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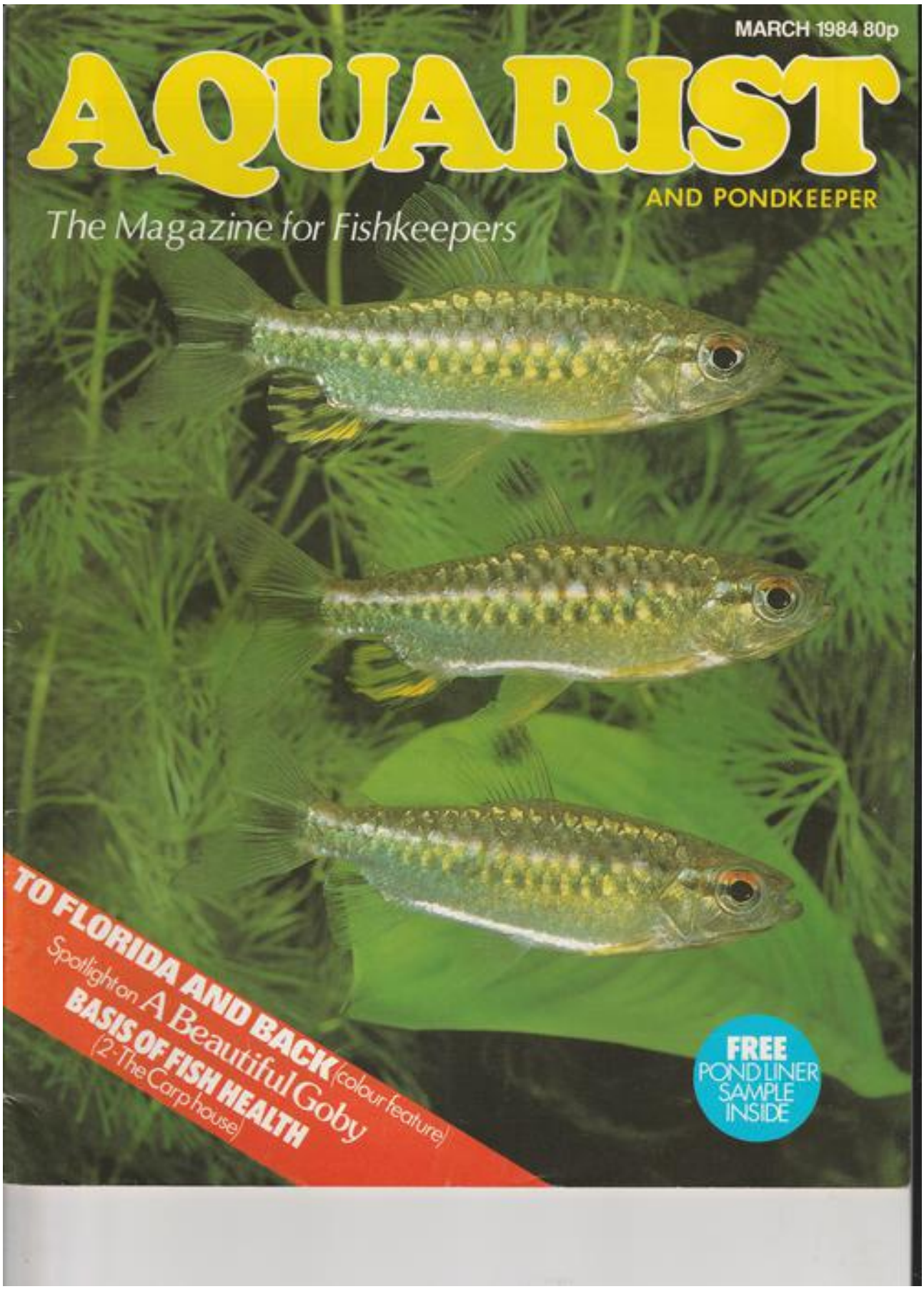
AQUARIST

AND PONDKEEPER

The Magazine for Fishkeepers



TO FLORIDA AND BACK (colour feature)

Spotlight on A Beautiful Goby

BASIS OF FISH HEALTH (2-The Carp house)

FREE POND LINER SAMPLE INSIDE

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FIRE SALAMANDER

by Christopher Mattison

S. salamandra terrestris

THE Fire Salamander is one of Europe's most distinctive amphibians and it is impossible to confuse it with any other species. It measures about 8 inches in total length, of which one-third is tail. Its limbs are thick and powerful and end in four digits, or 'toes'. Its coloration is striking to say the least: the glossy black skin is liberally marked with bright yellow (occasionally red or orange) markings, the arrangement of which varies according to the geographical origin of the specimen. Briefly, animals from Belgium, France, the Pyrenees and western Germany have two broad yellow bands running right down the back, eventually joining on the tail, whereas animals from Spain, Portugal and western Europe are covered with irregular yellow blotches. In either case, the pattern is very vivid and serves to warn would-be predators that the salamander is poisonous. The poison comes principally from two large glands (the paratoids) which are prominently situated behind each eye and which may be identified by a number of pores on their surface. The secretion which they exude is white in appearance, and sticky, but captive animals only rarely produce this. (I once witnessed a large Bullfrog attempting to eat a salamander: it held the head for several seconds and then dropped the animal, which was unharmed. Traces of the poison could be seen around the paratoid glands, and the frog began to wipe its mouth with its fore-limbs. About one minute later the frog began to convulse and it died shortly afterwards. This is the only time, over many years of keeping a large number of salamanders that I have ever seen them defend themselves in this way.)

The natural habitat of the Fire Salamander is shaded and damp woods, usually alongside a river or stream, where they hide by day under rocks or in burrows in the loose soil. They emerge on damp nights to forage for slugs and earthworms, which form their main prey, and where they occur they are usually present in quite large numbers.

In captivity their accommodation should simulate their natural habitat as closely as possible. This may be achieved by utilising a fairly large, e.g. 36 in. × 15 in. × 12 in., aquarium, covered to a depth of 3-4 in. with leaf litter. On this may be arranged flat mossy stones, pieces of bark and dead leaves. The substrate should be sprayed regularly to prevent drying out, but it should not be allowed to become water-logged. A temperature of 70°F should be regarded as maximum, 55-65°F probably being ideal, and they may be hibernated in winter by keeping them at about 40°F in a container of moist leaves or moss. If an outside enclosure is available, for instance, a cold-frame or cool greenhouse, they may be kept under semi-wild conditions very successfully in Britain. An ample supply of slugs should be provided for them.

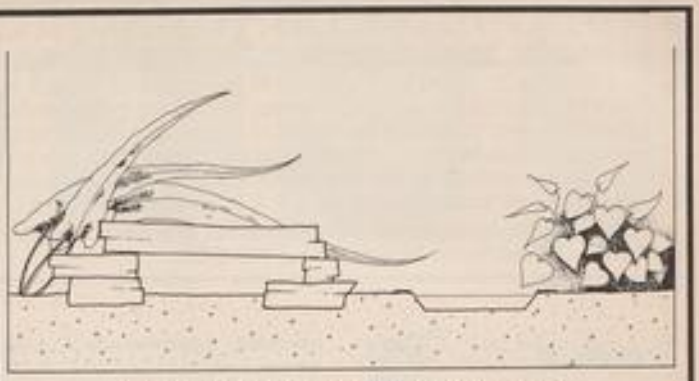
Breeding may take place under optimum conditions if both sexes are present. These may be told apart by examining the base of the tail: in males there is a very obvious swelling around the cloaca, which is not the case with females. In addition, the latter tend to be more heavily built.

Their breeding habits are rather unusual. Mating takes place on the land, the male laying a small packet of spermatazoa (called the spermatophore), and then manouvering the female until her cloaca is directly over it. She then takes up the spermatophore and the mating process is complete. The eggs are therefore fertilised internally, as in most newts and salamanders, and development continues inside the female's body until the young tadpoles are well-formed, complete with four legs and a pair of feathery gills. At this stage

the female goes to a shallow part of a stream or pool and, by sitting with the hind part of her body in the water, gives birth to the larvae, numbering from 15-50. The gestation period varies tremendously, according to the altitude, and therefore the temperature, at which the animals are living, and it appears to be quite common for females to retain their young throughout the winter (when they are hibernating) and 'give birth' the following year. In the vivarium, it is of course necessary to provide a shallow dish of water for this to take place successfully.

The tadpoles are carnivorous and require large supplies of *Daphnia*, Brine Shrimp and/or *Tubifex*. Because they are born at such an advanced stage, the tadpoles metamorphose very quickly, and as they do so their mottled bronze coloration changes to that of the adults. The young salamanders are quite easily reared on a diet of White-worm and small earthworms.

A number of subspecies of the Fire Salamander have been described, some of which are of rather dubious validity.



Suitable vivarium set up for the Fire Salamander

The most distinctive forms are listed below:

European subspecies of the Fire Salamander, *Salamandra salamandra*.

S. s. salamandra	
E. Europe, Asia	blotched
S. s. bejarae	
Spain	blotched
S. s. cornica	
Corsica	blotched
S. s. fastuosa	
N. Spain, Pyrenees	striped
S. s. gallaica	
Portugal, NW Spain	blotched
S. s. gigliolii	
Italy	blotched
S. s. terrestris	
N and W Europe	striped

Habitat of *S. salamandra* in the *Schwarzenwald* (Black Forest)

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. C. Andrews

Tropical

festive cichlid . . .

What are the preferred aquarium conditions for the festive cichlid?

The festive cichlid (*Cichlasoma festivum* or *Mesonauta festivus*) comes from the Amazon in South America. It is a beautiful and decorative fish that prefers a large, well planted tank, with plenty of rocky refuges. They are best kept with other similar sized, peaceful cichlids (eg. angelfish). Their tank should be well filtered and regular partial water changes carried out.

The festive or flag cichlid may reach 10-12 cm. in length, prefers a steady temperature around 25°C and should be fed on *TetraMin* and *TetraCichlid*.

moving home . . .

I am shortly moving house and I wish to know the best way to move my three foot community tank?

To begin with you should have a look at the book 'Your Aquarium, Your Vacation, Your Relocation' by G. S. Dow (TFH, about £4·00). Although somewhat 'Americanised', it is still quite useful.

Naturally the tank will have to be emptied—but keep the water (if you can) to fill your tank at the other end. The tank and equipment should be carefully packed and the plants transported (just damp) in polythene bags, wrapped loosely in several layers of newspaper (for protection).

The fish can be carried in large, strong, polythene bags, containing ¼ aquarium water and ¾ air. Do not feed the fish for 24 hours before the journey (or during the journey!), this leads to less 'pollution' in the transport bags, which should not be overstocked and kept out of direct sunlight in insulated boxes (eg. sturdy cardboard boxes with plenty of newspaper). If properly packed they (the fish) should be OK for a 12-24 hour journey.

When you get to the 'other end', try to refill the tank with at least some of the 'old' water, topping it up with fresh tap water and brought to the correct temperature with a little boiling water. Check that the pH and water hardness at your new home is not too different to what they are used to—if it is you may have to acclimatise them over a few days.

Do not forget to float the fish bags (to equalise the temperatures) before you release the fish.

d. i. y. tanks . . .

I am very interested in making my own tank. Can you give me some information?

The best thing I can do is to refer you to 'Making Your Own Aquarium' by J. Hansen (Bell & Hyman, about £7·00). This is an excellent book, packed with useful information. **C.A.**

Coldwater

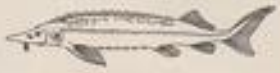
trees . . .

I am thinking of moving my small pond to another site in the garden. It will be under some trees, one of which is a Laburnum. Could this be dangerous?

All parts of a laburnum are reputed to be dangerous. If you must use the site you will have to stretch a net over the pond in the autumn. However, the mesh will have to be small to catch the very small, hard seeds. Leaves from other trees could also tend to upset the water if too many were allowed to remain in the pond all winter. It must be realised that the smaller the pond the greater would be the concentration of poison from any source.

the sterlet . . .

I have recently bought a pretty little fish called a Sterlet. It is four inches long. Can you tell me anything about it please?



The Sterlet (*Acipenser ruthenus*) is a member of the Sturgeon family and can grow to a metre in length. It is found in rivers flowing into the


Arthur Boarder


Vivian De Thabrew


Hilda Allen


Graham Cox


Eberhard Schulze

Black Sea and the Sea of Azov. It is a bottom feeder as is indicated by the four barbels. It is carnivorous and feeds on live foods such as snails, worms, *Tubifex*, etc. It requires a fairly large tank as it is very active, swimming over the bottom in search of food. The compost needs to be fine sand and no sharp rocks or stones should be in the tank. It is not easy to keep in an aquarium for long and so is not commonly kept by aquarists. I know of no book dealing solely with this fish nor any society concerned with it. It should be included in any large book on Freshwater Fishes.

breeding goldfish . . .

My goldfish spawn in the pond every year and I see many fry among the water weeds but none ever grow and soon disappear. I have tried taking some and putting them in a tank but these die as well. Can you help please? I have a lot of frogs, toads and newts in the pond every year.

The fry may be safe for a time in the pond among dense water plants but once they swim around they are likely to be eaten by the larger fishes. Frogs and toads do not normally eat under water but newts do. A smooth newt can eat an earth worm as long as itself in quick time and as they lie in wait among water plants they are ready to snap up anything moving that may come their way. Try to remove the newts as soon as they appear in spring.

As for losing the fry in a tank, this must be from wrong treatment. When very tiny they may be crowded in a tank but as they grow they must have sufficient swimming space and, of course, the right type of foods according to their growth. Get my book Coldwater Fishkeeping as it contains all you need to know about breeding fishes.

A.B.

Plants

coldwater plants . . .

Could you please suggest suitable plants to grow in a coldwater aquarium?

Most coldwater plants are fairly compatible, and I suggest the following list of hardy plants to choose from at your local aquatic dealer: *Cardamine lyrata* (Meadow-Cress or Bitter Cress), Hair-Grass (will grow in tropical or coldwater tanks), *Hydrilla verticillata* (Water-Serpent), which is an attractive oxygenating plant, *Hygrophila polysperma* (Long-leaved Waterwort), *Lobelia dortmanna* (Water-Lobelia), *Ludwigia palustris* (Water-Purslane), *Lysimachia nummularia* (Creeping Jenny, Moneywort), *Mentha aquatica*, *Myriophyllum alterniflorum* (Alternate-flowered Water-Milfoil) and the striking Stratiotes aloides (Water-Soldier).

V.T.


Eleocharis, Hair Grass

Koi

filters . . .

My outside multi-chamber filter is proving to be a constant source of trouble by becoming blocked and requires frequent clearing. Why do I have this problem when there are many similar filters in use or offered for sale?

I cannot enter into the arguments about such filters but I do receive letters complaining about their usefulness.

In ponds containing only small Koi, or other fish that rarely need any form of filtration once the balance of stock to water and plants has been established, there should not be a problem. However, the requirements rapidly change with medium 9-12 in. and large 18-24 in. Koi and can be further aggravated by the number of Koi some people believe they can safely keep in relation to the surface area and volume of the pond.

Outside filters of the type you describe are not maintenance-free in the same way as any properly constructed under-gravel filter within the pond.

The total area of the chambers presented to the passage of water may be in accordance with the generally accepted rule for under-gravel types, but it must be recognised that the effect is different by the water having to pass through only the very small area of each successive chamber.

Thus, the filter media and chambers can become progressively blocked, and in many cases the flow rate is too great so that a path develops through the media leaving the remainder to degenerate into a blockened anaerobic mass adding to pollution in the pond.

The situation may be alleviated by allowing the first chamber for settlement of algae and waste products from the pond before passing through large to small grades of gravel or crushed stone in the following chambers.

Even so, the settlement and other bays will require frequent cleasing or flushing and ideally a bottom drain should be fitted to each. The frequency of servicing will vary according to all the factors involved of pond volume, number and sizes of fish and water temperature.

"In-built" U/G filters, such as the one visible on the left of the photograph, are easy to maintain

bright colours in koi . . .

I am disappointed that my brightly-coloured Koi tend to fade or otherwise deteriorate as they grow, yet I have picture books showing very large Koi with magnificent coloration and patterns. Is there anything I can do to maintain the colour of my small fish or improve the now large ones?

Your query is a fairly common one and one that concerned myself many years ago when starting with Koi. It was only by observation, fact-finding and experience that a whole number of reasons became evident for what is really a natural course of events for any living thing.

As regards Koi, the problems start with the inherent quality (or not) of the parent breeding stock, through various cullings to sort out those with average potential to be exported in their tens of thousands, leaving relatively few high-grade Koi for growing on in protected conditions.

Japanese breeders are experts in judging the future potential of Koi when young, and comparatively few are cosseted throughout the winter in the hope of producing valuable Koi for sale at the next autumn auctions.

The pictures of Koi you have seen in Japanese books are undoubtedly in the latter category and the very best fish can only belong to the wealthy who can and do pay many thousands of pounds for a champion Koi. Some owners seldom do anything but pay dealers for both the fish and necessary pond servicing and thus become collectors in the true sense of the word.

I doubt if that aspect is your problem, it is certainly not mine!

In Japan, Koi tend to be at their best when 3 to 4 years old and colours and patterns have generally stabilised; here, in our less favourable climate it may take 4 to 5 years with imported small or home-bred fish. During that time many changes in patterned Koi may occur and in particular the colour red is probably the most difficult to be maintained.

I have not the space to explain what happens in the endless varieties of coloured Koi now available, but excessive sunlight, apart from causing sickness as it does with humans, will result in fading red areas. It is for this reason Koi are at their brightest in winter or where the pond is shaded.

Certain animal and vegetable foods do contain colouring properties and since at least the mid 1970s various

Good-quality Koi are essential if bright colours are to develop

makes of specially prepared pellets have been available, including those used in Japan. Of necessity they are slow acting and any improvement effected lasts only as long as such expensive foods are given.

In short, it is not possible to get quality which is not there in the first place, but improvements might be made with shading your Koi from direct, strong sunlight, selecting a good, varied diet and when it occurs in summer allowing mildly-green water always provided it is kept under careful control with the aid of filtration and sensible periodic water changing.

swim bladder problem . . .

One of my Koi seems to spend most of its time on its side and has done for over eighteen months. I have tried a couple of treatments but the effect is only temporary and I would be pleased to learn of a permanent cure.

Your Koi obviously has a swim-bladder problem for which the accepted treatment is warmer shallow water with cooking salt added at the rate of ½ ounce per gallon. Treatment can last for 7-10 days. This is often effective in the case of a chill, but in view of the weather at the time you wrote to me this seems highly unlikely. There is also the fact that the fish has been in trouble for a long time and this suggests either a congenital deformity or malfunction of the swim-bladder which is unlikely to improve. I can only advise you to consider destroying this small Koi, but it should be despatched in a

humane manner please. Fish should never be flushed down toilets nor should they be dumped in the nearest open water, but unfortunately I have heard of both methods of disposing of unwanted fish, including Koi. **H.A.**

Marine

colourful wild clowns . . .

I have pursued marine fish-keeping for the past 8 years and I was wondering if you could confirm or refute an observation I have made. When I first started in the hobby, clownfish seemed brilliant, perfectly formed and generally glowing with vitality. The majority of clownfish today seem to fall short of this description. Is this a fair comment or have I become more discerning?

I understand that the majority of clownfish available in the U.K. are bred in the U.S.A. (Q1) Surely a fish breeder will (and must) be less discerning than mother nature when it comes to culling? (Q2) Also, are breeding pairs taken from bred or wild stock? Many freshwater species are now less striking than can be found in the wild due to prolonged use of 'domestic' fish for breeding.

On the plus side, I think that commercial breeding is to be applauded and given the choice between slightly below par fish (mother nature only producing champions) and stripping the coral reefs there is no contest. The answer is surely that commercial breeders can only economically supply average fish and if you want 'champions' you must breed them yourself.

I would welcome your comments on this letter and recollections of the general quality of clownfish 8 years ago (approx.).

I agree with almost everything which your letter states. However, please allow me to make the following observations:

1. Many companies, my own included, annually import many **wild** clownfishes from all over the Indo-Pacific area. *Amphiprion percula* and its various races or sub-species is most commonly obtained from Malaysian waters and Filipino waters. Although the latter specimens are the most colourful, even the Malaysian *percula* clownfish is a vast improvement on the average tank-bred specimen if coloration is your yardstick of excellence. On balance I agree with you that, at the moment, wild fishes are hardier, more vital and more colourful.

A beautifully marked Clownfish

Some years ago I published a paper in German and English which attempted to outline my own and my Company's successive breeding coralfishes since the 'Sixties'. At the present moment, the English language version is out of print.

2. I am afraid that I have always found it difficult, even if only on grounds of common-sense alone to go along whole-heartedly with the conventional Green Peace/Friends of the Earth philosophy with regard to 'reef-stripping' as you term it. I regret that to expand my views on this subject would require more space than is available here.

Come up and see me some time. I may not have all of Mr Kenny Everett's charm but I'd certainly enjoy a good natter with you!

Highlights

1. *"I may not have all Miss Mae West's charms—but I'd like to meet you for a chat".*
2. *"The 'Friends of the Earth' are wrong about the rape of the coral reefs".*

G.C.

Discus

I have been keeping Discus fish for almost 2 years but still consider myself a beginner. I have had very few problems with these fish mainly because of the advice given to me by my local shop and yourself. Having taken your advice to start with the much cheaper "Browns"; I feel I am now ready to keep a more colourful fish, my favourite being the Schmidt-Focke Turquoise x Red. I have seen only photos so far since no one seems able to get any of these fish in my local area.

I remember reading lately that these fish are always stunted and never grow to their full size. I would like to purchase some but only if they grow to their full size. Please give me your opinion.

What is a proper size of an adult Discus Fish? I have seen in an advertisement that a shop is currently offering Discus fish up to "10 in." in size. Over the years I have seen many very large Discus Fish but must admit that they never have been the size of a dinner plate and frankly I do not believe that they would ever grow to these sizes. Discus Fish are usually measured top to bottom and not horizontally. Although there is no standard adult size Discus Fish grow normally to 5 to 6 in. Wild-caught specimen are often somewhat larger than tank-bred ones.

As far as Schmidt-Focke Turquoise x Red Discus Fish are concerned; I have seen them as large as most others, and I have seen them also somewhat smaller even though they were "fully grown". To achieve a specific colour or markings or both, very often size is lost (Mendels Law). However, these Discus Fish will still grow to at least 4 to 5 in. and any hobbyist who has ever seen such a pair must admit they are magnificent.

Discus Fish will also not grow to their full size when certain types of medications are used too frequently.

E.S.

THE BASIS OF FISH HEALTH

by 'Mayfly'

Argulus

the fish louse

THE carp louse (*Argulus*) is commonly found, often in large numbers, on fish of many species—especially members of the carp family, in the late summer and autumn. It occurs in ponds, lakes and in sluggish rivers. There are two species, *Argulus foliaceus* and *A. coregoni*, found in this country although the former is by far the most common. The latter grows to a larger size (12mm compared with 7mm) and lacks spines on the last segment. There is a third species (*A. japonicus*) that occurs in Europe. Worldwide there are about 200 species.

The louse is rather similar in appearance to the waterflea, *Daphnia*, but it is flattened dorso-ventrally (i.e. from top to bottom). It is quite transparent which makes it difficult to see when attached to a fish, and has four pairs of feathery swimming legs. On the head there is one pair of suction cups for holding onto its host and these together with the disc-shaped body make it difficult to remove, even with a pair of forceps. Each of the two suckers can be moved independently so that *Argulus* can 'walk' over the surface of the fish. In front of the mouth is a hollow tube or stylet which is used to pierce the skin and walls of blood vessels to suck up blood. A pair of black eye spots is present between the stylet and the suckers.

When *Argulus* lands on a fish it causes a violent response as it penetrates the skin. It injects an anti-coagulant into the blood stream so that unclotted blood can be drawn up the hollow tube by the pumping action of the front part of the gut (pharynx).

Each louse spends most of its time attached to fish, but it may leave the host and swim in the open water until it meets another fish. In this way the louse may be responsible for spreading disease from fish to fish within a population in much the same way as mosquitoes spread malaria and other diseases from man to man. Most species of freshwater fish can be attacked by either of the two main *Argulus* species, although different susceptibilities can be seen in ponds with mixed fish populations. Fish already suffering from other pathological problems are often chosen as hosts in preference to healthy individuals.

Mating of the fish louse probably occurs on the body of the fish, but afterwards the female leaves the host and swims to the bottom of the pond to deposit her eggs on sticks, stones and plants. Several hundred eggs are produced by each female, so that numbers can build up very quickly, especially if there is a crowded population of fish in an enclosed space, such as a small pond. The masses of eggs are enveloped in a jelly-like material. They hatch after about three weeks (depending on the temperature of the water) and a small larva emerges from each egg which has feathery antennae at the front end and hooks instead of suckers but otherwise looks like a miniature adult. In a few days the larva moults its skin, and after several moults the adult stage is achieved—capable in its turn of producing another generation of lice. The larva must find a fish within a few days of hatching, otherwise it will not survive.

When *Argulus* is swimming in the open water it must appear an attractive food item, just like the water fleas. However film of sticklebacks attempting

Continued on page 47

Coldwater Jottings

by Frank W. Orme

OVER the next couple of months the weather should improve sufficiently to encourage even the laziest of pond owners to give some time to giving a spring-clean to the ornamental pond—especially if it is not over large. The charm of an average size ornamental pond can be lost all too easily if allowed to be constantly neglected for too long. Imagine a home which was seldom cleaned; it would not be too long before it became little more than a hovel. The ornamental pond is no different; it can soon become a mess of algae and overgrown plants, with a thick layer of rotting matter and ooze covering the bottom. Such conditions are unlikely to please the eye, nor can they be the ideal conditions in which to maintain fish. Of course, the size of the pond does, to some extent, dictate the frequency of the intervals between cleaning operations, nevertheless even large ponds benefit by being cleaned out occasionally and/or some attention given to thinning out the plant life.

Early spring is an ideal time to devote a few hours to attending to the pond. The water can be drained away after catching the fishes, and the bottom layer of silt removed. Take care that no fish is hiding in the soft muddy silt. Although this ooze may smell rather strong, it can be disposed of on the garden where the smell will quickly disappear. It is then possible to scrub down the interior of the pond to remove any algae; the plants can be thinned if necessary, and the detritus removed to leave everything clean and tidy. It can then be refilled with fresh water.

Before returning the fishes, check them to ensure that they are in good condition. Any which may require attention can be given whatever treatment is considered necessary in order to bring them back to a state of good health. At this time any fish which is required for breeding purposes can be separated by placing it into a tank ready for conditioning. Be sure to allow the water temperatures to equalise by floating the fish container in the pond for a short time. It is essential to avoid chilling, or causing shock, which could result in problems with the fish.

A little time spent attending to the chore of pond cleaning will benefit the fish and preserve the ornamental appearance of the pond. It will be time well spent and is, after all, less arduous than maintaining the garden which requires regular weeding and lawn mowing in order to preserve its attraction.

There will be those who will be hoping, for the first time, to breed their fish. This most fascinating aspect of our hobby often frustrates many newcomers who have difficulty in persuading the breeding pair to spawn. Often the problem can be traced to either inadequate preparation or a lack of patience and there are even instances where the novice has tried to breed two fish of the same sex.

Although there are exceptions to the rule, it is generally safe to say that male Goldfish and Koi will develop small whitish pimple-like tubercles upon the gill plates and pectoral fins, whilst

Continued on page 35

Spring is a good time for giving ponds like this one a major clean-out

TO FLORIDA AND BACK!

by Keith Barraclough

During 1983 Keith Barraclough, who has been in aquatics for over thirty years, visited many of the leading fish and plant farms in Florida. He kept a special diary of his eventful and fascinating trip and we felt that the following extracts would be of interest to readers.

The objects of the visit were manifold. Basically, the company was looking carefully at the American market potential and needed some background details including examining new lines of supply for higher quality fish. Together they would provide interesting research, especially when such a tour would bring us into contact with some very important and interesting people in the fish world, Stateside.

The broader the extent of the visits, the more complete the picture would be. Most British aquarists are aware of the Florida fish breeding activities, but we thought a detailed report of such a trip would be of great interest to hobbyists at home, offering the opportunity to know a little more about fish breeding and rearing on a large scale the American way. One thing was assured before departure, the Florida farmers are far more forthcoming and talkative about how they do things than the people in Asia.

Florida is an enormous State, offering almost ideal conditions for farm rearing methods for ornamental tropical aquarium fish. Temperatures are generally in the 75° to 85° region with only occasional bad weather and very few days in a decade when temperatures fall below 60°, even on such occasions, well water can be drawn from the ground at a minimum of about 60°F. One farmer told me, "when it gets cold I just pump more water". Lower temperatures do affect breeding and growing of course but holding fish through these odd cold spells seems to be well within the capabilities of the Florida farmers.

Fish farmers in the region have their own Florida Fish Farmers Association. Their market is almost totally domestic, over 90% in the USA and Canada. The Association has over 350 members and they claim that the Tampa, Orlando area houses the most concentrated intensive fish farming of ornamental tropical fish anywhere in the world. From what we see there is no reason to disbelieve that claim.

Shipping fish to Europe has not, to date, been seriously considered by the Florida farmers. This is because home demand has remained high and shipping is obviously less hassle. However, slightly falling markets coupled with some increase in the imports from Asia has led to some of the more progressive operators looking to Europe with an eye to the extra potential business.

What they have to offer in most cases is very good stock, good at least for the English market, fish are generally larger, a point very much liked in England but not, for instance, in Germany.

Variety does not yet match the Asian extent though, and this may be a problem making up large shipments to keep freight at a reasonable level. Freight often makes up a greater part of cost than the fish themselves, a fact that has led to much consolidation in recent years.

One important point for hobbyists to be aware of is that in Florida the breeders do use a substantial amount of flake fish food in their diet, therefore, fish from a very early age are fed the kind of food that will form a substantial part of their everyday diet when they are purchased as aquarium specimens.

The markets in America are equivalent to the entire European and Scandinavian markets put together. Although there are no accurate figures, the world market share of tropical fish bred in Florida must be in excess of 30% of total world off-take.

For many past years Florida has been famous for livebearers, particularly Swords and Platies, but things are now changing. In the past few years more and more farmers are breeding Characins. This is explained by the experts as a change in demand. They say fish sales in the nickel and dime stores are not as big now; this amounted to a big proportion of the livebearer business.

But more interest in genuine fishkeeping as we know it, appears to have gained some ground. There are some specialist breeders of African Cichlids, for instance, others concentrating on Barbs, plus the people that have always bred Angel fish.

The advantages of farming in Florida are of course, free heat, plenty of space, very good supply of quality well water, an accessable supply of creek water without too much trouble, easy creation of *infusoria* for baby fish and plenty of light. Labour does not seem too much of a problem. Most farms are family concerns which employ everyone to the second cousin removed if it's a big farm, although some smaller farms are operated by one or two people only. On the farms where staff are employed it was nearly always the same story, that is, "well, Al has been here about 15 years, and Guss about 24 years and young Bob, he has only done 10 years". Even when ownership had changed hands, the employed people seemed to remain.

From an outside observer's point of view, it's hard work with long hours, but it obviously gives a high level of job satisfaction.

There are a few problems, as with everything. These range from tadpoles, frogs, terrapins, snakes, birds and alligators through to rats and thieves. Everyone has their own methods of dealing with these various problems as you will read.

One thing that came through very clearly from the visit was the wide gulf between the basic breeder/farmer and the people employing all the latest technology brought in from food fish farming. Some of the older school farmers are slowly catching on

Our party, which included many of members, looking over the old world nursery

to a few of the ideas, but the more advanced are into computer controlled stock filing, order compiling, etc. Coupled to this is programmed rearing, even mixing of species to employ maximum density levels of ponds. Fishes are pre-selected for order despatch, all computer controlled to ensure very quick final packing before shipment, resulting in some very slick despatch departments.

Old World Exotic Fish Limited

Specialist in African Cichlids, situated in agricultural countryside, three quarters of an hour south of Miami in the district of Holmestead.

Old World is owned and run almost single handed by Laif Mason. Laif is a 29 year old hobbyist and now a professional fish farmer. He has bred fish for 12 years but established his business only five years ago. Laif is a very lucky man, who enjoys what he is doing and gets great satisfaction from developing his farm.

He owns a plot of about 2 acres. The ground is coral based. Laif excavates a pool with a mechanical digger then paints the sides and base with a thin cement mixture to seal the coral. This exercise has to be carried out every year to ensure reasonable retention. The cement mixture is applied with a stiff sweeping brush. The ground, being coral, cuts out symmetrically and, of course, the side walls are clean cut and do not fall in.

Laif estimates the initial cost of each pool at about 1,000 US dollars. On the plot currently there are 36 pools, measuring 30 ft. × 15 ft. and two pools 55 ft. × 20 ft. In addition there are 450 concrete vats which were purchased secondhand in Miami. All pools and vats have continuous pumped well water. If the temperature falls then Laif just increases the flow of water, even when there is frost on about two days per year, he says the lowest he has known his pool drop to has been 55°. Water comes out of the ground at 72° at a pH of 9·0 from the water table running 8 ft. to 14 ft. underground. So it's easy to understand why he specialises with African Cichlids.

We asked Laif about water hardness. He was not quite sure and in fact we found on the tour that American breeders in general pay very little attention to this factor. Maybe they are just lucky that in most cases it's about right. Or possibly they just have a natural feel to do the right thing. On the other hand, it could be that so many other ingredients are ideal for the fish that they themselves are not too fussy.

At Old World, adult fish are placed in vats to mate many females in with just a few males, always there is a dominant male, and the spectacle of colour under the Florida sunlight has to be witnessed to fully appreciate the true beauty of some varieties. Under these circumstances they give Koi a good run for sheer attractiveness.

In Stuttgart last year we saw a heated outdoor pool, with a cover, which was full of mixed African Cichlids with a rock cover as a centre piece. We thought at the time what a superb idea for a special show. Seeing these fish once more under similar conditions, plus the Florida sunshine, convinced us that an indoor pool of these fish could make a spectacular attraction.

Back to breeding, the females of aggressive species are removed when carrying a mouth full of eggs and kept in smaller vats. When the young are about 3 weeks old they are put into vats for 8 weeks and placed into pools to grow on. Spawning mainly takes place in June, July, August and September even though the temperature is OK almost all year. Laif Mason believes this is due in some ways to the light cycle, therefore stock are carried the whole year around. Fishes are netted by seine net about every 4 months and graded and selected for size.

Two species of fish are kept with only odd species proving difficult to spawn. They include more than 30 varieties of Haplochromis, eight varieties of Trematocranus, 15 varieties of Pseudotropheus and Labeotropheus plus a host of Tanganyikan fish.

Every pool and vat is cleaned out completely every year and all vats have the bottom syphoned off at least each month. Much of the alleyways between the vats are flooded with water and getting your feet wet is part of the job. Wellington boots being the order of the day. In all the flooded areas there are swarms of Guppies. They are kept there to

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by
Roy Pinks

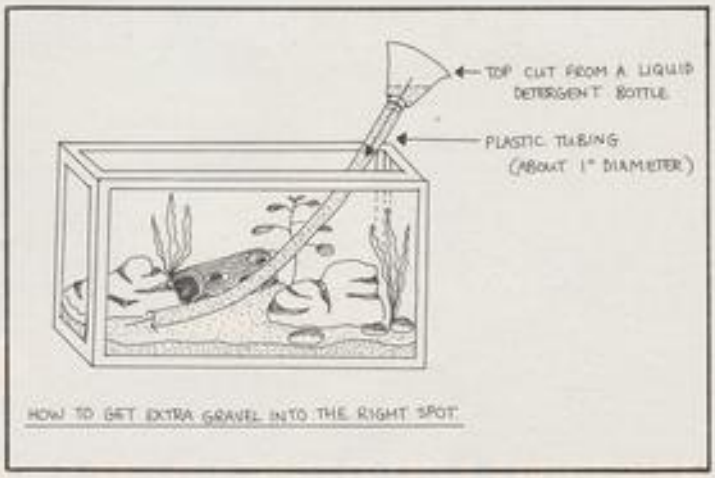
LAST month I discussed some of the uncertainties facing the aquarist who is setting up a planted tropical tank for the first time, with special emphasis on built-in filtration. I purposely omitted consideration of power filters because you can get by without them, they are quite expensive, and are not especially relevant to the earliest days of a new tank. I will now pass on to examination of some of the techniques for getting the best out of plants. This is a subject which I find increasingly fascinating, as the challenge is far greater than that of keeping most of the fish which come our way. Indeed, it is probably true to say that if you can succeed in persuading your plant life to thrive, you will have done enough more than to halve your potential problems in managing your fish.

Whatever conventional planting medium you use—sand, gravel, ornamental chips and the like—the common feature is that they are sterile and inert and do no more than offer plant roots a home. So it matters little what you choose, though if you want to retain a particular colour you will have to bear in mind that you are going to have to keep the tank floor clean. From the first lesson we recall that cleanliness may bring godliness but it doesn't encourage plants to put on weight! But you simply cannot have it both ways. Professor De Wit, whose classic AQUARIUM PLANTS (Blandford) is an admirable guide to good practice, states that if you introduce loam into the tank substrate you stand an excellent chance of achieving luxuriant plant growth. It does imply that you have the right amount of light and that the water quality is right for the species you are cultivating, but it is counsel which we tend to have shunned over the years in our obsession with cleanliness at all costs. So, most tanks are set up with inert rooting material, as often as not resting on a sub gravel filter—an ideal combination for the removal of animal wastes but a poor start for plants for which we continue to pay so much. But whatever they cost us, they are beautiful things and deserve just as much care as do the fish.

The nearest concession to providing plants with a medium in which their roots were happy and which at the same time offered some of the nutrients necessary for development, was the insertion of clay and loam pellets. These very messy things were pushed down into the gravel near to deserving candidates, and although in time some benefits may have resulted, the immediate fogging of the water was generally followed up by similar blackouts generated by catfish or loaches which inspect all things thoroughly and very consistently. The notion of first laying an inch of gravel, then an inch of loam and then two inches of gravel on top was unthinkable in the circumstances, but those who had the wit to lay plates of peat atop the loam before adding the final thickness of gravel may well have had some interesting surprises.

All the thinking so far has assumed that one plants straight into the compost on the tank floor, but this is now by no means the only way. Sad to say, probably 90% of tanks are still prepared that way, and that is why so many plants die. Yet we are all guilty of repeating old untruths like not putting any fish in until the plants have really started to grow. If we keep the initial setup sterile the plants never will grow, and the longer we keep the fish away from them the longer we are denying them the free muck and dirt they need to help them on their way. Another dilemma for the beginner!

Help is in sight, though. The highly skilled and fascinating art of aquascaping has revealed lots of practices, at one time though not quite the thing, to provide a proper resting place for the plant which is at the same time visually inoffensive. For example, plant pots of the smaller sizes are ideal for accommodating many submerged plants, and it is simple to insert into



HOW TO GET EXTRA GRAVEL INTO THE RIGHT SPOT

COMMENTARY

these the gravel/loam etc sandwich described above. They can be moved around, albeit with care, and completely replanted if necessary without serious disturbance to the rest of the tank.

At one time most aquaria sported a few earthenware pots (they were square or oblong in those days), and the most luxuriant plants resulted. In the course of time, in efforts to achieve a completely natural-looking scenario, the pots were outlawed, and they have taken a very long time to come back. Today, great care is taken to hide them behind rocks or cork bark, but if you employ a sub gravel filter you can certainly introduce gravel of sufficient depth such that the pots can be completely submerged and rendered invisible. Even so, you will find that as you plant up a tank you will run short of spaces for the pots and some will have to remain temporarily visible on the surface of the gravel. Once you have achieved a generally pleasing shape to your planting and rockwork layout you can infill with additional gravel. This is where some aquarists despair of ever getting it in the right places. The best way is to use a piece of clear plastic tubing with a bore of at least an inch, cut to a few inches deeper than your tank. Fit the top of a detergent bottle to the top of this so as to form a funnel, and you have the perfect instrument to project your compost just where you want it. As I'm not sure whether I have actually invented this implement or not, the sketch shows all.

We have till now considered plants which demand rooting media for their survival—such as vallisneria and the cryptocorynes. Others, like wisteria, are less demanding in this respect and may be dropped into a likely spot and left to carry on the good work provided that the light and the nutrients are there in the right quantity. At a later stage I will discuss some of the likely plants for decorative aquaria, with particular emphasis on those which will help the beginner to attempt some elementary aquascaping and to get a feel for the plants at his disposal.

Coldwater Jottings

Continued from page 30

the females will appear to be rather more plump than usual, which may appear to distend one side of the body more than the other—especially if viewed from above. These signs become evident when the fish are in, or very near to, breeding condition. There is little point in attempting to spawn the fishes unless they are exhibiting signs of being in breeding condition and are a true pair of male and female fish.

Rising water temperatures and longer hours of daylight, coupled with extra, small feeds of good quality nutritious foods, will encourage the fish to come into breeding condition.

In the case of Goldfish the selected breeding fish can be brought into an indoor tank where they can be fed upon chopped earthworms, whiteworms, *Daphnia* and quality commercial dried foods—both flake and pellet types—offering the food in varied small amounts as often as it will be accepted, ensuring that the food is eaten before offering more. During this time the base of the tank should be siphoned over at frequent intervals to keep it free of mulm and droppings. Replace the drawn-off water by adding clean fresh water at the same, or near, temperature to that in the tank. If the sexes can be separated during this conditioning period it seems to encourage spawning when the pairs are placed together. Given this treatment the fish will eventually exhibit its sign of being in breeding condition. The aquarist must have patience, for some fish may take longer than others to reach this desired state of readiness; some fish condition much quicker than others, and much depends upon the prevailing temperature of the water—even a few hours of sunshine can be of great benefit in helping to promote the fish's breeding condition.

Once the fishes are seen to be swimming alertly with fins extended and the breeding characteristics are well in evidence, an attempt can be made to obtain a spawning. The breeding tank, which should have been prepared some days previously, need contain nothing more than the water and spawning medium. Mops made from strands of nylon knitting wool make good repositories for the fishes' eggs, and avoid the risk of introducing any undesirable pests into the tank. Place the male into the tank during the morning. In the evening the female can be introduced and, if the male begins to lazily chase the female, fingers can be crossed in anticipation of the following morning finding the spawning in full swing. However, if there is no such activity, leave the pair together and do not interfere with them. Feed with earthworms, keep the tank clean, and await events. If conditions are right the fish will, with time, decide to spawn, but too much interference can tend to delay things. If, after about fourteen days, the fish fail to spawn they can be returned to their conditioning tank for a few days before trying again.

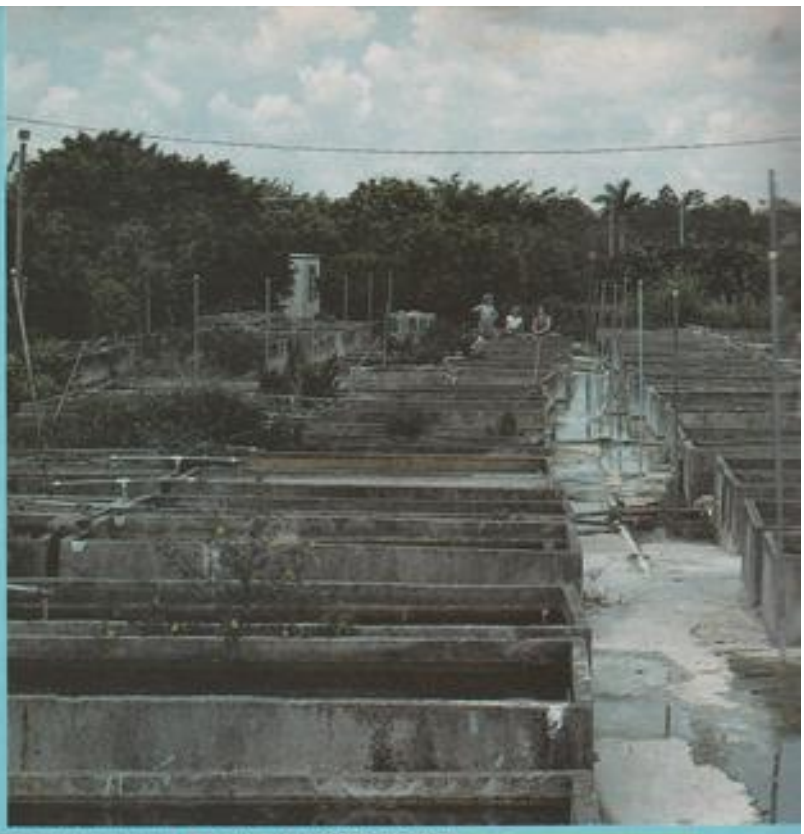
As soon as the spawning is completed and the fish have lost interest in each other, the pair must be removed. If allowed to remain in the tank, the fish will turn their attention to eating the eggs and few will be left. For this reason many aquarists try to spawn their fish during the week-end, when they are able to pay close attention to the breeding pair.

There is no secret to breeding Goldfish, it is purely a matter of ensuring that there is a true pair which are properly conditioned, the correct conditions of temperature and daylight, plus patience from the aquarist. When the pair are ready they will spawn, but only when *they* are ready and not before. The real problems arise when trying to raise the young fish to adult size!

keep mosquitoes down. Toads and birds cause some problems. The wind is too strong to use protective bird nettings and the larger fish prove very tempting to herons and the occasional pelican.

Feeding varies from Laif's own blend of shrimp meal and baby food to poultry pellets plus a liberal supply of live foods. Pollution of the water, of course, is not such a problem when continuous running water is employed, otherwise the water would quickly foul up with disastrous results using such a diet base.

All fishes are currently sold on the mainland of America to either wholesalers or very large specialist African Cichlid outlets. There is a huge number of fish on this farm. Many of them at adult stage which is a major part of the business. From what we saw during the visit the quality and size are exceptional. Obviously this young man is building up his stock for breeding and for sale. There is no reason why he should not be able to fulfil demand for some time to come, building up a nice business on the way.



An aulonocara adult female and younger specimens

Young adult male *Tilapia buettikofori*.
Our world exotics

A beautiful aulonocara male, the colour in natural daylight is devastating

A long range shot of part of old world exotics

Leif Mason, old world exotics, examines his stock

Leif Mason chats with Fritz Muller, a wholesaler and importer from West Germany. (As you'd expect, Keith has got his back to the camera)

Florida Aquatic Nurseries Inc.

Plant growers for aquariums. Owner Brad McLayne.

An old established business run on traditional aquarium plant cultivation systems. Additional activities, breeds Apple snails and distributes freshwater mini crabs. Located in Fort Lauderdale, on the Atlantic coast side, this grower supplies almost exclusively to America and Canada, also limited into Germany.

The actual varieties of plants were somewhat limited in relation to what we have available in Europe. The quality was exceptional and great care was shown by all concerned in the propagation of the plants. Clearly this company grew plants to meet

TO FLORIDA AND BACK!

where there was a big demand and grew in very large quantities.

From talking with Brad we got the impression that the American hobbyist did not have the same interest in plants that European hobbyists have. A great part of their business was done in bunched plants. This idea does now seem to be gaining more ground in England, although we may see a big increase in the availability of pot grown plants in England soon. The advantages are, of cousse, obvious. Plants grown in pots grow much better and last longer when their root systems are not disturbed. Each time they are transferred from the grower via wholesalers and retailers through to the hobbyist they cost a little more, but it must be worth it in the long run.

Florida Aquatic Nurseries employs 15 people. They have five very large greenhouses with frequent humidification for semi aquatic plants such as Telanthera, Dracena, Hedge plants. Some Myriophyllum plants in this area are grown in a peatperlite mixture with occasional fertilisation.

True aquatic plants are grown in cement tanks which cover a large part of the 3 acre site. pH was 6·8 to 6·9. A copper base algaecide was used to control algae and blanket weed. An interesting plant sold for coldwater and not usually seen in Europe was Isoetes Quill Fern. It looked attractive and would be a nice addition to the coldwater plant range over here.

Brad said his prices are higher than the Asian imported price, but he wins through on continuous reliable high quality all year round.

There have been terrible problems in Florida with aquatic plants getting into local waterways and choking them up, therefore, the authorities are very strict on controls. Many plants are banned entirely in Florida, including *Elodea crispa* for instance.

Another very interesting point that came out in conversation related to growth rates of plants. The light heat combination caused things like Jungle Vallis (a really massive form of *Vallimeria torta*), to grow so fast in a single afternoon, 2 to 3 inches, that it raised the pH to 9·0 in a matter of 2 to 3 hours. This causes a kind of brown crust to form on the surface of the leaf, which once there, is difficult to get rid of. The only answer is to cover the growing tanks with close netting to retard the light and the growth, making a far more attractive plant to sell.

The general impression of this organisation was one of a very well managed, business-like outfit run by very nice people. Florida Aquatic Nurseries was established 25 years ago by Brad Mclayne's father. The unique feature about the plot is the 200 feet deep well which delivers water at a pH of only 6·8. Such plants as *Elodea densa* and Cabomba are harvested wild by local collectors. All other varieties on their list are grown on the farm, including Banana plants.

International Fisheries Inc.

Based in Hialeah, Florida and jointly owned by Harry Rambarran and Adolf Schwartz. Engaged in transhipping South American fish to America, Canada and Europe. Company formed in December 1981 and commenced trading in 1982.

The names of Rambarran and that of Schwartz have been every day names in the international fish business for many years. Harry Rambarran trading first in South America for over 20 years and now in a combined business along with Adolf. Although we have traded with Harry for almost 20 years directly and indirectly, this was the first opportunity we've had of personally meeting this very experienced collector and shipper. Regrettably our meeting was far too short. Adolf Schwartz is an old friend as well as a business colleague and to meet him is always a pleasure. His father, now deceased, was of course, the famous Willie Schwartz of Manaus, possibly one of the most well known and respected Brazilian collectors since exporting of fish on any scale really began. We were most privileged to make the acquaintance of Willie and his charming wife just a year ago before he passed away.

Adolf has continued the business in Manaus, now called Turkey Aquarium in which his mother still takes more than a small interest. He now spends one month in Brazil and one month in Miami, on an alternating basis, keeping well in touch with the two businesses.

The combination of these two men with their experience, background and connections should be one that will ensure continued quality and reliability of South American species for hobbyists worldwide subject, of course, to governments continuing to issue licences and collectors continuing to do their thing.

Their establishment engages all the latest techniques and ideas, plus years of actual experience, making it one of the best in the area. 620 aquariums are housed in a large modern warehouse with ample space to receive a large number of incoming fish boxes whilst dealing with outgoing shipments. The establishment itself has a capacity of up to 1,000 boxes per week outgoing.

The building is space heated, but of course, this is not always in use. Water comes to the unit from mains supply, passing through a dechlorinator onto a water softener and pH control. With the equipment installed it is possible to create any required water condition on tap!

A small proportion of water is changed each day in all aquariums automatically. Water is generally adjusted to a pH of 6·8 to 7. Seven people work in the unit and Adolf tells me they have over 250,000 fish pass through there every week.

Keith Barraclough took the opportunity whilst there of doing a short interview with Harry Rabarran.

K.B. Harry, can you tell the readers of *The Aquarist* back in Great Britain

what the supply position is right now?

H.R. Well, Keith it's very bad at this moment.

K.B. Why is that?

H.R. May and June are the worst months for rain down in South America, although it varies from country to country.

K.B. Do you mean it depends on the amount of rain or do you mean the times vary?

H.R. Well both really, if the rains are bad, it's bad all over. This year has seen very heavy rain but Peru improved about mid June.

K.B. That means some Corydoras will come back on the availability list.

H.R. Yes that's true. Guyana improved around mid July making Pencil fish more readily available. Colombia also improved in July, but it took until August before Brazil started to pick up properly.

K.B. Does that mean Cardinals are now out of stock?

H.R. No, Cardinal stocks are excellent at present. Closed season for catching is June, July and August.

K.B. Are there any fish that we are not going to see in the next few months?

H.R. Yes, *Corydoras rabauti* from Peru and *Corydoras spirulus* from Guyana have disappeared completely.

K.B. Disappeared completely, how can that be, is it over fishing?

H.R. No, much of the reason is too much pollution from things like outboard motors, but then there is much more industrialisation.

K.B. Is there anything else affecting the supply of fish?

H.R. Yes, the building of the Trans Amazonas Highway created improvements in some ways but caused a lot of problems in others.

K.B. Can you give me some examples how you see it?

H.R. When the Highway was being constructed the builders closed and diverted many streams causing a number of changes in waterflow patterns and the food chain for fish.

K.B. What advantages did it bring?

H.R. The advantages were not really to the fish industry. A lot of one time fishermen began to find better jobs with more pay for decreasing hours. And the other thing is young people are not replacing the old fishermen by coming into the business.

K.B. Harry, which countries do you bring fishes from to this central point?

H.R. Colombia, Guyana, Ecuador, Peru, Brazil, Surinam and Venezuela.

K.B. Despite all the problems, you must have a lot of confidence in the future supply of fishes to have made this big investment.

H.R. (Smiling) Yes.

John Pennekamp Coral Reef State Park

Key Largo, Florida. Situated at the northern end of the Florida Keys, this is the only live coral reef on the American Eastern Seaboard.

All animal and plant life in the State Park is protected. The John Pennekamp Reef is presented as a very slick commercial operation giving the general public the chance at first hand to observe closely the interesting and intricate sea life in a truly natural background. Organised snorkeling parties, scuba tours and a large glass bottomed boat are all scheduled to leave the dock on a strict timetable. You can hire anything from a snorkel mask to a 20 ft. 85.

We took the glass bottomed boat for our tour which was all time would permit. The first requirement is a strong stomach, all passengers were offered sea sickness tablets on the outbound journey, which took about 55 minutes. The boat was the biggest glass bottomed boat we'd been on, about 60 ft. long, taking upward of 100 people. There was ample deck seating on the upper deck where visitors could enjoy the beautiful Florida sun. On the first 20 minutes, it was a slow and steady cruise, with birdlife in abundance, through the mangrove swamps and down the deep channel out into the Atlantic Ocean.

The State Park and the adjacent Key Largo Coral Reef National Marine Sanctuary cover some 178 nautical square miles of coral reefs, seagrass beds and mangrove swamps.

The reef itself is situated some 6 miles out and once clear of the channel the gradual sea swell could be felt. When the boat arrives over the reef, passengers are invited down into the deep hull where a number of windows surround the room. It's very much like being inside a massive circular aquarium where you can sit on the floor and just watch the world go by. At this point now the engines had stopped, the boat began to sway and rock quite heavily and many people just could not handle the situation.

Outside it was a magnificent sight, everywhere massive pieces of coral of all kinds. Brain Coral, like the top of a letter box, Branch and Stag Horn in enormous pieces. There was a great deal of Fire Coral too. This is the stuff that often one gets swept into when snorkeling over a reef without a wet suit—it's quite painful. Fish were everywhere, groups of Sargeant Majors with hundreds of young Damsels darting in and out of the coral heads in a bossy sort of way. Hog Fish lazily picking around, whilst Queen Angels regally swam around. There were several Barracuda showing some interest in the people peering through the windows. An amusing incident was created by a large sea turtle who peered in through the window, then moved to the next window and so on, right along the side of the 10 or so windows just as if he was trying to find a long lost relative or something. All things taken into account, the 30 minutes spent over the reef was all too short. For those not feeling too good it could not end soon enough.

Back at the marina, we paid a quick visit to the marine aquarium. Unfortunately, this was a great disappointment. With all the resources so close at hand, coupled with the investment in the building, it would not be difficult to make this a spectacular showpiece for those who could not handle the sea trip. The operators have missed a great opportunity here and it's a great pity that this should have happened.

They do, however, sell a 30 minute programme of slides and tape, describing the reef and underwater life for about 20 US dollars. This is a terrific idea and it is superbly put together with a first class commentary to music.

BRITISH SHORE FISH-2

by Dr. Peter Miller (University of Bristol)

In this, the concluding part of my article on the most common fishes found between high and low tide on British shores, I will deal with those species normally associated with sandy habitats.

Fish from sandy shores

Gobies (Gobiidae)

Probably the most abundant small fish of estuaries, saltmarsh and adjacent sandy flats, the Common Goby (*Pomatoschistus microps*, 6·5 cm) is found in pools and channels, often in extreme shallows. This goby feeds on small crustaceans and worms, sometimes tackling a ragworm longer than itself. Usually greyish or fawn, the breeding male is dusky, with vertical dark bars, a reddish-orange throat, and a large iridescent blue spot on the first dorsal fin. Over the breeding season, from April to August, a female can produce at least six broods. Males dig a cavity beneath a stone or shell, which may then be covered with sand, and eggs are deposited in a layer on the ceiling of the nest chamber, where they are fanned and guarded by the male until hatching. Few individuals survive into a second breeding season. Juveniles of the related Sand Goby (*P. minutus*, 9 cm), slimmer and more sandy in colour, and the Painted Goby (*P. pictus*, 6 cm), with pale saddles and rows of dark spots along the dorsal fins, may be caught in lower estuarine areas or shore pools in late summer.

Flatfish (Pleuronectidae, Soleidae, Bothidae)

Small Plaice (*Pleuronectes platessa*, 51-91 cm), Common Sole (*Solea solea*, 51 cm), and Brill (*Scophthalmus rhombus*, 61 cm), and other flatfish, are often seen in sandy pools during the summer. They feed on worms and crustaceans, and move into deeper water on further growth.

Sand Eels (Ammodytidae)

Sand eels are noticed in active mid-water groups which dive into the sand when cornered. There are five British species, the most likely intertidal form being *Ammodytes tobianus* (20 cm). These feed on young fish and worms, and lay demersal eggs in sand from August to October.

Incidental Species

Sandy pools often merge with the sea at low tide and wading out into the shallows often yields other species.

Lesser Weever

Bottom dwellers include dragonets (*Callionymus* spp.), the Lesser Pipefish (*Syngnathus rostellatus*, 17 cm), and the Lesser Weever (*Trachinus vipera*, 14 cm). Weevers have wedge-shaped bodies, sandy to silvery, with spiny gill-cover and a short, jet black first dorsal fin, containing five to seven sharp spines. These spines, and that on on the gill-cover, carry poison glands, and *weevers should be handled with great care*. Stabs from the spines can be very painful, with inflammation, and, rarely, have been fatal. Weevers lie buried to the back in sand, awaiting their prey of shrimps and small fish; breeding is from June to August, with planktonic eggs. In midwater, shoals of young sand-smelts (*Atherina* spp.) or grey mullet (*Mugil* spp.) may be seen, but are not suitable as aquarium fish.

Low tide sandy reaches of the Teign estuary, Devon

Collecting shore fish

Before you go collecting, check the tide times, and, after low water, don't be on the wrong side of deep gullies or channels between you and the land.

Having taken these precautions, on the sheltered rocky shores, various species can be captured by turning over stones at low tide, or hand-netting among weed in larger pools. Shannies and bullheads may take a bait, such as a strip of limpet covering a tiny hook, dangled into a flooded crevice. In sand pools, you can catch fish, and recapture your youth, with a shrimping net, or a simple seine net, improvised from a piece of fine net curtain weighted along one edge with curtain weights or light chain, can be dragged across the bottom.

When shore-collecting, do remember to conserve the environment by carefully returning stones to their original positions, and avoid excessive removal of fish. Use plastic, rather than glass containers, which, on slippery rocks, are likely to be a hazard to you and future shore visitors. Transport of any fish between capture and captivity can be stressful. Shore species travel well in large polythene tanks or sacks (double, tied) supported in a cardboard box, and only a few inches of water need be provided. In summer, the water can be cooled with polythene bags of ice, brought along in your insulated picnic box—the ice should not be put directly into the seawater so that the latter remains undiluted. Remember that some species, such as the bullheads, can be very voracious, and fish collected should be segregated according to size.

Some species of shore fish will take a limpet bait

Shore fish in aquaria

Shore fish may be kept in captivity, following the usual principles of maintenance for the marine aquarium. It is probably better to use synthetic sea salt, to avoid the risk of pollution in water from the edge of the sea, and the usual undergravel filtration can be installed. As a rule, the common seaweeds are not suitable for aquarium use and so the tank can be kept out of direct sunlight, aiding temperature control and preventing growth of simpler algae. Illumination by a 40w lamp or equivalent should be adequate.

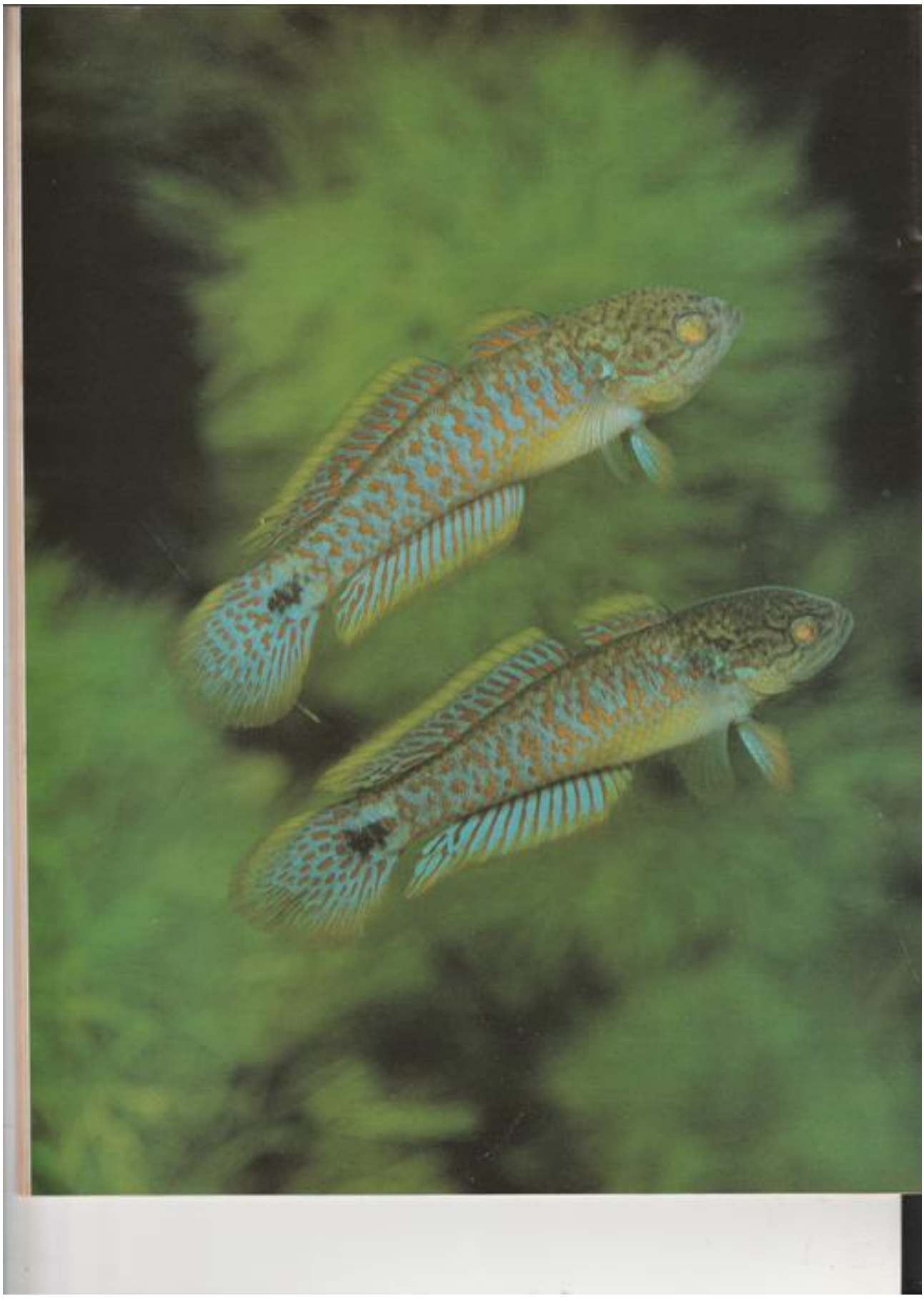
Sand Smelts, *Atherina* spp. are not suitable as aquarium fish

A rockwork decor may be enjoyed by the fish as well as the viewer, but bear in mind that the most easily kept species prefer to lie concealed rather than swim in the open, so provision of hiding places should not be too elaborate. Rocks providing cover from above, but providing some side-view of the fish, would seem ideal. To avoid conflict, or predation, the fish in an aquarium should be of comparable mouth size, and common shore invertebrates, such as crabs and prawns, and sea-anemones, are best excluded from a fish tank. Although species of warm temperate origin—shannies, gobies, and clingfish—tolerate water at comfortable room temperature, other shore fish, such as gunnels, bullheads, sea-snails and rocklings, prefer somewhat cooler conditions. An aquarium with these species would therefore be suitable for an unheated room or entrance hall. For technical enthusiasts, it is not difficult to arrange a relatively inexpensive cooling system involving an old fridge and a water pump. Nowadays, with a wide variety of frozen fish-foods, there should be no difficulty in satisfying the carnivorous appetites of most shore fish. They will also eat lean raw meat, shrimp and garden worms, but invertebrates from the shore should be used with caution. Obviously, they would seem to be the natural food, but there is always the possibility that the ones you collect, rather than those the fish would select, might have accumulated pollutants. If you embark on pipefish, then a supply of live brine-shrimps, or baby guppies, must be organised. For diseases which you can recognise, employ the proprietory remedies sold for other aquarium fish. Sometimes shore species are found on capture to be covered with small black spots, distinct from normal coloration and sometimes surrounded by reddening of the skin. These are the encysted metacercariae of a digenetic trematode flatworm, originating from an earlier stage in winkles and awaiting ingestion of the fish by a sea bird, in whose gut the metacercariae develop into the adult parasite. In the aquarium, these encysted metacercariae cannot infect other fish, but their presence may debilitate the fish concerned, especially in combination with the other stresses of captivity, and such individuals should be left alive on the shore.

Further reading and reference

A good introduction to the collecting and keeping of British shore life is L. A. J. Jackman's *Sea Water Aquaria* (David & Charles, 1974). The best reference book for British fish is *The Fishes of the British Isles and North-West Europe* by A. C. Wheeler (Macmillan, 1969). For identification, other useful books include *The Fishes of the Sea* by J. & G. Lythgoe (Blandford, 1970) or, more simply, *Collins Handguide to the Fishes of Britain and Europe* by J. Nicholls & P. Miller (Collins, 1980). If you become interested in the numerous kinds of invertebrates and seaweed that you will encounter when fish hunting, try *Collins Pocket Guide to the Sea Shore*, by J. H. Barrett & C. M. Yonge (Collins, 1977) or A. C. Campbell's *The Hamlyn Guide to the Sea Shore and Shallow Seas of Britain and Europe* (Hamlyn, 1976).

Getting more scientific, the biology of shore fish has been comprehensively reviewed by R. N. Gibson in *Oceanography and Marine Biology, Annual Review*, vol. 7 (ed. H. Barnes), pp 367-410 (1969) and vol. 20 (ed. M. Barnes), pp. 363-414 (1982) (published by Allen & Unwin and Aberdeen University Press, respectively).



SPOTLIGHT

A beautiful GOBY

(Taturndina ocellicauda)

by Arend van den Nieuwenhuizen
with photograph by the author

AS I was looking for the opening times of the annual discus exhibition in an advertisement of the Diskus Center Royal in the DATZ magazine of November 1982, I came across, amongst the fish on offer, a name which was unknown to me. I forgot it again, but when I was standing in front of an aquarium in Witten-Stokum in December on the glass of which the same name was to be read, my mouth dropped open with surprise at the sight of the species *Taturndina ocellicauda*. Magnificent fish were swimming to and fro or hovering around and hanging from the tank decoration, reminding me of Bumblebee Fish. My heart beat faster and even more so when I learned the price. Fortunately, however, there were two prices. One for fish collected in the wild and the other for fish reared in captivity. The latter was 60 per cent cheaper. As there were other interesting fish which I wanted to acquire, I thought over what I could afford. But then I had to suffer the disappointment of finding out that there were no fish available which had been bred in captivity. As I do not own a golden egg-laying goose I had to be content with a smaller number of fish than planned. Preferably, I buy a group of six specimens. But that would have exceeded what I could afford. Naturally, I wanted to learn more about these gobies. I will not say more about their coloration here, other than that it is even more beautiful than the photograph depicts! The largest specimens were about 4 cm in length. How big they grow, no-one could tell me. Today, about three months after purchasing them, they are scarcely any bigger and perhaps they do, in fact, remain small. As many gobies in the natural state inhabit brackish water, I enquired whether salt had been added to the water. Indeed this was the case and when I dipped my finger in the water and tested it, it tasted slightly salty. Back at home I decided to keep the gobies on their own at first, because of their very peaceful behaviour, in an aquarium measuring 50 X 30 X 30 cm. The tank bottom was covered with fine, washed sand, as I was thinking of the natural biotope in Malaysia, where I had come across Brachygobius and Stigmatogobius against a similar substrate. Bottoms of fine sand or mud are found in both fresh and salt water. In January 1978 my friend Odijk and myself discovered *Stigmatogobius sadanundio* and *Stigmatogobius hoevenii* on the island of Penang off the coast of western Malaysia. The fish were in small streams near the point where they flowed into the sea. There we observed the fish, positioned at a depth of 8 cm, along the edges of the waterways. They lay on the sand with their heads pointed against the stream of water. Because of the colour of the background and their own coloration and markings, they could be made out only with difficulty. Once they had been spotted it was easier to make them out subsequently. The water was completely devoid of plant life and the bottom bare. In addition, the fish were rather far apart. The distance varied between half a metre and more. Although the place where we found them was near to the sea (a few hundred metres), the dH value was only 4°. The water temperature was 27°, the pH value about 6-3. The streams lay partly in direct sunlight and partly in shadow. In the shadow the air temperature was 28-5°.

In waterways which were approximately twelve metres wide, Orysias with caudal fins bordered with yellow were to be seen swimming in the sunlit areas. The specimens of *Stigmatogobius hoevenii* were generally three centimetres in size. We saw larger specimens of *S. sadanundio*. Presumably, they feed predominantly on insects which fall into the water, but with fine-meshed nets we also caught mayfly larvae. Further upstream there was rich plant growth along the banks, but we were unable to fish there, because the local youngsters, as soon as they discovered us, jumped repeatedly into the water and thus prevented us from capturing anything.

We also caught mayfly larvae in a completely different location in Malaysia. This was in a stream

along the coast road to Acheh. One arrives there from Penang, if one takes the ferry across to Butterworth and then drives south through Batu Tengah and Nibong Tebal. At the last place a bridge spans the river Kerian and before the bridge a smaller road turns off to the right to Acheh. To the right of this road stretches forest from which came the sounds of hornbills and other birds and monkeys. To the left of the road lie small villages, by the side of which runs a small stream. At different places in this stream we saw fish traps, in combination with screens attached to rattan poles. The screen is positioned diagonally across the breadth of the stream; close by the edge is positioned a fish-trap constructed of the same material. The traps are quite large and of varying form. Here they were rectangular. The trap itself is partially covered with a palm leaf. Where there are fish-traps, one also finds fish. Therefore we decided to cast our nets here and there. We had previously tried to record bird noises, but it was impossible because motorcycles, the most common means of transport, passed by without interruption and made a fearful noise. In the water we had more success. First of all we saw the blue shapes of *Aplocheilus panchax* in the midst of large clumps of Najas and Ceratophyllum. In addition, there was quite a lot of Nyphaea and *Eichhornia crassipes* in places. The Eichhornia was, however, small in stature, although there were a lot of places receiving strong sunlight. Along the banks were a lot of grasses drooping into the water. The latter had a dH value of 5° and a pH reading of 6·0. The depth of the water was about 50 centimetres, the temperature 28°. On the surface of the water we saw a large number of pond-skaters, but we also caught water-boatmen and mayfly larvae. They provided food for *Trichogaster trichopterus*, young *Trichogaster pectoralis* and *Trichopsis vittatus* which had red fins. When we drew the net through the grasses hanging in the water, we caught Croaking Gouramis most of all. Rob Odijk suddenly gave a cry as he had just caught sight of two Bumblebee Fish, which he was unable to catch due to his surprise.

As well as these fish we caught innumerable tadpoles and also freshwater shrimps. All the tadpoles were spotted with red. In other places we found a restricted amount of vegetation, but did see Marsilea, small water lettuce and fine-leaved *Ceratopteris thalictroides*.

I was thinking of these experiences while considering how I should set up the tank for my new acquisitions. I had no knowledge of their natural way of life and had merely seen in the Diskus Center that they liked to hang from the filter pipes. I chose a fine substrate mixed with black sand, with the result that a mottled bottom was created. Then I filled the tank not with water from the tap with a hardness of dH 5°, but with water which had a dH value of 12° to which a level teaspoon of salt had been added for every ten litres. A few pieces of pine-wood and different kinds of plants, including floating fern, completed the set-up. As the tank stands by the window, it receives morning sunlight. The water temperature varies between 26° and 28°, often sinking at night, however, to 23°.

When the fish were introduced, they immediately disappeared beneath a clump of Java moss. After a while each fish seemed to have sought out its own spot beneath the moss or pine-wood. Subsequently, they appeared to be peaceable, but also preferred to have their own bit of territory in which any of their fellows were unwelcome. If one swam too close, it would be gently driven away. So far I have not observed them hanging from the aquarium glass as is often the case with Bumblebee Fish, but they do lie at the bottom on a piece of wood. At night especially they hang in open water. Until now they have refused dried food and, in fact, I have not yet seen them taking food. When I feed them it appears they are not interested in the least, but later there is nothing left. They are fed water-fleas, red mosquito larvae, white mosquito larvae, mayfly larvae and other live foods. When there are plenty of white mosquito larvae available the fish tend to be given a lot of them, but I have not noticed that they have any special preference for them. I find it rather surprising that they tackle red mosquito larvae, for the fish have rather small mouths in comparison to *Stigmatogobius*. *Tubifex* also disappear. I have the impression that the fish are more active at night than during the day time.

Although I started with hard water, I gradually reduced the hardness to 5°, which is the dH value of the water in my taps. This did not affect the fish and they are still in fine condition. The tank has an internal filter containing charcoal and wool. The water is given a certain amount of movement by means of an airstone but this is in no way turbulent. I carry out weekly water changes. The fish react favourably to these and hang with widely-spread fins close to, or on the bottom. One immediately notices when the water quality no longer suits them, for then the fins are folded. So far I have seen no signs of aggression.

Although mention was made of breeding in the tanks of importers, I did not discover any sexual differentiation. I spent a lot of time observing the fish since I would naturally have liked to have a female, but they all resembled each other in coloration, body-shape and finnage. As this species is not imported every day from New Guinea, it is to be hoped that breeding on a regular basis will be successful so that this marvellous fish will stay within our hobby. The same also applies for other gobies which have been imported from time to time in the last few years and now appear with increasing frequency in the trade. Their behaviour is quite different and their natural habitats vary too, however, in comparison with the species which has been described here.

THE BASIS OF FISH HEALTH

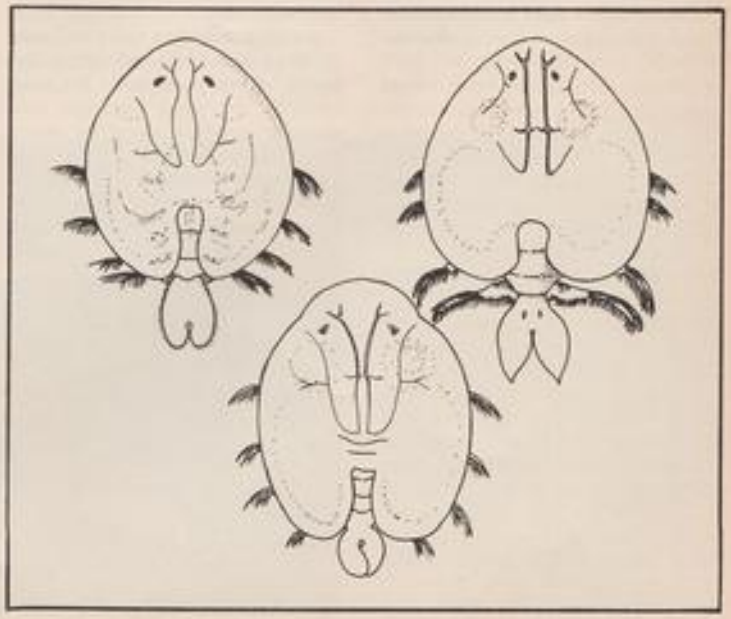
Continued from page 28

to feed on *Argulus* has shown that the louse is more or less immune from attacks by fish—at least small fish of the size of sticklebacks. When the louse is taken into the mouth of the fish it hangs on with its suckers defeating the vigorous efforts of the fish to swallow it. Eventually the fish spits the louse out into the water unharmed as far as one can see.

Argulus will attach to any part of a fish, but seems to favour the bases of the fins. The symptoms of an attack include nervousness and jumpiness in the fish. They often rub themselves against objects, dislodging scales which adds to the stress. In heavy infections anaemia is caused. There may be loss of colour because it is said, that the anti-coagulant injected into the fish not only affects the blood cells but also the pigment cells in the skin. *Argulus* can, in large numbers, cause the death of fish directly, mainly through blood loss. More important however, is the frequent secondary infections which take place. Bacteria from the water can reach the fish's blood stream and the lower levels of the skin through the punctures made by the feeding fish louse. Many instance are known of furunculosis and bacterial dropsy occurring after an *Argulus* infection. If the *Argulus* can be controlled the fish do not develop the secondary disease. As mentioned before, although not proved conclusively, it is likely that the louse can be a vector (carrier) for several diseases which are passed on when the parasite injects contaminated fluids from a sick fish into a previously uninfected one. Carp pox, a virally induced condition of cyprinid fish, is one of the diseases for which there is considerable circumstantial evidence for transmission by *Argulus*.

All fish keepers should watch for *Argulus* and take steps to control them. All fish should be examined and any lice removed carefully, with forceps, and a topical antiseptic applied to the wound. Acriflavine compounds are among the most useful for this purpose. For chemical removal of the *Argulus* itself fish farmers have employed short-term dips or long-term baths of their fish with organophosphate compounds. However, as these are dangerous to both fish and user, great care must be exercised in working out concentrations and immersion times. Formulations of these are now available to the aquarist (e.g. naled), although expert advice should be sought for difficult species or for valuable individual fish before commencement of treatment.

Precise methodology of treatment of various fish diseases, together with the advantages and disadvantages of baths, dips, flushes, treated food etc, will be the subject of one of the later articles in this series.



WHAT IS YOUR OPINION?

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

'Photographs by the Author'

Mr. Henryk Ronatowski resides at 18 Back Dykes, Auchtermuchty, Fife, in Scotland. He kindly sent me a Christmas card—and informed me that he has been reading *The Aquarist* since 1947. Mr. Ronatowski writes: "In the December issue you asked readers if anyone has been a reader of *The Aquarist and Pondkeeper* for twenty years. I think I can add some years to that. I have been a reader of this wonderful magazine since I was demobbed from the army in 1947. Since that time I have never missed one copy. I have seen many changes in that time, especially in the price, which was only one shilling (5p)—although it is still good value for money. I enjoy reading it very much and am looking forward to the next issue. Best wishes for the New Year."

My earliest *Aquarists* date from the early 1950s—when the cost was about 1/6 (7½p) if I recall correctly. I don't think I missed an issue since then. Does Mr. Ronatowski hold the record?

A beautiful snow-covered picture of Serija graced a card I received from Mr. Marjan Vidic, of Lesce, Yugoslavia. He wrote: "First, I wish you a merry Christmas, happy, healthy and peacefully New Year 1984. Thank you to publish my letter in the magazine. With your help I'm now in contact with one aquarist from Blackpool; he's very friendly and kind. Best wishes." I'm delighted to learn that at least one reader responded to Mr. Vidic's request for aquarist penpals. Perhaps someone else will also write to Mr. Vidic.

Mr. Jeremy Burr lives at 36 Merton Avenue, Northolt, Middlesex, and writes: "Having read your article in *The Aquarist* magazine I would be more than pleased for you to photograph my koi. I live in the London area and am secretary of the London Section of the B.K.K.S., and have kept koi in my home and garden for a number of years." (I'll give you a ring, Mr. Burr, *if* I'm able to take up your kind invitation.)

It's now 2nd January, 1984, and the snow is falling heavily. Yesterday was a very mild day—after a mild Christmas—and in my garden I was admiring buds and blooms on roses of Peace and Wendy Cussons, I was admiring primroses and polyanthus in bloom, noting that the daffodil bulbs had pushed through the grass; and feeling pleased with the indoor hyacinths and the host of flowers and buds on my elderly, large Christmas cactus. Tonight cars are skidding on the snow-covered road on the first snows of winter.

I visited a dealer's today and spent £7·50 on eight neons and eight golden barbs. All are young fish. My dealer made the interesting point that some specialist aquarium shops are feeling the pinch because many ordinary pet shops are now keeping a few tropical tanks in the corner of the shop and the average aquarist is buying a few fish in the local pet shop rather than visiting the big, specialist shop in the city or large town. He also made the interesting point that many home aquaria are now looking much more attractive than they did a few years ago because the aquarium in the living room or sitting room must now look really decorative to fit in with the standard of decor in the room. My dealer pointed out that he was pleased at the evolution away from a few free-breeding guppies in a shabby tank; but he noted a decline in the number of specialist aquarists who wish to have and are prepared to search and wait for particular, uncommon fish. I was pleased to see that his father, who sold me my first tropical fish in the late 1940s, has come out of retirement to work in the shop—and is enjoying it.

"May I be the first to wish you and all your readers a happy and prosperous New Year; and thank you for all your articles over the past few years? I'm afraid I haven't been with you for all 20 years but I've only been around that long. I hope this is acceptable," writes Mr. Andy Parkes, from 64 Silversmiths Way, Goldworth Park, Woking, Surrey. (Perfectly acceptable, Mr. Parkes. When I was about your age I wrote my first article for the *A & P*. Why not try writing one yourself!)

Mr. Parkes continues: "In the December 1983 issue you asked for comments on the magazine. Well, may I start with a mild complaint? Yesterday I looked back through the past two years' issues and could not

Opaline gourami

Thick-lipped gourami—*Colisa labiosa*

believe the number of identical replies to queries about *Tilapia buttikoferi* and the piranha species. Can I please advise all newcomers to join a local club or society, thereby getting almost instant answers to any problem.

"As for me, I am interested in the somewhat more unusual species of fish. I own a 400 gallon aquarium equipped with numerous internal, external and under-gravel filters. My fish include a snakehead, *Channa marulius*, tyre-track eel, *Mastacembelus armatus*, and a couple of other eels and catfishes. I am interested in discovering if anyone else has the particular species of snakehead; if so I should very much like to hear from him or her. Secondly, I should like some help in finding a particular fish—namely the marbled swamp eel, *Synbranchus marmoratus*. This is a beautiful tan-brown eel covered all over in black patches, it grows to approximately 5 ft. in length and it has an unusual patch on its head. It is found in southern America around Brazil and Peru. I will pay well for one, including any costs incurred in contacting me. There are also similar species in Africa, *Synbranchus afer*, and Asia, *Synbranchus bengalensis*, which I would be interested in.

"Anyone else with any type of eel or catfish, or *any* unusual species of fish that have outgrown their accommodation, I should be pleased to hear from—either by post at the above address, or by telephone at Woking 26799. I also own a number of reptiles and shall soon own a couple of tarantulas. P.S. I also own a *Tilapia buttikoferi*."

Regular correspondent Miss Margaret Cairns-Irven, B.A., resides at 4 Watts House, 105 Wornington Road, London, W.10. In her latest letter she writes: "I was interested in the comments—*A to Z of the Aquarium*, October 1983 issue—on the relative ineffectiveness of the mosquito fish, *Heterandria formosa*, in the control of mosquito larvae. My own specimens of this attractive and hardy livebearer are uninterested in live food of any kind if an alternative is available—which is fortunate because they can be kept with their own young. Early books state that *H. formosa* is known as the mosquite fish because of its small size; however, I have noticed that the juvenile specimens, with their vertical stripes, relatively large heads and bodies, and drooping tails, actually resemble mosquito larvae—and may also hang just beneath the surface as mosquito larvae do. I can't imagine what survival function this could have in the wild.

"It seems possible that *H. formosa* could have been named mosquito fish because of its resemblance/its small size—*before* the use of more voracious species in mosquito control led to the popular name gaining a wider application and changing in meaning.

"It would be a pity if aquarists were deterred from keeping this easy and peaceful fish by a belief that it must have live food, or if those new to this species lost stock by feeding their fish on food too large for them to manage.

"P.S. Strange things come to light when one moves house: would any reader care to offer freshwater tropical fish/fry in exchange for non-living but decorative white coral, or red pipestem coral?"

"Congratulations on your 20 years," writes Mr. Peter Nance, whose home is at 23 High Trees, 90 Epsom Road, Sutton, Surrey. Peter continues: "I keep a 36 in. × 12 in. × 12 in. and a 48 in. × 12 in. × 12 in. tank at the moment. The larger tank houses two large severums which have become very tame over the years. I cannot express the pleasure these intelligent, gentle cichlids can give if provided with a little care. The fish in the smaller tank include three discus. Two are spawning quite often and are slowly learning the skills of breeding. At one time I kept these fish without filtration of any kind; but by changing a bucket of water every day for them

Cabomba species

they thrived. Constant partial water changes are a chore well worth doing when keeping cichlids. They respond so well with their feeding and breeding habits. Please keep up your excellent column—but not too much about bulbs, please! Fluorescents have got to be more economical in the long run; or what about the new Thorn 2D lamps?"

I make occasional references to Woolworth's bulbs, Mr. Nance, because I consider them to be very good value in four-packs at 99p; and I find that such tungsten bulbs produce much better plant growth than any of the fluorescent tubes I have tried over my aquaria. Obviously other people may have different opinions and have reached different conclusions. I have wondered about Thorn's 2D lamps after reading about them in the Sunday colour magazines. Lamps and fittings seem to be relatively expensive to start with. No doubt they are cheaper to run than tungsten bulbs. If I can light an 18 in. tank with one, a 24 in. tank with two and a 30 in. tank with three 25p Woolworth bulbs, and grow good plants, I think I'm getting a good bargain—and I wish to share my findings with other aquarists. I should be pleased to hear from anyone who has tried the 2D lamps—with or without aquaria.

***Bacopa* species**

Photograph 1 shows an opaline gourami, *Trichogaster opaline*, and photograph 2 a thick-lipped gourami, *Colisa labiosa*. Please send me details of your experiences with the keeping and breeding of these—and indeed any other—species of gouramies. Two popular tropical aquatic plants that sometimes do not last too long in particular aquaria are *Cabomba* (picture 3) and *Bacopa* (picture 4). Please send me details of the general conditions under which you successfully grow these attractive plants. Has either species bloomed in your tanks?

Several weeks ago I splashed out on a new, rather expensive camera, case, motor-drive, flash unit, extention lead and set of extension tubes. I've yet to crack the several books of instructions. Former pupil Robert Robinson (17) has his eye on a £360 camera that has just been added to the Olympus range. I think we should swop jobs. Some of his fish photographs are very good.

For a future issue please send me your opinions on any of the following: (a) unusual livebearers; (b) tablet foods; (c) feeding aquarium plants artificially; (d) aquarium snails; and (e) breeding any of the tetras. I hope to hear from you. Best wishes until next month.

Opaline Gourami

Mr. Zukal, in his article on the opaline gourami, printed in your issue dated December, 1983, says "the fish was made available to the aquarist hobby when it was discovered on the island of Sumatra at the end of the last century".

Unless my mind is getting very fuddled with advancing age, the opaline gourami did not appear in dealers' tanks—over here, at any rate—until the early 1950s. To the best of my knowledge, the opaline gourami was developed from matings between the blue gourami and the old-style two-spot gourami (basically leaden silver overlaid with a sheen of clayey brown and violet adorned with faint oblique grey stripes). The production of this 'new' fish took place in the U.S.A. during or after the Second World War. The American aquarist responsible for this fish bore the name of Cosby. Those interested can refer to contemporaneous aquarium magazines. It is plain to the eye that, blue gourami forebears loom large in its genetic make up. The blue gourami or *Trichogaster trichopterus sumatranus* was first described by Dr. Wilhelm Ladiges in 1933. I remember buying some blue gouramies—among the first to reach here from Germany—in Charles Schiller's exciting aquarium shop situated in Jason's Court, London, W.1. about the middle of the 1930s. The scientific name of the old-style two-spot gourami is *Trichogaster trichopterus trichopterus* (Pallas 1777), introduced to aquarists in 1896. Today there are a number of colour varieties of the so-called two-spot gourami.

Jack Hems, Leicester.

A-Z of the Aquarium

Water

WATER is a liquid chemical compound made up of two gaseous elements, hydrogen (H) and oxygen (O). Unlike a mixture, e.g. sand and sawdust, in which the overall properties are a sum total of the properties of the individual components, a compound has distinctively unique properties brought about by precise chemical bonding between its components.

Therefore, in water, gaseous hydrogen and oxygen are always "bonded" in the ratio of 2:1 to give a clear, tasteless liquid represented chemically by the formula H_2O. Any other combination cannot be water, e.g. H_2O_2 is Hydrogen Peroxide, well-known for its bleaching qualities.

The hydrogen and oxygen atoms are electrically charged and are called ions, the former being positive and the latter negative. These opposite charges are responsible for attracting the atoms to each other. In H_2O, it takes two ions of hydrogen (H^+) to "balance out" the charge carried by each oxygen ion (O^-). When this balance is achieved, the resulting molecule of water is electrically neutral.

It is possible to split each molecule of water by "removing" a hydrogen ion. This results in a single, positively charged ion of hydrogen (H^+) and a negatively charged hydroxyl ion (OH^-). The hydroxyl ion carries a single negative charge, instead of the two that an oxygen ion carries, because one of these is cancelled out by the hydrogen ion. (The second hydrogen ion can also be removed, as in the electrolysis of water which results in gaseous hydrogen and oxygen ions).

Because hydrogen and hydroxyl ions are charged, they are highly reactive, particularly towards each other. Therefore, in the absence of any other ions, i.e. in pure water, there will be equal numbers of each.

The overall situation can be summarised in the form of an equation which shows, by means of arrows, that reactions are possible in both directions:

$$H_2O \rightleftharpoons H^+ + OH^-$$

(Water) (Hydrogen ion) (Hydroxyl ion)

Since aquarium water is not absolutely pure, there will inevitably be an over-abundance of either H^+ or OH^- ions. An excess of H^+ ions causes a drop in pH (acid), an excess of OH^- leads to an increase (alkaline conditions), while dissolved salts give water its "hardness".

Surge of water filling a tidal pool

X-ray Fishes

THE term X-ray Fishes has been used at various times in referring, quite loosely, to a number of species whose only shared characteristic is that their skeleton is visible, to a greater or lesser extent, through their body tissues.

For example, *Pristella maxillaris* (*riddlei*) is usually referred to as the X-ray Fish or the X-ray Tetra. However, it is in no way as transparent as the name implies. It is, nevertheless, a very attractive, shoaling species which is occasionally available in the albino form. The X-ray Tetra belongs to the Family Characidae.

Members of the Family Centropomidae (formerly Abassidae, from which the various *Chanda* species took their now obsolete name, *Ambassis*) have also been referred to as X-ray Fishes. However, a more common, and probably more appropriate, way of referring to these fish is as Glassfishes.

***Chanda baculis* is the Burmese Glassfish**

There are about 30 species in the Centropomidae distributed among 9 genera, of which *Chanda* is the best-known and most X-ray-like genus. The genus, itself, has at least six "aquarium" species all of which, at first sight, may appear very similar to the untrained eye or when kept under less than ideal conditions. By far the most popular species is *Chanda ranga*, the Indian Glassfish, which is probably also the most attractive representative of its genus. All *Chanda* species prefer hard, alkaline water with up to two or even three teaspoonfuls of salt added to every gallon.

Yet another species of fish that has been likened to an X-ray, is the Glass Catfish, *Kryptopterus bicirrhis*, also occasionally known as the Ghost Fish. Like its close relative, *K. macrocephalus* (the Poor Man's Glass Catfish), *K. bicirrhis* belongs to the large Family of Eurasian Catfishes, the Siluridae. Unlike most Catfish, *Kryptopterus* does not rest on the bottom. Instead, it rests at an oblique angle in the water, facing the current and waiting for food to come its way.

***Kryptopterus bicirrhis*, the Glass Catfish**

Camouflage is an obvious advantage for a predator which, in turn, is preyed upon by larger fish. The method that has evolved in so-called X-ray fishes allows them to "disappear", at least partially, into their background or else reduce the definition of their bodies sufficiently to make things difficult for prey and predators alike.

Wrasses

A young Twinspot Wrasse, *Coris angulata*

WRASSES belong to the Family Labridae. All are marine and are widely distributed in the Atlantic, Indian and Pacific Oceans as well as in many of the major Seas, such as the Mediterranean. There are about 400 species in 58 genera, ranging in size from around 5 centimetres to a maximum of 3 metres. Together with the Families Scaridae (Parrotfishes) and Odacidae, the Wrasses form the Suborder Labroidei (Wrasse-like fishes) of the Order Perciformes (Perch-like fishes).

Their wide range in size and distribution makes the Wrasses one of the most diversified of all the fish Families. Despite this, there are a few characteristics which set them apart from all the others. Two of these are very typical. Anatomically, the teeth project forward and are clearly visible, extending beyond the (usually) fleshy lips. Behaviourally, most species bury themselves in the substratum at night or when alarmed, something that should be borne in mind when setting up an aquarium to accommodate these fish.

Some species are known to be protogynous hermaphrodites. This term refers to the ability exhibited by such species to change sex as they mature or as conditions alter within a breeding group. In protogynous hermaphroditism, the sequence is from immature to female and, finally, to male. In protandrous hermaphroditism, the male and female stages occur in reverse order (See A-Z, Damsels, May 1983).

Further, in Wrasses, there may be two methods of spawning. Both involve the scattering of eggs by the mating adults. In group spawnings, the fish, although adult, are not old enough to have developed the colours or size of the very largest males. These tend to be very conspicuously marked, are significantly larger than other males and spawn with single females rather than in groups. Some species of *Thalassoma* exhibit this characteristic.

Perhaps the best-known of the "aquarium" species is the Cleaner Wrasse, *Labroides dimidiatus*, from the Pacific, Indo-Pacific and the Red Sea. This, and other species, such as *L. quadrilineatus* and the Spanish Hogfish, *Bodianus rufus*, derive part, or all, of their food by picking off parasites and generally cleaning the body surface and (even) gills of larger, often predatory species.

Labroides dimidiatus, the Cleaner Wrasse

Xanthochromism

ALTHOUGH fish exhibit a bewildering array of colours in countless combinations, these can be reduced to just two *types*.

Some colours are produced by pigments—these are called BIOCHROMES. The others are produced by reflection (by crystals) and refraction by body tissues—these are referred to as STRUCTURAL COLOURS or SCHEMATOCHROMES. The cells which contain pigment are collectively known as CHROMATOPHORES and these are further subdivided according to their main pigment.

Melanophores
contain black or brown pigment (melanin).

Erythrophores
contain reddish pigments (carotenoids and pteridines).

Xanthophores
contain yellow pigments (carotenoids).

Leucophores
contain white or uncoloured purines (usually as small, motile guanine crystals).

Iridiophores
contain large, non-motile (non-moving) crystals, mostly of guanine.

Some chromatophores contain more than one pigment and are known as COMPOUND CHROMATOPHORES.

Biochromes are produced by melanophores, erythrophores and xanthophores while Structural Colours are produced by leucophores and iridiophores.

The terminology used in the preceding paragraphs is based on Carl E. Bond's, "Biology of Fishes" (Saunders College Publishing, 1979).

The Golden Orfe is a xanthochroic form of the Ide, *Leuciscus idus*

In xanthochromism, no black or brown pigmentation is produced. This allows the other pigments to show through, producing an overall yellow colouration of varying intensity. When the orange and reds are also "blocked", the overall colour that shows is uniformly silver.

Although xanthochromism is known to occur in the wild, as in some Trout (*Salmo* sp) and Eels (*Anguilla anguilla*), it is found more commonly in cultivated varieties. Among the best-known of these are the Goldfish (*Carassius auratus*), Golden Tench (*Tinca tinca*), Golden Orfe (*Leuciscus idus*), Golden Gourami (*Trichogaster trichopterus*) and Golden Medaka (*Oryzias latipes*). A rare, but authenticated, example is found in the otherwise drab (to some) Climbing Perch (*Anabas testudineus*) which, if developed, would undoubtedly increase the popularity of this species significantly.

Fish which exhibit xanthochromism are referred to as XANTHISTIC or XANTHOCHROIC.

Hoplosternum littorale

by Alan Hodgson

FIRST discovered in 1823 by the explorer and biologist Hancock in the Demerera river in British Guiana, *Hoplosternum littorale* is also found as far west as Peru and as far south as Uruguay.

These heavily armoured catfish are usually found to inhabit slowly moving streams and rivers, normally under riverbanks, overgrowing tree roots or low branches, rarely in open water where their blue-black to grey coloration would not give the same camouflage effect as the mottled shadows of the sun shining through the overhanging plants, or root systems, breaking up the outline of their bodyshapes. Perhaps this seems like camouflaging a tank; quite a good similarity, in fact, as the Hoplo has few natural enemies due to the amount of armour on the body—a double row of overlapping scales, correctly called scutes, on each side of the body, plus eight pre-adipose scutes on the back. (See fig. 1).

This fish (who's name, littorale, means, incidentally, the type of place the fish is found, ie, the tract of water adjacent to the riverbank) is of a peaceable temperament (except for the male when actually guarding eggs or young) going about in small shoals seeking food on the bottom of their habitat.

The Cascadura, as it is locally known in Guiana, has been known to grow to a shade over 8 inches (20 cms) from the tip of the snout to the caudal peduncle, not counting the tail or the two pairs of maxillary (or lip attached) barbels.

Other identifying features include the slightly forked tail, the twenty five upper and twenty three lower scutes, (differentiating it and the other three members of the Hoplosternum genus from all the other fish in the family Callichthidae). The barbels, with the top pair pointing down and the bottom pair pointing up—like teeth—and the colour, as previously described fading to dull cream on the belly (where the fish rests when not moving and giving rise to the genus name of Hoplosternum, short 'hops' on the breast), and the clear fins, which have a moveable spine on the adipose and strong spines on the pectorals, which the fish use for moving about on land during rainy weather (like stilts or primitive legs).

The entire family of Callichthidae does not rely on oxygen dissolved in the water, but can utilise atmospheric air taken in through the mouth, passing it into the gut and absorbing it by means of the vascular respiratory endothelium, ejecting it through the vent. The fish will, in fact, die if unable to get to the water surface to take in air in this manner, and can live in near stagnant conditions which would kill other fish. Breeding in these conditions is, of course, out of the question, as the baby fish, or fry, do not use this method of breathing until about a month old and so would be unable to survive in poorly oxygenated water.

To get the best from aquarium-kept fish, conditions should be at least similar to the natural environment to make the fish feel 'at home' in the unnatural environment of a glass tank. If these conditions can be made acceptable to any fish, then it will thrive and eventually, perhaps in some cases, years, it will breed, which after all should be the aim of every Aquarist and is the difference between the true Aquarist and the fishkeeper, who may not be able, for various reasons, to treat the fish as they really deserve.

Babies to breeders

For quite some time I had been 'after' some uncommon catfish to keep in my 30 tank fish shed, and when the chance of six young *Hoplosternum littorale*—free—appeared, I jumped at the chance.

When I got the six fish they were just three months old and a shade over two inches (5 cms) from lip to caudal peduncle. On their arrival at their new home, they were put into a hurriedly set up tank of 24 in. × 18 in. × 12 in. deep, no special effects or out of the ordinary conditions except extra care due to the move from their previous owner.

The water conditions of my locality are quite acceptable to most fish and these proved to thoroughly enjoy and thrive on the slightly soft, neutral alkalinity (7° d.h.) water that comes from the tap in my home town of Wombwell in Yorkshire. The tank temperature was 78°F (26°C) and the water kept clean by half of the tank base being given to an undergravel filter and the other half being bare. This makes tank cleaning less of a chore as any uneaten food or excreta ends up on the bare part and can be easily syphoned out every couple of days.

Regular water changes of up to 50% of the tankwater are, in my experience, essential to the growth and well being of the fish so these were getting their water changed quite often, the tank being refilled by the simple method of a hosepipe delivering cold tapwater at full blast; the fish seemed to like the fast, cold flow as they swum directly in the stream.

The tank was well planted with *Echinodorus paniculatus*—Amazon Sword—and *Cryptocoryne* species of plants with a 1 in. layer of *Riccia*—crystalwort—floating on the surface to minimise glare from the fluorescent tube above, and after a short sulk of about 24 hours the fish started to feed and settled in to their new surroundings.

At this time it was impossible to tell what sex the fish were, because, as with most fish, adult characteristics are not discernible until the fish approaches full

size and maturity, this is because fish, being smart, know that adult males usually will never attack females, only males, and then normally only when in breeding condition, so juveniles adopt female coloration etc, until the young males are big enough to realise what life is all about. Most female fish, being relatively placid, will live in harmony with other females or juveniles.

When young, ie, up to about 5-6 months old, the littorale has a very chic mottled pattern; this, sadly, gives way to a much duller coloration as maturity approaches. Considering that the fish are fairly long lived, perhaps up to 10 years, they mature quite early, about 12 months being the age when mine first showed signs of wanting to breed.

Diet consisted mainly of high protein trout pellets, with flake food, beefheart, bloodworms (midge larvae) and *tubifex* worms given occasionally to vary the menu.

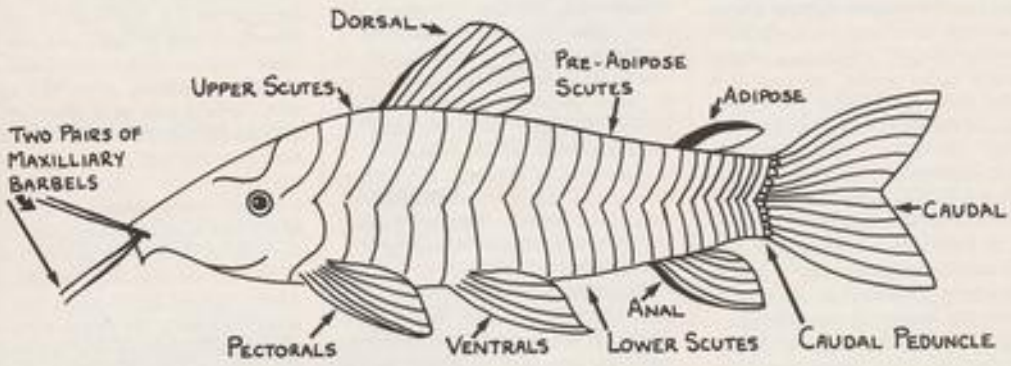
The fish grew quite quickly, especially one, making me think that it could be a male, and at 7 months old, started to sex out.

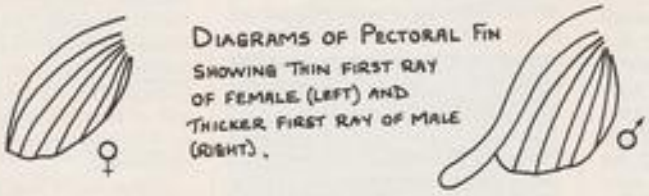
The first, and it turned out, only fish to show male characteristics, strangely enough, wasn't the large one, however, but the third largest. Sizes at this time range from 4½ in. to 6 in. The three smallest females were sold as being surplus to requirements.

The original six fish had not been kept in the first tank all the time, but had been split up into three similar sized aquaria so that they were never cramped for growing space. Now that half the stock had gone, another move took place; this was for bringing into breeding condition.

Hoplosternum littorale ♀

SHOWING IDENTIFYING FEATURES





DIAGRAMS OF PECTORAL FIN SHOWING THIN FIRST RAY OF FEMALE (LEFT) AND THICKER FIRST RAY OF MALE (RIGHT).

The method I used for this was to put the two females into one 36 in. × 15 in. × 12 in. tank and the male in the original aquarium, feeding with only beefheart and trout pellets. By keeping the sexes apart and feeding a higher protein than normal diet, all the fish are concerned with is feeding and resting, the need for expending energy for anything other than eating is removed.

After two weeks of this treatment, the moment of truth is near. Are the fish old enough? Will they be compatible? Are they in correct condition? Will they know how? Perhaps most important . . . will the conditions that they have grown up in, and will be given shortly, be suitable for them to breed in?

Only time will tell.

To breed or not to breed?

In October 1981, the fish were, in my opinion, ready in age and condition anyway, to breed, so a further tank was set up, the largest (for them, so far) of 36 in. long, 18 in. wide, and 15 in. deep. That, I thought should be big enough. It was planted similarly to the original, but with the more robust Indian Fern—*Ceratopteris thalictroides* —instead of *Riccia*. Temperature up to 82°F (28°C). A large portion of *tubifex*, and—no reaction. Try the other female just the same, plenty of zero. Try a 50% cold water change and then fetch the temperature back up —nothing; well, they did eat all the *tubifex*, but that wasn't quite the *only* thing I had planned would happen.

What could be wrong. The fish were definitely a pair, both tries, but just were not interested. No wonder they weren't common. I thought. Ah well, back to the think tank (the fish that is).

Giving the matter careful thought over the next few days, I wondered if, as with a previous experience with some other fish from the same area, they might be seasonal breeders, only spawning at a certain time of year. Well nothing ventured etc, I decided to try in the new year.

February 1982, try again time. Using the same tank as last time, but a 4lb. margarine tub lid floating on the water surface to try and convince the fish that there was a nice firm roof to spawn against (I had found out that in the wild they lay eggs on a floating leaf or branch) I waited with fingers crossed for any developments; just as last time, nothing. Despairing, I tried a 35 gallon (out of 55 gallons) water change, and a slight increase in temperature. Lights out and off to bed.

Next morning the temperature had gone to 83°F—the magic figure as I was to realise and the male was showing signs of interest in the female.

That evening, the male started to build a nest.

He did this by swimming upside-down underneath the margarine tub lid and using a kind of chewing action, passing air from the water surface through his mouth and out of the gills as tiny bubbles. These built up like a layer of foam, pushing the lid clear of the water. All the well established plants were uprooted and pushed into the nest, which by now looked quite impressive, 3 in. deep and approximately 9 in. diameter. It must have impressed the female anyway, as she started to spawn at about 8 o'clock that night.

Unfortunately, the method of egg-laying was not observed but other members of the family hold the newly laid eggs in the ventral fins and nuzzle at the vent of the male, taking milt into the mouth and blowing it, via the gills, over the eggs, then depositing them on the lid. All this being done under the nest, while swimming inverted.

By the next morning, spawning was completed, and the male was circling under the nest, fins and barbels held stiffly out in an attitude of belligerence, ready to defend his nest and the contents against all-comers. The poor female, however, was a little the worse for wear, looking quite a bit tattier than she did the night before. Every time she went within a foot of the nest, the male drove her away in no uncertain manner, attacking until she lay under a piece of slate placed in the tank just for that purpose. I quickly moved the female into another tank before she suffered irreparable damage, leaving the male on guard.

For the next three days, he untiringly looked after the nest and eggs, (about 500 adhering in clusters to the under side of the lid—I pecked), then the eggs started to hatch. It looked like a swarm of little black dots under the nest, and as the male was losing interest, he was removed at this time. He did not seem too bothered about not having the nest to guard any more; this could have been due to the temperature in his new tank being about 5°F less than that of the breeding tank.

As the newly hatched fry still had part of the yolk-sac under their bellies, they were not fed at this point, but when they were three days old. Micro-worm (*Rhabditas* or *Anguillula* species) was given in ever increasing doses. They certainly enjoyed them and started to grow.

The small, 4mm long, fry were not recognisable as Hoplos at this juncture; in fact not until they were a month old did they look like the parents in body shape.

They grew quickly and were soon able to move onto the high protein diet which proved successful with their parents.

Now at almost three months old, they range in size from just over an inch to nearly three inches and the approximately 200 fry that survived (mortality was quite high until a week old) are slowly being sold off, snapped up really, as people see and hear about them. Quite a profitable little sideline, in fact.

Well up to date, the fish have spawned four times, the larger female depositing a few more eggs than the smaller, but both willing to spawn so long as the temperature is 83°F. The parent fish seem to have stopped growing at between 6½ and 7 inches but this could be because they are producing eggs and milt instead of body weight.

Acknowledgements

Mr. Ron Cohen without whom this would not have been written. Freshwater Fishes of the World by Gunter Sterba. (out of print).

Company Profile

Aqua-Pet International

The Strood premises of Aqua-Pet International. The entrance to the loading bay is visible behind the delivery lorry

FISHKEEPERS in the South East of the country will soon be able to buy freshwater tropical and coldwater fish from retailers supplied by Aqua-Pet International. In fact, some will have already done so by the time this article goes to press.

At the time of writing (January 1984), Aqua-Pet International had already started supplying the trade from their initial stocks of 40,000 quarantined fish. Yet, even this number represents only one third of the carrying capacity of their brand new, superb (there's no other word for it) set-up in Strood, Kent.

At full capacity, Aqua-Pet International will carry around 125,000 fish. They could carry more but feel that this self-imposed ceiling marks a realistic level within which they can operate and maintain the extremely high standards they have set themselves.

On visiting their purpose-built premises at the Deacon Industrial Estate, one cannot fail but be impressed by the level-headed approach being adopted by Managing Director, Rodney Willmott and his team.

However, no matter how level-headed the approach or how high your standards may be, in the end it all comes down to the quality of the product and the expertise of the staff running the operation.

The Aqua-Pet International team is headed by Laurie Getley, the Fish House Manager, who has 20 years' experience in the business, during which time he has become both well-known and greatly respected. He has total responsibility for all aspects of the running and maintaining of the fish house and this includes the buying, importing and quarantining of all stocks.

It was particularly pleasing to see that quarantining is given top priority. There is no question of risking the health of the fish for the sake of a fast turnover rate. In fact, every tank is examined twice-daily and details entered in a record card placed directly above it. No fish are sold unless, or until, they are believed to be perfectly healthy, and certainly not before they have undergone a period of quarantine. This, of course, can take weeks but Aqua-Pet feel that the time, effort and expense are well worth it in establishing and maintaining their stated aim of supplying quality fish. A further back-up service is provided by a local vet who is always available, day or night, to deal with any emergencies.

Clearly, the size of the operation will increase as stocks approach full capacity but there are already contingency plans to employ all the necessary extra staff as things develop over the coming months.

This is another example of the level-headed approach referred to above. Although the company could have come in "with all guns blazing", they have resisted the temptation and have started trading at one third capacity to allow themselves the time necessary to iron out any teething problems that may arise.

Even so, the complete quota of tanks and ponds are ready for use at a moment's notice. This quota consists of 860 aquaria and 23 large coldwater ponds. By the time they are fully stocked, there will be, in addition to the present tropical freshwater and coldwater species, tropical marines, a wider range of coldwater species (including Koi of all sizes) and a substantial plant section.

Resin-filled pH water treatment cylinders

"Water hardness" cylinders are connected to fully automated header tanks where temperature and other final adjustments are carried out

Such a varied assortment of species, obviously, has widely differing requirements in terms of water quality. This is taken care of by a highly sophisticated water treatment plant which can be programmed to produce water with temperature, pH and hardness characteristics encompassing a range wider than that required by even the most demanding of species.

The whole system has been specially designed for Aqua-Pet International after discussions and research carried out by Laurie Getley in collaboration with local engineers and chemists. The result is a system that dechlorinates, softens/hardens, acidifies/alkalinifies, warms/cools up to 1,000 gallons of water for the tropical stocks. As far as the coldwater species are concerned, their water goes direct from the mains, after a pre-determined degree of depressurisation, into a dechlorinator and softener before being made available for use in the coldwater house.

Therefore, as the above shows, great care is taken at every stage to ensure the quality of fish made available for sale. A small, but, to me, highly significant reflection of this genuine feeling for the fish, is the way in which Siamese Fighters are treated. Because of their resilience and resistance to low oxygen concentrations, these fish are sometimes put into temporary quarters which are no larger than jam jars. At Aqua-Pet International, though, each specimen has its own 12 in. × 6 in. × 6 in. aquarium which receives the same carefully pre-treated water as all the other, often more delicate, species in the tropical house.

The house, itself, is heated from a gas fired boiler which feeds hot water pipes running underneath the tanks. The system is thermostatically controlled and, in addition, has an in-built fan driven air flow control to circulate the warm air throughout the house.

Laurie Getley and John Lampard examining stock tanks

Water aeration is controlled by one of two electric blowers, the other being on automatic standby. A diesel generator, housed in its own, separate building, is designed to keep the whole building in operation in the event of a power failure.

Helping Laurie Getley run things is Deputy Fish House Manager, John Lampard, who is (as Laurie) well-known and respected in the business. John has 12 years' experience in wholesaling, many of them as a Fish House Manager.

Adrian Long is the Sales Manager responsible for the sales staff, control of stock and purchasing of dry goods, tanks, etc. His experience includes the running of a successful retail aquatic and petshop in Rainham. Adrian has already built up an impressive collection of aquaria and stands which should satisfy the needs of most retailers and hobbyists. These are already on display in a neat, well designed Demonstration Room housed on the ground floor of the premises.

I mentioned in my opening sentence that Aqua-Pet International are already supplying retailers in the South East. However, they will be expanding, along with their stocks, over the coming months to cover the whole country. For further details contact:

Aqua-Pet International, Unit 5, Deacon Industrial Estate, Knight Road, Strood, Kent ME2 2AU. Tel: Medway (0634) 724625.

by Eric Hardy

How fishes swim is not nearly such a simple matter as might first appear. The long-nosed paddle fish shown for the first time in this country last year in London's Zoo's 60 years old aquarium has its long "snout" not for smell. It helps to stabilise this constantly swimming fish cruising in midwater with widely gaping mouth to feed upon plankton. The newcomers were only a few inches, but they may grow to as many feet, and come from the Mississippi.

They may grow to 23 ft with the "paddle" a third of the length, hence another nickname of spoonbill. Another explanation for the long sensitive rostrum is to detect prey in the mud. It is related to sturgeons with a similar relative, the slender beaked sturgeon in Chinese rivers. Its very small eyes are supplemented by the sensitive beak in finding prey in muddy waters.

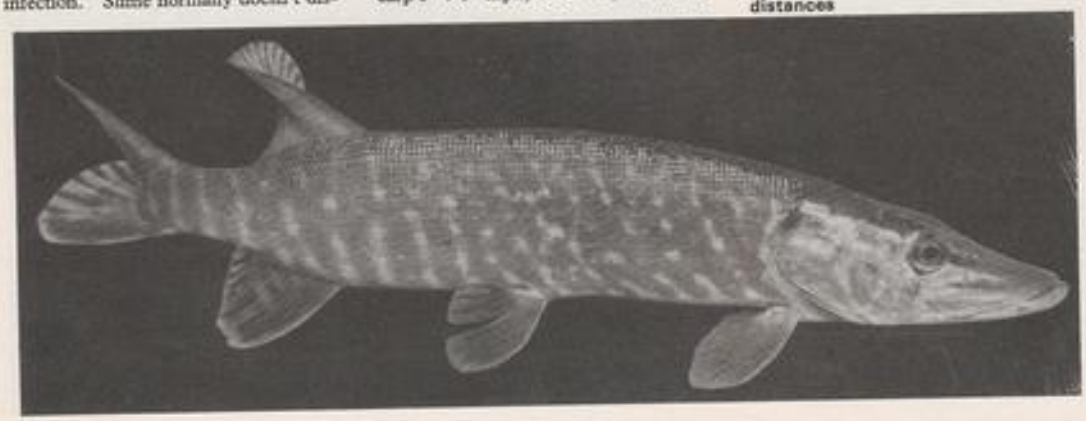
Most fish, of course, swim with their tails and balance with their fins, evolution modifying these to improve their efficiency and speed. The slimier the fish, the faster it swims. The skin-slime of some fish like barracuda can cut water-friction by two-thirds, though in fish which don't need speed, this is not so and the slime lubricates scales as the body flexes, and guards against bacterial infection. Slime normally doesn't dissolve in water, but when a fish attacks or is chased, the water disturbance along its body starts dissolving slime, which cuts friction and the turbulence.

Some small fish when swimming generate a whirling vortex within the concave part of their curving bodies and push against the vortex to propel themselves forward.

Estimates of fish-speeds by "piscatometer" are numerous ranging from a carp's 7·6 mph, eel 7·5, tench 7, roach 10, barbel 11, pike 15, black bass 12, and trout 23, compared with man's 4·01. A small fish moving in short bursts can travel 10 times its body length in a second, varying with the species. Up to a foot long, their top speed is in proportion to their length and the frequency of tail-movements. Temperature has more effect on cruising speed than top speed with an optimum 16°C for trout. Young goldfish placed in a rotating circular tank with only the outer wall glass, swim steadily at a rate varying with the temperature when the water is aerated. Their best performance is between 20 and 30°C, and the highest temperature to which they can be acclimatised is 41°C. The goldfish makes an angle compensation when turning. At Hull University, researchers are investigating muscle-fibre recruitment at various speeds and temperatures.

Most fish are not so fast as once claimed. The effect of the tail depends on the size of the tail-fins or, in the case of sharks, its lobes, and their flexibility. In some fish like the slow sharks where the tail curves upwards, the smaller upper lobe may be used to

Pike can move very fast over short distances



counter the upward thrust of the larger lower lobe so it doesn't raise the rear of the fish when swimming. This type of tail, in association with large pectoral fins, evolved to enable sharks, etc, to swim while their specific gravity increased. The large pectorals are set at an angle to take their heavy weight. The more typical fish-tail developed without this link with pectoral fins.

Small fish tend to have longer speed endurance than large specimens of the same kind. Electrical stimulation and the use of drugs like adrenalin show the adrenergic sympathetic nerves control tail-movements, as they control the flow of blood to the gills, and much else.

Swim bladder

The swim-bladder causes the specific gravity of fish to equal that of the water, so that no vertical action is necessary to keep the swimming fish off the bottom. Fish with swim-bladders like most cods and herrings also give a better echo on sound-recorders, accounting for half the echo when even only a twentieth their size. Turbot only have them when young, soles, mackerel, slow dogfish and flatfish are among those without any. The swim-bladder gives buoyancy and enables a fish to rest without continuous swimming like the typical aquarium shark. Without it, flatfish can glide to the bottom for safety camouflage. Oxygen concentration in the swim-bladder increases with water-pressure, using a "gas-gland" of closely parallel capillaries regulated by sympathetic nerves, most efficient in deep sea fish. The fastest fish, like tuna, have lost the swim-bladder because they can make quick changes in depth without it when necessary. So have flatfish.

Fish sometimes stop swimming in a tank and allow their momentum or fins to carry them forward, slowed by water-resistance. Speed and tails probably evolved under such conditions for survival from predators, improving in efficiency in turbulence-reduction in the eddying wake to avoid too rapid a use of energy acquired from food. Thus speed was not so necessary with coral-fish and others surviving by camouflage or hiding. The earliest fish probably swam with a side-to-side lateral undulation backwards down the body, like eels. Later the front of the body as in salmon lost its flexibility and the undulation was confined to the rear. Then caudal fins were enlarged, and finally fish were propelled by tail alone, with more powerful muscles and higher body-temperature. Bottom-living skates and rays evolved large pectoral fins, initially to take their weight and then for propulsion the tail fin gradually disappearing. They became almost all pectoral fins, together approximating to a square with an extremely thin body and tail, swimming by the original undulatory movement passing backwards.

Frogs

The much publicised decline in frogs, which was largely in southern England, has been arrested by the increasing popularity of garden ponds, now a main breeding source. Most of Sheffield's frogs for instance are found in better class western and southern suburbs. Two rare Baxter's toads, the first found in Wyoming for two years, died last year at the University of Wyoming when they became entangled in netting covering their cage.

Amazonian piranhas in this country are either admired in a fish-tank at shows, or subject to sensationally exaggerated articles proclaiming them to be man-eaters from the jungle. Their true place in the ecology of the Amazon, like over 200 other species of fish in the Amazon Basin, is that they depend upon its trees for their food and the trees like rubber and palm depend upon the piranhas to distribute their seeds, and for their survival. Amazon fish evolved specially adapted molar teeth to crunch hard nuts during the annual floods, and bloated stomachs to store fat when the waters retreat. Several piranha species became vegetarian. Destruction of Amazon trees has drastically reduced some fish populations, and efforts are being made to keep large tracts of floodplain forest in a natural state.

COVER STORY *Photo: A. van den Nieuwenhuizen*

Arnoldichthys spilopterus, the Red-eyed or Arnold's Characin, is the only representative species of its genus which is, therefore, referred to as monotypic. Although it was first introduced to the aquarium hobby as early as 1907, this deceptively beautiful fish has never quite achieved the popularity it deserves. The fact that there are no well-documented accounts of its breeding behaviour may have contributed in some measure, yet other, less colourful species have become established despite this apparent drawback.

Arnoldichthys is a very active, shoaling species which tends to swim close to the surface and herein may lie the secret to spawning success. Males are easily identified by the presence of yellow and black stripes in the anal fin. Our cover photograph, therefore, depicts two males (upper fish) and a single female. Large scales on the top half of the body distinguish this Characin from other superficially similar species such as *Alestes* spp.

In the aquarium, *A. spilopterus* prefers soft, neutral to slightly acid water kept between 24° and 28°C (c. 75°—82°F). It likes clean (but not raw) water, will take a variety of flake and live foods, and can grow up to 12cm (c. 5 in.) although it usually remains about half this size.

In the wild, this species is found in Tropical West Africa, mainly around Lagos and the Niger Delta.

Tomorrow's AQUARIST

DESIGN-A-FISH COMPETITION

THANK you very much for all your entries to this competition sponsored by Tetra. The standard of entries has been very high indeed and judging is currently under way. We will publish all the results next month so—watch this space in April!

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INTRODUCING FRANS HERBST

For many months now, Frans has been writing regularly to our Consultant Editor requesting information on a wide range of aquatic subjects. The general picture that has emerged during this time is that Frans is a very keen and active aquarist who is experiencing some difficulties in obtaining relevant literature and assistance in South Africa.

Although he has a number of friends who keep fish, Frans would like to broaden his field of experience and establish contact with young fishkeepers in other countries. This, of course, is something that we at *A & P* wholeheartedly support.

Our hobby has a great unifying quality which brings people from all walks of life together through the exchange and sharing of knowledge and experiences.

If you would, therefore, like to share your fishkeeping experiences with Frans, he would be delighted to hear from you. Please address your correspondence to:

FRANS HERBST,
98 NOBEL STREET,
VIRGINIA,
SAAIPLAAS 9430,
REPUBLIC OF SOUTH AFRICA

★ ★ ★ ★ ★ ★ ★

BEGINNERS' EVENING

Some months ago (Tomorrow's Aquarist, October 1983), we requested details of any arrangements that Societies have specifically for newcomers to fishkeeping.

As promised, we will feature some of these activities over the year and offer our sincere thanks to all who have supplied us with details. If your Society runs special sessions, we would still like to hear from you. Please address your correspondence to:

THE CONSULTANT EDITOR,
AQUARIST & PONDKEEPER,
THE BUTTS, HALF ACRE,
BRENTFORD, MIDDX.
TW8 8BN.

This month we kick off with the plans that Wolverhampton Aquarists' Society have for their first Beginners' Evening due to take place at "The Stamford Arms," Bristol Street, off Owen Road, Wolverhampton, in April (further details from W.A.S.).

The Wolverhampton Committee feel that many aquarists come into the hobby with little or no knowledge of "aquariumship" or else with a mass of confusing, conflicting and sometimes misleading information. They hope to help their new members overcome their initial problems by offering them practical, down-to-earth advice on a wide range of subjects. Instead of having formal lectures by invited speakers, they will run the evening on an informal basis. The whole Committee will be present to discuss such important topics as the New-tank Syndrome, Water Quality, Filtration, Heating, Stocking, Planting, etc. One subject that will receive special attention will be the choice of suitable, compatible "beginners' " species of fish. This will highlight many of the difficulties that arise in new tank communities when fish, such as Mollies, are kept with, say, *Corydoras* Catfish species. The advice given for Mollies usually includes the adding of salt to the water. Yet, this is detrimental to *Corydoras*. How best to avoid or overcome this and other similar problems will form the basis of much of the debate in April.

Albino Lyretail Mollies

In addition, it is hoped to mount a practical demonstration of how to set up an aquarium from scratch, highlighting all the major pitfalls and how to deal with them.

If the evening proves as successful as they hope, W.A.S. will run similar sessions every three months or so. In their efforts to make the evening a success, publicity leaflets will be distributed through many of the fish shops in the Wolverhampton area. We wish W.A.S. all the best and look forward to receiving a report from them in due course.

For fuller details of W.A.S., please see our "Meet the Societies" feature elsewhere in this issue of *A & P*.

Uno Reliant Combined Heater Thermostat

THE best review a heater thermostat can get is to report that there is nothing to report! I have been using the Uno 'Reliant' combined heater-thermostat for several months now, and so far it has proved totally trustworthy—in fact, I had forgotten it was there. This of course is how it should be, a heater-thermostat is such an important part of the tropical aquarium that it should be totally reliable. No equipment should get in the way of one's enjoyment of the fish.

It is when you are initially setting the thermostat, or need to change the temperature setting to suit the requirements of some new fish that a thermostat comes under scrutiny. All thermostats are generally quite easy to adjust when they are new, but just try it after even a few months use with many! Hardened rubber or plastic tops can make what ought to be a simple task fraught with difficulty, not to mention the potential danger of creating a split in the top. Here, however, we have a thermostat with a perfectly simple remedy, that appears to work very well. The Uno Reliant has a nylon top, with a large, easy to grip adjustment knob that is quite precise in its positioning. The temperature can thus be rapidly adjusted up or down, a little practise quickly determining the degree of turn needed to adjust temperature by the desired amount. At the same time, Uno have incorporated a simple 'stop' at each end of the range, to stop the aquarist (or home brewer!) cranking the temperature too high!

Apart from these simple but effective modifications, of which I heartily approve, the Reliant combined heater-thermostat is quite a standard one. It has a bimetal strip thermostat, and coiled heater filament on a ceramic mould, encased in toughened glass. There is the usual neon 'heater on' indicator, and the unit is provided with about 40 inches of two core green cable that is reasonably unobtrusive.

While in the months it has been in operation the test unit has proved in every way satisfactory, the points on the thermostat have already started to scorch. Bimetal strip thermostats have been around for a long time, and are effective and cheap, but surely it is about time an alternative was found? While electronics would seem the obvious answer, in this country at least, fail-safe, zero-switching electronic thermostats are far and few between. A simpler way would be to retain the old tried and 'trusted' (well at least until the points solder themselves together) bimetal strip, but not to put the mains current through it; merely use it as a sensor. The mains current could be switched electronically with a single component, a triac, adding only a few pence to production costs. This would still leave the possibility of the points on the bimetal strip sticking, but would be much less likely as they shouldn't corrode with so little current flow.

This is a general grouse, incidentally, and is most certainly not directed solely at Uno, who in the new Reliant heater-thermostat have produced a simple solution to an old problem that is effective, and all in a unit that is extremely good value at a retail price of about £7·50 or less.

IAN C. SELLICK

BOOK REVIEW

Looking After Aquarium Fish *by David Alderton.* Published by Ward Lock of 82 Gower Street, W.C.1. at £6·95.

Well laid out and with excellent colour photographs by Hans Mayland, this book supplies the aquarist with all he needs to know about stocking and maintaining an aquarium. The first section deals with care of tanks, plants, maintenance, feeding and diseases while part 2 supplies detailed and illustrated descriptions of a wide variety of species under the headings of: Cold-water Fish, Livebearing Tropical Fish, Egglaying Tropical Fish. A useful bibliography is also included. Well executed drawings are used to illustrate certain salient features as in the case of angel fish where details of the head shape and lips point the difference between *Pterophyllum scalare, P. dumerilii* and *P. altum.* **L. E. Perkins**

Meet the Societies

BRADWELL AND DISTRICT AQUARIST SOCIETY

Botia sidthimunki

THE B. & D.A.S. is a relatively new, flourishing Society formed on 14 September 1982 by a number of experienced, enthusiastic aquarists from the Potteries. Most of the founder members had previously been members of other Societies where they held a variety of committee positions. They were, therefore, excellently placed to appreciate the value of encouraging young aquarists as well as beginners of all ages.

The range of B. & D.A.S. activities is a good reflection of this in that (unusually) there is a Junior Show Secretary and Assistant Secretary, aged 14 and 15 respectively, whose responsibility it is to organise many of the Junior activities.

Newcomers are equally encouraged by inclusion of a Novice Class at every Table Show. At the end of the year, the newcomer with most points is awarded the Novice of the Year Trophy.

Experienced fishkeepers are catered for, as far as trophies are concerned, by two major awards. The Fishkeeper of the Year Trophy goes to the member attaining the best performance over a period of three months in rearing young fish of a selected species. The Showman (Showperson?) of the Year Trophy goes to the member winning most points in Club Shows over the twelve-month period.

Although there is no Newsletter at the moment, the growing number of members is fast making this a very real possibility and it is hoped to start one up in the near future.

Trips are organised to various places of interest such as major Fish Shows (the Yorkshire and British Aquarist Festivals featuring prominently). Members have also visited Chester Zoo and plans are currently being discussed for a behind-the-scenes trip to the famous Blackpool Tower Aquarium and for the First Open Show to take place on 20 May 1984 (all societies welcome). Other activities include debates, lectures, slide shows and a Christmas party.

Meetings are held fortnightly (Tuesdays) at St. Barnabas "Annexe", Cauldon Avenue, Bradwell, Newcastle-under-Lyme, Staffs.

Subscription Rates:—
Adults, £1.50; Juniors (10-16 years), £1.00; Minors (6-10 years), £0.50p.

Apply to: Mrs. E. Edwards, 67 Shawport Avenue, Bradwell Estate, Newcastle-under-Lyme, Staffs.

WOLVERHAMPTON AQUARISTS' SOCIETY

Thayeria boehlkei

THE W.A.S. was formed in 1974 as the Oxley Aquarists' Society to cater for the needs of hobbyists in the area. However, as the number of members and their geographical distribution expanded, it was felt more appropriate to rename the Society to reflect this. The name chosen was the Wolverhampton Aquarists' Society, rekindling memories of an earlier Society of the same name which, sadly, had only enjoyed a brief period of existence (approx. 1954-1959). A further nostalgic (and, to us, noble) gesture towards the original W.A.S. was the adoption of their old logo depicting a Penguinfish.

The range of activities organised by W.A.S. include lectures, quizzes, slide shows, trips to Zoo aquariums, fish 'safaris' to well-known shops, regular Table Shows, inter-Society dances, social evenings, a highly successful Open Show, tanks in hospitals, children's and old people's homes . . . the list goes on . . . . There is also an excellent Newsletter full of news, views and articles.

A very interesting feature of the competitive side of the W.A.S. activities is the provision of a Senior and a Junior League. This is done specifically to encourage younger members to become involved in Showing, thus laying the foundations for the continued success of the Society in the competitive arena. Among the honours won by W.A.S., special mention must be made of their several wins of the West Midlands League and their two victories in the Central Aquatic Group League which, incidentally, has only been running for two years.

In 1981, the W.A.S. Tableau won First Prize at the Yorkshire Aquarist Festival. This was the first time that the top prize had gone to a Club outside Yorkshire.

Since many of the members are judges, lecturers and specialists, there is no doubt that W.A.S. can offer all aquarists a varied and interesting programme throughout the year (see Tomorrow's Aquarist).

Meetings are held on the first Saturday of the month at The Stamford Arms, Bristol Street, Off Owen Road, Wolverhampton.

Subscription Rates:—
Families (including children up to 16 years), £9.00; Senior Members, £4.50; Junior Members, £1.00; O.A.Ps—Free; Unemployed Members (special arrangements available).

Apply to:—Mr. F. Whitehouse (Secretary), 68 Oaken Park, Codsall, Wolverhampton. Tel. Codsall 3884.

NEWS...

SOUTH WEST

Portsmouth Aquarist Society's Inter-Club Show will be held at St. Simons Rooms, Albert Road, Portsmouth. As they have had to change their venue this year the clubs around the South will be notified by post as soon as the information is printed.

As usual the judges will be from the F.B.A.S. panel.

There will be no films while the fish are being judged, but they hope to have something to entertain as well as refreshments, if the weather is too bad to see the sights of Portsmouth, or spend a couple of hours on Southsea beach.

Clubs taking part last year, Bracknell A.S., Brighton & S.A.S., Havant A.S., Isle of Wight A.S., Kingston & D.A.S., Mid-Sussex A.S., Petersfield & D.A.S., Salisbury & D.A.S. and of course Portsmouth A.S.

Basingstoke A.S., Bournemouth A.S., Hounslow & D.A.S., Southdown A.S. and New Forest A.S. were unable to take part, but wished the show every success.

Although Littlehampton and Bognor accepted the invitation to take part, they did not attend.

Bracknell A.S. were the Shield winners.

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North Avon Aquarist Society enjoyed an interesting meeting in January, with a commentated slide programme presented by Mr Gordon Churchill, on the subject of Killifish. He opened his talk by describing various Fishhouse interiors, and proceeded to identify the different species of Killifish, their place of origin, individual peculiarities, and their breeding habits. The response at question time indicated well that it had only been possible to scratch the surface of this immense subject.

Appreciation was shown by a good size gathering, including some new faces. If you would like to be one of these new faces, then come along to any of our meetings, held on the third Monday in each month at Hanham Folk Centre, High Street, Hanham, Bristol, where a warm welcome awaits you, or contact the Secretary, R. W. Cumpsins, 1 St Annes Close, Cadbury Heath, Warmley, Bristol BS15 5UH.

* * *

Nailsea and District A.S. held their A.G.M. on 24th January and a new committee was formed as follows: Chairman, Don Kenwood; Secretary, John Dolling; Treasurer, John Walters; Show Secretary, Peter and Mary Gadd; Vice Chairman, Basil Billinger; Programme Officer, Angela Russell.

SOUTH EAST

AT the recent A.G.M. of **Tongham A.S.** the following committee members were elected: Chairman, Jeff Ottley; Secretary, Janet Baines; Treasurer, Anne Ottley; Show Secretary, Andy Pierce; Public Relations Officer, Steven Baines; Programme arranger, Gary Horton.

Tongham Aquarist Society will be the hosts of this year's Three Counties Group Closed Show. This will be held on 8th April, not 1st April as previously suggested. The Tongham Aquarist Society annual open show will be held on 9th September. Both of these events will be held at the Memorial Hall, Thornhill Road, Aldershot, Hants. Tongham Aquarists meet on the first and third Thursdays of every month at Victoria Hall, Ash, Nr. Aldershot. Novice and expert fishkeepers always welcome. Further details of the above from Jan or Steve on 0252-876439.

* * *

THE following results of **Tongham Aquarists** Club Table Shows held at the Victoria Hall, Ash on 19th January and 2nd February.

19th January: Angels: 1 and 2, J. Ottley (Pterophyllum scalare). Catfish: 1, K. Perrin (Heteropneustes fossilus). Mollies: 1, R. Cooke (Poecilia species); 2, M. Bird (Poecilia velifera). A.O.V.: 1, K. Perrin (Pantadon buchholzi); 2, R. Cooke (Pseudetropheus minutus); 3, N. Mashinnack (Tilapia Buttikoferi); 4, R. Cooke (Rasbora bengali). Judge: Roger Paine, A. of A. A total entry of 14 fish was recorded. Speaker for the evening was Malcolm Goss, who gave an amusing talk with slides on fish breeder.

2nd February: Barbs: 1 and 3, K. Perrin (Barbus schuberti); 2, J. Ottley (Barbus titteya); 4, C. Pearce (Barbus terrazona). Gouramies: 1 and 2, A. Ottley (Colisa chuna); 3, K. Perrin (Macropodus opercularis); 4, A. Ottley (Trichopsis vittata). Killifish: 1 and 2, M. Bird (Panchax); 3, K. Perrin (Panchax). A.O.V.: 1, T. Legge (Geophagus brasiliensis); 2, M. Bird (Poecilia vivitata); 3, A. Pearce (Barb species); 4, C. Pearce (Mesgurnus anguillicaudatus). Judge: Rod Norris.

A total entry of 20 fish was recorded. Speaker for the evening was Norman Reading, who gave an informative talk on Gouramies, together with a slide show.

* * *

Reigate and Redhill A.S. held their A.G.M. on 9th January, the new committee for 1984 will be: Chairman, Alf Gardiner (Redhill 66045). Secretary, Janette Sanders (Reigate 40587). Treasurer, Derek Payne (08632-5388). Show Secretary, Dick Gush (Redhill 65152).

Club meetings are held at 8 p.m. on alternate Monday evenings at Somers Hall, Slipshoe Street, Reigate. Anybody interested in aquatic life will be most welcome to join us.

On 16th April we will be holding our Annual Bring and Buy Auction. A great opportunity to purchase aquatic equipment, etc., at bargain prices, in particular for a newcomer to the hobby.

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THE **Wycombe Marsh A.S.** held their A.G.M. on 5th January when the following officers were re-elected: Chairman, Johnny Johnson; Secretary, Jeff Woodbridge; Treasurer and Publicity Officer, Stephen Friend.

The club meets on the 1st and 3rd Thursdays at 8.30 p.m. at the Young Adult Centre, Wycombe College. Further details can be obtained from the Secretary, Jeff Woodbridge, 26 Mount Pleasant, Lane End, Bucks. Tel: High Wycombe 882875.

* * *

HILDA AND ERIC ALLEN (President BKKS) are visiting the London Section of the **British Koi Keepers Society** on Sunday 25th March, 2 p.m. Entrance Fyee. Lecture on the Art of Good Koi Carp Keeping. Not to be missed. All koi keepers and new members welcome. Conway Hall, Red Lion Square, London WC1. (The large Hall). Parking no problem. Park anywhere on Sundays. Underground: Holborn. All enquiries: Alec Burr, PRO. Telephone 01-864 1056.

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.

AT the a.g.m. of the **East Kent Aquatic Study Group,** the Chairman, Mr. R. G. Spoore and the Secretary, Mr. C. J. Bridgeman were both re-elected to serve for a further year unopposed.

There were eight candidates for the seven committee posts and after a free vote by society members the following 1984 committee was elected: J. Edwards, G. Neaves, T. Wetnall, B. Clarke, A. Aspital, M. Martin and H. Piggott. The unlucky candidate was D. Martin.

The group, who enjoy lectures, film shows and demonstrations concerning all aspects of the fish keeping hobby, will be continuing to hold their meetings at the Memorial Hall Belringe, on the 2nd Tuesday of each month.

The Secretary's address is 150 Greenhill Road, Herne Bay, Kent.

* * *

Bedford and District A.S. 3rd open show on the 18th of March 84 will be run to A of A rules. For postal entries please write c/o Mick Dashwood, 27b Saint Michael's Road, Bedford, Bedfordshire MK40 2LZ. For telephone entries phone either (Bedford) 42616, (Bedford) 59353 or (Bedford) 42745. The show to be held at the West End Club, Bedford.

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THE **Walthamstow and District A.S.** held their A.G.M. in December and the new officers are as follows: Chairman; B. Moore; Vice Chairman; F. Chandler; Secretary; D. Millins; Treasurer; A. Chandler; Committee; C. Peck and L. Adams; Show Secretary; M. Waller. Our meetings are held on the first Friday and third Wednesday of each month at the Grange Community Hall, Frederic Street, off St. James Street, Walthamstow, E.17. With frequent fish talks and table shows, new members and visitors are always welcome.

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NEW SECRETARY FOR F.B.A.S.

Readers are requested to note that the Federation of British Aquatic Societies now have a new General Secretary who is: Mrs. Sylvia M. Brown, 46 Airthrie Road, Goodmayes, Ilford, Essex IG3 9QU.

MIDLANDS AND WALES

THE **Midland Tropical A.S.** held their A.G.M. on Wednesday 11th January, at Holy Souls School, Mallard Close, Acocks Green, Birmingham. The officers elected were: Chairman, T. Cobill; Vice Chairman, J. Stephens; Secretary, L. W. Smallwood, 23 Lindsworth Road, Kings Norton, Birmingham B30 3RP; Treasurer, G. Hodges; Show Secretary, L. M. Smallwood; Librarian, A. Wilson; Equipment Officer, C. Whitworth; Editor, C. Sabell; Floor Members, I. Mills and K. Brown.

The Society meet on the second Wednesday of the month, visitors and new members are most welcome.

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Port Talbot and District A.S. recently held their a.g.m. and the following were elected as officers for 1984: Chairman, R. Perkins; Secretary, D. Nicholls; Treasurer, G. Roberts; Show Secretary, J. Egan.

The following were elected to serve as committee members: R. Collins, A. Collins, W. Llewellyn, F.B.A.S. delegate, Colin Richards.

It was agreed to hold an open show once

again, this will be held at Talbach Youth Centre, Port Talbot, West Glam. on Saturday 23 June, details from 55 Pentre Afan, Baglan Moors, Port Talbot, West Glam. S. Wales, SA12 7RN (s.a.e. please).

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AT the A.G.M. of the **North Staffs A.S.** the following members were appointed to the Committee. Chairman, D. Askers; Vice Chairman; A. Hackney; Treasurer, H. Van Bakel; Show Secretary, B. Evans; Secretary, Mrs. E. Hackney; Assistant Secretary, Mrs. J. Perry; Committee Members, T. Perry and S. Leach.

We still meet at Pitfield House, The Brampton, Newcastle, Staffs on alternate Tuesday nights at 8 p.m. and are arranging talks on fishkeeping, breeding, etc. at future meetings.

EAST

Great Yarmouth and District A.S. meet monthly (usually first Monday in the month) at "The Imperial Hotel," Great Yarmouth. The following are the names of Committee members and also our programme for the year: Chairman, Ray Andrews; Vice Chairman, Ken Smith; Treasurer, Don Lacey; Secretary, Mrs. Helena Rogers; Assistant Secretary, Tim Marsden; Show Judge/Secretary, Gary Drewery; Committee, Les Bird; Paul Howes; John Rogers; Kevin Young; Junior Member, Sean O'Kaye.

The proposed programme for the year is as follows: 6th February, Slide Show and Talk on Catfish, Carl Rumsby. 12th March, Lecture and Slides on Coldwater Fish, Mr. A. Clarke. 2nd April, Table Show. Open Discussion. 30th April, To be arranged. 4th June, Illustrated Lecture—Marine Life on the Norfolk Coast, Sue Crelling. 2nd July, Lecture—Breeding Fish, Frank Vickers. 6th August, Video and Slide Show, Gary Drewery. 3rd September, Lecture by Dr. D. Ford of Aquarian Research. 1st October, Table Show. Lecture, Killie Fish. Mr. A. Burge. 5th November, Slide Show—Fish of the River Niger, Mr. Carl Rumsby. 3rd December, 4 a.m.

Club Outings are also being arranged. It is hoped to visit Wildwoods Aquatic Centre in April or May. We are to have a family outing to Whipsnade on 29th July; we hope to go to the Yorkshire Aquarist Exhibition at Doncaster on 18th August, and to Bellvue in Manchester in November.

Members are also reminded of the Annual Dinner/Dance to be held at the "Imperial Hotel" on Friday, 27th April, 7.30 for 8 p.m. This will take the form of a buffet and disco as last year. Price for this remains the same as last year, £7.

Any enquiries about any of these events should be made to Helena Rogers on Great Yarmouth 751230.

NORTH

THE West Yorkshire Marine Aquarists Group held its A.G.M. on Wednesday, 18th January at its usual venue "Club and Institute," Dewsbury. Due to other commitments, Mr. Noel Oglesby asked not to be considered for chairman this year and a vote of thanks was passed for his work in the past years. The officers for the current year were elected as follows: Chairperson, Mrs. Anne Hampshire; Secretary, Steve Preston; Treasurer, Mrs. Pearl MacBeth; Social Secretary, Bill MacBeth. With the new committee elected, some considerable time was spent on the question of subscriptions. Finally it was agreed on £3 per annum and 25p per meeting. It was felt that this scale of charges would be fairer on our non-attending members. The agenda for 1984 was then discussed and it looks like another interesting year, thanks again to our secretary Steve Preston. Anyone interested in joining us should contact Steve on Heckmondwike 405387.

After so much talking a halt was called at this point to recharge our glasses ready for the next part of the evening. This was in the shape of a short film (16 minutes) entitled "Between the Tides" which was filmed on the Pembrokeshire coast. A nice film, showing the life that is to be found round this coast, and so ended another very enjoyable evening among our 'fishy' friends.

Forthcoming events in 1984: 18th January, A.G.M./Film. 15th February, Workshop 1 (the aquarium). 21st March, Lecture N. Oglesby, S. Preston. 18th April, Richard Sykes on Native Marines. 16th May, Workshop 2 (the equipment). 20th May, Visit to Skegness, Natureland. 20th June, Dr. D. Ford of "Aquarian Foods" on Nutrition. 24th June, Visit with Richard Sykes to our coastline. 18th July, Films. 19th September, Workshop 3 (the water). 23rd September, Visit to Mr. J. Rigg's breeding project. 17th October, to be arranged. 21st November, Films. 19th December Workshop 4 (maintenance).

B.M.A.A. Seminars will be held on 5th May and 20th October.

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Doncaster and District A.S. elected the following committee for 1984. Chairman, Mr. N. W. Bywaye, 37 High Street, Bentley, Doncaster. Tel: 873139. Secretary, Mr. T. D. Groom, 1 Ridgewood Avenue, Edenthorpe, Doncaster. Tel: 886241. Treasurer, Mr. H. Ackroyd, 15 Hall Flat Lane, Balby, Doncaster. Tel: 858476. Show Secretary, Mr. D. Penny, 46 Park Road, Askern, Nr. Doncaster. Tel: 702917. Publicity Officer, Mr. J. Clark, 60 Sunnyside, Edenthorpe, Doncaster. Tel: 882391.

* * *

AT the annual general meeting of **Halifax A.S.** held at Forest Cottage Community Centre on Wednesday, 18th January, the following officers were elected. Chairman and Council representative to Forest Cottage, Mr. D. Fryer. Secretary, Mr. D. Shields. Treasurer and programme organiser, Mr. T. Wheelwright. Minutes and Press Secretary, Mrs. M. Swales. Social Treasurer, Miss J. Davidson. Badge Secretary, Mr. P. Swales.

Twenty members attended the meeting and the next meeting will be on 1st February at Forest Cottage, commencing at 8 p.m. when the main item will be a quiz followed by a general discussion on the hobby of keeping aquarium and pond fish. A full programme of slide shows, talks and coach outings are planned for the coming year.

All new and old members will be very welcome to come and join us.

SCOTLAND

Edinburgh A.S. recently held their election of office bearers for the coming year. The following were nominated: Chairman and Treasurer, Hector Kerr; Secretary, John Milligan; Public Relations Officer, James Ballantyne; Show Manager, Jack Irish; Club Shop, Steven Kemp; Committee, Spencer Oswald and Niall Ballantyne.

On Wednesday 11th January a club meeting was held where a general discussion on fishkeeping was the topic of the night. Wednesday 25th January was given over to a bench show and a talk on the fish shown and how the results were obtained. It was given by the judge for the night Mr. Jake Milligan.

The results for the night were as follows: Corydoras Cats: 1 and 3, Niall Ballantyne; 2, Steven Kemp. Barbs A: 1 and 3, Niall Ballantyne; 2, Steven Kemp.

Junior Section: Corydoras Cats: 1 and 2, Spencer Oswald. Barbs A: 1 and 2, Spencer Oswald.

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Paisley and District A.S. held its last meeting on Tuesday, 10th January 1984 when the tableshow on the night was Pairs of Fish. The results were as follows: Senior: 1, Tetras, Ian A. Lindsay; 2, Barbs, Trevor Shierff; 3, Swordtails, Bill Dunbar; 4, Kribensis, Andrew Johson. Juniors: 1, Kribensis, J. Thomson; 2, Swordtails, D. Anderson; 3, Tetras, D. Anderson; 4, Barbs, Richard Brooking.

The Club meets on the first Tuesday of every month at 7.15 p.m. in the Museum and Art Galleries, High Street, Paisley. Everyone welcome, further details can be obtained from the Club Secretary, Mrs. E. Lindsay, 71 Wright Street, Renfrew. Phone 041-889 5772.

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Dunfermline and District A.S. held its A.G.M. on 18th January and elected a new committee as follows: President, P. West; Vice President, D. Dobbie; Secretary, J. G. McPherson; Treasurer, Mrs. J. Wells; Show Manager, J. Wells; Newsletter Editor, P. McNiel; Adult members of the committee, Messrs. H. Hogburn, D. Sneddon, A. Purdie and N. Key; Junior members of the committee, A. Grant and K. Johnston.

The meetings are held in the Nethertown Community Centre, Nethertown Broad Street, Dunfermline at 7.30 p.m. on the 1st and 3rd Wednesdays of each month except July.

Anyone wishing information about D. & D.A.S. please contact J. G. McPherson, 30 Station Road, South Queensferry, West Lothian EH30 9HZ.

Dates for the diary

A monthly information column to keep you up to date on forthcoming events.

MARCH

4th March: KEIGHLEY A.S. open show, Victoria Hall, Keighley, 40 classes. Further details from Show Secretary, Mr. B. Murray, 7 Westhill Avenue, Cullingworth, Bradford, West Yorkshire. Tel: (0535) 273453.

4th March: NORTH WEST GROUP BRITISH KILLIFISH ASSOCIATION are holding their 3rd open show at the Too-H Hall, Siddow Common, Leigh, Lancs.

11th March: HARINGEY A.S. 2nd open show will be held at Highgate Wood Lower School, Park Road, Hornsey, London N8. Further details contact Show Secretary, A. Dempsey, 31 Oakfield Road, N4. Tel: 01-272 1884.

18th March: SKEGNESS & DISTRICT A.S. 7th open show, to be held at the Imperial Cafe (opposite Pier), North Parade, Skegness.

18th March: BEDFORD AND DISTRICT A.S. third open show will be held at the West End Club, Queens Park, Bedford to A. of A. standards. Please phone Bedford 45616 or 42937 for details or write to Mick Dashwood (Hon. Secretary), 27b St. Michael's Road, Bedford, Beds. MK40 2LZ.

24th March: EAST DULWICH A.S. annual open show at Paisley Hall, Stopford Road, Manor Place, Walworth, London SE17. For further information please contact The Secretary, D. Winder, 32 Eddystone Road, Brockley, London SE4 2DH.

25th March: HALIFAX A.S. Spring auction at Forest Cottage Community Centre, Cousin Lane, Illingworth, Halifax. Details, ring David Shields, Halifax 60116.

25th March: BRITISH CICHLID ASSOC. A Cichlid Auction will be held at the New Imperial Hotel, Temple St., Birmingham. Doors open 10 a.m. Entries will be accepted up to 1 pm. only.

APRIL

1st April: SUDBURY A.S. open show, to be held at Neasden High School, Quainton Street, Neasden NW10. Further details and schedules from: R. Witteridge, 142 Joel Street, Northwood, Middlesex. Tel: Northwood 24450.

1st April: RUNCORN A.S. open show will be held at the R.I.C.C. Canteen, Helsby, Nr. Runcorn, Cheshire (new venue). Plaques for all class winners, annual trophies, etc. Further information, schedules, etc., Ruth Muckle, 23 Adela Road, Runcorn WA7 4TU. Tel: 79099. (N.B.—New venue easily accessible from motorway. Maps will be sent with schedules if requested).

8th April: CENTRAL MIDLANDS CICHLID GROUP 1st "Cichlid Only" open show. To be held at the Penkridge Middle School, Teddesley Road, Penkridge. Details and show schedules available from either Maureen Hall, 71 Saxon Road, Penkridge, Staffs; or Mick Kirkham, 10 Bracken Way, Rugeley, Staffs. 23 classes plus auction and other attractions.

8th April: TAUNTON & DISTRICT A.S. Annual open show at Youth and Community Centre, Trenley, Taunton. F.B.A.S. Championship Trophy, Class G, Tropical catfish. Schedules and more information available from P. W. Coles, Widewater Cottage, Screech Owl, Hunterworth, Bridgwater. Tel: North Petherton 662505.

15th April: KIRKCALDY A.S. annual open show at Balwearie High School, Balwearie Gardens, Kirkcaldy. Fish auction, tombola and canteen facilities. Schedules from A. Little, 164 Elgin Drive, Glenrothes, Fife.

15th April: THE CROYDON A.S. annual open show at the Endeavour Hall Melfort Road, Thornton Heath, S.W.16.

15th April: BISHOP AUCKLAND A.S. open show at Bishop Barrington Upper School, Woodhouse Lane, Bishop Auckland. Further information from: R. Brogden, 44 Ridgeside, North Close, Spennymoor. Tel: Spennymoor 816666.

22nd April: OLDHAM & DISTRICT A.S. annual open show to be held at Werneth Park, Oldham. Further information and show schedules can be obtained from 9 Bronville Close, Chadderton, Oldham OL1 2RH; telephone 061-652 6207.

22nd April: MALVERN & DISTRICT A.S. 11th open show which is being held at St. Joseph's School Hall, Newtown Road, Malvern. Details and show schedules from S. K. Yallop, 3 Monkhide, Yarkhill, Ledbury, Herefordshire HR8 2TX. Tel: Trumpet 562.

22nd April: EAST KENT AQUATIC STUDY GROUP 1st open show, at Catholic Social Club Hall, Clarence Road, Herne Bay. Show schedules from: J. Edwards, 14 Upper Dane Road, Margate, Kent.

23rd April: ASHBY FISHKEEPERS' SOCIETY'S mini open show. Benching 1200-1400 hrs. Venue: Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe.

29th April: HULL A.S. open show.

29th April: YEOVIL A.S. open show at St. Michaels Hall, Yeovil. Schedules (s.a.e. please), from T. C. Perry, 31b St. Michaels Avenue, Yeovil BA21 4NF.

29th April: MERSEYSIDE A.S. annual open show will be held at the Rainhill Village Hall, Rainhill, Lancashire.

MAY

5th May: SOUTHEND, LEIGH AND DISTRICT open show, St. Clements Hall, Leigh-on-Sea, Essex. Schedules available nearer the date.

5th May: BRITISH MARINE AQUARISTS ASSOCIATION Marine Seminar to be held at Dewsbury Club and Institute, Oates Street, Dewsbury, commencing 10.30 a.m. Guest speakers include Dr. David Ford and Richard Sykes. Members free, non-members 75p. For further details contact Mr. S. Preston, 16 Fountain Drive, Liversedge, West Yorkshire WF15 7PX or phone Heckmondwike 405387.

6th May: STRETFORD AND DISTRICT A.S. open show at Hartford Community Centre, Canterbury Road, Davyhulme, Manchester. For further information contact show secretary, Gary Cummins, 16 Royal Avenue, Urmston, Manchester. Tel: 061-748 8973.

8th May: I. & E. A.S. open show at Monk's Dyke High School, South Lincs.

9th May: WHITBY & DISTRICT A.S. 9th open show to be held at The Spa Pavilion, West Cliff, Whitby, N. Yorkshire. Judging 2 p.m. Further details from Mr. T. Wilson. 1 Helsedale Gardens, Whitby, N. Yorkshire.

9th May: PAISLEY & DISTRICT A.S. open show to be held in Gallowhill Community Centre, Paisley. For further information, please contact the Secretary, Mrs. E. Lindsay, 71 Wright Street, Renfrew. Phone: 041-889 3772.

13th May: BOURNEMOUTH A.S. annual open show will take place at Kinson Community Centre, Pelhams Park, Kinson, Bournemouth. Show schedules will be available after 1st April, from Show Secretary, Jack Jeffery, 13a Woodland Avenue, Bournemouth Dorset BH9 2DJ. S.a.e. will be appreciated.

13th May: WILLENHALL AQUARIST GROUP 1st open show will be held at the Frank F. Harrison Community Centre in Walsall. Details and schedules will be available from Alan W. Davis, 5 Star Close, Bentley, Walsall WS2 0LU, West Mids.

13th May: KING'S LYNN A.S. open show, Corn Exchange, King's Lynn. Further details from Dave Rye, Field End Close, King's Lynn, Norfolk.

19th May: BRITISH MARINE AQUARISTS ASSOCIATION Marine Seminar to be held at Uxbridge Scout H.Q., Rockingham Road, Uxbridge, commencing at 10.30 a.m. Guest speakers include Mr. Graham Cox, Mr. Andrew Stagg and Mr. Jerry Gawdor. Members free, non-members 75p. For further details contact Mr. T. Condra, 15 Turnpike Lane, Uxbridge, Middlesex UB10 0AH or phone Uxbridge 54627.

20th May: ABERDARE A.S. second open show at Aberaman YMCA. Schedules from Mr. R. Williams, 298 Cardiff Road, Aberaman, Aberdare, Mid-Glam. CF44 6UU.

20th May: BRADWELL & DISTRICT A.S. first annual show, will be held at Bradwell County Primary School. For further details contact the Show Secretary, Mr. J. Blakemore, 17 Cedar Road, Chesterton, Newcastle-under-Lyme, Staffs.

26th, 27th May: SCOTTISH AQUARIST FESTIVAL. Motherwell Civic Centre, Scotland. Details and schedules from W. Bennett, 15 Coulter Avenue, Cottness, Wishaw, Lanarkshire ML2 8SZ.

27th May: PORTSMOUTH AQUARIST SOCIETY'S Inter-Club show at St. Simon's Rooms, Albert Road, Portsmouth.

27th May: CORBY & DISTRICT A.S. open show, Corby Civic Centre. Schedules from A. Henderson, 5 The Nook, Corby, Northants. Tel: 05366 68269.

27th May (Whit-Sunday): DROITWICH A.S. 2nd annual open show at the Salwarpe Village Hall, Salwarpe, Nr. Droitwich, Worcs. This year the show will be under the Association of Aquarists rules, with good trophies, plus annual trophies. Benching will be from 9.30 a.m. until 1.00 p.m. Postal entries 15p, entry on the day 25p. Show schedules from the Secretary, Droitwich A.S., 47 Oakleigh Road, Droitwich, Worcs. WR9 0RP. S.a.e. please.

JUNE

2nd June: SWINDON A.S. open show at Park South Community Centre, Cranmore Avenue, Swindon. 1st place trophies as well as perpetual trophies. Show Secretary, Mr. K. Curtis, 78 Beech Avenue, Swindon, Wilts. (Tel: 0793 32920).

3rd June: MID-SUSSEX A.S. show will be held at "The Sydney West Sports Centre," Leylands Road, Burgess Hill, Sussex. F.B.A.S. Championship Class "B". Show Secretary, Mr. J. Smith, 51 Eastbourne Road, Brighton BN2 4DL. Tel: Brighton 602407.

9th, 10th June: AQUARIAN FISHKEEPING EXHIBITION '84. Kempton Park Racecourse. Details and schedules from: The Secretary, The Association of Aquarists, 7 Wheeler Court, Plough Road, Battersea, London W11.

10th June: NORTH AVON A.S. will be holding their 5th open show at Hanham Folk Centre, High Street, Hanham, Bristol. Further details will be published at a later date, but any interim enquiries should be directed to the Show Secretary, R. W. Cummins, 1 St. Annes Close, Cadbury Heath, Warmley, Bristol BS15 5EH.

30th June: NAILSEA & DISTRICT A.S. 11th International open show, to be held at Scotch Horn Community Centre, Nailsea, Avon. Further details from show secretary, Mrs. K. M. Gadd, 22 Stoke Lane, Stoke Lodge, Patchway, Bristol. Also, would show secretaries please endeavour, when arranging dates for their shows, that dates do not clash in the same areas.

SEPTEMBER

15th September: BRISTOL A.S. Coldwater Fish show at St. Ambrose Church Hall, Stretford Road, Whitehall, Bristol, from 3-5.30 p.m. Details and schedules from Show Secretary, V. Capaldi, 7A Walsingham Road, Bristol BS6 5BT. Tel: 0272-426323.

23rd September: BASINGSTOKE AND DISTRICT A.S. will be holding their annual open show at the Basingstoke Carnival Hall. Further details can be obtained by sending a large stamped addressed envelope to the Show Manager, C. P. Ralph, 325 Abbey Road, Popley 4, Basingstoke, Hants. RG24 9EH.

23rd September: DORCHESTER TROPICAL FISH SOCIETY 4th open show to be held at the Boys' Brigade Hall, Sawmills Lane, Weymouth Avenue, Dorchester, Dorset. Schedules from Mr. R. Symes, 3 Arnhem Green, Poundbury, Dorchester, Dorset DT1 2PS. Or phone: Dorchester 67552.

OCTOBER

7th October: HALIFAX A.S. open show at Forest Cottage Community Centre, Cousin Lane, Illingworth, Halifax. Schedules on request. S.a.e. please to David Shields, "Cobblestones," Gaisnez, King Cross, Halifax HX2 7DT, or ring for details Halifax 60116.