reds. I have read all the available books on discus.

Your letter is very typical and I suppose, my answer will be typical also. If you like the look of these fish, by all means keep them and get it out of your system because Discus Fish often become an obsession and the only way to get on top of the whole thing is, just to get started. But breeding—consider this as a bonus and not as your main aim otherwise you will get many sleepless nights like any newcomer to the "Discus Fish Hobby." I started to keep Discus Fish many, many years ago to prove that I could do it even though all the literature suggested it was almost impossible and the few, (and there were very few) enthusiasts who either kept them or had information, were not always willing to part with it. In fact, I know that I was given wrong information deliberately by a breeder for reasons best known to him. Today, it has become somewhat easier for anyone to start with Discus Fish. In addition to the column in this magazine, there are many more Discus Fish articles being published and Discus Fish Associations exist both here and in America. Also, most

hobbyists are now quite willing to give some of their secrets away—if not all. It has become much easier.

The best size of aquarium for keeping Discus Fish is either 3 or 4 feet by 18 by 18 inches. Of course, it can be done in a smaller or larger aquarium but I have found that approx 200 to 250 litres is usually enough to raise youngsters or even to maintain 5 or 6 fully grown ones. If the aquarium is too small it will take a very good filter to keep it perfect but if you are prepared for a lot of work it can easily be done. On the other hand if the aquarium is too large, and something goes wrong with the water, it becomes a very difficult job to fix it. I am sure you will understand that it is much easier to look after 200 litres of water than after 500 litres of water. The most important aspect of Discus Fish keeping is the filtration and as far as I am concerned there is no better system than a power filter. There are a number of power filters available on the market and by talking to your fish-keeping friend you will soon learn the pros and cons of the various models available. As far as the OTP system is concerned, the idea of the drip-feed system is very good and I have used it for the last 6 years or so. However, I feel that you are probably better off making your own, something like 5 or 6 times as large as the one commercially available, because if you intend to keep the Discus Fish in a "clinical" set-up this system will become very important.

Your mains water doesn't seem too bad: Discus fish can easily be raised in a water up to about 10° dGH. When you want to breed them it will have to be softer but at present if you were to filter your water with a good quality peat you will not only make it softer but also bring the pH value down. It might be advisable to purchase a KH tester because peat will only start to acidify the water once the carbonate hardness is removed. To check whether peat is still active take a sample of water after it has passed through the peat but before it returns into the aquarium: if the water is acidic—about pH 3 or so—it is OK, but if the pH value is the same as the water in the aquarium it must be

changed. Peat is in many cases the best filtering material for discus keeping.

I don't know where you have seen Discus Fish but to state that you want to start with a few Greens, Blues and Reds will surely lead you nowhere. I suggest that you start with nothing but cheap Browns and if, after a period of time, you feel that you have mastered everything then by all means go on to a more colourful variety. Remember, that "labels" very often are meaningless and to save you a lot of disappointment as far as colours are concerned, make sure that you purchase your fish from a truly reliable dealer. When you say that you are going to start with Blues, Greens and Reds, do you mean wild-caught fish or Far Eastern bred fish? What is a Red Discus? Don't be fooled by a label on a dealer's tank; there is really no such fish generally available. The few "so called Reds" are all "bastard" Browns from South America and a great deal of money would be paid for them by breeders in America, Germany or the Far East.



It is a good idea to start with Brown Discus

The Reds you must have seen are nothing else but hormone-fed Browns and will within a very short time look like a Brown and also will become infertile. It seems that a great many hobbyists still fall for this and are surprised when the fishes have lost all their colour. I have never sold such a fish and if everyone in the trade was willing to stop importing and/or selling such hormone-fed fish, then maybe within a short time a better quality of Discus would come out of the Far East.

Finally, let me say—and I must have said it a thousand times—Discus fish-keeping is comparatively easy these days but, before you start to run, learn to walk. Although it is easy, it is also different; and to be successful you have to master the differences. **E.S.**

Outdoor enclosures for

TERRAPINS

in Britain



by Julian C. F. Sims,
M.Sc. F.L.S.

Abstract

British summer temperatures are not high enough for long enough to incubate eggs laid in an outdoor environment. However, the range of spring and summer temperatures are sufficient to promote active feeding, courtship, copulation and basking amongst European and North American freshwater chelonians kept in outdoor enclosures.

A range of suitable enclosures is discussed, together with practical hints on their construction and maintenance.

Suitable species for stocking such enclosures are listed.

Introduction

Most terrapin species are very active reptiles. Thus, however much space is made available in indoor tanks, large terrapins benefit from spending the summer months in outside enclosures. This not only gives these reptiles the opportunity of exercising their limbs while walking and swimming, but, equally important, there are no substitutes for natural sunlight and fresh air, so much enjoyed while basking.

In particular, North American species such as Red-eared terrapins (*Chrysemys = Pseudemys scripta elegans*) and Floridana terrapins (*Chrysemys floridana*) usually stay close to the water, basking on a nearby log or at the

Three species of terrapins—European pond, Spanish and Red-eared basking on the terraces around a "red-shank" fibre glass pond

edge of the pond. The head is held outstretched as are the fully expanded hind flippers. This posture maximises the reptile's surface area, important in collecting the warming rays of the sun. Muscle contraction in the neck during breathing is clearly visible. Such basking action has led to terrapins being called "sliders" in North America, due to their habit of quickly slipping into the water when disturbed.

Conditions for successfully keeping terrapins in captivity have previously been described (Sims, 1979 and 1982). Both papers give details of water filtration and diet, with especial

reference to vitamins and minerals essential in the prevention of calcium deficiency leading to 'soft shell'. The use of a PVC paddling pool as a temporary outdoor enclosure has also been recommended.

Types of enclosure

A blue PVC paddling pool with tubular steel frame, 2m x 1.3m x 38cm high, manufactured by Dekkertoys and obtainable from ARGOS discount showrooms, makes an excellent temporary outdoor pool.

With only 15cm (6 inches) of water in the pool, the smooth PVC sides prove to be an effective barrier against terrapin escape. A basking island made of bricks and constructed in the centre of the pool is essential. Well away from the pool sides, such an area cannot be used as an escape route. The lower bricks of the island must be placed on thick foam rubber to avoid cutting the PVC pool lining. Similarly, to avoid damage to the PVC, the ground on which the pool rests must be very carefully prepared with no sharp protuberances or plant roots which could grow up through the pool lining, puncturing it.

As a paddling pool stands above ground and has a drain plug, removal of water for regular cleaning out is a relatively easy matter. The PVC can be quickly hosed down to remove algal growth and faecal remains from the terrapins. However, a pool standing above ground level has one major disadvantage. On cold, windy days, air circulating around the walls has a cooling effect on the water inside.

A more permanent arrangement for sunny gardens is to use one or more fibre-glass ponds, sunk into the ground, with surrounding terraces which function as basking areas and nesting sites. The ponds must have sheer sides so that if terrapins plunge into the water when disturbed, they do not injure themselves. Suitable ponds for terrapins in the garden include the 'Penguin' manufactured by Glass Art and the 'Red Shank' manufactured by Lotus. Both types of pond have a deep area (30cm) which remains more or less constant in temperature throughout the summer months, being insulated by the surrounding soils.

A deep water area is essential for male courtship display in front of the female, often followed by copulation.

'Penguin' and 'Red Shank' ponds also have a shallow end (15cm). If the ponds are carefully aligned in the garden so that the shallow area receives the early morning sun, this water warms up quickly, becoming 1°-2°C higher than the deep end. A roofing tile resting on a brick serves as an essential platform by which terrapins can climb out of the shallow end of these ponds.

Emerging terrapins often remain on these ramps for two or more hours in the early morning sun. As they become warmer and therefore more active, terrapins venture further from the water onto the surrounding terraces.

A complex of three such ponds in a Wiltshire garden has been successfully used by the author to breed European Pond Tortoises (*Emys orbicularis*) during the summer of 1982. Although the preserved remains of European Pond Tortoises have been found in Britain, confirming that chelonias inhabited this region when the climate was warmer in previous inter-glacial periods, summers are not at present hot enough for long enough to naturally hatch the eggs which are laid. For this reason, the eggs were removed from the excavated nest and incubated indoors.

As certain species of terrapin do wander some distance from water, especially when looking for a nesting site, a wall approximately 60cm high with overhanging coping stone is essential around the basking area. Such a wall will prevent escape and localise nesting activity so that eggs can easily be located for incubation. A low wall will also have minimal shading effect on the ponds and basking area but will act as a wind break, stopping cooling air currents.

Once the ponds are stocked with terrapins, the water quickly develops a rich green colouration with single celled algae. Although making it difficult to observe the terrapins swimming about or resting underwater, the green algae give protection from the sharp eyes of predators such as gulls (*Larus sp.*) and crows (*Corvus corone*).

The algae also oxygenate the water

during photosynthesis and use up some of the nitrogenous products excreted by the terrapins. This nitrogenous waste is used by water plants in the primary production of protein.

During feeding and the swallowing of food underwater, terrapins ingest some of the algae, an important source of vitamins. Such a vegetable supplement to the diet is especially important for species which are noted carnivores, e.g. *E. orbicularis*. Other species have a much more omnivorous diet e.g. *C. scripta elegans* and *C. floridana*. Water weed must therefore be supplied as part of their diet, although rooted macrophytes will not become established in a small pond due to terrapin activity—both swimming and feeding. Duckweed (*Lemna sp.*) which floats on the surface is a favourite food. This plant has two further advantages:

- (i) *Lemna* reproduces quickly and can therefore become established unless feeding pressures are very high.
- (ii) *Lemna* forms a dense surface mat, helping to insulate the pond against temperature loss at night.

When the water becomes too dense with algae and suspended organic matter ponds can be cleaned out by boiling with a bucket. The walls of a fibre-glass pond are easily kept clean by wiping with a sponge.

Hibernation and breeding

If the pond is deep enough and the winter mild enough, large terrapins can survive in outdoor ponds throughout the year. The mild winter of 1982-83 was just such an example when a large female *C. floridana* and several *C. scripta elegans* and *E. orbicularis* remained out of doors.

Terrapin heads emerge on sunny days to survey the surroundings and re-charge the bloodstream with oxygen. Even when a thin film of ice forms on top of the water, terrapins can be seen swimming about underneath. Due to the effect of the surrounding soil as a 'heat sink' and the abnormal expansion of water at lower temperatures, deep water remains warmer than that at the surface in winter. However, if a period of very cold weather persists, the formation of ice increases downwards. It is strongly recommended that under these cir-

cumstances, the terrapins are brought indoors to complete the winter in tanks of *southeast* water.

The terrapins can be lifted out of the pond after the ice has been melted with hot water. The ice must not be broken as this will send pressure waves through the water, causing stress to livestock.

Some authorities state that reptiles must hibernate to induce the correct physiological changes essential for fertile mating. However, large collections of terrapins maintained at a constant warm temperature throughout the year in the reptile houses of many zoos, frequently produce eggs. Adult *C. scripta elegans* at the Cotswold Wildlife Park, Burford, Oxon have laid eggs in their indoor display tank in the past. Eggs laid indoors by this species have been successfully hatched at the Welsh Mountain Zoo (Thomas, 1981).

The author's *E. orbicularis* colony which bred in 1982 were kept indoors from December 1981 to March 1982 due to the abnormal severity of this British winter. Indoors, these terrapins were maintained at ambient room temperatures in *southeast* water. Although remaining active, they only fed occasionally.

The eggs which were laid on 1st August 1982 were removed from the nest, excavated in a basking terrace. The eggs were incubated indoors in moist Vermiculite at a fluctuating temperature which did not exceed 25°C or go below 19°C.

The *Emys* eggs were totally covered with moist vermiculite throughout their incubation for three important reasons:

- (i) The eggs of *E. orbicularis* are flexible-shelled, which means that they are not water-proof. During incubation, water can be lost to a dry surrounding environment resulting in dehydration of the egg. Alternatively, water can be absorbed from a moist environment, causing the egg to increase in size. Legler (1954) recorded that eggs of Painted terrapins (*C. picta*) located toward the top of nests are more frequently dented (i.e. dehydrated) than eggs toward the bottom of nests. This indicates that eggs within the same

nest have different patterns of water exchange according to their position.

Moist vermiculite prevented dehydration of the *Emys* eggs. In the later stages of incubation, these eggs absorbed water from the vermiculite and increased their length and diameter.

- (ii) The absorption of water by flexible-shelled eggs allows the developing embryo to more fully utilise the food reserves in the yolk (Packard *et al.*, 1981). Thus the embryo can grow larger before hatching. This extra growth would not be possible in eggs which cannot absorb water from their surroundings. Larger hatchlings have a higher survival rate than smaller terrapins.

- (iii) The majority of reptiles excrete most of their nitrogenous waste as uric acid—they are uricotelic. As uric acid is almost insoluble in water, this nitrogenous waste helps the reptile to conserve water so that relatively hot and dry habitats can be colonised.

However, aquatic reptiles such as terrapins excrete a significant amount of their nitrogenous waste as soluble urea—they are ureotelic (Wiley and Lewis, 1927). Water conservation is not a problem for terrapins due to the habitat in which they live.

Gelatinous uric acid, being relatively harmless, is stored in the eggs of uricotelic reptiles during their development. Conversely, the soluble urea produced by the reptilian embryo in ureotelic eggs must diffuse out through the shell during incubation. A moist environment surrounding the egg is therefore essential for the uptake of this urea.

The *Emys* hatchlings emerged after 60 and 65 days of incubation. On emergence, the hatchlings buried deep into the moist vermiculite where they stayed for four to five days so that the yolk sac scar could heal on their plastron.

On entry to warm water (24°C), the hatchlings floated. They were first observed to drink and then take water into their cloaca. This action gave

buoyancy control so that the hind end of the hatchling sank in the water. By evacuating and then refilling their cloaca, the hatchlings became adept at positioning themselves in the water, eventually swimming about underneath the surface.

A half brick was used as a basking platform—the rough edges providing an easy method by which the terrapins could climb out of the water.

Hatchling *E. orbicularis* are of similar dark colouration to their parents. However, hatchling *C. scripta elegans* are a vivid green, very different from the adult terrapins. This bright colouration must give an increased chance of survival by camouflage in shallow water, dense with vegetation.

As *C. scripta elegans* terrapins get older, their carapace becomes progressively darker. This has an important function in thermo-regulation—darker surfaces warm up faster while basking. In capacity, it is also noticeable that diet can affect the colour of the carapace. Two male *C. scripta elegans* fed solely on pelleted food, e.g. garden pond pellets and pelleted dog food, had much greyer carapace colouration than individuals fed on a varied diet including meat, earthworms and fresh vegetation.

Suitable species for outdoor ponds

The following species have been successfully kept in outdoor ponds. However, it is important that only large terrapins are maintained under such conditions. Terrapins with a small carapace area do not thrive or grow because their small surface area does not absorb and then *retain* enough solar energy to maintain essential metabolic functions.

Hatchlings should certainly not be kept in outdoor ponds, where a very poor growth rate would result. On warm, sunny days, hatchlings do benefit if their tank is carried out into the garden and placed in dappled sunlight, NOT direct sunlight without shade.

(i) European species

The European Pond Tortoise (*Emys orbicularis*). The darker specimens found in France and

Continued on page 26

Outdoor enclosures for

TERRAPINS

in Britain

Continued from page 24

the much more yellow and brown variety from European Turkey and Yugoslavia thrive in garden ponds.

The Spanish Terrapin (*Mauremys leprosa*) from the Iberian Peninsula and North-west Africa.

(ii) North American species

The Red-eared Terrapin (*Chrysemys = Pseudemys scripta elegans*). Florida Terrapin (*C. floridana*). There are three subspecies: *C. f. floridana*, *C. f. peninsularis* and *C. f. hoyi*. In Britain, these terrapins are often referred to as "hieroglyphic" because of the intense patterning of the carapace when young.

The Mississippi Map or Sawback Terrapin (*Graptemys kohnii*)—known in the pet trade as 'grey-backs'.

(iii) Asia

Mauremys mutica from mainland China.

The Amboina or Malayan Box Terrapin (*Cuora amboinensis*). In the normal course of events, this species from South-east Asia should not be kept outside, both day and night, in Britain. However, three large adults (one male and two females) have in past years been successfully kept in the pool complex for several weeks through the hottest part of the summer. These terrapins shelter under vegetation during most of the day, avoiding direct sunlight. They are particularly active in the hours of darkness, walking around the terraces on warm nights.

Conclusion

Without doubt, large terrapins benefit from living in outdoor enclosures in the warm, summer months. Skin colouration becomes more vivid from prolonged basking. Regular drying of the carapace also allows the outermost

layers of the shields (scutes) to gradually loosen at the edges and eventually peel off. As new shell material has previously formed underneath, continual loss of the upper, outer layers is essential for even growth.

The regular loss of the outer scutes also removes any colonies of algae which occasionally develop on the carapace.

The fibre-glass ponds described provide the benefits of both deep and shallow areas, and have the added advantage of being easily cleaned. Regular cleaning will prevent the accumulation of mud at the bottom of the pond, and this fact together with the relatively small size of 'Penguin' and 'Red-Shank' ponds means that rooted water plants cannot become established.

Fibre-glass is an easily shaped material, it is widely used in the motor trade to repair car bodies. Thus ponds can be constructed to an individual shape and design to suit both the specific requirements of the inhabitants and the space available in the garden. Larger ponds could have an area cultivated with water plants—rooted in submerged polythene baskets specifically manufactured for this purpose by Lotus.

Other materials which could be used to manufacture ponds for terrapins include concrete and sheet rubber, PVC or polythene pool liner. However, these materials are not without their problems.

New concrete either has to be 'seasoned' for approximately a month or treated with neutralising salts to remove the 'free lime' which is present. A proprietary treatment such as 'Sil-glaze', obtainable from water garden specialists, neutralises the lime and seals the concrete, making it water-proof.

Pool liners are of variable quality and durability. Polythene sheeting is probably the least durable, becoming brittle in sunlight. Rubber sheeting

is less affected by bacterial growth or sunlight and some PVC liners are of double thickness with a strengthening nylon network between the two PVC sheets. The length of life of all sheet pool liners can be extended by covering the liner with a layer of soil or inverted turf. Terrapins will bury into this mud, making the pond water turbid.

Whatever material the pond is constructed of, if mud or silt is present on the bottom, complete cleaning will not be possible. Similarly, very large ponds cannot have their water changed as often as small ponds.

Terrapins in a garden pond give a great deal of pleasure. They are a constant talking point with visitors and neighbours. In fact, at holiday time, there is seldom a shortage of volunteers to come round and feed the livestock. The keeping of large terrapins in a pond is strongly recommended both for the benefit of the reptiles and their human owners.

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- Lotus Water Garden Products Ltd., 260-300 Berkhamsted, Chesham, Buckinghamshire HP5 3BY.

Spawning of CLEANER WRASSE

(*Labroides dimidiatus*)

by A. S. Bashford, B.Sc., Master Mariner

MY interest in coral fishes was originally aroused some 30 years ago when, as a Merchant Seaman, I often had the opportunity to observe and marvel at these colourful jewels of the deep in their natural habitat on the reefs of the Red Sea and the Indian Ocean; regrettably I never visited the Pacific. At that time the keeping of these creatures in captivity was in its infancy and certainly not a hobby to be considered on ship. Upon changing careers some 10 years ago, and now being on stable *terra firma*, I embarked upon the fascinating hobby of marine fish keeping, it being my firm intention one day to attempt to breed some of the exotic species becoming available to the hobbyist. To this end partial success has been achieved with regular spawning of a pair of Cleaner Wrasse, *Labroides dimidiatus*, the smallest of the Wrasse family.

There are approximately 600 species of Wrasse in the family of Labroidae among which are several smaller species which have evolved to become specialists at removing the external parasites from other fishes. *L. dimidiatus* (4 in.) is the smallest of these and sometimes known as the Blue Black Wrasse by reason of horizontal blue and black banding; it is the most abundant of the cleaners and maintains a well defined cleaning station on the reef of several square yards in area to which its customers, other fish, will come for the attention of this little cleaner which will actually

enter the mouths or gill rakes of its much larger patients without fear of being eaten. Patients are attracted to the cleaning station by the flaunting motion of the cleaners and their bold coloration and will then assume a recognisable rest position to indicate their willingness to be cleaned. Not only will this little doctor of the reef remove parasites but will also clean wounds and remove dead or damaged skin. The relationship between the parties appears to be of a true symbiotic nature both having a need for each other. It has been demonstrated that removal of cleaners from an area of the reef will result in a marked reduction of fish numbers and that the area will remain underpopulated until the cleaners have re-established themselves.

In the aquarium, cleaners make an attractive and welcome addition and although allegedly difficult to acclimatise, I have not found this to be so. They require feeding with finely chopped food (as their tank companions obviously will not have sufficient parasites to maintain them), shrimps and frozen scallop being relished, and I find lobster eggs and brine shrimp to be an easily accepted staple diet. At night Blue Black Wrasses sleep individually in a selected crevice or small cave where they surround themselves with a mucous cocoon for protection. The chosen sleeping place is meticulously cleaned and the used cocoon removed daily. To avoid stress, suitable sleeping places should be provided

in the aquarium, a cluster of barnacle shells being readily accepted. Knowledge of their sexual behaviour, method of spawning and even the determination of the difference between sexes have remained hidden up till now when I am pleased to be able to provide at least an insight into this aspect of their behaviour which has been revealed by the successful spawning of these delightful little fish.

Some months ago two young fish approximately 1½ in. in length were purchased from a local dealer. The fish were chosen in the hope of obtaining a pair on the basis of their obvious attraction to each other, i.e. playing together in the dealer's tank. The choice proved to be correct and spawning has since occurred.

The fish are housed in a well established 48 in. x 15 in. x 15 in. community tank, furnished with a variety of algae-covered rocks and corals and with lush growths of *Caulerpa*. The tank is lit for eight hours per day by one 3 ft. North-light and one 3 ft. 6 in. Gro-lux tube supplemented by a 30 watt spot light illuminating a 10 in. anemone.

Initial spawning took place on 24th January 1985 and thereafter at three day intervals during the first month with the frequency increasing to virtually daily to date (24th March). Spawning behaviour appears to commence approximately three to four hours prior to spawning with the female seeking out the male and displaying to him by curving her body, yawning, flaring her fins and in particular by the erection of her dorsal fin. Activity intensifies approximately two hours before spawning with the two fish in constant movement around the tank and maintaining a close proximity to each other. At this stage the female's abdomen starts to swell noticeably, also the male develops a light lemon colour in the silver facial and abdomen areas, which colour develops and deepens to gold immediately prior to spawning. The blue coloration in the male also intensifies and takes on an almost fluorescent

sheen. Approximately 45 minutes prior to spawning the female's vent starts to dilate and protrude and she loses the dark eye line through the eye and her mouth now remains continuously open (these features and the male coloration can be seen in the accompanying photograph). The activity of the fish increases as spawning approaches and the female's abdomen is hugely swollen. An occasional attempt to spawn is made, indicated by brief fast dashes through the water; finally both fish take a fast run near the surface, side by side bodies touching, spawning takes place at the end of the run and the fish separate. On the many occasions when spawning behaviour was watched from commencement to completion, only one spawning run was made on each occasion and on each the male took station on the right hand side of the female.



The pair one hour prior to spawning note gold coloration of male's abdomen (upper)

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45 minutes prior to spawning and female (lower) has lost eye line and her mouth remains open

All but one of the runs were horizontal near the surface and on the exception, a vertical twisting climb. On several occasions the fish actually broke surface. Spawning took place at between 3 and 3.30 p.m. on each occasion.

In the initial spawnings, only a small number of eggs are spawned possibly as few as 20 or 30, but numbers increased to approximately 75 to 100 as the frequency became daily. The eggs quickly disperse and are so small that initially individual eggs could not be seen in the aquarium by the observer or his family. Both parents and their tank companions had no difficulty! It was quickly apparent that the eggs were of neutral density as up to 15-20 minutes after spawning fish could be seen still picking eggs up in mid water. Later examination

Continued on page 42

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TetraRuby

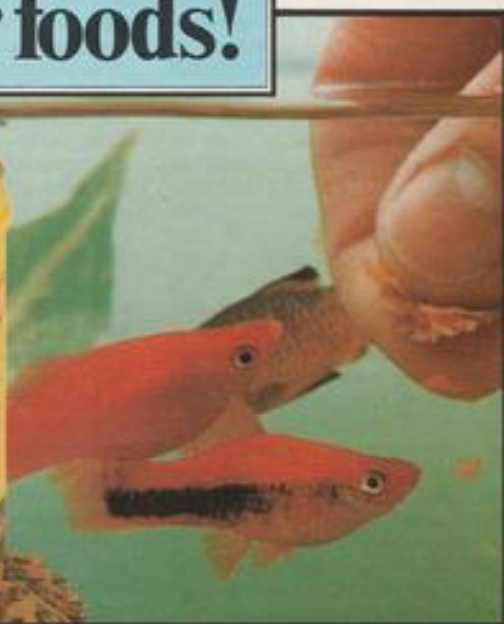
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If you were suffering from spots before the eyes it is unlikely that you would be satisfied until you had seen a properly qualified specialist at the local hospital. He would be appointed to his post only after many years of intensive study and experience, but would be no more able to pronounce on why you have flat feet than why twenty six inch goldfish will not thrive in a twenty four inch tank. If you had any doubts as to the specialist's probity you could easily establish, by enquiry, what tickets he did, in fact, possess, in much the same way that the police patrolman can demand to verify your ability to drive a car by examining your licence. If there is anything wrong with your cat or dog you will instinctively consult a vet, or, perhaps a specialist breeder if you were wise enough to buy your animal from one.

The pet trader, however, is not necessarily a specialist in any one area of his activities and is not required by law to have qualified, even in 'general practitioner' terms in respect of the creatures he sells. This results in a very mixed bag of potential consultants: one retailer may in fact be a highly competent fish breeder but wholly ignorant of plant culture. Another may stock tarantulas because he happens to study spiders as a pastime, but

hardly knows a guppy from a killie because he has given his spare time to detailed knowledge of fish foods and dog biscuits. The common feature in all this is that the purchaser comes to expect that retailers will gloss over their ignorance—their main object in life is to sell, after all—and he will come away grateful for such bits of genuinely good advice as he can glean. There are certainly wise retailers who would rather lose a sale than mislead, and one can only respect them for this, but all too few realise it is much better to say that they don't know than to prevaricate or to guess. So, there remains a feeling of uncertainty on the part of the buyer from non-specialist shops whether the seller really knows what he is talking about. Even when patronising specialist firms he must always take a lot on trust because there is nothing against which he can measure his adviser.

It could be argued that, since the buying of a tank or of fish is purely a monetary transaction the seller has no responsibility for the outcome. He can also (and often does) disclaim all responsibility even if the fish dies the next day or the expensive plants disintegrate within the week. The unfortunate aquarist can only then turn to the vet about the departed fish: the vet must hear some very sorry stories and yet can do little to help. The rotted plants can scarcely be referred to anybody impartial or knowledgeable, and have to be written off. This is not twentieth century stuff at all. On the hardware side, by comparison, the technocrats have schooled their outlets well, and they will have all the answers about the most efficient (sic) air pump, filter or tank, and the merits of the food most calculated to win medals. Many items even carry guarantees!

I seldom criticise without proposing a solution. In this case I have already suggested a hobby Yearbook. As this has not been taken up, I can only assume that there's no money to be made from such an enterprise (though I am not so sure). But if this handbook contained the names, addresses and telephone numbers of private and trade specialists in fish, plants, disease,

etc., the whole hobby network would begin to look far more respectable than it is. It seems quite wrong that there is no regulation requiring those who sell animals to be reasonably and literately qualified in their management and welfare. Membership of trade associations is no criterion (still) that the seller does much more than pay his due to them and abide by their rules. It is not good enough that most of them are straightforward traders blessed with goodwill. These personal traits do not enable them to answer questions as to whether snails are good for ponds and tanks. 'Community tanks' are still being talked of, with 1930's thinking. 'Scavengers' for pond and tank are widely acclaimed, as though they really meant something useful. 'Algae eaters' are still widely recommended and passed across the counter at the same time as chemical algicides. Buyers of water lilies are warmly advised to take advantage of the price reduction in garden fountains, and so on. There are even fish consultants. Everybody seems to be a consultant who sells something, so if this is how the land lies, let him first get his professional ticket before being allowed to open his shop. He can then hang his framed certificate in the window and do his stuff properly. This will bring the trade, prising it away from those who are little wiser than those fairground worthies who used to offer goldfish in bowls as prizes. The latter is now illegal. It doesn't seem to make much sense, does it?

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FRESHWATER Tropical Aquarium Fishes

(A Question of Popularity) by John A. Dawes

SOME months ago, I started compiling a list of popular species of freshwater tropical fishes for inclusion in a book that I was writing. Within seconds, I realised that I did not quite know where to draw the line between popular and unpopular species.

Certainly, there is no doubt that Neons and Guppies constitute popular species, while something like a One-sided Livebearer does not. But, what about species like the Blind Cave Fish, Fire Eel, Hatchet Fish, Upside-down Catfish, Black Neon, Convict Cichlid, Piranha and all the rest? To what extent can we rate them as popular or unpopular?

If the letters I receive are a true reflection of what is happening in terms of popularity, then the Piranha could well soon fall fairly and squarely within the popular category.

The fact of the matter is that there is no sharp dividing line. We just unthinkingly seem to accept that there is. This probably has more to do with history than anything else. What I mean by this is that, 25-30 years ago, when the range of species and varieties available to the tropical freshwater hobbyist was more restricted than today, it was a lot easier to draw some form of baseline.

Nowadays, with improved methods of transporting fish and

with more and more species and varieties being bred commercially for the hobby, the list of imports has expanded significantly and appears to show no signs of slowing up.

Species which were, therefore, relatively uncommon or absent from the hobby in the past are now easily available. However, the popularity tag attached to some of the old favourites still remains, partly re-inforced by revised/reprinted editions of old books, partly by word of mouth and (most importantly) by the inescapable fact that some of the fish which were *really* popular 25 years ago are *still really* popular today, irrespective of where any baseline is drawn!

Outstanding examples of this last category are Guppies, Platies, Swordtails, Mollies, Angels, Neons, Gouramis and Fighters. Although all these remain popular, many of the "types" have changed. For example, how long is it since you last came across regular supplies of *short-finned* Green (or even Black) Mollies? When I started keeping fish over thirty years ago, these delightful fish were the rule, not the exception. The exception was represented by a few of the colour morphs of the Sailfin Mollies which, today, constitute the rule. Similarly, sturdy Round-tailed or Top/Bottom-sword Guppies were the

norm. You need to go a long way today to find good stocks of these.

Ghost, Grey, Blushing, Half-black, Zebra, Gold and Albino Angels were no more than figments of the imagination.

In fact, from the shortlist referred to above, the only fish to escape unscathed has been the Neon. This can be put down to several factors, including its shorter history of captive breeding. But, even if its "captive" history were as long as that of any of the others, is it really possible to improve on the classic beauty of a shoal of wild-type Neons? Perhaps Cardinals can do this, but that is a matter of opinion.

Some would argue that there is no point in developing new strains of any fish. To these aquarists, the real beauty of a fish (and hence its popularity) lies in the unadulterated wild form.

Whilst agreeing that it is hard (I think impossible) to beat a really good, wild-caught Platy, Swordtail or Molly (some of which I am privileged to own), I feel that none of these fish could have retained their level of popularity had they not been worked on and developed by commercial breeders. The nature of the competition, represented by more recent imports such as African Rift Lake Cichlids is, after all, very strong indeed. Yet, despite this, some fish have remained truly popular for many years.

What is it then, that determines levels of popularity? I think that the following are, perhaps, the main factors:—

- Availability, Adaptability
- Beauty, Behaviour
- Usefulness
- Size

- Ease of maintenance, Expense

I will deal with each of these briefly below. However, before I do, it may not have escaped the notice of some eagle-eyed readers that, if you take the first letter of each of the above lines, you end up with *A.B.U.S.E.*

I must, therefore, stress straight-



Swordtail



Blue Gourami



Guppies



Harlequin Fish

FRESHWATER Tropical Aquarium Fishes

away that I have not chosen the above sequence as a means of pointing the finger at anybody to accuse them of abusing their fish. But, the fact remains that some of the really popular species unintentionally do come in for a certain amount of abuse in the hands of inexperienced fishkeepers.

This can, almost invariably, be put down to lack of preparation on the part of the new tropical freshwater hobbyist. I have honestly lost count of the numbers of letters and personal approaches that I have received at Shows from people who have bought or obtained some fish and then want to know what to do.

Fortunately, many of the most popular fish are very *adaptable* and can survive considerable hardship. This is just as well because, until the basics of aquariumship are mastered, a certain amount of unintended abuse can take place. This can, of course, be minimised by adopting the correct approach and doing all the necessary groundwork before any fish are obtained. Adaptability must, obviously not be taken as a licence for neglect.

All popular fish are, of course, easily *available*. Some varieties may be difficult to obtain, such as Grey Angels, but the species itself, *Pterophyllum scalare*, is always available in one form or another.

Availability cannot always be equated with *beauty* though. Take, for example, the Sucking Loach, *Gyrinocheilus aymonieri*. It is always available but, when it comes to beauty, it doesn't score very highly in the eyes of most hobbyists. I, personally, love them but more for their biological adaptations than their coloration. Sucking Loaches are popular because of their *usefulness and behaviour*,

even though these aspects are often over-emphasised. True—Sucking Loaches eat algae, but a single Sucking Loach will not normally be able to cope with a sizeable tank on its own. Four or half-a-dozen specimens will, however, do a magnificent job. Yet, how many beginners buy four or six Sucking Loaches? Add to this the fact that many new fishkeepers are very concerned about algal growth and, therefore, strive to eliminate all traces of algae from their tanks, and the argument for the popularity of the Sucking Loach in terms of usefulness loses most of its strength.

The most common popular fish, in addition to *Gyrinocheilus*, bought for its usefulness and behaviour, is the Bronze Catfish, *Corydoras aeneus*, available in wild-type and albino forms. The usual reason for buying Corys is that they will eat up any leftovers. This is probably why so many of them, bought when small, hardly grow at all! Let's face it, once you've mastered the basics of aquariumship, you are not very likely to overfeed your fish. It therefore follows that many catfish go hungry because of the "left-over approach" adopted at the start by the new aquarist and not modified accordingly later to take account of the needs of these fish.

The joint labels of availability and beauty apply best of all to species such as Angels, Neons, Cardinals, Tiger Barbs (despite their inherent fin-nipping tendencies when kept singly or in pairs), Dwarf Gouramis, Fighters, Harlequins, Zebras and many other species. Incidentally, is it my imagination or are Zebras and Harlequins less popular today than, say, ten years ago?

These, and even the less colourful beautiful species, all owe a considerable degree of their popularity to their size. None, for example, grow to a maximum of 1 centimetre or, at the other extreme, 30 centimetres.

They are all, therefore, large enough to be easily visible from a

distance but not so large as to represent a major accommodation problem. When size problems arise with popular species it is often the result of mismatching, e.g. very small Neons kept with medium-sized or large Angels.

As long as a reasonable amount of attention is paid to conditions in the aquarium, e.g. avoidance of extreme fluctuations, popular species are *easy to maintain*. All will eat most foods provided (even the Sucking Loach will eat other things besides algae), and will tolerate a range of oxygen, carbon dioxide, ammonia, nitrite, light, temperature and pH levels. In fact, ease of maintenance is one of the most important, among all the other important, factors determining overall popularity.

Finally, the *expense* factor. It has always been important and will continue to be so. If you look at the price of all the popular species, you will find that medium-sized and large specimens of even the most expensive ones will be well within the spending capacity of every serious aquarist. If I hesitate to quote an average price, it is simply because there isn't a *single* average one. Prices vary according to numerous market factors ranging from the ways in which words such as extra-large, large, medium and small are defined, to transportation costs, overheads, demand and so on. Despite these difficulties, the general point still holds true, particularly if you identify popular species by numbers imported and kept in aquaria. This classification, therefore, excludes fish such as Discus which, while being the envy of many aquarists and enjoying tremendous, deserved popularity in name (*everyone* knows about them), are not available in the same quantities as the countless Guppies or Angels kept by millions of aquarists the world over.

It would be very interesting to carry out a popularity poll in ten or twenty years time. My guess (and hope) is that the old favourites will still be there, defiantly holding their ground against all comers.



**Coldwater
Jottings** by Stephen
J. Smith

One of the most pleasurable aspects of keeping fish is in meeting and talking with other people who are involved in the hobby. This provides the opportunity to exchange ideas and views, and to talk about each other's successes—and even inevitably one's failures!

Such a valuable opportunity arose at the recent National Pet Show held at the Royal Showground at Stoneleigh, near Coventry, over the Spring bank holiday weekend (26/27th May).

Several colleagues from the fishkeeping world were in attendance in the aquatics hall, including Dr. David Ford of Aquarian, who is also president of the Midland Koi Association. MKA themselves were well-represented with an impressive display, as were the Association of Midland Goldfish Keepers, Leamington and District Aquarist Society, and the Federation of British Aquarist Societies.

A great deal of attention was received on the society stands. Some of my own treasured examples of fancy goldfish were loaned to AMGK for their stand and I am pleased to say that they aroused quite some curiosity. It was interesting to note how fascinated the ladies were with the Chocolate Oranda—an attractive newcomer to the goldfish scene—while the Moor received a broad spectrum of comment: from abject disgust to divine admiration.

It all goes to show that, after all, "one man's (or woman's) meat is another man's poison!" But back to the National Pet Show. This was partly sponsored by Midlands-based Shirley Aquatics, who put on a fine display of coldwater and tropical fish in conjunction with pet foods manufacturers Thomas's.

An impressive new range of fish-keeping accessories under the banner of 'Atlantis' was the centrepiece of the Aquarian stand, and kept John Dawes, our colleague at *Aquarist and Pondkeeper* extremely busy throughout the event.

Before I continue, a word of praise must go to the organisers of the National Pet Show, who put on a most successful two days which included everything under the sun which had anything to do with keeping animals, and which was extremely well-attended despite atrocious weather.

Meeting

This show was the first time that I had met John Dawes, and provided my first opportunity to thank him personally for inviting me to join *The Aquarist* to write on a regular basis.

It was an extremely pleasant and most unexpected surprise to receive a telephone call from John way back in December.

My immediate reaction to his invitation to produce "Coldwater Jottings" was one of concern—to follow in the footsteps of a friend and mentor in Frank Orme is something which I regard as a great privilege, and which subsequently I have found an enjoyable responsibility.

One of my main aims in producing "Coldwater Jottings" is to help bring together all aspects of the hobby of coldwater fishkeeping: from clubs and associations to manufacturers and retailers; and to present items which will be of interest to readers who themselves may be having their first encounter with 'the pleasurable pursuit' as well as to hardened serious aquarists.

Input from all sections of the fish-keeping fraternity is therefore welcomed. We all have our point of view and I would be most interested to hear your ideas on keeping coldwater fish, as well as your ideas on any aspect of the hobby which you would like to see discussed in more detail.

First spawnings

Over the past few months coldwater enthusiasts will have been paying close attention to spawning their fish and raising their fry towards becoming healthy adults.

Continued on page 46

My own humble establishment consists mainly of four rearing ponds which contain no so-called 'oxygenating' plants. A scattering of lilies provides shade for young fish, and the ponds are netted as protection against scavengers



LANGUAGE OF FISHES

By John A. Dawes

SPLIT RESPONSIBILITIES

In my previous article I dealt with an aspect of fish reproduction which can frequently be deduced from similarities in the shape and size of the body of adult fish, i.e. when both sexes look very similar to each other, this can often be taken as a clue that the duties performed by each member of the pair (or shoal) are also similar.

As we move away from this situation, there is a tendency for overall differences in the appearance of members of each sex to become progressively more pronounced. Sometimes these differences are so marked that it is difficult, if not impossible, to identify males and females as belonging to one and the same species purely on physical grounds.

Perfect examples of this exist in virtually every aquarium. In fact, they are so common that they are often overlooked.

Everyone can recognise male and female Guppies but, if you stop to think about it, there isn't a great deal of similarity between them, is there? Taking this point a bit further, there really isn't any sound, biological reason why they should be similar in any way other than genetically.

The argument goes something like this:

Differences between individuals and species arise predominantly through small, chance mutations in the course of evolution. These are then selected for or against, depending on how favourable/unfavourable they are, through the process of Natural Selection. The end result (although this is open to further change) after numerous generations is an organism that is pretty well suited to its way of life. Therefore, if a fish is of a particular shape, or size, this is not just the result of coincidence.

There is absolutely no doubt whatsoever that it is not coincidence that makes female Guppies so different to males. It is much more than that, even though the accumulated mutations that allowed the differences to be selected for arose originally by chance.

These resulting differences are reflected in the very different responsibilities of the sexes during reproduction. The male's "job" is to ensure that he can effectively fertilize the eggs from which the next generation of Guppies will, hopefully, develop. His whole body is, therefore, geared towards this. The "language of the sexual organs" which demonstrates how this can be deduced from an examination of body structure will be discussed in another article.



The main point here is the way in which the differences between males and females are related to their respective responsibilities in reproduction.

Having completed the job of insemination, male Guppies play no further part—their responsibilities are over. It is entirely the females' responsibility to see to the survival of the species from then on. Their "job" is to ensure that the eggs receive maximum protection. They do this in one of the best ways possible, i.e. by carrying the eggs inside them until they hatch.

This situation is a far cry from that found in Neons, Goldfish, Tuna and all the other fish discussed in my previous article, "Equal Responsibilities". As far as Guppies are concerned, it is very much a question of "Split Responsibilities".

Not surprisingly, these split responsibilities are expressed morphologically in the very different appearances of the two sexes. If knowledge of the reproductive biology of a species can be used to explain away observed morphological differences between the sexes, it follows that it should be possible to work backwards and make general and reasonably accurate statements concerning reproductive strategies from observed differences between the sexes, i.e. if the two sexes look different, the chances are that they have split responsibilities throughout, or at some stage during reproduction.

There are so many examples of this that it will only be possible to refer to a few here.

Some of the best cases of split responsibilities occur among Mouthbrooding Cichlids, including those from the African Rift Lakes.

In many of these fish, the males are strikingly coloured, particularly during the breeding season, while the females are rather drab. This, in itself, reveals little more than the implication that the species concerned exhibits split responsibilities.

The key factor that allows us to take our interpretation of the language of reproduction further in these species (other than the actual witnessing of the spawning cycle itself) is the appearance of the anal fin of the males.

If these have spots or other modifications that create the illusion of eggs, then we can say with considerable confidence that the species is a mouthbrooder and (very



Two very different Mouthbrooder females: *Melanochromis aureus* (left) and *Pseudocrenilabrus philander* (right)—See text for details

importantly) that the females are responsible for incubating the eggs.

The egg spots or dummies form, in fact, a very fundamental part of the language of reproduction in such species. During spawning, the female deposits her eggs and then turns round and picks them up in her mouth. She also pecks at the egg spots/dummies and (in some species, at least), thus stimulates the male to ejaculate. As she continues to peck, she sucks in some of the sperm, allowing fertilization to take place inside her mouth.

Once inside her mouth, the eggs are safe until they hatch (or, at least, as safe as the female herself).

I referred earlier to many female mouthbrooders being rather drab when compared to males. This, of course, is only true up to a point. The fascinating thing is that, if we divide mouthbrooding species into two groups—those that have drab females and those that have colourful ones, this split often goes hand in hand (or fin in fin!) with a marked difference in female behaviour during egg brooding.

I must be careful in what I say here. The following few sentences are based on my own observations and those of other aquarists only, i.e. they are not based on any fully documented recordings published in scientific journals.

What I and others have found is that drab-looking females of species such as the South African Mouthbrooder (*Pseudocrenilabrus philander*) and the Peacock Cichlid (is it still *Aulonocara nyasae*?) exhibit a tendency for incubating their eggs out in the open. Colourful females, e.g. those of the Golden Nyasa Cichlid (*Melanochromis auratus*) seem to prefer incubating their eggs out of sight, e.g. in rock caves.

This, of course, makes sense. It would be advantageous for a female which incubates her eggs in the open (probably because the environment is largely devoid of shelter) to be as inconspicuous as possible. The best way to achieve this is by being able to merge with a drab, and probably quite featureless, background. On the other hand, colourful females would be fully exposed and easily visible if they adopted the same technique. The way round the problem is, obviously, to hide.

If this were to be proved or, at least, strongly suggested by methodical observations in large aquaria and in the wild, it would constitute a beautiful example of fish language at its best. Perhaps such studies have already been carried out—if so, I've missed the relevant papers.

The final example of split responsibilities that I would like to deal with is one concerning some of the messages conveyed by the pattern of egg deposition exhibited by a

Therefore, the species is polygamous, i.e. spawning is not restricted to a single pair and no long-lasting partnership exists between the sexes. It also points to a co-ordinated reproductive sequence (the eggs are neatly arranged and in a difficult-to-reach spot: the cave roof). Further, the male is responsible for guarding the eggs (it would need two or more females to form a partnership for collectively defending their eggs—this would be most unlikely). Yet another message is that the males and females are likely to exhibit some differences either in body size or shape, or both (inferred from the split responsibilities indicated by the eggs).

In fact, all the above conclusions are valid. The species in question is the Bullhead or Miller's Thumb (*Cottus gobio*).

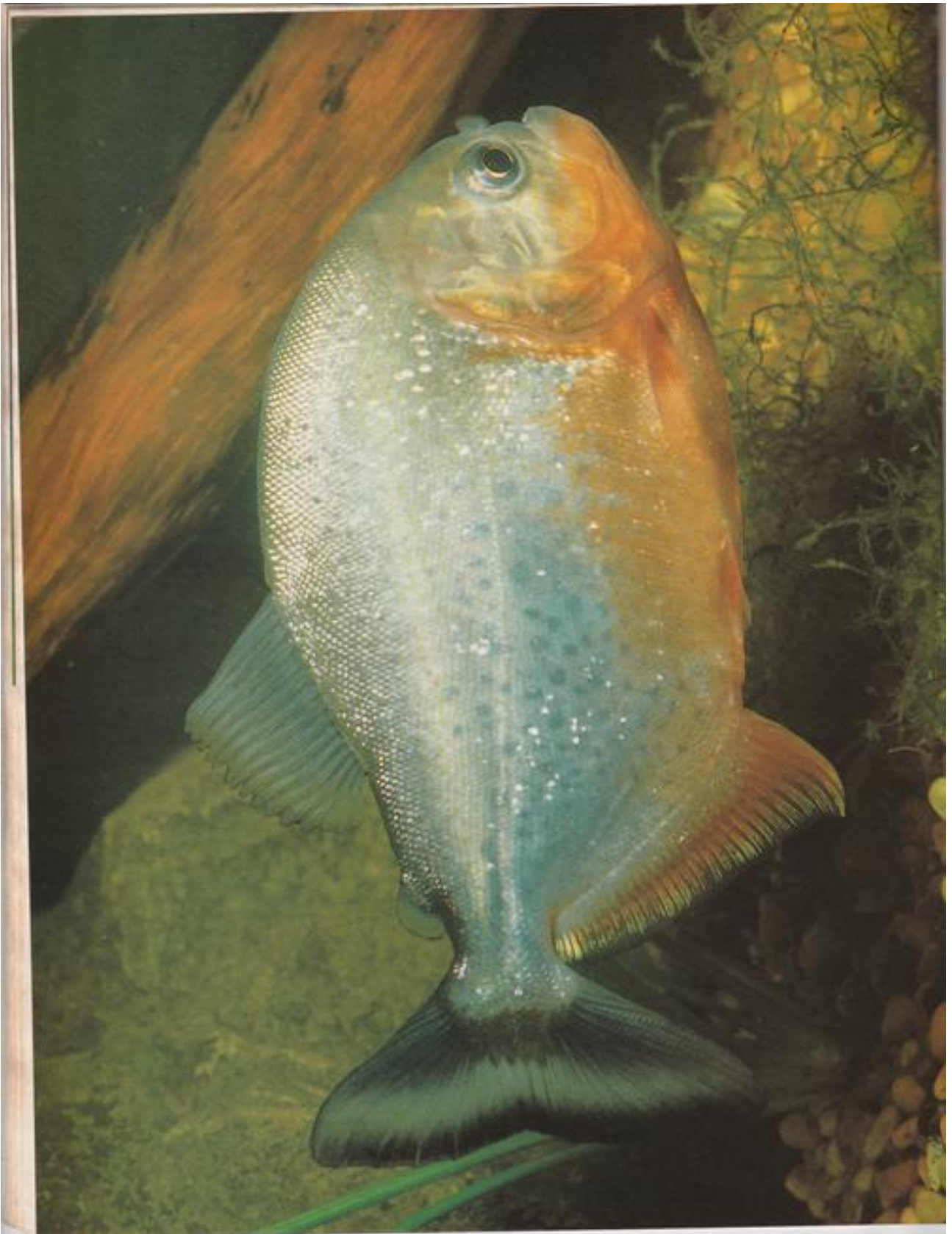


Male Bullhead, *Cottus gobio* (above). Two batches of Bullhead eggs (below)



Similar examples can easily be observed in most aquaria, although the spawning site and number of eggs may be different to the above. Some of the best-known species that fall into this category are Gouramis, Fighters and Loricariid Catfishes, such as *Sturisoma*.

I hope that the picture that is gradually emerging from this series is that, wherever we look, there are strong messages coming at us, each telling us something about the lives of the fish that emit them.



SPOTLIGHT

THE RED PIRANHA

THE Red, Red-bellied or Natterer's Piranha, like so many other well-known fish, often appears under a variety of scientific names in aquarium literature. Some books refer to it as *Serrasalmus nattereri*, others as *Serrasalmo nattereri* and yet others as *Rooseveltiella nattereri*.

The question, of course, is "Which, if any, of these is correct?" The answer is, very probably, "None". If Géry in his *Characoids of the World* is close to the truth (and he seems to be), the full correct name of the Red Piranha is *Serrasalmus (Taddyella) nattereri*.

Taking the story from the top, as it were, it goes something like this:

The Piranhas and Pirambebas (an alternative common name used for predominantly non-dangerous species) are typical characins, e.g. they have well-formed teeth (1) and an adipose fin. Therefore, they belong to the family Characidae, as defined by Greenwood and others in 1966.

However, they also possess some unique characteristics that set them apart from other characins. For example, all Piranha have interlocking teeth which form a saw-like cutting edge in each jaw. The precise way in which the teeth fit together to form what amounts to a single cutting unit is such that Piranha have to replace a complete set of teeth on one side of the mouth if a single tooth becomes worn. Other characins can replace individual teeth if, as or when required.

These characteristics are so typical of Piranha that they are thought to represent a separate subfamily of

by John A. Dawes

characins, the Serrasalminae. It is also thought by Géry that there is only one genus in this sub-family, i.e. *Serrasalmus*.

Closer examination of the species belonging to this genus, however, shows certain differences and similarities which indicate a number of sub-groups within the genus. Parameters used to distinguish between these sub-groups include the presence of scales on the base of the anal fin, the number of rows of these scales, the symmetry (or otherwise) of the teeth, the number of cusps on the teeth, the presence or absence (and the number) of teeth on the palate, the overall 'sturdiness' of the head and jaw, and other features.

Use of the above criteria subdivides the genus *Serrasalmus* into five sub-genera, namely: *Pygopristis*, *Pristobrycon*, *Serrasalmus* (this is known as the Nominated sub-genus), *Pygocentrus* and *Taddyella*.

Of these, the only really dangerous species of Piranha belong to the last two subgenera.

The Red Piranha is one such species. It belongs to the subgenus *Taddyella* which is distinguished from *Pygocentrus* in that the latter has a few small rays in the adipose fin.

Together, the two subgenera contain all the species which can justifiably be called True Piranhas. Contrary to common belief, though, these are very few in number. For example, there are probably only two species in the subgenus *Taddyella*: *Serrasalmus (Taddyella) ternetzi* from the Rio Paraguay and

the Red Piranha, *Serrasalmus (Taddyella) nattereri* found in the whole of the Amazon Basin and the Orinoco (the 'other' species found in this river has been described as *S. notatus* but may, in fact, be *S. (T.) nattereri*). Other species, such as *S. altus*, are also believed by Géry to be synonymous with *S. (T.) nattereri*.

The single specimen of the Black Piranha described as *Serrasalmus niger* and regarded as a True Piranha by many, is thought to be an old specimen of *Serrasalmus (Serrasalmus) rhombeus* by Géry who, therefore, believes it to be a Pirambeba and not a True Piranha at all.

As can be seen, Piranha classification can be quite involved and not always easy to follow. This brings me back to my original discussion concerning the correct name of the Red Piranha.

Although its full scientific name may be *Serrasalmus (Taddyella) nattereri*, the subgeneric name is usually omitted from most texts, leaving us simply with *Serrasalmus nattereri*.

Irrespective of which name is used or chosen the Red Piranha remains the same, i.e. a highly efficient predator.

In the wild, it swims in shoals but within the confines of aquaria this is not usually possible, as keepers of this species in captivity will vouch for.

Water chemistry is not too critical but soft, slightly acid conditions between 24-27°C (75-80°F) seem to be preferred. Filtration is, of course, very important. Power filters are, perhaps, best since water-

SPOTLIGHT



fouling is typical of Piranha because of the concentrated waste products that their carnivorous/piscivorous tendencies generate.

Beef, oxheart, fish, liver, mussels,

carnivore flake, large earthworms and other animal-based foods are readily accepted by most specimens.

Despite their formidable reputation, Piranha can be quite timid in aquaria. Clumps of stout vegetation, along with bogwood and/or rock shelters should, therefore, be provided to reduce the inevitable stress that these fish otherwise have to endure.

A final word or warning: Piranha can be dangerous, so handle them with care at all times!

References

1. Géry, Jacques: Characoids of the World; *T. F. H. Publications, Inc. (1977)*.
2. Greenwood, P. H. et al: Phylogenetic Studies of Teleostean Fishes, with a Provisional Classification of Living Forms; *Bulletin of the American Museum of Natural History, Vol. 131: 339-456 (1966)*.
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Spawning of CLEANER WRASSE

Continued from page 29

under a medium power magnifier of water syphoned from the main tank revealed the eggs as being individual, colourless, transparent spheres of less than .55 mm diameter of neutral density; they can virtually only be seen when rim lit against a dark ground.

Attempts have been made to raise fry by syphoning the eggs into a small fish tank but to date no success has been achieved. It is believed that the fry hatch on the 7th day as developed embryo have been observed to react to light on that day whilst still in the egg. The small size makes observations extremely difficult and hatched embryo possibly less than 1 mm are immediately lost to view in even the smallest fry tank. Attempts are still continuing and hopefully success will eventually be achieved. One positive addition to our knowledge of this species is that the eggs are of neutral density and remain suspended for a period of

approximately 18 hours before sinking to the substrate. On the reef the eggs would obviously be carried by currents for some distance before sinking thus providing a natural means of dispersal, whilst daily spawning of a limited number of eggs produces a prodigious quantity over a period of time to ensure survival of at least a few.

Finally a tip for sexing these fish: when spawning, sexual differences in appearance are obvious but normally sexes are almost indistinguishable. My observations have revealed that there are two clues to sex identification. Firstly the abdomen of the adult female has a slightly 'baggy' appearance and the black body line has, in the female, a slight downward kink like a shallow V just ahead of the gill cover; whereas the male's black body line is a smooth curve from mouth to tail. These differences can be observed in the accompanying photographs. I suspect, how-

ever, that pair bonding takes place at an early age and that acquiring individual fish of opposite sex will not, as a matter of course, lead to spawning.

The accompanying photographs were taken minutes prior to spawning and clearly show the colour changes in both fish also the female's swollen abdomen and vent. For the technically minded photos taken with a 135 mm lens with +1 DIOPTRE close up attachment at F32 lit by overhead flash of approximate duration 1/5,000 sec. Trying to keep these fast moving fish in the frame and in focus was not easy!

Footnote

Water conditions — analysis by courtesy of Aquarian Laboratories:
Temperature—78°F
Specific Gravity—1.023
Ammonia—Zero
Nitrite—Zero
Ph—8.0
Nitrate 20 PPM as Nitrogen

Meet the Societies



BRACKNELL AQUARIST SOCIETY



The B.A.S. logo



Rasbora heteromorpha

BRACKNELL Aquarist Society (affiliated to the A. of A. and Three Counties Group of Aquarists and twinned with Sandgrounders A.S.), was formed in 1958 with the aim of "finding out, from first-hand experience, the best way to keep, breed and maintain" as many different types of fish as possible.

Meetings are held on the second and fourth Tuesdays of each month, starting at 8.00 p.m. at the Bracknell Rugby Club in Lily Hill Road. The meetings themselves are varied and include, besides the usual range of activities such as lectures, other less common ones like Inter-Club Darts and Fishing Tournaments. In addition to the monthly Table Shows, Bracknell A.S. also runs an annual Home Aquaria Competition and organises coach trips to other local Societies, such as Ashford, Hounslow and Kingston, as well as visits to aquatic establishments, usually linked with trips to Open Shows at Brighton, Salisbury, Bournemouth and Chard.

Points accumulated during the year count towards trophies presented at the AGM. A further trophy, The Aquarist of the Year, is awarded to the person adjudged to have done the most to promote the good name of the Society in the preceding twelve months.

Space does not allow for comprehensive treatment of all Bracknell's other activities. However, some should receive, at least, a mention. Among these is the Society's annual Open Show held in conjunction with the town's own Show in late August. Fundraising events include a charity market stall and tea-house (a facility made available by the Town Council). Then there are the Christmas Disco, the Society's participation at the British Aquarist Festival and the Aquarian Fishkeeping Exhibition...the list continues.

Bracknell has a reputation for friendship and for catering for novices, experts and all grades in between. In fact, the range of ages of its members goes from 15 to 68 and the level of expertise from single-tank owners to members who go to such exotic places as Sierra Leone to collect fish.

Subscription Rates: Joining fee, £2.00/year, plus 30p per meeting.

Juniors, free; Senior Citizens, £2.00/year but no meeting fee.

Apply to: Tony Cockett, 15 The Larches, Warfield Park, Bracknell, Berks. Tel: Winkfield Row 884596.

BIRTLEY AQUARIST SOCIETY



The B.A.S. logo



Notopterus chitais

BIRTLEY Aquarist Society is a very young Society. It was formed on 13 January 1982 by five hobbyists who met at the William Hotel in the town. One of these is the current Chairman while another was the Secretary before becoming an F.B.A.S. Judge. The remaining three founder members still attend meetings when time allows.

Birtley A.S. is affiliated both to the F.B.A.S. and its Tyne Tees section from whom they receive support.

Meetings are held every second Thursday of the month at the Railway Hotel, Durham Road, Birtley, starting at 7.30 p.m.

Despite its "youth", B.A.S. holds an annual Open Show, usually in March, and supports both local and national Shows. The Society has already been represented at Doncaster (Yorkshire Aquarists' Festival), Belle Vue (British Aquarist Festival) and Motherwell (Scottish Aquarist Festival).

Whenever trips to Shows are organised, they are also linked to visits to fish farms or tours of aquatic shops in the area.

Although there are quite a few Fish Clubs in the region, Birtley members come from far and wide, the town being roughly halfway between Newcastle-upon-Tyne and Durham, just off the A1. Its members keep a wide range of species, including (in addition to all the usual types), native marines.

We are assured that the Society's meeting place, the Railway Hotel, just cannot be missed—it sits next to the only set of traffic lights in the town!

B.A.S. has about 30 members on its books, which is pretty good considering the competition from other longer-established Societies in the area. A second factor affecting the number of members (according to B.A.S.) is the current economic climate. Even so, with the most conservative estimates putting the number of fishkeepers at about 1½ million, we are not doing too badly as a hobby, overall.

We hope that any of these who live around Birtley and read this article will take the opportunity of attending one of this Society's monthly meetings. Without a doubt, they would be made very welcome, even if they are only seeking information and not membership.

Subscription Rates: £1.00 per year, plus 40p per meeting.

Apply to: Jim Alexander, 105 Blyth Terrace, Birtley, Chester-le-Street, Co. Durham DH3 1DW. Tel: 091-410-8929.

WHAT IS YOUR OPINION?



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

I AM typing this on the longest day of the year—and very dull, cool, wet and misty it is where I live. I'll endeavour to forget about it by getting stuck into the first of this month's letters—written by Mrs. Jane Meredith, of 18 Cranleigh Road, Portchester, Fareham, Hants. She writes: "In the February issue you asked for readers' opinions on cultivating live foods and cultivating Amazon swords in tropical tanks.

"First, the live foods I have had success with are micro worms and white worms. I breed the micro worms in water-soaked bread. I find they will keep going for about two months instead of the weeks in the smelly cereal and yeast composition.

"The white worms I put in a mixture of sterilised garden soil and peat. They will not breed unless kept cool; and I feed them on porridge—left over from breakfast, or water, or milk-soaked bread, depending on the season, as in summer it's unwise to use milk or it may turn the culture bad.

"As far as Amazon swords go, I have found that they will not send out runners without daylight from above. I have a sky-light in my fish house and the swords that are in the tanks underneath are continually sending out runners with six or more plants at a time; while the tanks using artificial light contain plants that have never reproduced.

"You sounded a bit tired at the end

of your column. Please don't give it up. What would we do without you?"

You must be a mind reader, Mrs. Meredith. Lately I've been finding it more and more difficult to fit in time to write W.Y.O.; and this very morning I spent about one-and-a-half hours at an Income Tax appeal hearing concerning my *Aquarist* earnings.

I hope you'll all excuse me for that little moan. It has helped me a bit—and I'm quite sure that it's the personal touch about W.Y.O. that has enabled it to retain its popularity: it gives you a chance to praise or blame or moan or pass on information—and me too.

Writing the last comment about cultivating white worms has just made me realise something amusingly silly: for about 16 years I have fed and watered a culture of white worms, on a window sill—and it's just struck me that I don't think I have fed my fish once with them in all that time. I think I'll give them away tomorrow!

Young Mark Gill's last letter was published in the December 1984 issue. Mark, who lives at 15 Upavon Close, Castle Vale, Birmingham, sends us an up-date on his oscars. "Six months after having transferred my oscars from my 36 in. x 12 in. x 15 in. tank to my 60 in. x 12 in. x 19 in. tank I have quite a lot to tell you as a lot has happened during this time.

"First let me say that all four fish are still very much alive and swimming; in fact, two of the oscars have grown from 1½ in. to 7 in. I am sure you will agree that the growth rate has been ex-

tremely good. One of the other two oscars is slightly smaller at about 6½ in., with the fourth oscar now a nice 5½ in. At one stage I didn't think that the smallest of the four was going to make it because he was constantly chased away by the other three fish to the point where he hid away until feeding time. I believe it was the fact that he did come out at feeding time that kept him going; and now he gives as much as he gets and has definitely caught up with the others as far as growth is concerned.

"I have had an unsuccessful attempt to get the fish to feed off cichlid pellets despite starving them for a week and offering them nothing but pellets; so it was back to the old faithful chunks of sprats, cod, haddock, roe and mussel, etc.—all the most economical foods at this size. I no longer feed them on gamma foods because the last four packets that I purchased at a cost of £4.40 were consumed in under four weeks. The food I get now is bought from the fishmonger's. This is chopped up, refrigerated, and fed to the fish three to four times daily. The average cost is about £1.00 per week." (Seems the same as the gamma food in costs.)

"The tank also houses three other occupants: a 7 in. pleco., a 5½ in. pimelodella and a 3 in. firemouth. The pimelodella eats anything and at times gets really fat. The furnishing in the tank consists of three large chunks of bogwood and three pieces of Simla-

Oscar—*Astronotus ocellatus*



wood. Filtration is effected by two undergravel filter plates, one 24 in. and one 18 in., operated by a very powerful Whisper 800, two Fluvel 51 internal power filters, the sponges of which are cleaned once per week, and finally a Fluvel 201 external power filter filled with gravel. To back this up I change two gallons of water three times a week. Given this type of feeding, filtration and water change the fish are in good health, are happy, and fighting is greatly reduced. I am sure the oscars will live together for life, which I understand can be as long as 15 years. Perhaps I have a pair: if so I will bring my 36 in. tank back into operation in the future and get the fish to breed.

"I am seriously considering the purchase of a 6 ft. x 2 ft. x 2 ft. tank in about a year's time. In it I would love to keep about 10 of these magic fish. I have kept many different fish in the last four or so years, including marines, and I've found that of all the fish that I have kept, none have provided me with as much enjoyment as the oscars.

"By the way, have you ever kept oscars? I must say I have never seen you mention them in the magazine. Why has the *Meet the Aquarist* feature stopped? I used to find those few pages most interesting. Perhaps you should do one on yourself and take a few pictures of your own tanks."

I have kept oscars, Mark—tiny ones that survived only a few days. A friend, Robert Robinson, has had his oscars featured in this article several times. I'm not so keen on them because they are so big when they grow up; and they'd eat my plants. I dislike messy fish—and messy people. I suppose *Meet the Aquarist* has disappeared because the Editor dropped it; or because writers such as I haven't had time to keep it going. Unlike many other forms of article, the one you mention means getting up and out and interviewing someone. One has to be able to photograph people and fish as well to illustrate such articles. I may do one on a 13-year-old piranha-keeper in the near future. Please drop me a line if you live in or around London, or Belfast, and would like to be featured in *Meet the Aquarist*.

Miss M. L. Slipp, of 6 Percy Road, South Norwood, London SE25 5NA, writes: "I was interested in your article about the teenager who had the sick terrapin. I've had six terrapins for nearly a year now and find them lovely and very interesting animals. When I bought them they were about the size of a 50p piece; but they grow very fast and are now 4-5 in. long.

"I found out all you need to know on how to care for and keep them in books from my local library. They need a diet of chopped raw steak, raw fish and cooked fish. It is the bones in the raw fish which help keep the carapace (shell) hard. Give them some green weed from the pet shop—or chopped lettuce if you cannot get any weed. The terrapins must be kept warm or they will not eat; about 75-82°F I find to be alright. As they are always shedding their skin they need to be cleaned out and given fresh water every day to keep them healthy. As they love to sit under the warmth of the tank lights you must provide a dry area in the tank so that they can get out of the water if they wish.

"Also, let them walk around the floor while you clean out their tank: it's good for them to get the exercise; but make sure they can come to no harm. They are very inquisitive animals and can get stuck in the corner, or under furniture or in corners. They make really lovely pets but you must remember one very important thing: always wash your hands before and after you handle them. I've had mine nearly a year and would not be without them."

I hope that photograph 1, which shows one of Robert Robinson's large oscars, pleases you, Mark.

A couple of weeks ago I bought two small, plain, striped silver angels and, with trepidation, placed them in my 24 in. tank housing eight quite large marbled angels. I wondered if the big angelfish would attack the small ones. Fortunately such has not been the case. The small fish are happily swimming about and claim their fair share of any food supplied without any trouble from the large fish. I shall soon have to move some of the eight big ones to a



Angel fish—*Pterophyllum scalare*

separate tank because they are reaching the stage where they need more space—especially if I want them to breed. Regular readers know that I'm not too fussed whether or not my fish breed. I don't have the space to house broods of babies; and I don't have the time to give them the attention they require. Of course, were my angels to spawn I should endeavour to accommodate the needs of the parents and the eggs/fry. I look upon fishes breeding in my tanks as a bonus.

I've commented before on my ability to grow thickets of plants in all my tanks except the angel tank. Well, just to confound me a few small, floating Indian fern plants that I placed in the angels' tank were not eaten, and began to grow. Quickly they began to flourish and the tank now contains a good layer of sturdy, floating Indian fern. A couple of weighted plants are growing in the gravel but the movement of the water caused by the large angels and the power filter, allied with the fact that the plants sail up to the surface very easily because of their relatively lower density, means that I'll have to put good, heavy chunks of lead on the base of some plants to enable them to gain a firm root-hold in the gravel. It always fascinates me that certain plants that won't grow in a tank at one time may positively thrive in it at another

when, to me, the fish and conditions are identical. It could be said that the angel tank is getting more light now that it's summer—except that it's sited in a dark corner and there's been rather little sun this year so far in any case. To be honest, I'm not too sure what fish and in what numbers are in my other five tanks because of the plant thickets; and in the case of small fish, such as neons, cardinals and pencil-fishes, one looks very much like another. Obviously I'm much more aware of the presence of large fish such as my angels and clown loaches—which continue to thrive. The latter only appear from the plant thickets when it's feeding time. Both love to grab a food tablet and sail off into the bushes with it to consume it. They also enjoy flake food. These are the only foods I use with any of my fish;

and the plants get only light from outside (not directly) and from Woolworth's light bulbs.

I hope the photograph of the 'plain' angel will please those who are less keen on the fancy varieties (photo 2).

Mrs. Jacqueline McNeill's address is 31 Crusader Crescent, Stewarton, Kilmarnock, Ayrshire. In a long letter she writes: "I also grow a lot of *Cabomba* in my aquarium. I use U/G filters with 3 in. of gravel. I use plant food once a month and find I have to cut back my plants at least monthly. The temperature of my tank is 78°F and I find *Cabomba* one of the fastest-growing plants in my tank. The only problem I have with it is the fact that the young plants grow along the gravel from the bottom of the main plant. In removing these young plants I usually disturb a lot of other plants. My fish

also like to nibble at it but don't usually do much damage."

The 3 in. layer of gravel over the U/G filter probably accounts for the good plant growth; however, Mrs. McNeill's description of young plants growing along the gravel does not sound usual for *Cabomba*. It sounds more like the problem one could encounter with plants that produce runners, e.g. *Vallisneria*. *Cabomba* does not produce runners. However, as long as the plants grow it doesn't matter much what they are.

Well, that's it for this month. For a future feature please drop me a line about: (a) koi; (b) breeding angels; (c) cultivating *Cabomba* and *Cryptocoryne*; (d) garden ponds; and (e) aquarium equipment and accessories. Have a good summer!

Coldwater Jottings

Continued from page 35

I have had quite a number of spawnings this year, and despite the weather this promises to be one of my best and most exciting seasons.

For me the sight of scores of tiny 'splinters' of newly-hatched fry adhering to the aquarium glass is one of the most exhilarating experiences in the world. Without wishing to labour the point, the transition from egg to fry is nothing short of a miracle. Apart from environmental conditions the aquarist has no control over what happens inside the egg between the time of spawning and the time each fry hatches.

After hatching, however, it is the responsibility of every breeder to ensure that the best possible conditions are provided for the gradual development from fry to healthy adult fish.

Thus, it is imperative that fishkeepers do not produce spawnings 'just for the sake of it'. There is no point in producing hundreds or

thousands of fry if there is not enough space available to accommodate them. Far better to rear a few healthy fry to maturity than to attempt to produce hundreds of feeble examples through lack of space.

My own humble establishment consists of four specially-made rearing ponds, which gives me space to spare—a situation envied by a couple of my friends in particular who operate a commercial breeding establishment and who need every square foot of aquascape they can get hold of!

Hot August nights

The months of August and September often represent one of the most crucial times of the year to the coldwater fishkeeper. By now water temperatures in ponds or aquaria will have reached their peak, and matters are made worse for their inhabitants by close, muggy atmospheric conditions.

Consequently oxygen levels in the water will be at their lowest. This does not appear to affect the fish too much during the day. Many hobbyists use so-called 'oxygenating' plants such as *Clodea* to relieve the situation—unfortunately this can make matters worse!

During the daytime, when light is shining on water-plant life, the plants will absorb carbon dioxide and in turn produce oxygen. However, the reverse is the case at night, when plants absorb oxygen—so scarce on hot August nights—and give off carbon dioxide.

Consequently, fish will be seen gasping painfully at the surface for oxygen during the early hours. The devastating sight of expired fish will greet the aquarist who fails to rectify the situation promptly.

My advice would be: do not use 'oxygenating' plants in the pond. The only plants I use, if any, are lilies, which provide shade. Secondly, check your pond or aquarium when a sultry night occurs. For myself, I can't sleep anyway when conditions are muggy, so I would prefer to attend to my charges in the ponds. I find that a gentle spray from the hose (or even a lawn sprinkler) will alleviate the problem.

I have even heard of fishkeepers who have broken every 'rule' in the book by removing the fish to cold water and emptying the pond completely before refilling and returning the fish!

Tomorrow's AQUARIST



VISIT TO THE INSTITUTE OF OCEANOGRAPHY MONTE CARLO, MONACO

By:- Jonathan Moss

Hi's back again! Readers of T.A. will, no doubt, remember Jonathan's article on his visit to the Aquarium at Nancy (T.A. March, 1985) and Professor Condé's kind reaction published in T.A. in June 1985.

Well, Jonathan has visited yet another of Europe's leading Aquaria, this time in the idyllic town of Monte Carlo, home of the Monaco Grand Prix. He has now sent us the following report, along with a collection of photographs (some of which show great potential).

Clearly, if you are travelling anywhere in the vicinity of Monaco, the Institute of Oceanography at Monte Carlo is a definite 'must'.

If you visit any place which you think would be of interest to T.A. readers, drop us a line and send us some photographs. We would be happy to consider your report for possible publication on this page.



The impressive museum facade

"Le Musée Océanographique is situated in the sun-spoilt City of Monte Carlo in the small principality of Monaco.

The Aquarium is only a part of the Museum's exhibits. There is also a Whale Room, the Physical Oceanography Room, the Applied Oceanography

Room and many other exhibitions of marine history.

The entrance fee is at the moment 38 francs (now approximately £3.40) and 19 francs for a child (about £1.70).

Since the opening in 1910, the Aquarium has attracted passing tourists as well as experienced scholars of Marine Biology.

Apart from the fantastic sights of the fish, there are large windows, through which the glamorous southern coast of France can be seen, and dare I say it, these views are sometimes just as breathtaking as the fish.

The fish usually arrive by 'plane in plastic bags containing seawater and a good oxygen reserve, insulated to maintain the initial water temperature in which they lived. When they arrive, they are placed in special tanks, where they receive special attention, and after a period of adaptation, the fish are put in elaborately decorated tanks with their own species or with other fish, where they will live without danger.

Among the inhabitants are the guppies and mollies seen in the community tank back home and the Hawksbill Turtles, which look like they are merely gliding through the water, and the unusual Grongos (Italian for Conger Eel), which I doubt are as common as the aforementioned livebearers in the tanks at home. Incidentally, the massive Grongos, which measure up to 2.50 metres long and weigh up to 50kg, are kept among Greek Amphoras found off the Coast of Monaco.

Unicorn Tangs are a popular feature of some of the tanks. They are

white/grey in colour, have large eyes and what seems to be a long nose. These fish are from the Pacific and look as if they have starred in a cartoon.

The people of the Côte d'Azur are shown the Daurade (French for Gilt-head Bream) and the Loup de Mer (French for Sea Bass) which are local fish specialities and the Scorfano Bruno/Nero, or Rascasse (Italian and French for Scorpion Fish) which are main constituents of the fish soup.

At one end of the exhibition there is a large show of Cichlidae, where both parents and young can be seen.

My favourite of the show was the highly ornate Flying Scorpion Fish, *Pterois volitans*, which is highly venomous, from the Indo-Pacific.



The commemorative entrance plaque

In the entrance hall, with its beautiful marbled staircase, there is a large selection of souvenirs—key rings, books, shells and a numerous amount of postcards.

In the Oceanographic Museum, Monte Carlo, fish thousands of miles apart can be seen in the space of one floor."

the SCOTTISH AQUARIST FESTIVAL

Two fun loving members of
Bridgewater A.S. with their
winning tableau



Tableau by Edinburgh Aquarium and
Pondkeepers Society



Tableau by
Stirling Aquarist Society

The 13th Scottish Aquarist Festival was held at the Motherwell Community Centre on the 18th and 19th May 1985. Despite wet and windy weather over 3,000 people attended the show. They saw 18 Tableaux and 335 Entries. There were 25 Schools' Aquatic Art and displays by the Herpetologist Society, Goldfish Society of Great Britain, Catfish Association and Southern Livebearers Aquatic Group. All the traders had stands selling the familiar brands of Tetra, King British, Hagen and the new Atlantis Range. Dr David Ford of Aquarian Laboratories attended with his Advisory Service. Denis Barrett, John Scarle and Dave Thomson gave talks on their recent fish catching expedition to South America.

Two new awards were presented at the show: the Scottish Supreme Champion and the Open Show League. The Scottish Supreme Champion was sponsored by Brian Dainton of LMB Aquatics, Oldham. The class is open to any aquarist who has won the Best Fish in Show in any Open Show or Festival judged under the rules of the Confederation of Aquarists. Three classes are available in the Open Show League: a Single Fish, Breeders Egg-layers and Breeders Livebearers. John McEwan of D & G Aquatics, Glasgow supplied the trophies.

The Scottish Supreme Champion was a *Crisicichla strigata* owned by Mr A Wilson of the Scottish A.S. He received the new Shield from Brian Dainton and was also awarded the new Atlantis X550 power filter jointly from LMB Aquatics and Thomas's. John McEwan presented the Open Show League awards to John Wells of Dunfermline, M. & S. Poulton of S.M.T.A., and T. F. Ramsay of Scottish A.S.

The Best Fish in Show was a *Xiphophorus andersi* owned by K. Buckley of Bridgewater A.S. His club also won best Tableaux with an attractive garden scene complete with animated gnomes and music. The best class entry in the School's Aquatic Art was by Lanark Primary 7A Girls School, the best individual winner by

Colin Beaton of Lanark Primary School. The largest number of entries was of Catfish (B) and Breeders Egg-layers (D) and the Society gaining highest points was Dunfermline A.S.

The complete list of Trophy winners is as follows.

NOTICE TO THE AQUATIC TRADE

Will Companies please note that all aquatic products intended for review by Mr Ian Sellick should now be addressed to: 21 Tuffley Road, Westbury-on-Trym, Bristol 10

Trophy	Class	Winner	Society
NEL	Furnished Aquaria		Paisley
FNAS	Individual Furnished Aquaria	J. Bennet	Lanarkshire
Edinburgh Pondkeepers	Best Coldwater	K. Hunter	Workington
Earl of Motherwell	Best Guppy	W. M. Walker	Workington
George Henderson	Best Mollie	Walter Renton	Dunfermline
Dunfermline Silver Jubilee	Best Platy	K. Buckley	Bridgewater
Basingstoke Friendship	Best Swordtail	W. M. Walker	Workington
Scotia Aquatics	Best OAV Livebearer	H. Bowie	Edinburgh
Aquarama	Best Pairs Livebearer	J. Davidson	Dalkeith
Hutchings	Best Pair Guppies	J. Wells	Dunfermline
Stan Taylor	Best Barb	K. Fowler	Workington
Woodcock	Best Characin	P. & L. Sutherland	Livingston
Bob Ferguson	Best Rasboras	G. Colquhoun	Livingston
Friendship	Best Danio	Mr & Mrs Robinson	Scorpion
B.K.A.	Best Egg-laying Toothcarp	Alistair Purdie	Dunfermline
Belle Vue	Best Siamese Fighter	P. Hunter	Workington
Muirhouse	Best Gourami	K. Johnson	Dunfermline
Rift Valley	Best Rift Valley Cichlid	Henry Hoey	Dunfermline
Fotheringham	Best Dwarf Cichlid	Walter Renton	Dunfermline
Mark Aitken	Best Catfish A	P. & J. Wilson	Grangemouth
Ayrshire	Best Catfish B	J. Makin	Grangemouth
Aquarian	Best Shark	J. Wells	Dunfermline
Hartlepool	Best Loach	K. Fowler	Workington
Aberdeen	Best A.O.S. Egg-layer	M. Kyle	Dalkeith
Duncan	Best Aquarium Plant	S. Naismith	Lanarkshire
Fotheringham	Best Pair of Egg-layers	R. Thomson	Clyde
M & M	Best Breeders Livebearers	A. Lockie	Edinburgh
Lanarkshire	Best Breeders Egg-layers	M. & S. Poulton	Pondkeepers S.M.T.
Allan	Best Tableaux		Bridgewater
Tetramin	Tableau with Highest Points		Dunfermline
Aquarist	Best Fish in Show	K. Buckley	Bridgewater
Bobby Wood	Scottish Supreme Champion	A. Wilson	Scottish A.S.
L.M.B.			

AQUARISTS with salt-water aquaria had their interests aroused in the recent campaign for establishing marine statutory reserves along the best parts of Britain's 6,000 miles of coastline. Already voluntary conservation society reserves exist for marine life at Kimmeridge Bay on the south Purbeck coast of Dorset, around Skomer Island off Pembrokeshire, St Abb's coast on the Berwickshire coast its kelp forest with many sea-urchins, sea-slugs, sea-squirrels as well as fish, and Roseland in the Fal estuary of Cornwall. Saltern Cove, Torbay is another. Fortunately not the Loch Ness monster centre at Drumadocht!

Priority areas for consideration for new state marine reserves include the Isles of Scilly, Lundy, the Marloes peninsula of Pembrokeshire, North Wales, Bardsey Island and adjoining Llyn peninsula as well as the Menai Straits, and Scotland's Loch Sween in the Sound of Jura (Keapdale). Among other things, they aim to control shell, sea-fan coral, ormer, lobster and sea-urchin collecting, spearfishing, pollution and speedboats; but they ran into difficulties over the rights of fisheries for lobsters, crawfish, etc.

The first 'marine park' was created nearly 50 years ago in Florida. Israel has one famous for its Red Sea fish and corals at Eilat. 150 marine parks exist in the world, 30 in the Mediterranean where 30 more are planned. People most affected will be the present collectors at or below low-water—school parties, amateur aquarists, skin-divers and commercial fishery and trading interests. In some waters, sea-fan and Devonian cup corals, sea-urchins and ormer shells have been reduced by over-collecting.

Professional shell-dealers in Britain don't aspire to the prices of those advertising their wares from Tahiti and Australia to the inevitable money-making U.S.A. The trade chiefly concerns the gullibility of day-trippers assuming that these and other curiosities of the sea purchased in Scarborough or Blackpool are products of the local

*From a
Naturalist's
Notebook*



by Eric Hardy

seaside. Most marine aquarists now favour tropicals like clowns, surgeonfish and butterflies. They would be more affected by marine reserves abroad; but these should not seriously affect supplies of popular fish, of which Singapore is a notable trading centre.

Focus on Marine Life is an 8-page illustrated folder-introduction to the

natural history and conservation around our shores, obtainable free from the RSNC and the Marine Conservation Society, The Green, Nettlesham, Lincoln LN2 2NR. We have over 150 bony fishes and over 40 cartilaginous sharks and rays. The main losses have not been from collecting so much as alteration of natural habitats, like infilling and reclamation along the Sussex and east coasts, or the construction of harbours which wiped out the natterjack in the Mersey estuary.

Amateur aquarists are not so blasé as to miss the opportunity of these reserves for watching fish, above or below water, now that so few cold water sea-fish aquaria exist beyond Plymouth, compared with once famous collections at Blackpool, Southport and Brighton. Just watching mackerel and common squids swimming all their lives in order to keep off the bottom sets one thinking about the problem of keeping up in the sea without a swim-bladder. Some sea-creatures secrete or absorb buoyant

Continued on page 52

Built in 1800, this tidal fish pond, 8ft deep at Port Logan, Mull of Galloway, makes a natural aquarium where fish are here being fed with limpets. It was made to provide fish food for the family



Company Profile

Reflections Aquatic Centre



Reflections attractive shopfront

MARTYN HAYWOOD is well known to *Aquarist & Pondkeeper* readers through his excellent articles and Spotlight features on marine fish and invertebrates over recent years (there are some more in the pipeline). He is also the author of a successful book, "Popular Marine Fish for Your Aquarium", published by Foulsham (ISBN: 0-572-01163-6), and used extensively by marine aquarists in this country.

This book was published in 1982, some time before Martyn started his preparations to set up the Reflections Aquatic Centre in Aldershot. The shop opened to the public on 1 October 1984 and has already built up the sort of reputation that one would associate with someone of Martyn's ability, enthusiasm and dedication.

The shop is large, roomy and attractive and is situated in North Lane, not far from the Aldershot F.C. ground.

During our visit, there was a constant flow of customers, both local and from well outside the area, the latter representing a steadily increasing number of specialist aquarists who have already become aware that Martyn regularly imports a large selection of unusual and difficult-to-find species.

Although some of these species are also available elsewhere in the country, there are very few shops which will regularly stock such a wide range simultaneously. At Reflections, one can expect to find, at least, 30 of these on any one day.

Martyn attempts to maintain this high level of variety by receiving at least two deliveries of fish every week and by running about 130 tanks, the smallest of which holds over 20 gallons. To give you an idea of the range of freshwater tropical species which you can expect to find (over and above all the more common ones), here is a sample of the list that was available on the day of our visit:

Characins

Pirabacus dentatus, *Megalomphodus megalopterus*.

Catfish

Synodontis angelicus, *S. contractus*, *S. decorus*, *S. flaviventris*, *S. koenig*, *Corydoras robbinsi*, *C. acutus*, *C. barbatus*, *C. spilargenteus*, *Heterobagrus bacourte*, *Anadoras grypops*, *Euchilichthys*, *Adult Sturionia*, *Chaetostoma*, *Parotocinclus*, *Farlowella*, *Pecholia* and *Hypostomus*.

Killifish

Protocarpus, *Aphyosemion* and a selection of *Lamprologinae*.

Cichlids

Apistogramma caesi, *A. geisleri*, *A. reticulosa*, *Pelvicachromis subocellatus*.

Barbs

Laubuca dadiburjori, *Barbus pentazona*, *B. filamentosus*.

Anabantoids

Ctenopoma ansorgei, *C. fasciolatum*, *Sphaerichthys ophromenoides*, *Trichopsis schalleri*, *Trichogaster pectoralis*.

Add to the above the range of commoner species and Martyn Haywood's stocks of freshwater tropicals averages around 300 species. In addition, there are always between 50 and 60 species of marine fish, 8 marine invertebrate tanks and a selection of coldwater fish, including large Moors, Ranchus, Calico Fantails, Orandas, Comets and Shubunkins, plus a pond full of small-to-medium Koi.

The shop also offers a comprehensive assortment of dry goods, books, live and frozen foods, pond plants, living rock, seaweeds and 50-60 species of tropical freshwater plants, some of which are only rarely seen in UK.

Reflections Aquatic Centre has been designed with the disabled aquarist in mind. Consequently, there is a ramp leading up to a wide door which is large enough to allow a wheelchair comfortably through. The aisles between the rows of tanks and the dry good shelves are equally spacious.

Since the shop is at street level, nothing is out of reach, making it an ideal place for wheelchair-bound aquarists to visit. This point is one that is regularly being pushed by Nick Lushchan, the author/compiler of our



A nice pair of Clownfish photographed at Reflections



The dry goods area is both spacious and well laid out

bimonthly series, Helping Hand. He was understandably delighted to hear of the facilities at Reflections.

Opening times are a bit unusual, so why not make a note to avoid disappointment?

Mondays	— Closed
Tuesdays	
Thursdays	— 10 a.m.-6 p.m.
Saturdays	
Sundays	
Wednesdays	— 1 p.m.-8 p.m.
Bank Holiday	
Mondays	— 10 a.m.-6 p.m.
Tuesdays	
(following Bank Holiday	
Mondays)	— Closed

For further details, contact Martyn Haywood at Reflections Aquatic Centre, 232 North Lane, Aldershot, Hampshire. Tel: Aldershot (0252) 314437.

NEXT MONTH

GEOGRAPHICAL REPLACEMENT SPECIES AMONG BUTTERFLY FISHES by Barry Black

SPOTLIGHT ON THE LONG-NOSED ELEPHANT FISH (*Gnathonemus petersi*) by Jack Hems

CREATURES OF THE SARGASSUM by Dr. R. Goldstein

THE MUDSKIPPER by Jørgen Wimo

STARTING AN AQUARIST SOCIETY by William Hogg

Continued from page 50

substances, others change the chemical constitution of their body fluids.

Gelatinous jellyfish, sea gooseberries, sea-butterflies, salps and sea elephants control their densities and have their body fluids isotonic with sea-water, replacing their heavy sulphate ions partially with a lighter chloride ion. They float because their organic matter is less than 1% of their bodies, thus aiding the few milligrams lift for every c.c. of water. Two thirds of the oceanic squid Cranchidas comprises a huge floatation chamber in which the usual sea-water salts are replaced by lighter ammonium chloride, acting like a bathyscape. Gas in the Nautilus shell has nitrogen, but no oxygen. Sharks have a quarter of their body composed of enormous fatty livers, regulating the amount of fat to balance

their weight. Cuttlefish use their "bone" like a submarine's bouyancy tanks. They have gas-spaces and by pumping water in or out of the spaces, control its density.

One's own marine aquaria began with local grey mullet and various crabs and prawns from the Wirral coast. I learned that to survive in an aquarium, herrings had to be caught with great care in a bucket from the fishing net, to avoid their scales rubbing off. It is over 50 years since I wrote in the Dundee Courier one of the earliest "stories" of the tourist claim for a Loch Ness Monster. Despite Peter Scott's ambitious addition of a scientific name and the so-called American Academy of Applied Science expedition, my recent visit to Loch Ness and the monster research museum in

Inverness added nothing to my original reporting of people's early assumptions. There is nothing but assumption that all the reports and sightings are the same thing, or that any was alive. The loch didn't exist in the days of suggested early Plesiosaurian reptiles, and for a primitive species to survive to modern times a large breeding stock would be necessary, like the hundreds of coelocanth caught since pioneer deep sea-trawling discovered that primitive species off South Africa. Also, the original photo (whatever it depicted) was published upside down because it made a better press picture. This year I was leading a field-group of naturalists hence, on the shores of Loch Ness, we parted from a friend's coach of tourists in strongly differing views.



From Aquarists' Societies

Monthly reports from Secretaries of aquarists societies for inclusion on this page should reach the Editor by 3rd of the month preceding the month of publication.

Dates for the diary

AUGUST

4th August: DORCHESTER A.S. 5th open show at the Boy's Brigade Hall, Weymouth Avenue, Dorchester, Dorset. Annual trophies for each of the thirty-three classes. Highest Pointed Visiting Society and many more. Schedules available from Mr. B. Symes, Show Secretary, 3 Arnhem Green, Dorchester, Dorset DT1 3PE, or phone Dorchester 42817.

4th August: BLACKPOOL AND FYLER A.S. open show at St John Vianney School, Glassonbury Avenue, Blackpool. Sponsored by Arncliffe Nimrod Products. Also an auction. Further information from Mr. C. MacDonald, 109 Kensington Road, Southport, Merseyside. Tel: Southport 41392.

4th August: GRIMSBY & CLEETHORPES 14th annual open show to be held at T.A. Centre, Westward Ho, off Bargaat, Grimsby. **10th & 11th August: YORKSHIRE AQUARIST FESTIVAL** Doncaster. Racecourse. Details and Schedules from Mr. N. Ballan, 11 Sherburne Drive, Pocklington, Yorkshire YO4 2ED. Tel: 07592 3177.

10th August: BRITISH KOI KEEPERS SOCIETY (Leeds section) present their 10th national show at Langtons Gardens, Billes Lane, Hornchurch, Essex. Further details from Mrs. M. J. Bishop, 5 Green Lane, Barnwood, Leigh-on-Sea, Essex SS9 5AP. Tel: 0702 522368.

10th August: TYNE & WEAR PASSENGER TRANSPORT EXECUTIVE A.S. open show at Walsend Community Centre, Vine Street, Walsend, North Tyne. Further information from C. B. Howell, 89 Healy Avenue, Walsend, North Tyne. Tyne & Wear. Tel: Tyneide 2340018.

20th August (Bank Holiday Monday): 9th Yorkshire Koi Festival at Harewood House, near Leeds, presented by the **YORKSHIRE KOI SOCIETY**. Entry forms and trade stand information from S. E. Best, 58 Broom Crescent, Rotherham, S. Yorkshire. Tel: 560 255.

21st August: SCOTTISH GOLDFISH GROUP open show at Davidson Mainz Parish Church Hall, Quality Street, Edinburgh. Further details from Charles Didcock, 12 Greenbank Drive, Edinburgh. Tel: 031-447 4968.

21st August: G.S.G.B. (Scottish Group) open show at Davidson Mainz Parish Church Hall, Quality Street, Davidson Mainz, Edinburgh. Further details from Charles Didcock, 12 Greenbank Drive, Edinburgh. Tel: 031-447 4968.

SEPTEMBER

1st September: PRESTON & DISTRICT A.S. 3rd annual open show at St. Catherine Beckwith Club Rooms, Deepdale Road, Preston. Booking in 12-1.30 p.m. Bazaar will again be presented for 1st, 2nd, and 3rd places. Refreshments, combos, raffles, etc. Information and schedules from Mr. J. Taylor, 140 Daisy Meadow, Clayton Brook, Preston.

1st September: SALISBURY & DISTRICT A.S. open show at the Activity Centre, Wilton Road, Salisbury, Wilt.

1st September: SALISBURY & D.A.S. open show at the Activity Centre, Wilton Road, Salisbury, Wiltshire. Further details from Mr. I. Goddard, 8 Pennys Crescent, Pondingridge Ham.

4th September: SURREY MARINE A.S. 2nd meet at 8 p.m. at the Laker's Hotel, Redhill, Surrey. Enquiries to Miss J. Sanders, 12 Shore Lane, Reigate, Surrey RH2 7HL.

8th September: HUDDERSFIELD TROPICAL FISH SOCIETY open show at Slaithwaite Civic Hall, Slaithwaite, Huddersfield.

8th September: EVESHAM A.S. open show (to F.E.A.S. Rules) in Evesham Town Hall, High Street, Evesham, Worcester. Schedules from: Mr. K. Harrison, 3 Manor Farm Cott, School Lane, Middlekilstone, Evesham, Worcs. WR11 5WZ. Tel: (0584) 831724. (S.A.E. please).

8th September: DARLINGTON A.S. 3rd open show, Eastbourne Comprehensive School, Darlington. Further details K. Rodway, Darlington 487581.

8th September: HUDDERSFIELD A.S. open show at Slaithwaite Civic Hall, Huddersfield. Sponsored by Aquarian Fish Foods. Further details from Pamela Town, 187 Abbey Road, Shepley, Huddersfield HD7 8DY.

8th September: HODDINGBURGH A.S. open show at St. Rude's Community Centre, Orwell Terrace, Dalry, Edinburgh. Further details from J. Milligan, 22 Stevenson Avenue, Edinburgh. Tel: 337 6563.

12th, 14th, 15th September: NESHKIGOH 1983 (Koi Festival) at Gregory's Boon, Toton Lane, Studfield, Notts. For further details ring 0602 209496 or 0942 724896.

14th September: WALTHAMSTOW & DISTRICT A.S. open show at the Gladstone United Reformed Church Hall, Buxton Road, Chingford, E.4. Details from Dave Millins 01-531 0906.

15th September: NORTHAMPTON AND D.A.S. open show at the Gladstone Centre for the Disabled. Further details from Mr. B. Harris, 22 Latham Court, Billings, Northampton NN3 4BD.

15th September: NORTHAMPTON AND DISTRICT A.S. open show at the Gladstone Road Centre, Gladstone Road, Northampton. Further details from Chris Swain, 13 Weypost Court, Northampton NN3 4LN. Tel: Northampton (0604) 465058.

15th September: STOCKTON A.S. open show at Billingham Community Centre, The Causeway, Billingham, Cleveland. For further details contact Mrs. M. J. Neasham, 27 Denshaw Close, Fairfield, Stockton, Cleveland. Tel: 686332.

16th September: ST. EDMUNDSBURY & DISTRICT A.S. open show at the Howard Community Centre, Bury St. Edmunds, Suffolk. Further details from Show Secretary, Mr. J. Maloney, 75 Northgate Street, Bury St. Edmunds, Suffolk (0774-4606).

21st September: BRISTOL A.S. Coldwater fish show, St. Ambrose Church Hall, Streetford Road, Whitehall, Bristol. Open 3.00-5.30 pm. Schedules and further details from Show Sec. Ian Midson, 87 St. John's Lane, Bristol BS3 5AB. (0272-712363).

21st September: PLYMOUTH & D.A.S. open show, at Trinity United Reform Church, Tor Lane, Harty, Plymouth. Show Sec. Mr. W. Randle, 47 Farringdon Road, 58, Tudea, Plymouth.

21st September: HOUNSLOW AND DISTRICT A.S. open show at Hounslow Youth Centre, Kingsley Road, Hounslow, Middlesex. Further information, Pete Purze, 11, Lyons Road, Hounslow, Middx. Tel: 01-570 0634.

22nd September: NORTHERN AREA GROUP C.A.G.B. Catfish show at the Library Theatre, School Street, Darwen, Nr. Blackburn. 24 classes, 82 trophies, 4 cards and prizes in each class. Lecture by Dr. C. Andrews, trade stands, plus catfish auction. Booking 11 a.m. to 1 p.m. Further details, S.A.E. to Mr. J. T. Morris, 102 Cole Lane, New Springs, Wigan, Lancs. Tel: 42386.

28th September: EAST LONDON AQUARISTS AND PONDKEEPERS ASSOCIATION open show at Central Hall, Cecil Road, Chadwell Heath, Romford, Essex. For further information on the Club and this show, please ring Hazel and Martin Howells on 01-590 1824.

28th September: BRECKLAND A.S. open show at the Memorial Hall, Derryham, Norfolk. Further details from: Mrs. S. Frepp, 18 Wood Drive, Beely Derryham, Norfolk. Tel: 860728.

28th September: THROCKLEY A.S. open show at Orange Welfare Association, Throckley. Further details from J. English, The Cottage, Henderson Fibers, Throckley, Newcastle-on-Tyne.

28th September: WOLVERHAMPTON A.S. open show to be held at Pendleton High School, Marsh Lane, Foodhouses, Wolverhampton. Our Show Sec. is Barry Jays, 23 Hargreave Close, Pecon, Wolverhampton. Tel: 0902 750144.

28th September: DARWEN A.S. open show at the Darwen Library Theatre. Details from D. T. Massey, 22 Green Street East, Darwen, Lancs. BB3 3HY.

OCTOBER

8th October: BRISTOL TROPICAL FISH CLUB 'Silver Jubilee' open show at All Saints Church Hall, Grove Road, Fishponds, Nr Bristol. Schedules (from mid-June) and other information from Mr. T. E. Davis, 264 Badminton Road, Coalpit Heath, Nr. Bristol BS17 2QU. Tel: Wottonhouse 754432 s.a.e. with application slips.

8th October: SUNDERLAND open show to be held in the Prentiss Community Centre, Penaywell, Sunderland, Tyne Wear.

15th October: PRESTON & DISTRICT A.S. Public Auction of fish, plants, and equipment, at the Lancashire Poly in Preston. Refreshments and excellent parking. Booking in of lots 12.00-1.30. Auction to start at 1.30 p.m. with Derek Harrop your auctioneer. Further details from Mr. J. Taylor, Secretary. Tel: 0772-913079.

18th October: BLYTH A.S. 1st open show at Ridley High School, Blyth, Northumberland. Further details from Stefan A. Holmes, 16 Cottingham Green, Newsham, Blyth, Northumberland NE24 4TY.

18th October: WHITBY & DISTRICT A.S. open show at the Spa Pavilion, Whitby. Details and schedules available from Mr. S. Burgess, 9 Mickley Drive, Whitby. Tel: 6947 604278.

18th October: TORBAY A.S. open show at Newton Abbott Community Centre. Further details from Mr. L. Stevens, 77 Howards Way, Wildwoods Copse, Newton Abbot, Devon. Tel: Newton Abbot 64273.

18th October: ILFORD & DISTRICT AQUARIST'S & PONDKEEPER'S SOCIETY Annual Exhibition of Fish at the Ilford Town Hall, Ilford, Essex. Doors open 11 a.m.

20th October: SOUTH LEEDS A.S. open show at Collingham Memorial Hall, Collingham, Nr. Leeds. Further information from Mr. Tomkinson, 6 Sissons Row, Middleton Leeds LS10 4J7.

27th October: TYNE TEES AREA ASSOCIATION (F.E.A.S.) open show at Peter Lee Leisure Centre, Beching until 2 p.m. Further details from Mr. P. Barrow, 16 Woodgate Gardens, Bill Quay, Gateshead, Tyne & Wear NE10 6ST.

27th October: WEST CORNWALL FISH-KEEPERS first open show at Camborne Community Centre. Further details from show manager, A. N. Ellis, 19 Pengwern Road, Camborne, Cornwall. Tel: 0206-717720.