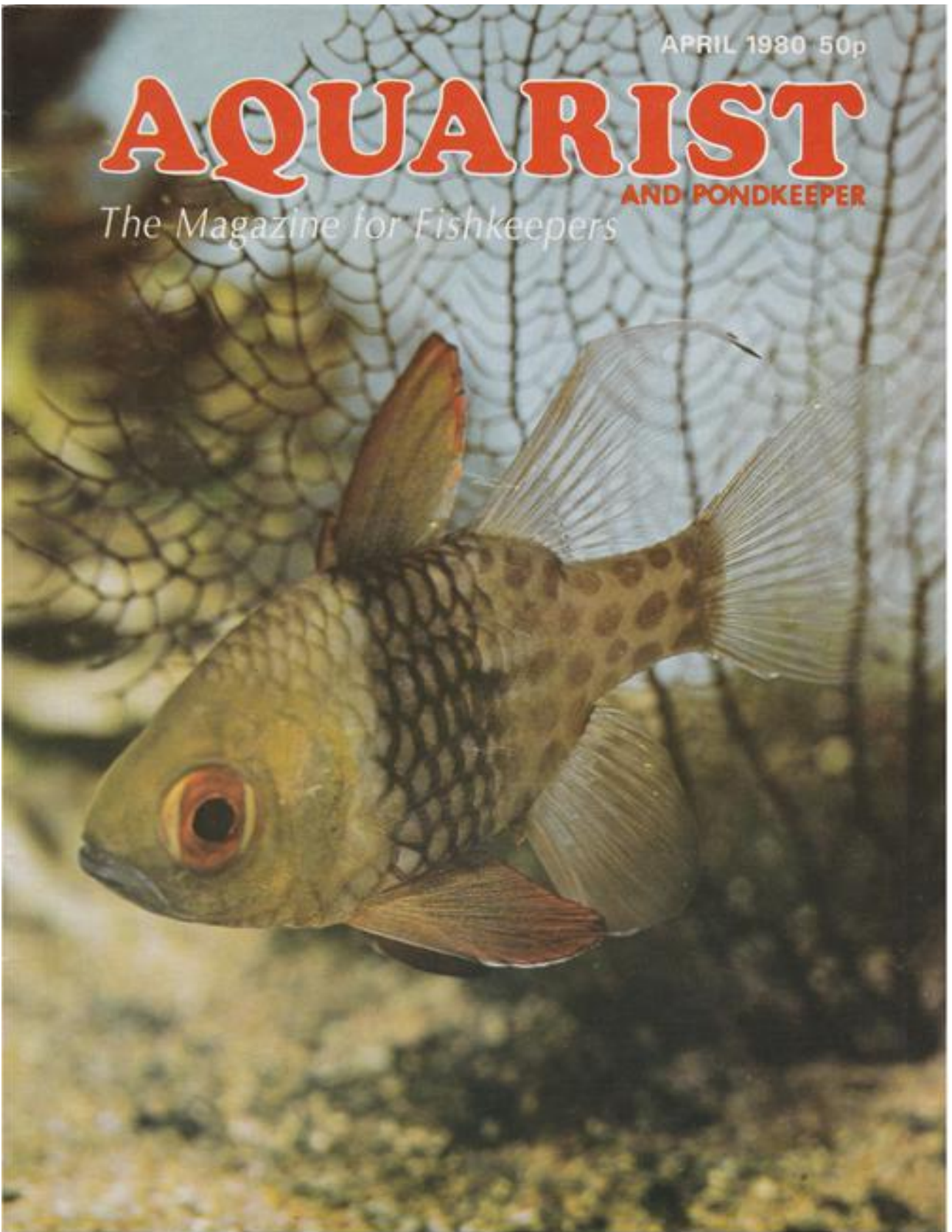


APRIL 1980 50p

AQUARIST

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The Magazine for Fishkeepers



SeAquariums
26

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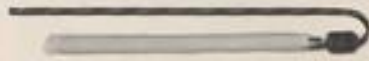
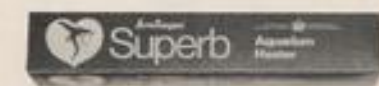
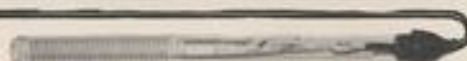
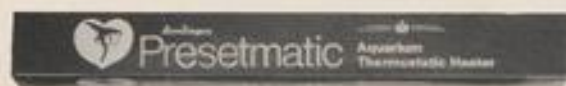
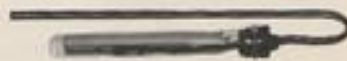
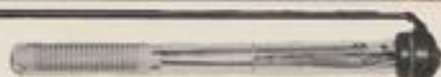
Armitages Heaters for reliability



Sid Singleton, designer of the range, says —

"Since 1932, hundreds of thousands of our aquarium heaters have been sold throughout the world, gaining for us an excellent reputation for quality, craftsmanship and reliability. We use only the highest quality components: borosilicate glass tubes, porcelain formers, 80/20 nickel chromium elements and pure nickel leads for all the heating sections; magnetic snap-action bi-metal strips and heavy silver contacts for the thermostat sections; PVC bungs which will not contaminate the water.

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- Fully submersible. Suction holder provided.
- Wattage range 50W to 200W.
- Neon indicator glows when heater is on.

MINOR thermostat

- Similar to the thermostat section of the Presetmatic.
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- Fully submersible, although normally the head is kept above water. • Suction holder is provided.
- Loading 300W at 240 Volts. • Neon indicator.

SUPERB heater

- Fully submersible. • Wattage range 50W to 300W.
- Borosilicate heat resisting glass tube, tough porcelain former, 80/20 nickel chromium coil wound element with 100% overload safety factor.

CHOICE OF WATTAGE

Depends on the aquarium capacity and room temperature. This table gives a guide (if in doubt choose the highest wattage).

Aquarium capacity (gallons)	Room heating conditions		
	Heated day and night	Heated daytime only	Generally unheated
3	50W	50W	75W
6	50W	50W	100W
9	50W	75W	150W
12	75W	100W	150W
18	75W	150W	200W
20	100W	150W	200W

AGB

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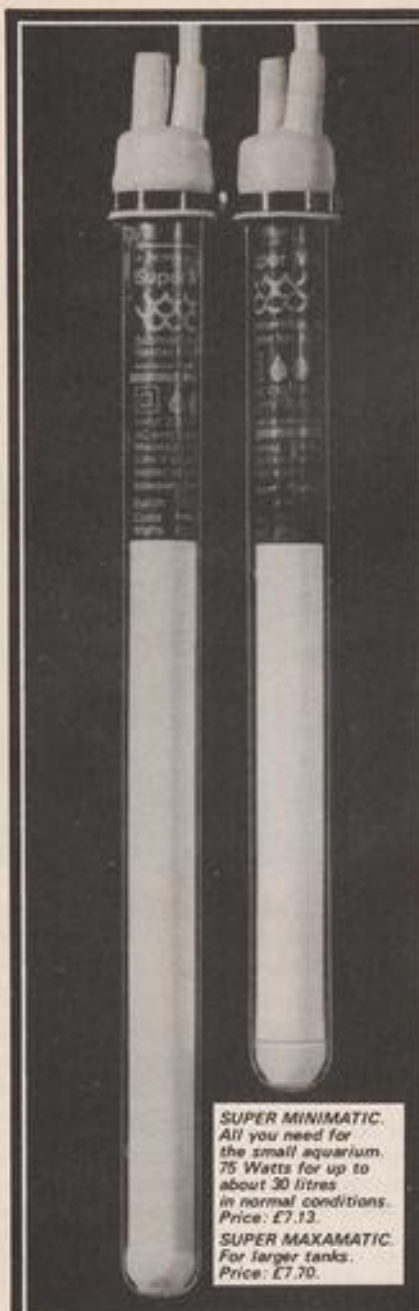
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Recognised by the Design Centre



What size Heater?

Size of Tank ins.			cm.			Approx. Galls.	Volume Litres	Wattage required for normal conditions	Recom- mended Unit
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12	8	8	30	20	20	2.8	11.8	50W	Super Minimatic
18	10	10	45	25	25	5.8	25.8	75W	
20	10	10	50	25	25	7	31	75W	
24	12	12	60	30	30	11.1	50.5	100-125W	Super Maxamatic
30	12	15	76	30	38	17.6	80.0	150W	
38	12	15	100	30	38	23	104	200W	
48	15	15	122	38	38	35.8	163	2 x 150W	



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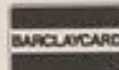
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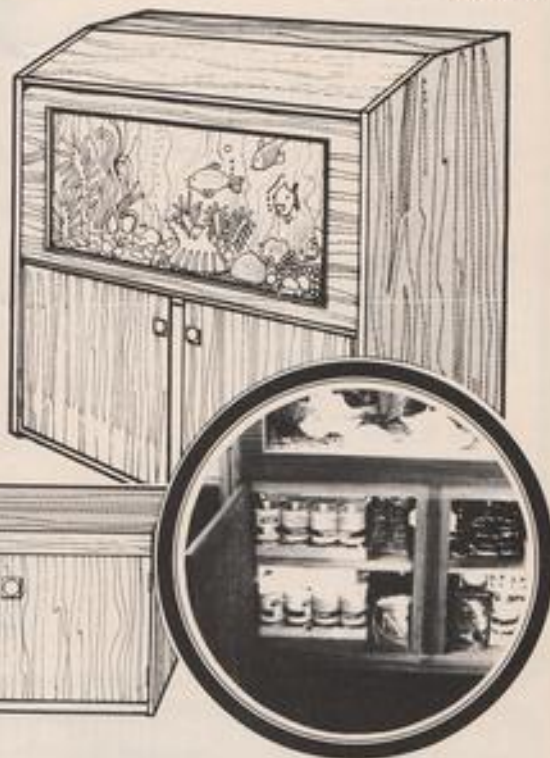
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The Editor accept no responsibility for views expressed by contributors.	

Aquarist and Pondkeeper

EDITORIAL

“—into the Eighties”

A HOBBY HAS ever been a useful facet of life, fulfilling man's need to "express" himself as an individual and enabling him to use some of his leisure hours in a constructive fashion. The need for an absorbing pastime in these times of increasing stress and international tension is greater than ever before. It is not suggested that an ostrich-like attitude to world events should be adopted, but some refuge from life's black spots is essential and our hobby of keeping fish supplies just such a refuge while affording a wide spectrum of interest and enjoyment.

Fortunately this is a hobby which can be indulged at many levels and does not require, necessarily, the expenditure of large amounts of cash. Along with everything else, costs of involvement have suffered from inflation but expenses can be trimmed to suit the individual's finances and savings can be achieved in many realms by the ingenious enthusiast.

Much of the initial expense encountered by the newcomer to our hobby stems from ignorance of factors obvious to the experienced aquarist and the intention of this magazine is to help the tyro negotiate the lower rungs of the ladder leading to the realms of successful fishkeeping but while a magazine can do a great deal to help by publishing features written by experienced aquarists, interchange of ideas between fishkeepers is also of paramount value and can be achieved only at the grass roots when people with a common interest get together. Aquarist societies provide the means for such contact and it has always been the policy of this magazine to foster the growth of such societies and to en-

courage membership. This we shall continue to do while inviting enthusiasts to publish within these pages accounts of their successes—and failures—for the benefit of others treading the same path.

One of the cardinal features of the eighties into which we have all been propelled is the need to save all our resources and in this endeavour a good start can be made by pooling our ideas and our knowledge, whatever our calling or aspirations. The *Aquarist & Pondkeeper* is not just a monthly digest but a forum for the closer interaction between people with a common regard for the manifold delights to be derived from keeping and observing the world's fishes under controlled conditions.

OUR NEW LOOK

With the inception of our new format it is intended to provide a wider variety of articles, with more colour photographs, drawn from sources throughout the world but particularly from Europe from where we shall be welcoming writers and photographers in subsequent issues.

While anticipating the new, however, we shall not reject the old—those regular features which have been so popular for so long.

As in the past, correspondence from readers will be welcomed and letters published as space permits. So let us have your comments, suggestions and criticisms. This is your magazine so why not help shape it the way you want it?

LAURENCE E. PERKINS



The Orange Cichlid, *Lamprologus leleupi*

The Orange Cichlid

by Anders Wickman
Stockholm Aquarium Society

Some observations of what is perhaps the most beautiful cichlid in Lake Tanganyika

FOR THE PAST ten years Lake Tanganyika has been providing the world of aquarium enthusiasts with a large number of interesting species, for instance cichlids such as the *Julidochromis ornatus*, the *Eretmodus cyanostictus*, the *Lamprologus brichardi* and the *Tropheus duboisi*, to name but a few . . . beautiful fish with interesting behaviour and which make suitable inhabitants for an aquarium of normal size as they seldom grow larger than 8 cm.

These species have been in great demand not only in Europe but also in America, but there is little risk of any overfishing worth mentioning in Lake Tanganyika at the present time. With the exception of the "horsenosed cichlid" (*Eretmodus cyanostictus*) the fish are now being cultivated to a great extent, and as many, moreover, are fairly difficult to catch in their natural environment, netting fish in the wild state will soon be an unprofitable business.

One could well have believed that by this time Lake Tanganyika had displayed the whole of its assortment and that there were no more surprises to be expected. But then at the beginning of the year the orange cichlid made its appearance, a fish which many people consider to be by far the Lake's most beautiful representative.

As new species nowadays often reach the aquarist before the fish have been scientifically classified, the determination of the species is usually uncertain. All indications are that the orange cichlid is a colour variation of the lemon cichlid, *Lamprologus leleupi*, which is pale yellow in colour and is caught in another part of the Lake, off the coast of Burundi at a depth of approximately 5 metres.

The orange cichlid may, however, be marketed under the name *Lamprologus petricola*, which would appear to be

a different fish with a higher-formed body and brownish in colour.

Young fish of both the colour variations may be difficult to distinguish as the orange cichlid is yellowish in hue before it becomes orange and it is, in fact, for just this reason that I mention in this article the lemon cichlid, which came to Sweden as long ago as the early 1960s.

The *Lamprologus* family is among those with the greatest wealth of species and shape in the Lake, and they are to be found in all its different zones at depths from two to a couple of hundred metres. Many of the species are large in size while others never become longer than 7-8 mm. The orange cichlid has been caught near the mouth of the River Malagarasi, south of Kigoma, at depths of 15-20 metres.

The body is elongated and fusiform. The male measures approximately 8 cm. and the female 6 cm. in length. The whole fish is of an intensive orange hue. On the male there is a gleaming, curved blue marking around the eye and mouth. A careful examination of adult fish also reveals a slight difference in colour. The orange shade of the female has a slightly yellowish tint while that of the male is reddish orange. This is most noticeable at mating times. In other respects fully grown fish can be distinguished by the fact that the female is smaller.

The orange cichlid is a peaceable cichlid and does not pursue or injure other fish to any extent worth mentioning, but is content to chase unwelcome intruders out of his reserve by attacking them at lightning speed. Its behaviour resembles more that of the *Julidochromis* species than its relative "The Princess of Burundi" (*Lamprologus brichardi*) which, when it has eggs or young, can pursue other fish in a brutal manner and injure them severely.

The orange cichlid likes to have access to rocks and caves, and like other species from Lake Tanganyika, it is used to still, clear and pure water (pH 8.6-9.2 and dH approximately 12). A good method of keeping the water of the aquarium steady is to change just over one third every second week and to clear sediment and food remains away from the bottom. Temperature should be around 26° Centigrade and the question of food is no problem as this fish eats most things, including dry foods. The orange cichlid does not appear to be particularly sensitive, though possibly spawn and young fish are easily scared and panic for the slightest cause. A normal brood consists of about 150 offspring.

I shall now attempt to describe the behaviour of the fish when preparing for mating, caring for its young and defending its reserve, as drawn from my own observations.

Two fully grown fish were put together in a 200-litre aquarium equipped with rocks and a roomy cave. I had selected them from about 20 specimens caught in the wild state and I assumed that they were of different sex. The larger specimen, which I guessed to be the male, immediately began to chase the smaller fish in a somewhat alarming manner, not exactly aggressively but very actively nevertheless.

One could of course have suspected that they were two males and that the larger wanted to keep the other out of the new area, but when I could not observe any bodily injury on the smaller fish in spite of the intensive chase I left the situation to develop for a few days.

It was soon evident that it was not the ambition of the male to chase the smaller fish away but to get it to enter the cave and, moreover, to stay there. This was eventually successful and the chase suddenly ceased. That line of behaviour convinced me that the smaller fish was a female.

To begin with the female was allowed to leave the cave to look for food but only within a radius of 20 cm. If she went beyond this limit she was immediately driven in again.

After a couple of weeks the female began to take a serious interest in the interior of the cave, removing all the gravel from it, cleaning the walls and taking excrement and food remains outside. The male made occasional visits to the cave but otherwise was mostly stationed at one of the invisible borders of the reserve. When he approached the opening of the cave the female stretched all her fins, trembled for a few moments, and then disappeared, quick as a flash, into the cave enticing the male to follow.

After a few days this behaviour ceased, the male no longer swam into the cave. On the occasions he tried

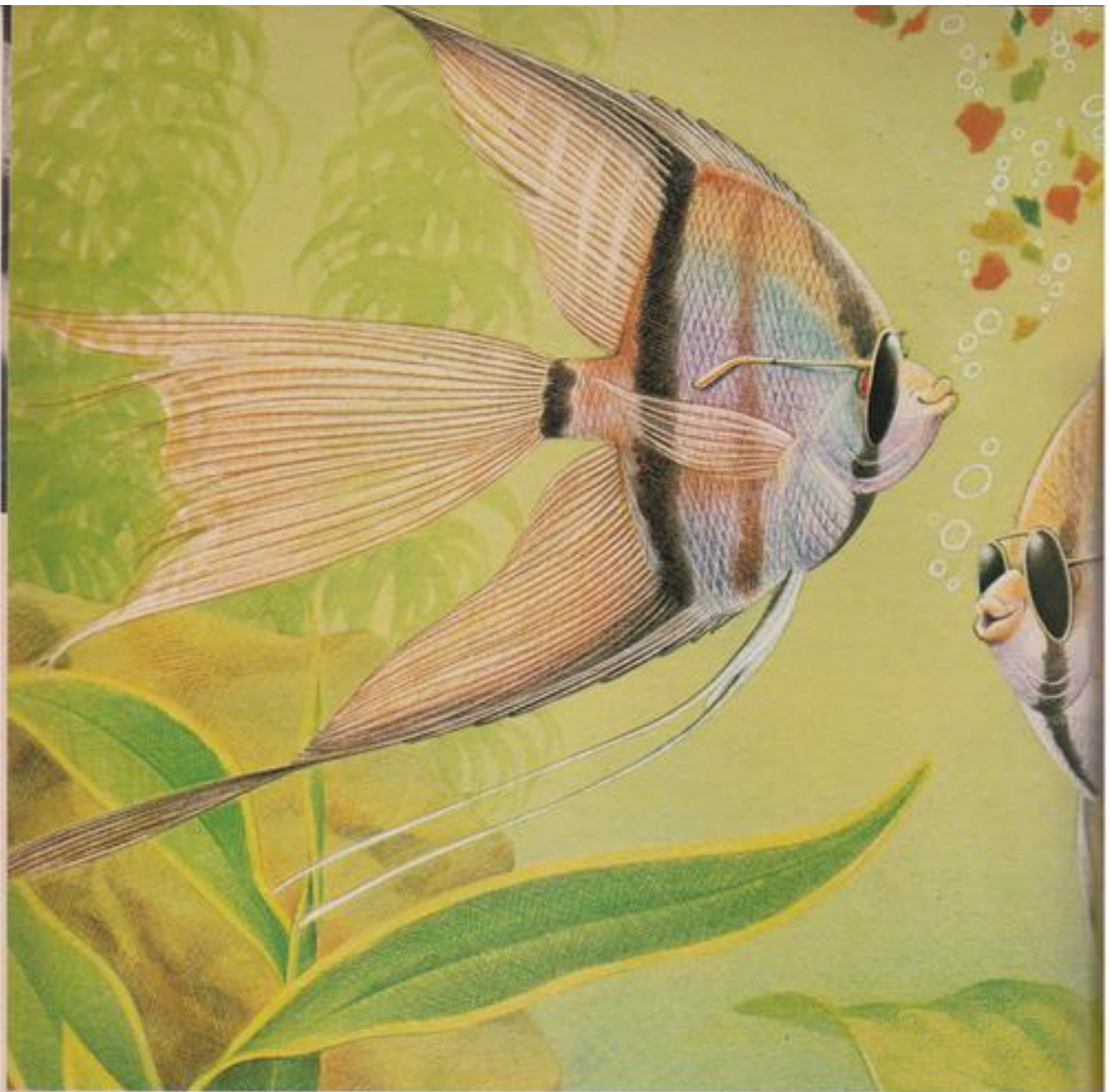
to enter he was driven out. Most of the time he remained at the border of the reserve to keep off some half-grown lemon cichlids which I had deliberately put in with the orange cichlids to evoke the natural reserve-defending reaction of the male. This was, perhaps, an unnecessary step to take but I did not want to run the risk that the male might mistake the situation and for lack of other intruders drive his own young away. Such excessive or mistaken actions do actually occur sometimes, especially among fish caught in the wild state.

A week after the mating a dense collection of spawn could be seen flat on the floor of the cave. After a few more days they could move across the cave floor in small jumps.

I gave them *artemisia* to eat and this the female picked up and carried into the cave. Two weeks after mating the young fish began to find their way out of the cave, still using jumpy movements. In the third week they left the cave and were now swimming fairly normally but only just above the bottom. At the slightest hint of danger the female twitched her fins while at the same time she rapidly reversed obliquely in a downward-backward direction, this no doubt being a definite signal to her offspring, as they disappeared in a flash into the gravel on the bottom of the aquarium. In the evening the female took her young into the cave again. Soon these young fish were swimming out of the local reserve and over the whole of the bottom of the aquarium, causing the male to extend his reserve to cover the whole of the bottom, which meant that the lemon cichlids were only allowed in the topmost layer of water, but as by this time I considered that they had fulfilled their task of diverting the attention of the male they were removed from the aquarium. The newly-hatched fish are of a greyish colour up to a length of 15 mm, after which they become increasingly yellow and at 4 cm, i.e. when five months old, the intensive orange colour begins to appear.

In contrast to the *Jaliscochromis* species and the *Lamprologus brichardi*, for instance, it seems that the parents do not willingly look after more than one lot of progeny at a time and are not interested in mating when they are together with older offspring. In one case the parents mated nevertheless when their offspring were about six weeks old, but after a few weeks they ate up the newly-spawned fish.

It is my guess that the orange cichlid, thanks to its splendidly colourful appearance, interesting behaviour and suitable size, will shortly become a very popular and common cichlid in our aquaria. At the time of writing the price for cultivated fish is still high but as the species is prolific and fairly easy to breed, the price will gradually fall. It is being cultivated in Germany as well as in Sweden, and large breeders in Singapore have already made sure of supplies of young Swedish fish.



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by Arthur Boarder

I intend to make a garden pond with the aid of a liner. How shall I dispose of the excavated soil?

You can pile the soil around the edge of the pond and then consolidate it well. The liner can cover this and then be anchored with slabs of concrete etc. By this means you can raise the water level of the pond above that of the surrounding ground. This will prevent any rain water running from this into the water, which could cause trouble. If you do not like this idea then you can pile the soil up at one side to form the basis for a rockery. If this is made on the opposite side to the house you will be able to make a very colourful scene as flowers will be reflected in the water. If you decide on this latter course, see that there is a small channel near the pond to prevent rain water from running into the pond.

I am thinking of keeping one or two sticklebacks in a tank, 20 x 12 x 10 inches which is planted with plenty of *Elodea canadensis*. Shall I need a filter and an aerator please?

You will not need a filter nor an aerator as long as uneaten food is not allowed to remain in the tank. I suggest that you have one male and two females. They are not fussy eaters and will take any small live foods and also flake foods as given to goldfish etc. The fish may breed in the spring and if so, once the male fish has encouraged the females to lay their eggs in the nest, he will chase the females off and so they should be separated.



Pontederia cordata

I have made a garden pond and would like some advice on plants. I am all right for under water oxygenating plants but would like some to give above water colour in the summer?

As your pond is not over large I advise you to be rather sparing with plants. Water plants usually grow very quickly and so can soon get out of hand and the whole pond can become a mass of vegetation. A water lily is a must, as no plant gives better service in a pond. The type will depend on the depth and size of the pond. Study a catalogue or ask your supplier to let you have the one which is suitable for your pond. Suggest the colour you prefer and then leave the choice to him. There are three other plants which I have found to be very good for the medium sized pond. The first is *Pontederia cordata*, the Pickerel weed. This plant sends up shoots with heart-shaped leaves and has a very attractive blue flower. Another good one is *Sagittaria japonica alba flor pleno*, which has arrow-head shaped leaves and produces spikes of double white flowers. The third plant is a flowering rush, *Butomus umbellatus* which has the usual narrow rush-like leaves and flowers with a fairly large umbel of pink heads. These are all the plants you need and if they are planted in containers which have holes round the sides, many roots will find their way out and attract mulm etc., from the water and so tend to keep the water pure. It is surprising how detritus in the pond is drawn to the roots, perhaps by their own action but also by the swimming of the fishes. Any pond which has one deep part will be useful as most of the waste matter in the pond will settle in this place and can be removed easily.

I have two eight-inch Moors in a tank, 36 x 15 x 12 inches and they are three years old. Both are beginning to change colour a little. A bronzey shade is starting from underneath and I am wondering what I am doing wrong and will they change colour all over?

I do not think that this is a disease and I have known many Moors to lose their deep black and turn bronze as they age. I have wondered if this is because the fish have been kept at too high a temperature. About thirty years ago I lent a good Moor to Nottingham Aquarist Society to be included in an exhibition of the different varieties of fancy goldfish. After the show my fish was looked after for some time by a tropical fishkeeper, naturally in warm water. When I eventually received the fish it had changed from deep black to bronze. If your fish are going the same way I do not think there is anything you can do to stop this change.

I get masses of Duck weed on my pond and would like to know how to get rid of it. It dies down in winter but comes back as thick as ever in the spring?

If you can clean out the pond before the spring you



Flower-head of Pickerel Weed

stand a good chance of clearing it. Then if any does appear you can scoop it off before it gets a good hold. When a pond is covered with the weed the best way to clear it is to play a strong jet from a hose from one side of the pond to the other. This will roll the weed to the edge where it can be raked out easily. Remember that most of the Carp family, which includes the goldfish, will eat this weed if they are hungry.

Dr David Ford is a specialist in fish nutrition and head of the Fish Research Laboratory of the Animal Studies Centre, Melton Mowbray. The team of Veterinary Surgeons, Biologists, Nutritionists and Technicians, using the facilities of the Centre, which is Europe's largest Pet Care Study Unit have completed more than five years of research and trials into modern fish foods. The result of their labour has been Aquarian, made in the highest quality control conditions and developed as the perfect food for all fish.

Dr Ford himself is a Chartered Chemist and Food Scientist who has been keeping fish now for over 35 years. He answers some common questions raised about Aquarian.

WILL ALL MY TROPICAL FISH EAT AQUARIAN?

Yes. Trials at the Animal Studies Centre have proved Aquarian to be the one favourite

tropical fish food. Even finicky feeders, like Piranha, Discus and Butterfly fishes, have thrived exclusively upon it! The reason's simple. Aquarian has fresh meat, fish and vegetable. It's because these fresh ingredients are closer to the foods tropicals would choose in the wild that Aquarian is a more attractive diet. More than that, however, it's nutritionally right. Aquarian has all the highest quality proteins, vitamins and amino acids, essential for top class condition, in a perfect balance. Whereas traditional foods concentrate on quantity of materials and sacrifice quality, Aquarian achieves top quality in all ingredients. That's why it's healthier. And that's why it's more appetizing. Aquarian is the one flaked food all fish enjoy.

WON'T THE FRESH FOOD CLOUD THE WATER?

By cooking the fresh food into flakes we avoid this problem, achieving a food form that's perfect for all fish. Flakes float for surface feeders, suspend for middle feeders and be

discreetly on the gravel for bottom feeders, all without clouding. And thanks to Aquarian's higher quality proteins, fish excrete less ammonia and nitrite to pollute the water.

DON'T ALL FISH FOODS HAVE FRESH INGREDIENTS?

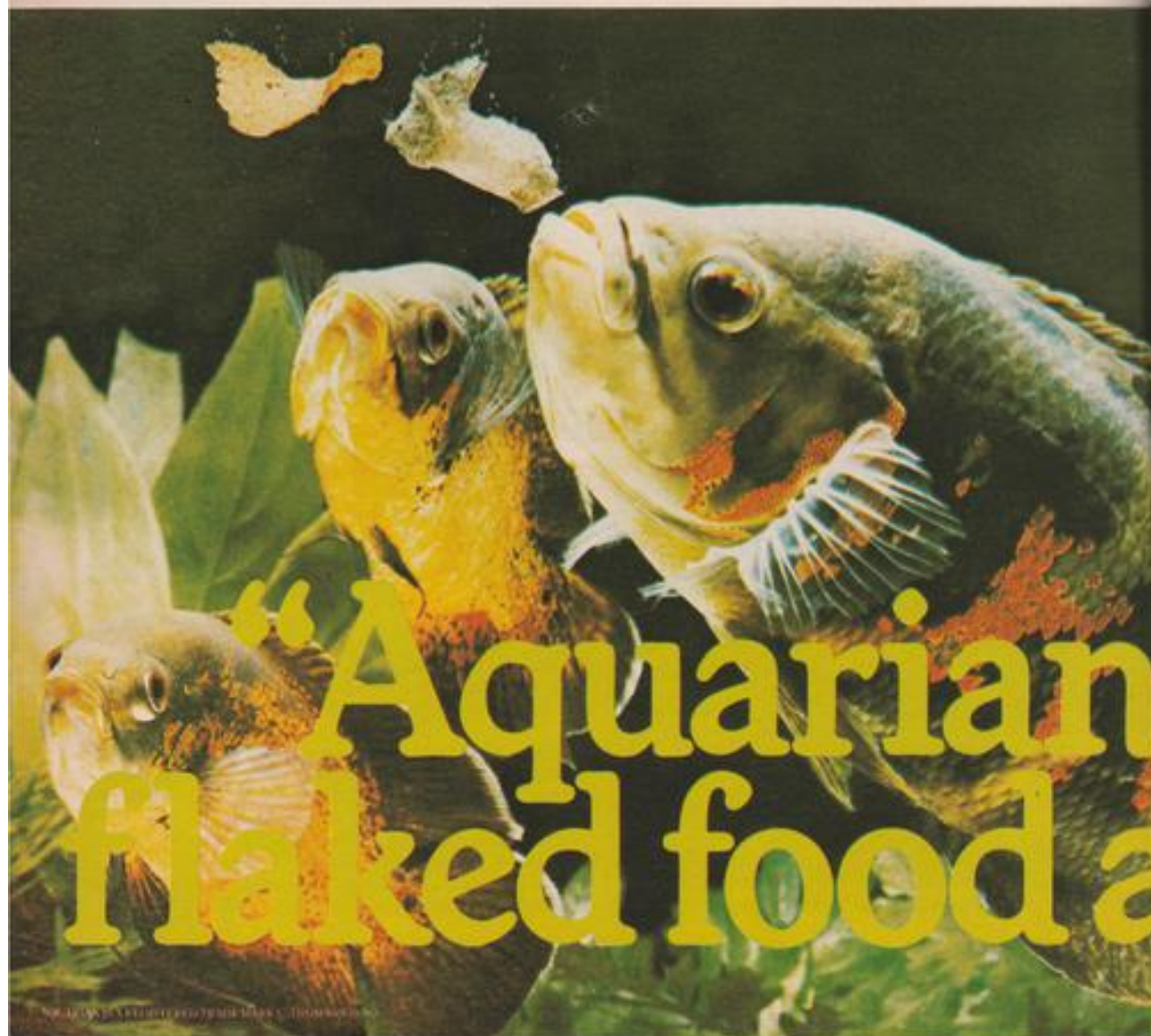
No. Extensive trials proved quite conclusively that the world's traditional fish foods were either cereal or fish meal and meat meal based with an almost negligible fresh content.



AQUARIAN FORMULA



TRADITIONAL FORMULA



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Aquarian, however, has fresh meats, fish and vegetables backed up by aquatic insects and added vitamins and minerals.

ARE THE COLOURED FLAKES REALLY DIFFERENT?

They certainly are! For example, the browns contain fresh meats, the greens fresh vegetables and so on, all nutritionally balanced. There are also correct levels of oils and fats to keep fish in peak condition. Aquarian's coloured flakes combine to make the ideal diet for all tropical fish.

WON'T THE FRESH CONTENTS OF AQUARIAN DECOMPOSE FAST?

Our airtight container guarantees you get Aquarian's full freshness. And after you've opened your container you can retain that freshness with the special recloseable lid.

WHAT DO LEADING AQUARISTS THINK OF AQUARIAN?

Their reaction to Aquarian has been amazing.



CAROTENE COLOUR ENHANCER

EGG & VEGETABLE PROTEIN

FRESH LIVER

FRESH PRIME CUT MEAT

FRESH VEGETABLE

FRESH FISH & CEREAL

FRESH WHITE & OILY FISH

VITAMINS & TRACE ELEMENTS

They've tried it, tested it, proved it and are now endorsing it openly as the one food they can trust. And the fact is, the majority of prize winners in the national shows for the past three years have used Aquarian.

Professional fish breeders too, have been equally open in their appreciation of Aquarian's quality and reliability.

WILL IT BE TOO EXPENSIVE FOR THE HOBBYIST?

Although each container of Aquarian has the freshest of natural food ingredients balanced scientifically by fish nutritionists, and has a back-up of years of research, it is no more expensive than many other foods.

IF I DO CHANGE TO AQUARIAN, WHAT DIFFERENCE WILL I SEE?

Aquarian will make all species bigger, brighter and more full bodied, and for two reasons. Firstly because of the natural healthy freshness. Secondly because it's an appetizing, enjoyable food. All fish find that goodness attractive.

WHAT ELSE DO AQUARIAN MAKE?

There are thirteen different fish foods developed by Aquarian, ranging in speciality from Marine fish food to Goldfish food. There are also tablet foods, pellets for pondfish and a series of seven remedies and water treatments.

Each has just as intense a research and quality control back-up as Aquarian tropical fish food.

so you can see why Aquarian is a name in fish care that you can rely on.

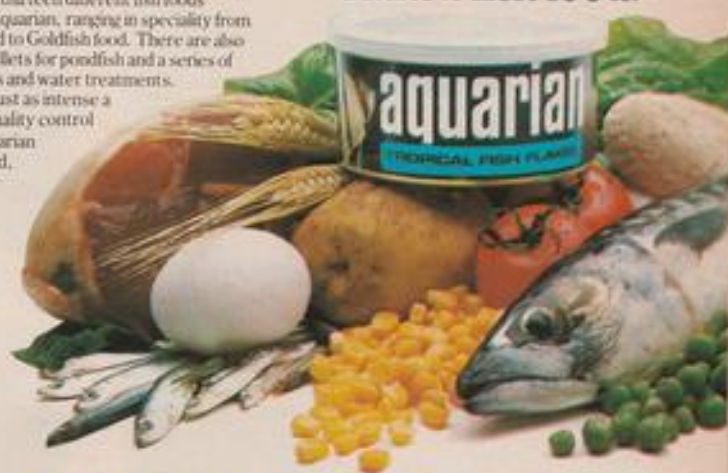
IF I HAVE ANY PROBLEMS CAN I CONTACT YOU?

Yes. We run a free service for all Aquarian users, including a very special guide for beginners. Write to me:-

Dr David Ford,
Aquarian Laboratories
Animal Studies Centre,
Freeby Lane, Waltham on the Wolds,
Melton Mowbray,
Leicestershire LE14 4RT.

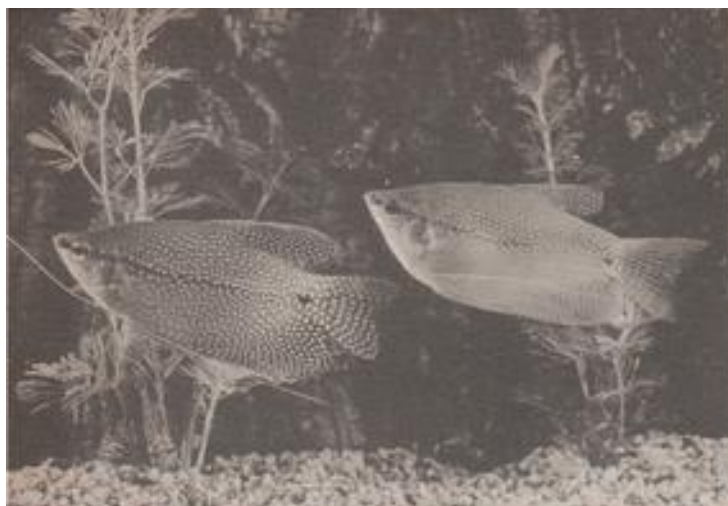
aquarian

The fresh approach to flaked fish food.



is the one all fish enjoy"

Dr. David Ford.



The breeding pair—male on left

Trichogaster leeri

Spawning Sequence

by Ruda Zukal

AS EARLY as 1933 the mosaic or pearl gourami was imported to Europe from its natural habitat in Indochina, Thailand, Malaysia, Sumatra and Borneo.

Temperatures in these areas vary on average between 20 and 27°C—that is at altitudes around 750m. above sea level; in lowland areas the temperature rises further. These areas often consist of flat swamp-land covered with dense—and often impenetrable—tropical rain forest. Extending up to altitudes as high as 1,500m. above sea level, however, they are reminiscent of the tropical jungles of South America and Africa. Numerous rivers flow into the swamps and, mainly during the monsoon season, they flood extensive areas of land. The rainfall in these regions is quite heavy throughout the year and during the monsoon it reaches 3,000 mm. and as high as 4,400 in some locations.

The waters which are the natural home of this fish are soft and slightly acid, pH 6 approximately, coloured yellow or brown and so rather murky with the result that very little light penetrates. Together with the bank-side vegetation which arches above the waters of the rivers, these conditions are less than ideal for water plants. However, the open, shade-free expanses of the swamps receive more warmth and light from the sun, offering a more suitable environment to the numerous plants, many varieties of which are used by we aquarists. Of the floating plants, varieties of the genus *Ceratopteris* grow in abundance. Plants which take root include *Ceratopteris* again, a few varieties of water lilies, *Limnophila*, *Hygrophila*, a range of both familiar and unfamiliar *Cryptocorynes* and other plants.

The mosaic gourami shares its home waters with numerous species of the genera *Puntius*, *Capoeta*, *Borboides*, *Rasbora*, *Danio*, *Laubuca*, *Aplochelus*, *Botia*, *Acanthophtalmus*, *Dermogenys*; and also genera of the large family Anabantidae, to which *Trichogaster leeri* itself belongs.

Over an extremely long period of time the fish in this family have evolved an interesting feature through adaptation to the surrounding conditions of life. In the warm, rather de-oxygenated waters where they live, survival



The male builds his bubble nest



The female nudges the male to indicate she is ready to spawn

would have been impossible without a supplementary respiratory organ. As a result they are able to take in gulps of air from the water surface through their mouths and extract the oxygen from it in this 'labyrinth.' The used air is then expelled through the mouth and gill slits. The mosaic gourami attains a size of about 10 cm. and the splendid colouring of the male makes it clear why this fish is so popular. Sexual differences in adult fish obtain not only with regard to coloration but also in the length of the fins. The male has resplendent colours shading into dark red; the female has a plain, uniform colour; the male has a longer dorsal fin; that of the female is more rounded off. The male is bigger and more slender, the female deeper in the body. They are non-aggressive and docile fish to the point of being rather shy.

Their breeding activities are very interesting. As is the case with most of the Labyrinth fishes, the male builds a bubble nest at the water's surface beneath which the breeding action takes place. After the preliminary courtship and display, chasing and nibbling, the fish curve their bodies around each other and the female releases the eggs. These are lighter than water and rise to the surface. The male gathers them up rather roughly and places them in the nest. Two or three hours after the breeding action has ended the female should be removed, leaving the male to look after the young. It is now necessary to lower the water level very carefully to about 15 cm. On the third day the young should be free swimming and will need their first feed. At this stage it is advisable to remove the male too. Up to 2,000 eggs can be expected from one spawning, although it is invariably impossible to rear all the fry as many die in these early stages. As soon as the young fish develop their labyrinth—after about four weeks—they must be provided with small particles of food. Again care must be taken here, otherwise they will choke on food that is too large. At this point the light aeration used so far can be replaced by the introduction of a filter. After a further five days the danger is half over and food can be given to the young fish, in particles no bigger than the fishes' eyes, once again.



The female swims into his embrace

Here the newly hatched fry can be seen. The white specks are unfertilised eggs which have fringed



The female turns onto her back



The female releases her eggs and simultaneously the male fertilises them



The pair separate amid a cloud of eggs



The male collects the eggs together in the nest



Tropical Fish Farming

by Dr. David Ford

Singapore Fish Farm. The family all live in the bungalow house visible in the background



HAVE YOU often wondered where your Tropical fish came from? Obviously further afield than the High Street aquarium shop. If you look-up the species in one of the encyclopedias you will find that the fish originates from the Amazon or India or wherever. Perhaps this was true of your fish's ancestors but many tropical aquarium fish are now mass produced in fish farms around the world. A classic example is the Neon Tetra, *Paracheirodon innesi*, which actually comes from the Amazon, but is now considered a Hong Kong fish simply because practically all specimens come from fish farms in the New Territories.

During the development of the Aquarian range of fish foods I toured many of these fish farms in both the Far East and southern USA. The following information is just some of the fascinating facts that tour revealed.

Market Size

The latest report¹ of the Food & Agricultural Organisation of the United Nations estimated the world-wide market in ornamental fish and accessories to be \$4,000,000,000 or £2 billion (USA billion). A marketing survey² in the USA a few years ago showed over 16 million families keep fish as pets, and their total value was higher than all other pets, including dogs and cats. Almost half of these households (7 million) keep tropicals in an aquarium. Certainly the USA is the greatest importer of tropical fish, but in terms of number of fish per head of population West Germany is the highest. Denmark is second. The UK is only in 6th place where 1.8 million households own a pet fish, but only about three-quarters of a million are tropical fish keepers.

I estimate some 200 million tropical fish are moving around the world annually to cater for this market. Where do they all come from? Publications by various Governments reveal the monetary value of their exports and comparison of these figures gives the following estimates of the sources of ornamental fish:

Eastern Asia	69% mainly tropicals
Latin America	27% tropicals
Africa	2% tropicals
Japan	1.5% Koi and some goldfish

The Asian fish originate from:

Hong Kong	23%
Singapore	12%
Thailand	6%
Taiwan	6%
Phillippines	6%
Indonesia	2%

India, Malaysia and Sri Lanka (contribute non-measurable amounts to the total).

Many UK importers get their fish from Singapore and so assume that this is their actual origin. In fact many fish farms in the Far East ship their produce to Singapore to take advantage of their lower air-freight costs, hence many of the so-called Singapore tropicals are often produced by other countries, particularly Hong Kong.

Wild Fish

Before describing the farmed tropical fish, mention should be made of wild-caught species. This includes all marine fish because the number of tank-bred specimens available to the aquarist is still insignificant (but not zero please note). Wild-caught tropicals include all those fish which farmers cannot breed in captivity. Examples are Scats (*Scatophagidae*) and Spiny Eels (*Mastocembelidae*). Even here, market pressures prevail. The well-known Red Tailed Black Shark (*Labeo bicolor*) was only available as wild-caught specimens from Thailand and being fairly rare (it is a territorial fish and so cannot be netted in large numbers like shoaling fish) it was expensive. Demand for the fish grew but the fish farmers of Thailand failed to breed the fish in captivity. The Thailand University investigated on behalf of the farmers and established that breeding could be initiated by injection of hormones. A fish scientist now tours breeding farms injecting breeding pairs on a routine basis and as a consequence most aquarium shops now stock the Red Tailed Black Shark. You may now be thinking that the price hasn't dropped either—but in actual fact, the fish is about the same price it was a few years ago—which is an effective drop if inflation is taken into account.

Some areas of the world only supply wild fish because

A Singapore farm using netted fish in the local river





A farm producing plants for the aquarium trade: note that many are arial shoots for rapid growth

the local peasantry have not the will or facilities to set-up fish farms. Two examples are Brazil and Central Africa. The African Cichlids are well-known among experienced aquarists, especially members of the British Cichlid Association and their counterparts in France, Germany, Belgium and the USA. Tank-bred specimens of these fish, such as the Malawi Cichlids, are now on sale, but it is interesting to note that the "farming" of these fish has been achieved only here in the UK.

In Brazil all the exported fish are wild specimens, with between 10 and 17 million fish caught annually from the Amazon basin.² 85% of these fish are Cardinal Tetras (*Chirodon axelrothi*) and 6% are *Corydoras* (mostly *C. julii*). *Discus* (*Symphysodon*) and the Bleeding Heart Tetra (*Hyphessobrycon rubrostigma*) account for almost 3% and the remainder, although over 100 species, only 6% of the total.

Although these wild fish are often larger and sometimes more colourful than farmed fish they suffer from the major problems of endemic diseases and parasites. The collectors, and often the distributors, have no knowledge of such diseases and simply accept huge losses (over 90%). Farmed fish are definitely healthier, more numerous and cheaper and can be bred into fancy varieties. On the other hand they may be less colourful, shorter lived and more delicate (often because of in-breeding). On balance, however, farmed tropical fish are better for the trade and for the aquarist.

Fish Farms

There are two major groups of tropical fish farms—the technical, low-labour American farms (mainly in Florida) and the high labour, non-technical jungle farms of the Far East (mainly Hong Kong, Singapore and Thailand).

During the development of Aquarian foods I visited many such farms in all these countries. This was not only for educational reasons but to actually carry out feeding trials to supplement my own laboratory controlled studies. Obviously such trials included millions of fish rather than the few hundred at the Animal Studies Centre, where the research laboratories are based.

American Farms

The advantage of using Florida for a fish farm is the climate. The ambient temperature is ideal for raising tropicals although it can become cool in the winter so most farms have a fish house with tanks heated by electricity or oil. The winters of 1977 and 1978 were unusually cool and many fish losses occurred.

The rainfall can be quite high, due to fairly frequent tropical storms and this rainwater soaks into the ground where the peculiar geology (much of the land is an ancient coral reef) allows artesian water to be pumped out from shallow wells. This water is pumped into concrete ponds laid-out in rows with connecting plastic piping for minimum of maintenance. Electronic monitors watch water flows and levels etc. which is necessary because many of the farms may only have one or two staff. Breeding pairs are held in these ponds and the eggs harvested routinely for hatching in aquaria or other ponds according



The Bangkok Sunday Market. No need for heaters and thermostats, the ambient temperature was nearly 100°F.

to species. The young fish are shipped-out via mail order to dealers throughout the USA mostly by air from Miami. There is no export business because the Florida fish farmers cannot meet the USA demands—in fact many species are imported from the Far East and redistributed from Miami.

Some of the fish farms in the heart of the State suffer from pilfering and unwanted visitors are kept away by surrounding the farm in barbed wire sometimes with an Alsatian guard dog. The effect is more like visiting a concentration camp than a fish farm.

During the summer months when the sun is high, the ponds can become overheated, so one routine chore is to shade the ponds with sheeting. As one farmer said to me early one morning "Oh no! Not another nice day."

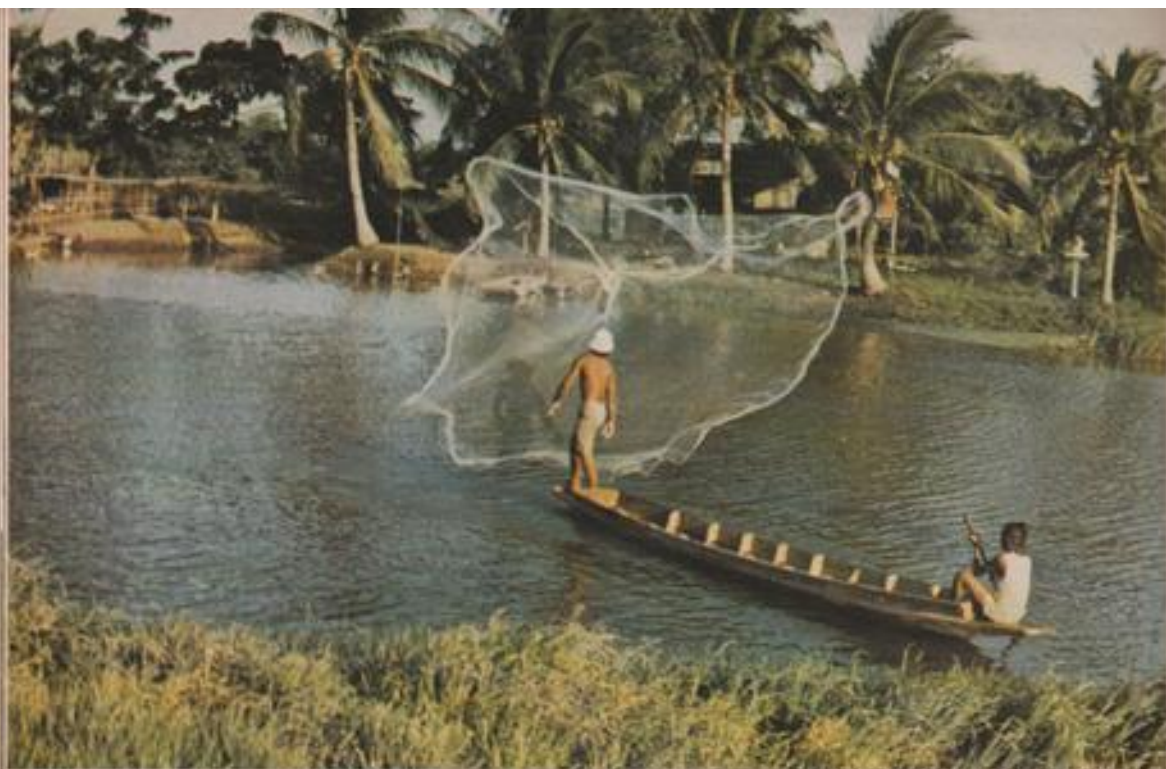
Another routine chore is to sort the growing fish, otherwise pecking-orders become established and a few fish grow at the expense of the rest. In some cases the fastest growers eat their brothers and sisters. To grade the fish a wooden float that just fits the pond is inserted at one end. The frame supports a mesh that captures all the fish in the pond as the device is drawn across the pond and allowed to float up to the surface. The fish are then sorted by hand, runts thrown out and any diseased fish inspected for early treatment of the whole brood.

The fry are fed mainly on *Artemia* nauplii (freshly hatched brine shrimp) either directly or as soon as the species has grown sufficiently on the naturally occurring infusoria. The brood fish are fed scrap diets often to the farmers own (secret) recipe. This is because commercial foods are too expensive to feed on a bulk basis.

Hong Kong

There are a few major distributors of tropical fish based on Hong Kong Island. These own plots of land in the jungles of the New Territories where tenant farmers produce fish for them on a contract basis. A whole family lives on the farm and they all work, from Grandmother right down to the youngest child, seven days a week. Their one job is to produce ornamental fish for the distributor to collect in bulk and air freight around the world from the colony's busy airport. Often a farm will produce just one species and with such intensive breeding mutations occur or varieties are developed. Hence "new" fish are continuously being announced, such as vicetails or albino forms.

The jungle farms are never far from some river or stream, so the local water is always used. This is carried in old jerrycans to fill rows of outdoor aquaria or concrete ponds. Such waters are rich in natural foods, but also diseases and parasites. The fish all looked fat and healthy and seemed able to resist infection in their ideal surrounds. Infestation was often a problem and few farmers routinely treated their fish, or were even aware of the parasite problem. However, the distributor-owner of the farm was quite knowledgeable and treated the bulk fish prior to sorting and shipping. Treatment was by secret potions from Red China and I was told that as a Westerner I wouldn't know of such remedies or how they worked—but it amazed me how much the potions resembled Methylene Blue, Malachite Green and Acriflavine. On one tin, covered with Chinese characters, were the letters **PENICILLIN**.



Netting wild tropical fish in northern Thailand

Singapore

Singapore Airlines ship tropical fish all around the world. Many of the Singapore exporters are holding fish farms for specimens flown in from other Asian countries in order to take advantage of the special air freight rates. But Singapore have their own fish farms which stretch right up into the Malayan jungles. There are so many streams and rivers many are even unnamed. Some of the farmers produce just one fish—the local species, which are netted and held captive within the very river of their origins.

Thailand

The Thais are in the process of changing from wild-caught to farmed tropical fish. The main distributors are situated in or near Bangkok, to take advantage of the international airport. The jungle farms are also in southern Thailand where they produce a wide variety of aquatic animals and plants. Although labour is cheap and plentiful, the Thais use scientific methods. School children are taught all about fish farming as part of their basic education and bus loads arrive daily at the one major public aquarium run by the University of Thailand. Many of these children will grow to be fish farmers, both ornamental and edible fish.

The aquatic plant farms have carbon dioxide cylinders slowly releasing the gases into shallow open ponds growing huge quantities of all the popular species.

Bloodworm is a popular food item, as well as the naturally occurring infusorians and aquatic insects and larvae.

Further north the conditions become more primitive, especially as political problems rear their ugly head, and farming of fish gives way to the harvesting of wild species. This harvest is seasonal and distributors are geared to handle influxes of wild-caught specimens such as the best known of all Thai fish, the *Betta splendens* or Siamese Fighting Fish.

Every Sunday morning the Thais hold an open air market in Bangkok where everything you can imagine is bought, sold or bartered. One section of the market is devoted to ornamental fish and here fish farmers exchange or sell breeding stock from their farms. At this market I saw quite a few Thai people buying Discus and Oscars and carrying them home in polybags just like we do. As I said to an interpreter with me on that trip, I didn't realise there were so many aquarists in Thailand. Oh, no, he explained, they are going to eat them. . . !

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2. The European Pet Products Market, Frost & Sullivan Inc., June 1975.
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A Guide to Exhibiting Fishes

Part 1—WHY?

by Barry Durham

WHY SHOW FISH? Why uproot all the plants in your tanks to catch a three inch specimen and put it into a jar; transport it 30, 50 or even 100 miles to a school hall or community centre; put it on a table and stand around for three or four hours while a couple of men decide if, in their opinion, it is better than the next fish? Why?

That is an argument I have been confronted with on many, many occasions by fellow aquarists who don't show fish. They cannot see the reason behind all the trouble and time taken to prepare a fish for the show bench.

They do not appreciate all the work that goes on before the fish even gets put into its jar for the show. Some of them come to look at the exhibits and invariably you can hear someone comment: "I have a tetra (or anything else for that matter), in my tank which is much better than that. I can't see what the judge finds so good about it."

So I go up to them and say: "It's no good in the tank at home, it should be on the show bench if it's so good."

They whirl round with a horrified look on their faces and say: "Oh no! I would never dream of bringing MY fish out to a show!" "So how do you know it is better than that one?" I say, pointing to the winning fish. "I just know it is. I don't need a judge to tell me that my fish are the best."

I try my best to keep the smile off my face and ask: "What colour is it? Are all the fins intact? Has it got any scales missing? Are its fins always held erect? Is it lively? At this point my 'friend' either turns his back and ignores me or pauses for thought and then says:

"Er . . . I think so . . ."

"You mean you don't KNOW!" I say in mock alarm.

"Well it looked all right the last time I saw it."

"And when was that?"

"I saw it this morning."

"But did you really look at it? I mean carefully inspect every aspect of it?"



Carl Norton of Sandgrounders A.S. judging at a top Northern Show in 1979.

"Well I haven't really looked closely at it for a day or two, but I know it's all right."

I shake my head. "All right isn't enough. Are you absolutely sure it is better in every respect than that one?"

"Well I think it is bigger . . ."

"I didn't ask that. I said is it better?"

"Er . . . I think so . . ."

The conversation usually ends there because the poor

At a show you get the chance to view hundreds of fishes — many the best of their species in your area.



chap is now deep in thought wondering if his fish really is better, and just when was the last time he had really looked at it? It seemed to have a little split in the dorsal fin last week come to think of it. Has it healed up yet? And what about that missing scale near the tail . . .

Let's face it, everyone thinks their fish are better than the next person's, but the only way to prove it is to enter them into a show and let a trained, experienced judge decide. You may still not agree with his decision if your fish doesn't get an award, but at least the decision will not have been coloured by personal feelings. But proving your fish are the best (or not, as the case may be), is not the be all and end all of exhibiting fishes. The show is the yardstick for the standard of fishes currently available. By its competitive element it must encourage people to obtain and produce the best fish possible, so the exhibitor becomes a discerning animal who not only buys the best, but is always looking for perfection in the fish he breeds. This has a tendency to influence shops to a certain extent, and encourage them to sell only the better quality fish.

In many towns and cities with a society which has a keen showing element you find at least one shop which appreciates this fact and acts accordingly. His fish are noticeably better than anyone else's; he is helpful and friendly and well worth getting to know because he will probably go out of his way to get that special fish you want. Those are the best shops to frequent; they are the shops for aquarists as opposed to fishkeepers.

There will be folk who disagree with me, trotting out the old argument that the best fish never appear on the show bench because they are in tanks belonging to people who think too much of their fish to bring them out to a show. But what influence do these people have on the increase of quality within the fishkeeping hobby? Nil! They may have a good fish, but who is to judge? And if no-one but the owner and a few close friends see those fish, they contribute little or nothing to the progress of fish culture. They may have an enormous tank in the living room where their fish grow to prodigious size, but they are not aquarists. They are fishkeepers. And keeping one tank, however big it is, and keeping it clean so that it looks nice in the living room, does not make an aquarist.

It is like the man who buys a diamond necklace for his wife then insists that she never takes it out of the safe.

An aquarist is someone who takes a much deeper interest in the hobby. He wants to know about his fish; about what makes them tick; what sort of water and food they prefer; how they breed. He may go in for rare



There's nothing like winning on your home ground. Stuart Ainscough (right) receives Best Fish in Show trophy for his killifish at Bridgewater A.S. Open Show, 1979.

and exotic species which few other people want, or he may stick to the better known fishes, but in either case he does his best for his fish. He is proud of them and willing to pass on the knowledge he gains to other people. And one of the best ways to pass on such knowledge is at a show. Not only can people see just what sort of fish you keep, but you can also meet other aquarists who want to talk about fish; to pass on their ideas and listen to yours. The show becomes as much a social gathering as anything else where aquarists gather from miles around to chat, swap their ideas, information and breeding techniques, and sometimes fishes, as well as to show off their pride and joy.

It is nice to go up on stage at the end of the day and be presented with a small award, but that only provides a climax to an enjoyable afternoon.

To me, showing fish is an integral part of being an aquarist. But to do it properly, like anything else, needs a lot of hard work and dedication. But you don't

have to be rolling in money so that you can provide dozens of tanks to house prize specimens to be a successful exhibitor.

A community tank can be, and quite often is, sufficient. I gained the first awards for my fish when all I had was one 24 in. \times 12 in. \times 12 in. community aquarium on a cupboard in the living room—and I know of several aquarists who have gained 'Best in Show' awards with their community fish.

I started showing the hard way—I didn't know the first thing about it—so I dived in the deep end. But after much trial and error, and many disappointments, I finally found what I think is a workable formula for the aquarist who can only manage a few tanks.

In the following months I hope to be able to show you that formula so that with a bit of dedication and common-sense you can improve the quality of the fishes in your tanks up to that enviable prize-winning standard.

Next month: Start right.

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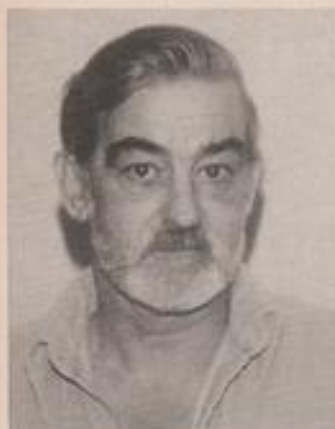
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Coldwater Jottings

by Frank W. Orme

LAST MONTH I described the sorting of the very small goldfish, and mentioned the various faults that should be watched for. This month I will describe the culling of the young that have grown sufficiently to be recognised as potentially good, or bad, specimens of their particular variety. As the fishes grow, faults that were not evident when they were smaller will become more obvious and this will make the task of culling much easier. All fish that do not meet a reasonable standard of quality must be rejected, a poor type will not improve with age. Only the best fish of their type should be kept for growing on into future breeding and show stock. Those that do not quite make the grade can usually be disposed of to fellow fanciers of the goldfish—but they will not be interested in the inferior quality types with too many bad points. Always remember that every poor fish that is kept will deprive a better specimen of food and growing space, and plenty of food and space is essential to the satisfactory development of the young.

A close inspection should be made of each fish's body shape, finnage, colour, size and condition. Each variety differs in some degree, as do the individual fish, some more than others, therefore I will list the points that must be sought in those that are to be kept as worthwhile representatives of their type. It will be found that a copy of a set of Show Standards will be a great help to the novice goldfish breeder; from these it will be possible to ascertain what the ideal fish should look like when fully grown, and the immature fish can be judged accordingly—bearing in mind that, at this stage of their development they will not be miniature replicas of the adult.

First, remove all undersized and weakly fish together with any that have any obvious deformities to the body

or finnage. Fish that have difficulty leaving the bottom of the tank and sink heavily after having done so, or any that swim with a jerky action, must also be removed for these faults will not improve. The fish which remain should be fully coloured, of good size for their age, have an alert, healthy, well-fed look about them and swim with an easy well-balanced grace.

All nacreous ("calico") fish should be quite evident and those exhibiting the best, and deepest, colours can be easily selected. Unless it is intended in the future to try a metallic x matt spawning, which will produce 100% nacreous young, all pink and metallic type fish must be removed. If the metallic scaled group have been bred, select those young which have changed from the dark wild colour to the desired gold. It is always preferable to select those young metallics which change colour early for this factor will be passed on to their future progeny; those fish which are slow to change colour may well produce young that prove even more reluctant to assume the gold coloration. Dame Nature continues trying to change the fancy goldfish back into its original form and we, the breeders, must combat her by selecting only those specimens which we prefer—avoiding any which exhibit any sign of reverting.

The finer points can now be inspected for the particular variety. Since to go into great detail for each variety would run to too many pages, only the basic points applicable to similar types will be outlined.

SINGLETAILS. In comparison with other varieties these are possibly the easiest for the novice to sort. Having



Celestial Goldfish

selected the best of the particular scale group, it merely remains to ensure that the body shape conforms to the desired standard as nearly as possible, and that the fins are supported by strong rays. The caudal (tail) and dorsal fins should show no signs of drooping or twisting, and have evidence that, when adult, they will have the correct shape for their particular variety although, at this stage, they should not be too large otherwise when it is fully grown the fish will be over-finned.

If the Standards are studied it will be seen that both the common goldfish and London shubunkin are sturdy fish with short, paddle-like fins and a moderately forked caudal fin. The Bristol shubunkin, on the other hand, is somewhat slimmer, with a rounder, less pointed head. The fins are larger in this variety, the distinctive feature, apart from coloration, is the well developed caudal fin. The "tail" is large and broad having well rounded lobes and should be well spread with no sign of drooping. Although similar, in some respects, to the Bristol shubunkin, the comet has a slightly slimmer body, but the feature from which this variety derives its name is the caudal fin. This is deeply forked, with a length very near to that of the body forming narrow upper and lower halves almost becoming points at their tips.

TWINTAILS. These fall into two categories; those with dorsal fins, and those which have no dorsal fin. All have short, chunky bodies, twin anal and caudal fins. The longtailed types are generally deeper in the body than those with the shorter fins. Ideally both should have dorsal outlines that curve smoothly over the back from the nose to the root of the caudal fin. The underside should present a similar, matching curve. With the possible exception of the ryukin, there should be no evidence of a hump where the head joins the back, nor should there be any sign of "snoutiness" to mar the contour of the head.

April, 1980

The short-finned varieties, such as the fantail, tend to have oval-shaped bodies. The caudal must be in the form of two "tails" of equal shape and size; it must be carried stiffly, be well spread, and not droop into a "draggletail." Preferably the two halves of the caudal should be fully divided although a join that does not exceed more than one-third of the upper edge is acceptable. The anal fin must be cleanly divided to form two completely separate fins, both having identical size and shape, and carried at matching angles to the body.

The longer finned veiltail type varieties have much more rotund bodies, and carry well developed long fins in comparison to their shorter tailed relatives; however, the remarks concerning the body and head outline apply just as much to these latter varieties. Although at this stage the caudal fin of the young fish will be much shorter than that of an adult, it should nevertheless be broad, fully divided, with as near to a straight trailing edge to each half as possible. As with the fantail types, the anal fin must be paired and fully divided.

When inspecting the finnage of the different varieties always remember that the fins will continue to grow, at a diminishing rate, throughout the life of the fish. Therefore, a young fish which is an exact miniature of an adult is, quite obviously, carrying fins that are too well developed for its age; it will be grossly over-finned as an adult and lack the ability to support them in the most pleasing and desired manner.

TELESCOPE-EYES. This eye-type may be found in a number of different goldfishes, generally due to some unthinking person crossing a normal-eyed fish with a moor. I have seen Bristol shubunkins with telescope-eyes. The moor, mostly of the veiltail type but sometimes as a fantail,

Metallic Veiltail Goldfish



is the generally accepted variety to have this sideways protruding eye development.

In the young fish the same remarks apply as were made for their normal-eyed counterparts, but the eye protrusion should be evident. Pick out those fish with the best developed eyes, which must be evenly matched in size and shape. Choose the blackest of the young, trying to ensure that the colour spreads into the whole of every one of the fins; avoid any which appear to be "brassy," the aim being to find those which will develop a rich, velvety black coat as an adult. The celestial is a variety which lacks a dorsal fin, has a body somewhat longer than the usual twintail types, and has eyes which protrude in an upwards direction. During the development of the young fish the protruding eyes slowly turn upwards until they remain in a position which gazes heavenwards—hence the name of this variety.

DORSAL-FINLESS VARIETIES. As the description implies, these varieties lack a dorsal fin; in other respects they have bodies and finnage similar to that described for the short-finned twintails. The dorsal curve must be perfectly smooth with no trace of a fin, spine, lump or hollow to mar its appearance. Often these fishes are broader across the back than those which sport a dorsal fin.

HOODED TYPES. The lionhead is a variety which has no dorsal fin, has short finnage, and a thick, chunky body. The anal and caudal fins are divided into twin, separated fins as described for varieties of that type. The oranda is identical to the veiltail, but seems most popular in its metallic form. Both have a common feature—the hood. The hood is a soft raspberry-like growth which, with the exception of the eyes and mouth, completely shrouds the head of the adult. Of course, the young fish will not have this growth; however, the head should be broad and blunt to form a good base for the future hood. Those which have a rough, granular appearance to the top of their heads are exhibiting the start of the growth and these are the ones to select. Always choose as future breeding stock those fish which develop the hood growth in the shortest time.

Redcaps may be of either the lionhead or oranda type. The hood, which is red in colour, grows only on the top of the head—hence the name. The body is silver and the fins clear, making the red cap appear quite bright.

Possibly one of the best ways to learn what to look for in a young goldfish is to visit one of the larger, specialist coldwater shows where, in the breeder's classes, it is possible to see the current seasons young in its various varieties. Such shows are held in London, Bristol and Bolton. It may come as a surprise to see the size of these young fish, and should provide a lesson as to what can be accomplished if the correct conditions are provided when rearing the young stock.



Lionhead

Having carefully selected those young which it is considered are worthy of retention, and rejected the remainder, the problem of providing sufficient growing space should have been considerably eased. Give each fish as much space as possible. With good feeding this will encourage maximum growth.

As mentioned earlier, it should not be forgotten that the fish are not yet twelve months old and should not be replicas of an adult; any fish that is is almost sure to be a "runt" and, in any event, will be grossly over-finnaged in a very few years. On the other hand, it will take some time for the lionhead and oranda to grow a fully developed hood growth.

As a rule, the more experienced breeder of fancy goldfish practices very severe culling of the young stock; the novice should try to emulate this practice. Too often the novice attempts to raise too many fish in too little space. Provide ample room, from the time of hatching, to prevent overcrowding and ensure that there is always a varied and plentiful diet of good, nourishing foods. Keep the young growing throughout the whole of the rearing period so that at the end of the season, whilst there may not be very many, they are strong, sturdy and well grown specimens of which the breeder can be justly proud.

During the growing period the water temperature can be artificially warmed to a moderate degree. However, as the season progresses the temperature should be gradually lowered. By late August/early September all heat should be dispensed with, and naturally, fluctuating temperatures allowed to prevail. This will enable the young fish to acclimatize to cold water in readiness for the winter months—a period during which it should not be necessary to use any form of heating in the fish tanks.

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KOI QUERIES

by Hilda Allen

Two years ago, before I was aware of the special needs of Koi, I made a concrete pond 28 ft. x 10 ft. and I also have a small 3 ft. x 3 ft. x 18 in. deep pond connected to the large pond by a cascade and waterfall. I have no filtration at all and do not relish the thought of continuous under-gravel filtration. I am planning to pump the water from the main pond down to the bottom of the small one and allowing it to flow up through a 3 ft. deep gravel bed and then back to the main pond. Is this a practical idea, and if not I would appreciate your suggestions on an uncomplicated method. I am also contemplating building an indoor Koi pond about 28 ft. x 10 ft. and I would like to keep about six or eight 24 in. Koi. This pond will be 2 ft. deep and have a waterfall. Thank you for your earlier advice on treating disease and fungus.

Both your letters to me indicated a lack of appreciation of the basic elements of fish-keeping, much less Koi-keeping, so I assume you are probably fairly new to the hobby.

I hope my reply will not appear too harsh but it gives me the opportunity to explain a few rudiments of successful Koi-keeping based on my own experiences over twelve years. Of course, mistakes were made and hard lessons learned. I can but try to help others to avoid some of these painful, expensive mistakes.

Your plan to filter around 3,500 gallons of water successfully through 13 cubic feet of gravel is not practical; a much larger area is required and ideally a pre-settling area also. Your small filter pond would only have a very limited life before being completely blocked. The worst of the mulm will stay and build-up from the bottom of the gravel and provision must be made for regularly flushing this away. A diagram of a useful external filter

was given in the October 1977 issue of *The Aquarist*. ALL filters must be made large enough to cope with what they are expected to do; wishful thinking, cost-cutting or economy of labour is not advised.

Your new indoor pond sounds interesting and you have the chance to get this one right first time. A depth of 2 ft. is certainly not deep enough for 24 in. Koi, even indoors. Do you have any idea how strong, deep-bodied and large in every respect a 24 in. Koi can be? Certainly such fish are entitled to a greater depth of water rather than paddling about in water that will barely cover them when, like all carp, they feed over the floor of the pond.

I would suggest you make your pond at least 3 ft. deep and perhaps going down to 4 ft. in one area. An under-gravel filter measuring approximately 90 sq. ft. could then be installed in the shallower part and the water return going to your waterfall over the deeper area to provide a good circulation and oxygenation.

Two bottom drains should be fitted together with the necessary plumbing during the construction of the pond.

Your plans to have six or eight 24 in. Koi indicate that you have the space (and presumably the cash) to finance the project and make a good, practical Koi pond.

I think that your present ideas on Koi-keeping and your hopes of keeping large Koi in good healthy conditions are not compatible, but I wish you well.

The largest pond I can construct along one side of my garden would measure 14 ft. x 8 ft. I think I can deal with the necessary plumbing for a bottom drain, filtration, etc., but I am not sure of the amount of liner needed, assuming about an extra one foot all round to be covered by paving. Will you please explain the calculations for a liner for the depth of water you recommend, also the area for the

filter bed and where this would be best sited in the sketch of my proposed pond.

Without changing the broad outline of your pond which, I understand, is determined by existing underground pipes and services to your house, I would suggest you allow for a deep area to provide safe over-wintering for Koi.

The reasons for a good depth of water have been explained many times before and it is a fact that deeper volumes of water are slower to freeze over than shallow ones.

You should consider the best liner material you can afford and liners based on Butyl rubber are recommended for a long, trouble-free life. This may appear expensive at the outset but cost is comparable to building a concrete pond nowadays. The diagram is based on your pond and details the layout and dimensions of the liner required.

The under-gravel filter with its pipework and 8 in. to 9 in. depth of $\frac{1}{2}$ screen washed gravel is sited at the shallow end, with a retaining barrier of stone, brick or concrete blocks and made higher than the filter-bed to avoid overspill into the pond. When the pond is filled with water there will be very little pressure from the gravel inside the barrier. If you have any doubts on its strength or wish to present a smoother surface to avoid possible damage to Koi, the barrier could be improved by covering with a layer of glass-fibre matting and several coats of resin.

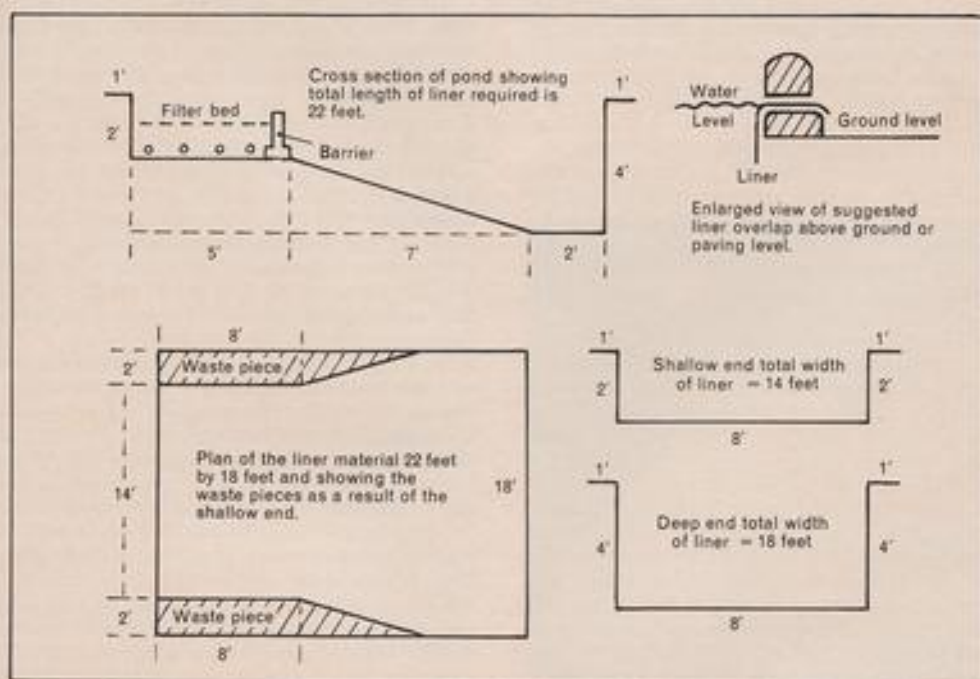
From the plan of the liner measuring 22 ft. \times 18 ft. you will note two waste pieces. By the time the pond is filled and the liner has been gently pulled into place, these waste pieces should be larger than drawn and can be used as a second reinforcing layer under the gravel filter-bed, after the first water has been pumped to waste.

In adding up all the dimensions to determine the size of liner required you may think I have ignored the increased length of the slope. It is true that on very steep slopes the length of liner can vary considerably (as some calculator enthusiasts might be quick to tell me), but the difference for your pond only amounts to about 2 inches and can be ignored.

It is understood that you will arrange for drainage at the deep end and are familiar with the special swimming pool type drains and fittings available for this purpose.

With regard to the surrounding paving, one suggestion is to raise the sides of the pond above ground level by draping the liner over a plinth of concrete or bricks, etc. This simple extra will prevent any polluted water from your garden draining into the pond. Additionally, if you can build a low wall, say 12 inches or so, over the liner this will act as a safety precaution for children, hopefully prevent Koi jumping out and will deter predators, such as next door's cat, from fishing in your pond.

If a few small gaps are left in this wall they will allow for safe overflow of water, or you could build in short lengths of plastic pipe for this purpose.



What is Your Opinion?



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

THREE YOUNG ANGELS on the alert for food at the surface of the water, feature in photograph 1—and make an appropriate photographic introduction to the subject of breeding angels as discussed by Mrs. Nancy Shuttle, of 3 Wade Street, Middleton Junction, Nr. Manchester, in the first of this month's interesting and instructive batch of letters.

She writes: "I bought a pH water test kit earlier this year just out of curiosity, but when I used it I was dismayed to find that the water in all my tanks was pH 6.0 according to the test colour chart; so very acid, apparently, that none of my fish had any right to be looking so healthy and breeding so regularly. Panic stations! In went the bicarbonate—half a teaspoon per ten gallons. This boosted the pH up to nearly 7.0, but when due for the usual weekly water change all tanks were back to 6.0; so I bought crushed shells, putting small amounts at first in each tank and gradually building up with additional amounts until a constant pH of 7.0 was steady without adding bicarb. every week. But alas, during the weeks that followed that first attempt to boost up the pH, all the fish looked decidedly unhappy and many died. Strangely enough, most of the deaths were in Malawi and Tanganyikan communities—fish which are supposed to thrive only in a pH of 8.9-9.0. Yet these had been spawning regularly and I'd been raising their young without any fatalities for over two years in the 'impossible' 6.0 pH. I'd say, if we know the fish we buy are wild caught by all means try to reproduce the environment they've been used to. But if we buy fish which have been tank bred

in this country then it's pointless, and even dangerous, to expect the poor things to re-adjust to their ancestors' environment—like expecting us to thrive in Arctic conditions if we happened to have Icelandic grandparents!

"In future there won't be any more experimenting with 'improvements' unless the fish themselves tell me there's something wrong with the environment. After all, they are the real experts. Fortunately they don't read the books (if they did, we'd have tanks full of neurotic hypochondriacs), and unfortunately they don't write the books (if they did, we'd know a heck of a lot more about them)."

Angelfish

"About the problems in raising angels: maybe I've just been downright lucky but I've rarely had any difficulty in this respect. On occasions I've even had pairs of angels adopt the fry of another pair as their own. The first time was when my marbled male/silver female (in a tank on their own) had spawned and at 48 hours their eggs had all fungussed. Out of curiosity I dropped onto the gravel a piece of leaf containing about 50 healthy, wriggling, 4-day old fry from a pair of silver angels. The marbled/silver pair immediately scooped up mouthfuls of these alien fry and spat them all out onto a leaf which they had previously been cleaning for their own fry. On another occasion this same marbled male (by then spawning with his silver daughter) spawned in a 4ft. community tank and on the same day a pair of gold angels also spawned at the opposite end. The marbled/silver fry were free-swimming 7 days after spawning, and the following day I found that about 30-40 of these fry had found their way across the tank into gold angel territory where the gold angel fry, eight days since spawning, were still wriggling on their leaf. Although the marbled/silver fry were much darker in colour and noticeably larger than the gold fry, the gold parents were frantically dashing around collecting them in their mouths and spitting them onto the leaf containing their own fry. Time and again the darker fry refused to be 'treated like babies' and just wouldn't stay where they were put. But when next I looked at the tank a few hours later the marbled/silver fry were all hovering obediently over the surface of the leaf full of gold fry, apparently having learned from constant repetition that this was where they were supposed to be.

"Angel parents aren't always so obliging about adopting orphans, however. Once when the marbled/silver pair had raised a brood to free-swimming in a community tank I removed the other fish to let them get on with it. Left in the other end of the tank was a free-swimming brood of a pair of *C. meski* which I had no available tank to grow on in, so I half hoped they might get themselves adopted by the angel pair. No such luck! The male angel suspiciously patrolled the newly-emptied tank, spotted the alien fry—and annihilated the lot in less than a minute! Yet about a year later, when this same marbled male angel had been without a mate and not spawned for months, he actually helped a pair of blue acara to raise their fry in a community tank, guarding the spawning area as if it were

his own; and when the fry were free-swimming the normally devoted blue acara parents confidently left the male angel in charge of their fry while they went to feed. It really was incredible to watch the angel hovering over the shoal of blue acara fry and fiercely protecting them when any other fish wandered into the area.

"However, to anyone not having much success in raising angels artificially I'd say for starters—forget that meth. blue. Leave the eggs in the community tank with the parents if possible until 48 hours after spawning. By this time the fry are hatching and there's no need for the anti-fungus chemicals, which I reckon actually kill off all the microscopic, natural *infusoria* which the newly-swimming fry should be 'first-feeding' on in the hatching/growing-on tanks. Take the fry-leaf from the parents when the eggs come 'alive,' anchor it in a small container and float this in the tank to be used for growing on, so there's no change in temperature when the fry are transferred. I always ensure that the growing-on tank is swarming with *infusoria*, ready for the fry, by putting in plenty of top plants; also a crushed lettuce leaf 2 or 3 days before the fry are turned loose. And never transfer them from the hatching bowl until they've really been shoaling and swimming for at least two or three days, because on the evening of that first day free-swimming the little mites are literally tired out and will put themselves to bed, hanging in clusters on the sides and base.

Too clean

"When raising angels, or any other substrate spawned fry, I think it's possible to defeat the object by trying too hard—clinically-clean, sterilized tanks, chemicals (anti-this and anti-that), and worrying about the old problem: too much/not enough food. Earlier this year I netted out a shoal of newly-swimming silver angel fry from a community tank and without worrying about temperature or any special water treatment or set-up, simply dumped them in an old 2 ft. planted tank with U/G filter. A week later—heater failure; temperature down to 66°F and not a trace of that happy little shoal; all died of cold I guessed. The heater was repaired, but not needing the tank at the time I just left it empty (or so I thought). About three weeks later I spotted about six and then eventually nine fully-developed young silver angels flitting amongst the top plants. Not only had the fry survived the earlier acute drop in temperature, they had obviously also been existing quite well on the natural *infusoria* amongst the top plants. Getting off to this bad start didn't do them any harm because now, at five months old, they are 1 in. body diameter and 2½ in. deep finnage. Dorsal and pelvic fins are perfectly straight, not a kink, bend or twist in any of them, and they are growing on now in a mixed community tank with adult angels, other cichlids and livebearers.

"In closing may I heartily second Mr. David Collinge's suggestion in the September issue regarding a regular feature on Rift Valley cichlids. It seems more people are graduating to keeping these fantastic characters every year but there seems to be very little definite information about them; so how about it?"



Three young Angels on the alert for food

Algae

I was interested to read in *The Observer*, of Sunday, 25th November, 1979, that algae, the scourge of the freshwater aquarium, are being used to advantage in another part of the world. I'll quote a couple of sentences from the article, 'India trusts in slime,' by Fabian Acker. "India may become an exporter of rice within years thanks to a scum that forms in stagnant water. Blue-green algae, and their ability to 'fix' nitrogen in the soil, are being exploited to reduce the enormous quantities of artificial fertilizer needed for the rising rice production. . . ."

In my part of the country one occasionally sees dulce for sale. It's a type of marine alga (seaweed), *R. palmata* if my memory serves me correctly—which it sometimes doesn't. It is eaten, after it has been dried in the sun, rather as one would eat peanuts or crisps. Its unique taste and texture do not appeal to me very much. Around

Fancy Goldfish



the coast where I live seaweed used to be burned, on the beaches, for its iodine content. I understand the kelp burners, as the people who burned the weed were known, could be identified by the brown colour of their skin—as a result of contact with the iodine. I assume the industry died out before my time. No doubt seaweed is still used as a soil conditioner in some areas.

Mr. R. Moyes resides at 40 Barra Crescent, Fraserburgh, Aberdeenshire. He says: "You requested opinions on 'producing plants and fish for sale to supplement one's income.' I do not supplement my income exactly, but I do offset the running and maintenance costs of my three tanks by exchanging the fish I breed for food, equipment, etc.

"I started with a 24 in. \times 12 in. \times 12 in. community tank in my living room, and then my interest grew and I purchased an 18 in. tank for spawning and a 28 in. tank for rearing the fry, and installed these in the box room—which was suitably decorated and fitted out for the purpose. There is also plenty of room for expansion, which I intend to do in the future—possibly specialising in angels or discus only. But until that time I will continue to breed my zebras, guppies, black widows, etc. and learn as much as I can from the experience. If I won the football pools tomorrow I would immediately open a retail establishment and... Oh well! Dream on..."

Nicky Pritchard is 11 years old and is a neat writer. He lives at No. 1 Bungalow, Meesdenbury, Nr. Buntingford, Herts., and writes: "I have a 36 in. \times 15 in. \times 12 in. aquarium which is stocked with two platies, two guppies, one molly, two swordtails, two angelfish, two zebra danios, five neon tetras, two dwarf gouramies, two coolie loaches and one sucking loach. All these fish are living well together. I am waiting for the female guppy to have her young. I have only a small light but all my plants are growing well."

Java moss

Mr. David Greenhill lives at 'Moonfleet,' Vicarage Lane, Hordle, Lymington, Hants. (I wonder if his home is named after the famous novel of the same name.) He states: "In your column in the December, 1979 issue you refer to a request by a reader in Sweden for a small supply of Java moss. I obtained a supply about four years ago and it has thrived ever since, enabling me to fill several tanks and give some to a local dealer. At this moment I have only a little to spare but would be very pleased to send some to you or direct to Sweden if required. I would not require any payment; indeed, I would be more than pleased to help a fellow aquarist.

"Whilst writing I would like to mention that this plant is about the only one with which I have had any success. I have grown it under tungsten and Gro-lux light—perhaps it grew slightly better under the former, whereas other plants, *Vallisneria*, *Hygrophila*, etc. did not—in very soft, acid water. It began to die below pH 5.0, and in neutral water—hardness 7°DH and higher. I also have a small amount in a cold greenhouse and it has survived temperatures down to near freezing, but has not grown." (I'm

typing this in February and snow has been falling all day. It's the kind of day that makes one glad one's hobby is the keeping of tropical fish. Thank you for your offer, Mr. Greenhill. I sent the Swedish reader a sample of Java moss some months ago. I don't know whether or not he received it. Please don't send any to me, Mr. Greenhill.)

I should be pleased to hear from any readers who have successfully kept and cultivated any type of spatterdock. Spatterdocks fascinate me—but I have never been able to keep one alive for very long. One does not see them offered for sale very often; and when they are available they are usually expensive. At the moment I am keeping an interested eye on a 30 in. \times 15 in. \times 15 in. aquarium, lit by three 40 watt bulbs, that I planted with Java fern and *Cryptocoryne affinis* a week ago. One leaf on each of the several *Cryptocoryne* plants is decaying and has developed a shiny, transparent look. I'll be interested to see if some or all of the remaining leaves similarly decay; or if they continue growing normally despite the change. Past experience—from years ago—suggests that the plants may lose all their leaves following the disintegration of one leaf in the tank. More recent experience showed that when no leaf got damaged then no leaf loss followed transplanting in another tank. Perhaps plants, like people, are unpredictable in their behaviour following a traumatic event such as uprooting and transplanting in a different environment.

The *C. affinis* and Java fern plants I removed from another aquarium—24 in. \times 12 in. \times 12 in.—that is lit by two 40 watt bulbs. It contains three half-grown angelfish; the gravel and rocks in the tank are free of calcium carbonate; and the tank is filtered, unnecessarily I should say, by a power filter. The named plants were planted in the tank several years ago and have been allowed to grow as they please. Both species have grown strongly and reproduced until the fish could seldom be seen. Some months ago I removed some of the *C. affinis* to plant in another tank. They grew on without hindrance—as did those that remained in the 24 in. tank. Last week I again removed plants from the 24 in. tank. The few spaces left somewhat bare after the first removal of *C. affinis* had been filled up again by new plant growth in the intervening months. The latest removal—which included enough plants to stock adequately the 30 in. \times 15 in. \times 15 in. tank—has left only a perfectly acceptable space in the centre of the 24 in. tank; and I can occasionally see my three angelfish now. The 24 in. tank still contains large numbers of plants, particularly thick drifts of Java fern. The conditions appear to be ideal for *C. affinis*—the plants' leaves are about 20 in. long—and for Java fern; and both plants obviously grow well in each other's company. The plants contrast well in colour, leaf texture and habit. I have not tested the water conditions. I can recommend the combination to those who have not tried it. It seems particularly good for tanks that don't receive very much light. My 24 in. tank gets about five hours daily supplied by two 40 watt tungsten bulbs. It receives little daylight and no direct sunlight.

German prices

055 Sig. Harris C., c/o Medical Centre, 1 Armd. Div. H.Q. & Signal Regt., B.F.P.O. 32, heads the next letter; and the writer says: "Reference the letter from Sgt. Garner, B.F.P.O. 106, which was published in last September's edition of *The Aquarist & Pondkeeper*. This letter seems to be a blow to the German people. One cannot expect prices of aquarium fish and aquaria, etc. to be the same as those in the U.K. as the cost of living here is much higher and so the average German wage packet is fatter to correspond with the prices. Should the pet shop owners here sell their items at lower prices for the British soldiers residing in their towns, and run their businesses at a loss?"

"As to the language barrier, we are living in their country, and should try to learn some of their language. It can be a great asset. If one can swallow one's pride and go along to one's local German—or continental—pet shop with a basic knowledge of the language, and a book on the subject, by pointing to the book and using some sign language one can obtain what is required—usually to the amusement of the shop assistant, oneself and others on the premises. Recently I have set up a tropical aquarium for the first time using this method—with great success.

"I agree that once I found that mail order items were available from firms in the U.K. at more suitable prices, I made a great saving. You can shop around on the continent for your aquaria needs; where there's a will there's a way."

"Some time ago you asked about how different people started keeping fish. I had no interest beforehand but was asked if I would look after some freshwater tropicals while a friend moved house. I built a small 18 in. × 9 in. × 9 in. all-glass tank and bought all the other necessary items. That was two years ago; and my interest in fish has expanded a lot since then," says Mr. Peter Sharpe, of 73 Oxford Street, Barrow-in-Furness, Cumbria, in a letter that has been in my files for some time. He continues: "At the time of writing I have four tanks containing 41 fish, the best of which are a 9½ in. velvet Oscar and two 5½ in. tiger Oscars. I find a slight difficulty in obtaining live food for my two spiny eels, although they have gone for as long as five weeks without any apparent ill effects.

"The two larger tanks—48 in. × 24 in. × 12 in. and 36 in. × 18 in. × 12 in.—have small stones from the beach. They appeal to the eye, but taking out the bits of shell can take time. Although I know very little about keeping fish, a lot of people I know come to me if anything goes wrong with their fish or tanks. I have gained a great deal of knowledge from your magazine in the time I have been reading it and find the queries' part very informative.

"I have had reasonable success with plants although some of them in the pet shops leave something to be desired and have to be chosen carefully. All tanks have U/G filters and the Oscar tank has an extra box filter. I have been told that Oscars tend to eat small fish; but I have a firemouth, pleco, sucking loach and pepper cats in the same tank and they have come to no harm at all. I could



Cryptocoryne affinis

go on a great deal longer; but perhaps I should give some others a chance in your column. I have enclosed a snapshot of my tanks. Perhaps you could print some other people's ideas on the way they have their tanks set out. The front cover comes right off mine to allow me to get to the tanks." (Mr. Sharpe enclosed a photograph of his attractive tanks. Would any readers care to send me a description of the layout of their most attractive tank, please? Avoid diagrams, if possible, because they would use up a lot of column inches. B.W.)

Cryptocoryne

A week has elapsed since I typed my comments about the *Cryptocoryne affinis* plants. No other leaves have deteriorated during the period. Photograph 2 shows some of my flourishing *C. affinis* plants. I particularly like the crinkled surfaces of the leaves and the contrast between their upper, bright green surfaces and their purple undersides.

Photograph 3 is of my only remaining 'coldwater' fish. I keep him alone in an 18 in. × 10 in. × 10 in. aquarium in water at a constant 75°F. His swirl of flowing fins fascinates me. How have your coldwater fish survived the winter—especially those kept outside. The high temperature has kept mine active and feeding.

Each month I receive a selection of magazines and journals from those who edit them for the various clubs and societies—both local and national—around the U.K. I know how hard magazine editors have to work and how difficult it often is to obtain material and articles, from club members, for publication. If you are a member of a society that produces a magazine, try to support your magazine editor by taking the occasional few minutes to pen a few lines for him. One doesn't have to be a literary Java Moss Mania spreading throughout the publication. A month doesn't go by without its being mentioned at least once in the literature. If you haven't got Java moss in your tank your fish haven't lived. I know I'm hamming

genius to write a few paragraphs about something that interests oneself—and would probably interest other magazine readers. One of the main attractions of our hobby is that the ordinary aquarist with a few tanks is as likely to make an original observation as is the professional aquarist who earns a living from buying/breeding/selling fish; and many of the experts in the hobby began with a community tank, or a few sticklebacks, at home. So, if you observe something that disagrees with what the books state, or if you notice something that you have not read about in aquarium literature, write it down and submit it to the editor of your club journal; or send it to me for publication in these columns. Everyone gains from this kind of cross-fertilization.

Koi

The current edition of the Midland Koi Association Newsletter contains interesting articles about waterlilies and dropsy—as well as Association news. Those of us who have not kept koi may raise an eyebrow on learning that a 12-14 in. koi can cost £20.00 to £30.00; and no doubt some may cost even more. Perhaps some of the koi experts would like to drop me a line telling me about the higher prices for which the best and largest koi change hands.

The Coventry Pool and Aquarium Society Newsletter is edited by Mr. Richard Bartlett. In an article in the current edition he addresses: "... those of you with combined heater/thermostats who might be wondering why the temperature in your tank fluctuates from the correct value during the day to a low temperature at night..." Mr. Bartlett suggests that when kept upright these combined units, especially in smaller tanks, are efficient in "... a warm room, but when the room temperature drops this heater control arrangement cannot compensate for the increased heat loss. The solution is either to place the large and ugly heater/thermostat horizontally in the tank or to buy a separate heater and thermostat, which are of course positioned on opposite sides of the tank." Have other readers noticed that combined units, in smaller tanks in unheated or cooling rooms, give less accurate control than separate heaters and thermostats during the hours of darkness when room heating is switched off? All my tanks are kept in unheated rooms: some contain combined units and others separate heaters and thermostats. I must admit I have not noticed any differences between day and night temperatures with either kind of heating unit. I was under the impression that combined units gave more accurate temperature control than separate units. No doubt continuous aeration of filtration ensures even temperatures throughout an aquarium. If temperatures drop at night it might suggest that a heater of higher wattage—or two heating units instead of one—should be used in the tank. Tungsten bulbs kept on during the day tend to raise the water temperature—especially in the upper layers of the water in tanks without aeration or filtration. Large fish in a tank may also tend to provide more even heat distribution. Of course, in the wild most fish have to adapt to

lower water temperatures at night when the sun disappears; and in static water there is usually always a temperature differential when the sun shines on the water because convection currents—or their absence—ensure that the warmer water remains at the top of the lake or pool. Fortunately most fish can adapt to varying temperatures and are unaffected unless the changes are sudden or large. Some aquarists maintain that slightly lower water temperatures at night are more natural than even temperatures 24 hours per day; and some consider that fish kept under such varying conditions are healthier than those used to a constant temperature. It's probable that fish used to diurnal/nocturnal temperature changes within acceptable limits will better survive a power cut or a heater failure.

It's several years now since last I had to buy a new heating unit. If I needed one I should buy a combined unit because it is handier and easier to conceal. A good many years have passed since I lost any fish as a result of a faulty heater or thermostat—which suggests that modern units are very reliable. I can recall an incident many years ago when I arrived home to find that a thermostat had stuck in the 'on' position, resulting in a tank of hot, dead fish.

I've often thought that plants would grow more quickly in an aquarium heated from the bottom—just as plants, cuttings and germinating seeds do very well in a bottom-heated propagation unit in a greenhouse. Have you tried any form of bottom heating from beneath the tank? If so, did it affect plant growth in any useful way? No doubt older readers will recall the days when paraffin and gas heaters were used underneath tanks to provide the heat. Fortunately I was born into the age of electrical heaters.

Mr. T. G. Harding has the following to say from his home at 22 Bridefield Close, Cowplain, Hants. "This is my first letter to your W.Y.O. feature but not the first to your queries section. I think the staff there do a great job giving invaluable information to any problems set before them.

"I have carefully read your feature, as always, in the February edition. One of the points you leave us with I should like to follow up if I may: new features. How about a guide to new and useful ideas, in the aquatic hobby, to improve small jobs or make them a lot more practical, e.g. threading electrical leads through airline and sealing the ends, thus making a waterproof housing; or the same principle with a marine tank? If you have an outside thermostat, as I do, with a metal fixing bracket, cover in the same way as already described to stop the salt corroding the metal and poisoning the fish.

New ideas

"Those are just two ideas, that come to mind, supplied by a fellow aquarist. I expect there are a lot of undiscovered inventors who could come up with some really great ideas. Food for thought! My next comment isn't so bright—but don't get me wrong. I think your mag. is great." (The next bit has been censored! B.W.)

"What is this Java moss everybody seems to crave for?"

it all up a bit. Just jealous 'cos I haven't any myself. Can somebody help?"

Thank goodness that despite the hectic pace of life in the 1980s there's still a time and place for a little humour—or hamming it up, as Mr. Harding calls it on this occasion. I suppose I am responsible for the so-called 'Java Moss Mania.' Several years ago I praised the plant because I found that it would flourish under a variety of conditions; and I was foolish enough to offer a small sample to those who cared to send me a s.a.e. and a small polythene bag. I received an absolute spate of requests at the time—from various parts of the world. Requests still come in each time the plant is mentioned (I packed and posted five samples two days ago) even though I withdrew my offer because I got rid of most of my moss; and because I spent a lot of my so-called free time packing and posting samples to readers. So, please give me a break, dear readers: I have to work for my living—and turning out six pages of copy and photographs to entertain and inform you each month leaves me with little time either to answer readers' queries or pack and post samples of Java moss. Please send your queries to our experts who specialise in writing personal replies to solve your problems. If you want to obtain some Java moss, try your local dealer. He's the person who supplies you with the fish that you want and he deserves your support as often as possible. If he cannot supply the plant, try some of the plant specialists who advertise in *The Aquarist & Pondkeeper*. Many firms supply plants by post. If those avenues are unproductive then keep an alert eye on this feature: occasionally a reader will offer a sample if you send him a s.a.e. and a polythene bag. There must now be many tanks sagging under the weight of Java moss—and the owners would probably be happy to part with some of the plant.

I've totally cleared all but two of my tanks of the plant because it grew so well that it smothered other plants and took over the tanks to such an extent that I could hardly see my fish—and the poor fish had hardly any space in which to swim. By the way, a glance into the tank in which I recently transplanted some *C. affinis* plants revealed that contrary to my earlier comment the plants' leaves have begun to disintegrate—which tends to suggest that my original postulation is correct: a decaying leaf releases some chemical substance that causes other plants of the

same species to lose their leaves. What is your opinion?

If your letter hasn't been published so far, don't give up hope: I often save letters about a specific topic until I have a variety of views that I can publish at the same time. In any case, I retain most unpublished letters so that I can use them in the future when, for example, the subject matter becomes topical; or when the season makes the contents more relevant, e.g. a letter about the collection of native marines would be more appropriate to a summer issue than to a winter one.

Please get out your pen or typewriter and send me your opinions on any of the topics that follow. (a) I've just ordered two relatively expensive spatterdock plants from an advertiser. One is a Cape Fear spatterdock; the other a Japanese spatterdock. Both plants are expensive; they are seldom offered for sale now compared to former days; and they are not the easiest plants to grow. Please send me details if you have tried either species—recently or in the past. (b) Which plants grow best in your tanks? (c) Do your plants grow better in summer than in winter; or do they grow equally well all year because you provide heat and additional light during the winter? (d) Send me details of your experiences with dwarf cichlids. Have you bred any? (e) Which of the egg-layers have you had spawn in your tanks? Did you raise any fry to maturity? (f) Are live foods essential for the spawning of specific fish; or do many of your fish spawn when fed only on a good-quality flake food? (g) Do you have any interesting tips which would be useful to beginners? (h) What background do you use behind your decorative aquaria? I still favour black paint on the outside of the glass; or a sheet of black paper stuck to the back of the frame. (i) Do you have any amusing stories to relate in connection with your fish-keeping exploits? If so, please share them with us all. No doubt, like me, you too have been looking forward to the 'new look' *Aquarist & Pondkeeper*. If you like it please tell me and your friends. It's encouraging to know that this magazine has been serving its readers and advertisers for well over half a century—which is something that few magazines of any kind can claim. Good-bye until the May issue—by which time, I hope, we'll have some sort of promise of summer weather as we always do when teenagers are preparing for their C.S.E. and G.C.E. examinations.



ADVANCE NOTICE
THE FEDERATION OF NORTHERN AQUARIUM SOCIETIES

Members of The Confederation of United Kingdom Aquarists
in collaboration with

THE AQUARIST AND PONDKEEPER

present

THE 29th BRITISH AQUARISTS' FESTIVAL

at
BELLE VUE MANCHESTER

on
SATURDAY and SUNDAY 8th 9th NOVEMBER 1980

Commentary

by
ROY PINKS

AILMENTS OF FISH are not always obvious to the uninitiated, and many deaths occur because the aquarist is quite unaware that his stock has become open to infection. In many cases the first evidence of trouble is the appearance of corpses floating at the surface, and even then it may be assumed that these are only the results of natural culling. The unfortunate owner cannot really be blamed for taking no action if his fish appear to be acting normally and taking food, even though they may at the same time be covered from tip to tail in a generous sprinkling of white spots! A careful and consistent watch should therefore be kept from day to day, but what are we to advise the beginner to look for?

Trouble Signs

The most obvious sign of trouble is lack of colour, loss of stability and purposeless locomotion. There is often, too, a tendency for the eyes to appear out of alignment and for the gill flaps to be standing proud of the body. These are purely indicators, and there may be no bodily disfigurements like spots or lesions. Of all these I think that the act of swimming is the most reliable indicator, as if a fish appears to lose ground after the act of forward propulsion it is almost certainly in trouble. In a collection there is probably little point in doing much at this stage, excepting to keep watch for other manifestations to appear. Account should be taken of whether there have been recent introductions. If there have, almost certainly the trouble will prove to be White Spot, and if this is diagnosed there are some very effective cures on the market. If, on the other hand, no new fish have been added to the tank for some time it may be assumed that the specimen in question has an individual complaint. But is this quite right, either? Is there a tank above, from which infected water could have dripped, did you use a net from an infected tank in any others, and did you introduce any plant life from elsewhere?

All these are potential trouble bearers, and if there are negative answers in all cases it is highly likely that the fish is either an old one, and in process of dying, or a young fish which nature is laying aside. In such cases removal of the remains is all that needs to be done, provided that no further

signs of external disease actually appear. It should be stressed that a careful examination of the body should be made. White Spot, in its initial onset, can kill individual fish especially susceptible to it without a sign of the disease itself, though in a few days signs may be there for all to see on every other fish in the tank. Some individuals do appear to come through attacks unscathed. It is not clear whether they get away with it or whether they suffer but do not reveal evidence of the infection.

False Disease

There is a lot of false disease, of course. And there is a lot of disease which seems to cause no real problems. In the first category many fish will lose colour on first introduction, and they will skulk and they will refuse all food. This may be because they are in soft water instead of hard, or because they are in a brilliant light when all they need is a little seclusion to enable them to sort their nerves out. There may be too much movement all around them, and they are petrified, and they may be made to share the tank with quite unsuitable company.

Sometimes a fish will lose equilibrium and bob around all over the place like an animated cork, but this will probably be because it has been a glutton with the dried food, and is as full of air as a football. This soon gets right—until next mealtime, but is nothing to worry about. Live food should be fed as an alternative if the habit gets too embarrassing when guests are present. Fish will sometimes develop growths of one sort or another, and in many cases these prove to be just disfigurements and do not inhibit normal processes. Now and again there will appear boil-like spots, and these can look most menacing, especially if the fish has a dark body colour. Most of these tend to disappear without treatment, and medication should only be applied if the area becomes large.

Pond Fish

Another very alarming condition is the appearance of pond fish after the winter rest, when their body mucus often seems to be peeling off in large "flakes". They are best left alone, as a chase and capture in a net at this time of the year is likely to do more harm than good, and it will usually be found that this condition rights itself with the onset of warmer days. I have never worried greatly about the odd tufts of fungus which sometimes appear on these fish at much the same time, as their improved condition after a few good meals of earthworms seems to enable them to shrug off the worst effects of the winter.

There are detailed guides to the diagnosis and treatment of diseases of fish, but one must be aware of the possibility of false indicators. In practice most beginners can get good advice from fellow aquarists who will confirm or dispel their worst fears with a good deal of competence. Thus, one should develop the habit of looking for trouble but declining the bottle until the need for it has been firmly established. I doubt whether fish take more kindly to unnecessary medication than we do. We should also remember that they, unlike most of us, are private patients and we are footing the bills.

Disease Queries

by Dr. Christopher Andrews

How can leeches be removed from goldfish?

One treatment which seems to work is to put the infected fish in a 2-2½% salt solution for about 10-15 minutes. This strength of salt solution may cause the fish to become a little restless, but it should do it little harm. Leeches are particularly dangerous to fish, since not only do heavy infestations have a marked debilitating affect, but they also transmit certain bacterial and protozoan diseases to fish, and the site of their attachment is often secondarily invaded by fish fungus. In the above salt solution the leeches should drop off (or may be easily removed without damaging the fish), and should then be killed in boiling water. Although it seems a rare occurrence in this country, if leeches become a real problem in a pond the only effective treatment may be draining the pond and liming!

Can you provide me with the titles of a few good books on fish diseases?

An excellent range of books covering this topic is published by T.F.H. Publications, 13, Nutley Lane, Reigate, Surrey. Notable titles include:

"Textbook of Fish Diseases" by E. Amlacher (about £10.00).

"Parasites of Freshwater Fishes" by G. L. Hoffman and F. P. Meyer (about £8.00).

"Diseases of Marine Aquarium Fishes" by M. P. Dulin (about £3.00).

There is also a series (by the same publishers) edited by S. F. Snieszko and H. R. Axelrod entitled "Diseases of Fishes." Topics covered by individual books include bacterial diseases, Crustacean fish parasites, diseases of warmwater fish, fish immunology, and stress and fish diseases. Each book is priced around £6.00.

However, for a comprehensive review of fish diseases, you should consult "Fish Pathology" edited by R. Roberts (Bailliere Tindall). It is rather technical and priced at about £20.00, so I suggest you borrow it from a library! At the other end of the scale, you may wish to glance at "Diseases of Tropical Fishes" by H. R. Axelrod (price about £0.50) or "Cure and Recognise Aquarium Fish Diseases" by G. Schubert (price about £3.00) (both T.F.H. Publications).

I have sent you a leaflet on disease diagnosis and control.

There is a large red worm protruding from the vent of one of my female guppies. Have you any idea what type of parasite it is, and how I can remove it?

From your description it sounds very much like a nematode (roundworm) infestation by a parasite known as *Camallanus*. You can probably see the tail end of a female *Camallanus*, and at high power (under a microscope)

you should be able to see large numbers of tiny juvenile nematodes inside her body. These are liberated into the water where they infect a copepod crustacean, which acts as the intermediate host. Fish usually become infected by feeding on infected copepods. However, there is evidence to suggest that this parasite may be able to pass from fish to fish—at least for a couple of generations. Heavy infestations in small fish can have marked effects, although treatment is unfortunately difficult. You should isolate the fish that you know are infected and observe the remaining stock for signs of the infection. Treatment using various chemicals (including phenoxethol and trichlorphon) have been tried—but with varying success. As a last resort you may have to destroy the infected fish.

How can I calculate the volume of my aquarium before the addition of a remedy?

This is very simple, but care must be taken. An error in the position of the decimal place can have drastic effects on the fish! It is a good idea to get a friend to check your calculations before you add the remedy.

The calculation goes as follows. Multiply the internal length of the tank by the depth of water by the internal width (all in centimetres). The result is the volume in cubic centimetres (cm³). To convert this to litres you simply divide by 1,000. If you are still working in gallons, litres may be converted to Imperial gallons by dividing by 4.6.

In a set-up tank you should subtract 10% from the total volume, to allow for rocks, gravel etc. A final word—do follow the instructions for use of each proprietary brand of remedy closely. Excessive amounts of organic debris and filtration over activated charcoal will reduce the efficiency of most remedies.

I have tried my hand at keeping a range of livebearing fish, especially mollies and, to a lesser extent, guppies. However, they frequently go off their food, turn hollow bellied, some develop fungus, and many eventually die. I would welcome your comments.

You did not describe the water conditions in your tank, but I suspect the water may be a little too soft and/or acid. Most livebearing fish prefer a medium hard water (general hardness around 15°dH) and a slightly alkaline pH (around 7.5). In unsatisfactory water conditions they may become more susceptible to certain diseases. You should also add about one tablespoon of aquarium salt to every 10 litres (2.2 Imperial gallons) of water in your molly tank. They prefer slightly brackish water. A temperature in the lower 20's°C suits guppies, although it should be a little higher for mollies. Both will acclimate to a lower temperature, so long as the temperature does not fluctuate too rapidly or widely. Both these fish require a proportion of vegetable matter in their diet.

Letters should be addressed to Readers Service, The Aquarist and Pondkeeper, The Butts, Brentford, Middlesex TW8 8BN, or Tetra Information Centre, 15, Newlay Lane Place, Leeds LS13 2BB.

From
a
Naturalist's
Notebook



by Eric Hardy

WHEN A FRIEND telephoned in frosty mid-January because he had just seen a 2-inch "lizard," dark, almost black, above, with speckly white along its sides and an orange-yellow belly with black spots, abroad so early on the Staffordshire-Cheshire border at Alsager, I realized it was no native lizard. Most likely it was a young wild, great crested or warty newt, escaped from aquaria or disturbed from winter hibernation. From 3½ to 4 ins, the warty newt more often has black spots on its orange belly than does an alpine newt, another species acclimatised to cold waters. The warty spends more of the year in water than do our other newts, but its young may leave for land during winter. Amphibians are abroad in mild places much earlier than is generally appreciated, February for instance may have frogspawn on Dartmoor.

A new British chalcid or gall-wasp parasite of common *Phragmites* reed, called *Rakovina deplanata* has been found in reed-stems at Woolhampton, Berkshire: A continental insect—its grubs burrow reed-stems in Hungary and Czechoslovakia. Reeds are already parasitised by species of sawfly, midge-gall and hymenopterous *Selandria*, as well as by at least three beetles, including *Cyphon variabilis*, abundant in my area, some tiny *Tortrix* moths and larger wainscots, and some flies. The best way to identify most of these stem-boring larvae is to rear them to

maturity hatching in glass-containers. Then you want a good identification "key."

Many tropical aquarists will have kept and heard the croaking and jewelled gouramis, two very audible vocalists. Fewer will have heard the slow knocking calls and quick grunts of haddock, which is picked up on a hydrophone where they compete for food, or the courtship grunts of a mating pair of cod. The courting male of a Bahamas damsel-fish, *Eupomacentrus partitus* "chips" as it dips towards the empty conch-shell used in spawning, and "grunts" as it circles it. Corixa water-bugs, water-bosmen, larval stoneflies and caddis-flies, and some dragonfly nymphs produce sounds.

After reading my reference to American "acoustobiologists" the other month, Dr. Tony Hawkins, one of the leading British researchers on fish-acoustics, kindly wrote from the Scottish Dept. of Agriculture & Fisheries lab at Aberdeen on his own work with colleagues on this in marine fish, much from small groups in aquaria. He suggests the haddock's sounds help recognition in its deeper, darker haunts than those of the silent whiting, for instance. But when recorded and played back to the haddock, they brought no clear response. 11 different fish, including freshwater burbot, but mostly the marine cod-family, have muscles attached to the swim-bladder for vocalisation, yet there isn't much variety in each one's sounds which don't seem to signal a great deal of information like the calls of mammals and birds. The short grunts, up to 20 at a time, of young lythe (pollack) were recorded from many feeding in competition when kept in cages in shallow coastal water. Short grunts were made by bottom dwelling lesser forkbeards or tadpole-fish when alarmed, though rather less than the coalfish, but none was recorded by whiting, coalfish (*saithe*), poor cod or three-bearded and five-bearded rocklings. In contrast to other "talkers," whiting remained silent during courtship.

Dr. Hawkins, with A. D. F. Johnstone used cardiac conditioning techniques to show that salmon are sensitive to low frequency underwater sounds, though unlikely to hear sounds from the air. But sound doesn't have such importance to salmon as it does to the other fish mentioned. Compared with carp, and cod their hearing is poor, like that of perch and plaice. Nor were they recorded producing any sounds, but they were trained to show a slowing of the heart on hearing a sound, in anticipation of a mild electric shock applied later.

Unfortunately the recent, rather expensive English language book on *Diversity and Adaptation in Fish Behaviour*, by Prof. Miles H. A. Keenleyside of the University of Western Ontario (208 pages, Springer-Verlag, Berlin, £16) has relatively little to say of fish-sounds. Its 20 pages of References do not include two important papers by Hawkins, Johnstone and Rasmussen. But aquarists and anglers will find much stimulating information in its very concise summaries of modern observations, often in aquaria, on swimming, internal fertilising like the guppy, *Poecilia*, spawning, caring for young like mouth-breeding cichlids, and social behaviour like clumping together, though no reference is made to the latter



Female Crested Newt showing black belly spots

habit for warmth in cold water, as tadpoles also clump. It is illustrated with line sketches.

Most observations and discoveries were made in aquaria, like the first time young were found feeding on the mucus produced on the skin of brooding parent discus, and the pair-spawning courtship of many fish like Rasbora. Some cichlids signal their young by flicking their pelvic fins which may have white or black signal-colours. High speed photography showed how the prey-spitting archer-fish spits low to compensate for refraction of light at the water-surface and allows for gravity's pull on the airborne drops aimed at some insect. *Vandellia*, an Amazonian catfish, enters the gills of goldfish, feeds on their blood, then drops out. Perch are more successful hunting roach by going around in small packs instead of hunting singly.

Right from schooldays when one tied a butter-muslin bag on the main tap and then spent an hour identifying its water-life beneath the microscope, the minute, single celled plants have been an influence in our lives, affecting water-taste and feeding into the food-chains of fishes like young perch and filter-feeding mussels.

Hilary Belcher & Erica Swale's new *Illustrated Guide to River Plankton* (64 pages, HMSO, £1.50) from the Institute of Terrestrial Ecology, provides a much needed key for identifying these microscopic algae, exquisitely patterned discoid diatoms, desmids, mobile-tailed green flagellates and their creeping relatives, and the celebrated *Daphnia* and *Volvox* which fill slow-flowing, lowland rivers in dry,

sunny weather. Enriched by nitrates and phosphates from farms or sewers, they may "bloom" and clog the water-engineer's filters. A suitable eutrophic river is more conveniently "collected" by a polythene bucket on a line, than the book's polythene jug, then centrifuged, or filtered. Slide-covers of good specimens are preserved by iodine, kept overnight by sealing coverslip-edges with petroleum-jelly. It supplements the authors' 1976 *Guide to Freshwater Algae*. A check-list of 1,000 British freshwater algae is available from the Department of the Environment Water Data Bank, Reading Bridge House.

The Institute of Terrestrial Ecology also sent me Peter S. Maitland's recent *Synoptic Limnology* (28 pages, HMSO £3) which analyses and classifies British freshwater ecosystems, the fauna, flora and physico-chemical status of standing and running waters, 5,283 species with some special attention to Scottish waters, like Taysides 947 lochs and 10,474 stream-segments Shetland and Outer Hebrides, the latter with over 6,000 lochs while 1,596 running waters were located in Shetland. This proved less informative, maybe because it is very condensed. We should understand the water-life communities and their requirements better when so many waters are sorted out this way. While 3,850 freshwater animals have been check-listed in the British Isles, the average freshwater community has 20. Notable waters range from Loch Morar, the deepest, to lowland Wales' eutrophic Llangorse Lake, Anglesey's sluggish, weedy Afon Ffraw and Lincolnshire's Great Eau, rich in larger plants.

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Dick Mills invites you in

Meet the Aquarist

No. 1: Dick Mills

FEW AQUARISTS admit to more than 'tinkering around,' and to actually see their aquatic set-up is often harder than gaining admittance to the Bank of England. One would assume that most of the 'expert' authors, lecturers and judges encountered within the hobby would be only too willing to share some of their secrets visually, instead of only through the medium of articles and lectures. (Perhaps they have little to show—or plenty to hide?) Of course, once an active role is taken up in the organisation of the hobby, ie Committee work at Society, Area Group or Federation level, then the time left available for *fishkeeping* becomes minimal with the result that many a very well known figure in the hobby is devoting less and less time to actually keeping fish!

This series of occasional articles will try to catch a glimpse of the aquarist doing his (or her) own thing; some of the people featured will be fish-household names, others will be lesser known, but all will hopefully impart information on *their* way of fishkeeping—which will differ totally from *your* way no doubt. The scope of this series is very broad: an aquarist with only one or two tanks (or a small garden pool) may provide just as much practical information as a large fish house owner. Everyone should feel they have something to contribute—let's find out who's doing what, how, and even why!

"That's all very well," you'll be saying, "but I want to see what sort of thing they want to know, I'm not going to make a fool of myself." Well, all right then, I suppose the

least I can do is to put myself under the magnifying glass for your enlightenment.

It wasn't long after I began fishkeeping that a growing family's demands needed more room than the fishes', so I moved the fish tanks to a garden shed alongside the house. A feverish weekend's work soon replaced half the shed's roof with clear corrugated plastic (to admit daylight) and eight tanks were precariously installed. Most were fitted with internal box filters, gravel and rocks *before* being put into their allotted position. *Mistake No. 1!* Such was my desire to accommodate as many tanks as possible within the shed, I forgot to leave enough space between the tanks vertically—and I couldn't remove the filters for cleaning! *Mistake No. 2* was the decision to try to use such a small shed for a fish house, as a sudden movement with something metal proved; a cracked front glass even in an 18in. x 10in. x 10in. pours an awful lot of water down the front of your trousers! However, a *Correct Decision* was to heat the tanks individually, and to insulate each tank's back, bottom and sides with thick polystyrene tiles. A lot of heat was still lost because of gaps in the wooden walls of the shed, ill-fitting window frames, and a perpetual cooling draught whistled up through the cracks in the floor, but I thought it was terrific. (Love is blind!) In this less-than-perfect area I did manage to spawn several species, *Jordanella floridae*, *Hemigrammus nanus*, *Brachydanio rerio* and, to my own delight *Pterophyllum* sp, plus some varieties of Livebearers.

Unfortunately, the passage of time began to take its toll

on the structure of the shed which soon competed very favourably with the Leaning Tower of Pisa for 'out-of-plumbness' and only remained upright and on the ground due to the weight of the tanks! When an extension was planned for the side of the house, much thought was given to the inclusion of a brick built fish house.

Provisionally, a door from the fish house into the garage was envisaged, but when building got under way it was quickly realised that two doorways in a room 8ft x 6ft would reduce the available wall-space considerably and so this plan was abandoned.

The aim was to 'space-heat' the room by means of a wall-mounted gas central heating boiler within the fish house, and a refinement was to add a small radiator controlled by a thermostat in the fish house (independent of the hot water and heating requirements of the main house). This proved most effective, and the average air temperature is main-

tained around 75-80° F. A small thermostatically controlled electric fan circulates the warmed air to avoid cold layers of air.

Windows are double glazed to cut down heat losses, and the walls (thermolite blocks inside an outer brick wall) are lined with 1in polystyrene sheeting. Tanks are supported on a framework of 3in. x 3in. timber and angle iron cross-members. The illustration shows the fish house with the roof removed, as well as some of the rubbish which has accumulated over the years!

Initially, a third row of tanks was used but these high level tanks were very prone to evaporation losses, even with cover glasses, and I'm not tall enough to see into them anyway and so the top shelves became storage spaces.

A ceiling mounted 5ft. fluorescent light, provides general light when searching for things in the fish house, and the tanks are lit by fluorescent light also, 4ft, 3ft and 21 inch miniature tubes. A portable hood with a low power tungsten lamp is utilised on a temporary basis, whenever it is required to light a fry tank overnight.

Filtration is mainly by outside, air-operated box types and the air is provided by a twin diaphragm vibrator pump together with a large single diaphragm pump. The obligatory decorative tank in the lounge is filtered by an electric power filter.

Space heating has disadvantages as well as advantages; it becomes a little too warm for comfort sometimes to work in, I find this especially true when spending long periods trying to photograph the fish. However, anything watertight can soon become a temporary home for fishes in quarantine or in transit to and from Shows etc. Brine Shrimp hatcheries spring up all over the place, as do Micro and Grindal Worms culture boxes. It is too warm for White-worm, which are banished to the relative coolness of the garage.

My fishkeeping policy is dictated by the time available, and demands by employment, F.B.A.S. duties, speaking engagements, Society meetings etc., mean that very often my fish plan their own destinies. My vague plan of campaign is to stock community collections in the 36in. tank until a pairing occurs naturally or until time can be found to try to spawn a certain species, in which case the 'happy couple' are transferred to a smaller tank for breeding. These smaller tanks then become rearing tanks for any resultant fry.

Although the accompanying sketch is not to scale, you can appreciate that the tanks receive only a little direct sunlight; the tanks are lit for around 15 hours each day.

Water Wistaria (*H. difformis*) *Vallisneria* sp, *Microsorium* sp, *Vesicularia dubyana*, *Riccia* and a few undisturbed *Cryptocoryne* species are doing well—I had to remove a Red-finned Shark (*Labeo* sp) to a Wistaria-free tank, for the plant's sake—and algae is not a problem.

Water changes—as opposed to regular topping-up—are made fairly often, perhaps up to 25% in each tank; replacement water is run straight in from the cold main (!) which doesn't have much effect on the fish except to trigger off a spawning sequence amongst the Angelfish and Festive Cichlids yet again.



A *Cichlasoma Festivum* on the prowl for whiteworms



Young *Julidochromis marlieri* in a spare tank awaiting transfer to permanent quarters

Feeding is mainly flake foods with occasional treats of earthworms, raw fish and meat, green peas, *daphnia* (when in season), *tubifex*, bloodworms and gnat larvae. The White worms and Grindal worms prove extremely popular with the Festive Cichlids and since they have spawned I have developed a different technique for collecting the worms from their culture medium.

Instead of a glass sheet on the compost, I use a piece of coarse cloth (mutton cloth is ideal). Food for the worms is placed on the cloth and the worms soon find their way through to the food. The cloth is then lifted off and immersed in the tank. In this way, the very tiny Grindal worms do not escape back into the compost but are washed from the cloth, much to the delight of the young fry. The cloth is then wrung dry before being replaced on the compost and fresh food (porridge oat flakes) added.

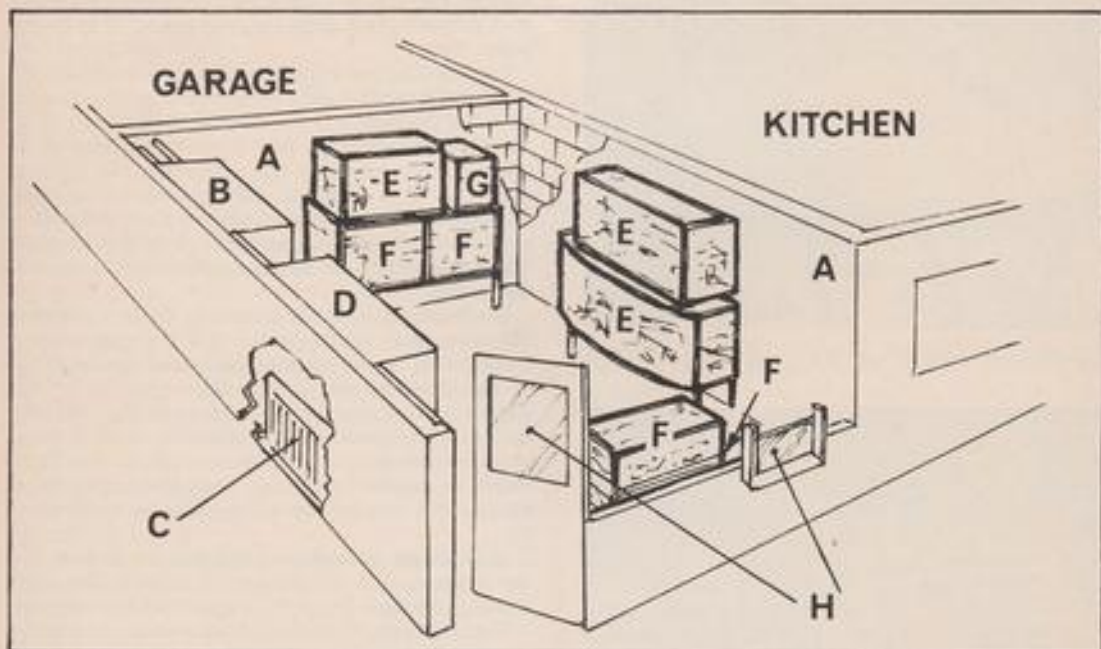
Fish feeding is done first thing in the morning, early evening and sometimes last thing at night for the benefit of my few Catfish and *Botia* species. At weekends, light feedings during the day are made also, although sometimes a day might elapse without any feeding at all—I don't think it does fish any harm to go without, it sharpens up their

appetites and they clean up the tank too!

It depends on what type of person you are I suppose, but I found that it was all too easy to wallow in the excess of opportunity presented by a fish house and to flit from one thing to another, without concentrating on anything in particular. Again, being away from the main living area it is a temptation to leave things lying around when you're 'in the middle of something.'

All this leads to nothing in the fishkeeping line, so a certain amount of self-discipline is necessary; try to keep some objective—there's not much point in having the warmest junk room in the locality!

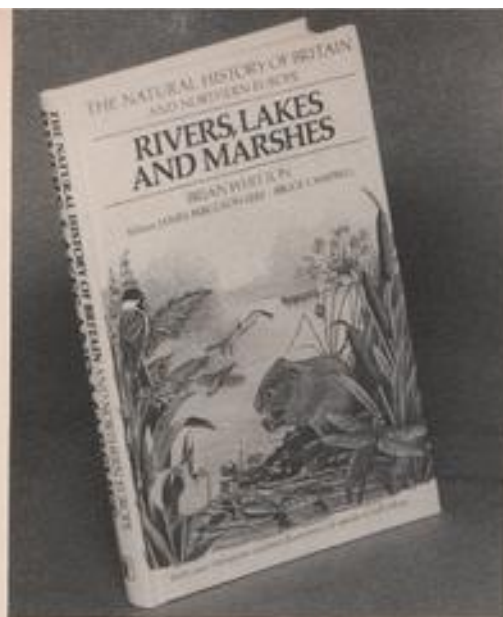
Well, that's a brief look at my side of the hobby, let's see behind the scenes of other fish houses; how do you arrange a fish house during the busy show season? Perhaps a plant enthusiast keeps a plant-house? What about a specialist fish house keeper, or why not be proud of those two tanks in the hall or lounge (to say nothing of the twenty tanks in the bedroom!)? I'm sure our fishes often wonder if there is intelligent life on the other side of the glass; write to the Editor about *your* set up, we can all learn from each other.



Key to Sketch

- | | |
|--|--|
| A — Polystyrene wall insulation | E — 36 in. + 15 in. + 12 in. tanks (3) |
| B — Central heating Gas Boiler | F — 24 in. + 15 in. + 12 in. tanks (4) |
| C — Radiator (controlled by fish house thermostat) | G — 18 in. + 10 in. + 10 in. |
| D — Storage cupboard | H — Doubled glazed windows |

Tank supports, wiring for power sockets, filters, air supplies, etc, omitted for the sake of clarity.



The 5th and final volume in the illustrated series of concise field-guides on the natural history of Britain and northern Europe: **Rivers, Lakes and Marshes**, by Dr. Brian Whitton, Durham University botanist, (Hooder & Stoughton, 224 pages, illust. with colour-plates, £5.50).

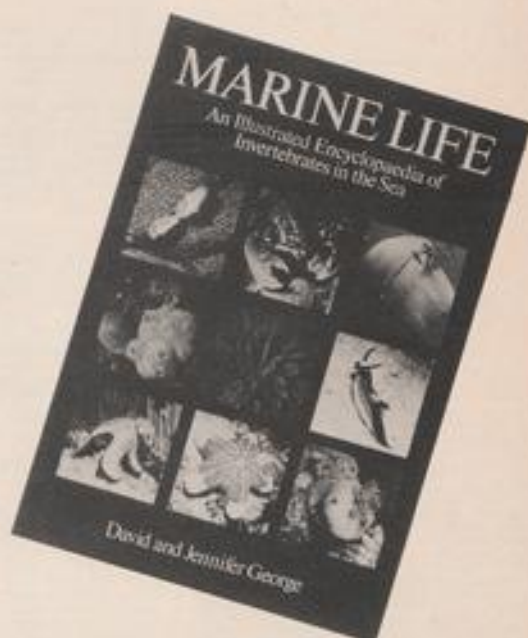
It packs a very wide selection of fauna and flora the amateur may find at most wetlands he visits. Inevitably it cannot include everything—the short section on introductions doesn't include the rapid post-war colonisation of hill-streams by New Zealand willowherb and lowland brooks by pink *Montia sibirica*, or the much longer history of bitterling introduced here from anglers' livebait.

Inevitably, like last year's FWBA Key to nymphs of mayflies, Lakeland's preponderance in freshwater biology seems to divide Britain into Windermere and the rest of England. But I looked in vain for mention of the natterjack, still widely distributed in brackish waters. There's nothing about the numerous insects, fungi and other parasites upon our waterside reeds, rushes, and other aquatic and semi-aquatic vegetation. The hobby falcon is mentioned only as a visitor to reedbed starling-roosts, whereas more fitting with the title is its regular evening habit of visiting suitable valleys to hawk for dragonflies, a bird-watcher's field-guide, while the sparrowhawk is a more likely raider of the reedbed starling-roost, as at Lancashire's Leighton Moss.

Unfortunately the misleading term "bulrush" is used for *Typha* the reedmace, with no explanation of a prior claim by *Scirpus lacustris*, here called common club-rush. 50 freshwater fish are covered, suggesting the burbot is probably extinct in Britain but not mentioning the smelt or spurling of Cheshire's Rostherne Mere. The specialist will still require his more particular field guides to identify less common species.

ERIC HARDY

BOOK REVIEW



Marine Life—An Illustrated Encyclopaedia of Invertebrates in the sea. By David and Jennifer George. Published by Harrap & Co. Ltd., 182 High Holborn, London W.C.1., £16.00.

Dr. David George is a Principal Scientific Officer in the Zoology Dept. of the British Museum (Natural History) and his wife, Jennifer, is a Principal Lecturer in Life Sciences at the Polytechnic of Central London. As a team they have investigated underwater life around the world including the Red Sea, the Bahamas, Caribbean, Canary Islands, Mediterranean and Norway.

This encyclopedia of sea invertebrates is comprehensive in its endeavour and coverage and carries 1300 photographs in colour which are of very high quality and come from a variety of sources.

Of particular value to professional biologists as a work of reference, the classification into classes, orders and families is as up to date as is possible.

Common names are omitted so that a scientific approach to identification is necessary and a reasonable familiarity with the marine invertebrate families essential to make full use of the work.



News 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.

SOUTH EAST



THE Ilford A.S. have some very knowledgeable speakers in the Society, apart from knowing many outside. They were fortunate some weeks ago to have back again a speaker who is so enthusiastic about the hobby in his particular field (Native Marines) that they have nicknamed him, the David Bellamy of Mariner. He is John Hancock, a bus driver, who has studied his hobby and became an open university student. In the Autumn of 1978 he was invited on an expedition to the Chagos Islands as Field Officer. His job was to set up the base and catch the specimens for the scientists. It was his talk on this expedition that they were lucky to hear. John Hancock is also an experienced diver as well, and he will be publishing a book later this year on the expedition and the keeping of Mariner. John is a frequent speaker at the Society and anybody wishing to visit or join, is most welcome. They meet the second Monday in the month at Wansstead Library, Spratt Hall Road, Wansstead, London E.11. Further details from membership secretary, L. Smith, 90 Nighthall Avenue, Ilford, Essex.

AT the a.g.m. of the Mid-Sussex A.S. the show secretary commented on the number of entries in the monthly table shows over the past year, which had risen considerably. The membership secretary reported that membership has risen by 50% since the beginning of last year, and hoped that they could reach a total of 100 members by the end of this forthcoming year. The following were elected to the committee: chairman, W. Slade; vice-chairman, P. Levine; secretary, J. Birch, 11a Sandrocks Way, Haywards Heath, W. Sussex (Tel: Haywards Heath 55585); treasurer, W. Perrin; show secretary, T. Tester; committee, Misses L. Pinney, K. Young and J. Smith, and Miss S. Tester. The outgoing chairman (J. Birles) was made an additional vice-president of the society. Meetings are held on the second Thursday of each month at Ockley Lodge, Ockley Lane, Keymer, from 8 p.m. Anyone interested is welcome to come along. Further information from the secretary.

DUE to the great success of the Challenge Shield introduced by the Ichiban Rancho Society in 1979 the competition will be run again this year. This is an open award and they would like to hear from any Southeast breeders who wish to enter. The entry fee is £5 per fish and the entry is restricted to current year fish. Along with the Perennial Challenge Shield there is a cash prize of 75% of the total entry fees. This amounted to £45 in 1978. Entries and enquiries to Mr. Gary Lewis, 91 Bounce Avenue, Hayes, Middx. (Tel: 01-873 1770).

AT the January meeting of the Horsham & District A.S., Mr. Jim West, of 72 Hurst Road, Horsham, Sussex, was elected secretary, and other new committee members elected were: chairman, Ken Groves; vice-chairman, C. C. Barnes; treasurer, Mike Beaumont. Club meetings are held on the first Thursday in every month at the Guide Hall, Dene Road, Horsham. All visitors welcome.

AFTER a very successful first year of existence the Catfish Association of Great Britain (Southern Area Group) now have a new meeting place at St. Richard's Church Hall, Egmont Road, Hove, Sussex. Visitors are always welcome to meetings which are held on the first Friday of each month at 8 p.m. For further information contact either Les Pinney at 72 Holmesdale Road, Burgess Hill, West Sussex or the secretary of the southern area group, Eddie Turner, 44 St. Aubyn Road, Fordingly, Sussex.

SOUTH WEST



A SPECIAL set of slides showing the different varieties of Goldfish was screened at the February meeting of Bristol A.S. The variations of body, fin, eye and scale were defined and emphasized.

MIDLANDS AND WALES



NEW officers of the Coventry Pool A.S., which meets at St. Christopher's School, Woodside Avenue, Allesley Park, Coventry and holds its meetings on the second Tuesday of the month, are: president, Tom Manning; chairman, Chris Bates; secretary, Austin Simmons; treasurer, Sue Bartlett; news letter editor, Richard Bartlett; social secretary, Derek Jones; public relations officer, Neil Payne.

AT the February meeting of the Evesham Fish Keepers Society, Chairman John Goff lectured and demonstrated "Basic Tropical Fishkeeping," with audience participation. This new experience was greatly enjoyed by members, who were able to put questions to a panel after the talk. The table show featured Sharks and Labio, Louches and Bots. Results: Sharks and Labio: 1 and 3, Mrs. L. Wright; 2, Mrs. J. Hesel; Louches and Bots: 1, R. Jenkins; 2, Mrs. J. Hesel. The Society meets on the first Wednesday of every month, at 8.00 p.m. at the Hampton Scout Hut, Preshour Road, Hampton, Nr. Evesham, Worcs. New members and visitors are welcomed. Secretary, E. M. Thornton, 41 Crooks Lane, Studley, Warks. (Tel: Studley 7125).

AT the a.g.m. of the Leamington and District A.S. the new committee elected were: chairman, Chas. Chamberlain; treasurer, P. Thomas; show secretary, P. Stoddy; secretary, Mrs. M. Chamberlain, 19 Sockley Road, Leamington Spa. Meetings are held on the first and third Tuesday of each month, at 7.45 p.m., Trinity Hall, Trinity Street, Leamington Spa. New members very welcome.

THE Newark and District A.S. are still doing well with about 45 members, and are now at a larger meeting place at "The Vine Hotel," Bardon-gate, Newark, where there is plenty of room should anyone else wish to join, or any Clubs visit them. At their last meeting they had a very informative talk by Mr. Eric Holmes, who explained about the Y.A.S. and gave tips on the showing of fish. Any enquiries about Shows can be dealt with by Show Secretary, Andy Foreman, 74 Riverside Road, Newark, Notts. (Tel: 72360 Newark). Other enquiries to Mrs. Mary Griffin, 3 Welbeck Avenue, Newark, Notts. (Tel: Newark 71402).

CHANGES in committee of the Long Eaton A.S.: chairman, D. Burton; secretary, Mrs. B. Burton; treasurer, D. Reynolds; vice-chairman, E. Saunders; show secretary, D. Peter. Further information from secretary, Mrs. B. Burton, 21 Lawsoner Avenue, Stapleford, Notts NG9 3TH. (Tel: Stapleford 392664).

CHANGE OF VENUE

THE Ellesmere Port Aquarium Keepers Society now meets at the "Station Hotel," Ellesmere Port. The new secretary is A. C. Morrison, 11 Glibbeck Avenue, Elton Park, Elton, Nr. Chester CH2 4PN. (Tel: Helsey 5052).

EAST



AT the a.g.m. of the Thetford Aquarist & Pondkeepers Society the chairman for the last eight years, Mr. Cyril Hum, had to resign for health reasons, and in appreciation of his work for the society he was made a life member. The new committee are: chairman, Peter Hutt; vice-chairman, Vic Good; secretary, Jim Jenson; treasurer, Mrs. Dot Wood; show secretary, Mrs. June Good; minutes secretary, Cyril Hutt; P.R.O., Frank Lovegrove. The society meet on the first Thursday of each month at the Youth Centre, Craston Road, Thetford. Anyone interested should contact the secretary, Mr. J. Jenson, 235 St. John's Way, Thetford, Norfolk.

NORTH



ON 15th February the Catfish Association Great Britain (Northern Area Group) met at R.A.O.B. Club, Quarry Bank, Ormskirk Road, Skelmersdale. Arrangements for a coach trip to London on 12th April on the occasion of the C.A.G.B. open show were discussed and the enthusiasm for this venture was reflected in the high number of names given to the honorary secretary of members intending to make the journey. Mr. David Sanda, the area group chairman, brought along some excellent slides to illustrate some of the *Loricariidae* and *Bagridae* families. Distinguishing features were pointed out to the 30 odd members who strolled on a nasty evening weatherwise.

Table show winners: *Loricariidae* class (7 entries); 1, B. D. and G. Harvey (Sandgrounders

A.S.) with a *Otocinclus affinis* (Best in Show); 2, B. D. and G. Harvey with a *Otocinclus affinis*; 3, Mr. and Mrs. B. Baldwin (Sandgrounders A.S.) with a *Otocinclus affinis*. *Bagridae* class (8 entries); 1, B. D. and G. Harvey with a *Myxus microcaulus*; 2, P. Kenyon (Sandgrounders A.S.) with a *Myxus microcaulus*; 3, Mr. and Mrs. A. Waterhouse (Leigh A.S.) with a *Aschenoglanis* species. Further information from Steve Horton, 81 Radnor Drive, Southport (Tel: Southport 0794) 24743; David Sanda, 116 Hesketh Lane, Tarleton, Near Preston (Tel: Hesketh Bank 2707) or George Waterhouse, 23 Moss Lane, Southport (Tel: 0794) 213004.

Wyke Show Society went to Sheaf Valley open show and got two cards, but at Barnsley mini show they received 13 cards, and at Darfield mini show 10 cards. At their club meeting they had a very interesting and educational quiz with lots of laughs. The table show results: Seniors: 1, Mr. and Mrs. Louth; 2, A. Wadding; 3, R. Gee. Juniors: 1, R. Laverick; 2, S. Groucher; 3, T. Tolhurst.

A committee change: Mrs. S. Louth is now fund raiser.

The club meets at 7.30 p.m. on the 2nd and 4th Thursdays of each month at "The Rose" public house, Beverley Road, Hull. Guests and new members all welcome.

Throckley A.S. held their closed show on 18th February with 71 entries. Best fish in show was a *Corydoras*, owned by D. Renwick. Best exhibitor, J. English, with 29 points. Meetings are held fortnightly in the Grange Welfare Centre, Newburn Road, Throckley, at 7 p.m.

Sandgrounders A.S., of Southport, are to share the tenth anniversary of their founding with aquarists all over the country in March next year. They are planning a one-day convention on 22nd March, 1981 with a line-up of excellent speakers, including Derek Lambouese and Dr. Trevesse. Two other slots on the bill have yet to be filled, but if the plans come to fruition they could see a remarkable first in this country. The venue is Southport's "Little Theatre" which seats nearly 600 people, and it is hoped to offer aquarists who have to travel quite a distance, a package dealing including their convention ticket and overnight accommodation.

THE February meeting of the Accrington & District A.S. consisted of a slide and tape lecture entitled "More Colourful Killers" from the British Kribbit Association. The lecture was informative and the slides excellent. Table show results were: Single fish: 1 and 2, P. Sturtard; 3, G. Westwell. Pairs: 1 and 2, G. Westwell.

The 5th March meeting will be a lecture by H. Cooper on *Characina*. From 2nd April meetings will take place on the first Wednesdays of the month at the British Legion, Abbey Street, Accrington.

MR. C. HUTTON, secretary of the Priory A.S. has resigned. Mr. M. S. Davies, 1 Lyric Close, Moor Park E.S.T., North Shields, Tyne and Wear (Tel: 573279) is now secretary.

DUE to unforeseen circumstances the David Brown A.S. will not hold an open show this year. Any enquiries, telephone M. Morrison (Hodds. 665401).

Dates for the diary

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

APRIL

- 6th April: Hyde A.S. open show at the Hattersley Community Centre, Hattersley Road East, Hattersley via Hyde, Cheshire. Further information and show schedules from Show Sec. K. J. Sherwin, 14 Lyme Grove, Denton, Manchester (Tel: 061-336 0574).
- 7th April: Southampton A.S. open show at the Avenue Hall, The Avenue, Southampton. Schedules from Show Sec. D. Mills, 30 Fernside Way, Bitterne Park, Southampton SO2 4E2.
- 12th April: Catfish Association of Great Britain open show at Raynes Park Methodist Church Hall, Worpole Road, Wansley, S.W. Schedules from Terry Cruickshank, 82 Stanley Avenue, Greenford, Middx. (Tel: 01-578 0104).
- 19th April: Morley A.S. open show at Newlands School, Wide Lane, Morley, exit off M62, follow arrows from then on. Schedules from J. Murray, 43 Pippins Green Avenue, Kirkhamgate, Wakefield WF2 0HX.
- 19th April: Taunton & District A.S. open show at the Corfield Hall, Magdalen Street, Taunton. Schedules from Show Manager, R. Cooper, 14 Rochester Road, Taunton.
- 19th April: Kettering A.S. open show at the McInley Theatre. Forms available from I. Lloyd, 32 Hawthorn Road, Kettering, Northants. (Tel: 519492).
- 20th April: Reading District A.S. open show at St. Peter's School, Church Road, Harley, nr. Reading. Specialist class fish not on F.B.A.S. size sheets. Schedules from F. C. Ruabrooke, 34 Melrose Gardens, Arborfield Cross, Berks. (Tel: A.C. 760393).
- 20th April: York & District A.S. open show at York Livestock Centre, Marston. Schedules from Show Sec. R. Slee and S. Wynn, 36 George Street, Pocklington, York YO4 2DQ.
- 20th April: Leigh A.S. open show at Leigh C. of E. High School, Leigh Road Leigh. Further information from Show Sec. Mrs. B. Waterhouse, 416 Liverpool Road, Platt Bridge, Wigan (Tel: Wigan 863738).
- 20th April: Malvern & District A.S. open show at Christ Church Hall, Barnards Green Road, Malvern. Schedules from J. V. Walton, 1 Beaver Close, Lower Wick, Worcester WR2 4BG (Tel: Worcester 422002).
- 20th April: Stanley A.S. open show at South Stanley Youth Centre at 2 p.m.
- 20th April: Bristol Tropical Fish Club open show.
- 27th April: Aberdeen A.S. open show at the Deaf Centre, Smithfield Road, Hilton, Aberdeen. Enquiries from Secretary George Menzies, 35B Bedford Avenue, Aberdeen AB2 3YN.
- 27th April: Merseyside A.S. open show at the Rainhill Village Hall, Rainhill, Lancs.
- 27th April: Skegness and District A.S. open show at Imperial Cafe, North Parade. Further details from Secretary, Mrs. G. Farr, 6 Albany Road, Skegness (Tel: 66261).
- 27th April: Yeovil and District A.S. open show at Pichill Hall, Martock, Somerset. Schedules and details from A. Holt, 45 Glenville Road, Yeovil, Somerset BA21 5AF.

MAY

- 1st May: Kingston & District A.S. bring and buy sale at the Methodist Church Hall, Worpole Road, Raynes Park SW20 at 8 p.m.
- 3rd May: Southend Leigh & District A.S. open show.
- 3rd May: British Aquarist Study Society, 2nd Spring meeting at the Palmer Building, Reading University (3 minutes from junction 11 on the M4). Dr. Elnwynn Trevesse, author and world authority on the Cichlidae, will give an illustrated talk on "The Study of Cichlid behaviour as an aid to classification". Two further talks on The Discus and the African Cichlid will complete the programme. Tickets and maps from Mr. W. E. Goodwin, 14 Dawlish Drive, Devon Park, Bedford.
- 4th May: Hull A.S. open show.
- 4th May: The A.G.M. of the British Kai-Koepers Society will be held at the Centre Hotel, Leicester at 1.00 p.m.
- 11th May: Corby A.D.A.S. open show at the Civic Centre, Corby. Schedules from C. MacAllan, 18 Maddford Road, Corby, Northants.
- 11th May: Goole and District A.S. open show at the Shire Hall, Howden, nr. Goole.
- 11th May: Throckley A.S. open show at the Grange Welfare Association, Newburn Road, Throckley. Reshaping 12-2 p.m. Schedules from Mrs. D. Lacey, 51 Hewley Crescent, Throckley, Newcastle on Tyne. (Tel: 6632 677346).
- 11th May: Bournemouth A.S. open show at Kinross Community Centre, Kinross, Bournemouth. Show secretary, Jack Jeffrey, 30 Brammer Avenue, Bournemouth, Dorset BH6 4JF.
- 11th May: Woodside A.S. open show at the Middleton Civic Hall, Middleton, Manchester. Judging will be to F.N.A.S. approved methods and standards, and the F.N.A.S. Show League will be in operation.
- 17th May: Port Talbot A.S. open show at the Talbot County Youth Centre, Margam Road, Port Talbot, West Glamorgan. Trophies, cards and plaques for all classes. Schedules from early March from Show Secretary, A. E. B. Fouracre, 3 Cross Street, Velindre, Port Talbot, West Glamorgan SA13 1AZ.
- 18th May: Scarborough Fishkeeping Society open show at Pirbright School Hall, Pirbright, Scarborough. Schedules from Miss J. E. Short, Show Sec., 17 Cross Street, Scarborough. North Yorks. YO11 1HP. S.A.E. please. Tel: Scarborough (0723) 68079.
- 18th May: Medway A.S. open show. Details from G. Carpenter, 46 Terryson Road, Gillingham, Kent. Tel: Medway 574424 (evenings and weekends).
- 18th May: Sheffield & District A.S. open show at Granville College of Further Education, Granville Road, Sheffield. Bencing 12-2 p.m. Further details from Mr. R. Sidebottom, 36 Dalves Drive, Sheffield S12 4AF.
- 25th May: Bridlington & District A.S. open show at the Hilderthorpe Junior School, Shaftesbury Road, Bridlington, N. Humberside. 38 annual trophies. For further details contact the Show Secretary, R. Walker, 30 Rosebery Avenue, Bridlington, N. Humberside YO15 3PR.
- 25th May: Portsmouth A.S. inter-club show at the Portsmouth Community Centre.

JUNE

- 1st June: Loughborough & District A.S. open show at the Burleigh Community College, Thorpe Hill, Loughborough. Schedules from Mr. I. S. Purdy, Show Secretary, 10 Cleveland Road, Loughborough, Leics. LE11 2SP.
- 1st June: Accrington & District A.S. open show at Astley Methodist Church Hall, Blackburn Road, Accrington. Details from Secretary Ian Entwistle, 30 First Avenue, Church, Accrington (Tel: Accrington 384342).

1st June: Mid-Sussex A.S. invitation inter-club, Sidney West Sports Centre, Leylands Road, Burgess Hill, West Sussex. Information from Show Sec. T. Tester, 19 Cyprus Road, Burgess Hill, West Sussex RH15 8DX (Tel: Burgess Hill 43202).

1st June: Redcar A.S. open show at the Coatham Bowl, Redcar. Benching 12-2 p.m. Details and schedules from the secretary, D. Readman, 1 Lovat Avenue, Redcar, Cleveland TS10 5BS.

7th June: Sudbury A.S. open show at St. John's Church Hall, Crawford Avenue, Wembley, Middx. Schedules from L. J. Brazier, 66 Ormsby Way, Kenston, Middx. (Tel: 01-204 3374).

8th June: Northwich & District A.S. open show at Hartford High School, Greenbank Lane, Chester Road, Northwich, Cheshire. Further details from Show Sec. D. Valentine, 43 Hartford Road, Davenham, Northwich, Cheshire (Tel: Northwich 6624).

13th, 14th, 15th June: Three-Rivers Aquarist Fishkeeping Exhibition at the Crowtree Leisure Centre, Crowtree Road, Sunderland. For further information contact G. Liddle, 17 Palmerston Avenue, Walkergate, Newcastle upon Tyne.

13th, 14th, 15th June: Tyne-Tees Area Association of the F.R.A.S. open show.

14th June: Llanrwst Major A.S. open show at Llanrwst Major Comprehensive School. Benching until 12 noon. Judging 12.30-3 p.m.

15th June: Salisbury & District A.S. open show at the Activity Centre, Wilton Road, Salisbury. Over 40 classes, including six cichlid classes and eight coldwater classes. Schedules from R. F. Adams, 26 Empire Road, Salisbury (s.a.s. please), or ring 0722-25390.

21st June: South Park Aquatic (Study) Society coldwater open show at Wimbledon Community Centre, St. George's Road, Wimbledon. Schedules from Show Secretary, L. B. Clapp, 16 Overhill Way, Beckenham, Kent (Tel: 01-450 4954).

22nd June: A lot auction will be held by the B.K.K.S. Birmingham Section at the Botanical Gardens, Edgbaston at 2 p.m.

22nd June: Havant & District A.S. open show is at the Hernean Community Centre, Hernean. Schedules from H. Aemittage, 74 Park House, Farm Way, Leigh Park, Havant, Hants. (Tel: Havant 473192).

28th June: Sherwood A.S. open show at the Lady Margerets Hall, Worksop.

28th June: St. Helens A.S. open show at Rainhill Village Hall.

JULY

6th July: South East London A.S. open show at 141 Greenwich High Road, SE10. Details from Show Sec. C. Osborne, 64 Guild Road, SE7.

12th and 13th July: Romford & Becontree A.S. open show (Dagenham Town Show), Central Park, Dagenham. Schedules (May), Garry Steptow, 35 Coniston Way, Elm Park, Hornchurch, Essex RM12 5EH.

13th July: Scarborough & District A.S. open show at Gladstone Road Junior School, Froiler Street, Scarborough. Schedules (April) from J. P. Richardson, 3 Kild Garth, Pickering, W. Yorks. YO18 8DG (Tel: Pickering 73964).

20th July: Sandgrocers A.S. 10th open show at Meelys Cop School, Meelys Cop Road, Southport. More than 30 trophies; prizes for each class winner. Inquiries to Mr. B. Baldwin, show secretary, 10 Olive Grove, Southport, Merseyside PR8 5BG. (Tel: 0704 43584).

AUGUST

3rd August: Blackpool and Fylde Aquarium Society open show at St. Kennerly's Parish Centre.

16th August: Grimby & Cleethorpes A.S. open show at the Memorial Hall Cleethorpes. Benching 12-2 p.m. Show schedules from Mrs. B. Mathew, 16 Swales Road, Humberston, Nr. Grimby, South Humberside (Tel: 0472 814438).

16th August: Northern Goldfish and Pondkeepers Society 4th open show at the Sports Centre, Silverwell Street, Bolton. Enquiries to B. Rothwell, 4 Whalley Road, Hair, Cheshire.

17th August: Cheltenham Tropical Fish Club open show at St. Mark's Community Centre, Heaters Way, Cheltenham. Schedules from M. Jenkins, 3 Marlborough Place, Prince's Street, Cheltenham (s.a.s. please).

26th August: Fierwood & District A.S. open show.

26th August: Long Eaton Aquarist open show at Gregory's Rose Garden, Toton.

31st August: North Wilts. A.S. annual open show (change of date). Further details and Show schedules will be available later. Show Secretary, P. Taylor, 7 Ridgeway Road, Stratton St. Margaret, Swindon, Wilts. (Tel: 0793 824114).

31st August: Nunston A.S. open show. Schedules from Show Secretary G. Jennings, 182 Tomkinson Road, Nunston, Warwickshire (Tel: Nunston 325271).

SEPTEMBER

7th September: North Wilts A.S. open show. Further details from secretary, G. Reynolds, 29 Mansell Way, Wroughton, Swindon, Wilts. (Tel: 0793 812107).

7th September: Huddersfield Tropical Fish Society open show at Slatishwaite Civic Hall. Show secretary, Mrs. F. Town, 187 Abbey Road, Shepley, Nr. Huddersfield. (Tel: Kirkstall 7680).

7th September: Bethnal Green A.S. open show. Show Secretary, S. J. Strabbing, 3 Mason Road, Clapton, London E3 9LH.

12th September: Bristol A.S. open Coldwater show at St. Ambrose Church Hall, Stratford Road, Whitehall, Bristol 5. Schedules from W. G. Ham, 18 Imperial Road, Bristol BS14 9ED (Tel: 0272 776924).

13th September: Hounslow & District A.S. open show at the Youth Centre, Cecil Road, Hounslow. Information and schedules from Show Secretary, Mr. T. Bolingbroke, 2 Holmwood Close, Addlestone, Surrey (Tel: Westhale 54976).

14th September: Harlow A.S. open show at Mount Hall, The Show, Harlow. Details from Dave Henman (Tel: White Roding 275) or Peter Mardock (Tel: Epping 72214).

14th September: Diss & District Fish Keepers Club open show at the Youth Centre, Challenger Road, Diss, Norfolk. Schedules from Show Manager, N. A. Hume, 10 Blenheim Road, Diss, Norfolk IP22 3NU.

14th September: Bridgewater A.S. open show at the St. George's Community, Little Hulton. Details from the Show Secretary, S. Alancough, 33 Oakmead Close, Howe Bridge, Atherton (Tel: Atherton 891999).

14th September: Koi '80 at Bressingham Gardens, Nr. Diss, Norfolk on the A1066.

21st September: Trenbridge & District A.S. open show at the Hadlow Community Centre, Hadlow, Kent. Schedules from Mrs. V. Feast, 5 Pollards Wood Road, nr. Oatnd, Surrey.

26th September: Half Moon A.S. open show at the Cooperation Hall, Was Row, Stockton, Cleveland. Schedules from C. W. Buck, 22 Dasher Grove, Thornaby, Cleveland TS17 8BX (Tel: Stockton 45284).

OCTOBER

4th October: South Park Aquatic (Study) Society coldwater inter-club show for tropical and coldwater plants at Wimbledon Community Centre, St. George's Road, Wimbledon. Details from Show Secretary, L. B. Clapp, 16 Overhill Way, Beckenham, Kent (Tel: 01-450 4954).

19th October: Basinstoke A.S. open show at the Carnival Hall, Basinstoke. Show Manager, B. Chaplin. Show Secretary T. Fraser. For further information phone Basinstoke 51817.

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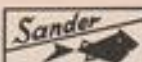
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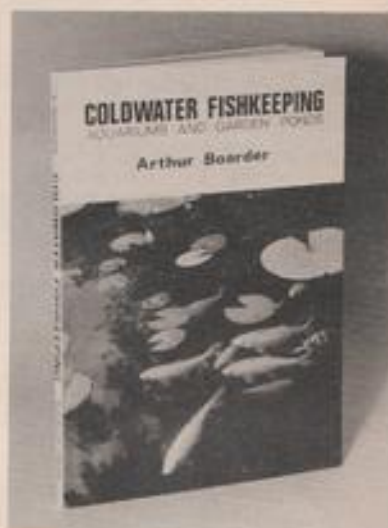
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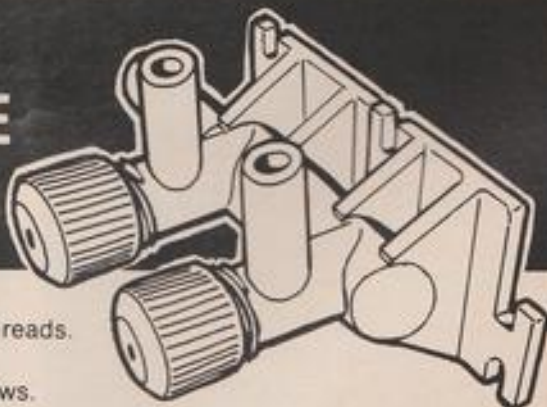
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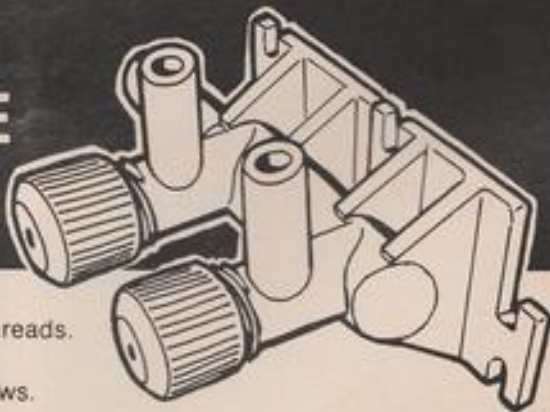
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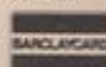
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