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AQUARIST

AND PONDKEEPER

Magazine for Fishkeepers

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T ON THE JAGUAR CATFISH

Y FISH OF SAUDI ARABIA

COVER STORY *Photo: A. van den Nieuwenhuizen*

Guppies have been strong favourites with aquarists for many years. They always figure in the top ten most familiar fish, along with species such as Goldfish, Angelfish, Mollies, Neons, Swordtails and Platies. Their reputation as lively, colourful, hardy, peaceful, easy-to-keep fish certainly warrants this privileged position.

The Guppy has been known scientifically as *Poecilia reticulata* for just over twenty years, following the major revision of the Poeciliidae carried out by Donn Rosen and Reeve Bailey in 1963. Prior to that, it had been known by a variety of names (as many as twelve) which, at one time or other, placed it in the genera *Girardinus, Poeciliodes, Heterandria, Acantho-phacelus, Poecilia* (as *P. poeciloides*) and, best-known of all, *Lebistes.*

The term "Guppy" comes from one of the scientific names referred to above, *Girardinus guppii.* The man responsible for this was Günther who, in 1866, honoured the Reverend John Lechmere Guppy for his reported association with the discovery of the species in Trinidad. This may not, however, be correct since Peters described *Girardinus reticulatus* in 1859 from specimens collected in Caracas, Venezuela.

Wild-type Guppies, while being rare nowadays, are (fortunately) still being maintained by specialist societies, such as the Southern Livebearers Aquatic Group (S.L.A.G.) in UK.

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MYSTERY FISH OF SAUDI ARABIA

by William Ross

In the years 1977-79 I made many visits to Hofuf Oasis in Saudi Arabia's Eastern Province. The purpose of these visits was to explore the many deep wells, irrigation canals and overflow ditches of the oasis in search of fish which I could possibly keep in my aquaria. In the wells and irrigation canals I found Arabian Killifish (*Aphanius dispar*—Ruppel 1828). In the winter months the main overflow ditch from the oasis meanders through approximately 80 kilometres of the desert until it enters the Arabian Gulf.

At the height of the summer some stretches of the ditch dry out leaving isolated expanses of water. This ditch produced, along with the Arabian Killifish, a member of the Mullet family (possibly *Mugil macrolepis* — Smith), both these fish have made interesting aquarium subjects.

On 18th March, 1983 I had the opportunity to visit Hofuf once again. I did not expect to find new fish but to my surprise I observed some large cichlid-like fish in some of the wells, I thought possibly tilapia. I had not come prepared to catch fish but some small specimens which I thought were tilapia fry were caught in a plastic bag used as a net. Second surprise of the day, these were Mosquito Fish (*Gambusia affinis holbrooki*). I had no luck catching tilapia with my improvised fishing gear. On leaving the vicinity of the wells I saw some Philippino

Juvenile *O. niloticus* × *O. aurea*

gentlemen fishing with a large net in one of the main irrigation canals, they were catching large tilapia for the 'pot'. These Philippinos were very obliging, they permitted me to go through their catch and photograph some of their fish. From the slides taken of these fish, my observations of the same fish in the wild and of some specimens I have caught I will now attempt to describe *Oreochromis mossambicus* (Peters).

Typical tilapia shaped body, dorsal fin XV1/11, anal 111/9. Immature specimens are coppery gold coloured with a bluish green sheen, 8-10 dark vertical bars on their sides depending on their mood. Young adult males are greyish brown with a greenish blue sheen on their flanks. Each scale has a yellow golden spot giving the overall appearance of a pine cone. Depending on mood, dark vertical bars can be displayed. Fins are black with a red edge to the dorsal and some may display a red tinge to the caudal; these colours are very much enhanced during spawning. Old males are an overall blue-black with a red edge to dorsal. Young females are not so colourful being greyish brown with dark vertical bars which terminate appeoximately at mid body level; spots on some of these bars give the impression of two longitudinal stripes on the fishes' sides at times. The fins are colourless with the dorsal more rounded than that of the male. Old females are blue-black with an orangish yellow lower jaw. In the wild they grow to 38 cms. but are mature at 10 cms. and seldom exceed 15 cms. in the aquarium. Normal range, East Africa.

On 25th March 1983 I returned to Hofuf fully equipped with nets, plastic bags and buckets hoping to catch some young Mozambique Mouthbrooders; the adults were obviously too large to keep in any of my tanks. In a well, heavily overgrown with Hornwort (*Ceratophyllum demersum*), I managed to net four juvenile fish, all approximately 4 cms. in length. These fish were installed in an 86 cm. × 30 cm. × 38 cm. aquarium with undergravel filtration. This tank supported a heavy growth of *Cryptocorne* sp. and some Giant Hygrophila. Temperature maintained at 25°C. My aquaria receives 25% water changes every week. At first the fish were fed on flake food; as they grew pellet food replaced the flake and small pieces of fish and meat were added to their diet. The pale green leaves of the Giant Hygrophila were eaten, the dark coloured Cryptocornes although damaged, never appeared to be consumed by the fish.

After four months the fish were sexable, one male and three females. The male was approximately 10 cms. in length, the females slightly shorter. The male cleared a saucer shaped depression in the gravel, one of the females joined him in the final stages of this operation. They were both obviously sexually aroused, the male's colours greatly enhanced the female, much lighter in colour and showing her dark vertical bars. Both fishes' ovipositors were showing, the male's thin and long, the female's short and stout. The female laid her eggs in the prepared depression whilst the male hovered around. As the female picked up the yellow eggs into her mouth the male was observed to release his sperm close to her mouth, the sperm appeared milky in the water. The female's lower jaw became distended with the eggs, her mouth closed, she made chewing movements creating a flow of water over the eggs. As the male didn't appear to have anything more to do with the brooding, I moved him and the other two females to a similar sized aquarium. On the fourth day of brooding I observed the female take a small piece of meat and eat it; this was not done with her usual gusto but eaten very gently. I was a bit disappointed at this stage as I always believed mouthbrooders did not eat whilst they were brooding. The sixth day saw a repeat of this performance. In spite of this she projected the impression that she still had the eggs in her mouth and at certain times I thought I could see them. The 11th day dawned with the female very agitated and aggressive towards the fish in the adjoining aquarium. She eventually 'coughed' and some young snails (*Melanoides tuberculatus*) were released from her mouth. Before I could be too disappointed she had another 'cough' and ten baby fish arrived in the watery world. At first she would take the babies back into her mouth when they appeared threatened. By the 12th day I could find only three babies which I removed to a nursery tank.

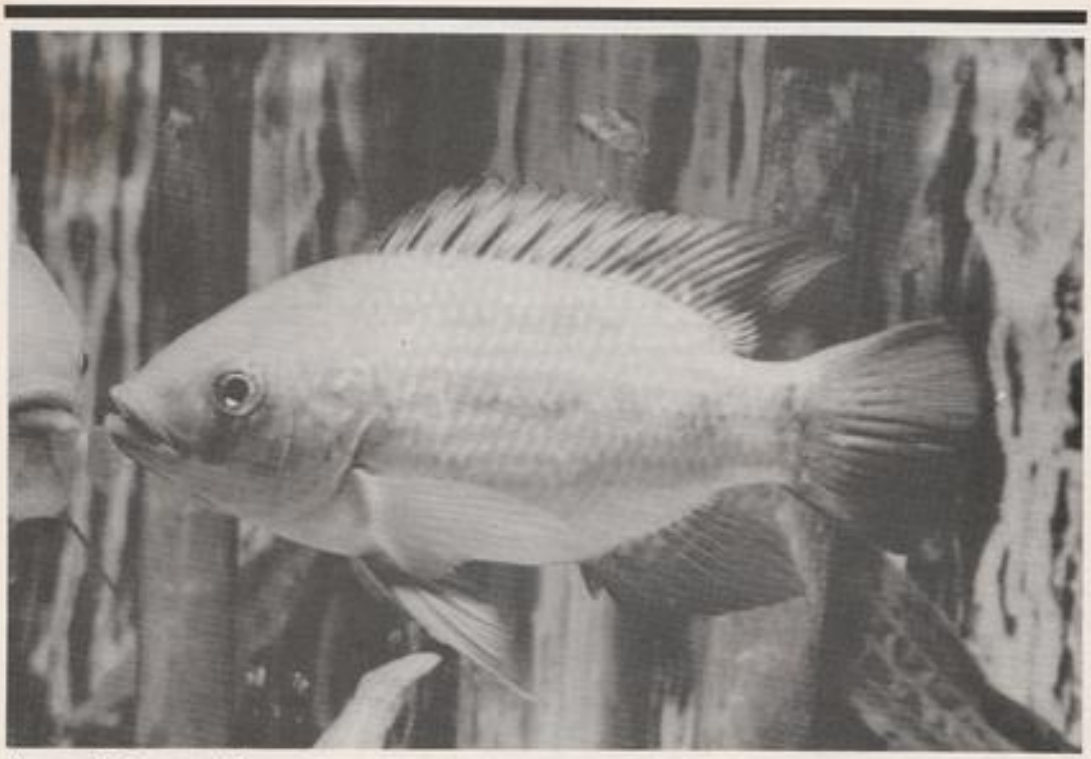
Whilst the first brooding female was on her own, I observed one of the other females brooding eggs. This female I left with the male and the non-brooding female. After the fifth day she appeared to be brooding no longer so I surmise she ate her eggs.

The third female was seen to spawn in a similar manner as the first spawning observed. This female was seen eating on the eighth day of brooding. The following day she released seven babies from her mouth, these were left with her. The babies dwindled in numbers until the 14th day when none could be seen.

The second spawning by the first female has been the most successful to date. On the seventh brooding day, as the female took a small piece of meat into her mouth, two babies popped out. The following day I found 100+ youngsters free swimming; I removed the mother immediately. The baby fish have been fed on dust-fine baby food graduating onto growth food then to crushed flake food. They are growing quickly at this time. Following spawning the females are fairly wasted and require a few days on their own being fed on a highly nutritious diet.

I feel I have been very lucky with these fish, the selection of one male and three females was very fortunate as they have all lived happily together. On acquiring one more small male, I added him to the four fish I already had. At first this new male was shy and well behaved but this did not last for long. As he settled and started to establish a territory of his own he became quite aggressive and created havoc with the other fish. Eventually I had to remove this later inhabitant and since then peace has reigned in my Oreochromis community.

One may ask how did an African Cichlid become established in Saudi



Young male *O. mossambicus*

Arabia? This is a very difficult question to give a positive answer to. From enquiries I have made and my own observations I will put forward this explanation: Speaking to local people I have deduced that these fish are fairly recent settlers to the oasis, this supports my own failure to find them in 1977/79. One gentleman put forward the theory that these were marine fish migrating from the sea to avoid the oil pollution produced from the Iranian oil leakage in the Gulf!

I have found that the King Faisal University has had two fish culture projects running at Hofuf. One of these is a small fish culture station working with tilapia. This establishment is on the bank of the main overflow ditch from the oasis and I jumped to the conclusion that this was the source of my tilapia. How wrong I was; the fish cultured here are an Oreochromis hybrid, *O. niloticus* × *O. aurea*; I have this on good authority.

Further enquiries about fish culture elicited that the Red Tilapia had also been imported for aquaculture. Red Tilapia are another hybrid, *O. hornorum* × *O. mossambicus*. Apparently the first cross of these produces an all male spawning and this is beneficial in culturing tilapia for food. At least here is *O. mossambicus* blood putting in an appearance in Saudi Arabia but not pure blood. I suppose the *O. mossambicus* in the wells could have derived from these but I find that difficult to believe. To have reverted back completely to their wild state from possibly a few escapees which were possibly all male is, I feel, too much to be believed. I now feel that someone introduced this fish either as a throw-out from the aquarium hobby or maybe someone with some fish culture knowledge has been doing their own farming. I am quite sure all of the fish I see in the wells are not *O. mossambicus* although the five specimens I managed to catch are. There are other adult fish of similar size but as yet I have been unable to catch any of these; they look like tilapia, possibly *O. niloticus* or a hybrid.

Tilapia have appeared in dealers' tanks on and off over the years and I have no doubt they will appear again. I can see problems for the aquarist interested in these cichlids. As a 'spin-off' from the commercial fish farmers I can foresee some of their hybrids finding their way into the aquarium hobby. First cross offsprings from *O. hornorum* × *O. mossambicus* being all males, other hybrids not fully conforming to the characteristics of any one known tilapia. I am not speaking against these hybrids as I am sure they can be very interesting but I can see the day when dealers' tanks could be labelled *Tilapia* sp. and left at that.

Whilst I have been investigating the mystery tilapia of Hofuf another fish culture centre has opened there. This has been built on the Aramco Experimental Farm and is culturing the same tilapias as previously mentioned.

THE BASIS OF FISH HEALTH

Mature female *Ergasilus sieboldi*. Actual size, body approximately 1.6mm long, body and egg sacs approximately 2.2mm long

by 'Mayfly'

The Gill Louse

Ergasilus

THERE are several *Ergasilus* species, as well as members of nearly-related genera which cause problems to fish. *Neoergasilus*, *Ergasilus* and their relatives are modified copepod crustaceans which are ectoparasitic on the gills (or sometimes on the skin) of freshwater fish throughout the world. There are two species of *Ergasilus* and one of *Neoergasilus* which have been recorded in Britain. All of these are believed to have been introduced with imports of coldwater fish within the last twenty years and are now distributed locally but widely throughout England and Scotland. *Ergasilus sieboldi* is the most widespread and has been known to be responsible for mortalities in wild and cultured stocks of cyprinid (carps and their relatives) fish. It is thought that the main host is the tench (*Tinca tinca*) but all members of the carp family, perch (*Perca fluviatilis*) and pike (*Esox lucius*) have been found to be infected. There are other species related to this parasite which cause problems in other parts of the world which could reach this country, emphasising the need for great care when bringing in fish from abroad.

The female *Ergasilus sieboldi*, when seen on fish, is up to 2-3mm long and has antennae modified into claws which are used to anchor the animal to the tissues of the fish. There is one compound eye and a mouth at the front end. Pigmentation on the body gives the animal a mottled appearance whereas the eggs in the egg sacs are white, turning slightly blue later in development. The egg sacs are relatively long and are held in a V-shaped arrangement. It is only the female that is parasitic. They are seen on those areas of the gills where the water flow is medium, at the proximal end of the gill filaments (near the gill bar) and in the regions near the attachment of the gill bars dorsally and ventrally.

The female carries up to 160 eggs. Some development occurs within the egg sac but it is not known exactly at what stage the embryos leave the egg sac. The eggs give rise to free swimming male and female individuals which go through several moults and larval stages in the water. It is not known upon what these free-living stages feed or where in the water they live. The males transfer spermatophores (packets of sperm) to the females in this free-living phase and then presumably die—only the females take up a parasitic mode of life on fish. Once the fertilised female has become attached to a fish, growth occurs and the egg sacs, with their characteristic arrangement, soon develop. In optimal conditions the life cycle as described here can be completed in a few weeks. Relatively high temperatures (23°C, 73°F and above) and dense fish populations are the major components of optimal conditions. During the summer accumulations of many hundreds of *Ergasilus* can be found on some fish. The parasites are blood feeders and cause an anaemia in the host. The claws, when dug into the gill tissues, cause a local inflammatory response which brings about the infilling and thickening of the gill tissues making oxygen up-take less efficient. This often leads to an increased breathing rate. Affected fish have an emaciated appearance with sunken eyes; they may be lethargic and hang from the surface gulping air. In heavy infections there is a pronounced anaemia. The fish's resistance to other diseases (or infections) is lowered and there are haemorrhages around the attachment sites, so secondary infections by fungi and bacteria may follow *Ergasilus* attack.

Infections of pond fish are usually introduced by bringing in infected fish, but because little is known about the free-living stages in the life history it may be possible to introduce *Ergasilus* on plants, mud or silt or in water.

The best treatment for *Ergasilus* is, of course, prevention—that is by taking extreme care to obtain clean fish stocks. When infections have been accurately identified there are many chemical treatments which can be used. The most efficient of which are the organophosphate compounds. Organochlorine compounds have been used in the past, but these are not now recommended as accumulation of these (eg, DDT, Gesarol) can occur in the treated fish with long-term side effects. Organophosphates (eg, Naled) have the advantage that they can be placed in the aquarium or pond and left indefinitely. Within a few days they will have broken down into harmless chemicals. As all crustaceans are killed this method gets rid of the free-living larval stages of *Ergasilus* as well as parasitic individuals. However, precision in dosage administration is very important as a mistake of a few parts per million may be sufficient to wipe out the more sensitive species (eg, orfe) of fish. Their toxicity to humans must also be borne in mind.

Your questions answered...

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

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

TROPICAL

Dr. C. Andrews

Tropical

starting out . . .

My son wants to take up aquarium fishkeeping. Can you give me a few hints and recommend a good but inexpensive book?

I have sent you a copy of the *Complete Aquarist Guide*, as it appeared in this magazine a few months ago. Another good book is *Aquariums* by A. Evans (Foyles, about £2.00).

To begin with it is important to buy a big enough tank. To maintain a mixed community tank of tropical fish, a 24 × 12 × 12 inch aquarium should be regarded as a minimum. Larger tanks, though more expensive to buy, are less prone to overcrowding, often more impressive to look at, yet no more expensive to maintain. It is, of course, very important to stress the need, to buy all the equipment (and perhaps plants), and set up the tank *before* fish are introduced. The aquarium (without fish) should be allowed to stand for a few days. During this time the tap water will condition somewhat and the filters begin to function properly. Similarly the functioning of the heater-thermostat may be checked and (if required) the pH and water hardness also measured. After about a week (longer if possible), one or two inexpensive fish may be introduced into the tank. To avoid temperature shock, all incoming fish should be 'floated' in the aquarium for 15-20 minutes before they are released. Assuming that these fish survive, the numbers in the tank may be gradually increased over the ensuing weeks.

Obviously it is better to recommend hardy species to the beginner and, wherever possible, at least pairs rather than lone individuals.

Swordtails are hardy, inexpensive and easy to keep

Overstocking and overfeeding *must* be avoided. As a guide, a 24 × 12 × 12 inch tank will accommodate 12-15 small tropical fish, which should be fed on flaked food about 2 or 3 times daily. At each feed all the food should be consumed within a few minutes. Every fortnight or three weeks about 25-35% of the aquarium water should be siphoned out (along with mulm and debris), and replaced with fresh water at the correct temperature. Regular, large scale cleaning operations, when most or all of the water is removed, can have disastrous effects on the fish.

Successful fishkeeping does not end there, and aquarists should be encouraged to read around the hobby, and join local societies and clubs.

bogwood . . .

How can I prevent bogwood from staining the water of my aquarium?

Some bogwood which is purchased from aquatic shops, once it has been scrubbed and then soaked in water for about a week, should not discolour your water too much. If you want to be sure though, paint the wood (when still dry) with several coats of polyurethane varnish—rinsing well before use in the aquarium.

By the way, bogwood can be weighted to the tank floor by 'glueing' it to a piece of slate with tank sealer.

soft and acid . . .

It is often said that most tropical fish (and plants) prefer 'soft and slightly acid' water conditions. How do I produce these conditions in the aquarium?

Many of the commonly kept tropical fish, along with a number of the more exotic species, prefer soft, slightly acid aquarium water. This type of water is, in fact, essential for the successful maintenance and spawning of fish such as Discus (*Symphysodon*). A high proportion of aquarists rely upon mains tapwater to fill their tanks, yet often find that it is too hard and/or alkaline for their requirements.

It is, of course, necessary to establish the pH and hardness of the tapwater using a reliable test kit. If the pH is between 5·5-6·5 and has a general hardness of less than 10° dH, the tapwater is already sufficiently acid and soft for most fish prefering this type of environment.

However, if the general hardness is above 10° dH, it may be softened by dilution with rain or distilled water. In many industrial areas, the rainwater may be too polluted to be of any value in fishkeeping. However, this pollution may be offset by *continuously* collecting rainfall in a large butt that drains from a garage or shed roof. The


Arthur Boarder


Vivian De Thabrew


Hilda Allen


Graham Cox


Eberhard Schulze

second half of rain shower is often much 'cleaner' than the first, and hence this continuous collection method effectively dilutes any toxins that are present, at the same time as allowing any volatile substances to escape. A piece of nylon mesh over the bottom of the down-pipe will prevent the entry of leaves, etc. into the storage butt. Distilled water is an excellent, although expensive alternative to rain water. To determine how much rain or distilled water will be necessary to achieve the desired hardness, several small-scale, 'sighting-shots' should be carried out.


Discus require soft acid water

If the pH is above 6·5, it may be reduced with the aid of good quality aquarium peat. The peat may be placed in an external/internal filter that serves the aquarium, or allowed to soak in a bucket of tapwater. If the latter method is used the peat should be tied loosely in an old nylon stocking and added at a rate of one handful per 1-2 gallons water. It may be necessary to allow the water to stand for several days or weeks for the peat to have its full effect. This water may then be added to the aquarium to reduce the pH. Whichever method is used, it is vital not to expose fish to sudden, marked shifts in pH. Using a test kit to monitor the results, the pH should be dropped by 0·1-0·2 units per day. More drastic changes may kill the fish.

A leaflet on the testing of aquarium water conditions is available from the **Tetra Information Centre, 15 Newlay Lane Place, Leeds LS13 2BB.**

C.A.

Coldwater

fish for tank . . .

I am thinking of setting up a tank, 36 × 12 × 12 inches for coldwater fishes. I thought of three or four veiltails and two Koi. Would these be suitable and which plants do you recommend?

I think that you will find that fantails are better than veiltails for a tank. They swim about more freely, as veiltails are slow swimmers owing to the size of the caudal fin and are inclined to sit on the bottom of the tank a lot. I do not think that Koi will be suitable as although they are handsome fishes for a large pond, in a tank they will soon upset the planting scene, are heavy feeders and the tank would need filtration. Also as they grow to up to two feet long they could soon outgrow your tank.

As for plants, you can have several clumps of *Vallimeria spiralis*, *Lagarosiphon major* or *Egeria densa* for the back corners and some *Hygrophila polysperma* for the middle of the tank. You do not need many plants as they will soon grow if they have space. Do not try to imitate a winning furnished tank you might see at a show as such a tank would be so over-grown with plants that there would be no swimming space for the fishes within a month.

sick fishes . . .

I have found two of my goldfish in the garden pond, suffering from Fungus disease. What is the best substance to put in the pond as a cure and preventive?

Any sick fish must not be treated whilst it is still in the pond. You do not want to treat all the fishes just because one is sick. Any fish needing treatment should be removed at once to a separate tank. When one or two fishes are attacked it may be that they have been damaged in some way, perhaps by careless handling or netting. This can remove some of the protective mucus covering from the fish and so leave it open to attack by pests and diseases. Providing you make sure that the pond water is in good condition the rest of the fishes should not need any treatment. Water in good condition means that the fishes are more likely to keep healthy and thrive.

black markings . . .

One of my goldfish has developed black markings on its tail. Is this a disease and if so what is the cure please?

It is not a disease and there is nothing you can do about it. It is probable that the tail has been damaged and the fresh growth is showing the black which is usual when new growth is formed. It should soon clear away. The tail could have been damaged by a sharp rock in the tank or even nibbled by another fish.

A.B.

Koi

calculating the size of a filter . . .

I am a fairly new Koi-keeper with a pond measuring 9 ft. × 5 ft. × 3 ft. deep and 9 Koi. I recently purchased a pump which has an output of 1,000 gal/hr.

Can you advise me on the size of an outside filter and pipework required to suit my pond and pump.

I can advise you that the size of a filter for efficient use with a Koi-pond is usually taken as ¼ to ½ the surface area of the pond. This does allow for a wide variation in the numbers or sizes of the Koi. If there is a 3 ft. depth of water then your pond contains about 840 gallons of water which is a relatively small volume to safely support the life of the Koi without filtration and periodic water changing.

I am not familiar with the pump you mention, but after allowing for pumping losses in the pipework and filter, the pond water will pass through the filter about once every hour.

Without knowledge of the pump, or whether it is a submersible or outside surface type, I cannot easily suggest the best arrangement of filter to adopt. However, from the basic rule, your filter should have an area of about 12 to 15 square feet and for use with your pond the filter bed should consist of at least a 6 inch depth of small gravel or crushed stone.

The pipework should not be less than 1 inch bore to suit the output of your pump to the filter, and where you have to use rigid plastic pipe under the filter bed this should be the 1¼ inch Bartol or similar; and the return to the pond if by gravity, the pipe should be 1½ to 2 inches diameter in order to avoid possible overflow from the filter.

I am not able to visualise how you are proposing to arrange your outside filter, or the direction of flow either up or down through the filter bed. But being mindful of some of the problems associated with outside filters, perhaps I can say for the benefit of others also, that an under-gravel type of the same dimensions could have been more easily constructed inside the pond with a lot less trouble, and for permanent and positive working under the worst freezing conditions particularly in the colder parts of the country.

a good koi pond . . .

I suppose you have been asked this question before, but can you tell me as briefly as possible how to make a good Koi pond? Cash is limited, but I am very keen to have some of these beautiful fish as soon as possible.

You are right, I have been asked this question many times before but brevity, coupled with haste and an admitted cash-flow situation is not ideal. It is unfair to any livestock to rush into ownership without first considering their requirements, even assuming these are known. All too often I hear from readers who have wasted both time and money on creating a pond that is totally unsuitable for Koi-keeping, mistakes are expensive!

After advising you to take your time and spend available cash on first making a good pond before spending anything on Koi (remember "Fools rush in, etc. etc."), so get the order right and then consider the following ideas based on experience.

Koi ponds need to be larger than goldfish ponds because Koi can grow into very large fish indeed. Depth is important, deep volumes of water are slow to cool, or heat, according to the season and thereby avoid rapid fluctuations in temperature which are quite stressful to Koi. A depth of 5 feet is considered adequate, with a greater depth the beneficial effects of sunlight are lost and temperature stratification can occur.

The height between the rock surround and the surface of the water in this pond is 10-12 inches

A space of 10-12 inches above the water level is advised, and easily achieved by a strategically-placed overflow. This space not only allows room for the Koi to leap safely, but also keeps them beyond the reach of marauding cats. I firmly believe that all ponds should be raised above ground-level to some extent, even if only by 12 to 15 inches. This removes the hazards of flash-flooding in the event of heavy rainfall and the degrees of pollution when chemically-treated garden-soil drifts or is washed into ponds. (Slug pellets are really not good for Koi.)

Bottom-drains for the easy removal of settled sludge and foul water have proved their worth, and these are available for fitting into both concrete and Butyl ponds at their deepest point.

From my own experience over 14 years, I am a great believer in the benefits provided by adequate under-gravel biological filtration within the pond. Without getting too technical about waste products and nitrite levels, a continuously-operated biological filter, coupled with judicious water-changes according to temperature is a proven boon to Koi-breeders.

When making a lined or even a concrete pond, by careful planning it is possible to dig out a suitable area of extra depth to contain an under-gravel filter. This forethought removes the need to build barriers in the finished pond to retain the gravel bed.

Perhaps, from the above brief recommendations you will accept that making a good Koi-pond closely resembles a feat of engineering, not to mention a well-known disease called "Hole-in-the-wallet." I well understand the fascination of Koi, but rather than build up a collection in various aquaria until a crisis point is reached (and no time or money available for a pond), I would prefer more readers to get their priorities in the right order and concentrate on making the pond first. There really is more pleasure to be gained that way. **H.A.**

Marine

living rock et al . . .

Welcome back! My query is in four parts.

(1) What is the best way to check if living rock is of good quality before you buy?

(2) In certain marine retail establishments there are some differing opinions as to whether star fish, sea urchins and nudibranchs can live quite happily together. Can you please list some of the more popular colourful and reasonably priced types?

(3) Do you know why no British firm has produced a light tube compatible with tru-light? Surely there is a market for this type of light, even for freshwater men, and without import tax it should be a lot cheaper. Which tube do you think comes nearest to the tru-light tube?

(4) The question of books is one which I think must be on the lips of most marine aquarists, and I feel that an answer in our press would make interesting reading. Why has it been so long since writing another book? There is quite a need for a good comprehensive British book including a section on invertebrates, and you are the man with the knowledge to do it. Your paperback book is excellent, but leaves a huge gap. Most of the books are American (TFH). I realise it would not be cheap, but I think most British marine aquarists would buy it.

Many thanks for your extremely kind remarks. They are greatly appreciated and I sincerely hope that they are justified.

(1) *Living rock:* Prime quality living rock is recognised *not* by fancy price tags but by the following four criteria alone:

(i) It should be extremely colourful, i.e. alive with *both plants and animals!*

(ii) It should be spatially complex in shape, i.e. full of holes, nooks and crannies.

(iii) If there are any foul-smelling, grey gelatinous films on any areas—don't touch it with a barge-pole!

(iv) It must be *affordable* (not the same word as cheap!)—but please bear in mind its weight and the outrageous price of air freight.

(2) *Compatibility of invertebrates:* None of the creatures which you mention are incompatible with any other invertebrates provided that:

(a) it isn't a rank predator, e.g. Octopus, Crown of Thorns Starfish, etc., and

(b) all the creatures come from the same geographic area, i.e. the same reef, and

(c) you remember to feed them now and again. Usually more now than again!

(3) *Fluorescent tubes:* I will assume that you mean 'comparable' not 'compatible'. As I have repeated many times here and elsewhere, there are *many* British tubes which are actually superior to the American tube which you mention, *and cheaper by far!*

I have been working for over 10 years to design a brand-new type of fluorescent tube which will outshine (sorry) all others. I hope to launch it internationally this year and at a sensible price.

(4) *Books:* Dear Mr. Williams, I work 8 days each week already. Do you want blood? I am just completing a brand new book for all types of aquarist—F/W and salt, hot and cold. I hope to see it published this year.

G.C.

Discus

new discus tank . . .

I have a fish tank, size 48 in. × 18 in. × 12 in. and would like to keep Discus in it. Could you advise me the best way to set it up. How many Discus could I keep in it? Can other fish be kept in the tank with them? Should I use undergravel filter or a power filter and how long must the tank be set up before I introduce the Discus; also the best plants.

Your aquarium is OK but if one were to aim for the ideal I suppose 48 in. × 15 in. × 18 in. would be a better size or even 48 in. × 18 in. × 18 in. If you like a "clinical set-up" you could have a few small pieces of bogwood and a few plants in flower pots. The best plants to use in any Discus Fish aquarium are Crinum, the Thai Onion Plant; Echinodoras, Amazon Sword Plants; Wistaria and if the water is not too acidic, even Giant Vallis. All these plants will certainly do well in soft, acid water with a temperature of 85°F. But you must remember that at this higher water temperature the light will have to be increased by about half to what one would normally have at 75°F.

Water Wistaria, *Hygrophila difformis*

Filter the aquarium with a power filter using either a quality peat, Optima or a biological filtering material like Eheim Substrate. A power filter is always a much better system than any U/G filter.

If you like to "furnish" the aquarium using gravel on the bottom I would also install a Eheim reverse flow undergravel filter and then you will probably have the best system. If you do this you could also plant some of the smaller plants like Cryptocorynes as a foreground plant.

Your tank will certainly take 6 to 8 Discus Fish if you were to start with young ones, and about 5 or 6 almost fully grown ones.

Once you are happy that all the electrical bits are working well, that your water temperature is about 85°F and you have used a water conditioner like AquaSafe or WaterCondit, you can introduce the fish. It may also be advisable to use a good iron based plant fertiliser.

As for other fish: Clown Loaches and Cardinal Tetras are always a very good addition to any Discus Fish tank. **E.S.**

The Madeiran Experience

Part 1
by John A. Dawes

IT WAS November—the sky was blue—the sun, hot—the sea, deliciously warm—and I was in my swimming trunks on an Atlantic island collecting fish for a Municipal Museum. It sounds like Paradise—and it very nearly felt like it.

At such times, I always tend to think that there is a great deal more to fishkeeping than siphon tubes, filter cartridges, electricity bills and White Spot! It is also at such times that the value of a really good Travel Agent becomes apparent.

It was they (Hourmont Travel), who had successfully tracked down the name and address of the Director of the Museum and Aquarium in the capital of Madeira, Funchal. What is more, it had only taken them a few days to do so.

I had written immediately to Sr. Manuel José Conceiçao Biscoito, introducing myself and asking if it would be possible to meet him at the Aquarium and have a behind-the-scenes look at things there.

Seven weeks had elapsed, we were due to fly out in three days' time but, sadly, had heard nothing from Madeira. I was, therefore, delighted to receive a telephone call

November in a Madeiran rockpool. The author (top right) is seen here with João Costa de Nobrega (left) and José Pedro Freitas Gouveia from the Funchal Museum. Eight species of fish were found in this pool, including *Mauligobius maderensis*

Jerry Maul (left), the former Director of the "Museu Municipal", with the author during a pre-collecting meeting

A magnificent specimen of *Serranus (Paracentropristis) atricauda*, a Comber or Sea Perch known locally as Garoupa

from the Director, all the way from Funchal, saying that he had just received my letter and that (since there was no time to write back) he was ringing to confirm a date for my visit.

Round about the same time, I had spoken to a friend of mine, Dr. Peter Miller of Bristol University, about my forthcoming Madeiran trip. I was fascinated to learn from Peter that he had recently described a new Goby from Madeira which he had earlier named after the former Director of the Museum, Mr. Jerry Maul. The Goby in question was *Mauligobius maderensis* which looks superficially similar to our own Rock Goby, *Gobius paganellus*, but is found only around Madeira, The Canaries and the Salvage Islands, i.e. the Continental Rise Islands of Temperate Macaronesia, as defined by Peter. Peter's full scientific description of *Mauligobius* is currently in press, but the fact that he had earlier published the name allows me to mention it here.

Therefore, armed with this knowledge, nets, polythene bags, Import Licence, camera and all the other trappings, and fired with enthusiasm after Sr. Biscoito's call, I arrived in Madeira on a grey, damp but warm and welcoming afternoon. Despite the cloud cover, there was colour everywhere. It's always a bit disconcerting when you are confronted with huge specimens of plants which you know well as small, windowsill or living room pot plants at home. In this sense, Madeira challenges your senses at every turn. There are ten-to-twelve foot high *Poinsettias* and *Crotons*, at least five different types of *Hibiscus*, more than twenty different species of Palm, Avocado Pear Trees, *Persea americana*, countless Banana Trees of various species, *Musa* spp. and (I am not exaggerating) Swiss Cheese Plants, *Philodendron* (*Monstera*) *deliciosa*, over thirty feet high/long, climbing skyward up straight and tall Palm tree trunks. What a place to find yourself in in mid-November!

Soon after our arrival, we met Sr. Biscoito, but in the most unlikely setting. He was coming to the end of his two-year stint of National Service and had been posted to the "Comando Naval" in Funchal. This meant that his work at the Museum was restricted to evenings, days off and weekends.

The Black Scabbard Fish, *Aphanopus carbo*, a useful and unusual source of deep-sea specimens for the Museum

However, the former Director, Mr. Jerry Maul, is still very active and deeply involved in Museum/Aquarium matters, doing a full day's work, everyday, as if he had never retired. This is neither surprising nor unexpected in a man of international repute who is so highly regarded in the museum world.

Jerry Maul was helpful in the extreme. To start off, he gave us a resume of the development of the Museum and Aquarium since his arrival on the island in 1931. Originally, he had gone there on a two-year appointment as Taxidermist—and stayed. Well, Madeira is that sort of place!

The Museum itself had been opened in 1929 and had had several Directors before Jerry Maul took over. Shortly after this, he started developing the aquatic side which ultimately resulted in a fully fledged marine aquarium which first opened to the public about twenty years ago.

Both the Museum (which specializes in the natural history of Madeira) and the Aquarium share the same premises at 35 Rua da Mouraria in the capital, Funchal.

On the ground floor is the entrance to the Aquarium which houses large, well-designed, attractive aquaria in which an excellent collection of Madeiran fish and invertebrates are displayed. Each tank is clearly labelled with the scientific, Portuguese and (thankfully) English names of the inhabitants. Details of geographic and ecological distribution are also given.

The list of species during November made impressive reading and included, among others, the following (brackets, except around *Paracentropristis*, indicate the local, Portuguese names for the various species).

Mugil auratus—Golden Eye Mullet and *M. cephalus*—Common Grey Mullet (both known as Tainha), *Atherina presbyter*—Sand Smelt (Guelro), *Lepadogaster lepadogaster*—Clingfish (Chupa—sangue or Pegador), *Helicolenus maderensis*—a beautiful small Scorpionfish found only in Madeira (Rocaz), *Trachinus draco*—Greater Weever (Peixe Aranha), *Serranus* (*Paracentropristis*) *atricauda*—Sea Perch or Comber (Garoupa), *Epinephelus guaza*—Grouper (Mero), *Capros aper*—Boarfish (Tem-te-em-pe) *Muraena helena*—Moray Eel (Moreia or Moreia Pintada), *Balistes carolinensis*—Trigger Fish (Peixe-porco), *Chromis chromis*—Damsel (Castanheta), a wide array of Wrasses—Family Labridae, numerous Breams—Family Sparidae, several species of Blenny—Family

These Sand Smelts, *Atherina presbyter*, proved extremely delicate and died within minutes of capture. Twenty others were safely transported back to one of the Museum's tanks

Blenniidae, Gobies—Family Gobiidae, including *Gobius paganellus*, the Rock Goby (Caboz de Escamas) and, of course, *Mauligobius maderensis*, and many other species of fish.

Among the invertebrates, there were Spider Crabs, Squat Lobsters, Shrimps and Prawns, large, colourful Bristle Worms (probably *Hermodice* sp), and an Octopus.

Finally, there was also a large Turtle which I could not identify with absolute certainty but seemed very much like a Green or Edible Turtle *Chelonia mydas*.

The water for the tanks is brought by water tanker to the Aquarium once or twice a year from a pollution-free spot several kilometres along the coast outside Funchal. Many trips are required before the 200,000-litre reservoir tank is full. From this reservoir, situated under the floor of the viewing gallery, the water is pumped into a header tank which then feeds the individual aquaria. The overflow returns to the reservoir via a large gravel-filled filter, and the cycle restarts. The system is simple, but effective, and results in clear, aerated water and healthy tank inhabitants.

Most of the species which are housed in the Aquarium, plus those that cannot (for one reason or other) be kept alive for any length of time, or are only seasonally available, or else are too large and/or predatory, are exhibited as stuffed specimens in the Museum.

This collection includes large sharks and deepwater fish caught off the Madeiran coast, either by local fishermen or by the crew of the Museum's own collecting boat. I would have loved going on a trawling trip but, although the offer was generously made, circumstances (such as heavy seas) made this impossible. Next time, perhaps.

Many of the deepwater specimens in the vast alcohol-preserved collection came, in the past, not from deepwater trawls, but from the stomach of the fearsome Black Scabbard Fish, *Aphanopus carbo*, known locally as the Peixe Espada Preto or Espada Preta.

This remarkable fish is caught on hand lines from depths down to as much as 1,600 metres! Yet, despite the considerable effort involved, the Espada is one of the most popular and tasteful fish in Madeira and is consumed in large quantities by Madeirans and visitors alike.

The link between the Espada and the Museum specimens lies in a longstanding arrangement that Jerry Maul had with the local fish gutters who supplied him with stomach contents for a small fee.

The result of this arrangement, plus the large numbers of deepsea specimens caught on various international expeditions, means that the Funchal Aquarium and Museum has a wealth of research material still awaiting investigation by the present Director, Manuel José Conceiçao Biscoito.

The Municipal Museum and Aquarium are both open from 9.00 a.m. to 8.00 p.m. (not on Mondays). The entrance fee was 12½ Escudos last November which, in Sterling, works out at around 7 pence! Much to the staff's regret, this was going to be raised to 25 Escudos to make ends meet. School parties will, however, continue to be admitted free of charge. Many thousands of visitors (I think the figure quoted was 80,000), mostly foreign, pass through the Museum's impressive wooden-carved doors. If you find yourself in Madeira, you would find a visit to 35 Rua da Mouraria both highly enjoyable and informative.

NATIONAL SHOW '84

AFTER a gap of five years a National Fishkeeping Exhibition is being held in the London area again.

Kempton Park is the venue, on Saturday and Sunday 9th-10th June. The sponsors, **Aquarian Fish Foods,** have gone to a lot of trouble to ensure that this event must not be missed. Besides all the usual stands, trade and otherwise, there will be lectures in the very attractive Kempton Manor. Numerous bars and fast-food will be on tap, and a really nice feature, a proper sit-down set lunch will be available. Another important consideration is that car parking is **free**! That should help everyone who comes along.

The **Aquarist and Pondkeeper** magazine which has given considerable assistance to aquarium clubs over the years and continues to sponsor or donate generous support to every major National Aquarium Show held in the U.K., will be very much in evidence as usual.

The Association of Aquarists are assisting in the show with stewarding, judging, information, etc. Many clubs from near and far are providing decorative society tableaux with fish displayed on each stand. This attractive feature is very hard work and taxes the ingenuity of each society to come up with a theme for their stand which can incorporate fish in some shape or form. Societies entering do have a competition for the best stand which has a first prize of £100. Assistance is also being given towards travelling expenses for these clubs.

A furnished aquaria competition is being held separately with tanks supplied for clubs or individuals to make an attractive display. This competition is open to anyone who wishes to take part.

The Association of Aquarists will have a stand where old and new friends can gather and discuss issues connected with the Aquatic scene. Specialist societies within the hobby have been invited to put on displays and for the Catfish, Livebearer or Killifish fanatic these stands will be a 'must' to visit.

Judging of fish, aquariums and plant classes will be to A of A approved standards and judges from all the aquatic bodies have been invited to officiate.

Help to make this an annual attraction by galloping down to Kempton for the Aquatic Stakes on 9th or 10th June. Further details can be obtained from: **A of A Secretary, 7 Wheeler Court, Plough Road, Battersea, London SW11.**

BOOK REVIEW

by John Dawes

"Fishes—An Introduction to Ichthyology", *by Peter B. Moyle & Joseph J. Cech, Jr.*, published by Prentice-Hall (1982). ISBN: 0-13-319723-9. Price: £30·55.

Technical books on Ichthyology are usually expensive and this one is no exception. However, price is relative, in the sense that a £5·00 book with few pages and poor text is a waste of money, while a £30·00 book full of high-quality material, presented in a lively manner, is a worthwhile investment.

Moyle and Cech have written a book which fits the latter category admirably. It is a substantial work consisting of 538 pages of text divided into 38 chapters, each with its own short list of Supplemental Readings. In addition, there is a Bibliography containing no less than 1,003 references. In this way, the authors have attempted to plug as many of the inevitable loopholes that, almost by definition,

accompany a "general" book such as this.

To quote from the Preface, the book is not just aimed at (academic) students of ichthyology, but also at the "growing number of sophisticated amateur ichthyologists who study fishes to increase their understanding of the fishes they keep in aquaria". This aim is reflected in the style adopted by the authors in that, while dealing with some difficult and potentially "dry" subjects, they nevertheless depart from the normally unemotional vocabulary of pure science as particular situations demand.

Scientific terms such as Epipelagic Zone, Mechanoreception, *Fernstasinn* (distant-touch sense) and numerous others are described in the text in concise, uncluttered fashion. Although this goes a long way towards avoiding confusion, a Glossary would, undoubtedly, have been of considerable help.

There are no photographs, but well-drawn, sizeable diagrams overcome this deficiency to an extent.

The text is divided into four parts dealing with a wide range of subjects, as befits an introductory book. Therefore, there are chapters on evolution, physiology (including all the major "processes" from respiration to reproduction), zoogeography (distribution), ecology and a very extensive section on the classification and major "groups" of fishes, all easily located via a detailed list of contents and comprehensive twelve-page index.

If the price, £30·55, places this book outside the scope of some potential buyers, then I strongly urge them to pester their local library into obtaining a copy. "Fishes" should definitely be more widely available to the general public than its price will probably allow.

Book Review

Catfishes of the World *by David Sands.* Volume three Auchenipteridae and Pimelodidae. Published by Dunure Enterprises/Dee Bee Books. Looseleaf edition £8·95.

To quote Dr. G. F. Mees, of Leiden Natural History Museum in his foreword, "Even when in a few cases my own conclusion would differ from his, the text will stimulate further study and discussion and therefore goes beyond the modest aims of the author to make catfishes a little bit better known to aquarists."

This volume is by far the best work produced by David Sands, the bulk of the pictures are of a high standard helped by the inclusion of the East German, H. J. Richter's pictures and those by Mike Sandford and David Allison of the Catfish Association.

Both families are obscure in commercial literature, certainly the driftwood catfishes which the author rightly states have virtually been ignored by most exotic tropical fish books. Many of the pictures illustrate catfish species for the first time. Some aquarists may find the scientific keys (to the genera of both families) difficult to follow but the care and breeding sections, in particular the extended parts for the *Pimelodidae* section provides information long sought after by catfish enthusiasts.

It is obvious from the numerous references to material published by Dr. Mees that the author has relied heavily on this scientist who is well known for his work on the Surinam representatives of both families. Although not much is written about breeding, presumably because none of the family *Pimelodidae* have been bred in aquaria, the hints on feeding large catfishes (or why *not to* when first purchased) is well written. The illustration showing a parasite of fish louse on a large specimen of Tiger shovel nosed catfish (Pseudoplatystoma) proves a picture is worth a thousand words.

I believe this volume is better than its forerunners because each genus is well set out and obscure species are illustrated and easy to compare with each other.

The author has separated the large from the small members of the family *Pimelodidae* which is important because I am sure keeping the small *Microglanis* (2-3 inches) is very different from keeping a giant red tailed catfish *Phractocephalus*.

The taxonomic information, such as detail on teeth arrangements, could bog the text down a little but it appears the author takes seriously his task of providing a bridge between science and the hobby.

Although the glossary is enlarged in comparison to previous volumes, a few scientific words are missing.

If any reader doubted the series would sufficiently cover imported species of catfish then this volume lays to rest any such thoughts. With almost 70 colour pictures and further information on many more species I believe this volume to be well worth the cost of buying.

I would echo Dr. Mees' foreword again and say, I look forward to the final two volumes to add to our modest knowledge of catfish. **Barry Black.**

The Marine Aquarium Manual *by Maurice Melzak.* Published by Batsford Ltd, of 4 Fitzharding Street, W.1. at £7·95.

This book introduces the reader to basic marine fishkeeping with particular emphasis on the natural system—based, that is, on as near a simulation of a natural environment as can be achieved within the confines of an aquarium.

In the initial four chapters the aquarium, water, lighting, filtration, substrate, pH, pumps, airstones etc, are dealt with followed by step-by-step setting-up. Chapter five deals comprehensively with the major phyla obtainable, the author suggests, from our native coastline, the myriad of life-forms clearly illustrated by the use of line drawings with a follow-on in the next chapter of descriptions of various shores and habitats. The final chapter covers the maintenance of a marine aquarium and stresses the importance of perpetuating a balance of organisms and conditions.

This is a well planned and written account of how to manage a native marine aquarium, a good basis on which to build experience of marine fishkeeping which forms a sound foundation for subsequent excursions into the realms of exotic marine fishkeeping.

New Observer's Book of Tropical Fishes, *by Neil Wainright.* Published by Frederick Warne of Bedford Street, London, W.C.2, at £1·95.

This is a reprint of the original 1978 edition in the Observers hard back series. In paperback and slightly larger format of 6 in. × 4 in. this handy sized volume is a useful pocket compendium for the tyro aquarist. Ninety species of popular tropical aquarium fish are described and illustrated with excellent colour drawings by Baz East. Outlines of breeding habits and requirements are included with each species covered. **Laurence E. Perkins**

Further notes on

KEEPING AND BREEDING DISCUS

by E. Schulze

I OFTEN receive letters from hobbyists asking for detailed information on the setting up, maintenance and breeding of the Discus fish. Occasionally, I receive letters from readers of this magazine, who seek a 'second opinion', and answering these letters I often find somewhat awkward; especially when the initial advice was given by a pro. The reason for this is that I have often been accused of 'not playing the game'. However, the advice I give to anyone who is willing to ask for it or through my column on Discus in the *Aquarist and Pondkeeper* is based on more than a decade of Discus keeping. It may not be the only way to keep these beautiful fish, but it has worked very well for me all these years. I certainly will admit that I have changed some of my views on certain aspects of Discus fish keeping over the years but this is nothing more than natural progression. I do remember, when I gave a talk to an aquarist society some years ago on the keeping and breeding of the Discus fish, when I stated that these fish will ONLY be bred successfully in a certain size aquarium, with a certain quality of water and fed with a certain type of food, when someone shouted from the audience: "Rubbish, I bred them in ordinary tapwater in an aquarium not much bigger than a milk bottle." Today, I would admit, that it is quite possible to keep and sometimes even breed, Discus fish in very adverse conditions but the likelihood of having real success is very minimal.

I do know hobbyists who have kept Discus fish for a very long time and who seem very knowledgeable about the whole business of Discus keeping, e.g. hardness, conductivity, pH values, special diets, etc. They are able to recognise a good specimen in any tank yet are almost incapable of keeping any Discus fish alive for any length of time. But, I do also know hobbyists who are confused by the semi-scientific necessities, ignore them and do very well. I feel, that very often, a hobbyist with too much knowledge, is quite willing to cutcorners resulting in disastrous consequences.

Admittedly, no hobbyist should keep Discus, or any other fish for that matter, without knowing something about water chemistry. One does not have to dig too deep into the subject but an understanding of water hardness, the pH values and the nitrogen cycle are the main factors and should really be understood.

When we talk about water hardness we talk about calcium and magnesium salts disolved in water. The most important of these salts are calcium carbonates ($Ca(HCO_3)_2$) and calcium sulphates ($CaSO_4$). Water containing large amounts of these salts is called 'hard' and water containing little of these salts is called 'soft'. The hardness caused by calcium hydrogen carbonate is called 'temporary' or 'carbonate' hardness and will disappear when the water is boiled. The remaining hardness resulting from the calcium sulphates is called 'permanent' hardness. Temporary and permanent hardness equal 'total' hardness and one degree of hardness is equal to 10 mg of calcium or magnesium oxide per litre of water. It sometimes happens that the carbonate hardness is greater than the total hardness, this is due to the presence of sodium, pottassium and other cations in addition to the calcium and magnesium cations which cannot be measured with the available hardness testers commonly used by aquarists. These cations do not cause hardness but may occur together with the hydrogen carbonate union and so increase the quantities of the hydrogen carbonate in the water.

The total hardness has a direct effect on the cell function of the Discus fish (an other fish), the plants and micro organisms found in any aquarium and therefore fish should be kept in a water within certain limits and not in a water which happens to be available. We know from various publications that the water in their natural habitat is very soft (0 to

4 dGH) depending on area and time of year (Hans J. Mayland, *Discusfische, Könige Amazoniens*, Dr. Rolf Geisler, *Wasserkunde für die aquaristische Praxis*, E. Schulze, Amazonas, A&P, October 1977), we also know that the successful Far Eastern Discus fish breeders breed their fish in a very similar water which must mean something. When Discus fish are offered for sale 'acclimatised' to tapwater (which in England could be very soft, soft, medium hard or even very hard) are subjected to an alien environment, if that tap water doesn't happen to be soft.

The pH value indicates the degree of acidity of the water. Pure water contains an equal amount of hyrdogen ions (H+ions) and hydroxide ions OH—ions). A pH value of 7 is neutral water, a pH value below 7 is acid water and a pH value over 7 is alkaline water. Discus fish will tolerate a great range of the pH value of the water. *Symphysodon discus* Heckel, Heckel Discus will be able to tolerate for a short time a pH of 4, whereas all other species of Discus fish, whether they are wild-caught or tank-bred would become rather stressed in such a low pH. A good average pH value for the maintenance of Discus fish is around pH 6. Whether the pH value is a fraction higher or lower will make very little difference to the well-being of the fish. One must, of course, remember that a change of one unit in the pH value means a change of 10 times over in equilibrium and any change of the pH value of the water containing Discus fish (or any others) must be carried out with great caution and very slowly. A too sudden drop of the pH value, any Discus fish will show signs of great discomfort and although not always fatal will certainly result in a sulky Discus fish with 'white eyes' and loosing his protective mucous membrane. This will very often lead to other ailments and the already stressed and weakened fish is bound to suffer a great deal.

A Heckel Discus

The nitrification cycle is the most important reaction taking place in an aquarium. The poisonous nitrite content of an aquarium is related to the amount of protein in the water and with young Discus fish, an excess of the very harmful nitrogen compounds must be avoided otherwise the fish will not grow properly; stunted fish with large eyes are certainly the result of a breakdown. These fish will never catch-up and hardly ever reach a size of more than 3 or 4 inches but displaying all their full coloration. Any Discus fish breeder, who suddenly finds himself with a batch of youngsters often experiences heavy losses without any apparent reason, usually it is due to the breakdown of the cycle because of the large amount of food needed for the youngsters which in turn will create large amounts of excreta (faeces and urine) as well as uneaten decaying food, and a complete shift of the established functioning of the aquarium. These organic nitrogenous substances decay in stages but only in the presence of oxygen. Without oxygen, nitrogen cannot break down in the aquarium. If the oxygen supply is poor, the organic compounds decay more slowly and the water is enriched with the toxic interim products of ammonia and nitrate. Therefore any Discus fish aquarium, with its usually high temperature of the water needs a good oxygen supply. Also, the lack of a suitable substrate in a clinical set-up, will slow down the accumulation of nitrification bacteria. It is, I am sure, for this reason that great improvements to equipment have come about over the last years. Aids like the Oxydator and Bio system filtration units will certainly make the raising

A Doctor E. Schmidt-Focke Turquoise & Red Mal

A Wild caught Royal Blue Discus

of young Discus fish or just keeping an established tank in a more stable condition, that much easier. Because of that, it is claimed that

the growth rate of young Discus fish, raised in such a system, will be almost twice as fast. As the first 3 or 4 months of a discus fish are the most important of his life, great care must be taken during that time so that the nitrification process is working without breaking down. Finally, what seems a very common practise amongst many fish keepers but should really be avoided is the simultaneous change of the water as well as changing the filter. The reason for this is that with each change of the water and filter a reduction in the amount of bacteria will lead to a change in the existing equilibrium.

Discus fish food

When Mr. Roy Skipper wrote that Discus fish can be finicky with their food he probably related this fact to fish which were not in 100% health. From my experience I must say that a healthy Discus fish will almost accept any given food such as *Daphnia, Tubifex* worms, White worms, Blood worms, Glass worms, Oxheart and even Flake foods. I believe Discus fish will eat what they are used to and for this reason one must vary their diet and it is not uncommon that even the largest of Discus fish will take a flake like Tetra Cichlid food or similar. The feeding of any live food must be done with caution since through live food bacteria and diseases can be introduced into the aquarium. Disinfectants like Cilex have helped to eliminate many of the nasties so often associated with the feeding of live foods. I know of many hobbyists who have fed their fish no other live foods than White worms and Super shrimps, both a clean food and with the addition of Oxheart and many of the Gamma frozen foods have been able to raise the fish to full size without ever having had any diseases relating to the feeding of live foods.

Oxheart should certainly be considered their main diet and be given at least twice a day. Oxheart-fed Discus fish will almost always grow faster than fish fed without Oxheart. It is a cheap, clean food and can be prepared by any hobbyist. The Oxheart is freed from all fat and put into a food processor and cut into a suitable size. Flake foods, spinach or other ingredients could be added as well as a vitamin complex. Many Discus fishkeepers or breeders have their secret ingredients and their success is usually related to their food. Many 'different' kinds of food could be made by simply varying the ingredients and no Discus fish should ever get fed-up with their offered fare.

A new type of food suitable for the first week of a hatched-out Discus is now also available and should make the previously almost impossible task of raising Discus fish artifically somewhat easier. This food consists of 8 amino acids, 2 fats, 2 carbohydrates and 8 vitamins. The makers claim that due to the balanced composition of the ingredients and the resulting total absorbtion there is practically no excretion and therefore the water stays free of waste substances. This seems certainly the greatest step forward in the breeding and feeding of very young

Continued on page 40

by Eric Hardy

IT IS NOT easy for the average aquarist to make a hydrophone to hear his croaking gourami, his coral trigger-fish or other fish like carp, catfish, etc. underwater, because of the difficulty of waterproofing a typical microphone without preventing sounds passing through the cover. But if you fit a contact microphone clamped tightly by plasticine or adhesive tape to the outside of the fish-tank, with a long screened lead to an amplifier in a noiseless room, or the microphone made sound-proof boxed in wood or similar insulation, you should hear some sound.

Some sounds from goldfish, Siamese fighters or sticklebacks may be feeding. Equipment in the transistor range may be purchased from radio dealers and adapted, with their skill.

Natterjack toads

Noticing in the recent annual report of the Nature Conservancy Council a £6,461 grant for two years' research into natterjack breeding by Sussex University, I was asked my opinion on the first comprehensive book on *The Natterjack Toad* by Dr. Trevor Beebee of that university, published by Oxford University Press last year. It's a very comprehensive scientific monograph on its haunts, habits, ecology and conservation, perhaps not up to Marshall's classic work on the frog; but I was disappointed at several omissions and so much speculative theory and much quoting without precise reference to each source.

Its complaint of lack of interest by country naturalists' trusts makes no mention of considerable interest and research in the Lancashire Trust. The supposedly mysterious shoaling of tadpoles is explained in America, and previous issues of *Aquarist*, as heat-conservation in cold spells. There *is* more than one record of a natterjack without the yellow line, as I have recorded from personal experience in *Aquarist* and in *Water Life*, 1939. The book makes no mention of the Countryside Act, and of important literature like Standen's first 1914 study in depth of natterjacks in Cheshire, my friend the late L. G. Payne's 1936 *Natterjack Toad* and his pioneer vivarium in his Richmond garden where he was the first to keep and study natterjacks, and especially Arnold Cooke's annual Nature Conservancy reports since 1979 on British natterjack colonies.

The modern decline of natterjacks is attributed to reduced heathland which may apply to Hants and East Anglia, but in its biggest area, the Northwest, former colonies abundant on both sides of the Mersey estuary were exterminated by draining their marshes for docks, and draining the Wirral dunes. No mention is made of their relict pre-war colony surviving in Liverpool sewers, which I described in the *Aquarist*. Craneflies are an autumn as well as spring diet and locally the toads in my youth were called Bootle or Southport (not Birkdale) nightingales. In the controversy over conservation methods at Airsdale dunes, no mention is made of the mechanical excavator, digging pools on Ainsdale reserve dunes, whose caterpillar tracks killed so many natterjacks that a voluntary warden, the late George Threlfall, resigned in protest.

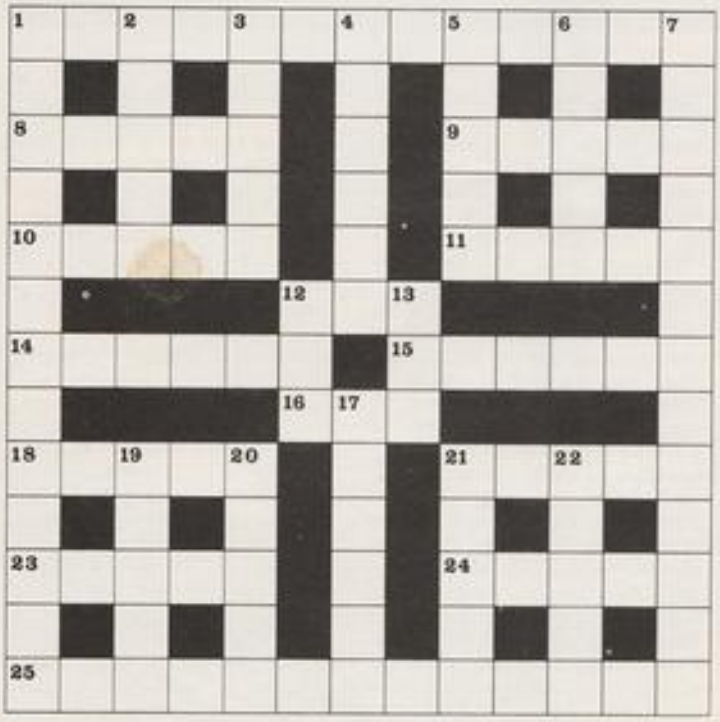
The Nature Conservancy's annual monitoring reports show the influence of rainfall on population-control, as many young are desiccated in droughts. Very small toadlets only 18·6 mm long survive hibernation which starts in October. Dytiscus and other water-beetles, dragonfly larvae, grass-snakes and hedgehogs prey on tadpoles. So will hens with access to ponds. Shoals of sticklebacks were harmless. If no recruitment of new natterjacks joins a colony for 2 years or more it becomes senile. Under favourable conditions males mature in three years and are identified by the pattern of dorsal stripe and warts. Spawning is from April to June and they do best in smaller, warmer pools. Females sometimes spawn twice, but they are not always the larger sex, as in most reptiles. They usually emerge from hibernation at the end of March.

Natterjack toad

Spawn is sometimes destroyed by Saprolegnia fungus and late spawn may be eaten by tadpoles.

Of Britain's 20-30,000 natterjacks, about 40% are on north Merseyside, 20% in South Cumbria and 20% on North Solway (Scotland). Their haunts are: *Norfolk:* Winterton Downs, Holkham reserve, Holme (introduced 1982), Syderstone. Introductions were at Sandy (Beds). Others are at Woolmer. *Lincolnshire:* Saltfleetby north end dunes reserve, Theddlethorp. Introduced at Milford quarry lake, Cannock Chase, Staffs. *Cheshire:* Hoylake Stanley Road Red Rocks reserve. *Merseyside:* a few Hightown dunes, most Formby, Point Range Lane End's Cabin Hillpool Ainsdale reserve, Birkdale dunes, Hesketh golf course. *Lancashire:* 1 site, Cockerham marsh. *Cumbria:* 21 sites from North (rarely now South) Walney, Roundhead, Sandscale, north of Dunnerholme golf course, Lady Hall, Millom Red Hills, Steel Green and other pools, Hodbarrow, Eskmeals gun range and shore reserve pools, Drigg north and south dunes reserve (opposite Ravenglass), Windscale, Braystones, Workington steel works, Allonby, Mawbray gravel pits and north slack, Wolsty Bank and golf course, Silloth, Haverigg, Kirksunton, Annaside, Hytton marsh. *Scotland:* North Solway, Caerlaverock, Powfoot, Southerness golf course, Newbie munitions factory, Priestside pool east of Burns Well, Midtown Farm. *Ireland:* Kerry south of Castlemaine Bay, sandy lagoons near Killarney, shallow lake Dingle peninsula. A reported introduction at Ynysla, north of Aberystwyth doesn't seem to have established, like some other introductions.

CROSSWORD *by Isis*



CLUES

Across:

1. By which name *Ponsinbie* and *Chastenbie* may be called (13)
8. Summate (3, 2)
9. Mixed up nun in am a year (5)
10. Egg laying cyprinodont (5)
11. Barb in Arctic town (5)
12. Age (3)
14. Pea rings in a season (6)
15. A damsel sported in a game (6)
16. Out of place (3)
18. Colour with 'e, my Yorkshire Rose! (5)
21. Odoriferous fish? (5)
23. Breeders entry usually as this (5)
24. Pound (one off) (1, 4)
25. Grampus species: King plus Pretender? (5, 3, 5)

Down:

1. Slightly salty suits Scots (8, 5)
2. Lunar water movement (5)
3. Pencil species (5)
4. Tank cleaner (6)
5. Stay 'e for the brewing? (5)
6. 1 coin classical term for dissolved chemical (5)
7. Rearrange meat on hide, do I? (13)
12. Self-esteem (3)
13. Deranged father (3)
17. Radio donation has spiny puffer (6)
19. European country (5)
20. Deleted *Poecilochromis* species; sexual without s . . . ? (5)
21. Neck ornament—guppy tail (5)
22. The same in the qualifications (5)

Solution on page 50

A Happy group

Continued from page 37

Discus fish and many more hobbyists should be able to raise their youngsters successfully where in the past they had no chance.

Although most hobbyists know what a Discus fish looks like, a great many hobbyists still find it difficult to distinguish between the various colour strains. As far as the wild-caught species are concerned the classification made by Schultz in 1960 is today still recognised and any hobbyist can familiarise himself. According to him there are two species with their sub-species:

(1) *Symphysodon discus* Heckel 1840 (Heckel Discus).

(2) *Symphysodon aequifasciata* with their sub-species:

Symphysodon aequifasciata axelrodi (Schultz 1960 (Brown Discus).

Symphysodon aequifasciata haraldi Schultz 1960 (Blue Discus).

Symphysodon aequifasciata aequifasciata Pellegrin 1903 (Green Discus.

It goes without saying that even any of the above mentioned species or sub-species will vary in colour or markings. Green Discus collected in Peru or Colombia are always dotted with red spots whereas Green Discus collected in Brazil in the Rio Purus are very similar to the Brown Discus. Although a Blue Discus is usually recognised by its markings of blue lines, not every Blue Discus has these blue lines.

The difficulty really arises when one is dealing with the many man-made varieties of Discus fish. There are the various strains of Turquoise Discus developed by either Dr. E. Schmidt Focke in Germany, or by Mr. J. Wattley in the USA. These fish usually colour up as their line has been fixed. There are, of course, other breeders of Turquoise Discus in the world today who have developed their own strain like Mr. Bing H. Seto and the Cobalt Blue Discus, or Mr. Mick Galbreath and the Powder Blue Discus or Mr. Kurth and the spotted Turquoise Discus, and many others. Many fish, young fish showing a lot of colour are often fed on hormones and although this practise used to be only employed in the Far East it has now also come to Europe. It is unfortunate that certain breeders find it necessary to feed their young Discus fish on hormones to be able to sell them. I am sure that many Discus fish fanciers would gladly keep a healthy, undamaged not so colourful Discus fish than a fish which will loose its colour within a very short time and usually be infertile as well. I really cannot see any sense in this at all; a Turquoise Discus which will turn into a Brown Discus. Hobbyists by refusing to purchase these types of Discus fish will certainly force the breeder to rethink his breeding habits for the good of all.

Although Discus are still by some considered a difficult fish to keep—I have found them very hardy and their longevity will give the enthusiasts a great deal of pleasure for many years and there is certainly no better sight in the fishkeeping world than a breeding pair of Discus fish and their young.

Coldwater Jottings

by Frank W. Orme

PERIODICALLY I get enquiries from various parts of the country, asking whether I can give the address of any coldwater fishkeeping society within their area. In many instances I have had to reply that, to the best of my knowledge, there is no such group in their locality.

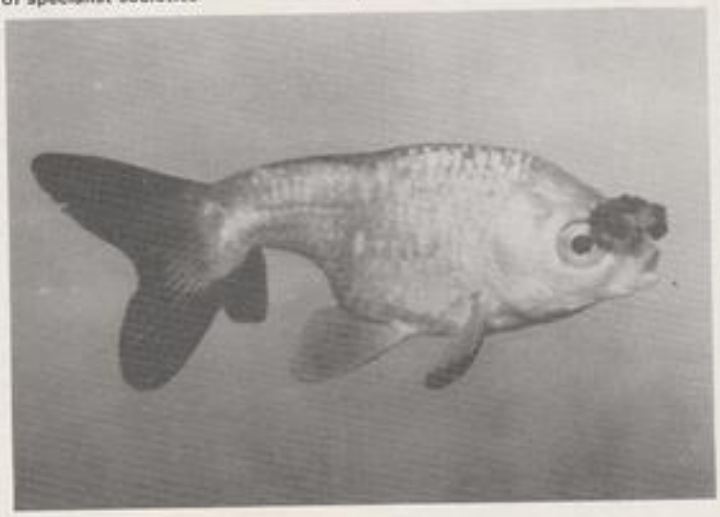
It has always puzzled me why, whilst nearly every town has a tropical fish society, goldfish societies are so few. The British Koi-Keepers Society, although relative newcomers to the fishkeeping hobby, have sections established in many parts of the country. Yet, goldfish societies can be numbered on one hand: the Goldfish Society of Great Britain, which is London based (although it does have a Scottish section); the Bristol Aquarist's Society caters for hobbyists in the Avon area; Lancashire has the Northern Goldfish and Pondkeepers Society which meets in Bolton; in the Midlands there is the Association of Midland Goldfish Keepers whose members meet in Coventry, and that is the sum total of specialist goldfish societies. London, Bristol, Lancashire and the Midlands have long been strongholds of the goldfish hobby; however, other areas also have their quota of enthusiasts but, so far as I am aware, no attempt has ever been made to establish a goldfish society in any of those other areas. Wales, for instance, has many enthusiastic goldfish hobbyists and yet, for whatever reason, they do not appear to have any inclination to form their own specialist society, and this applies equally to goldfish keepers elsewhere. It is not as though they were not interested in belonging to a society of fishkeepers, for many are members of their local tropical fish society.

There are many benefits to be derived from membership of a specialist society, not least being the sharing of a common interest. Within such a group new friendships will be forged, experiences and problems discussed. Meetings will be devoted to only those subjects which are of interest to the membership, the novice will gain in knowledge from talking to the more experienced members, and even 'old hands' may learn something new. Whilst there are benefits to be gained from membership of a society with mixed interests, I would suggest, most emphatically, that the benefits and pleasure derived from membership of a specialist society are far greater.

Every society originates from the vision and endeavour of one or two enthusiasts who are prepared to promote the idea, and are prepared to work to bring about the creation of a group of enthusiasts who share a similar interest. It can be quite a surprise to discover just how many fishkeepers there are in the area who would welcome the opportunity to become members of a specialist society that was within reasonable distance of their own home.

Creating a new society is not as difficult as it may at first appear; it only requires a willingness to 'set the

The Pompon—one of the many fancy varieties of goldfish kept by members of specialist societies



Coldwater Jottings

wheels in motion' by giving publicity to the idea. Obviously, in order to attract other fishkeepers, it will be necessary to spread the word around by giving publicity to the scheme. Approach the local pet stores and ask them to display a previously prepared notice, which should give a brief outline of the proposed new society and invite interested persons to contact you. Insert a similar small advertisement in the local newspaper in the 'Pets' section. The hobby journals should also be asked to give publicity to the venture—the *Aquarist & Pondkeeper* is always willing to give publicity to any proposed new society and, of course, if it is a coldwater society I would be only too pleased to mention it in my column. Be sure to approach any local enthusiasts that you know of and invite their participation and help. Whenever and wherever there is an opportunity to gain publicity, make full use of it. Treat all enquiries in a prompt and friendly manner, and keep them fully informed of progress until the time arrives to invite them to the first 'get-together'.

It is only necessary to have the firm intent, and the help of a few seriously motivated co-organisers to form the nucleus of the new society. Arrange a mutually convenient time, day and place to hold the initial meeting with the potential members.

A rough agenda should be prepared, which should be as simple and brief as possible. It need be little more than a few headings to act as reminders of the essential points to be discussed, such as how often should meetings be held, also when and where; how much should the subscription be, if any; is the number of members to be limited, or unlimited; what officers are considered necessary to form a committee, and for how long will the term of the appointed officers be before they become due for re-election; should a constitution be drawn up, setting out the aims and principles of the society. Finally, what should be the title of the new society—this should be simple but descriptive of the group's interests.

Having gathered the interested parties together, they should be warmly welcomed and thanked for their attendance. The outlined proposals of the agenda are then discussed and amended according to the majority opinion. Careful and accurate notes should be made of the decisions as each is arrived at and agreed. At the conclusion of the discussions, the notes should be read out to make sure that they are as agreed and have the approval of those present. Before bringing the meeting to a close, do not forget to arrange when and where the next meeting will be held. This will be the Inaugural Meeting, when the proposals will be finalised and the committee elected. Ask the departing visitors to do all they can to promote the next meeting with fellow aquarists, in an effort to obtain the largest gathering possible. Normally the decisions taken at the Inaugural Meeting will be binding upon the society, unless allowance is made for them to be varied, if need be, at a future Annual General Meeting (or a specially convened Extra-Ordinary Meeting).

The Annual General Meeting is usually the last meeting of the season. At this time the Chairman will address a few remarks to the members, the Secretary will report upon the progress of the society over the past year. The Treasurer will present a statement of accounts, which should have been previously audited. Each of the reports will be open to question by the members before they are asked for a vote of approval. At this meeting the amount of the annual subscription can be varied, if necessary, and a new committee elected.

The Ordinary Meetings are the main functions of the year, when meetings are devoted to subjects that are of particular interest to the membership, which will further their knowledge of the goldfish and its care. These meetings should be kept as informal as possible—restricting the business side to a minimum—ensuring that a relaxed and friendly atmosphere prevails at all times.

Hopefully, the foregoing will prove that it is not too difficult to found a new society, and will encourage readers to make the effort. A society may, after all, consist of a small group of six or so enthusiasts meeting at each other's homes. However, such a small group may well attract other hobbyists who would welcome the opportunity of becoming members. Publicity, both in print and by word of mouth, will do much to recruit others, and nothing would give me more pleasure than to be able to report the etsablishment of specialist coldwater societies in other parts of the U.K. during 1984.

Finally, if any reader is interested in forming a goldfish society in the Kent area, Mr. Paul Field, of 119 Star Lane, St. Mary Cray, Orpington, Kent BR5 3LN, would very much like to see such a society established in the area.

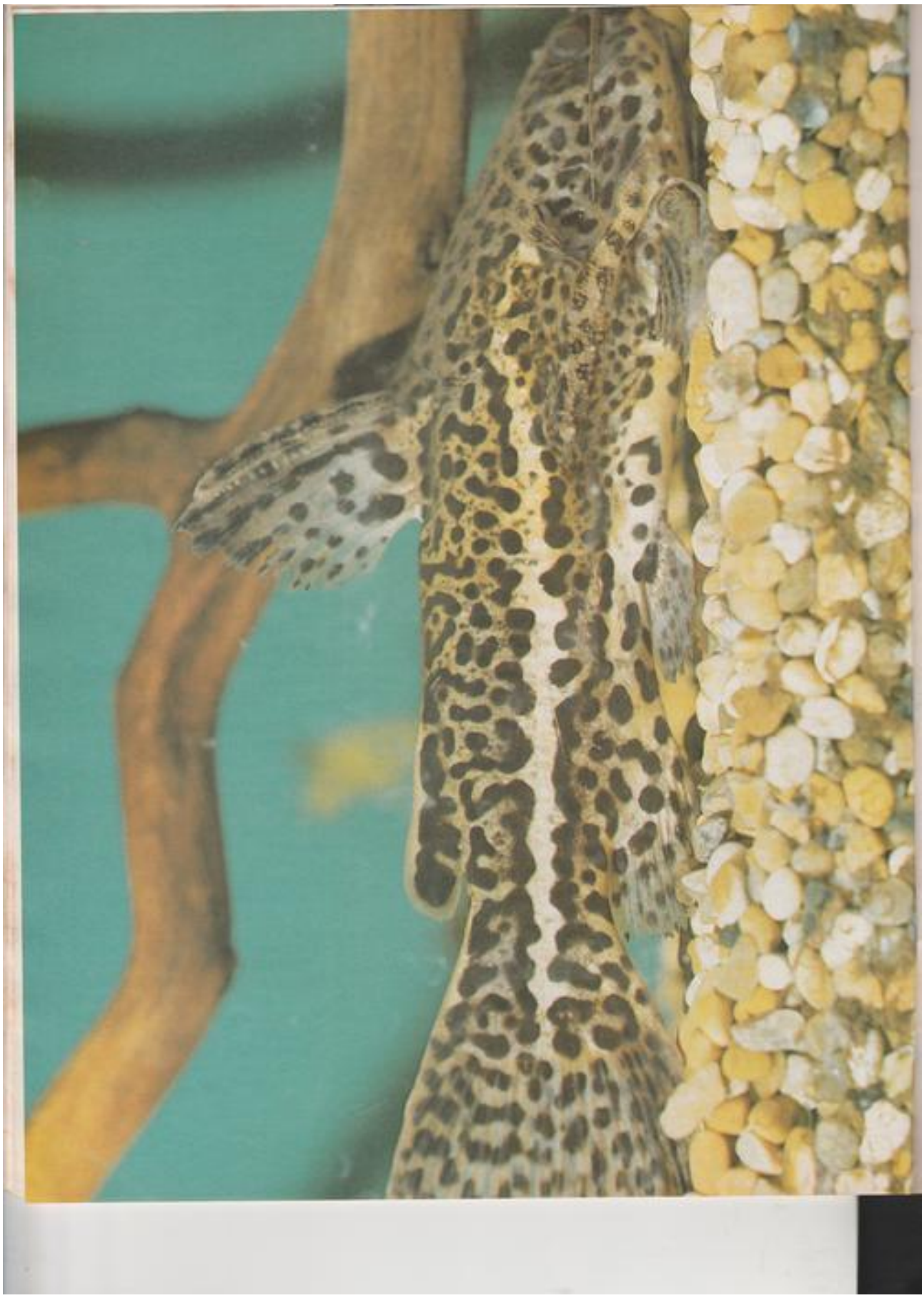
Come on, you goldfish enthusiasts, get organised into societies in the same way that Koi and tropical fishkeeping hobbyists have done—it can be done.

DISCOVER THE FISH

by Pisces—

The first is in HARBOUR and also in PORT
The second is in KIND but not in SORT
The third is in SORREL and also in HERB
The fourth is in STONE but not in KERB
The fifth is in SEA and also in SALT
The sixth is in BARLEY and also in MALT
The seventh is in BOTTLE but not in VESSEL
The eighth is in MORTAR but not in PESTLE
The ninth is in DORSAL but not in ANAL
The tenth is in BOARD but not in PANEL

(Answer on page 50)



SPOTLIGHT

The JAGUAR CATFISH

THIS midnight prowler can be seen gliding through the aquarium plant growth. The movement appears effortless, is silent and somehow menacing. To the observer an obvious comparison could be made between this catfish and the land feline, *Panthera onca*, the Jaguar, as it stalks the jungle, above water.

Liosomadoras is a strikingly patterned scaless catfish first described to science by R. H. Schomburgk who placed it into the genus *Arius*.

The recent science of this interesting catfish is available courtesy of Dr. G. F. Mees of Leiden Natural History Museum and renowned for his revision of the catfish families *Auchenipteridae* and *Pimelodidae* (formerly *Pimelodontidae* but corrected by Mees, 1983) Dr. Mees published a wonderful paper 'on the identity of *Arius oncinus* R. H. Schomburgk' 1978. In this natural history essay, Dr. Mees narrated his attempt to examine the original plate made by Schomburgk. Through the British Museum of Natural History he learned of the sale in London of some Schomburgk work and hoped to discover the whereabouts of the plate of *Arius oncinus*. The lot was purchased by the National Library of Scotland but sadly for Dr. Mees the trail petered away when it was discovered the *Arius* plate was not amongst the works of art.

by
David Sands

In nomenclature, H. W. Fowler (1940) described a new doradid *Liosomadoras morrowi* which in hindsight Dr. Mees admitted should have rung bells because it did not exactly fit into the family. The scaleless body (fitting the *Auchenipteridae*) was out of place with the main key of the *Doradidae* family, a single row of plates. The *Liosomadoras* did possess a rasp like postcleithral process, a character known in several genera within the family Doradidae. In truth it is these cross characters that bridge the catfish between these two families.

On examination of Fowler's Holotype Dr. Mees concluded that this catfish was identical to Schomburgks and should be placed in synonymy with the 1841 description. The name *Liosomadoras oncinus* was now founded and the catfish moved into the family Auchenipteridae.

American magazines have published photographs of the Jaguar catfish under various names but it is now certain these were incorrect (Brittan 1976 T.F.H. July).

Keeping *Liosomadoras* in aquaria should not present too many problems. They require slightly acidic water 6·5—6·9 pH and a spacious aquascape with bogwood type layout in which they can rest up during the daylight hours. An overcrowded catfish aquarium is not suitable as the soft flanks of the Jaguar could be scratched in the competition for hiding places.

A regular supply of chopped earthworms and tetra tabimin tablets will keep this beauty safe and sound for years of prowling.

Finally I will share a most amazing but true story relating to *Liosomadoras*. Members of the Liverpool Exotic Fishkeeping Society visited my shop a good while ago. At the end of their visit on one cold sharp winter's night they brought from outside into my shop a *Liosomadoras* for me to identify. The catfish floated upside down in a sweet jar, I hurredly placed it into an aquarium but all appeared lost. I carried the Jaguar into my home, wrapped it in plastic and placed it into the freezer compartment. My intention was to preserve it later to give to Dr. Mees.

Imagine my surprise hours later when my wife informed me that the fish in the freezer had moved, albeit a simple gill movement. We quickly placed the beautiful but forlorn fish into our own aquarium and a day later it fed greedily on chopped earthworms.

In over a decade of serious catfish keeping I have never witnessed such a recovery—the same fish was sold in my shop two months later; a typical cat with more than one life to rely upon.

Waterlife's two-acre site at Longford

BOTH freshwater and marine aquarists are familiar with the names SeAquariums Waterlife Centre, Waterlife Plastics Ltd., Waterlife Foods Ltd., Sansui, and Waterlife Research Industries Ltd.

What some aquarists may not be aware of is the way in which all these companies relate to one another.

The parent company is Waterlife Research Industries Ltd., all the others being subsidiaries specialising in one type of "product" or activity. The common factor they all share is Graham Cox who set up the original "founder" company, SeAquariums Ltd. at South End, Croydon in 1968. This was the first company in the world to deal exclusively with marines.

A main objective of the company was the manufacture and distribution of a range of products which Graham had developed during his marine biology teaching career in Central Africa in the late fifties and early sixties. These included 'Synthetica' Sea Salts (now marketed as 'Ultramarine') and 'Natura' Sea Salts. Over the years, other products have been developed and added to the list. Names that may ring a bell with our readers are 'Cuprazin', 'Myxaxin', 'Sterazin', 'Protozin' and 'Paragon'. 'Algizin(P)' and 'Sterazin(P)' are two other products specifically developed for ponds.

In addition, SeAquariums produce water treatments such as 'Haloex' (for neutralising chlorine, fluorine, heavy metal ions and other toxins in the water), test kits (for pH, nitrites, nitrates, fertility and hardness), vitamin supplements, freshwater ('Taxoflora') and marine ('SeaGreen') plant fertilizers and other treatment and maturing water additives.

All the SeAquarium products are manufactured in the company's new 18,000 square-foot, purpose-built production laboratory, very patriotically named 'Dreadnought'.

This laboratory, along with the other Waterlife companies, is based at the Waterlife two-acre site at Longford, a 'runway's throw' away from London's Heathrow Airport.

The incessant rumble of aircraft landing and taking off can be a bit disconcerting at first. However, Graham Cox's decision to move to this site way back in 1969, was a sound one. Being so close to Heathrow minimises livestock mortalities by reducing the period of stress experienced by the enormous numbers of fish and invertebrates which are regularly imported.

The import/quarantine/medication department is housed in a single-storey building named 'Invincible'. Being the "Wholesale" department means that this is the only building

Graham Cox with one of his brand new delivery lorries

One of the superb invertebrate tanks under the care of Ron Barlow in the Sansui Public Aquarium

which is strictly off-limits to the general public.

The company's Livestock Manager is Martyn Haywood, a regular contributor to the *Aquarist & Pondkeeper* who quite unwittingly demonstrated his genuine concern for the fish by declining to switch the main tank lights on during our visit because de-bagging of recent arrivals was in progress. Such action speaks volumes. Quite rightly, to Martyn, the fish come first and visitors second—an order of priority we heartily support.

Waterlife Plastics Ltd. was formed in 1983 with John Woolnough, an experienced plastics engineer, as Co-Director. WPL is a wholly-owned subsidiary of Waterlife Research Industries Ltd. and was formed to manufacture an entirely new all-British range of filters, air-pumps, water pumps, heaters, thermostats, ozonisers, air-diffusers, etc.

Waterlife Foods Ltd. is also a subsidiary company which was formed in 1982 to produce a new range of gamma-ray sterilised frozen foods which thus, overcome the risks of transmitting diseases or parasites to fish and invertebrates. WFL also produces and markets 'Invertfood', a micronised liquid food for marine aquaria, which is sold both here in UK and in very large quantities in Africa, Arabia and South-east Asia. 'Invertfood' is apparently used by many Singapore and Hong Kong breeders as a first food for baby *freshwater* tropical fishes.

The 'Victory' complex houses the retail buildings on the site of the old original SeAquariums Waterlife Centre. The 5,000 square-foot 'Victory' is managed by John Whitten. There is a Pacific Room (Marines), an Asian and an Amazon Room (Tropical Freshwater), a Chinese Room (Exotic Goldfishes), a Japanese Sales Garden (Koi) and, still under construction, a Japanese House.

The Sansui Japanese Gardens and Public Aquarium are run by Ron Barlow, the Manager, and his staff. The outdoor component consists of a true representation of the first half of the name and incorporates, therefore, numerous oriental touches (including plants and waterfalls) and three 50,000 stock ponds containing Israeli-bred Koi (initiated by Graham Cox) which measure up to 2½ feet in length but sell at a fraction of the price commanded by Japanese-bred fish.

Indoors in the Public Aquarium, is the famous 100,000-gallon Living Coral Reef Tank where numerous coral-fishes and invertebrates can be seen. It was very gratifying to see numerous very young fish, a clear sign of "natural" breeding successes. Sizewise, the most impressive occupants are a 4½ ft. White-tip Shark and three substantial Remoras.

Other tanks in the Sansui Aquarium hold a wide variety of tropical marine and brackish water life, all maintained and exhibited in excellent fashion, including an, as yet, "unknown" (to us) species of marine fish.

The Waterlife site is open to the public from 10.00 a.m. until 6.00 p.m., seven days a week (except Christmas Day, Boxing Day and New Year's Day).

There is a 100-car tarmac carpark, toilets and a picnic/refreshment area which will shortly be covered over and heated as a Tropical Garden Refreshment area.

There are numerous other projects that are either underway or on the drawing board but we cannot, unfortunately, feature them here either through lack of space or the desire to respect confidences. No doubt, Graham Cox will make these known publicly as and when circumstances allow.

For fuller details of Waterlife Research Industries Ltd., contact Graham at 476 Bath Road, Longford, West Drayton, Middlesex. Tel: Colnbrook 2487/5696.

Graham Cox's white-tip shark

WHAT IS YOUR OPINION?

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

'Photographs by the Author'

THE FIRST of this month's letters is headed Wolverhampton Aquarists' Society, and was written by Mr. T. R. Share, of 487 Sutton Road, Walsall, West Midlands, WS5 3AU. He writes: "Do you know the present address of the present secretary of the Newcastle Guppy and Livebearer Society? If not, can you find out if any of your colleagues on *The Aquarist & Pondkeeper* know of it? The name and address I have are: Mrs. J. Renton, of Half'beak House, as described 18 months ago in the *A & P*. I sent an entry fee to her in cash and have heard nothing since—and a couple of months have passed. I wrote a month ago and got no reply once again.

I'll forward your letter to Mr. John Young, our Advertisement Manager, in the hope that he may be able to advise you. I hope you did not lose much money, Mr. Share, in the post. Last September I had the misfortune to 'sell' a £100 hi-fi amplifier to a magazine reader who lives in North London. The verbal contract was conducted by telephone and the 'buyer' asked me to forward the unit by Securicor and said that he would forward my £100 plus half the cost of carriage after he had received and checked the amplifier. Securicor delivered my amplifier to the gentleman in question; but I did not receive a penny from him and none of my letters brought a word of reply despite recorded delivery. The police were unable to help. My thanks to an aquarist friend who lives in London who kindly made two visits to the address where my amplifier was delivered—only to find that the occupant was out. I regret having been gullible enough to have been taken as a sucker. Any suggestions? I told another reader/aquarist that he could keep my amplifier if he managed to get it back. I haven't heard from him since.

I was invited to dinner at my doctor's home recently and was amused when his wife and younger teenage son reminded me of their calling on me, some years ago, at the suggestion of a vet. It took me some time to recall the lady and the little boy with sick sticklebacks in a jamjar. A couple of nights ago I took my dog along to my local vet to get its two, annual vaccination injections, and some vitamin E and hormone tablets. While in the waiting room I was intrigued to hear one teenager tell another about his having been present when a little boy arrived with his dead goldfish floating on top of a goldfish bowl. "What happened?" asked the girl. "The vet told the boy that the best thing to do would be to pour the dead fish into a river," replied the teenage lad. "Did he charge him?" asked the teenage girl. "No, silly!" said the lad. About 30 minutes later, as my Scottie dragged me rapidly away from the vet's surgery £15·25 lighter of pocket, I considered how glad I was to have dozens of fishes and only one dog; but when I thought of the chap who had sat in front of my dog and me in the surgery, and of the fact that his beautiful spaniel with the twitch in one of its legs had had to be put down because of the progressive damage being done to its nervous system by the distemper virus, I was well aware of the fact that he would have been quite happy to pay out £15·25 if he could have saved his dog's life.

Former pupil Robert Robinson, who has a thriving collection of fishes both in his indoor tanks and in his outdoor ponds, recently asked me if I ever lost interest in my fishes. I was pleased to say that my interest had remained permanent to date and that I had never been without fishes since about the age of five. My hobby interests still revolve around aquaria, reading, writing, swimming, gardening, photography—still and video, playing records and tapes, recording, and radio and television. I like telling young children stories; and I like teaching teenagers for a living and seeing them mature into sensible young adults such as Robert.

I was interested to receive Newsletter No. 13 of the Anabantoid Association of Great Britain. Called *Labyrinth*, this useful, little publication

Java fern—*Microsorium pteropus*

Indian fern (centre) with *Cabomba*, hairgrass etc.

stretches to 12 pages and gives helpful information on the family of fishes that includes gouramies and Siamese fighting fish. Mr. D. M. Armitage, the editor, continues to do a most useful job. I often wonder how the various society magazine editors manage to get contributors to write and submit articles for publication. It must be for love and not money!

One of my *Bolbitis* (African fern) plants is now growing very well, producing quite large, dark green fronds, and very slowly creeping across the rock on which it is growing. I think that I'll soon have to move it and its rock to a tank larger than its present one of 20 in. × 12 in. × 10 in. My other adult plant is growing much more slowly. A small piece I removed from one of the adults some months ago is not making very much growth in another tank. I thought it had attached itself to a rock; but I now see that it has not. African and Java fern seem to grow better once attached to a solid object such as a rock.

Dr. J. Neville Carrington, of Interpet Ltd., is one of those uncommon people who manufacture aquarium products *and* retain an active interest in keeping fishes and aquatic plants at home. Neville kindly sent me the following opinions in response to the topics posed in my February article. "Under-gravel filtration. I use our Interpet CV sub-gravel filters in several of my tanks and find them very convenient and very good at keeping the water clear. With any sub-gravel filter it is necessary to exercise a maintenance routine from time to time by syphoning off excess mulm from larger fishes in freshwater tanks: and the filter should be cleaned out every year or two.

"The idea that plants will not grow in an aquarium with a sub-gravel filter is only partly true since many plants quite like to have a gentle flow of water pass their roots. It is always possible in any case to put a saucer or even a disc of polythene above the filter under the gravel where you want to grow the plants. Many plants will grow in any case in an aquarium with a CV sub-gravel filter without such measures. Many people consider that marine aquariums' sub-gravel filters with a bed incorporating coral sand together with a protein skimmer are the ideal way of keeping the water in good condition.

"Outside box filters. The popularity of air-operated, outside box filters has tended to decline in recent years and possibly this is a little unfortunate because maybe people forget that they are an economical and efficient way of removing excess mulm from the tank. They have the advantage that they do not disturb the aquarium when cleaning, and that they have a good dirt capacity, but the disadvantage that they do not operate very well when the water level in the aquarium is not high. We do find however that our Super Twin filter in particular is still very popular because this has such a good flow rate with only a moderate air consumption.

"There is a lot to be said still for motor-operated, outside box filters although enclosed filters and internal filters appear to be becoming more popular.

"As you know, I have trouble in growing Java fern, and whilst I used to be able to grow Indian fern I have not had success for some time. My *Cryptocoryne aponogetifolia* still grows fantastically well. If you recall, the sample I sent you did not survive. An unusual plant I am now growing with limited success is *Ceratopteris siliquosa*. At the moment I regard the growing of aquatic plants as quite a challenge and I should be glad to hear of anybody in the immediate area who is similarly interested."

The first of this month's photographs is of a decorative aquarium planted only

***Gyrinocheilus aymonieri* — sucking loach**

with Java fern—*Microsorium pteropus*. I find it an excellent plant for use either alone or with other species. Photograph 2 shows a variety of plants in another decorative aquarium. The major one (centre) is Indian fern—*Ceratopteris thalictroides*. Its other names include water speite. Under suitable conditions it can quickly grow up through the water surface and produce feathery fronds in the humid air above the tank. Both ferns produce young plantlets on mature leaves. Ferns do not flower; they produce spores.

Photograph 3 shows the popular sucking loach—*Gyrinocheilus aymonieri*. Have you any unusual stories to recount concerning this interesting species? The fourth photograph is of

A beautiful marine

a beautiful marine fish, the name of which I've managed to lose—and I still cannot recall who 'borrowed' my book about marine fishes. Drop me a line if you have kept the species shown and have some information to pass on about its requirements. I have yet to try tropical marines or koi. Please drop me a few lines if you share my passion for growing aquarium plants.

Many years ago I bought three small, outside filters known as the 'Slim Jim'. They have been in use until recently—when I managed to damage one of the three. The other two are still working perfectly. If you have an old 'Slim Jim', in good order, lying around your fish house, please let me know. I should also be very pleased to hear from you if you actually have a fish house. It's something I have never had.

I'm still testing a delightful Nuova power filter I received recently from Hillside Aquatics. It's even better than earlier models. I hope to write my review of it soon. Which filters do you like best? Obviously money will govern the choices of most of us!

Mr. Paul England lives at 12 Birchett, Ashford, Kent, and writes: "Many congratulations on this your 21st year as a contributor to the very excellent *Aquarist*—which, incidentally, is the length of time that I have been following the hobby. My other hobbies include keeping a mixed aviary of Australian finches and African waxbills in the garden, and gliding instructing at weekends at the Kent Gliding Club.

"When I first set up a modest tank at the tender age of 15 I was able to afford a stainless steel worm mincer, purchased from a local Wimbledon aquarium dealer. However, during the course of various home moves—who can afford to live in Wimbledon!—I realised to my horror that I had mislaid the most valuable gadget that could reduce a large garden worm down to a sensible size that would satisfy the smallest of fry. They are no longer available on the market. Perhaps the anti-blood league, etc. have been instrumental in their demise. However, I would like it placed on record that this stainless steel mincer did not cause any pain or suffering—provided you did not get your fingers caught between the discs! Whilst on the subject of worms, I might make a suggestion that would assist your correspondent, Mr. R. H. Chaplin (February issue), in removing white worms from the soil culture. The worms will cling quite happily to the surface of a glass sheet placed over the compost.

"Mr. Martin Moore (same article) expressed difficulty in obtaining a separate heater and thermostat. I have just purchased from a dealer in London SW1 a Uno external thermostat with 2 × 100 watt Uno Regal heaters for my new 48 in. aquarium. I wonder if worm mincers are available in America, Mr. Moore." (Many years ago, Mr. England, when I was a child, an adult aquarist made me a present of a pair of stainless-steel worm mincers. I have not used or seen them for years; but I think I know almost exactly where I'll be able to find them. When I unearth them, I'll send them to you as a little present after I photograph them. Using them rather frightened me, I think. If I recall correctly the mincers would not be too difficult to copy/manufacture. I'll consult with a colleague who teaches metalwork before parting with my pair.

For next month please send me your opinions on any topics mentioned in this month's article, also on any unusual pieces of equipment that you, as an aquarist, find useful. I'd also like to know where you site all your tanks in your home, i.e. room and situation (in light or shade). Goodbye until next month.

(Answer from page 43)

ODESSA BARB

Solution from page 39

Across:
1. Butterflyfish
8. Add up
9. Annum
10. Killi
11. Tuto
12. Fin
14. Spring
15. Dominot
16. Odd
18. White
21. Smelt
23. Teams
24. A quid
25. Royal and False

Down:
1. Brackish water
2. Tidal
3. Espei
4. Filter
5. Yeast
6. Ionic
7. Hemiodontidae
12. Ego
13. Add
17. Diodon
19. Italy
20. Basil
21. Scarf
22. Equal

A-Z of the Aquarium

Anablepidae

THE Anablepidae constitute a small Family of fresh and brackish water livebearing fishes from southern Mexico and northern South America.

There is only one genus, *Anableps*, with three species, *A. anableps*, *A. dowii* and *A. microlepis*. The one most commonly found in shops is *A. anableps*, but even this species is only rarely available.

The Anablepidae are also known as Four-eyed fishes owing to their unusual eye structure that allows them to see above and below water simultaneously. Despite their name, these fish do not really have four eyes. They have just the usual two, but these have remarkable adaptations that enable each eye to function as if it were two.

The adaptations that make this possible are, largely, concerned with the iris and lenses of the eyes.

The iris which, in most fishes, forms a ring of coloured tissue encircling the pupil, has two wing-like projections in the Anablepidae. These extend horizontally across the pupil where they touch but do not fuse. However, they form an effective horizontal barrier to light entering the eye and, therefore, "split" each eye into an upper and lower half. This is further enhanced by a horizontal band of pigmented cells which lies directly above the iris projections.

Although these modifications allow light to enter each eye via two apertures, they do not, by themselves, actually enable the fish to see above and below simultaneously.

For accurate vision in water, the best shape for a lens to be is spherical. For air vision, the best shape is biconvex with the long axis aligned at right angles to the incoming light.

In the Anablepidae, this is precisely what happens—the "ends" of each eye lens are rounded for water vision and are separated by a more or less extended biconvex portion for air vision.

Another interesting characteristic of the Anablepidae is that some males can only swing their gonopodium (modified anal fin) to the right, while others can only do this to the left. Similarly, females have their genital apertures deflected by modified scales (Foricula). Therefore, mating in such cases can only occur between opposite types.

***Anableps anableps*, showing the long straight back and posteriorly placed dorsal fin that allow it to swim just under the surface**

Bettas

Could the real name of *Betta splendens* be *Pseudobetta splendens* or *Parophiocephalus splendens* or (even) something completely new?

IT could be said that *Betta splendens* is one of the "stalwarts" of the aquarium hobby. However, the story behind this "firm" favourite is anything but firm at the moment.

Hans-Joachim Richter published an article in *Aquarien Terrarien* in 1981 in which he divided the various species of the genus *Betta* according to their method of reproduction. The bubble-nest builders, including *B. splendens*, remained in the genus, *Betta*, while the mouthbrooders were given a new generic name, *Pseudobetta*.

On the surface, this would seem quite straightforward since some species, notably *B. brederi*, *B. picta*, *B. taeniata* and (most recently) *B. macrostoma*, the Brunei Beauty, are known to be mouthbrooders and have, as such, certain physical characteristics to accompany the behavioural ones. For example, these species tend to be less aggressive (they don't have a nest to defend) and have bigger heads (an evolutionary adaptation to carrying eggs in the mouth).

The problems really start when the list of recorded *Betta* species is examined in detail. There are no fewer than 17 separate "species" (depending on which authority is consulted). However, little is known about some of these and it is believed (known?) that some names may be no more than synonyms. The real total is, therefore, likely to be considerably less than 17.

When we start examining this possibility, things begin to get really complicated. Richter named *Betta picta* as the type species for his new genus *Pseudobetta*. Bleeker, who was originally responsible for the name *Betta* in 1850, named *B. trifasciata* as his type species.

However, *B. trifasciata* is regarded by some workers as being a synonym of *B. picta* or *B. taeniata* (itself probably a synonym of *B. picta*). If this is the case, then Richter's *Pseudobetta* becomes a junior synonym of Bleeker's *Betta*. If mouthbrooding is significant enough to separate the "*Bettas*", then the mouthbrooders become *Betta*, leaving the Siamese Fighter and the other bubblenest builders hanging in mid-water, as it were, and requiring a new name.

At first sight, there seems to be a possible name, *Parophiocephalus*, first used by Popta in 1905. However, the type species for this genus is *P. unimaculata*—a mouthbrooder!

Could the Siamese Fighter end up as *Pseudobetta splendens*? Time will tell.

Anemones

ANEMONES belong to the Phylum Coelenterata, or Cnidaria, which is made up of three Classes; the Hydrozoa (*Hydra* and its relatives), the Scyphozoa (most of the Jellyfishes) and the Anthozoa (the Anemones, Corals and Sea Fans).

The Anthozoa are split into a number of Orders, e.g. the Sclerectinia (Stony Corals), the Gorgonacea (Gorgonian or Horny Corals), the Alcyonacea (Soft Corals) and the Actinaria (Sea Anemones).

Anemones are solitary Anthozoans characterised by the absence of a skeleton, the possession of "mesenteries in hexamerous cycles" and the presence (usually) "of two siphonoglyphs".

A mesentery in Anemones is a muscular partition extending inwards from the body wall into the body cavity. These mesenteries are usually arranged in multiples of six, hence the reference to "hexamerous cycles".

The "mouth" is slit-shaped, usually with a ciliated groove at either end. These are the siphonoglyphs and their role is to circulate water into the body cavity through the beating of short, hair-like cilia.

The mouth is, in turn, surrounded by tentacles which are armed with stinging cells (nematocysts).

These nematocysts are used to paralyse prey which is then dragged into the "stomach" (gastro-vascular cavity). Some small species are suspension feeders, trapping large quantities of small particles on their tentacles rather than single large food items.

Although Anemones live solitary lives, some are well-known for their associations with fish, crabs and shrimps. In some cases, crabs adorn their shells with anemones, thus acquiring formidable protection from predators. In return, the anemones obtain food from the crabs feeding activities and also (probably) derive benefit from being transported to a variety of environments.

Some of the larger species of anemone live in harmony with members of the Damselfishes (*Pomacentridae*), notably the Clownfishes, *Amphiprion spp.*, which are immune to the stinging cells or else inhibit the nematocysts from firing.

A Caribbean Clown with its anemone

Reproduction in Anemones can be asexual, by splitting in two or by leaving bits of the basal disc behind as the animal moves, or sexual, in which sperm and eggs may be produced by a single individual (hermophroditism) or by different individuals. Fertilization may be internal or external and some species are known to "brood" their young.

Binomial Nomenclature

Cichlasoma maculicauda Regan is known as the Spotted or Black Belt Cichlid (English), Cichlasome Macule (French), Getupfter Buntbarsch and Schwartz gurtel-Buntbarsch (German). No doubt, as this beautiful fish becomes established in other countries, further names will appear. Yet, in spite of this, all fishkeepers (irrespective of nationality) should know which fish is being referred to if the scientific name is mentioned. This does not apply when common names are used.

A further source of confusion arises when one common name can refer to a number of species. For example, the name Mosquito Fish is used in referring to *Heterandria formosa*, *Gambusia affinis affinis*, *G. affinis holbrooki* and others, e.g., *G. marshi* and *G. longispinis*. Even some Killifishes could lay justifiable claim to the name.

Binomial nomenclature represents an attempt at bringing some order to the chaos by allowing only one valid

Cichlasoma maculicauda

name per species. Guidance for systematists, whose responsibility it is to name species, is provided by a code of rules drawn up by the International Commission on Nomenclature.

These rules state that the name of an organism must consist of at least two parts. The generic name, that is, the name of the genus, is written with a capital letter, e.g. *Osphronemus*, while the name of the species is written in the lower case, e.g. *goramy*. Both names are written in italics.

If a species is thought to be represented by two or more sub-species, then their names follow the same format, e.g., *G. affinis affinis* and *G. affinis holbrooki*.

No generic name may be used more than once in either plants or animals and no specific (trivial) name may be used twice in the same genus.

Scientific texts usually include the name(s) of the author(s) immediately following the scientific name of the species. These names are not italicised and may be enclosed in brackets. If not, as in *Skiffia francesae* Kingston, this signifies that Kingston was the first person to name the species. If, however, the author's name appears in brackets, it signifies that the author named the species but placed it in the wrong genus. Later, it was transferred to the correct genus by another author, e.g., as in *Xiphophorus couchianus* (Girard) which was originally named, *Limia couchiana* by that author.

Osphronemus goramy

by
Roy Pinks

MY earlier notes covered some of the techniques for the successful culture of submerged aquarium plants. In this article I will put down some thoughts to help the purchaser to get the best value for his money by discussing the purpose of the various groups of plants which come our way. Once again I will emphasise that you will have to accept that the majority of plantings are temporary, simply because insufficient thought is given at the outset. If some planning is done and the plants are allowed to become established before fish are introduced, you will save lots of work and wasted money. It is not unreasonable to look at the planting of a bare tank in much the same way as the owner looks at a bare patch of garden. Both need a reasonably permanent planting of key subjects to form a backbone for the scheme. If everything else were permanent you might get tired of it, so comparatively short-lived plants are introduced to provide variety of colour or form. With gardens the permanent features are trees and shrubs, with perennial or annual plants providing greater or lesser lasting variability. In our tanks certain specimen plants will supply the landmarks, and these are allied with lower growing forms which add some shape. Quick-growing plants, usually termed "bunch plants", are used to fill in the gaps, and finally there are the floating species which usually run riot and need careful regulation.

There is no rule in the book which says you should have some of each in every tank, so you can choose what you like, though this is not to say that what you like will like you or your local waters or the particular tank in which you put it. There is a tremendous amount of trial and error in all this, with no reliable guideline to success excepting the principle that if a plant does well in your tank, capitalise on it. I also believe in leaving plants alone, trimming apart, if they are making out well. So, draw a plan of what you think you would like to see by way of form, and then either visit one of the specialist plant nurseries or consult one of their catalogues. I have recently been having fun (some of it unintentional) with the revised book issued by Everglades Aquatic Nurseries of Baunton, nr Cirencester. If anybody issues anything to compare with its helpfulness in shaping out a plan for a new tank, I should be delighted to receive a copy.

I repeatedly plead the cause of these specialist nurseries, which are run by plantsmen who really know their stuff. There is at the present time a bit of a boom in the marketing of first class aquarium plants, and most of the retailers' tanks are packed with them. Unfortunately over half will rot away within a week or so of purchase and probably a fifth of what is on display is not fit for underwater culture anyway. Dracenas, Ophiopogons Chlorophyllume, Hemigraphis and the like are widely offered as tank plants, and this is all wrong. They are terrestrial, and should in my view be advertised as such, in the spirit of the Trades

Aponogeton echinatus

COMMENTARY

Description Acts. The Everglades Catalogue, quite correctly, offers them and their like for paludrium use, and this is what ought to be universal practice.

In drawing up your plans you will take into account whether you want more or less permanency in your plantings. Some of us love to spend a few hours water gardening during the depths of the winter, whilst others prefer to let the plants look after themselves. So, the former will accept quite happily the wide range of bunch plants which can be moved around, pruned, cuttings taken, and experimented upon. Linked with them are many gorgeous specimens, notably the Aponogetons, which are bulbs; most of these require a resting period, so for several months there is a gap in their display, and, rather worse, the bulbs need to be removed from the tank and stored in damp sand at a lower temperature than normal. This is a nuisance and detracts considerably from the value of this group of plants, though it does argue the case for planting in small pots, which I have already dealt with.

Thus, the lover of the static but slowly improving scene will opt for certain of the permanent specimen plants, supported by some of the smaller "perennials", which in practical terms means the Cryptocorynes. These wonderful species often get by with less light than the aquarist thinks is necessary, and once their roots have secured they form marvellously attractive thickets which improve all the time. They are, regrettably, less available generally than they ought to be, and this is another reason why the specialist plant nurseries are indispensable for the successful tank. There are certain plants sold in bunches which will also prove tolerable to the lazy aquarist—any offered as "slow growing" are likely starters. Floating plants are best introduced for special reasons, either to reduce light in certain areas to defeat algae forming on submerged leaves, or to offer sanctuary to young fish. I would discount them in setting up a new tank, though the undersides of some do have their own attraction in some eyes. All need careful monitoring for over-rampant habit.

Two final points before making actual selections. Do resolve, whatever the cost to outlaw all snails, however tiny, from your new tank. The ravages of even the most miniscule can be devastating to your new plants which need their full strength to establish themselves. Equally, don't include bottom dwellers like catfish or loaches, which spend much of their time undigging all that you have so carefully put into position. The tiny foreground plants are particularly at risk here, and these are usually some of the trickiest to get going anyway.

CORRECTION

Poolside Plants from Seed (April, 1984)

The above article was held over for publication from last year and there have been subsequent revisions to References and Prices quoted, these amendments are noted, hereunder.

The reference to the previous Winter's record temperature of —36°F alluded to the Winter of 1982/83.

	Ref. in catalogue	Price
Suttons		
Anemone pulsatilla	10-16-36	50p
Cowslips	11-14-51	*
Mixed primulas	12-98-07	50p
Polyanthus, blues	12-85-77	85p
Arenaria	10-32-62	45p
Armeria	10-33-43	45p
Lobelia cardinalis	12-01-74	60p
Night scented stock	11-28-68	33p
Dobies		
Cowslips	2358	39p
Trollius	2883	45p
House leek	2833	55p
Thompson & Morgan		
Aubretia	7910	60p
Caltha palustris	7104	60p
Hardy cyclamen	2900	£1·50
Dierama pulcherrima	2915	80p
Hostas	8253	£1·15
Ligularia	8312	60p

*Not available this year

Tomorrow's AQUARIST

NEW EXCITING "OPEN" FUN-FISH COMPETITION

AMONG the many, excellent entries we received from our "Design-a-Fish Competition" (the winners were announced last month), we found a number of very clever, humorous ones. Unfortunately, some of these did not quite qualify for the competition because they were not designs of the "bottom-living-snail-eating" fish we were after.

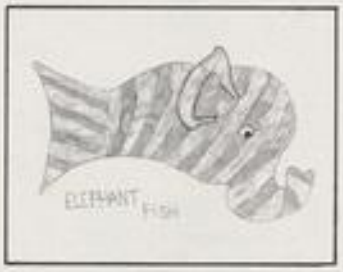
Nevertheless, these entries showed a considerable amount of thought and originality and, above all, showed a great sense of *fun*. We strongly believe that fun should play a major role in fishkeeping and have, therefore, decided to award a prize to the best of these "fun" entries. Each of the "winners" will shortly be receiving the first of SIX FREE ISSUES OF THE *AQUARIST AND PONDKEEPER*.

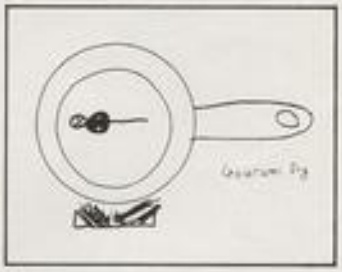
The Elephant Fish was sent in by:
EMMA JANE LEAR (Age 10),
93 HADEN HILL ROAD,
HALESOWEN,
WEST MIDLANDS.

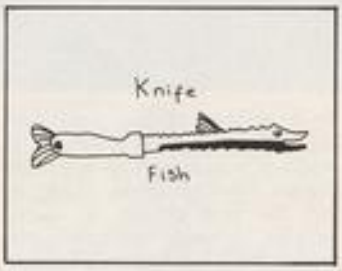
The Gourami Fry was received courtesy of:
ANDREA EAST (No age details supplied),
36 COLLEGE VIEW,
DELVES LANE,
CONSETT,
COUNTY DURHAM.

The Knife Fish (along with another drawing) came from:
MARTIN WRIGHT (Age 13),
34 CHURCH STREET,
WOODFORD,
LONDON, E18.

★★★★★★★★★★★★







★★★★★★★★★★★★

There must be hundreds of brilliant ideas just waiting for the right opportunity. If you think you can match this month's entries, then send us your drawing, along with your name, age and address. If we print your entry, you will win a FREE SUPPLY OF THE *AQUARIST AND PONDKEEPER* FOR SIX MONTHS.

There is no age limit in this Open Competition. You also have free choice of subject. However, just to get your thoughts moving along the right lines, some possible names to play around with could be: Horse-faced Loach, Four-eyed Fish, Egyptian Mouthbrooder, Cardinal Tetra, Flying Fish, Butterfly Fish, Clown Fish, Flying Fox, Spanner Barb . . .

You may even wish to invent a fish. How about the Flop-finned Dozy Barb? The name does not even have to be in English. One of the entries we received from Martin Wright was of *Tilapia buttikoferi*. Martin's drawing was based on the *butti* part of the name, showing a butter-pack-shaped fish which we cannot, unfortunately, publish because Martin included the actual brand name of butter! Sorry, Martin!

We look forward to receiving your drawings. These should measure no more than 10 inches by 8 inches and may be coloured and labelled. Print the words "FUN FISH" along the top edge of the envelope and send your entry to:

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

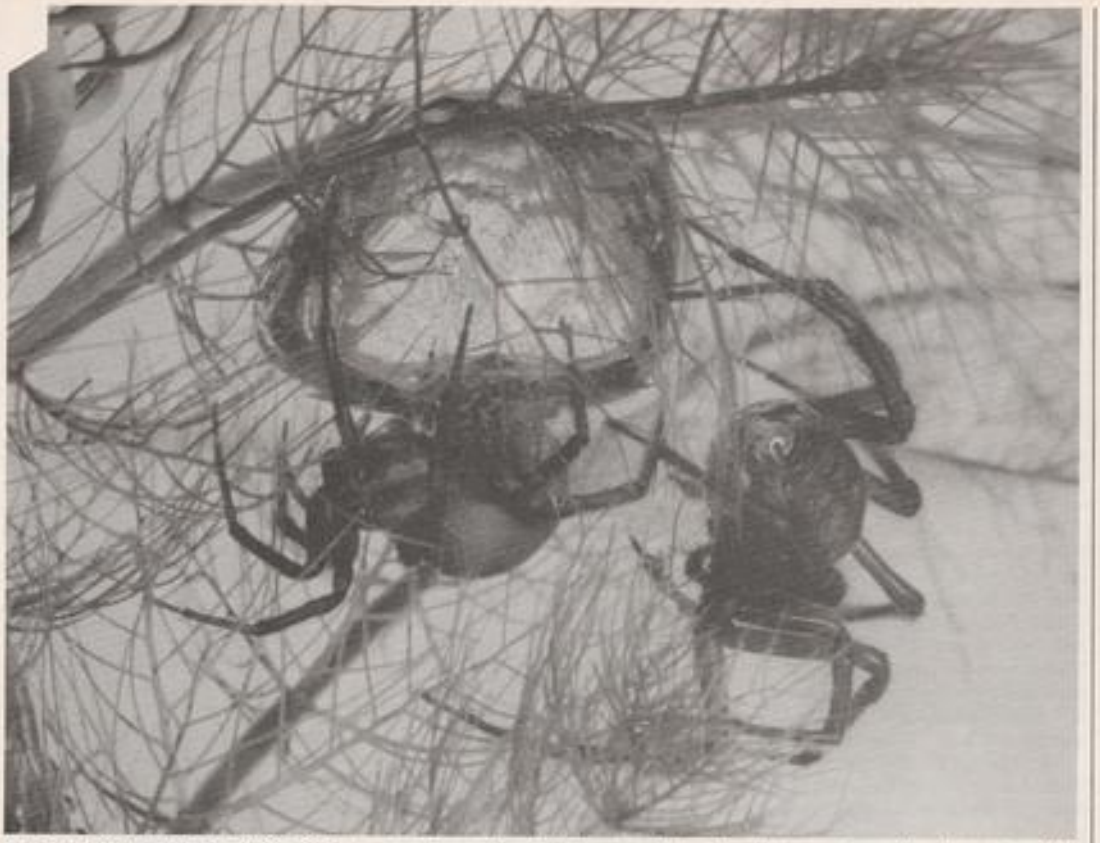
the water spider

Written and Illustrated by L. E. Perkins

Water Spider on submerged water-plant and showing thick coating of hairs on abdomen

ARACHNIDA is the class of arthropods describing spiders, the name deriving from that of the legendry maiden, Arachna, who was turned into a spider by the goddess, Athena. Spiders are to be found in every region of the world, even in polar areas and on the highest mountain peaks. They are not the most popular of 'creepy-crawlies' although superstition, suggesting that it is unlucky to kill spiders, has for long been to their advantage. However, there is one species which has fascinating characteristics which can appeal to all students of nature whatever their reservations concerning spiders.

Known as the Argonaut in recollection of the Greek myth in which Jason's sailors, the Argonauts, voyaged in the good ship Argo in search of the Golden Fleece, the water spider (*Argy-*



A pair of Water Spiders with their diving bell

roneta aquatica) is the only species, of the many thousands of spider species, which has returned to the water where life began. In adapting its life-style to a watery environment it has had to overcome the disability of breathing atmospheric air to obtain which it must make frequent journeys to the water surface. With the aid of hairs covering the abdomen, the spider traps a bubble of air on visiting the water surface and this supply of oxygen enables it to remain submerged for longer periods and also to indulge in the construction of an underwater home.

Initially the Argonaut connects two adjacent plant stems with a platform of silken webbing. Numerous trips to the water surface are then carried out and on each of these a bubble of air is collected and released under the web. Gradually the pressure of air trying to escape pushes the web upwards until a bell is formed into which the spider can crawl and remain for long periods. While this reservoir of air can be replenished by additional journeys to the surface, it is not essential because, by an interaction of diffusion between expelled carbon-dioxide from the spider and oxygen from the water, the *status quo* is maintained.

From the diving bell radiate web strands which signal to the spider within the bell when small creatures such as water-fleas (*daphnia*), mosquito larvae and the like, blunder into them at which the spider leaves its lair to effect a capture, returning to its bell to enjoy its meal.

The male Argonaut builds a separate bell next to that of the female and when ready to mate he chews his way into the female's bell which then becomes the nuptial chamber. As he is ½ in. long and she is only ¼ in. in length, his is not the fate of most male spiders which, being considerably smaller than their mates, have little defence against the almost invariable predilection of female spiders to eat their spouses after mating.

When ready to lay her eggs, the female water-spider builds an upper storey to her diving bell in which the young will hatch, subsequently biting their way out to go their separate ways and to build their own little diving bells.

Regrettably the water-spider, along with so many of our smaller indigenous life forms, has become scarce over recent years and many of its former haunts are now bereft of its occupation. An awareness of this depletion of our native fauna has now spread to those other than naturalists with a specialist interest in their wellbeing and it is to be hoped that such awareness will grow and that the once inane and too often voiced question: "What use is it?" will be heard less often, for every life-form has a purpose and it must be better to meet this realisation now than when extinction has rendered the question no more than academic.

Meet the Societies

BEDFORD AND DISTRICT AQUARIST SOCIETY

The B.D.A.S. Logo

Pterophyllum scalare

THE Bedford and District Aquarist Society was formed in 1976 by a nucleus of aquarists who were interested in furthering fishkeeping in the area.

From the outset, it was agreed that the Society was to be as informal as possible, within sensible limits. It was believed (and it still is) that this approach would encourage both experts and beginners alike.

This philosophy is highlighted in the excellent, humorous and well-written Newsletter by the Secretary, Mick Dashwood, who urges those members who have been on other committees not to "get upset if it all seems casual as it was long ago agreed that the Club was for fishkeeping and not politics". Well said, B.D.A.S.!

Meetings are held on the first Tuesday of every month at 8.00 p.m. at the Kempston Liberal Club, Kempston, Bedford. At these meetings, there are lectures on aquatic subjects, with a life-saving tea-break in the middle and a raffle at the end.

There is also a competitive side to the Society's activities, having joined the Association of Aquarists and the Verulam Aquarists Group, a Midlands-based group of Societies which meet four times a year to compete for a shield. This, they have won three years running.

There is also a Club Championship held over twelve months, the award going to the member who has collected most points in that period. Table Shows are planned ahead for the full year to cater for all the major groups of fish and provision is made for the out-of-the-ordinary by the inclusion of A.O.V. (Any Other Variety) Classes. There is a trophy for every Class, one for the highest pointed fish and an annual Open Show in March.

Juniors are encouraged through the Junior Club Championship which is awarded from points won in the "General" Club Championship (at present there are no separate Junior Shows).

Anyone interested in joining B.D.A.S. is welcome at any meeting where the only fee payable is 10p for a Club Magazine.

Subscription Rates:
Senior Membership, £5·00; Joint Membership (couples), £7·50; Junior Membership, £3·00.

Apply to: Mick Dashwood, 27B Saint Michael's Road, Bedford, Bedfordshire MK40 2LZ.

ILFORD AND DISTRICT AQUARISTS' AND PONDKEEPERS' SOCIETY

The I.D.A.P.S. Logo

Barbus tetrazona

1984 marks the Golden Jubilee of one of the largest and most active Societies in the London area. Ilford and District Aquarists' and Pondkeepers' Society was formed early in 1934 when a small group of fishkeepers started meeting in each others' homes in the Ilford area.

By the following year, there were already monthly meetings and, by 1938, the Society was so successful that it could actually afford to *reduce* membership fees.

Minutes of the early years make fascinating reading today; in particular, the entry for Monday, 4 September 1939 reads: "Speaker—Mr. L. C. Betts, Subject—Fancy Goldfish. Present were: No meeting owing to outbreak of war on Sunday, 3 September".

The Society "closed down" for the duration of hostilities but was revived in 1946 and hasn't looked back since.

One long-standing involvement that says a great deal about the dedication of members is the upkeep of a furnished aquarium (still maintained today) installed in the Children's Ward at the local King George's Hospital in July 1947. The original tank was set up from contributions amounting to 67/- (£3·35), slightly (!) less than the new "1984" model is going to cost.

The Society meets on the second Monday of every month at the Churchill Rooms, Wanstead Library, Spratt Hall Road, Wanstead, London, E11, at 7.30 p.m. Activities include guest speakers, Table Shows, quizzes, auctions, etc.

The Society also organises outings to aquatic businesses and exhibitions and arranges social functions, annual pond, home aquaria, novelty show jar and new ideas, competitions and many other activities.

The highlight of the year is the Annual Exhibition at the Ilford Town Hall, thought to be the largest Closed Show in the country where all the fish benched are owned by Society members.

Ilford will be holding an exclusive Golden Jubilee Celebration and Convention at London Zoo on 12th May (this month) for 200 invited friends from within the hobby. We wish them great success with this and all their other ambitious and commendable plans for the future.

Subscription Rates:
Single Membership, £5·00; Family Membership, £6·00; Junior Membership, £3·00.

Apply to: Mr. Len Smith, 80 Mighell Avenue, Redbridge, Ilford, Essex.

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 WEST

SPEAKING to **Bristol A.S.**, on Spawning and Rearing Goldfish, Jim Day advocated obtaining the milt first if hand spawning. He introduces an ample supply of Liquifry as soon as hatching is observed. He uses a temperature of 70°F for rearing. After 4-5 days brine shrimp is available and from then on porridge, sugar, cat food, grated cooked liver, Daphnia are among the wide variety of foods offered. To maintain water quality he uses running water and twice daily siphonings off tank bottoms.

Bristol A.S., a specialist Coldwater Society, meets on the second Tuesday at St. Ambrose Church Hall, Stretford Road, Whitchall. Further details from Hon. Sec. T. C. Harper, 11 Bridge Walk, Bristol BS7 0LE (0272-699131).

At the a.g.m. the following officers were elected: President, H. C. B. Thomas; Vice-presidents, J. Day; Treasurer, Mrs. I. Day; Reporting Sec., Mrs. J. Thomas; Registrar, Miss A. H. Morgan; Committee: Messrs. V. Capaldi, I. Mildon, W. Perkins, G. Smith; Secretary, T. C. Harper, 11 Bridge Walk, Bristol BS7 0LE. (0272-699131).

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North Avon A.S. were treated to a talk given by Mr. T. Johnson, an aquarist and retail trader for many years, entitled the "History of Aquaria Equipment".

He brought along a considerable number of items, heaters thermostats, air pumps, etc., spanning something like 45 years. We are grateful to him for the details he conveyed with regard to the usefulness and value of certain pieces of equipment, as he remarked on more than one occasion, "an item is only worth the spare part that you cannot get".

With a continuing number of new members, we are able to justify engaging speakers from a wider sphere, and as you will have seen mentioned before, we meet at Hanham Folk Centre, High Street, Hanham, Bristol on the third Monday in each month. Why not come along and join us? or contact the Secretary, R. W. Cummins, 1 St. Anne's Close, Cadbury Heath, Warmley, Bristol.

SOUTH EAST

RESULTS of the **Tongham Aquarists Club** table show held at the Victoria Hall, Ash on 1st and 15th March.

1st March: Knock-out—1st round: 1, R. Cooke, Pseudotropheus minutus; 2, A. Ottley, Colisa chuna; 3, R. Cooke, Corydoras aeneus; 4, K. Perrin, Pantadon buchholzi. A.O.V.: 1, M. Bird, Anseca splendens; 2, P. Hardy, Acanthophthalmus kuhlii; 3, P. Hardy, Barbus tittaya; 4, R. Cooke, Barbus schuberti.

Speaker for the evening was Mervyn Strange who gave an interesting talk with slides, on Tableaux.

15th March: Class 12b, Female Guppy: 1, M. Bird, Poecilia reticulatus; 2, P. Hardy, Poecilia reticulatus. 4b, Siamese Fighters: 1, G. Horton, Betta splendens; 2, M. Bird, Betta splendens; 3, C. Pearce, Betta splendens. 3a, A.O.V. Cichlids: 1, N. Mashimunick, Tilapia buttikoferi; 2, S. Baines, Hemichromis guttata; 3 and 4, C. Pearce, Aequidens pulcher. A.O.V.: 1, P. Hardy, Acanthophthalmus myeri; 2, S. Baines, Cyprocara boadrodi; 3, I. Legge, Synodontis brachardi; 4, G. Horton, Labeo bicolor.

Speaker for the evening was Derek Lambourne, who gave a very interesting talk with slides on European Aquaria.

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ONE of Kents foremost aquarists, Mr. John Edwards, was the speaker at the March meeting of the **East Kent Aquatic Study Group.** He explained the methods that he uses in conditioning and showing tropical fish and aquatic plants in fish shows, throughout the South East of England. With so many trophies and awards to his credit, his talk was listened to with great interest by the society members.

Guest judge for the Table Show this month was Mr. Bill Hastings. There were two classes which resulted:

Class 3F Corydoras: 1, J. Edwards; 2, T. Wabnitz; 3, E. Woby; 4, K. Woby. Class 'L' Loaches: 1, D. Bridgeman; 2, J. Edwards; 3, E. Woby; 4, D. Woby. The society will be staging their fourth annual Fish Keeping Exhibition at Littlebourne Hall, Canterbury on 8th and 9th September.

The Club meets at the Memorial Hall, Bettinge, Herne Bay, on the second Tuesday of every month.

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AT the **South Park Aquatic (Study) Society** AGM the following officers were elected: Chairman, Dave Brooks; Secretary, Marguerite Dudley; Treasurer, Bob Read; Show Sec., Dave Morgan; Asst. Show Sec., David Cameron-Dudley; P.R.O., Lilly Gray. Once again Mr. D. McKay was voted as an Hon. Member.

At the February meeting Bob Read played a vintage tape recording of hand stripping techniques. The information contained some very pertinent points of interest, and despite being 30 years old lead to a highly contemporary discussion on temperature changes on artificially propogated eggs, also thoughts on tap water chlorine concentrations both on the eggs and how levels may have changed in the intervening decades. After tea the membership talked about the forthcoming open show, which is on 2nd June at Wimbledon Community Centre, St. George's Road, SW19. Schedules and additional details from Show Sec., D. Morgan, 10 Tennyson Avenue, Mottspur Park, Surrey. Tel: 01-949 5597.

Meetings are held every third Tuesday at Wimbledon Community Centre. The emphasis in interest of the society is the "coldwater" fish, plant and other aquatic species. New members are always welcome and further details can be obtained from the Secretary: M. Dudley, 163 South Park Road, SW19 8RX. Tel: 01-540 5062.

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RESULTS of the **Bedford & District A.S.** third annual open show held at the West End Club, Queen's Park, Bedford, on 18th March. Our thanks to the A. of A. judges and all competitors who helped to make a successful show. Trophy winners were: Class 1: C. Tonna (Reading). 2a: E. Broderick (E. Leics.). 2b: A. Brown (Bedford). 2c: H. Sheriff (Wellingborough). 3: A. Hutchings (Bedford). 3b: D. Ford (Bracknell). 3c: J. Andrews (Reading). 3d: D. Lomas (Willenhall). 4: D. MacAllister (Corby). 4b: D. Ford (Bracknell). 5: J. Pichards (Leics.). 6: C. Larman (CAEB). 7: C. Larman (CAEB). 8: D. Sharpe (NADAS). 9: D. Taylor (Bedford). 10: D. Taylor (Bedford). 11: D. Tonna (Reading). 12a: T. Laughlan (Haringey). 12b: R. Bryan (Kettering). 13: C. Tonna (Reading). 14: E. Broderick (E. Leics.). 15: R. Cooke (Tongham). 16: D. and P. Lambert (SEAS). 17a: H. Sherriff (Wellingborough). 17b: M. Wright (Kettering). 18a: A. Brown (Bedford). 18b: R. Staniforth (Kettering). 19: A. Barton (Wellingborough). 20: T. Laughlan (Haringey). 21: N. Craddock (Kettering). Best Characin: A. Brown (Bedford). Best Cichlid: A. Hutchings (Bedford). Best Livebearer: T. Laughlan (Haringey). Best in Show and Gold Pin: A. Hutchings (Bedford) (C. severum).

NORTH

Hull A.S. hosted the first Statesman's league match of the 1984 season at the Newland Orphan Homes, Cottingham Road on the 6th March, and emerged victorious for the first time in several seasons. This could be a good omen for the season ahead as Hull have not won the trophy since 1975. The total points as judged by the Scarborough Society listed as follows: Hull 97 points; York 88 points; Wyke 33 points; Bridlington 13 points; Ebor 10 points.

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RESULTS of **Bimbi Aquarist and Study Society** mini show held on 22nd January. Class Ba: 1 and 2, B. Clark (Hexham); 3, M. Conway (Bimbi); 4, K. Holmes (Ind.). Ca: 1 and 3, D. Clark (Hexham); 2, A. Stevens (Darlington); 4, K. Holmes (Ind.). Dc: 1, A. Stevens (Darlington); 2 and 3, E. Hobson (Ind.); 4, J. Brady (Bimbi). E: 1, D. Burns (Novo'n); 2 and 3, J. Brady (Bimbi); 4, A. Stevens (Darlington). H: 1 and 3, R. and T. Kirkup (Caer Urfa); 2, A. Stevens (Darlington); 4, C. Freeman (Houghton). J: 1, 2 and 3, B. Clark (Hexham); 4, C. Allen (Cramlington). K: 1, J. Brady (Bimbi); 2, J. Hunter (Gateshead); 3, K. Holmes (Ind.); 4, W. A. Grant (N. Aycliffe). L: 1, K. Holmes (Ind.); 2, W. A. Grant (N. Aycliffe); 3 and 4, J. Brady (Bimbi). O: 1, D. Clark (Hexham); 2, J. Tinling (Bimbi); 3, K. Holmes (Ind.); 4, C. Freeman (Houghton). Q: 1, K. Holmes (Ind.); 2, R. Williamson Caer Urfa). T: 1, C. Allen (Cramlington); 2 and 3, M. Conway (Bimbi); 4, D. Clark (Hexham). U: 1, Newborn Special School (Ind.); 2, R. Williamson (Caer Urfa); 3, B. Hannah (Gateshead); 4, D. Burns (Novo'n). V: 1, A. Brown (B. Auckland); 2 and 3, D. Burns (Novo'n); 4, J. Harrison (Ind.). X-r: 1, N. Wilkinson (Bimbi); 2, P. Rice (Bimbi); 3, C. Freeman (Houghton); 4, J. Tinling (Bimbi).

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Skegness & District A.S. open show held on 18th March. Guppies: 1 and 2, Mr. and Mrs. Thorpe (Don); 3, Mr. and Mrs. Hooley (Wor). Mollies: 1 and 2, Mr. and Mrs. Sellers (Ind); 3, B. J. Heppinstall (Cas). Swordtails: 1, Mr. and Mrs. Pickford (CBAS); 2, B. J. Heppinstall (Cas); 3, Mr. and Mrs. Fawcett (Yo). Platies: 1, Mr. and Mrs. Thorpe (Don); 2, Mr. and Mrs. Pickford (CBAS); 3, M. Johnson (SJS). A.O.V. Livebearers: 1, B. J. Heppinstall (Cas); 2, M. Johnson (SJS); 3, I. Johnson (IE). Small Barbs: 1, Mr. and Mrs. Thorpe (Don); 2 and 3, Mr. and Mrs. Carey (Yo). Large Barbs: 1, Mr. and Mrs. Deacon (IE); 2, Mr. and Mrs. Campbell (Ash); 3, Mr. and Mrs. Allen (G/C). Small Characins: 1 and 3, Mr. and Mrs. Lake (IE); 2, Mr. and Mrs. Carey (Yo). Large Characins: 1, T. Haynes (Don); 2, Mr. and Mrs. G. Allen (G/C); 3, Mrs. Hildred (Li). Corydoras: 1, Mr. and Mrs. Hooley (Wor); 2, Mr. and Mrs. Fawcett (Yo); 3, Mr. and Mrs. S. Clark (Do). Botia and Loaches: 1, Mr. and Mrs. Hooley (Wor); 2, T. Haynes

(Don); 3, Mr. and Mrs. Pickford (CBAS). A.O.V. Catfish: 1, Mr. and Mrs. Pickford (CBAS); 2, A. Scott & Son (Cas); 3, J. Clark (Don). Sharks and Poeas: 1, Mr. and Mrs. Carey (Yo); 2, Mr. and Mrs. Marshall (IE); 3, Mr. and Mrs. Brackenbury (HCAG). Dwarf Cichlids: 1, Mr. and Mrs. Carey (Yo); 2, Mr. and Mrs. Bradbury (CBAS); 3, I. Johnson (IE). Large Cichlids: 1, C. Kellow (Li); 2, Mrs. M. Deweweser (SK); 3, Mr. and Mrs. Freeman (Don). Endemic Cichlids: 1, Mr. and Mrs. Lake (IE); 2, Mr. Hildred (Li); 3, M. Rugg (Wy). Angels: 1, Mr. and Mrs. Thorpe (Don); 2, Mr. and Mrs. Silk (SJS); 3, Mr. and Mrs. Deacon (IE). Small Anabantids: 1, Mr. and Mrs. Fawcett (Yo); 2, K. Prendergast (Ind); 3, Mr. and Mrs. G. Allen (G/C). Large Anabantids: 1, A. Scott & Son (Cas); 2, Mr. Hildred (Li); 3, Mr. and Mrs. Pickford (CBAS). Minnows and Danios: 1, T. Haynes (Don); 2, Mr. and Mrs. Brackenbury (HCAG); 3, Mr. and Mrs. Lake (IE). Rasboras: 1 and 2, Mr. and Mrs. Groom (Don); 3, S. Harrison (G/C). Toothcarp: 1, Mr. and Mrs. Lake (IE); 2, S. Harrison (G/C); 3, Mr. and Mrs. S. Clark (Don). A.O.V. Tropical (up to 15 cm.): 1 and 3, B. J. Heppinstall (Cas); 2, A. Scott & Son (Cas). A.O.V. Tropical (over 15 cm.): 1, I. Marshall (IE); 2, Mr. and Mrs. Carey (Yo); 3, C. J. Castor (Ca). Breeders (Live, 1 and 2): 1, Mr. and Mrs. Bradbury (CBAS); 2, M. Johnson (SJS). Breeders (Live, 3 and 4): 1, Mr. and Mrs. Bradbury (CBAS); 2, Mr. and Mrs. Hooley (Wor). Breeders (Egg, 1 and 2): 1 and 2, Mr. and Mrs. Hooley (Wor); 3, B. Todd (G/C). Breeders (Egg, 3 and 4): 1 and 2, Mr. and Mrs. Fawcett (Yo); 3, Mr. and Mrs. Pickford (CBAS). Pairs (Live): 1, Mr. and Mrs. Sellars (Ind); 2 and 3, M. Johnson (SJS). Pairs (Egg): 1, K. Fisher (G/C); 2, T. Froggatt (She); 3, Mr. and Mrs. Bradbury (CBAS). Common Goldfish: 1 and 3, Mr. and Mrs. Silk (SJS); 2, M. Cook (Wy). Fancy Goldfish and Shubunkins: 1 and 2, Mr. and Mrs. Silk (SJS); 3, S. Cook (Wy). A.O.V. (Coldwater): 1 and 2, Mr. and Mrs. Carey (Yo); 3, Mr. and Mrs. G. Allen (G/C). A.O.V. (Female, Egg): 1, Mr. and Mrs. Lake (IE); 2, Mr. and Mrs. S. Clark (Don); 3, Mr. and Mrs. Bradbury (CBAS). A.O.V. (Female, Live): 1, B. J. Heppinstall (Cas); 2, M. Johnson (SJS); 3, K. Prendegast (Ind). A.O.V. (Juniors): 1, I. and K. Johnson (SJS); 2, Miss C. McHale (Li); 3, Simon Silk (SJS). Fighters (Tyne): 1, Mr. and Mrs. Bradbury (CBAS); 2, I. Johnson (IE); 3, D. L. Braithwaite (Cas). Fighters (Multi): 1 and 2, Mr. and Mrs. Brackenbury (HCAG); 3, Mr. and Mrs. Bradbury (CBAS). Plants: 1, Mr. and Mrs. Campbell (Ash); 2, Mr. and Mrs. Pickford (CBAS); 3, Mr. and Mrs. Brackenbury (HCAG). Mini Tank or Jar: 1 and 3, Mr. and Mrs. Brackenbury (HCAG); 2, Mr. and Mrs. Pickford (CBAS).

Don: Doncaster. Wor: Worksop. Ind: Independent. Cas: Castleford. Yo: York. IE: I. E. Louth. Ash: Ashby. G/C: Grimsby and Cleethorpes. Li: Lincoln. Ske: Skegness. Wy: Wyke. HCAG: Hobbies Centre. Ca: Caistor.

Mr. and Mrs. Hooley won Best in Show and Best Exhibit. 369 entries.

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Keighley A.S. open show results: Guppies: 1, Mr. and Mrs. Thurlby (Otley); 2, Mr. and Mrs. Thorpe (Doncaster); 3, D. L. Braithwaite (Castleford). Plants: 1, L. Price (Castleford); 2, R. Cadman (Grimesthorpe); 3, Mr. and Mrs. Thorpe (Doncaster). Mollies: 1, A. Scott and Son (Castleford); 2 and 3, B. and J. Heppinstall (Castleford). Swordtails: 1, Mr. and Mrs. Pickford (CBAS); 2, R. and S. Cherryholme (Barnsley); 3, Mr. Grayson (Wakefield). A.O.V. Livebearer: 1 and 2, B. and J. Heppinstall (Castleford); 3, L. Wharton (Grimesthorpe). Small Characin: 1 and 3, Mr. and Mrs. Lake (I & E); 2, Mr. and Mrs. Carey (York). Large Characin: 1, T. Haynes (Ind.); 2, K. Lawton (Wyke); 3, I. Macbeth (Ind.). Endemic Rift Lake Cichlids: 1, Mr. and Mrs. Lake (I & E); 2, D. Baker (Keighley); 3, Mr. and Mrs. Murray (Keighley). Angels: 1, I. Macbeth (Ind.); 2, Mrs. P. Cooper (Ind.); 3, Mr. Harley (Accrington). A.O.V. Small Cichlids: 1, Mr. and Mrs. Carey (York); 2, Mr. and Mrs. Bradbury (CBAS); 3, Mr. and Mrs. B. Walsh (Darwen). A.O.V. Large Cichlids: 1, K. Lister (Bradford); 2, Mr. and Mrs. P. Ashton (Wakefield); 3, S. Chambers (Ind.). Rasboras: 1, Mr. and Mrs. Lake (I & E); 2, D. T. Milner (Darwen); 3, Mr. and Mrs. Fawcett (York). Danios and Minnows: 1 and 3, Mr. and Mrs. Lake (I & E); 2, T. Haynes (Ind.). Small Barbs: 1, J. Cartwright (Huddersfield); 2, Mr. and Mrs. Carey (York); 3, Mr. and Mrs. Thorpe (Doncaster). Large Barbs: 1, Mr. and Mrs. Carey (York); 2, K. Lawton (Wyke); 3, M. Storey (Otley). Aphyosemion: 1, Mr. Shincliffes (Bradford); 2 and 3, Mr. and Mrs. Bradbury (CBAS). A.O.V. Killifish: 1, L. Price (Castleford); 2, Mr. and Mrs. Lake (I & E); 3, B. Lydon (Keighley). Small Anabantid: 1, Mr. and Mrs. Riley (Leeds PO); 2, Mr. and Mrs. Fawcett (York); 3, Mr. Thompson (Bradford). Large Anabantid: 1, A. Scot (Castleford); 2, Mr. and Mrs. Richardson (Scarborough); 3, Mr. and Mrs. Riley (Leed PO); Fighters True: 1 and 3, Mr. and Mrs. Riley (Leeds PO); 2, I. Macbeth (Ind.). Fighters Multi: 1, Mr. and Mrs. Bradbury (CBAS); 2, Mr. and Mrs. Riley (Leeds PO); 3, T. Karpow (Ind.). Corydoras and Brochis: 1, L. Wharton (Grimesthorpe); 2, Mr. and Mrs. Riley (Leeds PO); 3, L. Price (Castleford). A.O.V. Catfish: 1, Mr. Sutcliffe (Ind.); 2, P. Cooper (Ind.); 3, D. T. Milner (Darwen). Loaches and Botia: 1, Mr. and Mrs. Riley (Leeds PO); 2, T. Haynes (Ind.); 3, Mr. and Mrs. Richardson (Scarborough). Sharks: 1, Mr. and Mrs. Carey (York); 2, K. Heigold (Keighley); 3, Mr. and Mrs. Bradbury (CBAS). Poeas: 1, J. Cartwright (Huddersfield); 2, M. Storey (Otley); 3, Mr. and Mrs. Bradbury (CBAS). A.O.V. Tropical: 1, Mr. and Mrs. Riley (Leeds PO); 2, K. Lawton (Wyke); 3, Mr. and Mrs. P. Ashton (Wakefield). A.O.V. Tropical: 1, N. Eastwood (Eboc); 2, Mr. and Mrs. Carey (York); 3, K. Heigold (Keighley). Pairs (Livebearer): 1, R. Godman (Grimesthorpe); 2, L. Price (Castleford); 3, K. Clough (SLAG). Pairs (Egglayer): 1, Mr. and Mrs. Fawcett (York); 2, J. Cartwright (Huddersfield); 3, Mr. and Mrs. Lake (I & E). A.V. Female (Livebearer): 1, B. and J. Heppinstall (Castleford); 2, R. and S. Cherryholme (Barnsley); 3, A. Scott and Son (Castleford). A.V. Female (Egglayer): 1, K. Lawton (Wyke); 2, Mr. and Mrs. Fawcett (York); 3, D. T. Milner (Darwen). Breeders (Livebearer, 3 and 4): 1, D. T. Milner (Darwen); 2, R. Clough (SLAG); 3, R. and S. Cherryholme (Barnsley). Breeders (Livebearer, 1 and 2): 1, R. and S. Cherryholme (Barnsley); 2, K. Lockwood (Huddersfield); 3, R. Godman (Grimesthorpe). Bronders (Egglayer, 3 and 4): 1 and 3, Mr. and Mrs. Fawcett (York); 2, Mr. and Mrs. Pickford (CBAS). Breeders (Egglayer, 1 and 2): 1 and 3, Mr. and Mrs. G. Windle (Wakefield); 2, Mr. and Mrs. Bradbury (CBAS). Common Goldfish: 1 and 3, Mr. and Mrs. Wall (Barnsley); 2, D. Dyson (Accrington). Fancy Goldfish: 1 and 2, Mr. and Mrs. Silk (S & J); 3, D. Dyson (Accrington). A.O.V. Coldwater: 1 and 2, Mr. and Mrs. Carey (York); 3, D. T. Milner (Darwen). Mini-Jars: 1, Mrs. J. H. Sharp (Bradford); 2 and 3, Mr. and Mrs. Pickford (CBAS).

Best Fish in Show: T. Haynes with 80 points. Highest Pointed Society: York with 32 points.

SCOTLAND

AT the **Edinburgh A.S.** meeting on 8th February a slide show and a general discussion were held in the club room. The meeting on 22nd February involved a table show of Characins and fighters, which was judged by H. Kerr. The results were: Seniors, Characins: 1, 2 and 3, N. Ballantyne. Juniors: 1, 2 and 3, S. Oswald. Fighters: 1, T. Milligan; 2 and 3, S. Kemp.

As from 28th February our club meetings will move from our present premises to new premises at St. Bride's Community Centre, Orwell Terrace, Edinburgh, where we will meet every 2nd and 4th Tuesday of the month.

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Paisley & District A.S. held its last meeting on 6th March, when the table show on the night was Guppies, Aquatic Plants and A.O.S. Fish. The results were as follows: Guppies, Seniors: 1, Sandy Holmes; 2, Patricia Ashcroft; 3 and 4, E. Shanes. Juniors: 1 and 2, Derek Anderson; 3, Steven Robertson. Aquatic Plants, Seniors: 1 and 2, Ian Lindsay; 3 and 4, Bill Dunbar. Juniors: 1, 2 and 3, Derek Anderson. A.O.S. Fish: Seniors: 1, Andrew Stone; 2 and 4, Bill Dunbar; 3, Patricia Ashcroft.

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

Dates for the diary

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

MAY

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

6th May: WHITBY & DISTRICT A.S. 9th open show to be held at The Spa Pavilion, West Cliff, Whitby, N. Yorkshire. Judging 2 p.m. Further details from Mr. T. Wilson. 1 Holmdale Gardens, Whitby, N. Yorkshire.

6th May: I. & E. A.S. open show at Monk's Dyke High School, South Lincs.

6th May: STRETFORD & DISTRICT A.S. open show at Hartford Community Centre, Canterbury Road, Davyhulme, Manchester. Secretary: D. Brightmore, 4 Malvern Grove, Salford 6, Manchester. Tel: 061-707-4300. Show Secretary: G. Cummins, 16 Royal Avenue, Urmston, Manchester. Tel: 061-748-8973.

6th May: PAISLEY & DISTRICT A.S. open show to be held in Gallowhill Community Centre, Paisley. For further information contact Show Manager, Mr. I. Lindsay, 71 Wright Street, Renfrew. Tel: 041-889 5772.

13th May: BOURNEMOUTH A.S. annual open show will take place at Kinson Community Centre, Pelhams Park, Kinson, Bournemouth. Show schedules will be available after 1st April, from Show Secretary, Jack Jeffery, 13a Woodland Avenue, Bournemouth Dorset BH5 2DJ. S.a.e. will be appreciated.

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

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

13th May: MACCLESFIELD A.S. open show at Ryles Park County High School, Ryles Park Road, Macclesfield, Cheshire. For further information contact: Mr. J. Merriman, 10 Grange Road, Macclesfield, Cheshire. Tel: (0625) 32951.

13th May: YORK & DISTRICT A.S. open show at the Livestock Centre, Marton, York. Show Secretary, Mr. M. Fawcett, 16 Scarcroft Road, York.

13th May: THROCKLEY A.S. open show will be held in the Grange Centre, Newburn Road, Throckley, Newcastle on Tyne. Children's video show. Good prizes. S.A.E. please for schedules to Mrs. D. Lakey, 51 Hewley Crescent, Throckley, Newcastle on Tyne NE15 9PX. Tel: 0632-677236.

17th May: KINGSTON & DISTRICT A.S. will be holding a Bring and Buy Sale at Worple Methodist Church Hall, Worple Road, Raynes Park, 8 p.m.

19th May: BRITISH MARINE AQUARISTS ASSOCIATION Marine Seminar to be held at Uxbridge Scout H.Q., Rockingham Road, Uxbridge, commencing at 10.30 a.m. Guest speakers include Mr. Graham Cox, Mr. Andrew Stagg and Mr. Jerzy Gawdor. Members free, non-members 75p. For further details contact Mr. T. Condrs, 15 Turnpike Lane, Uxbridge, Middlesex UB10 0AH or phone Uxbridge 54427.

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

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

20th May: BRIGHTON & SOUTHERN A.S. open show at the Quayside Youth Centre, Southwick, near Brighton. The show secretary is Bob Smith. Tel: Btn (0273) 415703.

20th May: CRAMLINGTON A.S. first open show at Cramlington High School, Dudley Lane, Cramlington. Benching 10.30 a.m.-1 p.m. Judging 1.10 p.m. prompt. N.E.F.A.S. rules apply. Enquiries to: Show Secretary, Dave Murray, 38 Whernside Place, Southfield Lea, Cramlington. Tel: 715993.

20th May: BIMBI AQUARIST AND STUDY SOCIETY 3rd open show at Felling Community Centre, Crowhall Lane, Felling, Tyne and Wear (easy access via A1(M) or A19). For further details ring 091-410 9997 (John Brady) or write to John Brady, 40 Hartland Drive, Springs Estate, Birtley, Chester-Le-Street, Co. Durham DH3 2LZ; or Mrs. M. Conway, Show Manageress, 13 Lowwell Gardens, Stoneygate Estate, Felling, Tyne and Wear.

20th May: ST. EDMUNDSBURY & DISTRICT A.S. third annual exhibition will be held at the Guildhall, Guildhall Street, Bury St. Edmunds. Open to the public by small admission charge between 11.00 a.m. and 5.00 p.m. Furnished Aquaria Competition and other attractions available.

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

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

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

27th May: BRIDLINGTON & D.A.S. 11th annual open show, to be held at the Hilderthorpe Junior School, Shaftesbury Road, off Kingsgate, Bridlington, E. Yorkshire. Schedules from the Show Manager, Mr. M. Jordan, 12 Greenfield Road, West Hill Estate, Bridlington, E. Yorks. Tel: 0262-74109.

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

28th May: Bank Holiday Monday. The South West Region of the **BRITISH KOI-KEEPERS' SOCIETY** closed show will be held at Ashton Court, Bristol, in conjunction with the North Somerset Agricultural Society. Exit 19 on M5 then follow RAC signs on A369. Gates open 9.30 a.m. Everybody welcome for a great day out.

JUNE

2nd June: SWINDON A.S. open show at Park South Community Centre, Cranmore Avenue, Swindon. 1st place trophies as well as perpetual trophies. Show Secretary, Mr. K. Curtis, 28 Beech Avenue, Swindon, Wilts. (Tel: 0793 32920).

2nd June: SOUTH PARK AQUATIC (STUDY) SOCIETY, Coldwater Fish and Plant Show, Wimbledon Community Centre, St. George's Road, S.W.19. Schedules available from Show Secretary, Dave Morgan, 10 Tennyson Avenue, Motspur Park, Surrey. Tel: 01-949 5597.

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

9th June: LLANTWIT MAJOR A.S. open show, Ham Lane, Llantwit Major, South Glam., Wales. Details from Show Secretary, Mr. Colin Turner, 146 Arran Street, Roath, Cardiff, South Wales.

9th, 10th June: AQUARIAN FISHKEEPING EXHIBITION '84. Kempton Park Racecourse. Details and schedules from: The Secretary, The Association of Aquarists, 7 Wheeler Court, Plough Road, Battersea, London SW11.

10th June: S.M.T. AQUARIST SOCIETY annual open show in the Ballerup Hall, Civic Centre, East Kilbride. Admission: Adults 30p; Children & O.A.Ps 15p. For further details, contact: Show Manager Mr. M. Poulton, 69 Fereneze Crescent, Hill House, Hamilton or Show Secretary, Mr. R. Houston, 20 Birgidale Road, Glasgow G45 9NA.

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

17th June: ACCRINGTON & DISTRICT A.S. open show at a new venue, Harvey Street Community Centre, Harvey Street, Oswaldtwistle, Nr. Accrington. F.N.A.S. Show League. Schedules with s.a.e., Mr. S. Hindle, 10 Orange Street, Accrington BB5 5AQ. Tel: Acc. 395371.

17th June: ARBROATH A.S. open show will be held in the Arbroath Community Centre, Marketgate, Arbroath. Details and schedules from John R. Steven, 95 Brechin Road, Arbroath. Tel: 0241-76605.

17th June: LINCOLN & DISTRICT A.S. are holding their first open show at the Ancaster Day Centre in conjunction with the centre's open day. Booking in from 12.00 until 1.45 p.m. Details from: Miss H. Craven, 6 Drury Street, Metheringham, Lincoln LN4 3EZ.

22nd June: PORT TALBOT & DISTRICT A.S. (Change of Venue). Fourteenth annual open show to be held at "Four Winds" Hotel, Aberavon Seafront, Port Talbot, West Glam. Schedules from Show Secretary, J. Egan, 53 Penrhr Afan, Baglan Moors, Port Talbot, West Glam. SA12 7RN (s.a.e. please).

24th June: THE BRITISH KOI-KEEPERS' SOCIETY are holding their National Koi show, once again at Billing Aquadrome, near Northampton. For further information, contact Show Chairman, J. Beattie, 96 Overstone Road, Sywell, Northampton.

24th June: ST. HELENS A.S. annual open show at Rainhill Village Hall, Rainhill. Merseyside.

24th June: ALFRETON & DISTRICT A.S. will be holding their 18th annual open show at Alfreton Hall, Alfreton, Derbyshire. Further details can be obtained by contacting M. Darrington, 48 Pennine Avenue, Riddings, Derbyshire. Tel: 0773 602077.

24th June: GATESHEAD A.S. open show at Gateshead Leisure Centre. Schedules from Mr. J. McCutcheon, 2 Lyndhurst Drive, Low Fell, Gateshead, Tyne and Wear NE9 6BB.

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

JULY

1st July: DARLINGTON & DISTRICT A.S. are holding their second open show at the Eastbourne Comprehensive School, Darlington.

8th July: SCARBOROUGH & DISTRICT A.S. open show at Friarage County Primary School, Longwestgate, Scarborough. Further details from: Mr. P. Baddley, 8 Endcliffe Crescent, Scarborough. Tel: 351952.

13th July: N.E.F.A.S. Convention to be held at the Grange Community Centre, Throckley, Newcastle upon Tyne. Speakers are Mr. John Dawes (Assistant Editor to the *Aquarist* Magazine, Chief Consultant to Aquarian Foods). Subject: The Language of Fishes. Dr. Randolph Richards (University of Stirling), Subject: Fish Diseases. Tickets £1.00. Admission by ticket only. For further information apply to: Mr. J. English, Henderson Filters, Throckley, Newcastle upon Tyne NB15 9DT.

13th July: The Lower Thames-side Section of the **B.K.K.S.** closed show at the Alpha Garden Centre, London Road, Wickford.

13th July: READING & DISTRICT A.S. open show to be held at the Southcote Youth Community Centre in Coronation Square, Southcote, Reading, Berks. For schedules please contact Show Secretary, C. Tonna on Reading 412373.

28th July: MIDLAND KOI ASSOCIATION open show, Baginton Village Hall, Coventry. (Near Coventry Airport. Off A45). Further details from R. Cleaver, 59 Kersington Road, Earlsdon, Coventry. Tel: Cov. 79891.

AUGUST

4th August: THE NORTHERN GOLDFISH & PONDKEEPERS SOCIETY, will be staging their 6th open show at the Sports Centre, Silverwell Street, Bolton, Greater Manchester. Open to the public from 1 p.m. until 5 p.m. Details and entry forms from R. Hodgkinson, 9 Stratford Close, Farnworth, Bolton, Greater Manchester. S.a.e. with application please. (Tel: 0204 75281).

5th August: LEICESTER A.S. 4th open show to be held at the St. Matthew's Community Centre, Malabar Road, Leicester. Further details and show schedules from J. Richards, 26 Huggett Close, Rushey Mead, Leicester. Tel: Leicester 666314.

18th & 19th August: YORKSHIRE AQUARIST Festival. Doncaster Racecourse. Details and schedules from Mr. N. Bollon, 11 Sherburngate Drive, Pocklington, York. YO4 2BD. Tel: 07902 3177.

26th August: LONG EATON A.S. open show, at Gregory's Rose Gardens, Toton, Nottingham. Any information may be obtained from the Show Secretary, Mr. G. D. Mackelroy, 51 Chesterton Road, Spondon, Derby; tel: Derby (0332) 671995.

SEPTEMBER

2nd September: PRESTON & DISTRICT A.S. annual open show. Venue Preston North End Supporters Club, Deepdale Road, Preston. Further details and schedules from Mr. W. Rawlinson, 364 St. George's Road, Preston. Phone: Preston 25270.

8th September: BRISTOL TROPICAL FISH CLUB open show will be held at the All Saints' Church Hall, Grove Road, Fishponds, near Bristol; benching 9 a.m./12 (noon). Schedules will be available from mid-June from Show Secretary, Mr T. E. Davis, 284 Badminton Road, Coalpit Heath, near Bristol, BS17 2QW, or telephone Winterbourne 775432. S.A.E. with application please. Show will be to F.B.A.S. rules and incorporate *Aquarist* Gold Pin, Championship Trophy Class and Brooch Scheme.

6th-9th September: Fourth annual Fish Keeping Exhibition to be held at the Memorial Hall, Littlebourne, Canterbury.

9th September: NORTHUMBRIA COLD-WATER FISH AND PONDKEEPERS SOCIETY will be holding their annual open show, but the venue has not yet been agreed upon. As soon as this is finalised you will be informed.