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AQUARIST

AND PONDKEEPER

The Magazine for Fishkeepers



The largest Killifish

The splashing Tetra

Picture story

THE AQUARIST AND PONDKEEPER

Britain's Leading Magazine for Fishkeeping

Published Monthly 70p

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goldfish varieties

Part 2

A series of six articles
by Frank Orme

IN LAST MONTH'S article, the first in this six-part series, the goldfish was discussed in general terms; in this, and the next four articles, it is intended to be rather more specific by covering the various varieties of the goldfish, commencing with those known as 'singletail'.

The term 'singletail' was first used by the Goldfish Society of Great Britain, and serves to differentiate between those fish which have the more usual single caudal fin and those in which the caudal fin has divided into two separate tails. In general, it may be claimed that these single-tailed fish are possibly the hardiest of the fancy goldfish varieties and, for this reason, most newcomers to the hobby are usually advised to start by first keeping one or other of the members within this group.

There can be very few people who would not recognise the so-called Common goldfish. Seen in pet-shops and water garden nurseries, offered as prizes at fairgrounds and hawked by street pedlars, it is cheap and often

ill-kept. It has been, and still is, the delight of countless children and numerous adults. To many it is the fish which first aroused their interest, and served to introduce them to the wider interests of the fishkeeping hobby, being well able to withstand the maltreatment of confined quarters, poor food given in too little or too great a quantity, dirty water and the consequent many changes of water and temperature that the inexperienced owner is apt to subject it to.

Possibly the Common goldfish was the first to deviate from its wild ancestor, and become the progenitor of the many diverse forms of fancy goldfish. Being equally at home in either the indoor aquarium or the more rigorous conditions of the outdoor ornamental pool, this fish has remained popular with a good many fishkeepers. Current Show Standards all depict, and describe, a well-proportioned sturdily built fish in which the dorsal and ventral contours are very alike in outline. The back rises in a smooth curve from the head, with no sign of any hump or 'snoutiness', reaching its highest point above the pelvic fins. From the high point the back descends in a smooth curve to the peduncle. The fins are sturdy and rounded; in particular, the tail or caudal fin is short with only a moderate degree of forking. The



Common Goldfish

dorsal fin commences on the highest point of the back, and should not be over large. The Common goldfish is a variety which belongs to the metallic group and, ideally, should be a self-coloured gold, the most sought-after being a rich deep reddish-orange



Bristol Shubunkin

colour. However, this variety can also be found in silvery-white or yellow together with combinations of red and silvery-white, or yellow and silvery-white, which, although attractive, are not so popular with those who like to exhibit their fish on the show bench.

There is a nacreous, or calico, form of the Common goldfish known as the London shubunkin. In this variety the metallic quality of the scales is missing, and this allows the underlying pigmentation to be seen. Somewhere I recall reading that a 'calico variety' resembled an artist's palette upon which splashes of blue, black, red, yellow, brown and violet had been daubed, black spots having been speckled over all. It is unlikely that many goldfish will carry all of these colours; nevertheless, a good combination of colours with an overlay of black speckles should be present. Blue is the preferred ground colour—but not the slaty-blue which is quite common. In all other respects the London shubunkin resembles the Common goldfish, and is just as hardy and adaptable.

The late Arthur Derham spent many years improving the London shubunkin and, in 1936, after 15 years of selective breeding, he reported that he had succeeded in producing shubunkins that were all blue—out of 350 young fish there were only three which were mottled, the remainder were entirely blue. These fish, however, were not well received—the multicoloured types being preferred by hobbyists of those days.

Although kept and bred by some enthusiasts—Mrs. Pam Whittington, of Reigate, a member of the G.S.G.B.,

is perhaps the best known breeder of this variety—the London shubunkin is not as popular, with the majority of goldfish fanciers, as some of the more highly developed varieties. This is a pity for, like the Common goldfish, they ask little of their keeper and will amply repay good attention. Owing to the easiness of their care and maintenance they are both the ideal varieties to teach the novice the art of fish management and breeding.

Large numbers of these fish are produced each year, in such countries as Italy, Hong Kong and elsewhere, and imported into the United Kingdom by the thousands. Most that are offered for sale are very young—less than 12 months old, and it is a tribute to their hardiness that so many survive the

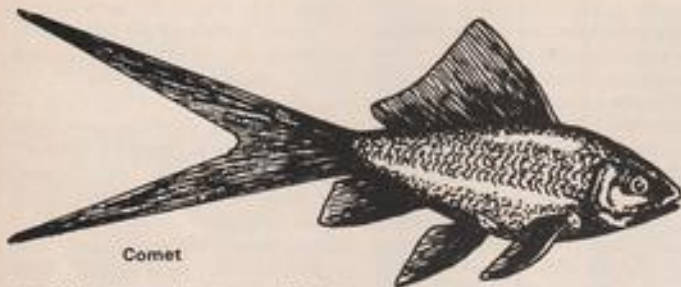
kins exhibited will be much larger than any other variety of fancy goldfish. This, like the London shubunkin belongs to the macreous group and should exhibit the varied colours required of that group—in a pleasing pattern upon a forget-me-not blue background. As with the previous two varieties this fish is also equally at home in both the aquarium and outdoor pool.

This variety derives its title from the city in which it was created, for it was produced by members of the Bristol Aquarist's Society. From stock, which originated in America, members of the Bristol Society began a system of selective breeding in an effort to improve the quality of the variety—in doing so they developed a new variety of shubunkin. In 1934 a show standard

was produced by Bristol Aquarist's Society for this new type shubunkin, giving their members an ideal to aim for. Two years later a show report from Bristol stated that many of the exhibited shubunkins were beginning to approach the Bristol shubunkin standard. From those early days this variety has become a well-established favourite with the British goldfish enthusiast. Good specimens are usually, available from amateur breeders only, the majority of whom are to be found in Bristol, London, Lancashire and the Midland areas.

This variety is colourful and streamlined in appearance, with fins that are longer, and more developed than those of the London shubunkin—the dorsal fin being, in height, equal to three-quarters of the body depth. The distinctive feature is the caudal fin which is roughly half the length of the body and is forked, forming two rounded lobes. In some specimens the lobes are almost disc-shaped, so that the upper and lower lobes overlap. Show standards, however, do not require such fullness and state clearly "Caudal fin shall be single and carried in a vertical plane without fold or overlap. Lobes to be large, rounded and well spread."

The only other singletailed variety, for which a show standard is provided,

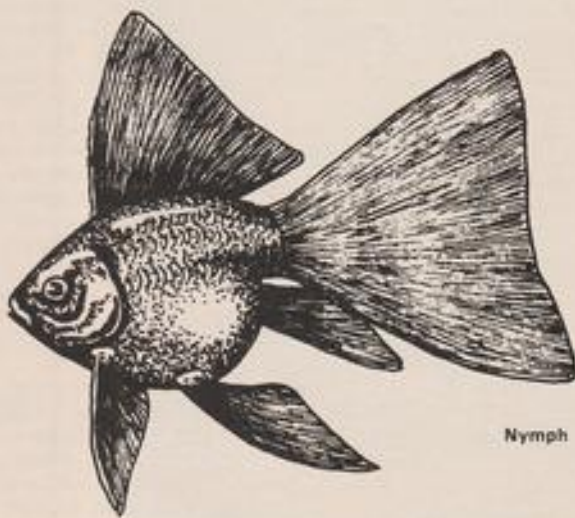


Comet

rough handling and overcrowding to which they are subjected between leaving the exporter and arriving at the premises of the importer in this country, to arrive alive in insufficient numbers to allow them to be sold eventually at such a relatively cheap price.

If given the correct treatment by providing ample swimming space and clean conditions, together with a sufficiency of a good and varied, nourishing diet, these fish will become quite tame, make good growth and cause few worries or problems. They are quite long-lived and, in pools, can grow to a length of 12 inches or thereabouts. Throughout their life they will live in peace, not interfering with or bullying either their own kind or other fish.

Probably the most popular variety of the singletail group is the Bristol shubunkin. At open shows which cater for goldfish it is probably true to say that the number of Bristol shubun-



Nymph

is the Comet. This fish originated in America, during the 1880s, and was developed by Hugo Mullert either from stock obtained from the pools of the Washington Fish Commission, or from fish which he himself created—there is some doubt as to who was the actual originator of this variety, but there is no doubt that it was Mullert who fully developed the Comet in marketable quantities. Unfortunately, this is another variety which does not have the popularity which it deserves although, of recent years, it does appear to be making a comeback.

It is a very streamlined fish, with a slim body that has a depth that is less than half the length of the body. It may be either nacreous or metallic; however, in general, the latter type seems to be the more popular of the two. It carries a high dorsal fin and equally well developed pectoral pelvic and anal fins. The essential feature of this variety is the caudal fin, which is deeply forked, as long as the body of the fish and wide spread. Carried in the vertical plane, the upper and lower lobes are long and narrowish, ending in extremities which are almost pointed.

As might be expected from the

appearance of this fish, it is capable of quite fast bursts of speed. Although in general home-bred stock tends to be of better quality than that of the imported specimens, it is possible to find worthwhile fish in the tanks of some dealers—if care is taken in their selection. In common with other varieties which have been mentioned, the Comet will make itself at home in both aquarium and pool, but probably prefers the more unrestricted space of the latter where it can exercise its turn of speed without hindrance.

The Nymph was at one time a recognised variety but that is no longer the case. Although Nymphs can be very attractive fish they are, nevertheless, singletail throw-outs from a Veiltail spawning. It is the aim of most present-day goldfish enthusiasts to improve the quality of only true varieties, therefore the Standards are designed with this objective in mind. To recognise fish which can be produced as throw-outs, no matter how attractive, would not be considered to be in the best interests of the goldfish or the hobby.

Bristol Shubunkin



WHAT IS YOUR OPINION?



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

IN THE JANUARY issue I published a short letter from Mrs. Jayne Paull, of 8 School Way, Severn Beach, Bristol BS12 3QA, about correspondence magazines. In a follow-up note she writes: "Just a quick line to say thank you for including my letter in the January issue of *The Aquarist*. I had six replies from avid fish breeders living in Devon, Leeds, London and Scotland. The magazine has a very high standard of literature donated by all the members."

"The saying 'From little acorns...' seems appropriate because I now find myself the editor for the British Cichlid Association."

Master Jeremy Sowell is 14 years old, has been keeping fish for nearly two years, and resides at 18 Lanmoor Estate, Lanmer, Redruth, Cornwall. He writes: "I have two aquariums—a 40 in. community tank and a 24 in. tank containing three delightful puffer fish, three bumblebee fish and four female guppies. The guppies provide live food for the others. I have to do very little cleaning because my catfish and loaches work very hard. These cleaners are: a clown loach and a skunk loach in my community tank; and three *Corydoras*, a *Plecostomus* and a 6 in. weather loach.

"In the February issue you asked about those who keep paradise fish. I have two—a male and a female—and they have a very interesting and unusual habit. They will jump a good 6 in. out of the water if they think food is at the target they have seen. My male is sometimes aggressive towards a red, Siamese fighter.

"To conclude: why do my red-tailed black, and rainbow, sharks seem to get great pleasure out of chasing my two golden barb. Once I had an albino shark which also chased them. I really enjoy *W.Y.O.* every month and have absolutely no criticisms whatsoever."

No 72 School Road, Dagenham, Essex, heads an interesting letter I received from Mr. J. Dawson. He writes: "I reply to your query about the growing and maintenance of *Cryptocoryne* species mentioned in the March issue of *The Aquarist*. I have been keeping tropical fish now for four years and in that time I have changed from a 24 in. tank to my present 39 in. x 15 in. x 12 in. During the period I have specifically grown *Cryptocoryne* plants. The tank's occupants range from various dwarf cichlids—*Juliichromis* and *hribensis*—to keeri gouramies, red-tailed black sharks and a pair of dwarf botias.

"The species of *Cryptocoryne* cultivated are: *C. balanac*, *C. affinis*, *C. ciliata*, *C. becketti*, *C. wendtii* and *C. willisii*. Except for *C. affinis* and *C. balanac* all were purchased from a well-known mail-order firm advertising in your magazine. I find they grow best with no U/G filters and a layer of peat below the gravel. The tank is lit by a 36 in. Truelite power twist tube which is on for about nine hours daily. The water temperature in the tank is 78-80 F and the pH 7-0. The tank is filtered by a power filter.

"All of my plants send out numerous runners; I never cut these off but let them grow into dense clumps—unless thinning is necessary. As the *C. balanac* is the largest of the species it is best to let its long leaves—up to 20 in.—lie

across the surface of the tank and shield the shorter *Cryptocoryne* species from the light. A partial covering of duckweed also helps to diffuse the light, I find. As the *C. balanac* can become so large and profuse—it is a rapid grower—it is necessary to remove one or two leaves per month. This also promotes new growth. Any deteriorating leaves should be removed as a bacteria build up can cause the disease 'Cryptocoryne Melt'. Partial water changes also keep the water in good condition. The tank bottom should not be siphoned too regularly as the plants seem to like a certain amount of fish excreta around their roots.

"In these conditions my *Cryptocoryne* species flourish—alongside *Aponogeton*, *Nymphaea* and Java fern, and are as easy to maintain—contrary to what many books might say."

The following letter was written by Mr. Peter Cairns, of 1 Muncaster Road, Ashford, Middlesex. "Having just read your January 1982 *W.Y.O.* I am writing to tell you that I have got copies of *The Aquarist* dating back to 1956. Earlier than that I had two photographs published in the magazine. This came about by readers being asked what they kept their tanks in, e.g. book cases.

"I still keep fish and I am secretary of my local club—Runnymede A.S. The first thing I read after looking at the magazine is *W.Y.O.* because it makes interesting reading and I like to see the letters from the youngsters as they are our future hobbyists."

Photograph 1 show a pair of attractive, dwarf cichlids—*Apistogramma bowelli*. The male is the much larger and more colourful of the two fish. Please send me details if you have kept/bred these beautiful fish.

Master Paul Crofts is 16 years old and lives at 27 Bradstock Close, Parkstone, Poole, Dorset. He writes: "At the risk of turning your opinions' page into a battle-ground, I should like to put my own views on the subject of acidity and water hardness after Mrs. Hall's predic-



Apistogramma borelli - male left, female right

tion—incorrect—of impending doom in my tanks. In your column in February's *Aquarist* she stated in her letter that Rift Lake cichlids need hard alkaline water, and that discus need soft acidic water. This is certainly not true. In the Bournemouth/Poole area I know of two very reputable aquatic shops that sell discus out of very hard and alkaline tap water. In the September 1981 *Aquarist* P.R. Allen published an excellent article and clearly stated that the pH of the water was 7.0 or neutral for his discus.

"The truth is that some fish prefer acidity or alkalinity and that a few fish need these conditions only for breeding. Most fish do not mind either way. For example, even angels and neons spawn readily in hard alkaline waters. I have watched them do it! I feel that as long as water conditions are stable the fish will do better than if chemicals or peat are not used to alter the pH.

"Hard water does, however, have the effect of making it more difficult for a sperm to penetrate an egg—from *The Living Aquarium*, Ward Lock pub—so I would recommend rain water for breeding some egglayers. I have also found that *Betta splendens* (fighters) build better nests in rain water.

"At this point I have two queries.

First, why do some aquarists filter rain water before top ups as it usually contains only a little carbon in the form of soot? Secondly, I have often read that peat softens water. My chemistry teacher says that this cannot be true. Who is correct?

"On Saturdays I now work in a tropical fish shop and because I like to be able to answer people's questions as fully as possible I have started keeping marine fish. I have had nothing but success and recommend this branch of the hobby to anyone. I have a 36 in. tank with 50 watts of Gro-Lux lighting which encourages lots of beneficial algae to grow. My fish are one sailfin tang, one copperband butterfly, one clown and a cleaner wrasse. It is a wonderful sight to watch the tang spread his fins for the wrasse to inspect.

"I also have a character of a hermit crab which moved into a larger shell that I provided for him; and after two weeks moved back into the old one. I had a quarantine tank set up for the fish when I bought them; but now that it is empty I am having much luck breeding black, sailfin mollies in the salt water.

"Could someone please send me some information on diseases of anemones as I can find little literature on invertebrates.

"I have no doubt that Mrs. Hall will not stand corrected; but please, can we let this be an end to it."

"Monsieur, J'ai lu dans votre *Aquarist* de Mars 1982 votre article: *What is Your Opinion?*," wrote French reader Mr. Xavier Cavrois, 51 Rue Jules Ferry, 62580 Vimy, France. He sent me 10 sides of A4 written in French; and although I could probably cope with a fairly simple conversation in French, I was pleased that Mr. Cavrois had got a friend to translate his letter into English. He continued, in translation: "On page 55 you mentioned that you would be pleased to hear from readers who have successfully cultivated tropical, marine algae—seaweeds. I am writing to you because I have two tropical, marine tanks—one 1 metre and one 2 metres—in which I have as many plants as in a freshwater tank. I have already had 18 different species of tropical, marine seaweeds. In France we have very few books which deal with and describe the marine seaweeds; so I have in my tanks many species of seaweeds, the exact or Latin names of which I do not know. These algae have a picturesque name of likeness (*sic*).

"Have you already written in earlier *Aquarist* magazines articles dealing with tropical, marine seaweeds? Are there any English

books which will be able to inform me about marine seaweeds? If such is the case I'll be pleased if you inform me about them.

"I have taken coloured photographs, over a period of a fortnight, but I am not a professional photographer and it's very difficult to take the photographs because of the reverberation (reflection) of the flash on the glass. They are not very good. I am going to take others.

"First, I have *Caulerpa prolifera*—which is probably the same marine alga that Mr. Douglas Rose had in his tank." (I think it was *Caulerpa*. B.W.) Monsieur Cavois continues: "This marine alga, which is well known, resembles *Cryptocoryne*. Currently it is almost the only alga that one can see in marine aquariums. Secondly, I have a seaweed of which I don't know the scientific name and which I call 'parasol'. It is light green and grows quickly and thickly—about 5mm. a day. Its creeping stem produces some raised-up axes with little corollas of 1-5mm. in diameter, like little parasols turned upwards. They quickly form a bushy plant that we must cut every week."

('Corolla' normally means the petals of a flower; and no doubt Monsieur Cavois and other readers are fully aware that algae do not produce flowers; however, I'm trying to combine both English and French versions into a version that the majority of readers will find interesting and instructive; while, at the same time, I'm trying to retain some of the flavour of the original French. B.W.)

"Thirdly, I have another species which is like little clusters of grapes of 1-5mm. in diameter. The plant is light green and I call it 'grape'. It is absolutely unknown in France. Fourthly, I have *Halimeda nana*—which looks like a cactus. It flourishes very well, but more slowly. It is dark green in colour. The fifth is *Halimeda macrolobata*. It is nearly the same as the *H. nana*, but taller, and middle green in colour. The sixth, *Vallonia fastigata*,

is dark green in colour; it is like grass and prefers a soft light.

"The seventh plant I have is a red seaweed and I have named it 'red curled chicory'. It is nearly the same as the freshwater tropical plant *Synsenna triflorum*, or the *Plocamium* of seaweeds. It grows very well." (*Synsenna triflorum*, better known as water wistaria, is now more correctly known as *Hygrophila difformis*. B.W.) "The eighth plant is another red seaweed. I've named it 'red bush'. It has the shape of feathers, is rather hard and prefers shade. It is like *Corralina officinalis*. If there is too much light it becomes light green. The ninth is called 'red lettuce' and resembles *Chondrus crispus*. Number 10 is dark green. I call it 'lamb's lettuce'. It is like *Ulotea petiolata*. It has thick, hard leaves and grows in the middle of the *Halimeda nana*. It grows very slowly. Number 11 is *Caulerpa sertularioides*, or *Sertularoides*. It's nearly the same as the *C. prolifera* but has a feather form and is light green. It grows well but slowly and is very decorative.

"The twelfth one is *Caulerpa scopelliformis*. It is like *C. prolifera* but with greener, longer, narrower leaves bearing indentations. The thirteenth is a *Codium* species. Its dark green twigs resemble thick tubes. It is difficult. Number 14 I call 'chestnut spaghetti'. It has flat ramifications like spaghetti and resembles *Cutleria multifida*. Number 15 is a dark green plant called 'vermicelli', growing from a tropical stone. Perhaps it is *Dasycladia*. Number 16 is a green plant named 'grass'. Like English grass it does not exceed 1 cm in height. The seventeenth is a seaweed that I call 'green fern'; it grows rather well. It seems to prefer soft light. Number 18 is a seaweed with the form of 'scoubidou'. As for *Dasyclis vermicularis*, the stems are unique. They have the form of a club—an elongated cone of 5 to 6 cm. in height. Its colour is whitish but it is difficult to grow. It is very pretty.

"Some seaweeds are 'born'

spontaneously from the stones imported from tropical seas—like the 'vermicelli'; others have been imported with the fishes or have been given or exchanged by amateurs. I have written in single inverted commas the names I have invented while waiting to learn the proper names.

"I should be pleased to hear from readers who could supply me with the correct names; also, I should be pleased to make exchanges of marine algae—seaweeds.

"Please excuse me. I only know English badly and have had a rapid translation made by someone who knows English a bit well. I am sending you some coloured photographs. Look at them with a magnifying glass; and after, send them back to me. Some of them are bad because the green seaweeds look yellowish.

"My aquariums are at Lens, where I am working in the department of Pas de Calais, about 15 minutes from Lille, or about one-hour from Calais. If one day you come to France I'll be glad to see you; never mind the day. I don't speak English, but my daughter, who is a student in Lille, is there all Saturday and she speaks a bit of English. She is making this translation.

"To help identify my seaweeds I have made drawings of them. I'll enclose them with this letter. I have asked a friend to make me photographs and macrophotos. As soon as I receive them I'll send them to you. Thank you in advance—and best wishes."

Thank you very much, Monsieur Cavois, for your letter, your excellent drawings, and your attractive photographs. Unfortunately I have never kept tropical marines so I do not know the correct names of your marine algae. My couple of reference books deal only with native marine algae found around the Irish coast. I did have one book about tropical marines but someone kindly borrowed it and did not return it to me. I'll retain your set of drawings and send the set to any expert who thinks he or she could positively identify the species described above.

Unfortunately I have only one set of drawings and I don't have space in which to reproduce it in the magazine. Thank you for the kind invitation to visit you. It's a long time since I had an opportunity to try out my inadequate French in France; but it seemed to be adequate to get me along on the Continent some years ago. I have no plans to visit France; but if I make a return visit I'll try to visit you to see your attractive tanks.

I should be pleased to hear from other readers who live in other countries.

The following letter, received from Mr. R. S. Homes, of 5 Keals Croft, Lynton, Devon, has been in my in-tray for some time. Mr Homes writes:

"I wonder to what extent aquarists and gardeners in this country are deprived of potential pleasure by vandals. We all bear the cost of damage to an apparently-endless list of public property: transport, telephones, toilets and buildings. Consider, though, not just the damage that is done or anticipated, but also the lack of amenities which could be provided yet are not there for us to enjoy because their provision would be pointless.

"The BBC programme, 'Pebble Mill at One', has included a fascinating series about a journey through Japan, made and reported by Donny Macleod. Having seen much of the world I can think of no other country in which I would rather live than England, but I do envy many aspects of the Japanese way of life. Vandalism is rare.

"Whenever Donny was seen in a public park, the setting was superb. Water is invariably a feature in Japanese gardens, and what impressed me more than anything was the occupants of that water. Any movement on an ornamental bridge or at the pool side attracted a shoal of koi—enormous, brilliantly-coloured and tame. I could enjoy lunch every day of my life sitting in such a park. What a pity we cannot be given the opportunity in Britain. Covetous 'pot hunters' would soon net and carry home the most attractive specimens, and the remainder would not long survive the atten-

tions of practical jokers with packets of detergents; or do I misjudge the great British public?

"Do readers know of attractive, litter-free, undamaged parks with well-stocked pools? Perhaps B.K.K.S. members who have enjoyed a visit to Japan can confirm that these beautiful city oases really exist."

Photograph 2 shows a collection of small fish, including neons and cardinals. Please send me details if you have bred either cardinals or neons.

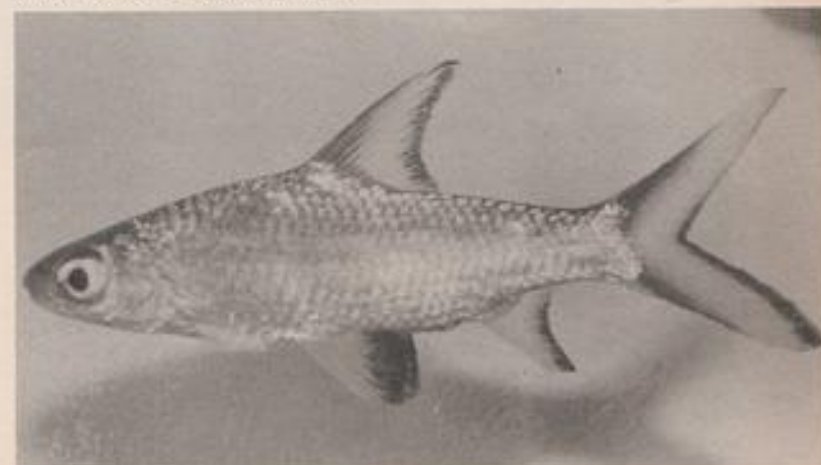
The 3rd photograph is of *Balantiocheilus melanopterus*, better known as the bala or silver shark. Please drop

me a line if you have anything to report on this beautiful fish.

Mr. Ray S. Holmes, who wrote the letter printed above, also sent me the following comments some time ago: "You and I apparently . . . enjoy keeping 'kribs' (Photograph 4). I refer to *Pelmatochromis pulcher*, formerly *Pelmatochromis kribensis*. I believe this beautiful, little fish has been renamed again. No doubt the fish will continue to be known to amateurs as kribs because the sometimes-used popular name of 'rainbow cichlid' is also applied to other species; and anyone shopping for a pair of 'pulchers' could



Cardinals, neons and other small fish



Balantiocheilus melanopterus - the bala or silver shark



Pelvicachromis pulcher-better known as *Pelmatochromis kribensis*

find they have got blue acaras or pretty tetras. Occasional publication of your own young kribis' photographs implies that you breed them regularly if not frequently. For this reason, I hope for a greater response this time to your repeated suggestion that readers write about their dwarf cichlid breeding experiences.

"Having noticed that most kribis offered for sale are poorly-coloured specimens, I wondered if these are

just a regional variation of the more colourful type; or whether they can be improved by selective breeding. They cannot be regressing towards some original, wild type since, unlike goldfish and some aquarium livebearers, the kribensis is kept and bred in its natural form.

"Sterba states that markings are 'very variable in the same brood'. This fact soon becomes obvious to anyone breeding them for the first time. Also obvious to me is the

fact that there are good and bad broods, assessed by the ratio of well-marked to poorly-marked—even spotless—fish." (My specimen in the photograph has only one spot. B.W.) "I began using only better-coloured males for breeding, choosing those with especially good tail spots. The gold-edged tail spots on males and those on the females' dorsal fins constitute one of the fish's most attractive features; and they seem to be either indistinct or totally absent on much



stock seen today. My females tend to vary only in colour intensity and show little variation in markings or colour distribution.

"My first-selected male proved disappointing in his ability to pass on to his sons his seven, brilliant tail spots. After that first trial, he was bred with a less-colourful sister of his first mate. Most of their young were very colourful and bore beautiful markings. This second female was then paired with a rather drab-looking male; and

she again produced a superbly-coloured brood. I have come to the conclusion, possibly prematurely, that it is the female fish which carries the 'male tail spot' gene. I shall now base my breeder selection on this assumption, which renders the exercise more difficult since there is no visible indication of which females produce the better-coloured progeny. If anyone else has experimented in this way I should like to hear the result. I wonder! Perhaps retailers' kribes seem so dull because everybody is experimenting, keeping the colourful young for breeding and selling their outcasts." (I have not kept any kribensis for quite a long time because all the fish I have seen on offer in dealers' shops have been relatively dull—including those whose tank sported the label 'wild caught', B.W.)

Mr. Holmes continues: "I was interested to read about the unisex brood problems encountered by some writers and the theory that predominance of one sex in a batch of young depends on the water chemistry. My own theory is that it is pure chance—because it has not happened to me yet. One of my pairs succeeded in raising only three fish as their first brood; though all were females, I don't think three out of three proves anything. Their second brood consisted of 11 of each sex; and in their third the score was 29 males to 21 females. The water in all my tanks is very soft, just as it comes out of the taps, and rendered slightly acidic by a layer of Irish moss peat under the gravel—with no filtration or aeration.

"Your request for opinions on earthworms as live food prompts me to reiterate a statement often made by Mr. Boarder. There is no finer food. I collect the earthworms at night, using a torch, after heavy rainfall or during a period of drizzle. My hunting provokes a variety of comment from dog walkers and pub goers, the most popular being something to the effect that they must be pretty difficult to light in such

weather. If readers are prepared to live with the reputation of being eccentric, I can recommend nocturnal prowling as an easy way of acquiring an excellent live food—at no cost and without the slightest risk of introducing pests or disease into the aquarium. Even city dwellers can indulge. Parks and sports pitches are good sources provided the grass is kept trimmed; but bowling and putting greens usually have worm killer applied. Below 45°F they rarely emerge. Above 45°F their numbers and activity increase with temperature. Twenty minutes on a cricket pitch on a mild evening can produce well over a pound of worms. They don't like wind by the way—fascinating facts one learns reading this feature—probably because of its drying or chilling effect; or both. Mine last, in two shrub tubs full of spent potting compost, at least until I have a chance to replenish the stock. I think Irish peat moss would do as well. What would we aquarists do without the generous Irish, who send us shiploads of the very land on which they live?" (Run out of material for 'jokes'? B.W.)

My thanks to both the British Koi-Keepers' Society and the Midland Koi Association for the latest copies of their magazines. As always, both publications make interesting reading.

Well, I've used up this month's allotted space. For a future feature please send me your opinions on any of the following: (a) growing any species of *Hygrophila*; (b) breeding dwarf or honey gouramies; (c) trout hatcheries or fish farms; (d) public aquaria; (e) suitable places for club outings; (f) breeding coldwater fish; (g) breeding marines; (h) air-operated outside filters; (i) filter media; (j) breeding dwarf cichlids; and (k) direct sunlight and its effect on aquatic plant growth. Please drop me a line.

Here are two more sets of figures for those collecting data about the life-span of certain bulbs in certain aquarium hoods. A Woolworth's Winfield bulb lasted for 79 days; while a Philips bulb lasted for only 40 days. Both were 40-watt, pearl bulbs. Goodbye until the July issue.

A PEACEFUL

CICHLID

(*Aequidens maroni*)

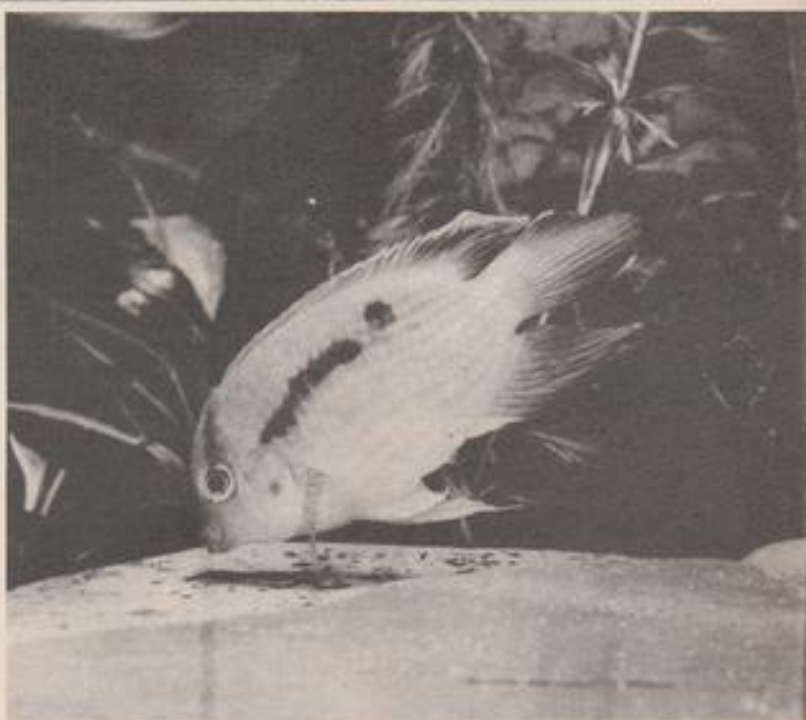
by R. Zukal



The female showing extended ovipositor

THIS FISH is called the Maroon Cichlid by German aquarists and Brown Cichlid by their Czech counterparts. It comes from Guyana, Surinam, the Demarara river and was first imported to Europe in 1936 and grows up to 10 cm in size, with the female somewhat smaller. The body is short, high, laterally compressed, one might say roundish, yellowish-brown with a suggestion of a shiny greenish-blue undertone. Below the dorsal fin is a dark spot framed by a yellow half-moon. From there to the head runs a black band. Round the eyes and gills there is a black border. Coloration changes as in most cichlids according to the environment, mood or state of excitement of the fish. The sturdily developed fins are transparent, coloured yellowish-brown with small markings. As already mentioned, the male is larger and his fins are more elongated.

Although they grow to such a relatively large size, these brown cichlids are the most peaceful members of their large family. One can keep them without trouble in the company



The female selects and cleans spawning site



The female deposits first eggs

of quite small fish, such as the neon tetra and other similar species. But the company of peaceful fish such as *Pterophyllum scalare* suits them best of all. They need a largish tank which is well-planted and contains normal tap water which should be neutral. A water temperature of 22°C is sufficient. As for feeding, the fish are not particularly choosy, but live food should be given preference. They quickly adapt to a new environment but retain their shyness, particularly when they are kept on their own. They should, therefore, be kept in a shoal of their fellows and also, possibly, with the kind of species which have already been mentioned.

These cichlids become sexually mature in their second year. As with almost all *Aequidens* species they too spawn on a firm substrate, which is carefully cleaned by the female. The male often takes part in the cleaning operation too. The temperature must be raised to 26°C. The fish will also spawn in the community tank, provided they are not disturbed by other fish. However, it is advisable to prepare a separate spawning tank for them. For this purpose a tank with a capacity of 50 litres upwards is suitable. The tank can be set up in the normal fashion.



The female, nearest camera, makes way for the male to fertilise the eggs

That is to say, with a sand bottom, plants and in an open space a largish flat stone or piece of slate. It is often a matter of some days and even weeks before the fish settle in and become sufficiently relaxed for them to be in the mood for spawning. In fact, these fish can be considered as rather reluctant spawners, which I suspect is to be attributed to their shy disposition. When the extended ovipositor can be seen in the female the onset of spawning has finally arrived. Individual eggs are carefully deposited on the stone. The male fertilises at the same time, or after the female has made room for him. The fish spawn for about three hours and upwards of a hundred eggs are deposited. Many parents look after their brood with great care, sending a stream of fresh water over the eggs by movements of their fins and defending the young fish for almost six months. However, very many parents eat up all

of the eggs at the slightest disturbance or suspicion of danger and in any event do not look after the brood. The brood can be reared, however, without the presence of the adult fish. If one prefers not to take any risks or has already suffered an unfortunate experience because of the behaviour of the adult fish, the parents should be removed immediately after spawning. Gentle aeration should be introduced with the fine air bubbles, if possible, touching the eggs. The water is very lightly coloured with Tripaflavin and as soon as the brood are free-swimming on about the sixth day they must be fed with fine live food.

A clutch of eggs on substrate of wood





Coldwater Jottings

by Frank W. Orme

Going on holiday with a clear conscience!

IT CONTINUES to cause me some surprise that so many coldwater fish-keepers, especially those who keep goldfish, are reluctant to take a holiday away from their home. I have even heard of the odd cases of people actually taking their most cherished fish away with them, rather than leave them to take care of themselves. Then, of course, there are those who enlist relations, friends or neighbours to look after the fish whilst their owner is absent. Why, I wonder, is there this fear that the fish cannot be left alone without attention for a week or two? If you, the reader, happen to be one of those who suffer from this fear I can only say the fear is without foundation. To allow your hobby to deprive you of that often much-needed rest in fresh surroundings is absolutely unnecessary. The fish will come to no harm—indeed they may even benefit from a respite from over-zealous ministrations, and you may well be surprised how fit they look and how clear the tank water appears upon your return. Each year I leave my fish to fend for themselves whilst my wife and I spend a relaxing two weeks in pastures new. It is always a pleasure upon returning to visit the fish-house and note how much growth the young have made whilst we have been away, a fact which is not so noticeable when they are attended to two or three times each day!

Precautions

Provided that a few simple precautions are taken a week or so before departing for your holiday, all will be

well and it will not be necessary to rely upon the help of another person. Very often the friendly well-intentioned help of a second person can lead to tragedy—the death of fish and gross pollution of the tank due to overfeeding. It just isn't worth putting friendship in jeopardy and risking disaster.

The first essential is to feed the fish just a little more than usual, but not too much more, so that a reserve of body fat is built up. Keep the front glass of the tank clean but leave the back and sides to build up a good growth of green algae; the fish will 'peck' at this growth and find a small amount of sustenance to keep them going during your vacation. Finally, the night before you are due to leave, lightly siphon over the base to remove any sediment. Lower the water by approximately fifty-percent and then gently refill with clean fresh water. The tank and fish should then be capable of surviving, barring anything unforeseen, your two weeks absence but if it would make you feel happier, a final feed of live *daphnia* can be given just before you close your door and start your holiday.

If you have a pool, then there is even less to worry about unless it is a very small pool—as are some glass-fibre pools. With these tiny pools it would be advisable to give similar treatment to that recommended for the fish tank, and then cover the pool with a sheet of clear polythene to prevent the plants drying out should a spell of very hot weather cause excessive evaporation. Preferably, and for reasons of safety, fish in these very small pools should be housed in more suitable quarters where they can come to no harm.

The larger pool can be given a partial water change and then covered with a net of $\frac{1}{2}$ inch mesh. (A wise precaution is to keep the pool covered all through the year with this net; this will prevent the fish-catching cat exercising its skills and also foil the attempts of various birds and other predatory creatures to make a meal of your prized fish. A net also serves the very useful purpose of preventing all but the very smallest leaves and other debris from falling into the water and adding to any possible pollution.)

The essential factors are to ensure that the fish have been adequately fed, are in a state of good health, and have clean conditions in quarters of sufficient proportions to prevent any overcrowding. Attend to these minor tasks (which should, in any event, be part of the daily routine) and you can spend an enjoyable holiday, knowing that your fish will be safe and are not being killed by good old 'what's his name' and his lavish hand of bountiful food and deadly kindness! There is little joy in returning home to an aquarium which has become a stinking mess of polluted water and dead or dying fish. The most profound of apologies will be unlikely to restore your feelings of friendship for the erstwhile caretaker. So I say, "do as I do—feed 'em, clean 'em, lock 'em up and go away and forget 'em!" It pays, and allowing for the unforeseen, all should be well and your homecoming a happy one!

It is quite possible that fish in the outdoor pool may decide to spawn during this month. If you suspect that from the behaviour of the fish a spawning is imminent and wish to raise any young fish under controlled conditions, it is possible. Place spawning nests, made of bunches of fine-leaved plants or nylon wool, in the shallow area of the pool. The fish will then spawn in the nests and this can be checked by quietly visiting the pool whilst the fish are spawning. But do not interfere with either the fish or the nests.

Later in the days after the fish have finished spawning the nests can be removed and gently swilled under the coldwater tap to remove any mulm or other debris. They can then be placed in a previously prepared tank for hatching after which the procedure is exactly the same as employed for spawn which has been obtained from fish bred in the aquarium.

Many more young fish can be raised in this way than might be possible if the spawn were left in the pool with the adults. Very many of the young would be eaten by the adults and due to the cussedness of Nature, it would most likely be the less desirable young which would survive.

The largest

KILLIFISH

An exotic beauty from
Lake Tanganyika

by *Arend van den Nieuwenhuizen*

BOTH the word exotic and the word beauty demand an appropriate price, one which will compare with the price range set for many Malawi and Tanganyika cichlids, for this fish, the largest killifish, lives in Lake Tanganyika.

It was a Dr. Pol who first pointed to the fish as a possible species for the aquarium, in 1952, but nothing more was heard on the subject until 1959 when an article appeared in the German magazine D.A.T.Z. under the title: "Fish of Lake Tanganyika." This article was devoted to species which Mr. Walter Griem of the Hamburg Aquarium had brought back with him in 1958 from a visit to East Africa, the high-point of which consisted of a trip to Lake Tanganyika. At that time the triumphant procession of Malawi and Tanganyika cichlids was

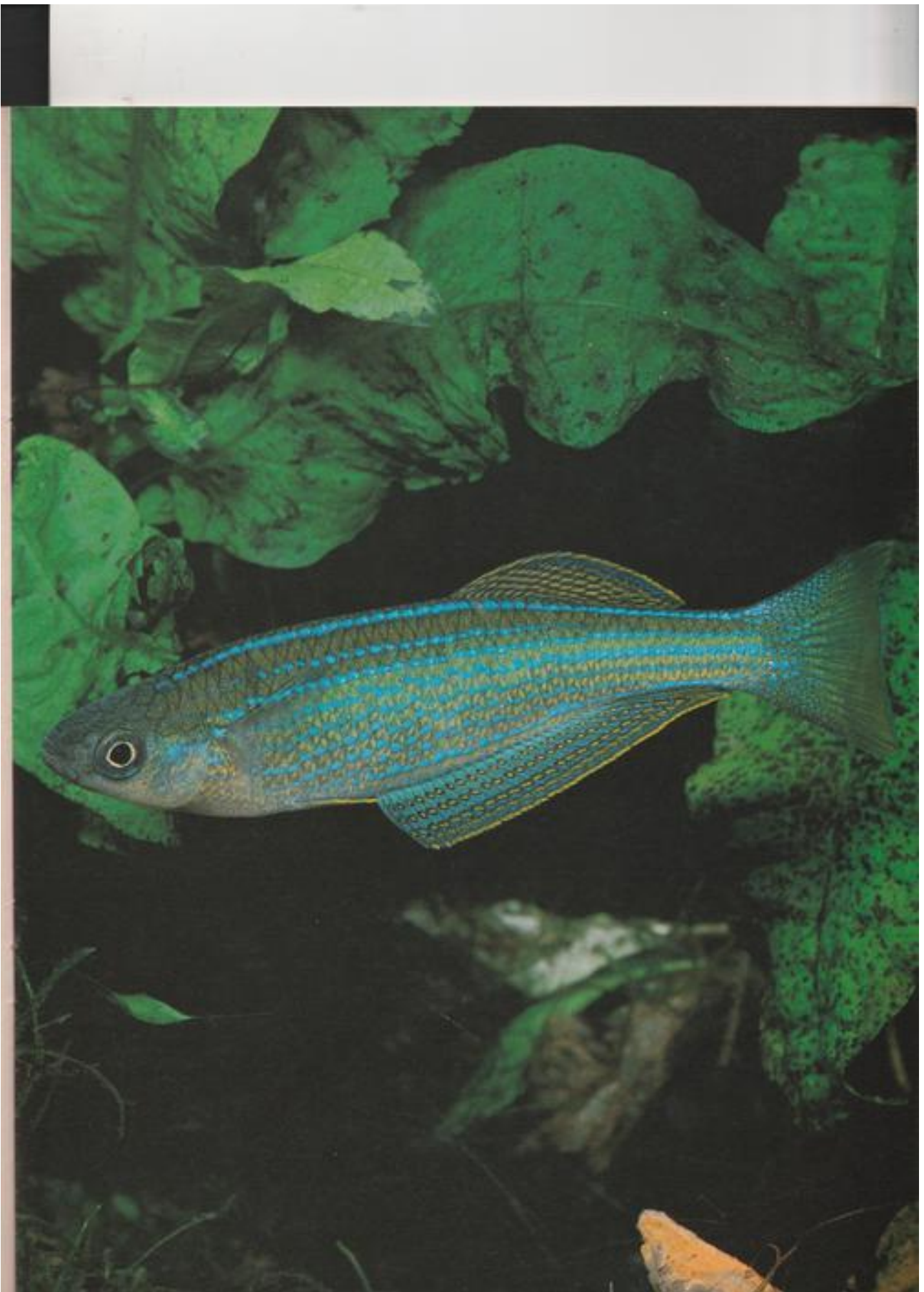
just beginning and these fish were then called freshwater coral reef fishes, as though any other fish were unknown to us—albeit smaller—which could be compared with the reef fishes from the point of view of the richness of their coloration.

After discussing the cichlids, the author Dr. Werner Ladiges, put the spot-light on *Lamprichthys tanganicus* Boulenger 1898, which at that time was included in the sub-family Lamprichthyinae, but today belongs to the family Procato-podinae. The Hamburg Aquarium was the first import firm which brought these valuable fish to Europe and also suffered very disappointing results with them initially. This species is, in fact, rather sensitive while travelling and cannot, for example, be transported

on the basis of several specimens placed in one plastic bag. They are rather vulnerable, being easily damaged, and it became evident that the loss of only a few scales leads to a general inflammation around these areas which, within a short time, leads to the death of the fish. In addition, it turned out that fish of this species which were kept on their own were very nervous, an experience which I myself had at the beginning. At the slightest unexpected movement the fish dashes at unbelievable speed around the aquarium and is obviously so alarmed that it bumps into the sides of the tank and other objects and quickly damages itself. From the above the reader will understand that at the beginning I had only one specimen, which I saw by chance at a German importers. In spite of the price I could not keep my hands off it for I was enchanted by the beauty of the fish.

In the wild these fish live in open water and are shoaling fish. They are strong and lively swimmers and it is, therefore, absolutely essential to provide a roomy aquarium for them. Ladiges points out in his article that they can be kept together with rainbowfish, because they quickly shoal up with them. What is more, one can obtain more quickly a shoal of (cheaper) rainbow fish than a shoal of *Lamprichthys tanganicus*...

It was a recommendation I quickly followed, for it is not only important that *Lamprichthys* feels healthier and more comfortable under such





an arrangement, but the composition of the water needed by fish originating from two different continents is more or less identical. It is known, however, that rainbowfish which have been imported in the last few years are best kept in hard, slightly alkaline water. In soft, acid water unfortunate results can result with these fish and, within a short time, they are liable to suffer from fungal infections which, if they are not quickly treated, can lead to a rather speedy demise. This applies equally to *Lamprichthys tanganicus*, for things soon go wrong within a short time under soft and acid water conditions.

In my own experience, things have gone well in keeping this species in water with a degree of hardness of 10°DH and a pH reading above 7. In addition, in order to be on the safe side, I added a level tea-spoon of salt for each ten litres of water, which the plants in the aquarium can tolerate without any trouble. Finally, I undertook a weekly replacement of 20% of the water at a temperature of 26°C. Originally, I kept my first specimen in an aquarium measuring 70 x 25 x 25 cm, but it soon became apparent that this was unsuitable. The fish evidently felt uncomfortable in this restricted space and kept itself almost motionless in a corner beneath a clump of plants. Subsequently, I transferred the fish to a 100 x 40 x 35 cm aquarium and this improved matters. The aquarium stood, however, in a

very quiet room with the result that the fish was never seen, for as soon as one entered the room it disappeared. As a result, he moved again, this time into my work-room and into an aquarium 80 x 35 x 35 cm together with rainbowfish. The aquarium was planted with Java fern (*Microsorium pteropus*) along the tank sides. The result was excellent and in the meantime I have added a second specimen. They receive the same menu which is fed to *Chilatherina sentaniensis* and *Melanotaenia trifasciata*. In other words, they will accept practically all kinds of live food, including fruit-flies (*Drosophila*), which I strew across the surface of the water.

The males are clearly recognizable by the small, azure-blue, shimmering rows of small flecks along the body and the larger dorsal and anal fins which end in a point. In the female the colours are not so vivid, the whole appearance is rather paler and the rows of shiny, blue markings are almost totally absent. The dorsal and anal fins are rounded off. In addition, the female is somewhat smaller than the male. The latter reaches a length of about 13-15 cm, the females have a maximum size of 10 cm.

Ladiges wrote as early as 1959 that many more males were imported than females and during my visits to importers to date I have, unfortunately, never seen a single female. That is also the case with *Iriatherina werneri*, for females, in the trade at least, are rarer than gold nuggets. Unfortunately, therefore, I can not write about any experiences in breeding the species and as far as available literature is concerned, the writings of Ladiges are all that have been published.

In his account of his experiences with *Lamprichthys*, Ladiges relates how the fish, at a time when the rainbowfish were busily engaged in their own spawning activities, joined in and how, as a result, a few large, crystal-clear eggs fell in amongst the eggs lying on the bottom of the aquarium.

These were collected, a few of them developed and the young hatched without difficulty. Three of these young fish attained a length of 3-4 cm. They hardly resembled their parents at all, being completely transparent and looked very much like *Aplocheilichthys* species. When Ladiges subsequently had more females at his disposal and so could form a number of breeding pairs, it turned out that this species did not spawn between the plants or, as *Procatopus* species, in crevices, but pairings took place in open water and the eggs than sank to the bottom. Whether this means that the fish in fact do not spawn between plants is difficult to judge because there is nothing in the article concerned about the arrangement of the tank in which the *Lamprichthys* fish were spawning. Besides, we know for example that rainbow fish prefer to spawn in very dense clumps of plants and the fact that it is stated in the article that the *Lamprichthys* laid their eggs among the rainbowfish lying on the bottom suggests, possibly, that there were no or hardly any plants in the aquarium.

However that may be, more needs to be learned on the subject and if you should be tempted into acquiring these fish and, furthermore, if you have more than one pair, I suggest that you should offer them a choice of spawning possibilities.

May I wish you luck and if you are successful, perhaps you might like to write an account of the spawning for this magazine.

From a
Naturalist's
Notebook



THE EXTINCTION of the Tecopa pupfish (*Cyprinodon nevadensis calidae*) which I mentioned the other month, is the first extinction of a species on the U.S. endangered animals list. Significantly, it inhabited the springs of California's Death Valley, until the last record in 1970. Its scientific name shows it is a local variety of the pupfish still extant elsewhere. No such concern was shown when some British variations like blue perch and graining variety of dace became extinct in the North-west last century, or the current burbot is endangered, much less several local varieties of trout recorded last century by Gallivan. If they were birds it would have been another matter.

Let's be equally interested in the world of discovery from research into how much commoner creatures go about their daily lives. Salamanders for instance. The popular Mexican axolotl and the tiger salamander to be precise. At the University of Massachusetts, Burggren and Wood differed from previous researchers in finding that this Peter Pan of nature when changed from gilled to gill-less adults had decreased its blood affinity for oxygen as did a relative salamander but not the tiger-salamander. Cold temperatures increased this in its prolonged youth yet they had no effect on adult stages. But it increased rather than decreased when the axolotl was acclimatised to warmer conditions. Yet at the same time the tiger-salamander's oxygen uptake increased as it became a gill-less air-breathing adult

by Eric Hardy

(which one would expect without costly research). Nevertheless, it sheds light on the biochemical metamorphosis amphibians have in changing from coldwater to warm air where there's more oxygen available. The tiger-salamander's type of haemoglobin in its blood changes, though mature larva axolotls have the same as adults.

The larval tiger-salamander may take 10 to 50% of its oxygen from the air. Many *Ambystoma* species, not only the common axolotl, become sexually mature though development is arrested at this larval stage. They may gulp air at the surface, but the blood haemoglobin of sexually mature larvae and adults is the same. Changes in oxygen-uptake are due to warmer temperatures. Despite the sexually active larvae having extensive gills, they are obligatory air-breathers, the red cells of their blood being chemically similar to mature adults.

Aquatic Snakes

The low haemoglobin concentration plays an important part in the water-life of some of the most interesting of snakes, the primitive yet totally aquatic Acrochordine snakes of the Indo-Pacific region, whose biological specialisation exceeds all the romantic fiction of sea-serpents. Sluggish, breath-holding and anchored near the surface by day, then active by night, these Javan and other water-snakes flatten their uniquely spiked, muscular skin to form a keel for more effective swimming, yet they are almost incapable of moving on land. Most are freshwater; a few small species live in brackish marine habitats. The gas-exchange metabolism in a new species, *Acrochordus anafurax*, recently separated from the sluggish Javan water-snake, has been researched by Seymour, Dobson and Baldwin of Adelaide and other universities. Its blood was found with an exceptionally high affinity for oxygen, linked to long nocturnal dives. It exchanges a small but significant amount of oxygen through its skin, as do some sea-snakes. Its high blood volume is reflected in the enlarged veins in its body. Little carbon dioxide is exchanged in the lung during the long time it holds its breath, more than 50% occurring during the brief time it breathes at the surface and 33½% of the exchange is through the skin, as with diving sea-turtles.

Consider now the catfish, and how its ear has been specialised above all

Continued on page 38

Naturalist's Notebook —

Continued from page 35

other fish to serve in short-range echolocation of objects like its prey. Popper and Tavolga at Georgetown University, U.S.A., have shown recently how the marine catfish's inner ear has a uniquely large-developed utricle, from which the semicircular canals arise. This is surrounded by bones, unlike other fish, and has a larger than usual otolith or carbone by which annual rings fish can be aged. Its nightly chorus of sounds had long been detected without understanding their purpose. Other fish couple the swimbladder to the ear to hear sounds. But whereas the marine catfish has a hearing range of only 50 to 1,000 Hz (Hertz, 1 cycle per second unit of frequency), the goldfish has over 3,000 Hz and another catfish *Ictalurus nebulosus* extends to over 5,000 Hz.

Fish Toppers

To "drink like a fish" is an unfair reference to inebriated aquarists rather than their tank pets. Salmon and trout transferred from rivers to the sea increase their drinking as they cope with problems like osmotic pressure, and reduce the permeability of their gills. Their initial crisis lasts about 30 hours, marked by rapid gill-dehydration, and they compensate for this by drinking. There's also an increase in blood-plasma and pronounced acidosis, according to French researchers Leray, Colin and Florentz. There's a slight decrease in gill-respiration rate, but this isn't influenced when seawater fish go into freshwater. Different strains of fish seem to vary their efficiency in regulating osmosis and require progressive acclimatisation. This large water-loss and increased drinking vary with the size of the fish.

Oxygen-affinity also plays a part in the unique haemoglobin in the

viviparous sea-perch, in transferring oxygen to the large foetus, unlike the foetal blood in land animals like rabbit, horse and pig. Ingermann and Terwilliger have shown a higher oxygen affinity in the viviparous sea-perch foetus blood than in its parent's, because its haemoglobin is structurally different, but a lower concentration of erythrocytes (red blood-corpuscles). Differences in carbon dioxide and acidity may also help the transfer of oxygen.

Third Eye

Do fish use their photosensitive pineal organs (third eyes) to detect their daylength from sunlight? Electrical recordings from this organ in the pike, by Falcon and Meissl in West Germany, indicate so. Likewise with lamprey; but not all bony fish have such well-developed pineal bodies as young pike. Massive pigment-movements in the compound eyes of the crayfish have been shown to play a vital part in adapting its vision to light and darkness by changing the optical properties near the photosensitive structures. Mexican researches have now shown this change is affected by the ionic balance of the external solution, which affects the transfer of stimulus. German workers

have shown it is aminoacids which stimulate the movements of crayfish-claws.

Attention is also given to water-plants, particularly control of the most troublesome freshwater weeds. One of the world's worst plant-pests is the floating fern *Salvinia rotunda* from India and Sri Lanka to Papua New Guinea, New Zealand, Australia and parts of Africa. It can double its weight in three days, but this native of southeast Brazil has only been a pest for 25 years. In Brazil it is kept in check by small black weevils, *Cyrtolobus pinguis*, which have been introduced to one of its trouble spots, Lake Moodarra in Queensland, with success. It has already reduced the growth there. Previously a similar use of this beetle for biological control failed because the wrong race or variety was introduced from Trinidad, where it fed on a different species of *Salvinia* and hadn't the right taste for the pest species. Nobody seems to have thought of "educating" the Trinidad weevils to eat the right floating fern, in the way that honey-bees are educated to work white clover (as in the Ukraine) and the cocoa-bean moth became the "tobacco-moth" by a forced change of diet.

NEXT MONTH

A BREAKTHROUGH IN BREEDING MARINES. Next month's beautifully illustrated colour feature.

Anthony Terceira describes the nature and habits of **THREE EMPEROR TETRA VARIETIES.**

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THE MAKING OF A WATER GARDEN

the bog garden

Part 3 by Gordon T. Ledbetter

SO called marginal or bog plants fall into roughly three categories. There are those which stand in water; those which like to be above the water line (although their roots may penetrate below the water level) and those which seek moist or damp soil but will not tolerate saturated conditions. Many plants will thrive in a variety of conditions. You have only to follow a river course over a few metres to observe the same plant first living right in the water and then around the corner happily living in a damp field at some distance from the river. However, you will find that plants do show preferences. So obviously in making a bog garden one should approximate these various conditions as far as possible.

Having made two ponds and a waterfall joining them, I was also keen to have a bog garden. The great majority of water plants belong to the marginal class and a pond without a collection of Marsh Marigold (*Caltha palustris*), Bog Bean (*Menyanthes trifoliata*) and Iris lacks one of its most distinctive features. You may remember that in the first article on making the ponds, I incorporated a shelf which could be used to support marginal baskets. Equally such a shelf could be turned into a 'bog perimeter'. I had plenty of small rocks and stones left over from building the waterfall. These could be put to good use in making an inner perimeter wall, on the shelf, right round the ponds. The walls would not have to be built very evenly as they would be almost totally submerged. The rocks would break the surface at irregular intervals and provide a very natural edge to the pond. (In the case of a formal pond, say a pond set in a patio, a bog perimeter could

be made not of natural stone but of brick.) The only real difference between making a shelf for baskets and one for a wall is that the wall shelf must be wider by the thickness of the building material. A depth of about 200 to 250 mm (8 to 10 inches) is adequate for most marginal plants, in fact you could make the trough shallower if necessary. The width of the trough should vary according to the size of your pond. Aim to keep the bog area in proportion to the water area. The troughs I made varied from about 600 mm (2 ft.) at the widest point to under 300 mm (1 ft.) at others.

The making of the two trough walls took surprisingly little time. Most of the effort went into carting the stone over to the ponds. That was time consuming, but two of us working together had the job completed in a day. As the stones were extremely small I found I needed a lot of mortar to keep the wall upright. Above two courses and the stones became very rickety. Their small size was the problem. It was difficult to get them to sit on one another without toppling over. Larger stones or rocks, if I had had them, would not only have meant fewer courses (I had to go up to four at some points) but would undoubtedly have improved the finished appearance of the ponds. I would have liked to have included a few large rocks in the perimeter. Using all the large rocks for the waterfall and keeping the small rejects for the bog perimeter has meant a lack of balance. At some future date I shall redress the balance. The stability of such a wall is of course important. Using cement and mortar in the ratio 1:3, with a waterproofer added if desired, is quite strong enough. But be sure to make sectional

walls at frequent intervals so that there is no chance of the perimeter wall falling inwards. Sectional walls are also useful for dividing the trough up into lots. They help to prevent plants getting mixed up together.

As mortar and concrete leach lime which can be harmful to both plant and fish life, it is important to rinse out the pond several times. Alternatively, one can use a product such as *Silglaze* which is painted over the mortar and has the effect of neutralising the lime. However, several applications are necessary to achieve the desired effect.

I filled and emptied the ponds a few times and then set to work carrying out the most backbreaking part of making the bog garden. That was the job of filling the trough with soil. It is surprising how many barrow loads are required. I wish I had counted them. Some readers may be horrified to learn that I first filled the troughs with a goodly amount of cow manure. It will be argued by some that that is courting disaster. Most marginal plants do very well in ordinary loam, adding cow manure is not only unnecessary but very likely to cloud the water for a very considerable length of time, perhaps the whole of a summer and longer. I admit that there was an element of risk. Cow manure is often recommended for water-lilies. Half a spadeful to each basket is not likely to seriously affect the condition of the water. But added to a trough running the whole way round a pond is quite another matter. On the other hand I was quite certain that the cow manure was well rotted. In that state it will not have much effect on water. And time proved me right. The water was not discoloured by the manure and I have no doubt that the vigour of the plants was much improved.

The troughs were suitable for plants which will grow just under or above the water line. For those



Above
Double marsh marigold,
Faltha palustris flore plena grows in shallow
water or wet soil

Right
Candelabra primulas are
marginals which come
in a wide range of
colours

Far right
Pickerel Weed, *Pontederia cordata*. A thickly
growing marginal best
restrained within planting
baskets



plants which like damp but not saturated soil I had another plan. At various spots around the lower pond, just beyond where the liner was tucked into the soil, I dug some shallow trenches. These I lined with polythene, making sure that the bottom of each sheet of polythene was well punctured with holes to allow adequate drainage. I then filled in each trench with a little cow manure and with loam. Next I filled the pond until it was brimful with water. I then removed half a spadeful of soil from under the liner opposite each of the lined trenches. I also cut off the 'tuck' from the liner at some of the spots. I then depressed the liner where it met each trench—depressing it by only a few centimetres at most—until water began to seep from the pond into each of the trenches. After a short time the trenches were watered and the pond then found its own level again. To keep the trenches moist in future, all that I would have to do would be to very slightly over fill the

Water lily, *Escharboeuf*

pond. The fact that the edge of the liner is depressed at the relevant spots means that it is the trenches that get most of the water and the rest of the surrounding ground receives little.

If your soil is particularly heavy and efficient in retaining moisture, it is possible to do without the polythene lining and simply flood the surrounding ground from time to time. But whether you use liners or not, the success of this method does depend upon you being available at the right times. In Britain it is in the summer that bog plants require the most moisture, but it is also the time when the rainfall is lightest. Polythene lined bog beds can dry out very quickly. That is the great advantage of the trough within the perimeter of the pond. Even if the water level drops due to evaporation, provided the roots of the marginal plants can still reach water, they will be quite safe. But if you want to grow plants that will not tolerate saturated conditions, Primulas for example, then it is necessary to make ex-

ternal bog beds, or heap the soil so high on an internal trough that the roots are well above the water table level. To do this, however, means making a very wide trough. Soil that is heaped up too steeply will crumble down into the pond by degrees if it is not immediately washed down by the first down-pour of heavy rain.

You might question whether it is worth going to the trouble of making a perimeter trough when plastic baskets are so convenient. Not only that but baskets require much less soil than a trough and plants can be re-arranged by shifting baskets instead of being uprooted. But baskets never look so natural. Inevitably a basket here or there will show over the top of the surface. Almost all plants relish the greater space provided by a trough. And a dense drift of Irises, perhaps stretching half the length of the pond, in full bloom on a summer's day, is one of the great delights of water gardening.

Gordon T. Ledbetter
(Next Month: Planting the Pond—
Oxygenators & Water-Lilies).





COMMENTARY

by
Roy Pinks

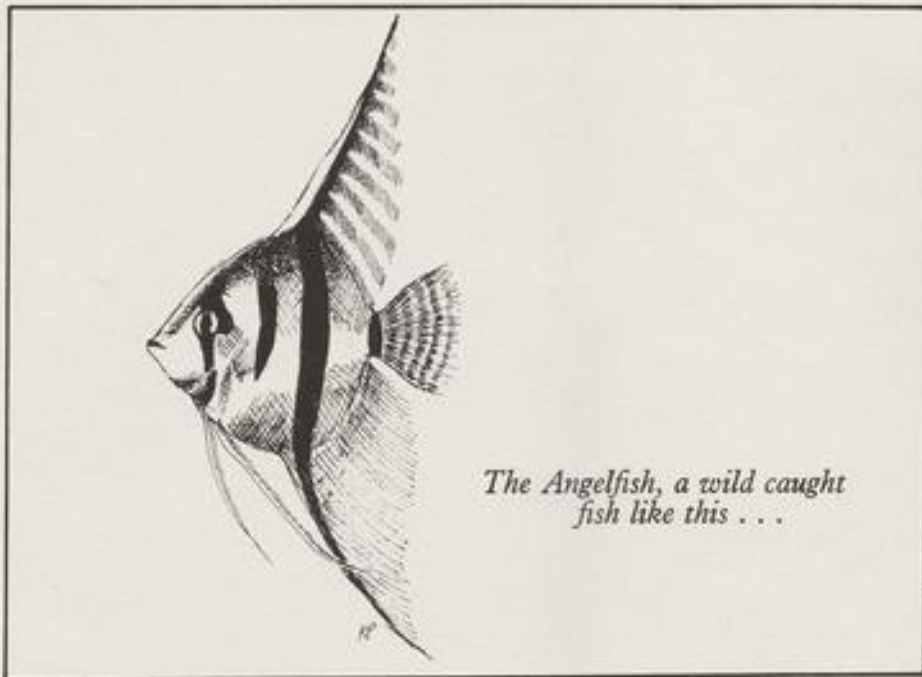
TROPICAL FANCIERS often ask whether fish offered for sale today are as good value as those available in the early days of the hobby. Those whose experience spans the years will generally agree that the overall impression gained from looking at tankful of fish in well run establishments is that they are of very even size and quality, and usually well coloured. But a factor which is often completely missed is that the fish have never been anywhere near their country or region of origin, but have been bred for several generations in vast commercial estab-

lishments thousands of miles away. So it is perhaps wrong to say that this or that tetra comes from the Amazon region when most specimens have, in fact, emerged from Singapore fish farms for many years past. Fish factories, one could say. In parallel with this, though on a far lesser scale, there are often available quantities of fish bred by local fanciers or clubs. Sometimes they are advertised as "locally bred", the epithet implying that these are in some way superior to all others. The would-be buyer is naturally interested in knowing, assuming that he has any real choice, where the long term advantages lie.

In actual fact, neither of the above choices presents the best investment, however attractive the fish may appear, as they have all to a varying extent been raised under cosseted conditions. When most fish offered for sale came straight from the wild there was reasonable expectation that a sound looking specimen would live for several years: it had got to its state of good condition by natural selection, and it was tough enough to last the pace

even after transfer from its natural waters, its transportation, and its eventual arrival in water of completely foreign nature. One can recall far fewer fish being available, but they were handled like gold dust and they always seemed to get away to a good start and to prosper. This certainly applied to species I kept as a youngster, and to the many fish we used to study in the school aquaria.

In more recent times restrictions on trapping and exportation of fish by many overseas governments have resulted in the virtual disappearance of numerous species, hence controlled breeding elsewhere alone has ensured something of a supply. Failure to realise this fact may mislead the aquarist as to the actual requirements of his charges, and he may needlessly attempt to reproduce conditions which in the event do more harm than good. Just every so often there is an opportunity of buying native caught fish, and these are usually advertised as such and are more expensive than the commercially bred specimens. Initially, one would not expect the colour to compare with those bred in captivity, but usually this improves with time. What is important about wild fish is their vitality, their stamina and, seemingly, their nervous energy, and they are usually most impressive creatures. I would always advise snapping up good specimens from these sources even though they may be less even in size and outwardly as attractive as those from commercial hatcheries. It is one of the unfortunate facts of life that creatures which are reared "soft" include in their numbers many which are programmed by nature to die early, and although they may hold their own in the hatchery, the shocks of transfer trigger off a downward process which leads to their early demise, and this often accounts for quite inexplicable losses of good looking stock on the part of aquarists who have behaved quite blamelessly as regards its management. It might even be helpful if retailers could indicate to their customers the *real* origins of their fish, as an aid to better after-sale treatment.



*The Angelfish, a wild caught
fish like this . . .*



*. . . is tougher and more reliable
than the man-made types like this
Veiltail Angel*

£10
PRIZE

YOU & US

**READER
PARTICIPATION**



THIS MONTH'S WINNER →

As stated last month our current letter writing competition has resulted in a much increased post bag containing a great deal of interesting comment concerning the content and presentation of the magazine. We are most grateful to all those people who took the trouble to enter the contest and a selection of the letters received during April is printed here. Many congratulations to Mr. P. Mansfield of Wickford in Sussex who will shortly receive our £10 prize.

Regular readers will note certain changes in the visual presentation of 'The Aquarist' this month which we trust will meet with your approval.

Don't forget that the competition will continue throughout June which offers you an opportunity to express your views about the alterations we have made, together with any other observations or suggestions you care to make. Entries for this, the last phase of the three month contest, should arrive not later than Monday June 28th.

All correspondence should be addressed to: Reader Participation, The Aquarist and Pondkeeper, The Butts, Half Acre, Brentford, Middlesex, TW8 8BN.

May we remind you that letters should be clearly written and contain not more than 400 words. If you are a Club member please state the name of your Society and should you be amongst the lucky winners your organisation will receive a donation from 'The Aquarist' in addition to your own cash prize.

Dear Sir,

I think the magazine most fishkeepers like myself require has to cover as wide a range of subjects as possible. After all, there are so many aspects of the hobby to cover and there are many thousands of aquarists, each with an interest just a little bit different to that of his 'neighbour.'

Various articles I would like to see are: (1) How to prepare and maintain a fish house. I have yet to see a book or magazine that even touches on the subject. Converting a shed, for instance, is not a task many people take upon themselves every day. It obviously needs a lot of thought, preparation and work put into it. Also, there are many choices available when it comes to methods of heating, insulation, etc. Which is the cheapest and most reliable system to use? The questions can become ever lasting and an initial mistake can cost a lot of time, money and exasperation. How many people would like a fish house but are scared to take a leap into the dark? (2) I enjoy 'Meet the Aquarist' articles, seeing what other people are doing within the hobby. How about 'Meet the Society?' Britain has a large number of aquarist societies, some of which get together for inter club meetings, but obviously this can only be done on a fairly local level. A club in the South has little or no contact with a club in the North. An article on various clubs would give us an insight into each others interests and aims. Also, it would be useful to know who is having success breeding fish in different parts of the country. We all know that certain fish breed better in different parts of the country and articles on different societies would show the water chemistry of various areas and also the different methods tried.

A lot of people are surprised to find that there is a society in their area. I only discovered my local society when I saw a sticker in a car window. By following the lead offered to me, I found a thriving society. It was a joy to at last meet and talk to fellow aquarists, most of whom knew more than me and were willing to pass on their knowledge.

Articles like 'What Is Your Opinion?' are great for finding out what other aquarists are doing and thinking, too. Such articles are to be encouraged.

Keep up the good work, we need our magazines to keep us up to date.

22, Cedar Avenue,
Wickford, Essex.

Yours Sincerely, Paul Mansfield
(Southend, Leigh & D.A.S.)

READER PARTICIPATION

A further selection of letters from our post bag

Dear Sir,

In my experience the average amateur aquarist of today, whether coldwater or tropical, is frustrated at not being able to expand his hobby to the level he desires, this situation being mainly due to two factors, i.e., the lack of space in which to expand and the finance necessary to cope with any expansion. Both of these points crop up in the subject of fish houses and their design and construction, sadly an aspect of our hobby on which information is lacking.

I am convinced many people would consider attempting a fish house project if only fellow aquarists who have already undertaken such a project could relate their experiences on aspects such as materials of construction and insulation, tank heating or space heating, typical running costs and making the best use of any available space no matter how small. For instance, I wonder how many people have considered building a fish house on a greenhouse basis, i.e., a construction chiefly of glass. Surely in the summer months this would mean no form of heating would be necessary in the daytime.

Alternatively, is the best way to attempt such a project to build a construction with no windows, but completely insulated and try to contain any heat which we supply? If this is the way to go then information needs to be forthcoming on insulation materials, etc.

Surely people have done experiments as to the economic way to heat tanks. Do we go for space heating or individual tank heating? If space heating is the answer then do we use gas, electricity, paraffin or maybe someone has come up with some better means such as solar heating panels?

Unfortunately for most of us undertaking a fish house project, we must get it right first time as there is no chance of experimenting if things go wrong, especially with our present economic climate.

If we had correspondence from people who have any relevant experi-

ence with any form of fish house, even converting spare rooms or attics, then more people would try such a project and hobby could make better headway at the amateur level. We would have more scope for breeding experiments and could even encourage a few of us to start up some form of business or at least supply us with a small income from selling surplus fish which could partially offset some of our running costs.

Andrew Taylor, Preston.

Dear Sir,

I am quite a new reader of your magazine and my favourite features are those which are about a particular breed of fish because they go into a lot of detail which I find very interesting.

My favourite articles are those on breeding tropical freshwater fish.

I first became interested in Tropical freshwater fish about two years ago, and I made the mistake of going out and buying a tank and equipment, putting in some fish and expecting them to be fit and well. They all died and I was very upset. I cleaned and sterilised my tank, and equipment and I set about learning all I could from library books and friends who had kept fish successfully.

Your magazine could help people like myself starting to keep fish of any type for the first time.

Each month have an article for beginners, and this could start by suggesting the best size of tank, filter, etc. It could go on to say which plants to buy and which are the hardiest breed of fish to buy, and then go on to say how to deal with diseases.

The articles could be written very simply so that even your youngest readers could understand and enjoy them.

If I had been able to read articles for beginners everything would have been so much easier as I would have known exactly what to buy, and I would not have lost all my fish. I now have a very nice tank with a good selection of healthy fish, and a small breeding tank with quite a few young ones.

I would like to see the advertisers in your magazine make the cut-out address coupons as small as possible, as

I like to keep the magazine without very large areas missing.

I thoroughly enjoy your magazine, and look forward to it each month.

J. Hand (aged 14), St. Helens.

Dear Sir,

I am an avid reader of the *Aquarist* and feel that I have learnt most about fishkeeping by reading the readers' queries pages. I would like to suggest that you run an article or series of articles on 'Electricity and the aquarist.'

I have always admired neat decorative tanks but due to a lack of knowledge and confidence, mine always have a mass of wires, plugs and adaptors. I do consider that I have the average person's ability with electricity, i.e., I can mend a fuse, make a table lamp and wire a plug, but when it comes to working out how many pieces of equipment I can run off one domestic socket, and the most efficient way to do it, I am completely at sea. It is for this reason that my community tank, terrapin tank and goldfish tank are all situated in different rooms beside their own sockets!

I have had my eye on a double tank stand, but coping with all the equipment is putting me off. Most people do not have the space that I have and probably have to limit themselves to one outlet anyway.

My head is buzzing with questions like—If I use a cable tidy, how then do I control my lighting without expensive time controls? How many tanks can I control off a domestic socket? How does one rig up lighting, etc., in a tank with no lid fittings?

I've seen many articles on setting up a single tank, and even they do not explain much about the wiring except to mention that lights, filters, heaters and thermostats should be fitted and concealed.

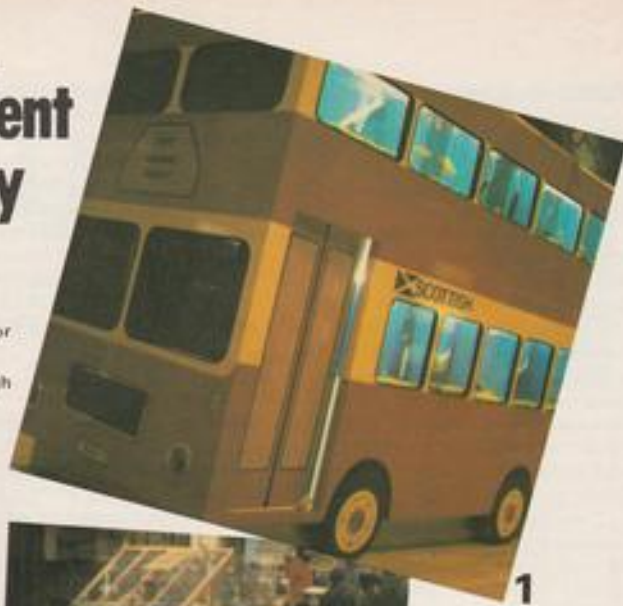
I feel that the subject could be expanded to include fish houses, shop fittings and exhibition displays. There must be many aquarists like myself who approach their electrical work wearing rubber boots and clutching their life insurance policies!

Anne Howard, Bridge of Weir.

A few of the excellent tableaux on display at this year's SAF

1. The winning tableau from the Scottish Motor Transport A.S.

2. A topical Royal Tribute from Edinburgh Aquarium and Pondkeepers A.S.



3. The Castle from Dalkeith A.S.

4. A neatly constructed Greenhouse from Darfield A.S.

5. 'Treasures from the deep.' The Workington and D.A.S. entry

6. 'Well saved sir.' An unusual tableau from Edinburgh A.S.



TENTH SCOTTISH AQUARISTS FESTIVAL

It is difficult to believe that this, our own National Show has been in existence now for almost a decade, and much progress has been made since our first tentative effort in 1973. It is, indeed, a dream come true, and we greatly appreciate all the assistance received from "The Aquarist and Pondkeeper" magazine over the years.

The Clubs pulled out all the stops this year, and the standard of fish was the highest we have seen for a long time. Even those taking third prize were highly pointed.

Most classes were exceptionally well supported: for example, Catfish (A) with 25 entries; Catfish (B): 34 entries; and Catfish breeder teams in every other tableau. One concludes that this must be "The Year of the Cat"! Once again, our grateful thanks to the trade, who do so much to make our show a success. This year they exhibited a wide range of equipment for all aspects of the hobby—everything for the beginner, and also something for the "old hands".

To mark our 10th Anniversary, the S.A.F. Committee presented as mementoes, neck-ties bearing the S.A.F. badge to all judges and those people on the serving committee. These were much appreciated by the recipients, including John Young of "The Aquarist and Pondkeeper" whom we have always thought of as one of us.

The Tetramin trophy for Best Tableau went to the Scottish Motor Transport A.S. with a very detailed model of a 'Bus' carrying as passengers, fish of an extremely high standard. Mr. J. C. McFall won the George Henderson trophy for Best Livebearer with an *I. Furcoides*, in addition to the

Bobby Wood trophy for Best Fish in Show. Mr. McFall also claimed the Aquarama trophy for Best Livebearers (Pairs) with a couple of *H. bimaculata*—an extremely good showing for their first S.A.F.

The prize for Second Tableau went to Edinburgh Aquarium and Pondkeepers with a cradle being delivered by a stork: A tribute to the forthcoming Royal Event.

Dalkeith A.S. walked away with the third prize for a neatly-constructed castle, and Aberdeen A.S. gained fourth prize with a Highland Scene depicting a winding road leading to the "Old Woman and her Shoe".

A working model of Kincardine Swing Bridge gained fifth prize for Muirhouse A.S. The Earl of Motherwell trophy for Best Guppy went to A. Bell.

The Aquarist trophy for the tableau with the highest number of points was awarded to Basingstoke A.S., and the F.N.A.S. trophy for Best Individual Furnished Aquaria went to J. Bennett of Lanarkshire A.S., the latter forming part of the Lanarkshire tableau.

The writer of this article was happy to accept the Duncan Fotheringham trophy for Best Aquarium Plant—a *Barclay Longifolia*—but no-one could have been more delighted than Mr. P. A. Moye who staggered from the platform with no less than seven awards: The Stan Taylor trophy for Best Barb—a *B. schuberti*; The Woodcock trophy for Best Characin, with an *A. ternetzi*; The Bob Ferguson trophy for Best Rasbora, with an *R. myersi*; The Friendship trophy for Best Danio, with a *D. malabaricus*; The Muirhouse trophy for Best Gourami, with *C.*

atingleyae; The Rift Valley trophy for Best New World Cichlid, with a *C. geryi*; The Ayrshire trophy for Best Catfish (B) with a *P. albofasciatus*. Many congratulations to Peter—a new individual record.

Other results were as follows:

The Hutchings trophy for Best pair of Guppies; J. Wall, Dunfermline A.S. Basingstoke Friendship trophy for Best Swordtail *X. cartezii*; M. Strange, Basingstoke A.S. The Lanarkshire trophy for Best Breeders Livebearers *B. epicopi*; C. Howe, Basingstoke A.S. Aquarian trophy for Best Shark *L. frenatus*; S. Dennis, Basingstoke A.S. The Edinburgh Pondkeepers trophy for Best Coldwater. A. Shubunkin; J. U. Hall, Calverly A.S. Belle Vue trophy for Best Siamese Fighter; W. A. Wright, Darfield & D.A.S. B.K.A. trophy for Best Egg-laying toothcarp *A. volcanum*; W. A. Wright, Darfield & D.A.S. The Aberdeen trophy for Best A.O.S. Egg-layer *J. apricanus*; Hodgson and Jackson, Darfield & D.A.S. Alloa trophy for Best Breeders Egg-layers *S. panamense*; B. Rogers, British Catfish Assoc. Hartlepool trophy for Best Loach *A. myersi*; D. Cruikshank. The Fotheringham trophy for best old world Small Cichlid *P. pulcher*; J. Croft, Workington D.A.S. The Mark Aitken trophy for Best Catfish (A) *C. punctatus*; J. Croft, Workington D.A.S. The M & M trophy for Best pair of Egg-layers *B. brederi*; J. Croft, Workington D.A.S.

A great show which reflected considerable credit on everyone involved.

Steve Naismith
(Show Manager)

Your questions answered...

Our experts are always pleased to receive your letters which should be addressed to:
Readers Service, The Aquarist & Pondkeeper,
The Butts, Brentford, Middlesex, TW8 8BN.
All queries must be accompanied by a S.A.E.

Tropical



Rasbora pauciperforata

hardy rasbora . . .

Can you give me some information on *Rasbora pauciperforata*, the red-striped rasbora?

This fish originates from Southeast Asia where it occurs in most small water courses. It reaches a maximum size of about 6-7 cm.

An aquarium for this fish should be well planted with some areas of open water. A temperature in the region of 25°C seems fine; there is no need to worry unduly about pH or water hardness—just avoid extreme values. This fish will benefit from the regular use of Blackwater Extract. Keep in small shoals and feed on small live food and good quality flaked food. As far as I am aware this fish has not been bred in the aquarium.

live foods . . .

What are 'safe' live foods and can you give me some hints on the culture of brineshrimp?

Most fish enjoy live foods at some time or other, and foods such as *Tubifex*, water-fleas, etc. can be very useful at tempting the appetite of timid, newly acquired fish, or bringing others into breeding condition. However, these foods pose a potential threat to the health and well-being of pond and aquarium fish by the introduction of disease organisms or other pests. It is, therefore, fortunate that in most instances these live foods can be replaced by either freeze-dried ("FD") prepared foods, or other, so-called "safe", live foods.

Safe live foods are live foods which do not originate from the aquatic environment, or are live foods which, although aquatic in origin, may be

cultured by the hobbyist under conditions which minimise the risks of introducing disease organisms or pests into the set-up aquarium or pond.

Brineshrimp (*Artemia*) "eggs" can be obtained from most pet shops, although they are a little expensive. However, the newly-hatched shrimps are an excellent food for many small fish fry before the fish can be fed on finely powdered baby fish foods.

Brineshrimp "hatcheries" can also be bought from most aquatic shops, but the same result may be obtained by using 2-3 clean milk bottles. Add about two-thirds of a pint of cooled boiled water to one of the milk bottles, and dissolve into this about one heaped teaspoon of cooking salt or marine salts. (A better percentage hatch may be obtained if marine salts are used.) Aerate this salt water, and allow to come to room temperature (which must be at least 15°C, and preferably 20-25°C. Add about enough brineshrimp eggs to cover a two pence piece, and place a cotton wool bung in the neck of the bottle. Aerate the salt water and eggs continuously and vigorously, and they should begin to hatch after about 48 hours.



Tubifex worms

Each "culture" will then last two or three days, so if you need to maintain a continuous supply of newly-hatched brineshrimp over a week or so, you should start off a new culture about every other day.

To remove the newly-hatched brineshrimp, simply turn off the aeration and leave the culture to settle for 5-10 minutes. The living brineshrimp

will collect about 2-4 cm. from the bottom of the milk bottle, and can be siphoned out, often directly into the fry tank, using a length of air line. To keep the culture going for another day or two, the bottle should be topped up to its previous level with dechlorinated salt water, and the aeration turned back on.

WORMS . . .

Can you give me some information on the culture of white-worm, and the use of earthworms as a food for fish?

White-worm "starter-cultures" are available from most pet shops, and the resultant centimetre-long worms are an excellent food for small adult fish and larger fry. If chopped up they can also be fed to small fish fry.

White-worm can be cultured in shallow trays containing about 5 cm. of loamy garden soil. The culture should be kept in the dark at a cool room temperature. To prevent the culture drying out, it must be covered with a sheet of glass or Perspex. Every few days, a small amount of moistened bread should be added to act as a food for the worms. Any uneaten and obviously decomposing food should be removed at the same time.

The worms will multiply and collect beneath the food—and can be easily removed with forceps.

Chopped or fed whole, there are few better (or safer) live foods than earthworms. In damp weather, they can be dug up relatively easily from the garden. In dry weather, a supply may be sustained by placing and "baiting" them with vegetable scraps about once a week.

Following collection, the earthworms should be maintained, in a sealed container, with small air holes, containing a little damp grass or moss. Within a few days they will have "cleaned" themselves—and are ready for feeding to your fish. **C.A.**

TROPICAL

Dr. C. Andrews

COLDWATER

Arthur Boarder

PLANTS

Vivian De Thabrew

KOI

Hilda Allen

MARINE

Richard Sankey

Coldwater**plastic liners . . .**

Last year we made a pond with a Butyl liner and all went well until lately after we had a lot of snow and rain. Now a lot of water has got underneath the liner and forced it up. It has even lifted the plant containers. What has gone wrong?

It is strange that sufficient water has got under the liner to lift it up. It almost seems as if a spring had formed at the bottom of the pond. If this has not happened then the trouble has been caused because the liner was not over-lapped at the sides of the pond and secured well with slabs. You will have to empty the pond and make a fresh start. Then see that the liner overlaps the edges of the pond and secured in position with slabs before refilling. If this is done there should be no chance of water getting under the liner from the edges.

minnows . . .

I have a small plastic container in which I had six Minnows. The other day when cleaning out the container I found one fish dead and partly eaten. What could have caused this?

The fish had died and would have started to decay. This soon happens, especially with a small fish and it could have then been partially eaten by the other fishes. Minnows are essentially stream or river fish and prefer clear running water. They are not suitable for a small tank. The size of

this tank was not stated and may have been too small for the number of fishes it contained. In such a case it is usual for the number of fishes to gradually reduce when the oxygen content of the water is decreased. Fishes will then die off until the correct stocking rate is obtained. You will do better with small goldfish, as they can stand under oxygenated water which Minnows cannot.

blind goldfish . . .

I have a tank, 36 x 12 x 15 inches and in it I have two 6 in. gold fish, two veiltails, 3 in., and a Rudd 6 in. Recently I have noticed a white film over the eye of one of the goldfish and it appears to be going blind, as the other eye now looks as if it is forming a white film over it. What is the cause and possible cure?

The eyes of fishes are sometimes affected by Fungus disease and this is often the result of some damage to the eye. The eye may have a cataract forming over it or may be attacked by a type of tiny worm. If there is disease of the eye and it is left untreated for a few days, it may penetrate into the brain and then prove fatal. The eye can be dabbed gently with a pad of cotton wool dipped in a solution of T.C.P. and water at the rate of four of water to one of T.C.P. Hold the fish in a wet cloth and remove any surplus moisture before treatment. After and before returning to water, smear the eye with a little Vaseline. Repeat twice a day and on the second day use a solution of double strength. If the trouble has not become too serious

a cure may be effected but if the disease has a very strong hold a cure may not be possible. Strangely enough goldfish appear to be able to survive when blind.

pond filter . . .

I have some carp in my pond and wonder if I should have a filter fitted?

It depends on which type of carp you have. If ordinary carp, such as crucian, mirror, leather or Higo, there is no need for a filter and these fishes seem to be able to stand poorly oxygenated water which would kill most other fishes. If, however the fish are Koi, then the pond may need filtration according to its size and the number and size of the Koi. Most Koi keepers find that a filter is necessary as water plants are not usually introduced to the pond. Also Koi are heavy feeders and so could soon pollute the water with their copious droppings. **A.B.**

Plants**algae . . .**

In a previous issue there was a letter asking how to rectify the problem of brown/reddish algae. This is a problem that I too have encountered. When I put new plants into my tank they grow well for about a month or so, and then they start to get a film of brown algae over their leaves. This algae can be rubbed off with my fingers. But if I leave it the leaves eventually break off and the tank becomes very

shabby-looking.

I tried to cure this problem by increasing the light, but this only caused green algae. So I was interested to read your comments about concentration of filtered rays, water temperature and the pH condition. However, I would like to ask the following:

- (1) What exactly does 'concentration of filtered rays' mean?
- (2) What should the temperature be adjusted to?
- (3) Should the pH be greater or less?

You also say to add a teaspoon of salt per gallon of water. What effect would this have on the fish, i.e. catfish, various tetras, gouramis and guppies?

First of all let me explain what I meant by 'concentration of filtered rays'. This literally means the concentration on a given surface of light rays through water. The intensity of rays through water differs according to the depth of water and distance between the light source and the surface of the water. Therefore it appears that significant adjustments to light intensity can be made by varying the above two factors.

The temperature should generally be between 72°-76°F for the well-being of the plants. The pH should be maintained at a slightly acid level, say 6.5-6.9. Too much acidity will encourage the growth of various forms of brown algae. Salt at the rate of one teaspoonful per gallon should be added about once a fortnight, at least twice. This treatment will not cause distress to most fish, as the concentration of salinity is negligible.

Unfortunately you do not give me sufficient information about your tank size, heating and lighting data and water condition. However, as a general rule, the temperature and pH level should be maintained as mentioned earlier. Moderate light should be given, e.g., a 30 watt warm white tube light should be kept on for about 8 hours per day, if the tank is about 24 in. x 15 in. x 12 in.

true ciliata . . .

Can you suggest a *Cryptocoryne* which grows to a reasonable height,

and yet is bushy, or has large leaves?

A *Cryptocoryne* species which grows tall and quite bushy is *C. ciliata* (the true species, only available from Sri Lanka), which grows to a height of up to 24 inches. In an aquarium it will grow up to 18 inches. The leaves are brown or brownish green. The true *C. ciliata* does not come via Singapore. What is sold by most traders is not the true species. *C. walkeri* and *C. petchii* are two other species with big leaves.



Young *Cryptocoryne ciliata* in its native habitat, a river-bed in Sri Lanka

V.T.

Koi

british pumps . . .

Not being able to use a siphon-system to clean the floor of my fairly large pond I am anxious to buy a pump and the attachment as shown on pages 68 and 71 respectively in the book 'Nishikigo' by Takehiko Tamaki. I would appreciate it if you can tell me if and where these pumps are available in this country?

I have sent you the name and address of a supplier in your vicinity and as this query has been raised by others I am making a general reply.

The regular cleaning of the bottom of a Koi pond usually becomes a 'must' as the fish get larger, or large Koi are added simply because they are primarily 'bottom feeders' and naturally sift and search for food through what would remain as settled matter in a goldfish pond. This habitual 'stirring up' is common to all carp and keeps the water cloudy, hence the need to reduce

the amount of bottom debris. The siting of drains to clear the floor area may be a problem as with any angular pond there will always be pockets where dirt can collect despite a circular motion imparted by the water return. More than one bottom drain may be necessary and taking it to a logical conclusion, I would suggest the ideal shape would be a round pond in the form of a gigantic funnel.

The average water pump having an impeller through which the water has to pass is just not suitable for pumping solids or other waste matter collecting in a pond. There is also a difficulty in priming and getting a pump to work when it is located outside the pond.

There are numerous water pumps readily available that are identical to the one illustrated in Mr Tamaki's book and can be obtained from almost any supplier of Contractors' or Plant Equipment. They have a large chamber surrounding the impeller which is of the open straight vane non-choking type, and once the chamber, incorporating a non-return valve, has been filled with water the pump is automatically self-priming. These pumps usually range from about 2,000 gallons per hour output but then it would not take very long to quickly clear the bottom of an average pond.

I cannot help you with any advice on the supply of a fish-tail end exactly as pictured but it is possible to make your own from PVC pipe, fibreglass or even fittings adapted from vacuum cleaners. Ingenious D.I.Y. efforts are cheap and quite satisfactory and some swimming pool fittings may also prove suitable.

koi . . .

In the spring I intend to stock my new pond with Koi and would be grateful for the names and addresses of any good Koi suppliers or at least where I could see a wide selection of Koi.

Two names and addresses have been supplied but these should not be regarded as recommendations. It will be up to you to shop around to compare prices, quality, and the general appearance of the premises. As Koi are

quite expensive, you would be unwise to rush into such a serious business as stocking a pond without fully investigating or at least being aware of some of the pitfalls awaiting the novice. I trust you are well aware also of the requirements of these magnificent fish in order that they do not suffer as a result of ignorance; buying Koi is only half of the problem. Today, reputable dealers often ask what provisions have been made such as size and depth of pond, filtration, etc before selling larger Koi and such concern is commendable. After-care is the responsibility of the keeper and the reason why I cannot possibly endorse particular traders as you requested in your letter.

You should consider visiting a few Koi shows in order to see what good specimens of Koi look like and the British Koi-Keepers Society will be holding several in various parts of the country throughout the summer. The society's northern members will this year stage the largest national Koi show, Koi '82 at Tatton Park near Knutsford, Cheshire on Sunday, 20th June.

H.A.

Marine

Filtration . . .

Could you please advise me as to the minimum and the maximum litres per hour necessary to maintain a 3 foot by one Eheim Reverse Flow Filter bed. It is used with a sacem sf240 4 litre minute, loaded with Sea Charcoal. However just in case that's not enough I am also using an Eheim 1016 Power Filter loaded with Ehfmarin SE-R 1 & 2. That is also supposed to be a 4 litre a minute but I have doubts.

My tank was set up in an emergency and is housing two Tomato Clowns, one Fire Clown, One Moon Wrasse, one Damsel white with yellow from snout to dorsal fin and lower fins dark and light Blue striped. The Black Trigger Fish has not liked the move and often lies on it's side. I expect to lose him but hope not. I lost a Wrasse cleaner Fish.

The method of setting up an established marine aquarium is enormously varied and I dare say every single aquarium shop has its own particular preference as, of course, I do. Fundamentally the reverse flow under gravel filtration system is technically quite good, although I would have reservations about the continuous use of any form of carbon filtration. Not that I am disagreeing with carbon filtration in total, it is just that in my opinion it is something that is best used for short periods, perhaps one or two days per month rather than on a continuous basis. My experience with long term carbon filtration has not been good. I personally believe that some of the waste products that are absorbed by carbon filters have a nasty habit of leaching back out into the aquarium at a later date. The other thing that does concern me about your system is the use of Ionic Exchange Resin; it does have its advantages when you are trying to establish an "instant" aquarium, but being a mechanical means of filtration product efficiency does deteriorate and it is important that you establish a good biological application within the system rather than rely too heavily on any form of Ionic Exchange Resin irrespective of the brand or type. Assuming that you are using a good quality synthetic sea water the danger is that exchange resin can alter the fundamental chemistry of the sea water.

My advice to you in your particular system, with the equipment that you already have is to place a heavy emphasis as possible on the mechanical filtration, that is to say increasing the amount of mechanical filtration you have inside your power filter and cleaning them out regularly. In this way the amount of stress upon your biological filtration (the reverse flow filter), will not be too great.

However, do appreciate that with biological filtration taking place inside the aquarium the demand by the bacteria for oxygen will be enormous, so do make sure that you have got a good air line and adequate surface agitation to give good gas exchange as the efficiency of any biological system is controlled by the ability of the

bacteria to get sufficient oxygen. In most biological filtered systems the oxygen demand by the bacteria within the filter can be up to five times greater than the oxygen demand by the fish.

pilot fish . . .

Can you give me some advice on the breeding of Pilot fish please, also I have a tank containing:

- 1 Blue/green Trigger
- 1 Panther Grouper
- 1 Rusty Angel
- 1 Sergeant Major.

My tank is 36 in. x 18 in. x 21 in. Is it possible to keep a small 7 in. Barracuda with these fish as well as a fox face?

Let me say that there are several species of Pilot Fish, but the most commonly imported species into this country is the common golden Trevally, *Caranx speciosus*. Most of these fish grow to an enormous size and eventually live in very large shoals on the exterior of a coral reef. Not a great deal is known about their exact breeding habits, except that they are plagic spawners and in simple terms that means they mass spawn as a shoal in open waters and that their eggs float around in the abundant planktonic "soup". In my opinion it would be totally inconceivable to try and breed them in a home aquarium. But please do not let this put you off; there are many species that are now being bred worldwide with ever growing success and I am sure that within a few years it will be relatively commonplace for the more serious marine aquarist to breed some of his aquarium fish.

Keeping some Barracudas in an aquaria is quite possible and if anything they are a little timid, and are most definitely not aggressive by nature as their name implies. Some years ago I grew on a 4 in. Barracuda to about 12 in. and the particular specimen never attacked even quite small live fish, but readily took small pieces of frozen dead fish. I have heard of some cases in public aquaria where they have grown quite large and become aggressive towards other fish within the same aquarium.

R.S.

Jumping behaviour of the **Splashing Tetra** (*Copeina arnoldi*)

by
A. van den
Nieuwenhuizen

UNIQUE among Characins, the male and female of this species leap out of the water to lay and fertilise their eggs on the underside of a overhanging leaf (or even the cover glass of the aquarium). To prevent desiccation of the eggs, the male sprays them by splashing water over them with his tail until they hatch and fall back into the water. The accompanying series of photographs records the stages of this extraordinary breeding phenomenon.

Part 1

1. After the male has chosen his territory and has moistened the future spawning site by spraying water on it with his tail, he allows the female into the territory and rides on her with the underside of his head and gullet on the front part of her back.

2. Close beneath the surface of the water she then changes her position and moves to the left or right side of the male. During the spawning period the male is much darker in coloration.

3. The female very often accompanies the male until just below the water surface before she moves close by his side. She has a lilac hue on the undersides and flanks.

4. At the beginning of the spawning sequence, it often occurs that while the female hangs beneath the surface ready to jump, the male still continues to chase her. Here he swims quickly up to the female and she is driven from his preserve by a ramming attack.



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10



5. At the beginning of the pairings the female adopts an almost vertical position beneath the water surface and the male approaches her.

6. The female arches her body a little and when the male is next to her he does the same and it appears as if the fish are lying side by side.

7. Then they arch away from each other until only the gill-covers and pectoral fins are touching.

8. At the moment they are about to jump they both swing their body to one side. From this point nothing more is visible to the naked eye. This is the beginning of the movement.

9. At this point the fish begin their leap and immediately afterwards their bodies come together, just at the moment in which they begin to leave the water.

10. Then they are positioned side by side and both fish raise themselves higher by a vigorous slap of the tail against the water.

Continued on page 61

How to raise marine fish larvae

by Robert J. Goldstein, Ph.D.



Breeding stock at the NMFS laboratory is held in circular tanks with sea water flowing into the tank at an angle, creating a circular current. The overflow runs out a central drainpipe covered with fine mesh screening

If raising marine fish larvae were easy, everybody would be doing it. At least, that's the general feeling in the marine hobby. In fact, the reason that everybody isn't doing it has nothing to do with how easy or difficult a job it is, so much as ignorance of how to go about it.

Scientists at the National Marine Fisheries Service Beaufort Laboratory on the coast of North Carolina have been spawning and rearing various marine fishes for years. The technology has been only alluded to in the aquarium literature, but is well known in scientific and fisheries circles. I recently visited this laboratory in order to learn how they do it, and to see if the methods could be applied to the home aquarist's capabilities. What follows is how they do it, and how that same procedure can be used directly by aquarists, or how the aquarist can substitute to provide an equivalent system. Along the way, you may be surprised at some of the methods, which will be exactly opposite what you thought was the right approach.

Part I. Spawning

Breeders are brought into condition by good feeding and the appropriate light regimen. If the fish are summer spawners, they are given a light regimen of 16 hours light and 8 hours darkness. If they are winter spawners, they get 8 hours light and 16 hours darkness. Clown anemone fishes will come into breeding condition with a summer schedule. The NMFS laboratory uses circular tanks for oceanic fish, including herring, with water jetted into the aquarium at an angle. This causes the fish to orient into the circular current, and keeps them from hitting themselves against walls or getting jammed in corners. The method should be very good for any large marine fish species, but is unnecessary for anemone fishes, which produce demersal rather than pelagic (drifting) eggs.

If the fish won't breed by the use of light alone, then they are injected with hormones. The simplest technique is to inject them with Human Chorionic Gonadotropin (HCG) at the rate of 0.5 to 1.0 International Unit per gram of fish. This translates to 15 to 30 I. U. per ounce of fish. How do you weigh your small marine fish? Easy



Human chorionic gonadotropin is injected into both sexes when the fish are in peak condition. HCG is injected into the muscle. If HCG alone doesn't work, then two additional injections using pituitary gland dissolved in a salt solution are injected. Due to the large volume of pituitary necessary, these injections are given in the body cavity. The rod and tube in the centre is a small mortar and pestle used to grind the pituitary to a fine powder.

as pie. Get a small scale, such as a postal meter, that weighs in half ounces. Get a glass jar sufficient in size to hold the breeding stock individuals. An ordinary drinking glass will do for an anemone fish. Place a mark about halfway up the glass. Add seawater to this mark, and then place the glass on the postal scale and get the weight. Then add your fish to this glass and take the new weight of fish, glass and water. The difference is the weight of the fish, and you can now determine the right dose of HCG. One source of HCG is Crescent Research Chemicals, Inc., 5301 N. 37th Place, Paradise Valley, Arizona 85253, U.S.A. The material is injected with a hypodermic needle and syringe into the musculature on the mid-side of the body.

A single injection of HCG should induce spawning within 36 hours. While some workers inject only the female, other workers prefer to inject both sexes. HCG costs about \$10 for 2000 I.U. vial of material.

If HCG doesn't work, and the fish seem to be difficult to induce into spawning, then a more expensive injection is used in addition to the HCG. This is dried carp pituitary

gland mixed in a 1% sodium chloride solution. That is 1 gram of salt to 100 millilitres (=c.c.) of water. Your pharmacist can make this for you in about five minutes. Dried carp pituitary gland is expensive (about \$100 per gram) and you need a lot (15 milligrams per c.c. of saline). Due to the large volume that must be injected, pituitary is shot into the body cavity, not muscle.

You can save this expense if you have access to fish heads from sport fish taken by fisherman during the spawning season. Any fisherman will be glad to give you the heads as he cleans his catch.

Make a horizontal cut at the level of the backbone through to the angle of the jaws. This should slice the brain away from the lower portion of the head. At the correct level, you will see what looks like a match-head sized piece of nerve tissue centered in the upper piece, surrounded by bloody tissues. The brain itself is above this region. That piece of grayish, soft tissue will be the pituitary gland. Pluck it out, and then proceed to get as many as you can from the additional fish heads. These glands can be

dipped in acetone (—nail polish remover), and then laid on the inside wall of a drinking glass, which is then placed inside a freezer for dehydration. When you need a pituitary gland, simply scrape it off, grind it to a powder, mix it with 1% saline, and inject it into your potential breeders (again, into both sexes). It will probably require two injections into the body cavity, on two consecutive days.

Injections of HCG or pituitary won't work if the fish aren't already in the peak of condition. That requires good water, space, good feeding and the appropriate light regimen for a period of some months. Don't rush your fish, or you will just waste money, effort and

time, and probably risk killing them as well. Many fish will breed with light alone, and the use of hormones may not be necessary for the home aquarist who does not have to meet a production schedule.

Part 2. The fry aquarium

A lot has been written (some by me) about how to set up an aquarium for baby marine fishes. Forget everything you've read!

Get a plastic barrel, about 20 to 30 gallon capacity, and some black plastic trash bags. Line the barrel with a bag or two. Fill the lined barrel with water from the breeding aquarium (which will then have to be replaced with new

water). You can siphon the fry with the water, but be gentle. You will use absolutely no filtration, no gravel, and not even an airstone. The water is to be absolutely still. To this water, add Furan-2*, which is a mixture of nitrofurazone and furazone. The concentration recommended on the package is correct. That is one capsule per ten gallons of water, or 7 parts per thousand, or an eighth teaspoon of powder per ten gallons. Mix the powder until it is totally dissolved before adding it to the fry aquarium. This will retard or prevent the growth of bacteria and certain fungi in the aquarium and on the fry themselves. The still, circular, black-lined aquarium will cause the fry to remain away from the walls, near the surface. And it will retard the growth of algae or slimy things on the walls. The water will remain clean and the fish will centre themselves, generally close to the surface. Don't use current, as it will beat the babies to death, and prevent them from catching their food.

* Aquarium Pharmaceuticals

Part 3. Feeding the fry

Some marine fish fry can take newly hatched brine shrimp (*Artemia*) within 48 hours, while others will not be able to eat this large food for a couple of weeks. Enter *Brachionus plicatilis*, a marine rotifer.

Rotifers are the "wheel animals", a group of primitive animals distantly related to some of the very simple invertebrates, more than to the protozoa. They are small. While brine shrimp are about 0.30 millimetres in length, *Brachionus* are about 0.06 millimetres long, or about a fifth the length. This also makes them about a 25th of the volume of a brine shrimp.

Brachionus live on algae in suspension. Several kinds of marine algae are used, including *Chlorella*, *Isocrysis* and *Nannochloris*. Live algal cultures can be purchased for about \$20 each from the Center for Mariculture Research, College of Marine Studies, University of Delaware, Lewes, Delaware 19958, U.S.A., or from several other sources.



Dr. Bill Hettler demonstrates the injection of HCG into the musculature of an Atlantic croaker



The algae are grown at room temperature in sea water to which has been added a nutrient solution. This solution is complex to make up, and a reasonable substitute (although messy) is 5-1-1 fish emulsion fertilizer, at the rate of 1 c.c. per three quarts (or litres) of sea water. Nothing else needs to be added. Keep the temperature no warmer than the seventies. Use a bank of fluorescent lights, with at least 14 hours of light a day. The NMFS laboratory uses Vitalight, but any good wide-spectrum fluorescent should suffice. Do not use those that throw a purplish light. Use sterile technique as best as you can. In my home, I heat the seawater/fertilizer mixture in a container with a cotton plug, using my microwave oven. As soon as the water begins to boil around the edges, I stop the radiation. This produces sufficient heat to sterilize the water of anything except spore-forming bacteria, and those are harmless anyway.

The greatest threat to your algal culture is contamination with blue-green algae, that dark green scummy material that looks like algae but feels like slime. Thus, you want to keep several stock cultures going of algae, and then use only old, much-handled cultures to inoculate your algal growing vat. I keep my stock cultures in small glass containers which hold about a glass of sea water, and then keep it only a third filled. No aeration is necessary.

The NMFS laboratory then uses its stock cultures to inoculate large carboys, about five gallon size. These large carboys have sterile sea water and nutrient, and also get plenty of light. They may be aerated, but even that is not necessary. It will, however, increase the yield of algae. You can sterilize large containers of sea water with ultraviolet light (48 hours) or heat.

The newly hatched fry are placed in large, black circular containers. No filtration is used. No aeration will be used until the fish are a couple of weeks old and feeding on brine shrimp. In the early stages, however, any current at all can keep them from finding their food.



Dr. Bill Hettler (plaid shirt) and Curtis Lewis in the rotifer laboratory. The high carboys contain *Nannochloris* algae in pure culture. Aeration is used to increase yields. The lower carboys contain the rotifer, *Brachionus plicatilis*. Rotifers are fed algal culture by siphoning from top shelf to bottom.

For my home system, I use one gallon jars to grow algae for feeding the rotifers.

When the algal culture in the large growth container is thick and soupy green, it is siphoned off partly into an equally large container containing the rotifers. Thus, both the algal and the algal-rotifer jars will be green. Again, neither needs to be aerated.

Care must be exercised to avoid contaminating the rotifer culture. If protozoans get into the culture, they might kill the rotifers. For this reason, use sterile procedures as best you can. For handling both the algal and the rotifers, I use disposable pipettes. You can purchase these at any scientific supply house.

You might be able to borrow good glassware, pipettes and other materials from a school biology department or purchase them through your local pharmacist who can place orders with his suppliers. Your family physician might help out with syringes, needles and other materials. Or, you can simply make do with household materials, being careful to treat each container as though it were a heart transplant.

To feed the fry, you cannot simply siphon the rotifer/algal culture into the barrel, as the volume would rapidly build up far above the capacity of the container. The rotifers must be filtered out of the green soup and then fed to the fry.

A series of filters is used by NMFS biologists, with the basic system consisting of 0.30mm mesh screening cemented to a polyvinylchloride pipe segment as the first screen. This will remove much of the algal gunk, but allow other algal cells and all the rotifers to pass through.

Another sieve of 0.06mm mesh, also cemented to a piece of four inch diameter PVC pipe will retain the rotifers but allow the remaining algal cells to pass through. You can get this mesh screening from a wildlife supply house, where it is sold for use in plankton nets. Or, you can substitute a series of layers of plastic window screening, panty hose, and a handkerchief. Two layers of handkerchief will effectively hold the rotifers, while allowing the water and algae through.

Don't be in a hurry to do any of this.

Not to grow the algae, grow the rotifers, filter the water or anything else. Impatience leads to sloppiness. It is difficult enough without scientific equipment, access to a sterilizer, and a good microscope with which to check the cultures for contamination and determine concentrations of animals. Since you'll be working by the seat of your pants, be sure to work as though those pants are from your best suit.

Part 4. Conclusions

This is the basic system used to grow marine fish fry and it can also be used to raise baby shrimp and crabs. While it is known to fisheries people, there are differences from laboratory to laboratory. For example, some scientists grow *Brachionus* on yeast rather than algae, and each lab may prefer a different algae. Sizes of containers may

differ, and some labs may prefer a different photoperiod or enhancement of algal growth with incandescent light.

I think this is the first comprehensive description of the system in the aquarium literature. What should result is a lot of experimentation and kitchen-ware modification, with a variety of jury-rigged pieces of equipment being developed by aquarists. For sterilization, you can use a variety of alcohols, formaldehyde (although it is difficult to wash off and has been reported to be carcinogenic), ultraviolet light, and microwave radiation. Don't forget a good old hot oven. Be sure to work with heat-resistant glass and crockery, and avoid metals. Avoid contamination with anything, as the cultures can be expensive or difficult to get.

Part 5. Acknowledgments

For all their help and courtesy, I wish to thank Dr. William F. Hettler for teaching me about getting the fish to spawn, and Mr. Curtis Lewis, Technician to Dr. Allan Powell, for teaching me how to culture the algae and rotifers. I would also like to express a special thanks to the National Marine Fisheries Laboratory and staff at Beaufort, North Carolina for a long and continuing tradition of helpfulness and sharing of technologies, not only to me, but the public in general.

Footnote

In a series of tests comparing microwave heated, oven heated and ultraviolet irradiated seawater for the growth of algae, UV was found far superior to the other methods, consistently yielding good algal growth. The heated seawater samples provided only erratic success or provided much slower algal growth. Tests are now underway to determine the efficiency of sterilization with a diatomaceous earth power filter.

In another series of tests, a liquid plant food fertilizer (10-15-10) was compared with fish emulsion fertilizer (5-1-1) for production of algae in irradiated seawater and in microwave heated seawater. The 10-15-10 liquid preparation (2 drops per gallon) provided good algal growth without the oily and gooey mess provided by fish emulsion fertilizer.

The rotifers are sieved from the lower jars through fine mesh screens. A large screen (0.420 millimetres mesh) is used as the first separator. Then the washings are passed through a second screen of 0.064 millimetres mesh. This finer screen will hold back the *Brachionus* while allowing the water and remaining *Nannochloris* to flow through. The *Brachionus* on the screen are then given to the baby fish.

To prepare the sieves, pieces of scrap PVC pipe (4 in. by 4 in.) are treated with instant epoxy glue along one cut surface, and then pressed onto a sheet of screen. When dry, the screen is simply trimmed



Continued from page 55

11. After which they leave the water with their bodies almost fully extended. The smaller female is then lifted up by the male. Partners which are about the same size often do not jump side by side but come together during the leap, above the water surface.

12. Here both fish position themselves in relation to the leaf and subsequently they hang beneath it for a fraction of a second. But, initially, they jump merely to estimate the distance to the spawning site and no eggs are deposited.



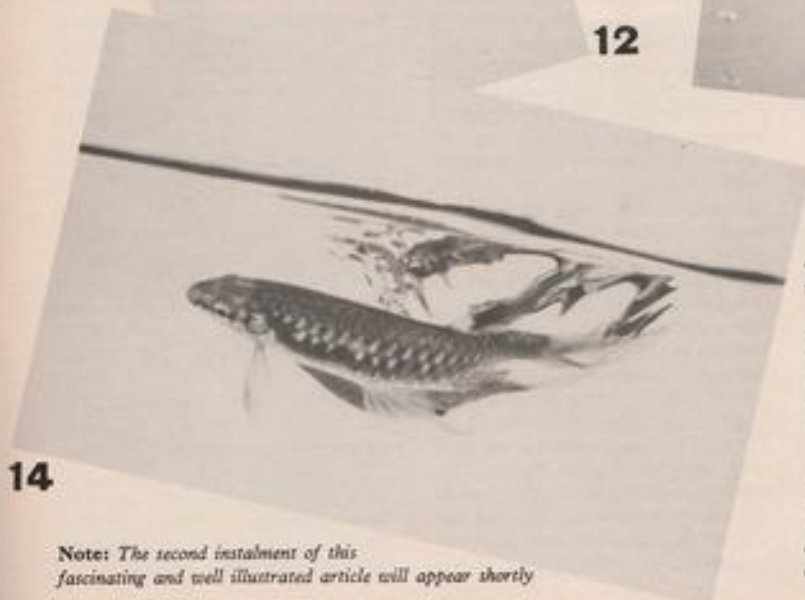
11



12



13



14

Note: The second instalment of this fascinating and well illustrated article will appear shortly

13. Often the jump is not big enough, they miss the leaf and fall straight back into the water.

14. Whenever the fish fall back into the water no spawning takes place. This is also the case when they position themselves for several seconds below the leaf. They do not spawn either when they land on previously deposited eggs. Furthermore, one never sees eggs building up on top of previously deposited ones. Whether deposited individually or several at a time, the eggs always adhere next to each other on the leaf.

Press Release



Interpet's Contribution to National Promotion

MORE people are finding pleasure in keeping tropical fish—thanks to the efforts of a British company.

The British Pet Industry Association has just awarded to Dr Neville Carrington on behalf of his Company, Interpet Limited, their 1981 award in recognition of an outstanding contribution to the Pet Industry. This is the first such award made by the PIA.

Interpet Limited started in 1981, a general promotion through the national papers to encourage more members of the public to take up fishkeeping. Advertisements are being placed in the large circulation national papers encouraging would-be fishkeepers to write to Interpet Limited for information on how to start fishkeeping. An Information Pack is sent which

contains general information on fish-keeping, together with mention of Interpet products.

This promotion has coincided with a complete repackaging programme for Interpet products to improve brand recognition and to update packing. At the same time various minor technical improvements have been incorporated in some products where this has been thought desirable.

The Interpet business started in 1952 with the product Liquifry—a food for feeding baby aquarium fishes. This product is still in the comprehensive product range and is now exported to nearly 80 countries. After steady growth, Interpet Limited is possibly the undisputed leader in the United Kingdom as a prime manufacturer and distributor of aquarium products. Recognition in the form of this latest award by the Pet Industry Association will doubtless spur the company to even greater efforts.

Copies of the Aquarist Information Pack which featured in the Award can be obtained by sending a stamp value 16p to Interpet Limited, Curtis Road, Dorking, Surrey.

For further information contact: Mrs. Daphne Parkins, Interpet Limited, Interpet House, Curtis Road, Dorking, Surrey RH4 1DP. Tel: (0306) 883202. Telex: 859115.



Interpet's new aquarium treatment

PARATOX originated from Aquarium Products in the USA and has achieved great success in combating parasitic and protozoan infections such as Hexamita, Trichodina, Flukes, Epistylis, Anchor Worms, Fish Lice, White Spot, Parasitic Copepods, Planaria, Leeches and Hydra.

Treatment can be carried out in the aquarium. Paratox does not affect pH and will not interrupt nitrification. However, the product is hard on plants and invertebrates and should be used with caution in the presence of Marine Sharks, Lionfish, Freshwater Piranhas and Metynnis.

Paratox comes in packs costing £1.99 inc. VAT and containing 12 tablets, sufficient to treat a total of 480 litres (108 Imperial Gallons).

Further information from: Mrs. D. Parkins, Interpet Limited, Interpet House, Curtis Road, Dorking, Surrey RH4 1DP.



Point of sale aides from KB

KING BRITISH have produced 2 new points of sale aides for their Tropical Flake and Goldfish Flake Products.

The first one is a neat self adhesive label, designed for affixing to the front of an aquarium, primarily in Aquarist shops. It carries the message BUY BRITISH BUY KING BRITISH. The label which says "NEW FISH" depicts a fish talking. A nice little amusing touch is the inclusion of: Scientific name *Spokemanus de Poissons*. Common name Talk-Sense Fish.

Supplies are available on request to retailers and hobbyists free of charge.

The second item is a circular information sheet designed to be seen through the clear reseal top of the newly introduced airtight packaging. The sheet explains some new and useful easy to understand information about proteins, vitamins and ingredients.

King British claim their Flake Food contains the necessary extras that all fish require. To support their claim they declare their proteins and vitamins present in the food, along with a number of official sources of information that verify the claim.



John A. Sagar



Mike Armstead

Two Appointments to BP Nutrition Pet Food Sales Force

Two new Executives have been appointed to the Speciality Division of BP Nutrition (U.K.) Limited.

John A. Sagar joins the company from a similar position with Spratts and will cover the Northern half of England and Wales and the whole of Scotland.

Mike Armstead is promoted from the company's Agricultural Division, where he was a Sales Information Assistant, and he will cover the Southern half of England and Wales.

Both will be responsible for the sale of the BP Nutrition range of Petfoods, which includes Beta Kennelfoods, Purr catfood and the new Pride range of fish foods as well as being involved in forthcoming product launches, through all the company's distribution channels.

Home Grown Water Plants from Griffin and George

OUR FIELD STATION near Dorking has been growing water plants for over half a century. Many varieties are stocked, all large healthy plants. Being home grown they are fully acclimatised and suitable for the most demanding applications, unlike many of the imported plants which are offered.

A copy of our full catalogue is in every secondary school in the country. We are, however, happy to sell our water plants to any member of the public. A free price list/order form is available to anyone on request from: Griffin & George Ltd, Gerrard Biological Centre, Worthing Road, East Preston, West Sussex BN16 1AS.

New Garden Pumps available from PLS Products

PLS PRODUCTS LTD., P.O. Box 114 Croydon, have now augmented their range of submersible and surface pumps with two units designed for domestic use. Known as 'Floria' and 'Florele', the new pumps are lightweight, portable and eminently suitable for garden/yard watering, pool and tank filling, and drainage or irrigation duties where there is a natural or stored water source.

Both pumps are self priming electrical types and are fitted with an "on/off" safety switch and a thermal overload protector. Capacities vary from 800 Imp. gal/h at a head of 15ft. and 220 Imp. gal/h at a head of 98 ft. for the 'Floria', to 1000 Imp. gal/h at a head 50ft and 220 Imp. gal/h at a head of 132 ft. for the 'Florele'. Maximum suction depth is 22 ft. for both units and electrical supply is 220/240V.

PLS 'Floria' and 'Florele' pumps are supplied complete with 22 ft. of suction hose, foot valve and strainer. Recommended retail price, inclusive of VAT is £117.99 (Floria) and £164.99 (Florele).



From Aquarists' Societies

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

SOUTH EAST



FORTY-EIGHT members and twelve guests attended the April meeting of the **East Kent Aquatic Study Group**. Society chairman, John Edwards, gave a fascinating talk about his experiences as a F.B.A.S. Class 'C' judge. He also explained how a fish is judged and gave many tips on how best to present a fish on the show bench. This month's table show was for two classes, Barbs and Oscars. There were 44 entries, which were judged by Guest Judge for the evening, Mr. Bill Hastings. Cards were presented: Barbs: 1, R. Spore; 2, S. Edwards; 3, R. March; 4, B. Marsh. Oscars: 1, P. Saxby; 2, S. Mason; 3 and 4, C. J. Bridgeman. The judge stated that this was one of the best table shows he had ever had the pleasure of judging and congratulated the Society on the high standard of the fishes on bench. Due to the ever increasing membership of the Society the May meeting is being held at the larger premises of the Memorial Hall, Bellingham, Horse Bay, Kent. If this is successful future meetings will be held at this new venue. For further details please contact P.R.D. Bob Spore, 23 Godden Road, (Tel: Canterbury 52342).

AT the monthly meeting of the **M.S.A.S.** at Oakley Lodge on 8th April, the Chairman welcomed members and those of the Brighton and Southern A.S. who had come to participate in the home leg of the competition 'Over the Downs'. The away leg was held on the 15th March. The lecture was by Pete Collis, speaking about Pencil fishes. Members were reminded of the open show to be held on 30th May, at the Sidney West Hall, Leylands Road, Burgess Hill. The fish showing for the evening were: *Sexed Paris, Louches and Botas, Killifish, Barbs, Rasboras, Corydoras and Brochis*. Winners are given below. The '50 Club' draw for the month was won by 1 and 2, John Smith. The points for the competition were Brighton, 78; M.S.A.S., 46. The Plaque was presented to Brighton by the judge for the evening Mr. Ray Cooke.

Winners were: Class B: 1 and 3, Ben Sayers; 2, Pete Levine; 4, Bill Slade. F: 1, Les Hill; 2, 3 and 4, Pete Levine. J: 1 and 2, Chas Raggio; 3 and 4, Tom Pidgeley. H: 1, Les Hill; 2, Ben Sayers; 3, Tom Pidgeley; 4, Pete Levine. L: 1, Ben Sayers; 2, Alison and Joanne Parry; 3, Tom Pidgeley; 4, Chas Raggio. Nb-M: 1 and 3, Chas Raggio; 2, Steve; 4, Pete Levine. Over Spill: 1, Pete Levine; 2, Chas Raggio; 3, Alan Harrison; 4, Bill Harrison.

ON 20th April South Park Aquatic (Study) Society members had a chance to try their hand at judging goldfish entered in the single-tail table show and comparing results with official judge for the evening, David Dudley. He gave a very informative and entertaining lecture on how a fish is pointed and what to look for when selecting individual specimens for the bench. Also on display were five tanks of the 1982 protest globe-eyes and each aquarist gave a brief description of how the young moors had been raised and the results achieved so far. The fish will be next on view at the October

meeting. Single-tail table show results: 1, Mary Franklin (Common Goldfish), 76 points; 2, Sid and Nora Lewis (Bristol Shubunkin), 70; 3, Sid and Nora Lewis (London Shubunkin), 66. The Society specialises in coldwater fishkeeping and meets at 8.00 p.m. on the third Tuesday of every month at the Wimbledon Community Centre, St. George's Road, London S.W.19. New members and visitors always welcome. Full details from: Mrs. Marguerite Dudley, 163 South Park Road, Wimbledon, London, SW19 8RX. (Tel: 01 540 5862).

RESULTS of the **CROYDON A.S.** open show on 27th March, at Ashburton School, Shirley Road, Croydon: Class Ag: 1, F. Coe. Ag: 1, J. Beati; 2, P. Mills; 3, S. Parnsdown. Ba: 1, A. Feast; 2, C. Brook; 3, D. Lambert. Bc: 1, C. Tonni; 2, C. Brook; 3, A. Chaplin. Cb: 1, Mrs. P. Edwards; 2 and 3, D. Winder. Cc: 1 and 2, D. Winder; 3, F. Scott. C2: 1, B. Hastings; 2, D. Lambert; 3, J. Edwards. Da: 1, S. Tonni; 2, M. Dursley. Db: 1, Mrs. D. Winder; 2, J. Rowsey; 3, R. Hastings. Dc: 1, A. Fuller; 2, M. Draper; 3, D. Riley. D2: 1, R. J. Scouting; 2, J. Rowsey; 3, A. Fuller. Ea: 1, T. Laughlin; 2, C. Tonni; 3, C. Pinnis. Eb: 1, C. Brook; 2, Jackson; 3, J. Rowsey. Ec: 1, S. Tonni; 2, C. Pinnis; 3, G. Hicks. Fc: 1 and 3, C. Chewright. Fd: 1, C. Chewright. F2: 1 and 3, G. Owen; 2, I. Harvey. Ga: 1, C. Brooks. G2: 1, J. Edwards; 2 and 3, D. Winder. Ha: 1, C. Pinnis; 2, C. Brook; 3, D. Winder. H2: 1, E. Jackson; 2, J. Edwards; 3, B. Hastings. I: 1, A. Chaplin; 2, Mrs. D. Theobald; 3, A. Feast. K: 1, C. Brook; 2, Mrs. D. Winder; 3, B. Cox. L: 1, D. Gayton; 2, J. Edwards; 3, J. Draper. L2: 1, D. Winder; 2, C. Hogan; 3, S. Tonni. Ma: 1, G. Hicks; 2, L. Foss; 3, P. Riley. Mb: 1, C. Tonni; 2, Mrs. D. Winder. M2: 1, A. Chaplin; 2, M. Cottis; 3, Mrs. D. Theobald. N(b-m): 1, D. Winder; 2, Mrs. P. Edwards; 3, H. Smith. N(o-t): 1, F. Scott; 2, S. Tonni; 3, D. Chewright. O: 1 and 3, P. Houspach; 2, Mrs. C. Smith. P: 1, B. Hastings; 2, C. Tonni; 3, T. Tester. Q: 1, C. Pinnis; 2, B. Hastings; 3, S. Tonni. R: 1, B. Light; 2, M. Clark; 3, B. Hastings. S: 1 and 2, R. J. Scouting; 3, Mrs. C. Smith. T: 1 and 3, J. Owen; 2, S. Parnsdown. Ua: 1, P. Mills; 2, H. Berry; 3, N. Boot. Uc: 1, D. Shiner; 2, C. Brook; 3, I. Harvey. U2: 1, J. Pollard; 2, I. Harvey; 3, N. Boot. Va: 1 and 3, T. Asquith; 2, R. Shiner. Vb: 1, D. Chapman; 2, P. Oldridge; 3, H. Berry. V2: 1, J. Pollard; 2 and 3, D. Shiner. W: 1 and 3, G. Owen; 2, J. Owen. X(b-m): 1, G. Owen; 2, F. Scott; 3, M. Theobald. X(o-t): 1, G. Owen; 2, C. Pinnis; 3, P. Scott. Y(a-w): 1, R. Shiner. Amphibians: 1, A. Reid; 2, D. Shiner; 3, M. Dursley. Reptiles: 1 and 2, G. Hooper; 3, D. Hunter.

SOUTH WEST



JIM DAY, speaking to Bristol A.S., claimed that it took him three weeks, with a gradually rising temperature, to bring his fish into peak

condition. During this time the fish were fed intensively, but the sexes were not separated. After hand-spawning, the eggs were kept at 75°F and Liquify was added in generous quantities at the time of spawning. The growing fry had a mixed diet, including Daphnia, and at ten days were taking cooked porridge. The temperature was kept at 75° for fourteen weeks and then gradually reduced. During the later stages the young fish had one foodless day per week. Last year fry, under this regime, had spawned this year aged eleven months. Miss Hilda Morgan was presented with a basket of fruit to celebrate her sixtieth birthday. She acts as registrar at the monthly meetings. Will Ham, who recently retired from the Committee, was presented with a book in appreciation of his services to the Society.

MIDLANDS AND WALES



RESULTS of the first **Bedford & District A.S.** show which was extremely well supported by exhibitors and public. Best in Show was won by C. Richards of Sudbury A.S. Class B: 1 and 2, D. Craddock; 3, Mr. Bryan; 4, R. Davies. C: 1, W. Hastings; 2, C. Richards; 3, P. Moye; 4, T. Ward. Ca: 1, J. Irvine; 2, J. Parry; 3, Mrs. Davies; 4, H. Smith. Cb: 1 and 2, Mrs. Davies; 3 and 4, M. Henderson. D: 1, R. Cooke; 2, M. Wright; 3, C. Wright; 4, I. Perry. Da: 1, S. Vickers; 2, Mr. Craddock; 3, M. Dawley; 4, T. Ward. Db: 1, C. Richards; 2, D. Winder; 3, T. Hudson; 4, R. Stanforth. Dc: 1 and 2, M. Law; 3, R. Cooke; 4, G. Elias. E: 1, D. Winder; 2, P. Morris; 3, C. Richards; 4, W. Rodgers. Ea: 1, C. Richards; 2, T. Ward; 3, D. Harries; 4, T. Laughlin. F: 1, G. Crumpton; 2 and 3, H. Johnson; 4, R. Wimmeridge. G: 1 and 2, D. Winder; 3, C. Richards; 4, H. Johnson. H: 1, M. Smith; 2, C. Hogan; 3, M. Johnson; 4, A. Waller. J: 1, R. Parry; 2 and 3, A. Brown; 4, Mrs. Davies. K: 1, D. Moye; 2, D. Harries; 3 and 4, J. Richards. L: 1, C. Richards; 2, Mrs. Davies; 3, C. Hogan; 4, D. Winder. M: 1, S. Hughes; 2, D. Winder; 3, Mrs. Davies; 4, J. Richards. N(b-m): 1, Mrs. Davies; 2, G. Crumpton; 3, J. Richards; 4, H. Johnson. N(o-t): 1, M. Smith; 2, Mr. Craddock; 3, J. Harvey; 4, Mr. Craddock. O: 1, 2 and 3, T. Laughlin; 4, C. Smith. P: 1 and 4, C. Richards; 2, T. Ward; 3, R. Stanforth. Q: 1, M. Craddock; 2, C. Smith; 3, Craddock; 4, C. Wright. R: 1, R. Bryan; 2, G. Woolley; 3, B. Wimmeridge; 4, F. Davies. S: 1, A. Waller; 2, K. Rodger; 3, H. Johnson; 4, R. Vickers. T: 1 and 4, S. Parnsdown; 2, M. Craddock; 3, P. Harries. U: 1, S. Vickers; 2, Mrs. Ellingford; 3, A. Vickers; 4, J. Masud. V: 1, T. Hudson; 2 and 4, A. Burton; 3, J. Masud. W: 1, A. Burton; 2, G. Hume; 3, G. Crumpton; 4, P. Chapman. X(b-m): 1, S. Hughes; 2, R. Bessner; 3, G. Crumpton; 4, M. Wright. X(o-t): 1, W. Rodger; 2, D. Winder; 3, A. Lushy; 4, A. Brown.

NEW SECRETARY
 THE new Secretary for Castle Ichthyology A.S. is D. Bolter, 35 Mary Street, Testhouses, Green NPI 5DN (Tel: 98 1357). Chairman, K. Davis; Show Sec., D. Sawyer. Anyone who wants to come to the meetings are welcome. They meet every Friday at St. Martin's Church Hall, Park Lane, Caerphilly, 7.30 till 9.30.

CHANGE OF SECRETARY
 A change of secretary for the Midland Tropical Aquarist Society, which meet at Holly Sock School, Mallard Close, Acorns Green, Birmingham. Meetings are held every second Wednesday of the month at 7.45 p.m. The secretary is now Mr. L. W. Smallwood, 25 Lindwood Road, King's Norton, Birmingham B30 3RP. (Tel: 021-458 6818).

NORTH



RESULTS of the Merseyside A.S. open show held on 25th April at Rainhill Village Hall. Number of entries 500. Best in show: Rift Valley Cichlid owned by Mr. and Mrs. Waterhouse of Merseyside A.S. Best Pair of Fish: K. Buckley of Bridgewater A.S. Best Breeders Team: Mr. and Mrs. Norton of Sandgrounders.

Guppies: 1, Mr. and Mrs. Slater (Blackpool); 2, M. and I. Crowther (Nelson); 3, A. Massey (Ind.). **Platies:** 1, S. Jones (St. Helens); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Goddard (Macclesfield). **Swordtails:** 1, Mr. and Mrs. Marshall (Merseyside); 2, S. Jones; 3, N. Cope (Ind.). **Mollies:** 1, M. and I. Crowther; 2, S. Jones; 3, P. Graham (Nelson). **A.V. Golden:** 1, M. N. Rimmer (Sandgrounders); 2, Mr. and Mrs. Slater; 3, Mr. and Mrs. Baldwin. **A.V. Poecilia:** 1 and 2, J. and K. Corbett (Merseyside); 3, A. and E. Berry (Bridgewater). **A.O.V. Livebearer:** 1, M. N. Rimmer; 2, J. Lynch (Merseyside); 3, A. and E. Berry. **Characins to 7.5cm:** 1, Mr. and Mrs. Baldwin; 2, Mr. and Mrs. Farnough (Sandgrounders); 3, A. D. Armit (Buxton). **Characins over 7.5cm:** 1, P. Slater (Blackpool); 2, R. I. Payne (Merseyside); 3, Mr. and Mrs. Underwood (Bridgewater). **Barbs:** 1, Mr. and Mrs. Stephenson (Oldham); 2, R. W. Carter (St. Helens); 3, K. Buckley. **Danios and Minnows:** 1, Mr. and Mrs. Underwood; 2, Mr. and Mrs. Baldwin; 3, K. Buckley. **Barbs to 7.5cm:** 1, Mr. and Mrs. Waterhouse; 2, Mr. and Mrs. Baldwin; 3, Mr. and Mrs. Stephenson. **Barbs over 7.5cm:** 1 and 2, D. Mercer (Merseyside); 3, E. R. Walker (Merseyside). **Cichlids to 10cm:** 1, A. D. Armit; 2 and 3, Mr. and Mrs. Underwood. **Cichlids over 10cm:** 1 and 2, Mr. and Mrs. Underwood; 3, S. Swift (Buxton). **Angels:** 1, Mr. and Mrs. Stephenson; 2, Mr. and Mrs. Slater; 3, A. Bibby (Sandgrounders). **Rift Valley:** 1, Mr. and Mrs. Waterhouse; 2, Mr. and Mrs. Norton; 3, Mr. and Mrs. Farnough. **Fighters:** 1, Mr. and Mrs. J. Riley (Lands P.O.); 2, S. Jones; 3, Mrs. A. Slater (Blackpool). **Anabantids to 6cm:** 1, M. Hartley (Sandgrounders); 2, Mr. and Mrs. Enoch; 3, S. Swift. **Anabantids over 6cm:** 1, Mr. and Mrs. Underwood; 2 and 3, M. Hartley. **Killies:** 1 and 2, R. Scobock (Oldham); 3, J. Roberts (Nelson). **Loaches and Bettas:** 1, P. Harris (St. Helens); 2, Mr. and Mrs. Stephenson; 3, Mr. and Mrs. Mackie (Runcorn). **Sharks and Foxes:** 1, Mr. and Mrs. Underwood; 2, Liverpool Exotic Fish; 3, A. Mitchell (Skelmersdale). **Cryodes and Brochis:** 1, P. Harris; 2, Mr. and Mrs. Baldwin; 3, P. Harris. **A.O.V. Catfish:** 1, Mr. and Mrs. Underwood; 2, B. W. Carter; 3, Mr. and Mrs. Baldwin. **Pairs (Egglayers):** 1, K. Buckley; 2, Liverpool Exotic Fish; 3, B. W. Carter. **Pairs (Livebearers):** 1, M. Stephenson (Merseyside);

2, J. and K. Corbett; 3, A. and E. Berry. **A.O.V. Tropical:** 1, Mr. and Mrs. Baldwin; 2, R. Layland (St. Helens); 3, A. and E. Berry. **Janitor (Egglayers):** 1, Master P. Underwood (Bridgewater); 2, Master D. Hartley (Sandgrounders); 3, Miss J. Baldwin (Sandgrounders). **Junior (Livebearers):** 1, Master D. Hartley; 2, Miss J. Baldwin; 3, Miss M. Carter (St. Helens). **Breeders (Livebearers):** A and B: 1, Mr. and Mrs. Norton; 2, K. Buckley; 3, Mr. and Mrs. Baldwin. **Breeders (Livebearers):** C and D: 1, K. Buckley; 2, R. I. Payne; 3, A. and E. Berry. **Breeders (Egglayers):** A and B: 1 and 2, Liverpool Exotic Fish; 3, Mr. and Mrs. Waterhouse. **Breeders (Egglayers):** C and D: 1, Mr. and Mrs. Waterhouse; 2, Liverpool Exotic Fish; 3, Mr. and Mrs. Norton. **Goldfish and Comets:** 1, A. Chadwick (Oldham); 2, Mr. and Mrs. Underwood; 3, P. Slater. **Shubunkins:** 1, J. Lynch; 2, A. and E. Berry; 3, N. Woodwood (Merseyside). **A.O.V. Fancy Goldfish:** 1, Mr. and Mrs. Underwood; 2, Mr. and Mrs. Coley (Oldham); 3, N. Woodwood. **A.O.V. Goldwater:** 1 and 2, A. and E. Berry; 3, Mr. and Mrs. Enoch. **Mini Jars:** 1, D. Patterson (Oldham); 2, Mr. and Mrs. Stephenson; 3, E. R. Walker. **Liverpool Exotic Fish** showed as a society not as individuals.

AT the April meeting of Rothwell A.S. the following were elected to the committee: Leslie Nicholson (chairman); Grotte Dighton (vice-chairman and show secretary); 46 Sandy Bank Avenue, Rothwell, Mike Price (secretary); 32 Broadwood, Woodlief, Leeds; Dave Clark (treasurer); 30 Brick Street, Hunslow, Wakefield. Meetings are held at the Carlton Working Mens' Club, Main Street, Carlton, Rothwell, Leeds, on the second and fourth Wednesdays of each month, 7.30 p.m.

Keighley A.S. held their a.g.m. on 1st April. A new committee was elected, among the officers were: J. S. Wright (chairman); B. Lydon (treasurer) and Mrs. M. Murray (secretary). They take the opportunity to thank all who made donations and assisted them to make their 1982 open show a great success.

Nelson A.S. open show results: Section A, Livebearers—Guppies: 1 and 2, Mr. and Mrs. Slater (Blackpool); 3, M. and I. Crowther (Nelson). **Swordtails:** 1, Mr. and Mrs. Slater; 2, M. and N. Rimmer (Sandgrounders); 3, D. Graham (Nelson). **Mollies:** 1, Mr. and Mrs. R. Whittaker (Lytham); 2 and 3, Mr. and Mrs. Baldwin (Sandgrounders). **Platies:** 1, G. Petherall (Nelson); 2, M. and I. Crowther; 3, J. Lynch (Merseyside). **A.O.V.:** 1, M. and N. Rimmer; 2, Miss J. Lee (Ind.); 3, J. and K. Corbett (Merseyside). **Section B, Anabantids—Fighters:** 1, Mr. and Mrs. Riley (Lands P.O.); 2, J. Corbett (Merseyside); 3, M. Allison (Sandgrounders). **To 8cm:** 1, K. Buckley (Bridgewater); 2, R. I. Payne (Merseyside); 3, E. Jones (Atherton N.W.). **Over 8cm:** 1 and 3, Mr. Hartley (Sandgrounders); 2, Mr. and Mrs. Underwood (Bridgewater). **Section C, Characins—Inc. 7.5cm:** 1, Mr. and Mrs. Baldwin; 2, Miss J. Lee; 3, D. Armit (Buxton). **Over 7.5cm:** 1, Mr. and Mrs. Enoch (Sandgrounders); 2, R. I. Payne; 3, Paul Slater (Blackpool). **Section D, Catfish—Cory and Brochis:** 1, J. Lynch; 2 and 3, Mr. and Mrs. Baldwin. **A.O.V.:** 1, Mr. and Mrs. Waterhouse (Merseyside); 2, J. T. Morris (Sandgrounders); 3, Mr. and Mrs. Underwood. **Section E—Loaches and Bettas:** 1, Mr. and Mrs. Baldwin; 2 and 3, Mr. and Mrs. Underwood. **Sharks and Foxes:** 1 and 2, Mr. and Mrs. Underwood; 3, K. D. Miller (Barnock). **Section F—Rashoras:** 1, K. Buckley (Bridgewater); 2, Mr. Hartley; 3, Mr. and Mrs. Mulla (Merseyside). **Danios and Minnows:** 1, R. I. Payne; 2, Bill Drake (Atherton); 3, K. Buckley. **Section G—Toothcarps top spawners:** 1 and 3, J. Roberts (Nelson); 2, E. R. Walker (Merseyside). **Toothcarps bottom spawners:** 1, R. Scobock (Oldham); 2, M. Agnew (Buxton); 3, D. Clark (Headford). **Section H, Barbs—Inc. 7.5cm:** 1, Mr. and Mrs. Waterhouse; 2, Mr. and Mrs. Baldwin; 3, I. Whittaker (Merseyside). **Over 7.5cm:** 1, Mr. and Mrs. Baldwin; 2, E. R. Walker; 3, K. Buckley. **Section H, Cichlids—Angels:** 1, Mr. and Mrs. Slater

(Blackpool); 2, N. and I. Crowther; 3, E. R. Walker. **To 10cm:** 1 and 2, Mr. and Mrs. Underwood; 3, D. Armit (Buxton). **Rift Valley:** 1 and 2, Mr. and Mrs. Waterhouse; 3, J. S. Wright (Keighley). **Over 10cm:** 1 and 2, Mr. and Mrs. Underwood; 3, Mr. and Mrs. Brien (Sandgrounders). **Section J—A.O.V. Tropical:** 1 and 2, Mr. and Mrs. Baldwin; 3, P. and N. Watt (Dewsbury). **Section K—Goldwater—Common Goldfish:** 1, S. Walsh (Accrington); 2, Mr. and Mrs. Coley (Oldham); 3, Mr. and Mrs. Underwood. **Single Tail Fancy:** 1, A. and E. Berry (Bridgewater); 2, A. Radcliffe (Nelson); 3, P. and N. Watt. **Twin Tail Fancy:** 1, Mr. and Mrs. Underwood; 2, Mr. and Mrs. Coley; 3, C. Wallbank (Accrington). **A.O.V. Goldwater:** 1, D. Armit; 2, Mr. Hartley; 3, Mr. and Mrs. Underwood. **Section L, Pairs—Livebearers:** 1, I. and K. Corbett; 2, A. and E. Berry; 3, M. and N. Rimmer. **Egglayers:** 1 and 2, J. T. Morris; 3, E. R. Walker. **Section M, Breeders—Livebearers A.B.:** 1, K. Buckley (Livebearers C.D.); 2, J. and K. Corbett; 3, K. Buckley. **Egglayers A.B.:** 1 and 2, J. T. Morris; 3, E. Jones (Atherton N.W.). **Egglayers C.D.:** 1, D. Miller (Darwen); 2, E. Jones (Atherton N.W.); 3, B. Drake (Atherton N.W.). **Section N, Juniors U/15—Livebearers:** 1, Miss J. Baldwin (Sandgrounders); 2, Paul Slater (Blackpool); 3, L. and M. Buckley (Bridgewater). **Egglayers:** 1, Miss J. Baldwin; 2, Master D. Hartley (Sandgrounders); 3, Paul Slater. **Coldwater:** 1, D. Hartley; 2, J. Baldwin; 3, C. Berry (Bridgewater). **Section O, Ladies—Livebearers:** 1, Mrs. J. Slater (Blackpool); 2, Mrs. Underwood; 3, Miss J. Lee. **Egglayers:** 1, Mrs. Enoch (Sandgrounders); 2, Mrs. Underwood; 3, Miss J. Lee.

THE "Rose" Public House in Hull is the regular venue for Wyke Show Society, and at their meeting in March members were entertained by Mr. Allen Wood, who gave an excellent Slide Show on Fish and Fishing in our local areas. His main interest was catching Bide fish he had caught in many rivers, canals and ponds. Like Stamford Bridge, in the second half they had a Quiz that went down very well. Members had to guess 20 names of the fish he had shown at the show. The winner was presented with a book called "Fish of Bridlington Bay" that Mr. Allen Wood had kindly donated. The table results were: Seniors: 1, C. Vernon; 2, J. Giddins. Juniors: 1, R. Lovrick; 2, K. Goldings; 3, D. Alderley. **Fish of Cought: A.O.V. **Coldwater:** 1, Mr. and Mrs. Ashton; 2, E. Ashton; 3, I. Giddins. Meetings are held every 2nd and 4th Thursdays in the month. Inquiries to Mr. M. Ashton, 26 Douglas Road, Loughall Estate, Hull. (Tel: 796231).**

RESULTS of the Gateshead Foresters A.S. first open show held on 4th April at the Gateshead Leisure Centre: Class B: 1, I. Sinclair (Caer Ulla); 2, F and 4, H. Prasse (Hexham); 3, Mr. and Mrs. Roe (Bishop Auckland); 4, J. Chapman (Darlington). **Ca:** 1, D. Turner (Anahid Plain); 2, C. A. Frame (Billingham); 3, A. Venus (Throckley); 4, Mr. and Mrs. Hepton (Sandgrounders). **Ch:** 1, C. A. Frame; 2 and 4, J. Taylor (Caer Ulla); 3, J. Middlemar (Stanley). **C:** 1, C. A. Frame; 2, J. Middlemar; 3, Mr. and Mrs. Rodway (Independent); 4, W. Horsby (Bishop Auckland). **D:** 1 and 2, D. Morgan (Newton Aycliffe); 3, H. Prasse (Hexham); 4, F. Bell (Dh); 1, T. Savers (Stanley); 2, Mr. and Mrs. Rodway; 3, C. A. Frame; 4, H. Ripon (Bartley). **De:** 1, Mrs. Clark (Stockton); 2, Mrs. Williams (Independent); 3, C. A. Frame; 4, Mr. and Mrs. Gwlad (Newton Aycliffe). **D:** 1, J. Kiley (Independent); 2, Mr. and Mrs. Wardle (Independent); 3, Mr. and Mrs. Rodway; 4, Mr. and Mrs. Gwlad. **Eg:** 1, E. Williams (Independent); 2, S. D. Smith (Independent); 3, Dr. J. Hodgson (Airefield Plain); 4, W. Horsby (Bishop Auckland). **E:** 1, D. Robson (Darlington); 2, Tindall (Independent); 3, D. and J. Hodgson; 4, R. Bell (Houghton-le-Spring). **F:** 1, T. Savers; 2, S. Galloway (Novon); 3, L. Gray (Billingham); 4, Mr. and Mrs. Roe (Bishop Auckland). **G:** 1 and 3, S. D. Smith; 2, J. Chapman; 4, D. Jackson (Independent). **H:** 1, F. Bell; 2, J. Taylor;

3, D. Turner; 4, J. Cross (News); 1, A. Richardson (Fountains); 2, Mr. and Mrs. Ribbery; 3, A. H. Maw (South Shields); 4, D. Redman (Billingham); K: 1, F. Bell; 2 and 3, Mr. and Mrs. Hepton; 4, D. and J. Hodgson; L: 1, W. Hornsby; 2, R. Penson (Sunderland); 3, C. Smith (Hexham); 4, B. Corser (Fountains); M: 1, Mr. and Mrs. Roe; 2, B. Corser; 3, M. and D. Turner; 4, C. Wilson (Independent); N: 1, A. Stevens (Dunston); 2, J. Kelly (Independent); 3, D. Turnbull (Independent); 4, S. D. Smith (Independent); O: 1, F. Bell; 2, A. Smith (Independent); 3, D. Dixon (Staley); 4, B. Corser; Not: 1, Mr. and Mrs. Hepton (Sunderland); 2 and 3, Mr. and Mrs. Rodway; 4, A. Venes (Throckley); O: 1, L. Burbot (Hexham); 2, N. Forster (Bishop Auckland); 3, M. and D. Turner; 4, Mr. and Mrs. Roe; P: 1, R. Bell (Hexham); 2 and 4, D. Nightingale (Cast Urf); 3, D. Clark (Hexham); Q: 1, F. Bell; 2, Mr. and Mrs. Roe; 3, Mr. and Mrs. Rodway; 4, Mrs. Ormsby (Sunderland); R: 1, P. Riley (Stockton); 2, Mr. and Mrs. Roe; 3, D. and J. Hodgson; 4, Mr. and Mrs. Rodway; S: 1, F. Sayers; 2, S. D. Smith; 3, L. Gray; 4, F. Bell; T: 1, J. W. Johnstone (N.G.L.S.); 2, N. Forster; 3, Mr. and Mrs. Roe; 4, F. Sayers; U: 1, R. Dodd (Bishop Auckland); 2, R. Bell (Hexham); 3, A. Ridley (Bishop Auckland); 4, R. Williams (Cast Urf); V: 1 and 2, K. Dodd; 3, C. A. Frame; 4, C. Herbot (Rebsar); W: 1, A. Herbot (Rebsar); 2, C. A. Frame; 3, J. Corner; X: 1, A. H. Maw (South Shields); 2, T. Sayers; 3, P. Riley (Stockton); 4, R. and S. (Cast Urf); Not: 1, Mr. Grant (Newton Aycliffe); 2, Mr. and Mrs. Hepton; 3, F. Bell; 4, Mr. and Mrs. Roe.

Best Fish in Show: Class G winner, S. Smith, showing a *Synodontis decorus*.
A special F.B.A.S. trophy went to Class B winner, I. Sinclair, showing a *Barbus evereti*.

THE first meeting of the 1982 Statesman League was held at York; members of the Bridlington A.S. officiated. Scarborough, last season's champions, started off with the obvious intention of retaining the trophy by obtaining a resounding 87 points. A poor turn out by Hull A.S. members resulted in only 20 points being scored. A vast improvement will have to be made for Scarborough to be overtaken. Points scored so far: Scarborough, 87; York, 65; Wyke, 36; Hull, 20; Ebor, 7.

RESULTS of Skegness and District A.S. open show held at the Imperial Cafe, Skegness on 29th April. Guppies: 1, N. Craddock (KE); 2, R. Byson (KE); 3, Mr. and Mrs. Brackenbury (AS); 4, Mollies; 1 and 2, R. M. Southurst (FT); 3, Mr. and Mrs. Lloyd (Ind.); Swordtails: 1, M. Johnson (Ind.); 2, F. S. Draycott (AD); 3, F. Lane (HA). Fishies: 1, Mr. and Mrs. Howell (AD); 2, Mr. and Mrs. Farrow (LI); 3, M. Johnson (Ind.); A.O.V. Livebearers: 1, M. N. Hancock (HA); 2, F. S. Draycott (AD); 3, Mr. and Mrs. Lloyd (Ind.). Small Barbs: 1, Mr. and Mrs. Farrow (LI); 2, Mr. and Mrs. Colley (AS); 3, Mr. and Mrs. Lloyd (Ind.). Large Barbs: 1, A. Marples (AD); 2, Mr. and Mrs. Pickford (Ind.); 3, Mr. May (AD); Characin (Largo): 1, Mr. and Mrs. Colley (AS); 2, R. M. Southurst and Son (FT); 3, F. S. Draycott and Son (AD); Characin (Small): 1, 2 and 3, Mr. and Mrs. Lake (G & C); Corydoras: 1, Mrs. D. Marples (AD); 2, R. Leverick (WY); 3, R. M. Southurst and Son (FT); Basse and Loaches: 1, Mr. and Mrs. F. Howell (AD); 2, J. Geary (KL); 3, Mr. and Mrs. Mitchell (LI); A.O.V. Catfish: 1, D. Moody (G & C); 2, J. Geary (KL); 3, Mr. and Mrs. Hare (G & C); Sharks and Foxes: 1, Mr. and Mrs. F. Howell (AD); 2, Mr. and Mrs. Marshall (I & E); 3, J. Butcher (JF); Dwarf Cichlids: 1, R. N. Southurst and Son (FT); 2, N. Hancock (HA); 3, Mr. Bee (G & C); Large Cichlids: 1, R. N. Fisher (FT); 2, Mr. Wright (KE); 3, I. Marshall (I & E); Endemic Cichlids: 1, Miss J. E. Hollingsworth (FT); 2, Miss A. L. Hollingsworth (FT); 3, K. M. Fisher (FT); Angels: 1, Mr. Witt (KL); 2, F. Lane (HA); 3, Mr. Witt (KL); Small Anabantids: 1, R. M. Southurst and Son (FT); 2, F. H. Baker (Ind.); 3, Mrs. Anderson (Ind.); Large Anabantids: 1, Mr. and Mrs. Howell (AD); 2, Simon Dams (Ind.); 3, Mr. and Mrs. D. Penny (AM); Minnows and Danios: 1, Mr. and Mrs. Lake (G & C);

2 and 3, R. Leverick (WY); Rabbits: 1, Mr. and Mrs. Lake (G & C); 2, Mr. and Mrs. Hare (G & C); 3, R. Leverick (WY); Tooth carp: 1, F. Lane (HA); 2, L. Turvorth (G & C); 3, T. Dawn (Ind.); A.O.V. Tropical under 15 cms.: 1, Mr. and Mrs. Mitchell (LI); 2 and 3, Mr. and Mrs. Howell (AD); A.O.V. Tropical (over 15 cms.): 1, Mr. and Mrs. Hare (G & C); 2, Mr. and Mrs. D. Penny (AM); 3, Mr. and Mrs. Ashton (WY); Breeders (Livebearers) (A and B): 1, R. M. Southurst and Son (FT); 2 and 3, F. S. Draycott (AD); Breeders (Livebearers) (C and D): 1, P. Lane (HA); 2, F. S. Draycott (AD); 3, R. M. Southurst and Son (FT); Breeders (Egg-layers) (A and B): 1, Mr. and Mrs. Brackenbury (AS); 2, Mr. and Mrs. Phillips (H); 3, P. Lane (HA); Breeders (Egg-layers) (C and D): 1, Mr. and Mrs. Phillips (H); 2 and 3, B. Todd (G and C); Pairs (Livebearers): 1, A. Palmer (HA); 2, F. S. Draycott (AD); 3, M. Johnson (Ind.); Pairs (Egg-layers): 1, Mr. and Mrs. Brackenbury (AS); 2, Mr. and Mrs. Lake (G and C); 3, Mr. and Mrs. Hooley (Ind.); Goldfish and Comets: 1, Mr. and Mrs. K. Fair (JF); 2, Mr. and Mrs. Hooley (Ind.); 3, Mr. and Mrs. Silk (GR); Shubunkin and Fancy Goldfish: 1, J. Southworth (AMGK); 2, Mr. and Mrs. J. Geary (KL); 3, Mr. and Mrs. Silk (GR); A.O.V. Coldwater: 1, Mrs. G. Marples (AD); 2, Mr. and Mrs. Lloyd (Ind.); 3, Mr. and Mrs. Hare (G & C); A.O.V. Tunnies: 1, A. Palmer (HA); 2, Steven Dawn (Ind.); 3, R. Leverick (WY); A.O.V. Female (Egg-layers): 1, Mr. and Mrs. K. Hare (G & C); 2, Mrs. Anderson (Ind.); 3, Mr. and Mrs. D. Penny (AM); A.O.V. Female (Livebearers): 1 and 3, F. S. Draycott (AD); 2, P. Lane (HA); Fishers (Trot): 1 and 2, Mrs. Anderson (Ind.); 3, Mr. Boat (JL); Fishes (Multi): 1, Mr. and Mrs. Hooley (AS); 2 and 3, Mr. and Mrs. Brackenbury (AS); Plants: 1, 2 and 3, Mr. and Mrs. Farrow (LI); Mini Jars: 1, Mr. and Mrs. Brackenbury (AS); 2, A. Cook (Ind.); 3, Mr. and Mrs. Hooley (Ind.).

Abbreviations: IE: Louth; DO: Doncaster; AS: Ashby; HA: Halifax; LI: Lincoln; LE: Leicester; H: Hull; M: Mertonborough; WY: Wyke; KL: King's Lynn; FT: Forest Town; KE: Kettering; GR: Grimsby; G & C: Grimsby and Cleethorpe; JF: Jolly Fisherman.

Best Fish in Show: Endemic Cichlids: Miss J. E. Hollingsworth (FT). Best Exhibit: Breeders (Egg-layers): Mr. and Mrs. Phillips (H).

SCOTLAND



Edinburgh A.S. Mr. L. Davidson and Mr. J. R. Wilson judged the table show on 28th April. Results: Sharks: 1, J. Milligan; 2, G. Oswald; 3, J. Milligan; Rabbits: 1, 2 and 3, J. Milligan; Sharks, Jr: 1 and 2, G. Burns; Rabbits, Jr: 1, P. Findlay. The Edinburgh Aquarist Society extends a warm invitation to anyone interested in joining the Club on 2nd and 4th Wednesdays of the month at Waverley Park Football Club, Corstorphine Road, Edinburgh.

Paisley & District A.S. held its monthly meeting on 6th April. Guest speaker was Tammy Boyle, from the Clyde Aquarist Club, who gave a very interesting talk on Anabantids. By coincidence, the table show on the night was Anabantids. Results: Senior league: 1, Andrew Stone (Thick-tipped Gourami); 2, George Caldwell (Thick-tipped Gourami); 3, George Caldwell (Honey Gourami); 4, Bill Dunbar (Golden Gourami); Junior league: 1, Dylan Lafferty (Oplatina Gourami); 2, Alan Patterson (Kissing Gourami); 3, Alan Patterson (Dwarf Gourami).

THIS a.g.n. of the Glasgow A.S. will be held at 34 Howlands Drive, Knightswood on the 6th June. Matters to be decided will be election of committee and discussion on hiring a hall in which to hold the meetings. The Society meets on the 2nd Tuesdays of every month.

Dates for the diary

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

JUNE

6th June: ARBROATH A.S. annual open show at Arbroath Community Centre, Marketgate, Arbroath. For further details contact J.R. Steven, 95 Brechin Road, Arbroath. (Tel: 0241-76605).

12th June: LLANTWIT MAJOR A.S. annual open show at School Hall, Ham Lane East, Llantwit Major, Glamorgan. For further details contact Show Secretary, A. Ibberton, 94 St. Mary's Avenue, Barry, S. Glamorgan. (Tel: Barry 740262).

13th June: NORTHWICH & DISTRICT A.S. open show at Hartford High School, Greenbank Lane, Chester Road, Northwich, Cheshire. Details from Show Secretary: D. Velezine, 41 Hartford Road, Dovesham, Northwich, Cheshire. (Tel: Northwich 6624).

13th June: DUNMOW & DISTRICT A.S. open show. Details from Mrs. P. Perry, Secretary, 5 Randall Close, Gt. Dunmow, Essex.

13th June: THE D.D. A.S. open show at the Foulkes Hall, Gt. Dunmow.

18th June: Meeting of the CENTRAL MIDLANDS CICHLID GROUP, AGM and arrangements for an Exhibition and Auction to be made. Further details available from Mrs. Maureen Hall, 71 Saxon Road, Farnbridge, Staffs. (Tel: 078 571 3944).

18th June: CATFISH ASSOCIATION OF GREAT BRITAIN (Scottish Branch) meeting at B.P. Social and Recreation Club, Grange-mouth, at 7.30 p.m.

19th June: SOUTH PARK AQUATIC (STUDY) SOCIETY 1982 open show for coldwater fish at the Wimbledon Community Centre, St. Georges Road, London SW19. Further details available from Eric Franklin, show Secretary (S.P.A.S.S.) 105, Haackin Road, Southam, London SW16. (Tel: 01-479 2690).

19th June: NAILSEA & DISTRICT A.S. sixth open show to be held at Clevedon Community Centre. For further details contact F. Fitcher, 2 Woodland Road, Nailsea, Bristol (Tel: Nailsea 853096).

18th June: EAST DULWICH A.S. special "Silver Jubilee" open show to celebrate the club's 25th birthday, at The United Reformed Church, Highcombe Avenue, Charlton, London SE27. For further information and show schedules: Show Secretary, Mrs D. L. Winsley, 32 Eddystone Road, Brockley, London SE4 2DE.

20th June: THE BRITISH KOI-KEEPERS' SOCIETY 7th National Koi Show, in the gardens of Totton Park, Knechtford, Cheshire, opening at 11 a.m. Further details available from Mrs. L. Liddicut, 2 Homecastle Road, Mosson, Manchester M10 0GD.

20th June: CENTRAL MIDLANDS CICHLID GROUP, exhibition, auction and "Silly-ciklid-erie" at the Peace Memorial Hall, Penkridge, Stafford. Doors open 12 noon. Further details from Mrs. Margaret Hall, 71 Savon Road, Penkridge, Staff. (Tel: 078 571 3944).

20th June: S.M.T. A.S. & GLYDE A.C. first open show at Lindsay House, Kitch Street, The Village, East Kilbride.

27th June: ROTHWELL A.S. 2nd open show at the Blackburn Hall, Marsh Street, Rothwell, Nr. Leeds.

27th June: PORT TALBOT & DISTRICT A.S. 9th open show at the Talbot Youth Centre, Port Talbot. Schedules from J. Egan, 47 Beverly Street, Port Talbot. (Tel: Port Talbot 885700).

27th June: ST. HELENS A.S. open show at Rainhill Village Hall. Further details from the Secretary, Mrs. H. Steadman, 10 Ribbles Avenue, Rainhill, Liverpool, or the Show Secretary, Mr. T. L. Pansy, 19 Hawkhead Road, Burtonwood, Warrington.

JULY

4th July: KING'S LYNN 4th open show at the Corn Exchange, King's Lynn.

4th July: GLOUCESTER A.S. 8th open show at Charvaldown Community Centre, Charvaldown, Gloucester. Further details from T. Tapping, 60 Blenheim Road, Gloucester.

4th July: LYTHAM A.S. 16th annual open show at Ansell Institute, Woodlands Road, Ansell. Further details from Show Secretary, Mr. P. Ham, 1 Wyndene Grove, Freckleton, Preston. (Tel: Freckleton 633182 or 635221).

4th July: CHARD & DISTRICT A.S. open show at Farnham School, Chard, Somerset. Details from Show Secretary, Mr. D. Shephard, 20 Furton Road, Chard, Somerset. (Tel: Chard 3987).

4th July: CASTLEFORD A.S. open show at Woodhouse Hill W.M.C., Normanton, nr. Castleford.

10th July: WESTON SUPER MARE A.S. first open show at the Emmanuel Church Hall, Daffodil Street, Weston Super Mare, Avon. Benching at 10.30 a.m.—12.30 p.m.

10th and 11th July: ROMFORD & HEACONTRIE A.S. open show at Dagenham Town Show, Central Park, Dagenham. Schedules from Garry Steptowe, 35 Coniston Way, Elm Park, Hornchurch, Essex RM12 5EH. (Tel: Hornchurch 44057).

10th July: SANDGROUNDERS A.S. 12th annual open show at Meols Cop High School, Meols Cop Road, Southport, Merseyside. Schedules available on receipt of s.a.s. from B. Baldwin, 10 Olive Grove, Southport, Merseyside. (Tel: 0204 43384). 50 Perpetual trophies. New Photograph Contest.

15th July: SCARBOROUGH & DISTRICT A.S. open show at Fringate County Primary School, Fringate Scarborough. For further information & show schedule please contact Mr. R. Stone, 9 Clifton Street, Scarborough, North Yorks. (Tel: 0723 60066).

21st July: Hall Show at the East Park, Holderness Road, Hull.

AUGUST

1st August: BLACKPOOL AND FYLDE A.S. open show at St. John Vianney School Hall, Glastonbury Avenue Blackpool.

1st August: LEICESTER A.S. 2nd open show at St. Matthews Community Centre, Mulbar Road, Leicester. All enquiries for schedules and information should be made to Show Secretary, J. Richards, 26, Hugget Close, Rauceby Mead, Leicester. (Tel: Leics. 666314).

1st August: BLACKPOOL AND FYLDE AQUARIUM SOCIETY open show at St. John Vianney School Hall, Glastonbury Avenue, Blackpool. Schedules from Mrs. J. Slater, 103 Kenwick Road, Blackpool, with s.a.s. for return of schedules.

2nd-7th August: PORTSMOUTH A.S. annual exhibition at the Wesley Central Hall, Fratton Road, Portsmouth. Open 10 a.m. daily to 9 p.m. Saturday 10 a.m. to 4 p.m.

7th August: NORTHERN GOLDFISH AND PONDKEEPERS SOCIETY 8th open show at the Sports Centre, Silverwell Street, Bolton, Greater Manchester. Open to the public from 1 p.m. Details and entry forms from D. W. Lord, 40 Hospital Road, Bromley Cross, Bolton, Greater Manchester. (Tel: 0204 58190).

7th August: BRISTOL TROPICAL FISH CLUB open show at W. D. & H. O. Wills Recreation Hall, New, Chastelton Street, Redmoss, Bristol. Benching 9.00 a.m. 12.00 noon. Schedules will be available from mid-June from the Show Secretary, Mr. L. Littleton, 9 Little Stoke Road, Stoke Bishop, Bristol BS9 1HQ, s.a.s. with application please. Show will be to F.B.A.S. rules and incorporate Aquarist Gold Pin, Championship Trophy class and Brooch scheme.

8th August: OLDHAM & DISTRICT annual open show at Worsath Park, Oldham. Further information and show schedules can be obtained from A. Chadwick, 9 Bromville Close, Chadderton, Oldham OL1 2RH. (Tel: 661-651 6207).

15th August: DORCHESTER TROPICAL FISH SOCIETY 2nd open show at the Boy's Brigade Hall, Sawmills Lane, Wymouth Avenue, Dorchester, Dorset. Schedules from B. Symes, 8 High Street, Fordington, Dorchester, Dorset. Please send s.a.s.

21st and 22nd August: YORKSHIRE AQUARIST Festival at Doncaster Racecourse. Details from Mr. N. Bolton, 11 Sherburngate Drive, Pocklington, Yorkshire. (Tel: 0592 3177).

27th, 28th and 29th August: IRISH FEDERATION OF AQUARISTS SOCIETIES open show in Bangor Leisure Centre. Details from A. Robbins, 140 Beersbridge Road, Bellast, N. Ireland.

28th August: ASHFORD & DISTRICT A.S. second open show. Secretary R. J. Scouting, 6 Manor Way, Ashford, Kent.

28th August: LONG EATON A.S. open show at Greggs's Rose Gardens, Toton. Benching 12 noon to 2 p.m. Further details from P. Simpkins, 47 Pinfield Lane, Nupton, Notts.

28th August: Yorkshire Koi Festival arranged by the YORKSHIRE KOI SOCIETY incorporating the 6th Open National Show. Venue: Harwood House, Harwood, Nr. Leeds, Yorkshire. For further information—general or trade stands—contact Mr P. Dalton, 151, Hanworth Lane, Clackhaston, West Yorkshire. (0174 679904).

SEPTEMBER

8th September: COVENTRY POOL & AQUARIUM SOCIETY open show in conjunction with 3rd Mal Show. Further details, contact Mr. C. Bates, 2 Fieldside Lane, Binley, Coventry. (Tel: 0203 451526).

5th September: WELLINGBOROUGH AND DISTRICT A.S. open show at Westfield school for boys, Beckhill Road, Wellingborough, Northants. F.B.A.S. Championship Class C.B. Schedules from M. Coe 20 Salisbury Street, Kettering Northants. (Tel: Ken. 521400).

5th September: NORTH WILTS A.S. open show, details from Show Secretary, Mr. P. Taylor, 7 Ridgeway Road, Stratton, Swindon, Wilt. (Tel: 0793 824114).

5th September: HUDDERSFIELD TROPICAL FISH SOCIETY open show at Sladsworth Civic Hall, Sladsworth, Huddersfield. Booking in time is 12.00 p.m.—2.00 p.m., plus afternoon auction at the same time.

11th September: BRISTOL A.S. Coldwater Fish Show at St. Andrew's Church Hall, Stretford Road, Whitehall, Bristol from 1-3.30 p.m. Details and Schedules from Show Secretary, I. Midden, 87 St. John's Lane, Bristol BS1 5AB. (Tel: 0272-712383).

11th September: HOUNSLOW & DISTRICT A.S. open show. Details from the show secretary, Mr. T. Bellingbrooke, 2 Holmwood Close, Addlestone. (Tel: Weybridge 54976).

12th September: BUXTON AND DISTRICT A.S. annual open show in St. Peter's Church Hall, Fairfield Road, Buxton. Benching 12.00 to 2.00. Judging to commence at 2.15 pm.

12th September: LEAMINGTON AND DISTRICT A.S. open show to be held at Lillington Community Centre, Lillington, Leamington Spa, Warwickshire. For further details contact Chairman Mr. J. White, 31 Charles Street, Warwick. (Tel: Warwick 492019).

15th September: DUNFERMLINE & DISTRICT A.S. 12th annual open show at Netherdown Institute, Dunfermline.

26th September: Northern Area Group open show at Darwen Library Theatre, Darwen, Lancashire. Details from B. Baldwin, 10 Olive Grove, Southport, Lancashire.

26th September: WOLVERHAMPTON A.S. open show, the venue to be decided at a later date. Show Secretary is Alan Davis, 31 Star Close, Bentley, Walsal. (Tel: Walsal 646265).

OCTOBER

3rd October: THE BETHNAL GREEN AND INDEPENDENT A.S. 2nd open show to be held at Windsor Road School, Manor Way, East Ham, London, E.6. Benching from 8.30 p.m. on Saturday to 11.30 a.m. Sunday. Judging at 12.00 noon. Schedules and further information from Mr. L. Tuck, 9 Hartford Street, Stepney, London, E.1. (Tel: 01-791 0945).

16th October: EDINBURGH AQUARIUM AND PONDKEEPERS 10th annual open show at Craigroyton Community Centre, Pennywell Road, Edinburgh.

18th October: BETHNAL GREEN AND INDEPENDENT A.S. open show. Please note changed date.

NOVEMBER

14th November: BRADFORD & DISTRICT A.S. open show at Clayton Village Hall, Clayton, Bradford. Further information available from the Show Secretary.