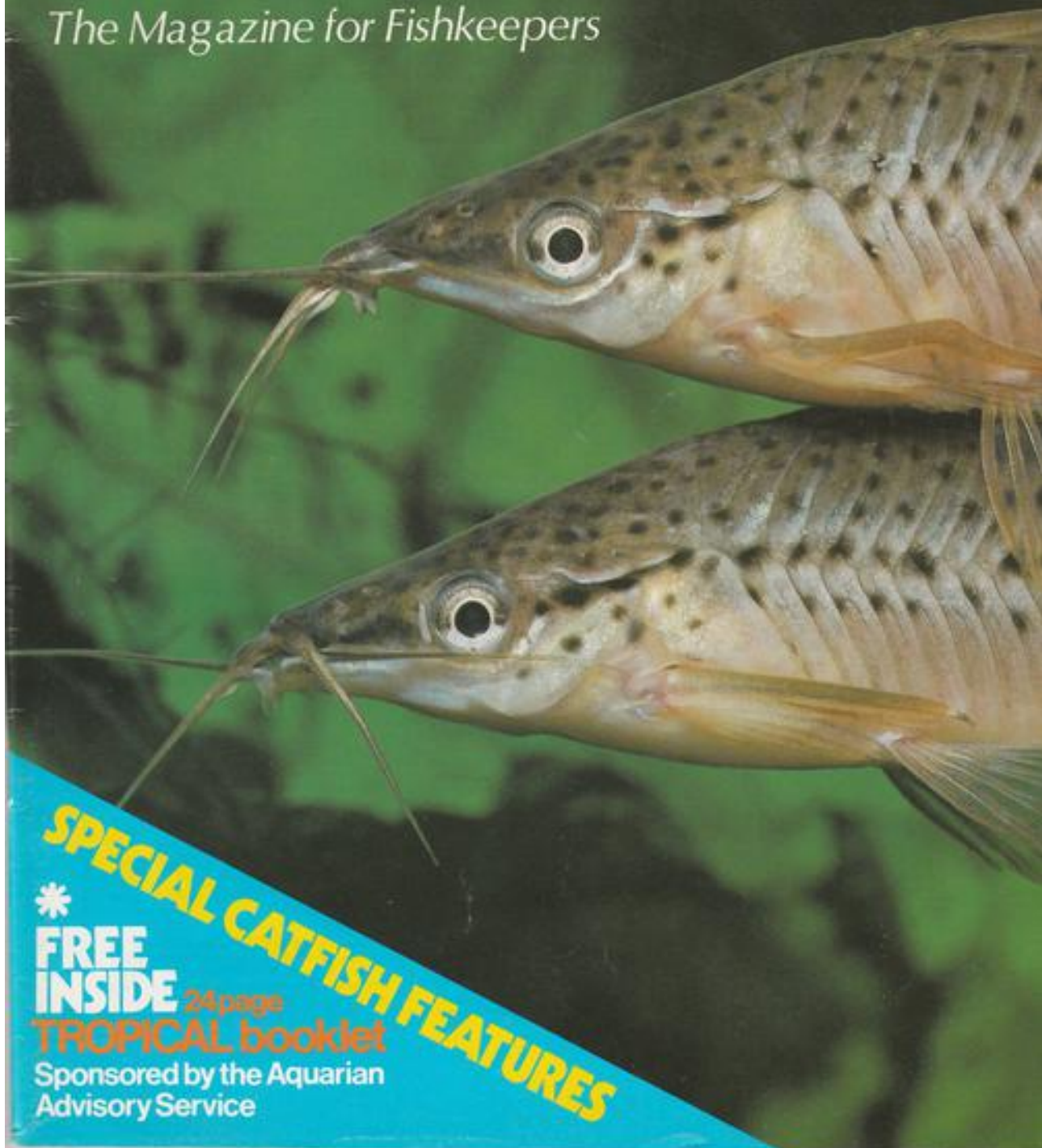


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AQUARIST

AND PONDKEEPER

The Magazine for Fishkeepers



SPECIAL CATFISH FEATURES

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COVER STORY Photo: A. van den Nieuwenhuizen

Dianema longibarbis, the Porthole Catfish, belongs to the family Callichthyidae, the Callichthyid Armoured Catfishes (as distinct from the other Armoured Catfishes, the Loricariidae). The Callichthyidae are distinguished from other Catfishes by their two rows of bony plates which run the length of the body, the possession of a single pair of rictal barbels (attached at the junction of the lips and the corner of the mouth) and one to three pairs of mental barbels (attached to the lower lip). In addition, these catfishes possess a spine on the anterior edge of the adipose (second dorsal) fin and have their swim bladder encased in bone. The numerous *Corydoras* species also belong to the Callichthyidae. *D. longibarbis*, as the name suggests, has long barbels which are clearly visible in the cover photograph. It is found in the Amazon basin in Brazil and in several rivers in Peru. A closely-related, and very similar species, *D. vrostrifata*, also occurs in the Amazon basin but may be distinguished from *D. longibarbis* by the former's strikingly marked caudal (tail) fin which, in *D. longibarbis*, is quite plain.

Porthole Catfish are peaceful fish which can grow up to 9 cm. or so in aquaria on a diet consisting primarily of live foods.

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I'M WRITING THIS on the last day of August, after an exceptionally fine summer, and finding it difficult to believe that you won't be reading it until the dark days of November. Roses flowered very well in my part of the world, despite the drought, although lawns suffered a great deal from burning. I cannot recall when last I saw so many butterflies—although wasps and bees were uncommon, and I did not see a single ladybird. I spent a delightful day at Kew Gardens and had a bonanza with my camera. The lily house was in splendid shape and the heat and humidity exhausting; but I was disappointed by many of the roses on display—especially the tiny Topsy, which blooms well in my garden. Fortunately my lawns did not need to be cut very often; and the use of garden hoses was banned this month.

It was the sort of summer when one tended to get outdoors as often as possible, so that many indoor aquaria were probably neglected to some extent. Certainly very few people put pen to paper for this feature. I hope the situation will have been reversed by the time you are reading this.

A regular correspondent who keeps me informed of her latest activities in the aquatic field is Miss Margaret Cairns, B.A., of 4 Watts House, 105 Wornington Road, London, W.10. In her latest letter she says: "Although actually in the process of moving to the above address I had to write to tell you how glad I am that W.Y.O. is back in its old form.

"Actually, this move has been easier as I had been considering giving up the hobby: I lost too many fish after the November '82 burglary, and intruders also killed fish in June '83. This time they evidently leant on the front glass of the tank for leverage to unplug the stereo. The glass broke and the water, gravel etc. cascaded into the room—together with my beautiful pair of spawning angels and about 300 five-week-old fry. The thieves left the stereo and, very wisely, fled before I got downstairs.

"The aquatic aspects of the move have been fairly easy as the landlord let me have the keys to both properties

WHAT IS YOUR OPINION?



by B. Whiteside,

B.A., A.C.P.

'Photographs by the Author'



Ron Baldry beside his outdoor pond—August '83

for a fortnight. I moved eight tanks down by stages, set them up, transferred the fish, and have left the last three, larger tanks for the professionals, on 26th August 1983. I'm racing against time to get it all done before the Notting Hill Carnival!

I have met/corresponded with many interesting people through your feature, but would have had few contacts within the hobby but for W.Y.O. My own circumstances have changed as I was house-bound largely through caring for my invalid mother, who could never be left by herself. She suffered a major stroke in December '82 and went into residential care in June. The present move is to single-person

accommodation. This should mean that I may now join a society, visit shows, etc.—but I'm still delighted to see that W.Y.O. is back! Long may it continue!"

Thank you for the kind comments, Miss Cairns. Like you, I've met and/or corresponded with many aquarists through this feature; and I know that many other readers have as well. It has enabled me to meet people ranging from Ron and Lily Baldry, who live in London's East End and who are two of the kindest people I know, to Dr Who—literally. I once visited Miss Cairn's home, unannounced, to ask if she'd like to feature in the former *Meet the Aquarist* series, but unfortunately she was not at home. The irony was that she was visiting a friend in a flat in the same building.

Ron Baldry was the first person I featured in *Meet the Aquarist* and since my original visit several years ago I've made regular return trips to meet him and his wife and to observe the progress of the fish in their outdoor and indoor ponds, and their indoor aquarium. On a recent visit to Ron and Lily's I was delighted to see that his pondfish had spawned. There were many thousands of baby fish in Ron's indoor pond and tank and, no doubt, he'll probably keep me informed of their progress. I've included some new photographs of Ron and his ponds—and in a future feature I'll probably tell of what happened when Ron asked me what I like to drink.

Another friend whom I met through



Ron Baldry beside his indoor pond—August '83

this feature is author Dick Mills—who featured in the first *Meet the Aquarist*. Dick, amongst his many other talents, has turned into a very prolific author with his sixth book under his belt. The latest to come my way is the beautiful *Practical Encyclopedia of Freshwater Tropical Aquarium Fishes*, by Dick Mills and Dr. Gwynne Vevers, with Douglas G. Campbell as consultant. The book is published by Salamander Books Ltd.—and the only thing that slightly disturbed me was the American/English spelling; however, this is a very minor reservation about a splendid book. The text is interesting and useful, and most of the photographs are absolutely top class—as one would expect from experts such as Arend van den Nieuwenhuizen, and Heather Angel. (A couple of weeks ago I noted Miss Angel on at least three different television programmes photographing plants and animals.) Dick's latest book is that rare sort of aquarium book that almost makes my mouth water. It's obvious that no expense has been spared—and it certainly shows in the quality of the whole publication.

Another star of an early *Meet the Aquarist* was 16-year-old Robert Robinson—who had one of his own

articles published in *The Aquarist* last year. Photographs of Robert's fish frequently appear illustrating this feature. The final examination results of the summer have just been published and I was delighted to learn that Robert had gained a Grade I in C.S.E. English Literature, and a Grade B in G.C.E. English Language. Modesty prevents my naming his teacher. Robert has just begun his career in the heating and plumbing trade. I wish him continued success and hope that he will continue to drop me the occasional few words for inclusion in this feature.

When I lifted the latest edition of the Magazine of the British Koi-Keepers' Society an advertising leaflet about Avenue Fisheries, of 19 The Avenue, Sandy, Bedfordshire, fell out. Listed in the advertisement were various koi, their sizes and their prices. As one whose tropical fish usually cost less than £1.00 each, I must say I almost fell out of my chair when I realised just how expensive large koi can be. A Sanke, Doitsu, of 28-29 in. in length, is listed at £1,600.00; a 22-23 in. Kohaku is priced at £1,150.00; whereas a 22-23 in. Hi Utsuri Kin costs only £850.00.

Woolworths' clear, 40-watt bulbs that blew recently chalked up 83, 109, 115, 150 and 177 hours. If I recall correctly, these bulbs still sell at 99p for a four-pack.

Mr. Frank Luck lives at 12 Stanley Street, Rothwell, Northants, and writes: "... I hope this information about aeration is useful. I am an aquarist of 20 years' standing and my experience of vibratory pumps is that they are noisy, buzzing things that eventually lose all their power. The piston pumps I tried are very good, and give but slight noise, but if used with filters the noise of the bubbles is irritating. They are also expensive and need servicing every 18 months.

"I have recently set up a 30 in. x 12 in. x 15 in. aquarium with an Algarde U/G filter and drive it by connecting a Rena A.30 centrifugal pump, with an adaptor, to the stack pipe of the filter, approximately 2 in. under the surface. It gives the most fantastic results and these would be even better if I hadn't shortened the pipe so much, due to a low-fitting lid.

The pump is absolutely quiet and the outlet may be directed by means of an elbow.

"For £12.00 anyone's filtration and aeration problems are solved forever. By means of its rubber suckers it can be attached to the side of the aquarium, or to the drip tray or lid, etc., and then just point the outlet level with the surface and the current and aeration produced must be seen to be believed. I have used other centrifugal pumps but in this price-range they are half as powerful, and not very versatile, having no rubber suckers and no adaptable outlets, and they use 20 watts instead of 10 watts.

"So, all you suffering from wheezing, buzzing, vibrations and noisy bubbles go and invest £12.00 in a Rena A.30 centrifugal pump. You will never better it."

Mr. Stephen Dyche resides at No. 1 Harlesden Avenue, Mackworth Estate, Derby, and he was fairly inexperienced when he wrote this letter: "... You asked about external filters, which I don't know a lot about, but I do have opinions on filters. I've seen other people's tanks and most contain U/G filters. I don't like them one bit. A friend of mine has U/G filters and his tank looks messy. Dirt is visible down the side of his tank, under the gravel. I don't have this problem up to now. I have a 36 in. tank and I use one box filter which I clean when it looks as if it needs it. I put filter carbon in this. Such filters are good because you get some aeration from them too. Also, I use one 305 power filter as well as a vacuum cleaner. This means that I'm taking out most of the dirt from the tank, leaving it as clean as possible. I find this set-up just about right for me. Am I on the right tracks? My favourite fish are cichlids—and best of all, kribensis. I just love kribensis. I'm mad on them. All the best—and thanks!"

I've stuck with a very sturdy and reliable, German-made pump for a good many years now and it remains as reliable as ever, working outside filters on four different tanks. Every so often I take stock of its working and change parts as necessary. I replace the little, felt, air filter pad every two weeks or so, when it has collected a



Waterlily: *Nymphaea*—blue beauty

little pile of black dirt from the air; and occasionally I check the diaphragm, and the valves in the air chamber. If required, these may be replaced very cheaply—and when they are, the pump works like a brand new one. My pump is very quiet: I have it hung from a stout nail, hammered into a brick wall, on knicker elastic. A wad of six sheets of coloured toilet paper, folded in the middle, is sited between the pump's body and the wall. Both paper and elastic help to reduce the noise level from what is already a very quiet, powerful and reliable pump (Kurrier). I also find it useful to clean filter tubes, including those up which air/water mixtures rise. Bacteria and algae tend to flourish in such aerated water—especially if the tube receives quite a lot of light. It's interesting to check over one's air-control valves, etc. The banks of two, three or four valves, controlling air line outputs, benefit from occasional cleaning. Tarry deposits tend to form

—even if one does not smoke—and such can clog the valves. Clear, plastic, air-line tubing should also be checked. Old tubing can become hardened and tough and dirty. New tubing may be bought for a few pence.

Photograph 1 shows Ron Baldry beside his outdoor pond; and No. 2 shows him beside his indoor pond. Please send me details of your experiences with ponds, and with waterlilies. Photograph 3 shows a *Nymphaea* species called blue beauty. A magnificent plant, that likes to be grown near water, is *Gunnera chilensis*—photograph 4 shows some at Kew Gardens. Its giant, rhubarb-like leaves fascinate me. Have you tried to grow it? For next month please also send me details of your experiences with indoor ponds; white worm culture; breeding angels; livebearers; and aquatic ferns. I hope you'll write to me. Goodbye until next month—and Christmas.



Gunnera chilensis at Kew Gardens. Lake, fountain and palm house in background

CATFISH RESPIRATION AND ECOLOGY

by IAN SELICK

The catfish are an incredibly diverse group of fishes, this diversity partly reflected in the large number of families that go to make up the Siluriformes.

While the classification of those catfish that have been discovered so far is reasonably well known (although family inter-relationships are not), nothing is known about how the majority of these fish live in the wild. Some deductions can be made from anatomical studies of catfish specimens and aquarium observations are also extremely valuable, but theories about how catfish live based on these observations need to be tested by studies in the natural habitat.

The respiration of catfish is a good example of the sort of study where both anatomical and captive behaviour studies can throw light on how the fish live in the wild.

All catfish have gills enclosed in an opercular cavity over which water flows from the mouth before being vented through the gill slits. In order for the fish to use this water for respiration, there must be oxygen dissolved in it, and all catfish at some point live in well oxygenated water when the normal pattern of respiration can occur. The vast majority of catfish have no need of other forms of respiration, but several groups of catfish have developed other means of breathing, and this has enabled them to exploit niches which might otherwise be unavailable to them.

There are two other types of respiration practised by catfish; both of these are facultative, not obligatory. Probably the best known of these is the air breathing habit of the clariid catfishes of Africa and Asia. This ability to breathe aerial oxygen both enables the fish to survive in water low in oxygen, as well as leave the water completely should the need arise.

In *Clarias*, and certain other clariid catfish, the gill chamber is extended above and behind the gills, with an opening between the second and third gill arches on either side. The walls of this chamber are lined with thin skin rich in blood vessels that can absorb oxygen from the air contained in the sac. Additionally, there are extensions to the second and fourth gills that protrude into the chamber, and which form highly branching tree-like structures (the "arborescent organs") that still further increase the surface area available for gaseous exchange. Oxygen is taken in, carbon dioxide is expelled.



Cutaway of the head region of *Clarias* to illustrate the arborescent accessory breathing organs. (After Norman, 1975)

By having these organs for breathing air, the clariids are able to live in habitats that other fish, with the exception of some similarly adapted, could not survive. The main use of these organs is in surviving seasonally changing conditions. In the Zaire River, there is a seasonal inundation zone which is water filled, well oxygenated and connected to the main river during the wet season, but in the dry season is swampy, the water becomes very acidic and almost totally deoxygenated in residual pools. Here several *Clarias* species survive, as well as the related *Clariallabes* and *Channallabes*.

Being able to remain in areas such

as this despite seasonally adverse conditions negates the necessity for migrations into and out of the flooded areas; this may have territorial advantages; it may also be energetically advantageous to survive a period of hardship in one place rather than use energy in migration. Finally, for a fish such as *Clarias* that will eat anything from vegetable matter through carrion to other fish, being able to stay in an area where the water will become uninhabitable to other fish may provide a source of food when many of those other fish die.

It should be said that there are other clariids in the Zaire River that do not live in these areas, but spend all their lives in the main river that always has well oxygenated water. Indeed, one genus, *Gymnallabes* spends all its life in fast flowing water in riffles and rapids. This clariid has significantly reduced arborescent organs, having no need of them; this presumably is a secondary loss, becoming 're-adapted' to river life.

A similar situation is seen in South East Asia where the clariids of the Mekon system (*Clarias macrocephalus* and *C. batrachus*) remain in swampy areas instead of returning to the main river during the dry season as do such catfish as *Pangasius*. As most of the fish that come into the flooded swamps during the wet season are small or juveniles, for example the young of *Pangasius* which have been spawned in the main river by their migratory parents, being present in advance, and of a sufficient size to take advantage of this influx of food may be of considerable importance.

Although it can breathe air, *Clarias* cannot withstand complete desiccation, but can survive considerable periods out of water if the air chambers are kept wet. It has been able to exploit otherwise inaccessible courses of water by its ability to migrate overland, usually during rain when it would not dry out. Introduced *Clarias* in Florida often cause consternation to motorists by moving from pond to pond across roads! In this manner, the population can disperse when, for example, the food supply in a pool is exhausted, or the population increases too much for the water body to support it.

Another variation on the expanded gill chamber theme is shown by the Asian catfish *Heteropneustes*. Here, there are two long air sacs extending almost the entire length of the body, giving the fish the appearance on dissection of having lungs, although these are analogous, not homologous, structures. The air sacs are closed by a valve formed by the fused gills, the gills therefore being significantly less functional than in other fish, so air breathing in these catfish may be more important for normal respiration than it is in *Clarias*. *Heteropneustes* is found commonly in the same regions as the clariids mentioned above, and may follow the same ecological strategy.



Cutaway diagram of anterior region of a *Heteropneustes* to illustrate the air-sac extensions to the opercular cavity (After Norman, 1975)

The curious thing is that, for all the number of catfish and their incredible diversity in South America, there are none that have developed air breathing in the same manner as the clariids. This is not to say there are no air breathing catfish in South America, there are, but they use a very different system. I find this surprising, as the same sort of events as happen in Africa occur in the seasonal rivers in the Guyanas, Venezuela and in the Mato Grosso Amazon drainage system.

South American catfish do not seem to be found in totally deoxygenated water, but join the other fish in small pools left by rivers drying up, or the retreat of seasonal floodwaters. Highly mobile catfish such as the pimelodids normally follow the water and stay in the main streams, whereas some of the doradids, callichthyids and more particularly the loricariids tend to stay put. It is in these groups that air breathing may be practised by some species as required.

All of these catfish swallow bubbles of air which are stored in the intestine or stomach where gaseous exchange takes place. The walls of the intestines are thin and well supplied with blood vessels. *Hypostomus* has been most studied, following early reports of this fish (eg Carter 1935 Report of the Cambridge expedition to Guyana). Experimentally, *Hypostomus* seems quite sensitive to oxygen tension. Twenty or thirty minutes after aeration is stopped in an aquarium, *Hypostomus* will start coming to the water surface at regular intervals to gulp air. This is obviously only to supplement normal gill breathing and certainly cannot replace it. In very deoxygenated water, *Hypostomus* will eventually swim at the surface trying to get its head out to flush the gills with air and water. It is interesting to note that Teresa Townshend, fishing in small cochas (pools left by receding rivers) in the dry season in Peru only found *Ritulus* in water containing 0.8 mg/L of oxygen. Loricariids were found in water of 1.7 mg/L and upwards.

In *Hypostomus*, the air inhaled is held in the stomach for up to 12 minutes, and is expelled while the fish is still underwater. This is done by the fish squeezing the air from its stomach into the bucco-pharyngeal cavity, and thence to the gill cavities from where it is expelled with some force (as evidenced by the fact that the bubbles travel backwards slightly before rising to the water surface). As soon as the air bubble is expelled, and assuming some accessory breathing is still required, then *Hypostomus* will again dash to the surface usually in a loop, grab a bubble of air and sink to the bottom of the water again.

Keeping the time in going to the surface and back to the minimum is important as this is the only time the soft underbelly of these catfish is exposed to predators. Being able to expel the exhausted air underwater helps to reduce this time as well. The bubble of air taken in is quite large: some data are available; for instance, a 13.8 cm long, 24g weight *Hypostomus* released about 2 ml of air (a volume that would displace 2g of water).

In the doradids and callichthyids, the ability to breathe air in a manner



Hypostomus, a stomach-breathing loricariid catfish
Photo: I. C. Sellick

similar to *Hypostomus* is less well documented. In these types, however, there is another function for this ability to use air. These fish, like *Clarias*, can move overland to escape drying of otherwise unsuitable water bodies, or will move overland to colonise new ones. During these migrations the body armour, presumably developed to deter predators, will also serve to prevent the fish drying up. It may be that during these excursions, the fish can also breathe air using the water film trapped by the gills.

Respiration is just one aspect of the biology of the catfishes in relation to their ecology. The way these catfish live, the diversity of food types utilised, from algae in the loricariids and some doradids, through vegetation, fruits, detritus, carrion and other fish; the habitats, from stagnant pools to waterfalls; the anatomical modifications, some obviously adapted, others at our present state of knowledge less obviously so; all these aspects make the keeping and studying of catfish one of the most fascinating fields of fish biology. These latter aspects I have not touched on here; much still remains to be learned. In the meantime I refer interested readers to the fascinating *The Fishes and The Forest* by Michael Goulding (University of Berkeley Press, 1980), and *Fish Communities in Tropical Freshwaters* by Rosemary Lowe-McConnell (Longman, 1975).

CATFISH BIOLOGY IN PANAMANIAN STREAMS

by IAN SELLICK

ALTHOUGH Central America is virtually devoid of catfish compared with South America, a few South American types do penetrate the isthmus, mostly loricariids, plus a *Pimelodella* and a *Rhamdia*, and a few others. During my trip to Darién (see August, 1983, *A & P*), I was not able to make many observations of catfish, but was able to study catfish in streams in the Chagres drainage in Central Panama.

The principal species present were *Pimelodella chagresi*, a beautiful yellow catfish with two longitudinal black stripes, found in large aggregations among the boulders on the bed of faster flowing parts of the streams; and *Rhamdia wagneri*, a somewhat elongate, almost eel-like catfish, plain brown in colour, found in smaller numbers in the same areas as the *Pimelodella*. Loricariids were the most abundant, *Rineloricaria uracantha*, *Ancistrus spinosus*, *Hypostomus plecostomus* and *Chaetostoma fischeri* all present, with the first two mentioned

being most numerous. The loricariids were found in all regions of the river, on rock and gravel beds where the flow tended to be fastest, as well as associated with the numerous branches and other pieces of wood, both floating and stranded in the river. In quieter parts of the river, the mud bottom tended to be covered with leaves where the catfish were no doubt also found, but were virtually impossible to spot.

The presence of so much timber in the water, most of it quite soft where it had started to rot, means that the loricariids have no trouble in finding spawning sites. *Rineloricaria* has been frequently bred in aquaria, spawning in pipes. In the small rivers of the Chagres system, such as the Rio Frijoles, the *Rineloricaria uracantha* spawn in hollow branches.

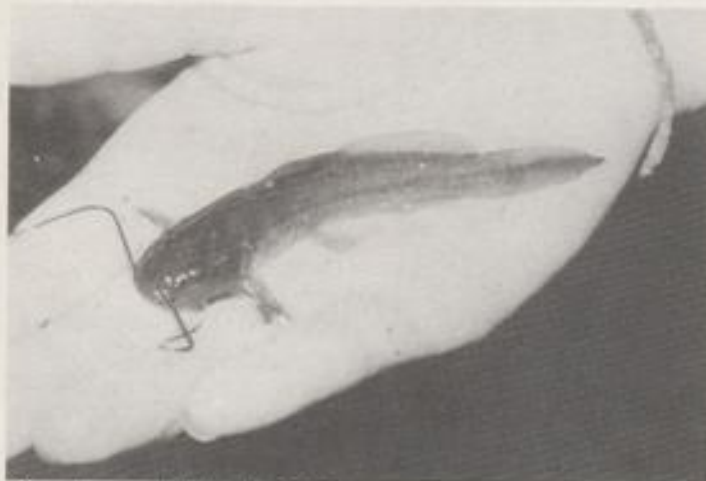
Mary Power has studied the loricariids in this river extensively. She found that for a hollow branch to be used as a spawning site, it had to be

well clear of the bottom, usually at least a foot, and there should be both upstream and downstream openings. By using artificial spawning sites made of PVC pipe suspended in the river, it was determined that if one end was blocked, the fish rejected it, as they did if the pipe was placed on the bottom. This is possibly due to the potential problem of a shifting bottom which could block off a spawning site, as well as leave the eggs and fry subject to predation by other bottom living fish (pimelodid catfish and cleotrids).

Male *Rineloricaria uracantha* choose the spawning site, females arriving about a day later. During this time, rasping sounds can be heard as the fish clean the spawning site. The production of this sound by the male might attract the females to a male ready to breed, and with a suitable site already secured.

While males always rested facing the current through their spawning site, females entered at either end, although spawning itself occurs with both fish facing upstream. Females leave the spawning site within 24 hours of spawning, the male guarding the eggs for about 13 days, when the young leave the spawn site. Males often stay in the spawn site, and spawn again with other females, one male doing this five times in a period of 73 days. *Rineloricaria* spawn all year round, but with a peak towards the height of the rainy season in October, and a lull towards the end of the dry season in April.

One of the fascinating sights in the Frijoles in January was the moving carpet of loricariid fry on the shallow gravelled edges of the river. The water in these areas is very warm, often exposed to the sun, so productivity is high, providing plenty of algae and diatoms for the young fish



Rhamdia wagneri Photo: Ian Sellick



A small stream off the Rio Frijoles, Central Panama. Fallen trees and branches in the water are used as loricatoriid spawning sites. Photo: T. Townshend

to feed on. Predation on these young must be quite considerable to thin out the numbers to the normal standing crop in the river; pimelodids, eleotrids and cichlids probably being important, although stomach contents of the cichlids revealed no small catfish. Other large fish in the river include *Hoplias*, and several quite large characins, although most of these seem to be surface feeders.

As the loricatoriids feed on algae and diatoms, it would be expected that more fish would be found in regions of the river where these grow best, i.e. where the sunlight gets through the forest canopy. By studying numbers of fish in the stream, it has been found (again by Mary Power) that, indeed, more loricatoriids are found in sunny pools than in shaded ones. Interestingly, the amount of algae in sunny and shaded pools is the same; this is because the loricatoriids graze the algae down to the same standing crop level. The fish redistribute themselves according to food availability, but if the situation remains constant, the fish remain in the same areas and do not move around much.

Although I have no information on the breeding habits of the other three loricatoriids, there are plenty of soft undercut banks in the Frijoles which are reputed to be spawning sites for *Hypostomus*. The *Ancistrus* and *Cha-*

tonoma probably also use rotting wood, possibly by chiselling suitable cavities as they have been seen to do in the aquarium.

A number of *Pimelodella chagresi* were captured (thanks to the expertise of Teresa Townshend) and several brought back to this country alive. Preserved specimens revealed that females of nearly 9 cm in (fork) length had ripening ovaries, males were ripe at 7.5 cm. This species probably breeds all year round; young fry

with head capsule lengths of only 2.5 mm were found in the stomach of an 8.9 cm female captured in the Frijoles in March. Apart from the two young catfish, other stomach contents were ctenoid fish scales of a size consistent with those from a 7.5 cm *Geophagus crassilabrus*, these were thus scavenged as carrion; mostly there were insect larvae, a few bivalve molluscs, and some insect parts (legs, mouthparts) from insects that have dropped into the water from the forest canopy.

A 7.6 cm male contained dragonfly larvae, molluscs, mosquito larvae, and some large cycloid scales, probably from the carcass of a large characoid.

There were virtually no sexual differences in preserved fish, just a hint that males have higher adipose fins than females, and that this may have a slightly darker edge; not enough specimens have been examined though to be sure.

In the aquarium, *Pimelodella chagresi* has proved amenable to maintenance in relatively hard water, and is a voracious feeder. The six largest fish frequently aggregate in their 6 foot aquarium and swim closely packed among the tree roots and rocks in it. I would suspect that they may spawn in such aggregations in similar circumstances in the wild. I await developments with interest!



Pimelodella chagresi. Photo: Ian Sellick



Paterson electronic digital thermometer E300

WHILE an electronic thermometer may be considered a luxury for the aquarist, I have found this to be a very useful, rapid way of accurately checking water temperature, and water temperature range, in aquaria and other liquids.

Designed principally for the dark-room for helping in the precise temperature control needed for many film processing procedures, the electronic thermometer is well suited for use in the aquarium.

A 7 inch long black plastic body houses the electronics, a LED display, a "read" switch and the 9 volt PP3 battery that powers the unit. Permanently attached to this is a $\frac{1}{8}$ inch diameter, 7 $\frac{1}{2}$ inch long stainless steel probe with a resin encased thermistor mounted at the end that actually does the temperature sensing. Because the temperature is read at the tip of the probe, by moving this around the tank, hot spots and cold spots can be located with ease. The thermometer reads from 0-70°C to a displayed resolution of 0.1°C. In fact, the temperature indicated is only accurate to about 0.2-0.3°C, but this is accurate enough for aquarium use.

If the thermometer has been stored in the cold, it needs a minute or two to reach a stabilised temperature reading, but usually a stable reading is reached in a matter of seconds, making the checking of a large number of tank temperatures extremely quick; just dip the probe in, wait a few seconds, press the red "read" button and the temperature is displayed on the large, easily seen LEDs.

A couple of small criticisms; the body of the thermometer is not water-tight, so do not submerge it too far, and there is no Celsius/Fahrenheit conversion button for those among us who cannot think in terms of fish living in 25°C water rather than 77°F water! There is another model, the E250 which overcomes both these points by having a probe at the end of a detachable 20 inch cord, and a °C/°F converter. The E300 is priced at about £47, the E250 at about £52.

This thermometer will appeal to the gadget collector, but will be found most useful by those who like to monitor their tanks closely, and will be especially favoured by experimental fishkeepers, researchers, etc, where precise knowledge of water temperature is necessary.

IAN SELLOCK

Fluval 302 Power Filter

THERE is only one way to test and review a power filter: fit it to the maximum recommended tank size and see whether its performance comes up to expectations. The Fluval 302 has been installed on a 72 in. x 15 in. x 18 in. tank containing a mixed assortment of cichlids and catfish for two months now, and seems well suited to the application, keeping the tank water very clear and well aerated.

The Fluval 302 has a flow rate of 220 gallons per hour: this applies to the unloaded pumps and naturally, as in all power filters, drops off when packed with filter media, especially as this starts to get clogged with debris. Unfortunately, the three media supplied by Hagen specifically for their filters were not available for this test, so the filter was filled in the standard manner with filter wool and high quality activated charcoal. The manufacturers recommend a coarse substrate, then charcoal, then a sponge filter which will polish the water by bacterial action.

On unpacking the filter from its carton, the range of parts and accessories contained with it is a little daunting, but it is soon realised that

this filter is extremely well equipped. There are no little 'extras' needed that nudge the price (often considerably) higher, as is the case with all other power filters of this type on the market. The only extras needed are the filter media, and I would recommend the snap-in connectors that can be obtained to make disconnecting the filter from the pipes into and out of the tank that much easier.

The filter has a brown plastic body with a cream coloured top containing two separate pumps with magnetically driven impellers housed under transparent covers. Although these make observation of dirt build up easy, I would normally clean out the impeller chamber of any power filter every time the media are changed as a matter of course. The impeller covers twist and lock; I fear they may prove a little flimsy if too much pressure needs to be applied to shift them, but this is a small point.

Having twin pumps means two sets of inlet and outlet tubes to the filter. This may be a disadvantage to a great many aquarists where even one set of tubes can be a bit of a handful and be quite unsightly. Four pipes takes some arranging, and some hiding for the single display aquarium that is not mounted in a cabinet. The great plus side is that better water flow and distribution in a large tank is possible. Additionally, should one inlet get blocked, the other will still work and some measure of filtration will be maintained. This is very important when bacterial action forms an essential ingredient in the filter's action.

I found the fact that the 12mm diameter hose is supplied in four approximately 2 foot lengths extremely irritating; why not one coil of 8 or 10 feet in length that can be cut as required? If you are filtering a six foot tank with the filter mounted at the same level at one end, it is not possible to use the accessories as intended and get a hose to the far end. Brown coloured 12mm hose to match that supplied does not appear to be available at present, although

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pipng from a rival manufacturer (green) will fit.

The filter is supplied with two rigid intake tubes and strainers, two spray bars and two venturi action air diffusers, these latter two can be used as alternatives depending on the users requirements. Personally, I found the venturi diffusers useful, giving a concentrated flow of water that is quiet and sucks in a reasonable amount of air.

Additionally, there are four flexible elbows, corrugated soft plastic affairs that allow the inlet or outlet tubes to be bent round corners without the risk of flattening of the standard tube. In practice, I found that this required suckers to be used at both ends of the flexible couplings to hold them in place without in turn placing a strain on them; too much tension will result in flattening. As the main aim of those flexible couplings is to get the hoses from the outside of the aquarium to the inside, this means that one sucker holding them must be on the outside. In the (hopefully) dry atmosphere outside the tank, I could not get the suckers to stick properly. I must say though, that for holding tubes in the aquarium, the suckers are some of the best I have come across, they really do stick, and so far are showing no signs of hardening or cracking, a common fault, and a most annoying one with many other brands. There are masses of these suckers supplied too, more than enough to hold the piping exactly as required.

The other accessories supplied with the filter as standard are four taps. These are in a hard cream plastic, with a sliding action to open or close. They are very good, and I found them to be very watertight and positive in operation. Syphon tubes on the inlet side or the filter could be closed with the taps and disconnected without any risk of water escaping.

Although it does not make it explicitly clear in the instruction book supplied with the filter, the taps should be mounted tight against the inlet and outlet nipples on the filter cover with the minimum amount of flexible hose coupling them. Any kinking

of the hose between tap and filter body, or tension on the hose at any joints if it comes to that, will restrict the water flow and, I have found, allow air to bleed into the filter causing it to operate noisily as it is expelled through the impellers.

In fact, if air does get in, the impellers are not particularly efficient at clearing it as they are horizontally mounted, so the maxim is to make sure all joints seal well first. All the joints between the filter body, flexible couplings, taps and the flexible tubing are fitted with locking collars that make positive and reassuring connections easy.

The filter media are contained in three interlocking baskets that fit into the filter lid before being lowered into the filter body, the whole being held together with five plastic lid clips. While the push-fit 'baskets' hold together when installing the filter with dry media, they will not hold when removing old media from a filter that cannot be drained except by inverting it (inlet and outlets are both at the top of the filter). This is rather irritating, as it is a small point that with a slight modification to the moulding used could so easily have been overcome. The baskets should be loaded with media, plugged together, the top strainer inserted into the pump head by twisting and locking, and the whole assembly lowered into the filter body. The pump cover/

filter body seal is by means of an O-ring.

I was a little worried that there is no 'sump' at the bottom of the filter body to allow large heavy pieces of debris to settle out. In practice, this does not seem to matter, so long as the strainers are kept on the end of the inlet tubes.

Having the filter media in separate containers means that not all of them need to be changed at one go. This is very useful if bacterial action is desired—by leaving one section unchanged, continuity of bacterial activity will be ensured.

Priming the filter takes a little practice with two sets of tubes. I found the best way to close one inlet and one outlet with the taps, start a syphon in the open inlet tube by sucking or using a pump primer on the outlet side, then closing this pair and repeating the process with the other two tubes. The filter should be allowed to fill completely with water before switching on; shaking it slightly to help expel air is a good idea.

Although I found the filter a little difficult to get used to, and with the few small criticisms above, the turnover, filter media capacity, and range of accessories included in such a low priced filter make the Fluval 302 one of the best new introductions to the external power filter scene.

IAN SELLICK

NEXT MONTH

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Catfish Classification

by Gordon Howes

Photographs: D. Lambourne

Senior Scientific Officer, Freshwater Fish Section, Natural History Museum

THE interest of aquarists in catfishes has increased dramatically in the past few years. Aquarists have found that generalisations about catfishes, such as secretiveness, sluggishness, exclusively bottom-dwelling, etc. are not necessarily true and that, furthermore, there is an enormous variety of catfish types. Indeed there are probably something in the region of two and a half thousand species, of which only a small proportion have been available to the aquarium trade. Even this minority, however, has been enough to stimulate the growth of a specialist aquarist society—the Catfish Association of Great Britain—and encourage aquarists to search out whatever literature is available on catfishes. Needless to say, one of their first calls is on the literature concerning identification and classification, and therein lies a major problem.

Unlike other popular groups of aquarium fishes, such as cichlids and killifishes, there are only one or two books on catfishes which are aimed at the aquarist and amateur naturalist. The reason for this state of affairs is that even among ichthyologists, catfishes have never been very 'popular' and there are few specialist workers on the group. Information is lacking on catfish ecology and behaviour, and very many species are inadequately described and known from only one or two specimens. This latter fact is one reason why it is often difficult to identify some aquarium specimens with certainty, and is the problem of identification which brings me to the subject of this article, namely the classification of catfishes.

It is important first of all to distinguish *identification* from *classifica-*

tion. Often, ichthyologists are asked by aquarists to 'classify' a fish for them, whereas they really want it to be identified.

Classification is the ordering of species into groups. Identification is supplying a name for the specimen so that it can be slotted into the classificatory scheme. More often than not, in the case of catfishes, the specimens will represent a known species. In order to make an identification it is essential to know the locality of the fish, so that a check-list of the fishes of that area can be consulted. In some cases, revision or monograph of a particular family or genus is available in which are given identification keys to species. Finally, if identification is particularly difficult, a direct comparison is made between the unknown fish and preserved specimens of already identified species. As mentioned above, some species are known only from a few specimens and there is a severe lack of knowledge concerning the variability and growth changes within a species. A new genus of auchenipterid catfishes for example was named on the basis of a single mature male specimen of a species previously known only from females and immature males! In this case the specialised characters of the mature male went unrecognised simply because specimens covering all growth stages were not available.

The whole question of what is a species is extremely complex and certainly cannot be discussed here, but as far as the taxonomist is concerned it is usually considered to be a group of organisms that share a unique character. Related species are grouped into a higher level category, the genus;

genera are grouped into families, and families into suborders and orders, so forming a hierarchical system of categories within categories. These higher level categories are also recognised on the basis of their uniquely sharing sets of specialised characters; the higher the category, the fewer characters it shares with its component lower-level categories. Although these higher groups are man-made, they do, nonetheless, have (or should have) a sound biological basis and, therefore, represent a 'natural classification', that is, one which reflects the evolutionary history (phylogeny) of the group.

A simple example will show what we recognise as a 'natural group'. When we visit the zoo all of us can recognise that our pet cat bears a striking resemblance to lions, tigers and pumas, and we would have no hesitation in placing our cat in the same group as those larger 'cats'. We certainly wouldn't be tempted to classify it along with bears or zebras, but we might be tempted to classify the bats with birds as both have obvious wings. Closer inspection though would reveal that bats have more features in common with our cat—teeth, hair, type of feet, etc.—than with the birds. Thus, in this way we can recognise two 'natural groups', namely mammals and birds, which in fact correspond to the levels recognised by zoologists as 'Classes', in this case, the Mammalia and Aves. Recognition that such a 'natural hierarchy' or order exists has had profound effects on the way we think about Nature, and has generated ideas about evolution to account for this orderliness.

The making of a natural classification,

that is, one which recognises the way in which groups of organisms are related to one another, involves studying, in great detail, their anatomy, genetics, behaviour and geographical distribution. With fishes there are acute difficulties in establishing such a natural classification. In part this is due to there being so many different kinds, around 20,000 species, and in part, to two other opposing factors. On the one hand, many fishes look so much alike that the zoologist can easily be fooled by convergent evolution—as in the case of bats' and birds' wings. In other words, two groups of fishes which the ichthyologist may recognise as being closely related (because superficially they look so much alike) prove on closer inspection to have quite different anatomical structures and represent two distinct lineages whose ancestors were certainly not closely related. On the other hand, some fishes appear so 'way-out' in their appearance (morphology) that they don't resemble any others! The catfishes are a good case in point to illustrate how both these problems affect the making of a natural classification.

On the face of it, catfishes don't appear to offer too much of a challenge to ichthyologists. After all, every junior aquarist can recognise a catfish! Certainly all ichthyologists are agreed that catfishes are a distinct and 'natural group'. They differ from other fishes in several respects; they usually have long sensory barbels; they often have strong, serrated dorsal and pectoral fin spines; they lack ordinary body scales, although some species have scutes or plate-like armour; and, on a more technical level, they lack certain skull bones, have a unique arrangement of blood vessels in the head, and have certain vertebrae fused.

So, although one can distinguish the catfishes as a distinct group, where do we place them in relation to other fishes, i.e., how do we classify catfishes? It has for some years, been recognised that catfishes belong to a higher, natural category named the Ostariophysi which also includes the characins, cyprinids, loaches and gymnotoids (electric 'eels' and knifefishes). All these fishes are thought to be



An Auchenipterid Catfish, *Lisosmodoras oncinus* (Schomburgk 1841). Approx: size 18 cm



A Clariid, *Clarias batrachus* (Linnaeus 1758). Approx: size 1 metre

related since all share certain features not found in any other group of fishes. Outstanding among these is the modification of the first four vertebrae into a complex structure consisting of a paired chain of small bones that link the swimbladder to the inner ear (named the Weberian apparatus after its discoverer).

The latest classification of ostariophysan fishes, recently published by two American ichthyologists, recognises the catfishes as comprising one of two suborders that together form the order Siluriformes. The suborder of catfishes, the Siluroidei, is regarded as being most closely related to the electric eels and knifefishes, the suborder Gymnotoidei. The Siluriformes are considered to be related to the characins (order Characiformes) and these, in turn, to the cyprinids, loaches and suckers (order Cypriniformes).

The whole assemblage of ostariophysan fishes is thought to form one of the two lineages which make up the superorder OSTARIOPHYSI. The other lineage, the ANOTOPIYSI, is comprised of the marine milkfishes and some rather peculiar African freshwater fishes, the phractolemids, cromerids and kneriids. The Ostariophysi is regarded as a natural group because all its members share a modification of the first four vertebrae, a two-chambered swimbladder, 'alarm substance' cells which release a warning chemical when an individual fish is injured, and various characters involving the vertebral column and skull.

The position of the Ostariophysi in relation to other bony fishes is still obscure but it lies somewhere between the clupeids (herring and anchovy-like fishes) and salmonoids (salmons, trouts and their allies). In other words, it is



An Asian Bagrid Catfish, *Mystus armatus* (Day 1865). Approx: size 18 cm (figured in Sterba as *Pimelodella gracilis*)



Brachyrhamdia imitator, Myers 1927, a member of the Pimelodidae



Corydoras paleatus (Jenyns 1842), one of the Callichthyid Armoured Catfishes (from the wild)

considered to be a relatively primitive group of bony fishes in overall anatomical organisation.

Although the latest classification of the Ostariophysi views the electric eels and knifefishes as the closest relatives of the catfishes, not all ichthyologists would agree that this is so. Others feel that these fishes are, in fact, closer to the Cypriniformes or the Characiformes. However, in order to justify such relationships it must be shown that catfishes share more specialisations with the Cypriniformes

or Characiformes than they do with the electric eels, and that means we must have more anatomical evidence than is available at present.

So much for the question of where catfishes stand in relation to other fishes, but what about the classification within the catfish suborder itself? At present, around 30 families are recognised. The total numbers given by various authors differ because one or two families are thought by some workers to represent only subfamilies. On the face of it one might suppose that the classification of catfishes wouldn't present too much of a problem. After all, few people could confuse the eel-like *Clarias* with a totally armoured *Corydoras*, even to the layman these fishes represent two different families! The problems that bedevil the classifier (systematist), however, are not so much the differences between one group and another, but the resemblances. The recognition of what constitutes a family can be a complex matter and the following are examples of such problems.

There are about two and a half thousand species of catfishes and about the same number of cyprinids (the carps, barbs and minnows). So why is it that all the cyprinids are assigned to a single family, the Cyprinidae, whereas the catfish species are distributed among 30-odd families? The main reason was stated above, that is, diversity versus uniformity. Carps and minnows, after all, do look pretty much alike, although when investigated in anatomical detail they do reveal a diversity of structures that suggests our present recognition of a single family may be erroneous. Even so, there is not the same level of anatomical diversity amongst the cyprinids, or for that matter among other ostophysan groups, as there is within catfishes.

Although most catfish families appear to be well-defined, problems arise with larger, anatomically uniform groups such as the Bagridae and Pimelodidae. The Bagridae occurs in Asia and Africa, the Pimelodidae is restricted to South and Central America. Both families are highly speciose, containing over 200 species apiece, and there are strong resemblances between the two families. Refined anatomical studies reveal, however, that there are several subgroups within these families. One might not think this is too much of a problem since these groups could be recognised as some lower category, such as subfamilies. But, problems arise when, as for example, I recently discovered a subgroup of pimelodids which appears

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The giant red tailed catfish: *Phractocephalus hemiliopterus*. This two feet specimen, affectionately known as Bertie to shop regulars graced the author's shop for several years and proved popular with young and old fishkeepers alike



'Bertie' about to feed—he would consume several 4 in. fish at one sitting then fast for a few days





The rare sailfin catfish, *Lelarus pictus* can be extremely aggressive towards other fishes, more so with other 'scaleless catfishes' to which they

can be territorial. This is one of the most sought after South American pimelodontids



Dr H. Britski, world authority on Brazilian catfishes of Sao Paulo Zoology Museum, holding the rarest catfish in South America he described as a new genus/new species *Merodontotus tigrinus* in 1981. A public aquarium specimen could be worth £1,000+



The author and Brazilian fish collector surveying the Rio Tiete from the Sao Paulo city heights



The author with an adult specimen (collected by M. Goulding during his research on Amazon fishes) of *Megalodoras irwini* an armoured giant which feeds on small snails and can be considered a peaceful colossus



Jau Paulicea lutkeni pimelodidae
(Captured at the Teotônio cataract)



Pirarara Phractocephalus hemileopterus pimelodidae (Photo by Barbara Gibbs)



Bacu Pedra Lithodoras dorsalis doradidae

An aquarium containing catfish would appear empty, a shoal of red Pacu would certainly liven up the show.

From the same family of scaleless or naked catfishes, *Pimelodontidae*, the sailfin catfishes *Leiarius pictus* and *Perrunichthys peruno* have proved very popular with aquarists. Whilst these catfish are adult at 18 in. (not as large as the red tail and tiger cousins); they demand similar conditions. They are also predatory, to some extent territorial, and are often difficult to mix in aquaria.

Small cichlids, catfish and characins would be easy prey for larger *Pimelodontids* which will even try to shred each other's finnage. Whilst finnage and body tissue can be regenerated after damage, continual attack would end in a fatality.

On a scientific note, whilst in Brazil in 1979 I had the luck to photograph one of the greatest large catfish discoveries of the last 100 years. At the time it awaited description as a new genus and species of *Pimelodontid*; it repre-

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Catfish classification

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to be more closely related to another family (the Hypophthalmidae) than to any other pimelodid! Such a situation can only be fully resolved when all pimelodid species have been investigated anatomically, and their various interrelationships established. When this has been achieved we will probably end up with a quite different familial arrangement than the one recognised at present. The measure of what is a family will not be based on how different a group is from any other, but what particular sets of characters it shares with other groups that place them all at 'family-level' in the overall classification scheme. In other words, it will be a natural classification and reflect the evolutionary history of those groups.

Such radical changes in classification are unlikely to be inflicted on families like the Loricariidae and Callichthyidae. Here, however, the systematist faces a different problem. Because the species belonging to these families have such specialised anatomy they no longer retain any indication of their past affinities. One might think that this is where fossils could help out. Unfortunately there are few catfish fossils and those that have been discovered shed no light on family histories.

Classifications of organisms are only temporary expedients; they are, after all, only theories of how groups of organisms are related to one another. Whatever their shortcomings, classificatory systems also serve as a vital means of communicating large amounts of information in a shorthand form. They act as keys to unlocking data stored under each category. Continuing research and the application of new techniques reveal characters previously unknown, or ones which had in the past been overlooked or considered of no value for classification. Our present classification of catfishes is just a useful starting point for a more refined and 'natural' one.

CATFISH FAMILIES AND THEIR DISTRIBUTION

(Numbers of species approximate)

Ageneiosidae (28 species)	South America
Amblycipitidae (33 species)	Asia
(includes Akysidae)	
Amphiliidae (56 species)	Africa
Ariidae (130 species)	Marine, circumtropical
Aspredenidae (30 species)	South America
Astroblepidae (30 species)	South America
Auchenipteridae (60 species)	South America
Bagridae (200 species)	Asia and Africa
Callichthyidae (120 species)	South America
Cetopsidae (12 species)	South America
Chacidae (2 species)	Asia
Clariidae (40 species)	Asia and Africa
Diplomystidae (2 species)	South America
Doradidae (80 species)	South America
Helogenidae (3 species)	South America
Heteropneustidae (1 species)	Asia
Hypophthalmidae (3 species)	South America
Ictaluridae (48 species)	North America
Loricariidae (600 species)	South America
Malapteruridae (2 species)	Africa
Mochokidae (150 species)	Africa
Olyridae (2 species)	Asia
Pangasidae (10 species)	Asia
Pimelodidae (300 species)	South America
Plotosidae (38 species)	Coastal marine and freshwater, Indo-Pacific
Schilbeidae (30 species)	Asia and Africa
Siluridae (30 species)	Asia and Africa
Sisoridae (100 species)	Asia
Trichomycteridae (280 species)	South America

THE CLASSIFICATION OF CATFISHES

Superorder OSTARIOPTERYGI

Series *Anotophys* (includes the marine milkfishes, and African freshwater phractolaemids, crotterids and kneriids)

Series *Otophysi*

Subseries Cypriniphysi

Order Cypriniformes (carps, barbs, minnows, suckers, loaches and hill-stream fishes)

Subseries Characiphysi

Order Characiformes (characins, tetras)

Order Siluriformes

Suborder Siluroidei (catfishes)

Suborder Gymnotoidei (electric 'eels' and knife-fishes)



Kings of the Amazon

Continued from page 38

sents the only large catfish not discovered by the 19th Century ichthyologists.

My photograph (the first colour picture ever published of this new catfish) shows the author, Dr. H. Britski with *Merodontotus tigrinus*, a beautifully coloured, striped catfish described to science on the 24th June 1981 in the *Papeis Avulsos de Zoologia*, University Museum of Sao Paulo.

At the moment the specimen (Holotype) is the only one in world

museums and it is thought a live specimen would be worth thousands of pounds to a rich public aquarium. Should this catfish, so rare it has only been collected once in the recent history of Amazon collecting, be netted from nature's greatest river system and be exhibited in an aquarium? I could easily argue so.

Another group of catfishes which end up in over crowded community aquariums are the *Doradids*, lesser known armoured catfishes from South America which could be given the collective title of Gentle Giants. In South America I held 24 in. long specimens of *Megalodoras irwini* and *Pterodoras granulosus* (often seen in the aquarium trade some years ago). Both these species eat fleshy fruits and pulmonate snails (according to Goulding), and in the high water season they disperse seeds which pass unharmed through the intestinal system. They are extremely

A giant black Pacu, *Colossoma macropomum* pictured in a display aquarium at a North London aquarist shop. This 18 in. specimen could crunch the plum stone flat!

nocturnal, lying still during the day and feeding at night which makes them less attractive to the aquarist. Sadly the gentle giants whilst proving better aquarium fish are not as popular as the predatory Pimelodontids.

The telephone tinkles and it's almost 11.30 p.m. A tiger catfish has attempted to swallow a smaller *Hemisorubim platyrhincos*—the next day the question will be: "How do I get my red tail catfish to eat? I bought it last week and the dealer assured me it was feeding on dog food."

To these and other aquarists—please read Michael Goulding's book published by Dr. W. Junk 'Man and fisheries on an Amazon Frontier'? Man is, after all, the higher animal.

Yorkshire Aquarists Festival 1983



The 'Barrel Organ' which won 1st prize for Darwen A.S.



This 'Helter Skelter' from Pocklington A.S. was placed 4th



No one else stood a ghost of a chance for 2nd place when Bradford A.S. arrived with their 'Haunted House'!

The 5th award was presented to Hull A.S. for this 'Wedge of Cheese'



THE 9th Yorkshire Aquarist Festival took place between Friday 19th and Sunday 21st August at its usual venue, Doncaster Racecourse.

Judging of the 500 or so entries took place on the Friday evening as in the past, with the Festival itself being open to the public on the Saturday and Sunday.

Even though I know that fish-keeping is one of the most popular leisure activities in this and other countries, it never ceases to amaze me how many people actually turn up to the major Festivals. True, Doncaster is well situated for such an event but, even so, travelling to the venue, particularly with fish, equipment and props for the Tableaux is neither easy, nor cheap. Yet, turn up they do—fish fanatics (yours truly included) and "casual" fishkeepers alike—in their thousands. Bearing in mind that the



An accurate representation of a 'Camera' from Oldham A.S.

'A Diesel Train'. This small but attractive tableau came from the J.A.P. Aquarist Society



Festival this year had to compete with a bout of particularly fine weather, business was brisk and heavy, especially on Sunday.

There was much to do, admire and buy, from high-quality fish and plants, to high-performance equipment, ornaments, books and magazines. It was, as the organisers hoped it might be, an occasion for all the family.

For those wishing to seek refuge and, perhaps, pick up a tip or two, there was the Open Forum which, this year, took the form of lectures or presentations. These went down very well. It was nice to see that the lectures were prominently listed in the Festival programme (which once again was donated by this magazine), and that they were efficiently backed up with clear announcements via the Tannoy system several times in the hour or so preceding each presentation. As one of the lecturers involved, I can truthfully say that this was much appreciated. I was well pleased with my turnout, the interest shown and the prompt, efficient and well-humoured assistance I received from the organisers. I believe that the other lecturers, Vivian De Thabrew, Chris Andrews and Les Holliday were just as pleased on the day.

Also in attendance this year were several Specialist Societies which attracted a constant flow of enquiries. The organisers were pleased to see the interest that these Societies generated and would like to see all the Specialist Associations represented in the future.

On the competitive front, there were three new competitions: 'Aquatic Photographs', 'Aquatic Paintings' and 'Aquatic Handicrafts'. These were well supported, attracting 68 entries of excellent quality.

The "First" prizewinners were:

Aquatic Painting (Age 5-10 years): L. A. Holden.

Aquatic Painting (Age 11-16 years): Y. Carter.

Aquatic Painting (Over 16 years): A. S. Spouse.

Aquatic Photographs (All ages): B. Leyland.

Aquatic Handicraft (Age 5-14 years): P. White.

Aquatic Handicraft (Over 14 years): R. Abbey.

The life of a Judge is not an easy one—and it is not likely to get any easier. The ever-improving expertise of the fishkeepers themselves, coupled with the availability of equally ever-improving food and water treatments mean that the quality of fish produced is, often, nothing short of amazing. Added to this must be the difficulty in judging "new" fish which, as we all know, are coming into the hobby with greater regularity nowadays, opening up opportunities in all directions.

It is therefore, fair and justifiable to say that, despite the difficulties facing them, the Y.A.F. Judges did their job thoroughly and came up with the following Order of Merit in this year's highly competitive Fish of Fishes:

First: Mr. T. Stansfield (S.J.S. A.S.) with a *Cichlasoma synspilum*.

Second: Mr. and Mrs. Golland (Sheaf Valley A.S.) with a *Chilodanis neumanni*.

Third: Mr. and Mrs. A. Smith (Lincoln and D.A.S.) with a *Notopterus chitola*.

Our sincere congratulations go to all (five) winners of this closely fought, high-quality contest which had, to the delight of the organisers, entries from as far afield as London.

Among the other Fish Classes, the Best Fish in Show went to Mr. Allan Tindall of York and D.A.S. with a beautiful *Aphyosemion fulgens*. The Best Exhibit was won by Mr. P. Cayton of Mexborough A.S. and the award for the Society with Most Points went to the Hobbies Centre Aquarist Group.

The Tableaux were, yet again, quite magnificent. Pride of place went to Darwen A.S. for their Barrel Organ, closely followed by Bradford A.S. with their Haunted House, the Hobbies Centre Aquarist Group's Victorian House, the Helter Skelter mounted by Pocklington A.S. and the Wedge of Cheese provided by courtesy of Hull A.S.

The other "Firsts" in this year's

Festival were:

Marine Furnished Aquarium (Society Entry): St. Helens A.S.
Freshwater Furnished Aquarium (Society Entry): Darwen A.S.
Tropical Freshwater Furnished Aquarium (Individual): Mr. and Mrs. Brackenbury (Hobbies Centre).
Coldwater Furnished Aquarium (Individual): Mr. and Mrs. Brackenbury (Hobbies Centre).
Aquascape Individual Entry: Mr. and Mrs. N. Stevenson (Oldham A.S.).
Novelty Individual Entry: K. Lancashire (Doncaster A.S.).
Guppies: H. Lake (Stanley A.S.).
Platies: M. Johnson (S.J.S. A.S.).
Mollies: R. Beal (Yorkshire Cichlid Study Group).
Swordtails: Mr. and Mrs. Marsh (Merseyside A.S.).
A.O.V. Livebearer: Mr. and Mrs. Maloney (Merseyside A.S.).
Small Barbs up to 10 cm: L. Mottershead (Bradford and District A.S.).
Large Barbs over 10 cm: Mr. and Mrs. Stevenson (Oldham A.S.).
Small Characins up to 7 cm: D. T. Milner (Darwen A.S.).
Large Characins over 7 cm: B. Leafe (Mexborough A.S.).
Rasboras: D. T. Milner (Darwen A.S.).
Danios: N. Fawcett (York A.S.).
Minnnows: D. T. Milner (Mexborough A.S.).
A.V. Aphyosemion: A. Tindall (York and District A.S.).
A.O.V. Killifish: Mr. and Mrs. S. Clark (Doncaster A.S.).
Siamese Fighters (true colours): T. Sayers (Stanley A.S.).
Siamese Fighters (multi colour): Mr. and Mrs. Brackenbury (Hobbies Centre).
Small Anabantids up to 10 cm: P. Griffiths (Mexborough A.S.).
Large Anabantids over 10 cm: Mr. and Mrs. B. Walsh (Darwen A.S.).
Endemic Rift Lake Cichlids: B. Wilson (St. Helens A.S.).
Angels: Mr. and Mrs. Boyle (Grimesthorpe A.S.).
A.O.V. Cichlids up to 10 cm: Mr. and Mrs. Bollon (Pocklington A.S.).
A.O.V. Cichlids over 10 cm: S. Morris (Pocklington A.S.).
Corydoras including Brochis: D. Sugden

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Meet the Societies



WILLENHALL AQUARIST GROUP



The W.A.G. Logo



W.A.G.'s choice of fish for their Logo is the Platy

LAST month we featured one of the oldest "General" Societies (perhaps the oldest) in U.K.—Croydon Aquarist Society. This month, in keeping with our philosophy of giving equal space to old and new, large and small alike, we feature a very new Society indeed.

The Willenhall Aquarist Group was formed a few months ago to cater for the needs of hobbyists in the area (including Walsall). Although this new Society has, by definition, no long history to speak of, the brief history that it does have, makes very interesting reading.

It was formed by ten aquarists who felt the need to break away from the traditional type of Society with its rules and regulations, large committee and inevitable differences of opinion. The idea was to form a Society purely to further the knowledge of, and interest in, fishkeeping.

Seeing as the founder members are all aquarists with many years of experience as members of Specialist and Midland Aquarist Societies, the Willenhall Aquarist Group are starting off on a very sound footing. Among these founder members are specialists in Livebearers, Rasboras, Cichlids, Catfish and other types of fish.

Whilst accepting that funds are essential to run any Society, W.A.S. believe that fund-raising should be as painless as possible. Therefore, instead of having an annual subscription, members pay "by the meeting". Rules exist only where they are felt to be necessary and these are flexible, reflecting a refusal to be tied down by a rigid set of "do's and don'ts".

Their basic aim is, therefore, to further the cause of fishkeeping as a relaxing hobby, hoping to cater for anyone with anything from a goldfish bowl to a fish house. Old and young are all welcome and a special effort is being made to attract young fishkeepers by the setting up of a Junior League with special Show Classes at the monthly meetings (every last Saturday of the month, starting at 7.30 p.m.).

There will also, shortly, be a monthly magazine for members.

Subscription rates: 50p per meeting.

Apply to: Mr. A. W. Davis, Show Secretary, 5 Star Close, Bentley, Walsall, West Midlands. Tel. No. Walsall 646265.

CATFISH ASSOCIATION OF GREAT BRITAIN

CATFISH ASSOCIATION
GREAT BRITAIN



The C.A.G.B. Logo CAGB diagram of *Brachysynodontis batensoda*

CATFISH account for well over 10% of all known species of fish. They also represent more than 25% of known freshwater species. Yet, in spite of their abundance and wide geographical distribution (they are found worldwide, with the exception of the Arctic and Antarctic), Catfish have generally been ignored in the aquarium literature. A notable exception is, of course, the genus *Corydoras*. The fact that other genera and families have been receiving more attention during the last few years is, no doubt, attributable to the concerted efforts of the Catfish Association of Great Britain.

The CAGB was formed ten years ago in the London area with the sole aim of furthering the study of Catfish, mainly through breeding, observation and recording. Within twelve months the membership had grown to around 80. Today it stands at 600 with members in U.K. and many other countries.

Over the years, CAGB has built up strong links with professional ichthyologists and scientific institutions. This is reflected both in their publications and in their annual conventions.

The publications include a quarterly magazine (available free to members), Information Books dealing in detail with a number of Catfish species, Volume I—Catfish Book (a greatly expanded version of the first five Information Books) and Size Guides on over 200 species of Catfish, all available to members at generous discounts.

This year's Convention is to be held on 19 November at Aylward Lower School, Windmill Lane, Edmonton, London, N18. The speakers will be Gordon Howes from the British Museum (Natural History) and Drs. Han Nijssen and Issac Isbrucker from the University of Amsterdam. Clearly, the Convention is an event not to be missed.

Other major CAGB activities include co-operation with most Federations in the compilation of Show Sizes, an Open Show (usually in April), bi-monthly meetings in London and regular regional meetings staged by the Area Groups.

Members may also buy badges, car stickers, keyrings, magazine binders and other items.

Subscription rates: Single, £5.00; Double, £6.00; European (inc. Eire), £5.00; U.S.A., Canada, S. America, Africa, India, £6.00; Australia, N.Z., China, Japan, £7.00.

Apply to: Martin Rooney (Membership Secretary), 3 Spencer Avenue, Hove, Sussex.

Tomorrow's AQUARIST



U-16 WINNERS AT THE B.A.S. SHOW

ONE of the major events of the "Coldwater" calendar took place in Bristol on Saturday 10 September. It was, of course, the 1983 Coldwater Fish Show held at St. Ambrose Church Hall by the Bristol Aquarists' Society, one of the oldest Societies in UK (See "Meet the Societies" in the September issue of *A & P* for fuller details of B.A.S.).

As usual, this was a superb Show, with no less than 477 entries distributed over a total of 40 Classes. It is always a pleasure to attend a successful, well-organised, well-supported Show, particularly one run by a Society actually involved in encouraging young aquarists on to the Showing arena.

True — other Societies also have Novice and Junior Classes and we (obviously) equally applauded them for this in the hope that their approach will become even more widespread.

There are many aspects about the Bristol Show worthy of mention but space restricts us to just a few, all relevant to "Tomorrow's Aquarist".

Novice Classes are open to competitors of any age who have not previously won a First. Bearing in mind that not everyone can have the space (or time) to maintain large



Linda Hatfield . . . waiting



Scott Wright's winning Fantail in the Junior Class

numbers of tanks, the inclusion of these Classes serves as a great encouragement to newcomers. Inevitably, some of the novices are children who, therefore, get an early opportunity to prove themselves against similarly experienced aquarists.

It was particularly impressive to see and overhear at least one veteran of the Showing scene (and longstanding member of B.A.S.) taking a young boy, who could not have been more than 8 or 9 years old, on a guided tour of the exhibits. All the salient features of each Class were expertly pointed out and invaluable information concerning their biology and maintenance given in an intelligible and interesting manner. Well done, Sir!

On the competitive front, some impressive victories were achieved by "juniors" in "non-junior" Classes. When one is made aware of the well-known and respected names of some of the other competitors in these

Classes, the real value of these victories becomes even more outstanding.

Of particular note must be **Martin Gregory's** First in Class 13—Orandas (Red-cap, Chocolate and Blue). Martin, who comes from Bolton, is 13 years old, has been keeping fish for five years and has already won three other Firsts in "open competitions".

Anthony Hughes, from Bristol (age 15), won a Second in Class 2—London Shubunkins (5 in. limit), a Second in Class 35—Koi (9 in. limit) and yet another Second in Class 40—Junior Class. Anthony is a coldwater specialist who has about 75 fish in his pond and tanks.

Moving on to the Novice Classes themselves, **Linda Hatfield** from Shirehampton (age 14) won a First in Class 7—Bristol Shubunkins (5 in. limit) with an exceptionally good fish. This was Linda's first-ever entry although she has been keeping fish for one and a half years. However, if the quality

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Russell Cooke receiving his award

of her winning entry is a sign of things to come, then "established" winners had better look out. You've got strong competition on the way!

Russell Cooke from Henbury was almost the youngest winner (but not quite). Although only 10 years old, he has already been keeping fish for

two years. He concentrates on cold-water fish while his father looks after the tropical side of the collection. Russell's major success came in Class 8—Novice A.O.V. Singletail Goldfish (5 in. limit). He also picked up a Third in Class 40—Junior Class, with a Bristol Shubunkin.

The youngest winner of all was 5-year-old (yes, 5!) **Linda Day**, who got a Fourth in the Junior Class with a Veiltail Goldfish which she has been responsible for rearing from young. The fish itself was a present from her father who is a well-known competitor in coldwater circles.

Top prize in the Junior Class went to 13-year-old **Scott Wright** from Heywood in Lancashire with a magnificent Fantail. Bearing in mind that Scott only has one large and two small tanks, the quality of his fish is nothing short of remarkable. Scott has been keeping fish seriously for two years and had already won another Novice Class First before the Bristol Show (at the Northern Goldfish and Pondkeepers Society Open Show).

We warmly congratulate all the winners and hope that they will be encouraged to take and play an ever-growing part in the hobby. We also offer our most sincere thanks to the organisers of the B.A.S. Coldwater Fish Show for their great interest in generating enthusiasm among newcomers of all ages to fishkeeping. As we were told by a member of the B.A.S. Committee, "Today's newcomer may well be the Champion of tomorrow".

"Tomorrow's Aquarist" agrees wholeheartedly.

Please address all correspondence for Tomorrow's Aquarist to:
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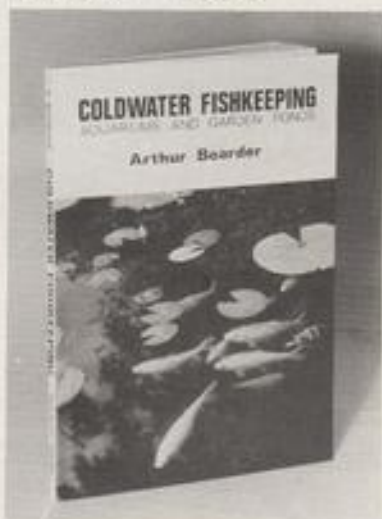
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TRADE ENQUIRIES INVITED





Coldwater Jottings by Frank W. Orme

NOT so many years ago small specimens of the coldwater catfish could often be seen in the tanks of dealers. Although still occasionally available, they do appear to be much less common than they once were. Certainly these fish do not have the attraction of the more popular goldfish and koi, nevertheless they do have a certain ugly appeal. The usual catfish on offer was the North American *Ameiurus nebulosus* (syn. *Ictalurus nebulosus*), known to the Americans as the brown bullhead, of the Family Ameiuridae.

Originating in the United States area of the Rocky Mountains to the Atlantic Coast, it was introduced into some European freshwaters in 1885 and has now become fairly common in many standing and slow moving Continental waters. Due to their voracity great damage has been done to the native fish populations of those waters in which they have become established.

Ameiurus nebulosus has a broad, dorso-ventrally flattened head, which is approximately one-quarter of the body length. The body is cylindrical and laterally compressed towards the rear, with a very slimy skin. Unlike many other catfish, the body is naked, having no scales or bony plates. The mouth is terminal and can be opened very wide, allowing it to swallow fairly large prey. The jaws are well equipped with numerous small teeth. A characteristic of the species is the eight barbels around the mouth: four situated on the upper jaw and four on the lower

jaw. The uppermost two barbels stand close behind the nostrils and are as long as those on the lower jaw. The lower two barbels of the upper jaw are located at the mouth corners; they are long and can reach to the base of the pectoral fins. The two pairs of barbels on the lower jaw are of the same length as each other and disposed as a comb. All the barbels are well furnished with many taste buds which assists the fish to locate its food.

The American catfish possesses a second dorsal fin, without rays, this fleshy fin is the so-called 'adipose fin,' and is set just before the caudal fin. The dorsal fin proper consists of a strong spiny ray and six to seven soft rays. The first ray of the pectoral is a hard spiny ray also and these can inflict a nasty wound to the inattentive or unwary handler who does not use a net. Wounds can easily become infected and may take some time to heal.



Ameiurus nebulosus

The colour of *Ameiurus nebulosus* can vary from greyish-brown to black with a somewhat greenish shimmer on its sides. The belly is a dirty white to yellow colour, and the iris of the eye is

golden. The general colour of the fish can vary according to its habitat. Sometimes a more or less marbled pattern can be seen.

Although the catfish is mainly bottom-dwelling, this does not prevent it from swimming near to the water surface—especially when the sun is shining. Even so it is principally a nocturnal fish, spending much of the daylight hours hidden in holes and similar places of concealment. It is very short-sighted but the hearing is well developed. These fish also are capable of intestinal breathing which enables them to live in waters with a low oxygen content where other fish might die.

Growing to something in the region of 18 inches, *Ameiurus nebulosus* is more suited to life in a pond; however, small specimens will quickly settle down in an aquarium. Feeding presents few, if any, problems. Their diet is omnivorous, in other words they can be offered the same foods that would be used for goldfish, but they will also prey upon any fish smaller than themselves—for this reason they should be kept with fish of their own size, or larger. It might be added that it is not unknown for them to nip the fins of slower moving fish. In the aquarium, earthworms and small fish will satisfy their predatory instincts.

The aquarium should be as large as possible, with a goodish layer of mulm over a bed of small gravel into which the fish can burrow. The plant life should be capable of withstanding rough treatment; Sagittarias and Vallisneria are perhaps the most suitable in this respect. Bearing in mind that *Ameiurus nebulosus* likes to hide amongst rocks and roots, away from brightly lit places, pieces of flat slate or stone should be utilized to create holes and caverns; clay pots can also be used for this purpose. The provision of these hiding places will be greatly appreciated by the fish.

The behaviour of this catfish can vary quite a lot. Mostly it will try to remain hidden but at other times it may swim slowly until it senses the presence of its food; then it will move with lightning speed as it seizes its prey with accuracy.

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SOME 40,000 species and subspecies of fish are supposed to be in the entire world, the richest area, with over 9,000 species, being the tropical Indo-Pacific from the Red Sea to Easter Island. The 50 ft. whale shark is the largest, the 30 ft. beluga or Caspian Sea and Black Sea sturgeon studied by Ambroz of Kishinev University, is the biggest freshwater fish. The 40 ft. basking shark is Britain's biggest fish.

That would seem enough for researchers and fish-keepers; but this is not so. Efforts to protect freshwater fish in particular become increasingly urgent annually, conservation in the past has favoured those with a sporting value. Fish-breeding research has largely concerned itself with commercial potential, like rainbow-trout and salmon. Little work has been done to develop equipment or methods for breeding European weather-fish, the giant loach *Misgurnus fossilis* for stocking purposes.

Of some 200 European freshwater species, 4% have hardly been seen for years, notably allis shad and sturgeon; 12% were never common and are now confined to one or two waters and 14% are endangered species. Researchers now aim to find why these have become rare: usually their difficulty in finding suitable spawning grounds, safe shelter, especially deep winter pools, or sufficient food. Some migration routes have been cut off by dams, weirs, hydro-electric works e.g. for Black Sea migratory trout in Turkey and the Danube, even where pollution has been removed. Still waters tend to silt up.

One suggestion is that waters containing threatened species should be turned into reserves, prohibiting fishing and stocking with competitive kinds in the way that introduced zander and barbel have affected British waters. A balance must be kept between predatory and other fish by scientific culling. The worst effect of Israeli occupation of former Palestinian waters has been the mainly monospecific populations of carp in Lake Huleh, etc.



by Eric Hardy

When the Biological Laboratory at Honolulu experimented with tank-culture and hatchery-rearing of African *Tilapia mossambica* for large scale bait-production for tuna-fisheries, their problem was the death-rate from disease, overcrowding and cannibalism. Spawning was increased by warming the winter water, growth by high quality feeding and reducing overcrowding. Lieder in Germany showed the importance of trace-elements in fish-rearing while Lawler in Canada focussed interest on the burbot which grows much larger there than in Britain or Europe.

Gorbunov in Russia described an aerobic method of fertilising ponds for fish-breeding. Mississippi University workers found some resistance to DDT developed in minnow-like mosquito-fish, *Gambusia*, while Lahav and Shinto in Israel found some resistance to lindane pesticide developed by *Argulus*, the tiny, troublesome fish-louse copepod parasite in fishponds. Malikova and Kotova in Russia showed the value of antibiotics in rearing young salmon in hatcheries, and Canadians showed growth declined with rising salt water temperature, and *vice versa*. Pacific salmon always die after spawning once because of fatty degeneration of the arteries, thrombosis, etc, due to high blood cholesterol level. We aren't the only species with a cholesterol problem!

Welsh monster

It had to come in the past hot summer's silly season—another monster, this time in Welsh Lake Bala, Llyn Tegid. Liverpool University Fish-biologists hadn't noticed anything without a rational explanation over their years of research, but a local warden broadcast his strange sight crossing the lake one day. Like the rubbish churned out from Loch Ness for half-a-century, it is obvious that these people did see something, and equally obvious they lacked sufficient zoological background knowledge and

Swordtail with extended tail, a male characteristic



experience to identify what they saw. This is pure assumption that the various sightings are the same thing. This was the gist of one of the first articles on the Loch Ness monster which I wrote in the *Dundee Courier* long before the war. Even the oft-printed photo of it was published upside down, because it made a better picture! As for Peter Scott's account, complete with an invented scientific name for it, I refer you to the comment of zoologists at the British Museum.

Alas, these sensationalists fail to register any interest in real phenomena among fishes, like the sex-changing Mexican swordtails and *Sebastes*, the scarlet sub-tropical scorpion-fish. When the London Zoo aquarium introduced the former to the public

at the same time that the Loch Ness rubbish "broke" in the London press 50 years ago, only one paper bothered to carry the story. "Truth may be all very well, but it doesn't sell newspapers"—how often did one hear that in Fleet Street! No more press interest appeared when *Ameiurus splendens* a live-bearer first described in 1971, was shown the other year.

As many aquarists see, the female swordtail, after producing several broods, not only adapts one of the lower fins as a pairing organ, but extends the tail-fin to the male characteristic. Why does it change sex? It adjusts the sex-ratio when females far outnumber males. The phenomenon is not confined to fishes. The superstitious 15th century church tried

at Basle, condemned and burned for witchcraft, an old barn-door cock which laid an egg, instead of asking how, and why. Disease or surgery may cause sex changes.

Frogspawn kept at high temperature or in acidulated water, or if the female is induced to retain her eggs a few days longer, ensures a preponderance of male tadpoles; the opposite if the eggs are kept merely moistened. A slight operation can turn a male toad female; then, when mated to a male, a majority of offspring are male. Oysters are classic examples of sex-change, our natives much more than Portuguese or American oysters. When shall we see this on Page 3 of the sexy tabloid? Maybe truth will one day sell newspapers!

Coldwater Jottings

Continued from page 47.

In fact it can be extremely boisterous when feeding, at which time the plants may be damaged and the mulm stirred up in clouds. It is most advisable to employ strong filtration to prevent the water being unduly clouded by the swirling mulm. In common with some other catfish belonging to the sub-order Siluroidea, it adopts various resting positions. It may simply lie on the bottom, or stand vertically, head upwards between the leaves of the plants. It can also rest with its hind part resting on a leaf whilst its forepart floats freely, without motion, in the water.

It has been claimed that these catfish will breed in the aquarium (John S. Vinden in *The Home Aquarium*, 1961), and that a minimum size, for the breeding pair, should be between 5 and 6 inches long. There are no external differences between the sexes, but the females assume a more rounded appearance during the breeding season. A large aquarium is required containing a number of rocks. The fish will create a depression in the gravel at the side of a selected rock, into which the rather

large cream-coloured eggs will be deposited. It is said that both parents guard the eggs, fanning them vigorously to keep them clean. According to the temperature, hatching will occur in from three to four days. The adults continue to look after the newly hatched fry, gathering up any which stray. The young require no food until after the large food-sac has been absorbed. The adults should be removed as soon as the young become free-swimming because they tend to



Ameiurus natalis

injure them whilst herding them. Food for the young is the same as given to young goldfish, i.e. newly hatched brine shrimps, micro worms, sifted *daphnia* etc. The point is made that all other fishes must be removed from the spawning tank, for *Ameiurus nebulosus* will refuse to spawn if any other fish is present in their tank.

Apart from *Ameiurus nebulosus* the United States is also home to the following *ameiurids* but, so far as I am aware, they will not be available from

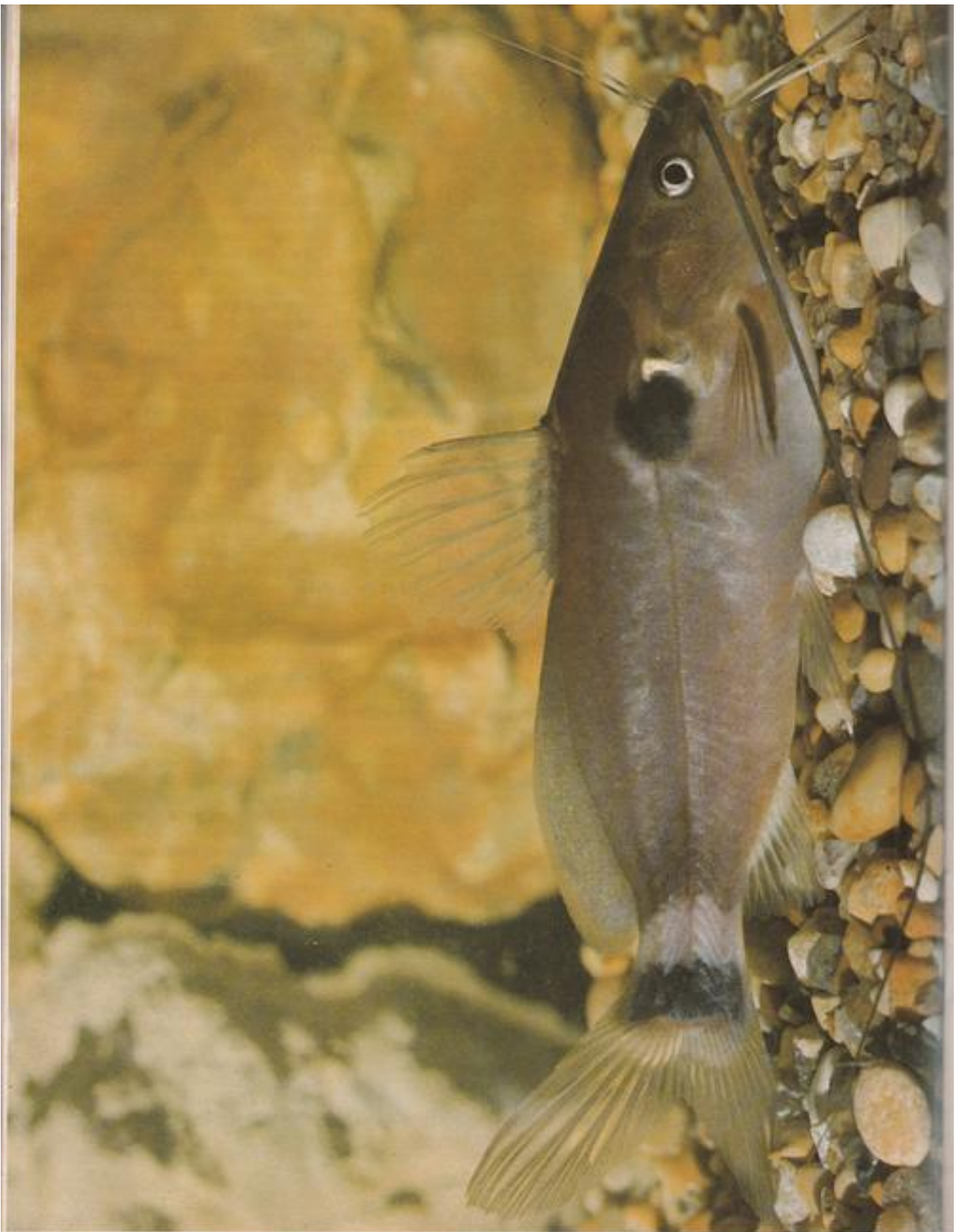
British dealers. In habits they are very similar to *A. nebulosus* and are treated accordingly.

Ameiurus nebulosus marmoratus is widespread from Indiana to Florida. It is brownish-green on the back shading to a yellowish, or dirty white belly. The head, back and flanks are adorned by irregular spots of a white, greenish or brown colour which contrast attractively with the base colour. This is probably a sub-species of *A. nebulosus*, and it grows to a similar length of 18 inches.

Ameiurus natalis is found in the region of Great Lakes and the Mississippi water system, has a slightly different shape to *A. nebulosus* and only reaches a length of about 14 inches.

Caught for food *Ictalurus punctatus* grows to around 28 inches and is widespread in the large rivers of the south and south-western states. However, this fish is unlikely to be sought by aquarists in Britain.

Silurus glanis, the European catfish or Wels, appears quite harmless when small. At first glance it resembles the Burbot, but can be distinguished by its short dorsal fin and very long anal fin. The body is rounded, carries a single dorsal fin, and has a broad head with a wide mouth and six barbels. It is actively predacious and grows to a large size; it is the largest of the European freshwater fish.



SPOTLIGHT

The TWO-SPOT Catfish

by Jack Hems

For me the two-spot catfish, *Mystus micranthus*, of the widely distributed (Africa and Asia) family Bagridae, has almost every desirable attribute I look for in a tropical freshwater fish well-suited to a decorative aquarium. For one thing, it has a singularly attractive coloration. For another thing, it has a life-expectancy—in a properly maintained tank—in excess of seven or eight years. Then again, it is not particular about the DH or pH of the water. In fact, ordinary mains water left to stand for a day or two, or boiled before use, is as good as any. And for general care and maintenance a temperature of about 70°F (21°C) to 72°F is perfectly satisfactory. All the same, it will withstand a gradual drop to the sixties (°F) with no harm done. For all that, a protracted spell in water registering a reading in the mid-sixties (°F) is not advised. Last but not least, *M. micranthus* is not fastidious about food.

In the wild state, the subject of this article is native to the freshwaters of Thailand and beyond to the islands of Sumatra, Java, and Borneo. It is stated in one well-known book that the fish reaches a length of 5 in. Fortunately—I say fortunately because catfish that grow too rapidly can quickly become a problem—a young *M. micranthus* can live in a well-aerated tank for months before showing any appreciable signs of growth.

But let's move on to its physical appearance. The most characteristic external features are its long—in relation to its girth—and naked body adorned with two distinctive markings: one below the anterior rays of the

tallish dorsal fin, the other completely masking the space between the caudal peduncle and the root of the tail. The markings are, in a manner of speaking, dense patches of black accentuated by irregular margins of ivory to enamel white. The pectoral fins—blackish along their leading edges—are situated close to the bottom of the gill-opening. The pelvic fins have their origin below an imaginary line drawn from the hind end of the dorsal fin to the underparts. The anal fin is short in the base.

There are four pairs of barbels. The pair on the chin (mental barbels) are short and white. Their companion barbels are dark brown. The maxillary barbels (most often seen in a forward position) can extend back to the tail. But then all the barbels are manoeuvrable, some pairs with more freedom of movement than others. It is of interest to note, also, that the barbels have so many uses: they can move independently of one another and are employed to feel round obstacles, acquaint their owner of anything likely to impede free movement, smell out food and pick up all sorts of vibrations in the water. The eyes look like tiny beads of polished jet set in narrow rims of shining gold. Returning to the fins, the lengthy and rayless adipose is of a clayey grey hue and quite opaque. The membranes of the other fins are glass-clear (hyaline is the word) with a slightly amberish tinge. All supporting rays of the fins are medium to dark brown.

Young fish are a delicate shade of

salmon-pink underlying a basic chocolate brown which pales on the lower sides and underparts to ivory-white speckled silver posteriorly. The basic body colours and markings present an everlasting delight to the eye.

During most of the light-hours (natural or artificial), *M. micranthus* makes itself scarce among such things as waterlogged tree branches, sizable stones, or good stands of underwater plants. That is until food is introduced when, as though summoned by the toll of a bell, it sallies forth from its dusky fissure or camouflaging aquatic herbage and coasts about in midwater or across the floor of the tank vacuuming (perhaps the aptest description of its feeding procedures) particles of food floating in the water before most of the other occupants of the tank are even aware of its presence.

Small pieces of raw red meat have great appeal. But more ravenously accepted are whiteworms, small or minutely divided earthworms, gnat larvae, Daphnia, and the rest. It feeds readily on prepared foods.

After clearing all the food it can find in its immediate surroundings, and apparently tiring of the twistings, turnings and buffetings of the other occupants of the tank, *M. micranthus* glides back faster than a sigh to its favoured retreat.

When the lights are put out, and sometimes long before electric illumination is switched on (if the tank is not kept really well-lighted for about twelve hours a day), the fish will swish from its place of hiding, and search its surroundings for anything edible which it may have missed earlier on. The species is particularly

SPOTLIGHT



adept at gently turning compost or probing into cracks in stones or wood. Hence the writer ranks it among the best of aquarium scavengers.

Thankfully, because the floor covering is not disturbed to any great extent and, provided there are enough thickets of plants to trap floating

sediment or, better still, a reliable form of filtration is used, there is no danger of this fascinating fish creating a permanent haze.

Unlike so many members of the family *Bagridae*, not a few of which can grow to above 2 ft. in size, *M. micranthur* will not eat or interfere in any way with other fishes smaller (but not so small as to be looked upon as food and swallowed at a single gulp) than itself. In fact, apart from its mingling with other fishes when feeding times come round,

the species keeps itself to itself. I have been unable to trace a record of its breeding in captivity, and cannot say what external sexual distinctions, if any, exist.

Experienced aquarists do know, however, that if two well-developed fish of about the same size show noticeable differences in girth (before gorging themselves on food) and the slimmer bodied of the two starts chasing its companion around, then this behaviour can often be interpreted as an indication of a true pair.

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Continued from page 42

(Bradford A.S.). **A.O.V. Catfish Armoured:** I. Fletcher (Merseyside A.S.). **A.O.V. Catfish Naked:** J. Lynch (Merseyside A.S.). **Botias and Loaches:** Mr and Mrs. N. Stevenson (Oldham A.S.). **Sharks:** G. Wigglesworth (Darfield A.S.). **Foxes:** Mr. and Mrs. N. Stevenson (Oldham A.S.). **Pairs Livebearers:**

J. and K. Corbett (Merseyside A.S.). **Pairs Egglayers:** D. Cruickshank (C.A.G.B.). **Breeders Livebearers 4 in.:** H. Lake (Stanley A.S.). **Breeders Livebearers 3 in.:** Mr. and Mrs. Pickford (Hobbies Centre). **Breeders Livebearers 2 in.:** Mr. and Mrs. Culley (Hobbies Centre). **Breeders Livebearers 1 in.:** J. and K. Corbett (Merseyside A.S.). **Breeders Egglayers 4 in.:** A. Littlewood (Darfield A.S.). **Breeders Egglayers 3 in.:** Mr. and Mrs. Brackenbury (Hobbies Centre). **Breeders Egglayers 2 in.:** D. T. Milner (Darwen A.S.). **Breeders Egglayers 1 in.:** P. Cayton (Mexborough A.S.). **Female Livebearer:** J. and K. Corbett (Merseyside A.S.). **A.V.**

Female Egglayer: Mr. and Mrs. Brackenbury (Hobbies Centre). **A.O.V. Tropical:** Mr. and Mrs. Silk (S.J.A.S.). **Common Goldfish and Comets:** K. Chapman (Mexborough A.S.). **Shubunkins, Bristols and Londons:** P. Cayton (Mexborough A.S.). **Fancy Goldfish, Moors, Fantails, Orandas and Lionheads:** B. Leafe (Mexborough A.S.). **Breeders Coldwater:** B. Leafe (Mexborough A.S.). **A.O.V. Coldwater:** Mr. and Mrs. Silk (S.J.A.S.). **Aquarium Plants:** Mr. and Mrs. Brackenbury (Hobbies Centre). **Amphibians and Terrapins:** D. Taylor (Hull A.S.). **Crabs, Shrimps and Lobsters:** Mr. and Mrs. R. J. Lack (Hobbies Centre).

OSCAR



G. Robinson



of the Aquarium

Oryziatidae



The Oryziatidae are represented by a single genus, *Oryzias*, known among aquarists as the Medaka, Rice Fish or Rice Paddy Fish.

According to some authorities, *Oryzias* is a genus of the Family Cyprinodontidae, the Killifishes. Although there are similarities between the two, *Oryzias* possesses a number of characteristics that suggests separation from the Killies. These differences were considered significant enough by Greenwood et al. in 1966

to place the genus in a Family of its own. This classification, which was adopted by Nelson in his 1976 'Fishes of the World', is also followed here.

One of the main similarities shared by the Oryziatidae and the Cyprinodontidae is the total lack of spines in the fins, a feature which places them, along with the Poeciliidae (Livebearers), Goodeidae (Mexican Livebearers), Jenynsiidae (One-sided Livebearer), Anablepidae (Four-eyed Fishes) and others in the Order Atheriniformes. The main feature that separates *Oryzias* from the Killies is its lack of two cranial (skull) bones, the vomer and the supraclithrum. It shares this with just three other (rare) genera, *Adriamichthys*, *Xenopocichthys* and *Horachthys*.

Although seven species of *Oryzias* are quoted in some of the literature, only two are found with any degree

of regularity in the hobby. These are *O. javanica*, the Javanese Rice Fish, and *O. latipes*, the Medaka, which exists in two forms, the wild type and the more popular gold (a red form has also been reported but this has been found to deteriorate quickly).

A third species encountered from time to time is the Celebes Medaka, *O. celebensis*.

In the aquarium, Medakas are peaceful community fish which, because of their small size (maximum of 5 cm in *O. celebensis*), are often at risk in the presence of larger, predatory species.

O. latipes is also particularly suitable for beginners to fishkeeping in that it can withstand wide fluctuations in temperature conditions with even greater ease than other well-known hardy species, such as the Guppy, *Poecilia reticulata* (10-30°C—50-86°F).

Another feature that makes the Medaka "desirable" is the reproductive behaviour of the females which carry bunches of fertilized eggs attached to their vent for a time after mating.

Percidae

Although commonly known as the Perch Family, this is only one of the nine genera, with about 126 species, which go to form the Percidae. In fact, it is the circumpolar distribution of the Perch, *Perca fluviatilis*, that has been largely responsible for this "honour".

All the Percidae possess two dorsal fins which are either separate (as in *Perca*) or joined (as in the Ruffe, *Gymnocephalus cernuus*). The anterior dorsal fin is always spinous while the posterior is soft-rayed.

Classification of the Percidae varies according to the status given to each of the three major evolutionary lines which are generally recognised. According to Nelson (1976), the Family is divided into two Sub-families:

1. Percinae—this is further divided into two Tribes:

(a) Percini—this includes the "true" Perches such as *Perca* and *Gymnocephalus*;

(b) *Etheostomatini*—this includes all 110 species of North American Darters, e.g. *Etheostoma* spp.

2. Luciopercinae—contains the European "Darters" such as the Zingel, *Zingel zingel* (alternatively and "pharmaceutically" known as *Aspro!*), and the Pikeperches, *Stizostedion* (*Lucioperca*).

The Percidae constitute a Family of great contrasts. For example, there are voracious, predatory species such as the Walleye, *Stizostedion vitreum*. This species is not only considered a gamefish in North America and Canada, but has even been scientifically exploited as a method of biologically controlling other predatory species such as the Yellow Perch, *Perca flavescens*.

Another predatory species is, of course, the "Common" Perch, *P. fluviatilis*, which is considered a gamefish in European countries, is territorial as an adult and can clear a body of water of smaller fish.

At the other extreme, some of the

Darters are highly secretive fish which congregate in large numbers in shallow water during the spawning season.

Another contrasting feature worthy of note is that, while some species such as *P. fluviatilis* are very abundant, others, including many Darters and some of the European Percidae, e.g. the *Asprete* (*Romasichthys valtanicola*), the Striped Ruffe (*Gymnocephalus schraetzer*), the *Asper* (*Zingel asper*) and the Zingel (*Zingel zingel*), are, at best, rare enough to warrant concern and, at worst, in dire need of protection.



The widely distributed, predatory Perch, *Perca fluviatilis*

Otoliths

The inner ear of fishes performs similar functions to those found in mammals, i.e. hearing and balance. These similarities are reflected in the structures of both types of ears. They have, for example, three semicircular canals placed mutually at right angles to each other, two in the vertical and one in the horizontal plane, which play a role in the maintenance of balance (Jawless Fishes have either one or two only).

Below the region from which the semicircular canals arise (the *utricle*), there is a "lower chamber" called the *sacculus* which has a small outgrowth called the *lagena*.

Each of these structures contain a calcareous "ear-stone" referred to as an OTOLITH. Each otolith, further, has a name of its own. The one found in the utricle is called the

lapillus; that in the *sacculus*, the *sagitta*, and finally, that in the *lagena*, the *asteriscus*.

When a fish moves through water, its angle and speed cause movement in the otoliths and these, in turn, stimulate nerve endings which give the fish the information it requires in terms of its position in, and its acceleration through, the water.

Vibrations of the otoliths caused by sound waves also give fish the ability to hear under water. However, their sensitivity to sound waves varies markedly, largely depending on the complexity of the connections between the swimbladder and the *sacculus*.

In the Ostariophysi (as per the classification of Greenwood et al., 1966), this connection involves highly modified bones, called the Weberian apparatus, which magnify the vibrations that occur in the swimbladder as it reacts to sound waves passing through the fish. The magnified vibrations are then transmitted to the *sacculus* and its otolith and thence, via the auditory nerve, to the brain.

A large number of Ostariophysi, therefore, have a highly developed sense of hearing. Many of the aquarium fishes we know, such as the Characins, Catfishes and Cyprinids, belong to this large group.

Since otoliths grow by the progressive deposition of layers, they can, therefore, be used, in the same way as "tree-rings", to determine the age of a particular fish.



These are the otoliths of *Albula eppsi*, a fossil member of the family Albulidae (Bonafishes) which are found in tropical seas. These particular specimens came from the Blackheath Beds in Abbey Wood and are between 50 and 60 million years old

Pufferfishes

ALTHOUGH closely related, not all Pufferfishes belong to the same genus, let alone Family. They all, however, belong to the same Order, Tetraodontiformes, which also includes the Boxfishes (Family Ostracodontidae) and both the Trigger and Filefishes (Family Balistidae).

Fish commonly referred to as Puffers are found in the Families Triodontidae, Tetraodontidae and Diodontidae. The latter two share the ability to swallow quantities of water when alarmed or annoyed. This is channelled into a ventral portion of the stomach and kept there until the original cause for the reaction has disappeared. Inflation with air instead of water can also occur.

In the Triodontidae, the body is enlarged, not by water, but by expanding a flap of tissue which is supported by the movable pelvic bone.

Another unusual feature of the

Tetraodontiformes is their ability to produce sounds by grinding their teeth or vibrating their swim-bladders.

The Family names of Puffers are largely derived from the number of fused teeth they possess: two in the Diodontidae (the Porcupinefishes), three in the Three-toothed Puffer, the only member of its Family, the Triodontidae, and four in the Tetraodontidae. These fused teeth give Puffers tremendous biting power, as many aquarists have discovered to their cost.

According to the classification adopted here (Nelson 1976), the Tetraodontidae are divided into two Sub-families—the Tetraodontinae (with



Canthigaster margaritatus

nine genera, including the most popular of all the Puffers, *Tetraodon spp.*), and the Canthigasterinae (Sharp-nosed Puffers, with the single genus, *Canthigaster*).

None of the Puffers possess either pelvic fins or true teeth. Most are marine, but some can be found in brackish or freshwater.

Of these, the most popular is the Common Puffer, *T. catus*. Others include the large (75 cm) *T. mbu*, the small Congo Puffer, *T. lineatus* and the Figure-Eight Puffer, *T. palmatus*. The Porcupinefish and Sharp-nosed Puffers are strictly marine.

Some species of Puffer produce a poison called Tetraodotoxin which can, reportedly, be fatal. Most of it is concentrated in the internal organs, particularly the gonads, during the breeding season, leaving the muscles relatively free. In spite of this potentially lethal characteristic, some species of Puffer are considered good eating in certain regions of the world, e.g. Japan.



It is quite remarkable how, almost every year now, we record some sort of new climatic extreme or the other. One year, an unprecedented drought, then a winter of horrifying severity, and now a summer of record heat and recurrent thunderstorms. One thing can be said for all of them—they all tend to explode one old wives' tale or another, which is something of a good thing because it teaches us to be not too narrow minded on matters of nature.

1983 started extremely wet, which at least relieved the pondkeeper of the need to keep topping up, but predictably within a few weeks the balance had gone the other way and many of us suffered from hosepipe bans. The very general bitterness over this, in view of the wet spring, was understandable by all who pay soaring water rates. By way of explanation the authorities waved the whole thing away by assuring us that there was plenty of water, but because we all wanted it at the same time it got just too much for the pumping apparatus, so many places ran dry. In the same breath people were taken to task for using sprinklers on their cabbages at night. So this rather did for the overworked pumps theory—or had the Water Boards missed a point? If day-time demand is too much, why not spread the load to the dark hours, just

as the Electricity Boards do by offering cheap power at night? So, after all, the pondkeeper came under quite a lot of stress during July, and no doubt many honestly carried bucketsful and doubtfully legal hosepipes were brought to bear. Then came the humidity and the thunder, and with them the debunking in my case at least of the axiom that this sort of weather causes pond fish to die. It is established fact, however, that regular reports come in of wholesale losses of fish during 'close' conditions, and I have experienced this myself several times over a period of about 25 years. People have brought me splendid specimens of orfe and rudd—but dead! No sign of disease has ever been apparent. People have written in, year after year, describing almost precisely similar conditions, and we have tended to write it all off because the weather was *thundery*.

The explanation springs suddenly and conveniently to mind because the enemy is clearly revealed, and because fish die under such conditions, ergo Thor is the miscreant. The only trouble about this is the question as to how the thousands of orfe and rudd which got away with it under the same sullen skies actually managed to do so.

The thundery weather theory has certainly sold lots of fountains and water pumps because many writers have found that disturbance of the water surface can help. This is true to some extent, but it is important to understand why. The distress to fish is first seen when the 'fast' ones, like orfe which are greedy for oxygen at the

best of times, gradually show signs of difficulty in breathing. This is difficult to detect in a pool at the onset, but the victims soon begin to roll and steer erratically, and may finish up half out of the water on a mud bank weakly gasping their lives away. Some may be revived by removing them to clear aerated water, but usually by the time they are in this state irreversible damage has been done to the gills, and swift killing is the most merciful course. If noted early, a strong input from the garden hose, the downfall from a powerful fountain, or the turbulence from a well sited waterfall may make matters more tolerable, but this is only first aid. You have to go back to first principles to track down the real cause of the trouble, which is simply an oxygen deficiency or, more likely, an excess of carbon dioxide. The two are not quite the same thing.

If you have defied all the rules and overcrowded your pool suddenly, your fish will suffer from a deficiency of oxygen—just like the rush hour on the Tube. Take away most of the people, and you can breathe again (more or less) normally. But many pools start the year with a huge layer of decaying vegetable matter on the bottom, and it is not until the warm weather arrives that this may become lethal; if the pond is understocked the fish will probably get away with it. If it is just on the borderline or overstocked, there will almost certainly be trouble when-

Continued on page 62



Golden Orfe

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



'Ich' ...

Can you give me some information on white-spot in fish?

White spot disease is caused by the protozoan parasite *Ichthyophthirius multifiliis*. This disease is easily diagnosed by the presence of small, white cysts on the skin, fins and gills. The parasite can multiply very rapidly at warm temperatures and effectively passes from fish to fish. Hence, prompt treatment is essential. Add 5 ml of *Contra-Ich 80* to every 10 litres (2.2 gallons) of water. A further half dose may be added after five days to treat persistent cases. Since the parasite can easily live away from the fish host for a short time, it is vital to treat the infection in the infected tank. White spot is often introduced into tanks and ponds with new fish, plants, snails or live food. Consequently, all new fish should be quarantined and given a preventative course of treatment with *Contra-Ich 80* as described above.



Hypessobrycon herbertaxelrodi suffering from white spot

Plants may also be treated in this way if they have originated from a potentially infected source. Snails are completely unnecessary in an aquarium or pond and should be avoided. Finally, freeze-dried foods along with safe (non-aquatic) live foods like earthworms should be used to replace *Tubifex*, water fleas and the like.

plants ...

Can you give me some advice on how to grow plants successfully in my tropical aquarium?

In our rather variable and unpredictable climate, it is not always possible to depend upon natural daylight as a light source for aquarium plants. Whilst lighting is relatively unimportant to most aquarium fish, adequate levels are essential for vigorous plant growth. As a rough guide, each foot length of aquarium needs about 40 watts of tungsten bulb lighting or 15-20 watts of fluorescent tube lighting left on for approximately 8-10 hours a day. In the case of Gro-Lux lighting, this wattage should be increased to 30 watts/foot length. However, the intensity and duration of artificial lighting must be tailored to suit the needs of each individual tank. Although fluorescent lights are more expensive to install (for example, a starter unit is needed), this may be offset against their lower running costs. In addition, even a 40 watt bulb gives off a considerable amount of unwanted

heat which may excessively warm the surface layers of an aquarium.

As with fish, certain plants have certain preferred conditions and they may find it difficult to survive outside this range. Many of the commonly cultivated aquarium plants will grow perfectly well under the soft, slightly acid conditions preferred by certain tropical freshwater fish. However, other plants, such as some *Echinodorus*, *Hygrophila* and *Vallisneria*, will tolerate harder, more alkaline water. To encourage good plant growth, a two-to-three inch layer of gravel on the aquarium floor should be used to conceal a thin layer of aquarium peat mixed with a little garden soil. The plants will appreciate this rich compost, although the occasional use of plant fertiliser is recommended. Many aquarists have found that undergravel filtration has adverse effects on plant growth and it is advisable to consider installing a *Tetra Billi* or *Brilliant* poly-foam cartridge filter. These are effective, easy to maintain, and have no adverse effects on plants.

Although there are now some excellent aquarium plants available, little compares to the natural beauty of a set-up tank stocked with living plants. Long-leaved varieties of *Vallisneria* and *Sagittaria* make a particularly attractive backdrop for an aquarium and there are several species of small *Echinodorus* and *Vallisneria* and also *Cryptocoryne neesii* that may be used to fill the foreground. The middle to rear regions may be planted with clumps of *Myriophyllum* or *Hygrophila* and a single large *Cryptocoryne* or *Echinodorus* used to form an impressive centrepiece. **C.A.**

COLDWATER

Arthur Boarder

PLANTS

Vivian De Thabrew

KOI

Hilda Allen

MARINE

Richard Sankey

DISCUS

Eberhard Schulze

Coldwater**oil on surface . . .**

I made a pond and also a waterfall to move the water around and I fitted a pump to work the fall. After a few days there was an oil slick on the surface and although I washed it off more appeared shortly after. What is the cause and cure?

The oil may have come from the pump, and if so it should soon clear up. However, there may be other reasons for the slick. When a water lily leaf starts to decay there is often an oily film coming from it. This is noticeable when the leaf is pushed under the surface. Also there may be something decaying on the bottom, such as uneaten food. Check up on these points and the trouble should soon clear up.

goldfish at surface . . .

I have recently set up a coldwater tank, 39 x 24 x 24 in., and have not more than 14 inches of body length of fish. The water plants are Vallisneria, Amazon sword and hair grass. In the mornings I have found the fishes mouthing at the surface. Why is this as I do not think the tank is overstocked?



Egeria densa is a very good oxygenating plant

The tank is certainly not overstocked with fishes. However, the water does not contain sufficient oxygen, so the fishes are at the surface mouthing for air. Your plant life does not seem to be of much use in your tank. Amazon sword is a tropical plant and hair grass is not a very good oxygenator. Try *Elodea canadensis*, *Egeria densa* and *Lagarosiphon major*. You may have been over-feeding and so there is some uneaten food on the bottom decaying and polluting the water. Change the water and do not feed too much. Many aquarists feed the fishes too soon after they have been introduced to a tank and before they have had time to settle down. The uneaten food is then a danger. Do not feed the fishes for about a week after they have been put in the tank.

golden orfe . . .

I have two small ponds in my garden and intend to make a large one about 16 ft x 14 ft and 3½ ft deep. Can you recommend a large type of fish which may be visible most of the day and not always on the bottom?

I am sure that golden orfe will suit your larger pond very well. They can grow to fifteen inches or more long and are surface feeders; they shoal well and are invariably near the surface. They are not fussy eaters and will take all kinds of live foods and also dried as well. They can also stand any amount of cold during the winter.

pond filters . . .

I have read that a filter is necessary for a pond containing koi. Is it also the same for goldfish?

A filter is not necessary for a goldfish pond as long as the correct stocking is maintained. Providing there are sufficient water plants and not too many fishes, then a filter is not needed. Another reason why a filter may be necessary is when too much food is given and much of it remains uneaten. This is the usual fault with beginners. They just cannot refrain from feeding the fishes every time they go near the pond. It should be realised that there is always likely to be a certain amount of natural food in any well set-up pond. Various creatures appear, apparently from nowhere, after a short space of time. There are the larva of

various insects, pond lice, and various small worms. Most fishes also eat soft vegetation and will even eat soft filamentous Algae. Most ponds with the correct stocking rate of plants and fishes can function for a long time without having to feed the fishes. Fishes live in natural ponds without anyone constantly feeding them. **A.B.**

Koi



breeding koi . . .

Having recently finished a Koi-pond in my garden I intend to breed Koi for sale in order to finance the hobby, I have a gold-fish pond where the fish regularly spawn. Can you please tell me where I can purchase a breeding pair of smallish Koi?



Home-bred Koi

I am always interested to hear from those people who hope to breed Koi, but in all fairness I feel I should explain further as your letter is typical of several received recently. Most of us are pleased to see our fish spawn as it is at least a tribute to our method of fish-keeping, and Koi-spawnings began this year at the end of April.

You will almost certainly need a second pond for the actual spawning and later to raise the fry. Ideally, Koi of the same variety should be used, and with two or more males to each female to ensure good fertilisation of the eggs.

The spawning material may be bunches of raffia, wool, boiled willow-

roots or branches of conifer. After the spawning the parent fish can be returned to the main pond and the eggs left undisturbed, they will hatch at 65°F-70°F in a few days and the fry will soon be free-swimming and searching for food.

Male Koi are usually slimmer and more cigar-shaped than females which appear generally more 'rounded' and often have less-pointed pectoral fins than males. Breeding Koi should be at least 15 inches in length, or as large as possible, probably about 3-4 years old. Your plans of buying a breeding-pair of smallish Koi may go awry, and you would be well advised to consider buying 4 or 5 Koi, not less than 6 inches long and of the same variety. That way you could be reasonably assured of getting fish of both sexes and gaining experience of keeping and growing them on before attempting to breed.

Koi demand space and raising a few thousand youngsters to even 2 inches will prove this point. There is a difference between raising a few fish of one's own, produced by favourite Koi; and rearing sufficient good-quality, or at least saleable Koi, to finance your hobby. If only things were that simple (especially for those with limited space and/or cash).

I can advise you to begin with Ohgons. Experience has shown that this single-coloured variety is more likely to produce good results than the patterned varieties, and my best wishes for success in due course.

H.A.

Plants



lilies from seed . . .

I would like to raise water-lilies from seed. I have written to two well-established water-gardens: one wrote to say it is impossible, and even if they knew how, would not tell me, and the other did not answer. I have raised *Nuphar lutea* from seed successfully, now wish to progress.

I cannot believe that one cannot grow water-lilies from seed, albeit is a long process, and that division is the only way of propagation.



Growing lilies from seed requires great patience

The propagation of water-lilies is normally done by rhizomes, as this is the easier and quicker method. However, it is possible to grow the lilies from seed, though it is a slow, tedious process requiring a lot of patience.

Water-lily seeds range from peppercorn to pea size. The best way to grow them is to take a shallow tray or pan and fill it with finely-sifted soil or John Innes compost N. 1 or 2. Then lightly pack or compress the soil evenly. Now sow the seeds and cover them with a layer of soil or John Innes compost of about $\frac{1}{4}$ in. Press this down very lightly. Very carefully water the soil well until saturated, using a small watering-can. Leave it in this condition for a day or two so that the seeds are well soaked.

After this saturation period the container should be immersed in a larger container with the water level about $\frac{1}{2}$ in. above the seed level. The temperature of the water should be between 72°-80°F. After some time, depending on the species, the seedlings will appear in the form of green shoots. Once the first two floating leaves have grown, you should transplant these to 2 in. pots and keep them submerged about 4 in. During this period maintain the same temperature and place the container with the immersed pots in a sun-trap. As the plants grow bigger, keep transplanting them to bigger pots. Once the plants have formed about six floating leaves they are ready for planting in their permanent position. **V.T.**

Marine



maroon clown . . .

Could you please advise me regarding a Maroon Clown fish and other Clown fish. All I seem able to find out is that they don't get on with the Tomato Clown but I do have some *Amphiprion percula* Clowns which are in a fairly large tank with Anemones and I would like a single Maroon Clown with them. I should be grateful for any information regarding this.

In their natural environment of the coral reef, anemone fishes are territorial. Invariably adult pairs of fish occupy at least one sea anemone and in some cases two or three within a confined area, and generally they will not permit any other anemone fish to come within close proximity. Sometimes it is possible to see a number of juvenile anemone fish occupying a single anemone but eventually many of the smaller ones will be driven out by those that are stronger. On my many visits to the coral reef environment I have never seen more than one species of anemone fish in an anemone. Therefore, I would generally recommend that only one species of anemone fish be kept in an aquarium unless of course it is an extremely large one. Even so, as the fish grow and become more established, they are still likely to fight over territory and with your particular request I would feel that a Maroon Clown would come off better against the Common Clowns.



The Maroon Clown, *Amphiprion bicinctatus* (formerly *Premnas*) R.S.

Discus



schmidt-focke . . .

Upon reading the correspondence in the March and May issues of the *Aquarist & Pondkeeper* between Mr. Eberhard Schulze, and Mr. A. B. Cass, I came upon a write-up by Mr. T. J. Burden of Epsom, Surrey, on 'New Colours in Discus' in the July 1977 issue of the magazine.

Mr. Burden writes of his visit to Dr. Schmidt-Focke and his work with Discus. At that time he was devoted to breeding the Brilliant Turquoise or Flasher Discus.

Mr. Burden then goes on to describe the different strains of Turquoise Discus, which reads Turquoise Cross Red Discus. In 1970 Dr. Schmidt-Focke obtained a large wild red discus. This fish was caught in Brazil near the border with Peru. It spawned within one week of arrival in Germany and much to Dr. Schmidt-Focke's surprise the mate was a green-striped turquoise.

In 1974 the Doctor returned to his normal work satisfied that he had done all he could to better his turquoise cross red breeding stock.

Unfortunately, hardly any of his stock now remains and he told me that his final hope for his strains lay within a 10 month old pair, for although he has other pairs he is satisfied with none. I hope to have a dozen or so of these young from the pair mentioned within the next month, but these fish are for my own breeding stock, and will not be for sale with the other types of European tank-bred stock I obtain for resale.

The fish can only be described as being tomato red with silvery turquoise stripes running through the body; the red only appears when the fish reaches maturity and is further accentuated by the absence of black cells. Females of this strain have less striping and have a broad green band decorating

the dorsal and anal fins.

To my knowledge the only breeding pair of these fish outside Germany are owned by Mr. Eberhard Schulze of Highgate but he has not yet managed a successful spawning. So come on Eberhard, lets have some of these magnificent fish for sale on the open market.

I am not knocking Mr Schulze's breeding methods, but as many of us know he has been plagued with bad luck concerning these particular fish so let us hope that he has more luck in the future.

All these write-ups to me are confusing. I would like to know what happened to the pair of fish Mr. Eberhard Schulze had, did Mr. T. J. Burden distribute any European stock in great numbers, and if Dr. Schmidt-Focke managed to build up his stock of Turquoise Red Discus.

I reply to Mr. R. A. William's letter regarding a breeding pair of Dr. E. Schmidt-Focke's Turquoise X Red Discus Fish, it is quite true that I was the only one who had such a pair outside Germany at that time. They were magnificently coloured; the red and turquoise colouration being equally intense in both male and female and the markings over the whole of the body were near perfection. As far as Discus fish go nothing like it had ever been seen before.

This pair spawned within a very short time after I received them from Dr. Schmidt-Focke but, unfortunately, I was unable to raise the youngsters. If my recollections are correct they spawned a second time. Again, I was unable to raise them.

This pair of fish was seen and admired by many enthusiasts and I had many fantastic offers but because of their scarcity I was unwilling to part with them. It is a sad but true fact that someone who could not be without this pair and felt that no one else should have such a pair, killed them with 1 lb. of caustic soda being put into 40 galls. of water.

Although I have had since then many pairs of Turquoise X Red Discus fish; I have never been able to obtain a breeding pair of equal magnificence.

E.S.



by Barry Black

Catfishes of the World Vol. 1 by David Sands. Published by Dunure Publications, 18 Station Road, Dunure, Ayr, Scotland at £8.95, Binder £12.5. Available overseas: International money order (£12 complete). Airmail £15.

Have you ever wondered what the South American rivers which contain your favourite catfish look like? How do scientists distinguish one species from another and which country and real *Corydoras julii* originates from? This volume provides such information and much more.

David Sands has written the first part of a complete book that catfish enthusiasts have waited 10 years for.

To publish in loose leaf form seems

a particularly good idea as many books are out of date the day they are printed. To be able to buy those sections which most interest the individual is an attractive proposition as a complete book costing anything from twenty to thirty pounds tends to drain the funds somewhat.



The opening section shows the armoured catfishes *Callichthyidae* and offers some scientific evidence for differences between genera, species etc. This first volume lists each genus separately with the lesser known *Aspidoras*, *Brochis*, *Dianema* being dwarfed by the section on *Corydoras*. Each information sheet shows the country of origin, in which of the scientific groupings the species is placed and how large the actual described specimen is.

I found this kind of format very useful and easy to follow. The idea of placing similar species together rather than listing them alphabetically (as in the index) works very well.

You will find information on care, breeding (dealing with eggs and fry), fossil *Corydoras*, aquarium layout and management, stocking levels in aquaria and treatment of catfish. The foreword to the book was written by Dr. H. Nijssen and an extract from a paper on *Corydoras* of Surinam by this well known Dutch scientist is also very interesting, although I was not happy about his description of the use of poison in collecting.

If the other four volumes are as thorough as this one then enthusiasts will have an excellent manual on catfishes.

This first volume will be of interest to all fishkeepers because of the general popularity of *Corydoras* and it should lead the author, (a well known contributor to this magazine) into wider fields of endeavour.

A particularly pleasing point about the book is that it originated in this country and to have pictures of species likely to be imported in the future, will undoubtedly prove a major asset to many aquarists. B.B.

COMMENTARY

Continued from page 57

ever climatic conditions slow down the process by which harmful gasses, largely carbon dioxide, are allowed to leave the water and to enter the atmosphere. Cool windy weather disturbs the water surface and helps release the gasses, but thundery, still, weather, locks them inside. Curiously, pondkeepers who have done all we have told them by planting heavily may also regret the fact on occasions when an excess of plant life may release an overwhelming quantity of carbon dioxide overnight which cannot be dispelled the following day under 'heavy' conditions. In this case drastic thinning will certainly help. Sometimes the several

sets of adverse conditions will combine to cause disaster, even though things were apparently going well. A colleague recently lost over 30 large goldfish in his well proportioned pool because he had failed to take account of the above factors. Whilst it is true that in one of nature's pools, a rough justice of balance rules that most will survive, we must remember that our ponds are artificial and man-regulated, and we don't always get the arithmetic right. I must certainly keep a watch on my own large pool: the orfe have grown to about 9 in.—I have never had larger ones—the oxygenators have multiplied amazingly, and I failed to clean out the pond two years running. As the fish have, apparently, enjoyed the summer as much as we have, it

seems as though I have got at least one of my factors well on the credit side!

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NEWS...

SOUTH WEST



North Avon A.S. had a very interesting meeting in September. A session of open discussion was initiated by Mr. Harper (who took the chair for the evening, as our Chairman Mr. C. Spence was unable to attend). Queries were answered, solutions were offered to problems, and suggestions were made with regard to producing live food forms, particularly useful in formulating a balanced diet during the impending winter months. We are still attracting new faces each month, which would confirm the saying, that "advertising pays". With out a.g.m. in October, we shall be entering another year, which at this point in time, looks very promising. A warm welcome awaits anyone interested in attending our meetings, held on the third Monday in each month at Hanham Folk Centre, High Street, Hanham, Bristol. Any enquiries should be directed to the Secretary, Mr. R. W. Cummins, 1, St. Anne's Close, Cadbury Heath, Wootton Bassett, Bristol BS15 3EEL.

THE Dorchester Tropical Fish Society held its 3rd annual open show on Sunday, 14th August at the Boys Brigade Hall, Weymouth Avenue, Dorchester. Top awards included: Best Fish in Show and Best Tropical to W. A. Knight with a *Cichlasoma citrinellum*, who also won the F.B.A.S. Championship Trophy for Class D (A.O.V. Cichlids) with the same fish. Best Coldwater was won by R. F. Adams for his Common goldfish and Best Livebearer went to R. Somers with a *Xiphophorus helleri*. The Practical Fishkeeping (Aquarium Top Tank '83 awards were: Best in Show: W. A. Knight; Best Pair: T. Waller and Best Breeder: A. T. Brown.

Other results were as follows: Class B: 1, T. Gray; 2, T. Gray; 3, W. A. Knight (Havant); 4, R. F. Adams (Salisbury); 5, A. Mariborough (Taunton); 6, R. F. Adams (Salisbury); 7 and 8, A. Waller (Southend); 9, C. Amey (Dorchester); 10, B. Syms (Dorchester); 11, R. Somers; 12, A. Mariborough (Taunton); 13, W. A. Knight (Havant); 14, G. W. Murphy; 15, T. Dowell; 16, D. Cox (Yeovil); 17, K. W. Grace (North Wilt); 18, D. J. and 19, W. A. Knight (Havant); 20 and 21, R. Somers; 22, I. R. F. Adams (Salisbury); 23, T. Waller (Southend); 24, R. Somers; 25, R. Cooper (Taunton); 26, D. J. and 27, L. C. Gill (West Cornwall); 28, C. Amey (Dorchester); 29, 1 and 4, T. Gray; 30, R. Paul (Dorchester); 31, R. Somers; 32, 1, R. F. Adams (Salisbury); 33, C. Amey (Dorchester); 34, P. Cox (Bournemouth); 35, R. Cooper (Taunton); 36, J. B. Sell (West Cornwall); 37, H. G. R. Johnson; 38 and 39, T. Gray; 40, H. G. R. Johnson; 41 and 42, T. Dowell; 43, J. W. A. Knight (Havant); 44, H. G. R. Johnson; 45, A. Waller (Southend); 46, Mr. and Mrs. G. Fitzgerald (Dorchester); 47, I. H. A. Miller (Chard); 48, C. Amey (Dorchester); 49, A. Waller (Southend); 50, F. Cox (Bournemouth); 51, 1, 2 and 3, T. Gray; 52, A. Whiteley (SELAS); 53, 1, W. A. Knight (Havant); 54 and 55, A. Waller (Southend); 56, D. Young (Dorchester); 57, M. J. C. Amey (Dorchester); 58 and 59, D. Cox (Yeovil); 60, W. A. Knight (Havant); 61, C. Amey (Dorchester); 62 and 63, D. Cox (Yeovil); 64, A. Waller (Southend); 65, 1, R. F. Adams (Salisbury); 66, 2 and 3, T. Gray; 67 and 68, F. Cox (Bournemouth); 69, 1 and 2, D. Cox (Yeovil); 70, R. Somers; 71, P. C. Laddon (SELAS); 72, Q1, 1 and 4, R. Somers; 73, K. Gray (Chard); 74, W. A. Knight (Havant); 75, 1 and 3, C. Amey (Dorchester); 76, P. Cox (Bournemouth); 77, A. R. Hocking (West Cornwall); 78, 1, R. F. Adams (Salisbury); 79, G. Murphy; 80, T. J. R. F. Adams (Salisbury); 81, G. Murphy; 82, T. J. R. F. Adams (Salisbury); 83, R. Syms (Dorchester); 84, 1, R. F. Adams (Salisbury); 85 and 86, T. Gray; 87, K. Cooper (Taunton); 88, V. L. Mr. and Mrs. G. Fitzgerald (Dorchester); 89, A. T. Brown (SELAS); 90, 1, R. F. Adams (Salisbury); 91, 2, A. T. Brown (SELAS); 92 and 93, W. J. Brown (L.C.A.S.); 94, M. J. C. Amey (Dorchester); 95, H. A. Miller (Chard); 96 and 97, C. Martin (BKA); 98, 1, D. Young (Dorchester); 99, R. F. Adams (Salisbury); 100 and 101, F. Cox (Bournemouth).

From Aquarists' Societies

The Show Committee takes this opportunity to thank everyone who made this show possible including Algarde, B. P. Nutrition, King British Aquarium Accessories Co. Ltd., Phillips Yeast Products, Ltd., Magnet Pet Foods, Ltd., Tetramin (U.K.) Ltd., Thomas's (Peters), Eric Woods (Boswood) Ltd., for their generous support.

THIS year the popular Bristol Aquarists' Coldwater Show was the venue for the Nationwide Trophy. The variety selected this year was Lionheads and included classes for Ranchos. There were about 50 fish in the four classes. The winner was Vic Capaldi, from Bristol A.S., with a very good standard Lionhead. It was hoped that by staging these four classes that the coldwater fraternity would be able to assess the possibilities of the two types. In the event the Ranchos benched did not reflect the best of the variety that are known to be about and as a result lost a valuable show window.

The Bristol Shubunkin classes were as usual very well supported with some colourful fish. Two new classes for Juniors and for Best Coloured Calico found many supporters. Perhaps for the first time as a large show the water in all the exhibition tanks was modified in view of depressing recent local incidents with fish, due, it was thought, to the presence of Chironomids in the tap water. The precautions taken proved completely successful and all the 470 entries were displaying well at the end of a most successful show.

Bill Lynch presented the awards. Among the judges assisting were Mrs. M. Dudley and Messrs. J. Amos, L. Baxter, A. C. Barnes, V. Capaldi, V. Cole, L. Dodds, L. Emery, G. King, R. King, W. Leach, J. E. Parker, D. S. Paul, W. Ramsden, B. Rothwell, H. C. R. Thomas.

Results: Best in Show and Aquarist Pin: B. Rothwell; Highest Points: J. Day; Best Shubunkin shown by member B.A.S.: B. Rothwell.

Section A—Singletails. Section winner: R. Jordan; Common Goldfish (15): 1 and 2, B. Rothwell; 3, C. Hayes; 4, D. Scott; London Shubunkins (3): 1 and 2, J. Pollard; 3, A. Hughes; Comets (11): 1, P. Holliday; 2 and 3, C. Hayes; 4, P. Norman; Bristol Shubunkins 3 in. (41): 1 and 2, B. Rothwell; 3 and 4 (VHC), J. Whiting; (VHC): G. Bell, T. Ball; Bristol Shubunkins 5 in. (45): 1, R. Jordan; 2 and 4 (VHC) J. Amos; 3, R. King (VHC); R. Howarth; A.V. Goldfish, Yellow or Variegated (10): 1, 3 and 4, D. Garland; 2, H. C. R. Thomas; Novice Bristol Shubunkins (11): 1, L. Hatfield; 2 and 3, C. Stiff; 4, P. Holliday; Novice A.O.V. Singletail (7): 1, R. Cooke; 2, 3 and 4, P. Garland.

Section B—Twintails. Section winner: W. Ramsden; Fantails, Merails (18): 1, 3, and 4, A. C. Barnes; 2, V. Capaldi; Fantails, Calico (11): 1, P. Pearl; 2, J. Amos; 3, R. Williams; Ventrals (14): 1, J. Day; 2, G. Smith; 3 and 4, P. Norman; Orandas (7): 1 and 3, J. Day;

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.

2 and 4, G. Smith; Orandas, Red-cap, Chocolate, Blue (5): 1, W. Gregory; 2 and 3, F. Pearl; 4, G. Bell; Moors (5): 1, 2, 3 and 4, W. Ramsden; Pearlscales (7): 1, J. Pollard; 2 and 4, R. Williams; 3, Larter & Hayes; Lionheads (12): 1, 2, 3 and 4, V. Capaldi; Bubble-eyes, Celestials, Telescopes (6): 1, W. Gregory; 2, 3 and 4, J. Day; A.O.V. Twintail (5): 1 and 2, J. Pollard; 3 and 4, J. Amos; A.V. Twintail, Metallic, Yellow or Variegated (7): 1 and 2, V. Capaldi; 3, R. Bennett; 4, G. Smith; Novice A.V. Twintail (7): 1, L. J. Bradley; 2, 3 and 4, T. and E. Harper.

Section C—Matched Pairs. Section winner: B. Rothwell; Bristol Shubunkins (11): 1, G. Bell; 2, R. Jordan; 3, B. Rothwell; 4, J. Whiting; A.O.V. Singletail (7): 1, P. Norman; 2, 3 and 4, D. Garland; A.V. Twintail (7): 1 and 2, B. Rothwell; 3, G. Smith; 4, R. Lee; Section D—Goldfish bred 1983. Section winner: B. Rothwell; Bristol Shubunkins (20): 1, B. Rothwell; 2 and 4, D. Paul; 3, D. Padfield; Ventrals (20): 1, 2, 3 and 4, J. Day; Orandas (5): 1, 2, 3 and 4, J. Day; Moors (4): 1, 2, 3 and 4, W. Ramsden; Lionheads (4): 1 and 3, W. Cumberland; 2 and 4, G. Bell; A.O.V. Goldfish (22): 1, 2, 3 and 4, J. Day; (VHC): P. Norman.

Section E—Teams of Four Fish bred 1983. Section winner: W. Ramsden; Bristol Shubunkins (13): 1 and 3, B. Rothwell; 2, A. Barnes; Equal 4, A. Barnes and D. Paul; Ventrals, Orandas, Moors: 1, 2, 3 and 4, W. Ramsden; A.O.V. Goldfish (20): 1, R. Williams; 2, D. Garland; 3, V. Capaldi; 4 (VHC): P. Norman; Koi, Pond or River Fish (5): 1, 2 and 3, R. King; 4, Mrs. J. Amos.

Section F—Pond or River Koi. Section winner: A. McDonald; A.V. Pond or River (13): 1, A. McDonald; 2, D. Sturt; 3, R. Cooke; 4, J. Parker; Koi, 9 in. limit (4): 1, A. McDonald; 2, A. Hughes; 3, T. and E. Harper; 4, D. Sturt; Koi (1): D. Sturt.

James Classes—Ranchos (13): 1 and 4, R. Fincock; 2 and 3, R. Elliott; Ranchos, bred 1983 (16): 1, 2, 3 and 4, P. Tagg; Best Coloured A.V. Calico (17): 1, J. Amos; 2, R. Fincock; 3, L. Baxter; 4, T. Ball; Junior Class, A.V. Goldfish (21): 1, S. Wright; 2, A. Hughes; 3, R. Cooke; 4, L. Day; (VHC): A. Woolley.

SOUTH EAST



RESULTS of the Topham A.S. club's show held on 15th September at the Victoria Hall, Ash, Swinstead: 1, A. Burgess, Xiphophorus helleri; 2, C. Preece, Xiphophorus helleri; A.O.V. 1, M. Bird, Biotis splendens; 2, P. Hardy, Anabantoides khali; 3, A. Burgess, Barbos tetrazona; 4, A. Burgess, Poecilia Mexicana. Judge: Mr. R. Cooke. An informal club quiz completed the evening's entertainment.

WELL known technical writer Cliff Harrison was guest speaker for the S.P.A.S.S. meeting on 20th September. Cliff brought along a wide selection of new equipment with the coldwater aquarist in mind and discussed the merits of various pond and aquarium filter systems, syphons, air pumps, and pond heaters. The evening ended with a general question time on specific products and Cliff was thanked by chairman Dave Brooks for a very interesting and enjoyable lecture.

South Park Aquatic (Study) Society specialises in coldwater fishkeeping and meets at 8 p.m. on the third Tuesday of every month at the Windmill Community Centre, St. George's Road, London SW19. New members and visitors always welcome. Full details from Mrs. Margarette Dudley, 163 South Park Road, Windmill, London SW19 9RX. (Tel) 61-546 5662.

RESULTS of the Reading and District A.S. open show held on 11th September. We would like to thank the A. of A. judges for their help at our show, and everyone who helped to make it a success. 270 fish were entered.

F.A.: 1, J. Tonna (RDAS); 1a: 1, S. Andrews (RDAS); 2, D. Ford (BAS); 3, W. A. Knight (Havant); 4, C. Tonna (RDAS); 1b: 1, S. Andrews (RDAS); 2, C. Spokes (RDAS); 3, J. Bath (Solent); 4, J. Gentry (Tonham); 2: 1, S. Norris (BAS); 2, J. Handley (Solent); 3, W. A. Knight (Havant); 4, S. Andrews (RDAS); 2c: 1, F. Cripps (Newbury); 2, Chris and Tom Ralph (Basingstoke); 3, M. Clarke (BAS); 4, G. Ford (BAS); 3a: 1, W. Knight (Havant); 2, P. Armstrong (BAS); 3, Mr. Gale (Newbury); 4, D. Stephens (RDAS); 3b: 1, D. Ford (BAS); 2 and 4, G. Purren (RDAS); 3, W. Knight (Havant); 3c: 1 and 2, Mr. Voddon; 3, Mr. Curtis (Swindon); 4, S. Norris (BAS); 3d: 1, F. Cripps (Newbury); 2, Mr. Voddon; 4, I. S. Norris (BAS); 2, J. Bath (Solent); 3, R. Collier (Swindon); 4, A. Orley (Tonham); 3, I. M. Clarke (BAS); 2, C. Curtis (Swindon); 3, C. and T. Ralph (Basingstoke); 4, P. Hadley (Solent); 5: 1, 2 and 4: L. Lovegrove (Basingstoke); 3, J. Handley (RDAS); 6: 1, P. Armstrong (BAS); 2, L. Gale (Newbury); 3, J. Handley (Solent); 4, C. Spokes (RDAS); 7: 1, R. Collier (Swindon); 2, D. Ford (BAS); 3, P. Armstrong (BAS); 4, P. Handley (Solent); 8: 1, C. and T. Ralph (Basingstoke); 2 and 3, R. Macklin (Basingstoke); 4, Mr. Voddon; 9: 1, S. Andrews (RDAS); 2, C. Spokes (RDAS); 3, C. and T. Ralph (Basingstoke); 4, S. Norris (BAS); 10: 1, W. Knight (Havant); 2, R. Macklin (Basingstoke); 3, W. Grove (BAS); 4, C. Spokes (RDAS); 11: 1, W. Grove (BAS); 2, P. Hadley (Solent); 3, R. Tyrrod (BAS); 11b: 1, C. Spokes (RDAS); 2, W. Knight (Havant); 3, R. Collier (Swindon); 4, D. Ford (BAS); 12a: 1 and 3, P. Armstrong (BAS); 2, Mr. Voddon; 4, D. Ford (BAS); 12b: 1, D. Ford (BAS); 2, C. Tonna (RDAS); 13: 1, W. Knight (Havant); 2, C. Curtis (Swindon); 3, R. Collier (Swindon); 4, S. Andrews (RDAS); 14: 1, C. Curtis (Swindon); 2, S. Andrews (RDAS); 3, F. Cripps (Newbury); 4, R. Collier (Swindon); 15: 1, S. Norris (BAS); 2, S. Andrews (RDAS); 16: 1 and 3, D. Lambert (Kingston); 2, S. Andrews (RDAS); 4, M. Clarke (BAS); 17a: 1, G. Ford (BAS); 2, D. Ford (BAS); 3 and 4, C. and T. Ralph (Basingstoke); 17b: 1 and 2, J. Bath (Solent); 3, D. Lambert (Kingston); 4, C. and T. Ralph (Basingstoke); 18a: 1, C. and T. Ralph (Basingstoke); 2, C. Tonna (RDAS); 18b: 1 and 2, D. Lambert (Kingston); 3, C. Tonna (RDAS); 4, S. Norris (BAS); 20: 1, I. Sims (RDAS); 2, S. Harrison (BAS); 3, A. Beasley (RDAS); 21: 1, G. Purren (RDAS); 2, W. Grove (BAS); 3, C. Tonna (RDAS); 4, C. Curtis (Swindon).

Best Fish in Show went to D. Lambert (Kingston). G. regani. Best Breeders: D. Lambert (Kingston). G. regani. Best Pair: 1, Bath (Solent). Niph. and/or. Highest Poised Visiting Club was Bracknell. Highest Poised All-rounder: Mrs. S. Andrews of RDAS.

AT the September meeting of the Folkestone A. District A.S. the members tested their knowledge in a slide show quiz which was won by one of the younger members Mark Reeves. An auction of fish was held afterwards. The results of the open class table show were: 1, T. Kemp; 2, M. Keese; 3, S. Keese; 4, A. Pain. The society meets on the third Tuesday of each month at the "Harvey Hotel", Dover Road, Folkestone, Kent. New members are always welcome. Contact Mr. Karas, 77 Ashley Avenue, Folkestone, Kent. Tel: 78799.

THE Catfish Association of Great Britain (C.A.G.B.) will be holding its A.G.M. and Convention this year at Atwood Lower School, Windmill Lane, Edmonton, London N.18.

It will begin at 2 p.m. on Saturday, 19th November. Our guest speakers will be: Mr. G. Howe of The British Museum (Natural History Dept.) and Dr. H. Nissen and Dr. I. Broecker of The University of Amsterdam. Tickets can be obtained in advance from: T. W. Glass, Eng., 10 Adelaide House, Portobello Court, Portobello Road, London W11 2DD. Telephone: 727 7481 (01 if calling from outside London). Tickets will cost £2.50 (members); £3 (non-members). Please enclose s.a.s. with all applications.

THE East Sussex Herpetological Society hold meetings in various parts of the area on the first Tuesday of each month for all interested in keeping reptiles and amphibians and the conservation of British species. New members are welcome including juniors and more details can be obtained by contacting the Hon. Secretary, Mr. P. R. Martin, 20 Silverdale Road, St. Leonards-on-Sea, East Sussex TN37 7DR. Tel: Hastings 440695.

NORTH



RESULTS of the Statesmen league match hosted by Wyke Show Society and judged by Ebor Aquarist Society. Points obtained by each society: York, 68; Scarborough, 64; Wyke, 52; Hull, 46; Bradford, 19.

Guappies: 1, Mr. and Mrs. Badley (Scar); 2, Mr. and Mrs. Badley (Scar); 3, Mr. and Mrs. Sowerby (Scar); 4, Mrs. G. Gray (Scar); 5, R. Koster (Scar); 6, Mr. and Mrs. P. Badley (Scar); 7, Mr. Fawcett (York); 8, Mark Walker (York); 9, G. Nelson (Hull); Finches: 1, I. and A. Johnson (Wyke); 2, E. Sanders (Hull); 3, S. Taylor (Wyke). A.O.V. Livebeavers: 1, 2 and 3, S. Taylor (Wyke). Small Characins: 1, C. and S. Waller (York); 2, Mr. Fawcett (York); 3, I. & A. Johnson (Wyke). Large Barbs: 1, 2 and 3, M. H. Smith (Hull). Small Characins: 1, Mr. Fawcett (York); 2, W. Sowerby (Scar); 3, Mrs. S. Sowerby (Scar). Large Characins: 1, C. and S. Waller (York); 2, K. Webb (Scar); 3, D. Sizer (York). Sea-Clams: 1, M. and P. Jordan (Read). Anglia: 1, Mr. Fawcett (York); 2, Mr. and Mrs. Slavin (Scar); 3, Bolton and Sizer (York). Small Anabantids: 1, Mr. Fawcett (York); 2, R. D. Tyler (Hull); 3, M. and P. Jordan (Read). Large Anabantids: 1, M. and P. Jordan (Read); 2, Mr. and Mrs. Frisby (Wyke); 3, K. Webb (Scar). Corydoras and Boccias: 1, J. Roston (Wyke); 2, W. Sowerby (Scar); 3, Mr. Fawcett (York). A.O.V. Catfish: 1, M. H. Smith (Hull); 2, W. Sowerby (Scar); 3, D. Sizer (York). Loaches: 1, S. Armstrong, Jr. (Scar); 2, C. and S. Waller (York); 3, E. Hooton (Scar). A.V. Aphroscimmi: 1, Mr. and Mrs. Tindall (York); 2, T. and J. Garton (Hull); 3, Mr. and Mrs. Tindall (York). A.O.V. Killies: 1, D. Andrews (Wyke); 2 and 3, E. Hooton (Scar). A.O.V. Tropical: 1, K. Webb (Scar); 2, Mr. and Mrs. Eilker (Scar); 3, R. Webb (Scar). Sharks and Puffers: 1, J. Foston (Wyke); 2, S. Foston (Wyke); 3, E. Hooton (Scar). Brd. (Egglayers A4 and B): 1, Mr. Fawcett (York); 2, Bolton and Sizer (York); 3, G. Andrews (Hull). Brd. (Egglayers) C3 and D1: 1, Mr. Fawcett (York); 2, Mr. and Mrs. Farrant (Brad); 3, Bolton and Sizer (York). Brd. (Livebeavers) A4 and B3: 1 and 2, G. Andrews (Hull). Brd. (Livebeavers) C3 and D1: 1, 2 and 3, G. Andrews (Hull). Matched Pairs (Egglayers): 1, M. and

P. Jordan (Brid); 2, V. Rugg (Wyke); 3, S. Harrison (Scar). Matched Pairs (Livebeavers): 1, G. Andrews (Hull); 2, and 3, M. and P. Jordan (Brid). Common Goldfish and Comets: 1, Mrs. M. Gray (Hull); 2, K. and J. Johnson (Wyke). Fancy Goldwater: 1 and 3, M. Cook (Wyke); 2, K. and J. Johnson (Wyke). A.O.V. Goldwater: 1, Mr. and Mrs. Snowden (York); 2, G. A. Todd (Hull); 3, Mr. and Mrs. Eilker (Scar). A.V. Female (Egglayers): 1, K. Webb (Scar); 2, D. Andrews (Wyke); 3, R. C. Laverick (Wyke). A.V. Female (Livebeavers): 1, W. Sowerby (Scar); 2, M. and P. Jordan (Brid); 3, W. Sowerby (Scar). Furnished Milla (A and B): 1 and 2, Mr. and Mrs. Tindall (York); 3, P. Taylor (Scar). Best in Show: Bolton and Sizer (York). Judging Society: Ebor.

RESULTS of the Blackpool and Fylde A.S. open show. Section A: 1, Mr. and Mrs. Bibby (Sandgrounders); 2, J. Turner (Accrington); 3, C. and A. Daniels (Blackpool); 3a: 1, J. Lynch (Merseyside); 2, J. Turner (Accrington); 3, C. Wallbank (Accrington). A.O.V. Goldwater: 1, S. Walsh (Accrington); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, C. Wallbank (Accrington). Veilfish, Fantails and Moors: 1, C. Wallbank (Accrington); 2, Mr. and Mrs. Bibby (Sandgrounders); 3, J. Turner (Accrington). Section B: Lionheads: 1, J. Turner (Accrington); 2, L. Mahoney (Accrington); 3, J. Lynch (Merseyside). Section C (Swordtails): 1, C. Carter (St. Helens); 2, Mr. and Mrs. Marshall (Merseyside); 3, Mr. and Mrs. Baldwin (Sandgrounders). Platies: 1, Mr. and Mrs. Marshall (Merseyside); 2, R. N. Carter (St. Helens); 3, Mrs. M. Daniels (Blackpool). Mollies: 1, A. M. Redman (Blackpool); 2, R. Beal (Huddersfield); 3, J. Lynch (Merseyside). Guppies: 1, Mr. and Mrs. Daniels (Blackpool); 2, R. W. Carter (St. Helens); 3, A. M. Redman (Blackpool). Goodeas: 1, Mrs. Jepson (Blackburn); 2, R. I. Payne (SLAG); 3, Mr. and Mrs. Marshall (Merseyside). A.O.V. Livebeavers: 1, Mr. and Mrs. Godard (Macclesfield); 2, R. W. Carter (St. Helens); 3, Mr. and Mrs. Marshall (Merseyside). Section D (B) Characins (over 7.5 cm): 1, D. Phillips (Merseyside); 2, R. I. Payne (SLAG); 3, Mr. and Mrs. Bibby (Sandgrounders). Characins (over 7.5cm): 1, R. I. Payne (SLAG); 2, Mr. and Mrs. Mulla (Merseyside); 3, Mr. and Mrs. Baldwin (Sandgrounders). Section E—Anabantids (up to 8cm): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, D. Hartley (Sandgrounders); 3, A. M. Redman (Blackpool). Section E—Anabantids (over 8cm): 1 and 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, M. and R. Hartley (Sandgrounders). Section F—Fighting: 1, C. A. Daniels (Blackpool); 2, Mrs. Gregory (Darwen); 3, Mrs. M. Daniels (Blackpool). Section G: 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, D. T. Milner (Darwen); 3, L. Evans (Blackpool). Section G—Danios: 1, Mr. and Mrs. Daniels (Blackpool); 2, S. D. Holden (Darwen); 3, C. Naylor (Darwen). Section G—Rashoras: 1, D. T. Milner (Darwen); 2, R. I. Payne (SLAG); 3, Mr. and Mrs. Baldwin (Sandgrounders). Section H—Labors, Sharks, Puffers: 1, R. I. Payne (SLAG); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, R. Beal (Huddersfield). Section I—Barbs (up to 7.5cm): 1, Mr. and Mrs. Marshall (Merseyside); 2, J. and S. Crosswell (Preston); 3, D. Whiteside (Lytham). Section I—Barbs (over 7.5cm): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, Mr. and Mrs. Whitaker (Sandgrounders); 3, R. Williams (Ellersport). Section J—Toothcarps: 1, 2 and 3, J. Roberts (Accrington). Section K (25): 1, R. I. Payne (SLAG); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, J. Lynch (Merseyside). Section K (26): 1, 2 and 3, M. D. Hartley (Sandgrounders). Section K (27) Angels: 1, Mr. and Mrs. Evans (Blackpool); 2, J. Eccleshare (Blackpool); 3, A. M. Redman (Blackpool). Section K (28) Rift Valley Cichlids: 1, Mrs. E. Baldwin (Sandgrounders); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Godard (Macclesfield). Section L (30) Corydoras: 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, R. W. Carter (St. Helens); 3, J. T. Morris (Sandgrounders). Section L (31): 1, J. T. Morris (Sandgrounders); 2, J. T. Morris (Sandgrounders); 3, D. T. Milner (Darwen). Section M (32): 1, Mr. and Mrs. Bibby (Sandgrounders); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mrs. A. Window (LAS). Section N (33): 1, D. Phillips (Merseyside); 2, J. Roberts (Accrington).

1980), 3, M. D. Hartley (Sandgrounders).
 Section C (24) Pairs (Livebearers): 1, R. L. Payne (SLAG); 2, Mr. and Mrs. Marshall (Merseydale); 3, J. Lynch (Merseydale).
 Section F (35): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, M. D. Hartley (Sandgrounders); 3, J. T. Morris (Sandgrounders).
 Section G (56): Breeders (Livebearers): 1, Mr. and Mrs. Marshall (Merseydale); 2, E. W. Carter (St. Helena); 3, Mr. and Mrs. Baldwin (Sandgrounders).
 Section R (37): Baldwin (Sandgrounders).
 Section S (37): 1, and 3, J. T. Morris (Sandgrounders); 2, D. Y. Milner (Darwin).
 Section 8 (30): D. Y. Milner (Darwin); J. Lynch (Merseydale); 3, D. J. Puck (Preston).
 Section 5 (38) Junior (Livebearers): 1, M. Carter (St. Helena); 2, M. D. Hartley (Sandgrounders); 3, M. Carter (St. Helena); 1, M. Carter (St. Helena); 2, C. A. Daniels (Blackpool); 3, J. Window (LAS).
 Best in Show: Mr. and Mrs. Godard (Macclesfield).
 Top Tank Best Fish: Mr. and Mrs. Godard (Macclesfield).
 Top Tank (Pairs): Mr. and Mrs. Baldwin (Sandgrounders).
 Top Tank (Breeders): D. T. Milner (Darwin).
 There were 356 entries in show.
 Our thanks to all that attended to make our show a success.

RESULTS of the Huddersfield Tropical Fish Society 21st open show held on 11th September. Groupings: 1, P. S. Draycott & Sons (A and D); 2, Mr. and Mrs. Riley (Leeds PO); 3, J. Edwards (SODIT); Mollies: 1, R. Beall (Huddersfield); 2 and 3, P. S. Draycott & Sons (A and D). Swordtails: 1, H. Codman (Grimeshorpe); 2, L. Wharton (Grimeshorpe); 3, B. and J. Heppensall (Castledale). Platies: 1, D. Barrett (BBC Thorne); 2, Mr. and Mrs. Kenworthy (Olney); 3, F. S. Draycott & Sons (A and D). A.O.V. Live: 1 and 2, D. Barrett (BBC Thorne); 3, P. S. Draycott & Sons (A and D). Small Characins (up to 7 cms): 1, Mr. and Mrs. Riley (Leeds PO); 2, J. Cartwright (Huddersfield); 3, R. Curtis (Grimeshorpe). Large Characins (over 7 cms): 1, Mr. and Mrs. P. Howell (A and D); 2, R. Foster (Grimeshorpe); 3, D. and G. Kenning (Hull). Small Barb: 1, Mr. and Mrs. Riley (Leeds PO); 2, D. and G. Kenning (Hull); 3, Mr. and Mrs. P. Howell (A and D). Large Barb: 1, Mr. and Mrs. P. Howell (A and D); 2, Mr. and Mrs. P. Howell (A and D); 3, R. Foster (Grimeshorpe); 4, D. and G. Kenning (Hull). Dan. Minnows: 1, J. Elliot (Olney); 2, S. Stansfield (Bradford); 3, L. Wharton (Grimeshorpe). Rainbow: 1 and 2, Mr. and Mrs. P. Howell (A and D); 3, R. Foster (Grimeshorpe). A.O.V. Killifish: 1, F. and S. Draycott & Sons (A and D); 2, B. Lydon (Keighley); 3, D. Baker (Keighley). A.O.V. Aplocheilichthys: 1 and 2, F. S. Draycott & Sons (A and D); 3, B. Lydon (Keighley). Angelfish: 1, Mr. and Mrs. Nelson (Ashby); 2, I. Macbeth (Ind.); 3, Mr. and Mrs. P. Howell (A and D). Cichlids (up to 10 cms): 1 and 2, Mr. and Mrs. Brackenberry (Hobbes Centre); 3, R. Beall (Huddersfield). Cichlids (over 10 cms): 1, D. and G. Kenning (Hull); 2, Mr. and Mrs. Curtis (Grimeshorpe); 3, Mr. Barton (Wyke). Rift Valley: 1, B. and J. Heppensall (Castledale); 2, D. and G. Kenning (Hull); 3, Mr. and Mrs. Murray (Keighley). Small Anabantids: 1, D. Barrett (BBC Thorne); 2, Mr. and Mrs. Kenworthy (Olney); 3, F. S. Draycott & Sons (A and D). Fighters: 1 and 2, Mr. and Mrs. Brackenberry (Hobbes Centre); 3, B. and J. Heppensall (Castledale). Large Anabantids: 1, Mr. and Mrs. P. Howell (A and D); 2, F. S. Draycott & Sons (A and D); 3, Mr. and Mrs. P. Howell (A and D). Cory and Brochis: 1, Mr. and Mrs. P. Howell (A and D); 2, Mr. and Mrs. Riley (Leeds PO); 3, R. Beall (Huddersfield). A.O.V. Catfish: 1 and 2, Mr. and Mrs. P. Howell (A and D); 3, F. S. Draycott & Sons (A and D). Loaches: 1, Mr. and Mrs. Riley (Leeds PO); 2, Mr. and Mrs. Curtis (Grimeshorpe); 3, Mr. and Mrs. P. Howell (A and D). Sharks and Pisces: 1, J. Cartwright (Huddersfield); 2, R. Beall (Huddersfield); 3, Hodgson and Jackson (SODIT). A.O.V. Tropical (under 15 cms): 1, 2 and 3, Mr. and Mrs. P. Howell (A and D). A.O.V. Tropical (over 15 cms): 1, Hodgson and Jackson (SODIT); 2, Mr. and Mrs. Curtis (Grimeshorpe); 3, Mr. and Mrs. P. Howell (A and D). Breeder (Livebearer): 4 and 3; 1, F. S. Draycott & Sons (A and D); 2 and 3, J. Edwards (SODIT). Breeder (Livebearer): 1 and 2; 1 and 3, F. S. Draycott & Sons (A and D); 2, D. Barrett (BBC Thorne). Breeder (Igg)

4 and 3; 1, Mr. Hassel (Ebor); 2 and 3, D. and G. Kenning (Hull). Breeder (Igg) 1 and 2; 1, Mr. and Mrs. D. Bradbury (Hobbes Centre); 2, R. Brook (Huddersfield); 3, P. Jackson (Keighley). Pairs (Live): 1, D. Barrett (BBC Thorne); 2, F. S. Draycott & Sons (A and D); 3, J. Edwards (SODIT). Pairs (Igg): 1, J. Cartwright (Huddersfield); 2, Mr. and Mrs. Riley (Leeds PO); 3, Mr. and Mrs. P. Howell (A and D). Common Goldfish: 1, D. Coulter (Ind.). Fancy and Man-made: 1, D. Roberts (Ind.); 2, Mr. and Mrs. Curtis (Grimeshorpe); 3, B. Brook (Huddersfield). A.O.V. Goldwater: 1, Mr. and Mrs. Riley (Leeds PO); 2, D. Lofthouse (Keighley). P. Jew: 1 and 2, Mr. and Mrs. Brackenberry (Hobbes Centre). Novelty: 1, 2 and 3, K. Lancashire (Doncaster). Best in Show: R. Codman (Grimeshorpe). Best Exhibit: Mr. and Mrs. D. Bradbury (Hobbes Centre). Society with Most Points: A and D. Huddersfield Member with Most Points: J. Cartwright.

SCOTLAND



RESULTS of the Edinburgh A.S. open show. Common Goldfish: 1, W. Thompson (FAS); 2, J. Milligan (BAS); 3, R. Christie (BAS). Shubunkins: 1, K. Johnston (DAS). Tetras: 1, 2 and 3, T. McLean (SGG). Doradus: 1, T. McLean (SGG). A.O.S. Goldwater: 1, M. Kyle (DCCAS); 2 and 3, J. Milligan (BAS). Guppy (Male): 1, N. Deppose (DAS); 2 and 3, J. Wells (DAS). Guppy (Female): 1 and 2, K. Piper (DAS); 3, D. Long (DAS). Mollies: 1 and 3, R. McInosh (MAS); 2, S. Craig (KAS). Platies: 1, J. Wells (DAS); 2, R. McInosh (MAS); 3, J. Brown (KAS). Swordtails: 1, J. Walker (NAS); 2 and 3, J. Milligan (BAS). A.O.S. Livebearers: 1 and 3, W. Brown (KAS); 2, R. McInosh (MAS). Birtos (A): 1, J. Hony (DAS); 2, J. Mackin (BAS); 3, T. Ramsay (SAS). Birtos (B): 1, P. McNeil (DAS); 2, S. Oswald (BAS). Characins (A): 1 and 3, J. Walker and S. Durie (NAS); 2, A. Mitchell (GAS). Characins (B): 1 and 3, T. Ramsay (SAS); 2, J. Mackin (BAS). Characins (C): 1, A. Mitchell (GAS); 2, J. Johnston (SAS); 3, R. Fleming (DCCAS). Rainbow: 1 and 2, J. Wells (DAS); 3, J. Walker and S. Durie (NAS). Danios and T. Minnows: 1, J. Wells (DAS); 2, M. Craig (KAS); 3, K. Johnston (DAS). Englishing (Footscray): 1 and 3, J. Mowat (BKA); 2, J. Steven (AAS). Siamese Fighters: 1, J. Milligan (BAS); 2 and 3, J. Johnston (SAS). Trichogaster: 1, D. Long (DAS); 2, G. Talbot (BAS); 3, J. Sinclair (MAS). Colours: 1, T. Ramsay (SAS); 2, J. Wells (DAS); 3, S. Davis (KAS). A.O.S. Anabantids: 1, H. Hony (DAS); 2 and 3, M. Kyle (DCCAS). Small Cichlids: 1, H. Hony (DAS); 2, M. Walker (BAS); 3, T. Ramsay (SAS). Old World Cichlids: 1, Ramsay (SAS); 2, J. McDonald (FAS); 3, P. Sutherland (WAS). Angelfish: 1, J. Gilchrist (SAS); 2, P. Sutherland (WAS); 3, T. Ramsay (SAS). New World Cichlids: 1, J. Johnston (SAS); 2, D. LeRoy (SMT); 3, S. Craig (KAS). Catfish (A): 1, A. Scott (NAS); 2, Y. Downie (DCCAS); 3, K. Roy (PAS). Catfish (B): 1, G. Talbot (BAS); 2, H. Hony (DAS); 3, J. Steven (AAS). Synbranch: 1, G. Rose (NAS); 2 and 3, Y. Downie (DCCAS). Sharks: 1 and 2, J. Downie (DCCAS). Snails: 1 and 2, J. Walker and S. Durie (NAS); 3, J. Wells (DAS). Loaches: 1, A. Mitchell (GAS); 2 and 3, J. Walker and S. Durie (NAS). A.O.S. Livebearers: 1, D. Dubois (DAS); 2, H. Shields (EAP); 3, W. Brown (KAS). Pairs (Livebearers): 1, J. Vallentine (Ind.). Pairs (Englers): 1, T. Ramsay (SAS); 2, D. Dobbie (DAS); 3, A. B. Scott (NAS). Platies: 1, T. Ramsay (SAS). Breeders (Guppies): 1, T. Ramsay (SAS). Breeders (DCCAS): 1, R. Downie (SAS). Breeders (MAS): 2, R. Downie and M. Brown (DCCAS); 3, J. and M. Gilchrist (BAS). Breeders (Swordtails): 1, J. Milligan

(BAS); 2, M. Walker (EAP); 3, D. Long (DAS). Breeders (Platies): 1, A. Gray (KAS). A.O.S. Breeders (Livebearers): 1, W. Brown (KAS); 2 and 3, R. McInosh (MAS). Breeders (Englers): 1, J. Mackin (SAS); 2, Y. Downie (DCCAS); 3, J. Davidson (MAS). (B): 1, A. Wainell (GAS); (C): 1, M. Brown and B. Downie (DCCAS); 2, F. Houston (SMTAS); 3, M. and S. Poulton (SMTAS). (D): 1, J. and M. Gilchrist (SAS). Breeders (Goldwater): 1, R. Fleming (DCCAS); 2, T. McLean (SGG).
 Best in Show, Aquaria Gold Pin, Practical Fishkeeping Aquarian Top Tank: W. Brown (KAS). Gambusia vittata.
 Key to abbreviations: Ayrroath Aquarist Society—AAS. Berwick Aquarist Society—BAS. B.K.A. (File Group)—BKA. Cuthbertson Aquarist Society—CAS. Dalrymple Society—LAS. Dundermine C. C. Aquarist Society—DCCAS. Edinburgh Aquarist Society—EAS. Edinburgh Aquarium & Pondkeepers—EAP. Forfar Aquarist Society—FAS. Grangemouth Aquarist Society—GAS. Kirkcaldy Aquarist Society—KAS. Lanarkshire Aquarist Society—LAS. Maithrough Aquarist Society—MAS. Mayfield Aquarist Society—MAS. Newcastle Aquarist Society—NAS. Scottish Aquarist Society—SAS. Scottish Goldfish Group—SGG. Scottish Midland Goldfish Group—SMG. Scottish Transport Aquarist Society—SMT. Stirling Aquarist Society—SAS. Peebles Aquarist Society—PAS. Whitburn Aquarist Society—WAS. Independent Entries—Ind. 21 Clubs entered 293 fish.

The Society meets every 2nd and 4th Wednesday of the month at 7.30 p.m. at the Edinburgh Wanderers Football Club, Murrayfield, Corstorphine Road, Edinburgh. Enquiries to J. Milligan, 21 Stevenson Avenue, Edinburgh.

Dates for the diary

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

NOVEMBER
 13th November: BRADFORD & DISTRICT A.S. annual open show. Further details from show secretary Mrs. S. Stansfield, 16 Hope View, Windfall, Shipley. Tel: 0274 595097.

DECEMBER
 15th December: PRESTON & DISTRICT A.S. Christmas dance, disco, buffet, presentation of club trophies. Visitors welcome. Further details and tickets from the Club Secretary, J. Goswell, Chorley 69312.

JANUARY 1984
 24th January: BIMBI AQUARIAN AND STUDY SOCIETY open show, at Felline Community Centre, Crosshall Lane, Felline, Tyne and Wear. For programme, information or further details contact: show manager, J. P. Brady, 40 Hartfield Drive, Springa Estate, Berles, Chester-Le-Street, Co. Durham DH3 2LZ. Tel: 091-410 9987.

APRIL
 22nd April: EAST KENT AQUATIC STUDY GROUP 1st open show, at Catholic Social Club Hall, Clarence Road, Home Bur. Show schedules from: J. A. Swards, 14 Upper Dane Road, Margate, Kent.

JUNE
 26th June: NAIKSEA & DISTRICT A.S. 11th International open show, to be held at Scotch Horn Community Centre, Naiksea, Avon. Further details from show secretary, Mrs. K. M. Gash, 22 Stoke Lane, Stoke Lodge, Patchway, Bristol. Also, would show secretary's please endeavour, when arranging dates for their shows, that dates do not clash in the same areas.