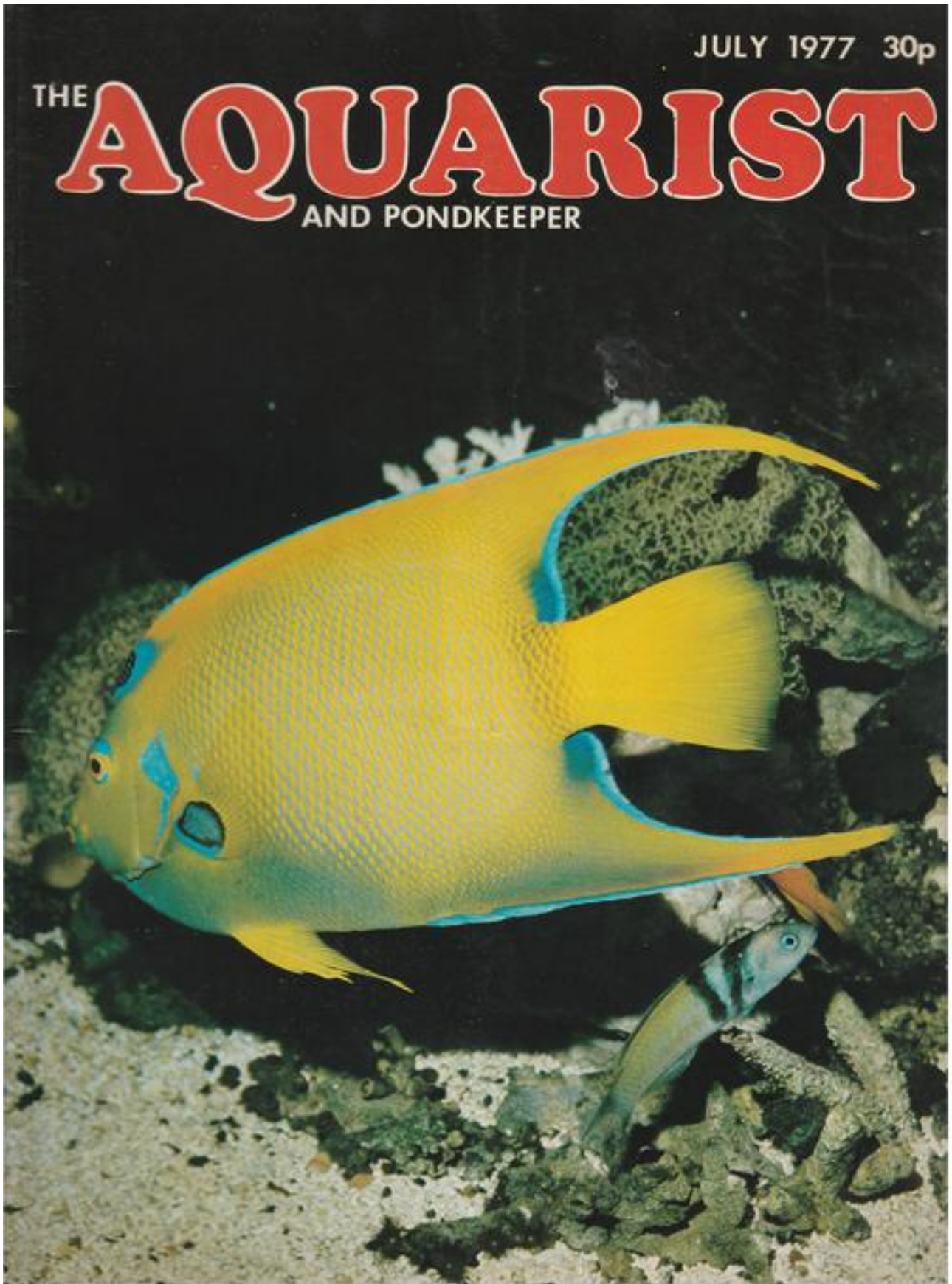


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THE **AQUARIST**
AND PONDKEEPER





THE AQUARIST AND PONDKEEPER

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Contents

| | PAGE |
|--------------------------------------|------|
| <i>Anubias nana</i> | 126 |
| Tropical Marines in Small Aquaria | 127 |
| New Colours in Discus | 128 |
| What is Your Opinion? | 130 |
| Hornworts | 135 |
| Pipefish | 136 |
| Fish House Planning | 139 |
| Our Experts Answer: Tropical Queries | 141 |
| Coldwater Queries | 144 |
| Koi Queries | 146 |
| Fish House Planning (continued) | 147 |
| Girdle-tailed Lizards | 151 |
| The Arawana and Related Species | 153 |
| BKKS News | 154 |
| Product Review | 155 |
| Marine Queries | 156 |
| From a Naturalist's Notebook | 158 |
| Vivarium Notes | 160 |
| Cotswold Herpetological Symposium | 161 |
| Keeping Marine Crustaceans | 162 |
| News from Societies | 164 |



A. nana with fully developed flower which comprises a spadix and surrounding white spathe.

Anubias nana

by Jørgen Hansen & Pamela Stewart

WHEN planting one's tank one will at some point feel the need for some small low plants with which to cover the foreground or to sprinkle between the tall plants. A common first choice might perhaps be *Cryptocoryne nevilli* or *Echinodorus tenellus* but an interesting alternative much talked about but seldom encountered is *Anubias nana*. However the astronomical price demanded for these plants (here in Denmark 5 kr.—about 50p—per leaf) may well make one think twice before making a purchase. This high price is due to the fact that the plant is rare, extremely attractive, and grows slowly.

Anubias nana, which was described by Engler, belongs to the family *Araceae* and is to be found in the Cameroons in West Africa. In all 13 species of *Anubias* are known, of which *A. nana*, a dwarf species, is the smallest and most well known. It is really a

swamp plant but grows well under water. It grows to a height of up to 5 cm. The petiole issues from a green horizontal stalk and bears light green oval leaves about 3 cm. wide and narrow at the tip. A rhizome—like root net, which serves both for attachment purposes and for obtaining nourishment, descends from the horizontal stem.

When planting *A. nana* one must take care that the horizontal stem is not buried by the gravel as it will then rot away; only the roots should be covered. One requires patience as the plant grows very slowly. A more interesting method of planting is to anchor the plant to a tree root or stone. One can, for instance, attach the plant to a stone with an elastic band. After a month's time new roots will have grown and attached themselves to the stone. After a few more months have passed the plant will have reproduced

such that the whole stone if not too large will be overgrown with the species, and one can then move the stone around exactly as it suits one.

The plant reproduces either by the tip of the stem dividing in two, the other end gradually rotting away until two plants are formed, or by a side shoot growing out from the stem and becoming an individual in similar manner. Under favourable conditions the plant will produce a large white flower. To our knowledge there are no accounts as yet of sexual reproduction of *A. nana*.

The plant is quite stiff in structure as one would expect in a swamp plant.

A. nana is very sensitive towards a polluted bottom

layer which will cause the roots to rot. It is similarly unwise to keep snails in the same tank as *A. nana* as they will shamelessly lay their eggs, encysted in a blob of jelly, on its leaves. This will first result in a large yellow spot on the leaf, and then in a large hole on the same spot. The plant grows splendidly just floating on the surface but has not the same decorative value.

As an excessive number of specimens have been collected from the plant's native regions, an export ban can soon be expected if not already in force. In the service of the aquarium hobby one should therefore care for one's *Anubias nana* as well as possible and now and then allow a few specimens to pass on to other aquarists, so that the plant is available to posterity.

TROPICAL MARINES IN SMALL AQUARIA

by S. Pember

MANY aquarists are reluctant to venture into the marine side of the hobby because they imagine marine fish to be extremely difficult to keep, highly priced and very costly to maintain in large tanks incorporating specialised and complicated equipment. This may be true of certain angel and butterfly species which require specialised conditions. However, many aquarists do not have the available space to house such set-ups.

I, myself, have only enough room to house two tanks of about twenty five gallons capacity (twenty gallons after substrate and various furnishings have been added) and therefore I am limited to the smaller species of marine fish of which there are many to choose from.

It is always advisable to buy specimens of roughly equal size and temperament to prevent constant bickering within the community; a good size to aim at is an inch to one and a half inches in the case of clowns, damselfish, wrasses and gobies which are excellent for a small fish community aquarium.

Do not, however, buy small angel or butterfly fish as they require specialised feeding and are best tackled by experienced aquarists.

Another important factor that must be taken into account when purchasing fish is the size they would reach in the wild state. It would be cruel to place a batfish, for example, which grows to at least two feet in length in the wild, into a twenty gallon tank where it would remain stunted and unattractive.

Marine fish have very highly developed territorial tendencies and when setting up an aquarium, even for small fish, this must be taken into account. This problem is easily solved by the intelligent use of

rocks and coral which, with careful positioning, can create crevices and barriers within the tank. As the fish are added they will take up a station in one of these areas except, of course, when too many fish are placed together and there are more fish than territorial possibilities. Strict rules must be obeyed in relation to stocking the marine aquarium and in a normally proportioned tank one inch of fish (less if possible) per two gallons of water should serve as a general rule.

My own tank at the present time contains four fish which are: a Domino Damsel, Electric Blue Damsel, Percula Clown and a small green wrasse which provide a very attractive sight set against red, white and black corals and patches of bright green algae.

An important consideration with marine set-ups is, of course, their price and to cut corners in this respect I utilised an all-glass tank that had previously housed my freshwater tropicals, and the under gravel filters, heaters, lighting and pump that were incorporated in this set-up. I have also found that the type of fish mentioned so far are also relatively cheap, in the region of £1.50 to £3.50, prices that are not uncommon among freshwater tropicals at the present time.

Many of the small marine tropicals are extremely brightly coloured and what they lack in size is made up for in beauty and continued activity.

All the factors mentioned above can be combined successfully to produce a scaled-down version of a large marine set-up at a fraction of the cost but with just as favourable results for the aquarist.

NEW COLOURS IN DISCUS

by T. J. Burden

THE turquoise discus was developed in America by careful line breeding, by the now famous Discus breeder, Jack Wattley. Mr. Wattley devoted some ten years to developing this fish before making it available on the open market. Dr. Eduard Schmidt Focke managed to obtain some of these fish through dealers and middlemen; unfortunately these fish did not grow too well and had an oval shape even after a year of his expert treatment. Dr. Schmidt Focke said that this, in his opinion, was due to the fish becoming ill during transit and not being treated properly or in time to check this ailment. Dr. Schmidt Focke has, for the last twenty years, been devoted to breeding bigger, more colourful and healthy discus; in fact he gave up his job as one of the top gynaecologists in West Germany for ten of these years in order to concentrate on his Discus full time. He is, at the moment, seriously thinking of retiring from his profession as he feels he must devote more time to his Discus. After seven years of intensive experimentation, Dr. Schmidt Focke has developed a strain of discus called Brilliant Turquoise or *Flaschen Discus*. These beautiful fish are not yet on general sale in this country or in Germany. They are the most beautiful fish I have yet seen. They are turquoise from nose to tail and covered in a transparent silver sheen. The available pictures that I have seen do not capture the colour or beauty that I saw in the Doctor's private tanks.

I was fortunate enough to obtain some young stock from Dr. Schmidt Focke, which I have brought back to this country for breeding stock (at a very high price, I might add).

They are growing very fast and at the moment showing nearly full colour although the Doctor tells me they go through various colour phases until they mature. So far they have been red, green and now turquoise. They have bright red eyes and are

perfectly round in shape. I have yet to find a food they refuse to eat.

The water that housed these fish in Germany was 82° - 84° F. pH. 6.8 and D.H. 4 - 5. In addition to the fish house that I was allowed into the Doctor also has a cellar fish house into which I was not permitted to go and to my knowledge there are only a very few selected people who have been allowed to do so. I hope that one day I may be allowed to enter the cellar fish house.

Now a little more about Turquoise Discus in general. There are, to my way of thinking, four types:

1. Turquoise Discus

The fish as previously stated was first developed by Jack Wattley in America. The basic colour is brown with turquoise stripes running through the body in a crazy paving style.

2. Brilliant Turquoise Discus

The same basic background as turquoise but instead of stripes and bars the turquoise is in sheets covering most of the body and although they are very similar to number 4, I feel they must be listed separately owing to the vast differences in intensity of colour.

3. Turquoise Cross Red Discus

In 1970 Dr. Schmidt Focke obtained a large wild red discus. This fish was caught in Brazil near the border with Peru. It spawned within one week of arrival in Germany and much to Dr. Schmidt Focke's surprise. The mate was a green-striped turquoise. In 1974 the Doctor returned to his normal work satisfied that he had done all he could and could not better his turquoise cross red breeding stock.

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

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

To my knowledge the only breeding pair of these fish outside Germany are owned by Mr. Eberhard Schulze of Highgate but he has not yet managed a successful spawning. So come on Eberhard, let's have some of these magnificent fish for sale on the open market. I am not knocking Mr. Schulze's breeding methods but as many of us know he has been plagued with bad luck concerning these particular fish so let us hope that he has more luck in the future.

4. Brilliant Turquoise *Flaschen Discus*

This to me is the most spectacular fish in the turquoise sect. A description of this fish is seen at the beginning of this article. As I already stated, Dr. Schmidt Focke has devoted seven years to developing this particular fish and all credit must be given to him for the beauty of this new colour variety. The patience, joy, heartbreak, sleepless nights and devotion he must have given to Discus in the last twenty years, to me would be, and surely is, priceless. The Brilliant Turquoise strain which he assures me is now fixed, is unlike the original Jack Wattle turquoise in that they can rear their young naturally. It would seem that Mr. Wattle and other breeders who raise their discus fish artificially appear to have offspring which have difficulty in raising their young in the normal manner. This statement is not completely confirmed although I have personally been told about it by breeders in the United Kingdom but mainly in Germany.

There are, according to Dr. R. Geisler and Heiko Bleher, all kinds of colour variations to be found in the Rio Purus with the exception of Heckels. Therefore by selective cross breeding and line breeding we could all create our own particular colour combinations. Germany appears to be years ahead of this country and most of the world in the art of selective breeding of Discus and apart from the handful of Discus people devoted enough in this country. (George Middleton, to name one) no one else seems to care and are quite happy to plod along waiting for someone else to do all the hard work. So come on Discus fans, it's time to get up and breed better discus and maybe even have our German counterparts wandering around our

country in search of better discus as I have had to do in Germany.

I thought when the Discus Association was formed by Frank Ashworth that at last we might be getting somewhere; the sharing of information and forming of local study groups seemed an excellent idea but somehow, it seems to have fallen by the wayside. I am sure that with more members and less secrecy the Discus Association could be a greater success than it is now.

I will gladly help any beginner on his way to breeding discus and I will gladly exchange ideas with anyone with breeding experience.

I am, at present, trying two different methods of tank cleanliness that I saw in Germany in addition to the sterile tank system we tend to favour in this country. Maintaining a number of tanks for Discus gets more and more time-consuming by the day and any method that will (a) keep the fish happy, and (b) cut down on maintenance seems to me worth trying. Fully gravelled and planted tanks is one idea but this is not to be advocated for breeding as small fry often get lost between the gaps of the separate stones and if the adults eventually see and attempt to rescue them it is possible that they can inadvertently crush and kill the young. Another method is a sub gravel filter in the corner of a tank with two strips of glass silicone-rubbered filling in the exposed edges of the filter approximately 2-3 in. high and covered with gravel in the normal way. The third method is to have plastic or china bowls with a fluid funnel placed in the middle. A hole is bored in the side of the funnel and an air line is inserted with an air stone placed centrally in the funnel mouth. This is then put upside down in the centre of the bowl or dish with $\frac{1}{2}$ -1 in. of gravel surrounding it but not under it; then a 1-2 in. layer of Sphagnum peat moss is placed on top with 1-2 in. of gravel placed over the top of it, thus producing a very effective way of keeping suspended bacteria down, adding peat to the water making it more acid—reducing the pH. All in one filter. It is easily removed and the peat changed and replaced in the tank every 8-10 weeks. You can, if you wish, use just plain gravel if you are satisfied that your water is soft enough. When I mention gravel you are advised to use lime-free or silicone gravel as this will not affect the pH. and D.H. of your water. One method of testing gravel is to pour a little hydrochloric acid on some of the gravel and if it fizzes it is not lime-free.

Any other ideas concerning filtration etc. are worth trying and should you find an effective method I would be very glad to hear about it.

If you require more information regarding the European colourful Discus fish that I have mentioned or others that you have heard about, please contact me and I will gladly assist you as much as I can.

All correspondence to T. J. Burden, 134 Hook Road, Epsom, Surrey. (78) Epsom 40226.

WHAT IS YOUR OPINION?

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

Photographs by the Author



AN UNEXPECTED trip to London, to collect *The Sunday Times Magazine's* Literary Merit award for my school magazine, has left me rather exhausted and has used up a lot of the time I had planned to devote to this month's feature; so please forgive me if my excitement at my pupils having produced creative writing that was adjudged to be better than that from pupils at Millfield, Rugby and Eton means that this month's feature may be somewhat shorter than usual. The only consolation I can offer is that it will probably never happen again—and at least you'll know that the occasional good piece of news can and does come from Northern Ireland, even if it tends to be ignored by the media.

Having got my little bit of boasting over I'll hurry into the first of this month's letters. Miss Josephine Fox, S.R.N., writes from 50 Morley Grove, Harlow, Essex: "You may recall my previous letters which you published in October 1974, and in March 1975, concerning my problems and successes in growing plants. Now I have settled and had my present set-up for some months I thought you would like to hear of my recent success. I moved to this address in September 1975 and until last summer was depressed to see the ever-deteriorating plants and the even more luxuriant carpet of algae. However, the fishes appeared to be in excellent condition despite this and I came to the conclusion that the sight was merely aesthetically displeasing. However, eventually I decided to strip the tank and re-set it using new gravel and plants. This was delayed by my being fortunate enough to watch a platy dropping her young; and so the four fry I saved occupied the spare tank for a time. Eventually they were large enough to join the rest and the whole family could be moved out into their temporary home.

"Out in the temptation of my favourite aquarium shop I went quite berserk and bought a new 24 in. x 12 in. x 15 in. tank. I also purchased some largish gravel—about 5 mm. in diameter, some pieces of slate, a fluorescent tube and control gear, some compost and a new box filter that fits into the top corner of a tank. I had previously ordered several pounds' worth of plants from a mail-order firm and these arrived right on cue after I had half filled the tank and put the gravel and slate in place. The plants consisted of a large number of straight *Vallisneria*, some *V. torta*, *A. undulatus*, *C. wendtii*, *Bacopa*,

Ludwigia natans and *arcuata*, *E. paniculatus*, *S. subulata* and a rather dainty and attractive plant I believe to be *Nuphar luteum*—or something similar. I left the plants for over a week before gradually introducing first the smallest fish and, finally, a large pair of angels. Before two more weeks had passed I was amazed to see the new growth. Runners everywhere! Within six weeks I estimated a 50% increase in the long *Vallisneria*. The *A. undulatus* and *C. wendtii* have done exceptionally well and two of the latter have flowered.

"Since the move the two angels have been spawning and have done so three times; but I can't decide if I have a pair or two females. The female of my pair of dwarf gouramies died in the move, so I purchased another—and the male immediately began building a nest. At his third attempt, built, of course, whilst I was away for a couple of days, he obviously succeeded in interesting his partner for the nest was full of eggs. These I moved by scooping the whole nest out with a tablespoon, leaves and all, and dropping it into the spare tank. Two days later I was prepared to clean it out again, seeing no life, but I left it 'until tomorrow.' Next day I found several fry in it. They are a week old now and appear to be thriving on liquid fry food with 24 hours of light and no aeration. I think I have about two dozen.

"I just cannot understand what I have done this time that I failed to do before. In a fit of curiosity I unearthed my copies of *The Aquarist*, since 1974, and read through them—it took some days—paying particular attention to *W.Y.O.* to see what had been written. Strangely, although many readers had made reference to plants and difficulties with them, I found only one positive comment—from Mr. Ayres of Yorkshire. He remarked that that the tank depth seemed to him to be an important factor. Well, my experience of having changed from 12 in. to 15 in. seems to have upheld that suggestion. I would also suggest that the gravel is as important—as well as the time of year. After all, no gardener worth his salt would transplant except at certain times of the year, would he? But mostly I think I was just plain lucky. Certainly good judgement never entered into it.

"My most recent acquisition is a pair of fish sold to me as Hong Kong plecostomus. However, when I looked them up in my own 'Bible'—Axelrod and

Schultz's *Handbook of Tropical Fishes*—*Otocinclus* would seem to be what I have. I hope so, for the former grows to 24 in. and the latter only attains 2 in.! Whichever, they are enchanting little creatures, much more entertaining than *Corydoras* and avid algae eaters!

"Your request last month for favourite books leads me to recommend the one mentioned above. It has a section on ichthyology and another on plants and aquarium management. The section on fishes is exceptionally informative. Each page bears a photograph, generally black and white, and a well-titled chronicle of requirements and preferences, with breeding details. It is certainly the easiest encyclopaedia type book I have found. With shops I have not been so lucky. This area seems to be particularly

swords. The spaces between the particles allows waste materials to reach the plants' searching roots. I also agree about the 15 in. deep tank—for most plants. Plants, like fishes, adapt to their environment; many tend to stay short and stunted if grown in 10 in. or 12 in. deep tanks; in 15 in. deep tanks they have more space for growth. On the other hand, dwarf plants tend to favour shallower water—as do certain fishes. As I've mentioned before, tanks can be kept so clean that plants are starved of food. Some fish droppings on the base of the aquarium can encourage plant growth; however, decaying fish food will encourage neither fishes nor higher plant forms. Ensure that floating plants are kept under control as masses of them can cut light supplies off from base rooted plants. A point of interest: I still have some Java moss which



devoid of really good aquarium shops and I have to travel far afield to Knebworth, Herts., and High Wycombe, to shop, where I have had excellent service and friendly advice when I asked for it. On one occasion the proprietor and his wife of the latter establishment called to inspect my tank in answer to a cry for help, diagnosed and corrected the fault, and absolutely refused to make any charge. It is eighteen months since I lived in High Wycombe, but I still shop there!"

Readers are reminded that I accept no responsibility for the views expressed by contributors to this feature—nor do I necessarily agree with the opinions expressed. Like Miss Fox, I have found that some plants—particularly Amazon swords that are heavy feeders—grow better in gravel that is somewhat larger in particle size than that usually sold in aquarium shops. I have found crushed granite chippings good for large

I'd be happy to give to anyone who'd like to try a piece. Please include a couple of 9p stamps to cover postage and packing costs. As usual, it'll be a case of first come first served.

Photograph 1 shows my single fancy goldfish. It's growing well and makes an ideal model for aquarium photography as it tends to remain stationary for longer than the smaller tropical species. The photo was taken using a standard lens set at f22, with no extension tubes, using FP4 film and flash mounted on the camera. I'd be pleased to hear of your successes with coldwater fishes and of your failures or successes with aquarium/fish photography. Please send a s.a.e. for the return of any prints you might care to let me see.

The next letter reached me from 298 Cheriton Road, Folkestone, Kent, the home of Mr. Antony Smith. He says: "It was about one year ago that I came to

what I considered to be the crossroads of my fish-keeping life. I was mildly interested in tropical fish and had just two tanks: one which housed cichlids and another that was a community tank. It was then I decided that if I were going to keep fish I must make up my mind what I was going to keep and concentrate on that. Eventually I decided to concentrate on livebearers and get rid of the others. I got three more tanks and planted them all with bushy plants. A friend gave me the address of the Newcastle Guppy and Livebearer Society and eagerly I wrote off to join.

"I was sent a N.G.L.S. Journal and looking through it I found there were many more species of livebearers than I thought. However, I soon made friends with livebearer enthusiasts and obtained quite a variety of fish. Soon I found that I had made the right choice in livebearers. My particular favourites

"This is my first letter to W.Y.O.," writes Mr. Stuart Laker, from 63 Benson Court, Ingram Crescent, Hove. He continues: "You asked about problems associated with large cichlids. My *Tilapia mossambica* were fine when they were small. I had two males and three females, but when they got to 5-6 in. the problems began to start. The males used to fight when they were smaller; but when they started at the larger size it was an absolute disaster. The females quickly got out of the way while the males were in mouth-to-mouth combat. I didn't notice it until I heard a loud splash whilst I was watching TV. I turned round quickly and saw a cloud of dirt disturbed in the tank and a trickle of water running down the wall behind the tank. I realised they were getting too big to stay in my tank so I separated the males. The next day I went to see my friend who owns a fish



are *Girardinus metallicus*, *Xenotoca eiseni*, *Limia vittata* and *Heterandria formosa*. The *Girardinus* in particular are very nice fish. When I got them they were fry but now they are fairly large. They possess very distinct metallic bars which have a goldish sheen, and also a black spot on the dorsal fin. As yet they have not had any fry but I am hoping for some in the future. Both the *Limia* and the *H. formosa* are very prolific and I now have a great number of young of these particular species. On the whole my fish are very peaceful and accept any food offered. I have only encountered one problem with livebearers and that is cross-breeding; but on the whole they are very interesting to keep and there's great pleasure in owning fish that are not usually seen in aquarists' homes."

132

shop; I asked him if he would take them and he agreed to do so. I went home quickly. My troubles started when I caught one. As I lifted it out of the water it splashed and I got covered with water. When I looked up I noticed duckweed sticking to the ceiling and over the stereo. This made me quickly make up my mind to get rid of all my fish except my albino catfish which I have had since I started in the hobby about three years ago. I decided to stay with cichlids and mouth-brooders so I bought smaller sized fish... I'm glad I won't get covered in water by these. I have just written a letter to Mr. J. Hems about my strange, small, painted face fish which, I think, are mouth-brooders. I hope he can find out something about them. Keep up the good work!"

The peculiar looking items in photograph 2 are the

THE AQUARIST

flower buds and floating leaves of a *Cabomba* plant. If you have also managed to get *Cabomba* to flower in your aquarium please send me details of the conditions under which it was encouraged to flower.

Mr. Paul Burn resides at 67 Windsor Drive, Cleadon Village, Tyne and Wear. He says: "After reading the article on breeding *P. pulcher* (*kribensis*) in the May edition I am prompted to tell you of my own experiences with this species. I obtained five of these fish from my dealer when they were very young. As they grew it became obvious that there were two males and three females. After two months the fish were about 1½ in. long—with the exception of one male that was a good ½ in. shorter than the others. These fish were placed in a 2 ft. tank and after three months the smallest male became interested in one of the females. These two fish were placed in an 18 in. tank, unfurnished apart from a cave in the back corner of the tank.

"The fish were fed on chopped earthworms, white worms and blood worms for two weeks before I was lucky enough to witness the spawning. This was where the fish differed from other species of dwarf cichlids I have kept. The female entered the cave, laid four or five eggs, came out of the cave and chased the male around the tank, showing brilliant colours, until the male eventually caught on, entered the cave and fertilized the eggs. This continued for about thirty minutes during which time 40-50 eggs were laid.

"Both parents cared for the eggs and were thus left in the tank; however, after two days the eggs began falling from the slate unhatched, despite efforts from both fish to blow them back on. But by the next morning the eggs were in a freshly-dug hole in the gravel. On the third day they hatched; and a week later the fry were free-swimming and eating brine shrimps. The parent fish looked after the young for a further three days but then suddenly ate them all. This was a great disappointment as none could be saved. The next time I spawn any cichlid I will remove the parents after the eggs have hatched.

"I find I have great problems with breeding the black molly. The females of all the pairs I have had, after bearing young, all die two or three weeks later. Anyone who has any idea as to why this happens and who would like to drop me a line would be greatly appreciated."

Fire Eels

Mr. L. A. Belshaw's home is at 121 Allendale Avenue, Apsley Estate, Nottingham. He writes: ". . . I must tell others that my (spotted) fire eel *Mastocembalus erythrotaenia*, is 12 in. long, 2 in. wide, and still growing very well. He eats between 6-12 large earthworms each night and still goes looking for more. I hand feed him. He has settled down in a large tank with rocks and plants which he loves to dig up. I have the tank fitted with a good power filter

that keeps the water on the move. He has lost his shyness and will eat any fish that he can catch and slip down his ½ in. gaping mouth.

"Once my fire eel was attacked by my 8 in. liver catfish, *Heteropneustes fossilis*. The catfish only nipped the eel's pectoral fin; then the eel chased the catfish round the tank, taking bits out of it. It was so bad that I had to treat the catfish's wounds. My 9½ in. *Plecostomus* is 3½ in. wide and boss of the tank. No other fish bothers him. Large specimens get very bossy at feeding time so I feed him first with dried food and then some earthworms which he loves. Once the eel sees the *Plecostomus* retire it comes up to the surface to feed. If anyone is thinking of buying a spiny eel that will grow very large I can tell them that all their smaller fish will be in great danger at night. And a big eel will bite you if you don't hold the food correctly. I speak from experience!"

Discus

Mr. Robin Maudsley writes, on behalf of his wife and himself, from 102 Meadow Street, Preston, Lancs. "We would like to have our say on discus. We both started fishkeeping about 4 years ago and about 3 years ago started the long hard work with discus keeping. With both of us trying desperately we always came to the same ending—disaster!—even after following what the books said. We found they gave a lot of misleading information to the beginner, so we decided to do away with books and start from scratch on our own ideas. We have had great success and have never looked back.

"We have four breeding pairs. Our first success was 160 young browns where the parents guarded and cared for the small fry—which are usually smaller than angel fry. After approximately 14 days the fry looked like perfectly formed miniatures of the parents in every way. Since then our breeding routine has grown, with our latest pair being a male blue Heckel crossed with a female brown which, as far as we can discover, are the first to breed and spawn in this country. Their first batch was 170 young; and their second batch are nearly 300 × 10 day old babies. As this is the first batch over here all the young are being grown up as we hope, and others agree, that these could be the missing link in discus which we hope will turn out looking like *S. haraldi*; but only time will tell. As both parents are beautifully marked, one can only hope; whatever happens they are unusual.

"One thing we have noticed with all our batches is that the young never retire back to their spawning medium at night, but remain with their parents both day and night. The breeding tanks are two 48 in. × 18 in. × 18 in. and six 36 in. × 18 in. × 18 in. all-glass tanks. Plans for a further ten, including 6 ft. tanks, are on the move as our biggest problem seems to be raising tank space for the young. Two-thirds of all our tanks are bare bottomed; the other third are

fitted with U/G filters with 3 in. of well-washed 1 in. gravel, with peat sandwiched between. This helps stabilize the pH and DH and stops some of the many problems.

"Very little live food, other than white worms, is given. Grated and scraped ox or beef heart and flake make the basic diet. Our average spawnings range from 90 fry from a 10 months old female red to 200 plus from our larger pairs. 10-15% deformed is usual with some pairs, unlike the higher rating with angels—which we think do very well. Many shops and private individuals sell what they think are breeding pairs; it is common for such pairs to turn out to be two females. Such pairs of females often react as if they were male and female: one acts as a male without releasing any eggs—which goes to prove that even fish have their own problems! Egg and fry eating are more common with discus than with angels;

use none and have very few troubles. Patience is the name of the game and the rewards speak for themselves when one sees a shoal of young swimming round their parents like a swarm of gnats on a summer evening. The food produced by the parents can and does increase their growth to double the size each day.

"There are others who breed and have bred discus and probably have more knowledge about discus than both of us. I hope to write to you again in a few months with some shots of our fish and, hopefully, a photograph of our Heckel \times brown. If you have any queries about discus keeping drop us a line and we will try to provide an answer." (I found your letter most interesting, Robin and Pat. I do not have any discus at the moment as I do not have the time to give them the attention they require; however, if I ever buy any more I shall certainly ask for your assistance, if necessary. Some months ago, in separate issues,



or at least we have found this to be the case.

"I have tried other adults as foster parents but they have not always been successful. At the moment we have around 600 young at various stages, and about 20 adults and others growing up. Later in the year we hope to have some coloured photographs of discus and their young. We do not yet advertise in the aquatic press as the demand in our area is large; but we hope to do so later in the year. I hope our letter sparks off someone's interest in discus keeping as this part of the hobby has been growing very quickly during the past few years.

"Discus are not impossible but they are quite demanding as regards their environment and conditions. If these conditions are not met correctly the fish suffer and waste away. But they are tough little fish and can stand a fair amount of abuse before they fade away. Think twice before adding drugs: we

I included letters about discus breeding from my friend, Derek Chambers, who wrote from New Zealand. Several weeks ago, out of the blue, I received a telephone call from Derek—and learned that he had brought his wife and family back home to Northern Ireland for an extended visit. I have not yet had a chance to meet Derek, in person, since his return, but I look forward to doing so and picking up some more tips about discus breeding. I understand that Derek sold off his stock before he returned home and that his profits helped to pay for the expensive fares home. There's obviously profit in discus if one can learn the secrets of keeping and breeding them.)

I'll conclude this month's feature with a photograph of a beacon fish, *Hemigrammus ocellifer*. Please send me details of your breeding experiences with this attractive species.

I should also be pleased to receive your opinions on

any of the following—although I don't expect a large number of letters as numbers tend to drop off in the summer while readers are taking their holidays. The subjects are: getting rid of pond pests; preparing fishes for showing; feeding aquarium plants; filter media—your favourite combinations; uncommon live-bearers; fancy goldfish; breeding good guppies and

obtaining good breeding stock; useful pond plants; raising live foods at home; the use of wood as a form of decoration in aquariums; tropical plants that grow very well for you; and the largest number of babies obtained from a single spawning—of any species. If you find time, please do drop me a few lines. Have a pleasant summer holiday!

THE HORNWORTS

by Phillip J. Brown

THE HORNWORTS belong to the genus *Ceratophyllum* (pronounced ser-at-o-fil-lum) which in turn has its own family, the Ceratophyllaceae. They are widely used in aquariums and ponds and the two major species mentioned here are both native to Great Britain, *C. submersum* apparently rare in the north. The genus is cosmopolitan but it is suspected that some at least of the thirty species recorded are only local variants of *C. demersum* and *C. submersum*.

These two species are often confused but attention should be paid to their leaves, *C. demersum's* generally being single or twice forked, *C. submersum's* being three-four times forked. *C. submersum* is also rather softer and brighter green. Still, these differences are of little import to the average aquarist.

The Hornworts are delicate plants arising on thin brittle stems which rise to the surface of the water (if not too deep) and spread along it if the light is strong. However, they will grow in shady positions and in a wide range of water and temperature conditions. Imported plants alone should be used in the tropical aquarium. Plants from the wild will not only harbour some insect travellers but also need acclimatisation. The leaves are grass-green in colour and bear tiny little spines that make it feel rough when picked up in the hand. Under intense light the stems turn somewhat reddish.

If grown in deep water it becomes somewhat leggy and the apical tips are best pinched off to encourage side shoots which can easily be replanted once they are about three inches long. Roots are not produced in anchored plants, but plants may sometimes be found anchored in mud by means of special branches

bearing finely divided foliage. Older plants can be allowed to float if desired. These will form dense growths, the older parts dying away.

During the Autumn, the apices of the shoots cease to grow and begin to appear more crowded with darker green leaves that contain a lot of starch. These usually drop during the winter to the substrate, remaining dormant until the spring (unless it is an exceptionally mild winter) when new plants will begin to grow.

Flowering is rare in deep water, more common in crowded shallow water. Flowers are present in the leaf axils, small and inconspicuous, both sexes on the same plant. Pollination, however, is interesting. When the anther (the pollen-containing part of the stamen) is mature a tiny float carries it to the water surface where it opens allowing the pollen to gradually sink downwards, some falling upon the stigmas of the female flowers, provided that not too vigorous water movement carries them away. This is why crowded conditions help. For germination to take place fairly high temperatures (27-35°C.) appear to be required.

In the aquarium the biggest problem is that the lower halves become clogged with algae and detritus unless kept in very clean water preferably with a little current. I bunch my plants together pushing them (carefully, for they are very brittle) about two whorls down into the gravel. In my experience lead invariably crushes the stems. In good light they will grow fast and make a beautiful backdrop to the aquarium picture.

PIPEFISH

by

Huw Collingbourne

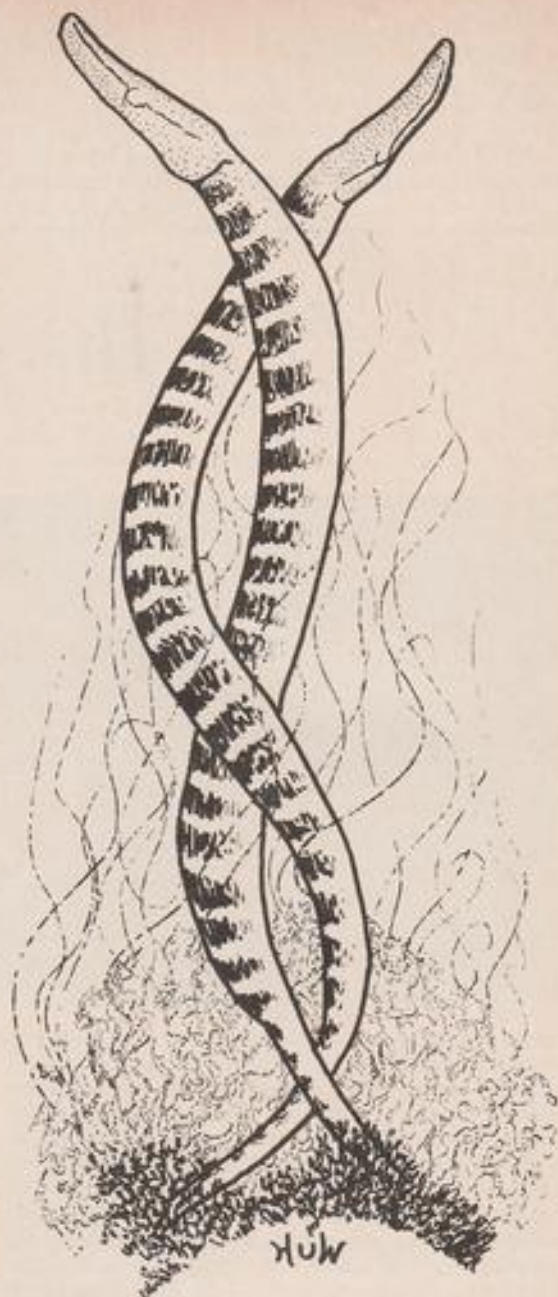
I CAN WELL remember my astonishment upon seeing one of these creatures for the first time. I had just turned over a stone lying amongst some weedy rocks on the lower part of the shore and there it was! This extraordinary thing, half-a-yard long, its body all armoured with scales and its angular head like a long-nosed version of the knight in a chess set. I was too taken aback even to successfully capture the thing. Fortunately, however, there proved to be numerous others on that particular shore and before much longer I had caught specimens representative of several different species of pipefish.

Unfortunately these creatures are far from universally common. My only encounters with them have been on certain stretches of the shore in south Devon. However, I am told (and reference books confirm) that pipefish may be found in clear seawater in most areas of Britain. In this they differ from their close cousin the sea horse which, although a native fish, is seldom found anywhere but in the extreme south and even there is something of a rarity.

The "typical" pipefish may be described as a long, thin, almost snake-like creature, though its body is far less supple than that of a snake. Midway down the back it possesses a dorsal fin which propels the animal by moving to and fro very rapidly (so rapidly, in fact, that it frequently blurs into invisibility) in exactly the same manner as the fin of the more familiar sea horse. Indeed, for those who have never seen a pipefish, I could perhaps do no better than to describe it as looking like a sort of very long sea horse which has had all the bumps stretched out!

The head is remarkably like that of a sea horse. It is characterised by a projecting snout with a very tiny mouth for the pipefish normally only eats microscopic creatures.

The breeding behaviour of pipefishes is worthy of note. From the time the eggs are laid until the



young hatch the male is charged with their care. Those species belonging to the genera *Eutelurus* and *Nerophis* carry the eggs adhering to the ventral surface of the body. The only other British genus, *Syngnathus*, however, incubates the eggs actually

the worm pipefish will prove to be a far better aquarium inmate. Even this species will require plenty of room, so please don't try to keep one of these animals unless you have a suitable aquarium and are already an experienced marine aquarist. I know that many aquarists are tempted to try to keep interesting indigenous creatures in a quite unsuitable way because, unlike their tropical cousins, they involve no expenditure, but to do this is courting disaster.

The last species which I am going to mention I do beg even the most experienced of aquarists to leave where he or she finds it. I am talking of the great pipefish, *Syngnathus acus*. It is a creature of splendid appearance but is unfortunately totally unsuitable as an aquatic pet, for it grows to a length of about 22 inches! Apart from the size of the animal there are numerous difficulties to be overcome should one contemplate keeping any pipefish. Pure, clean seawater is essential. This should be thoroughly aerated and filtered but should not be disturbed by the excessively strong currents created by some of the more expensive power filters. An old and efficient under-gravel filter is, I believe, ideal.

Like sea horses, pipefish are notoriously fussy feeders. They are small-mouthed and in a natural environment eat only the very small drifting life. To most aquarists the production of suitable food will prove the most serious, perhaps insurmountable, problem and may deter him from keeping pipefish altogether.

An excellent substitute for their natural food is brine shrimp, but to hatch these in sufficient vast numbers to satisfy one or more adult pipefish is a task not to be underestimated.

Water fleas may be used as a diet supplement, though even these are too large for very small pipefish and in any case water fleas soon die when introduced into seawater. Besides, unless you have your own thriving culture of water fleas you will not be able to provide these in sufficient numbers and even then you would need to resort to some other food in the water when the water fleas die off.

Some pipefishes may be tempted to eat tadpoles and I have even fed these directly from my fingers. Others, however, refuse to eat at all in captivity and, unless these can be tempted to break their fast very soon after being introduced into the aquarium, they will certainly die of starvation.

One must also be careful in the choice of tank mates for a pipefish. Ideally they should have an aquarium to themselves or possibly shared with some sedentary invertebrates. Certainly they should not be included in the same aquarium as any other type of more lively or aggressive fish. Apart from the fact that they do not thrive on bullying, they cannot stand any competition for their food supply.

The snake pipefish conforms more to the "typical" pattern, being much longer and possessing a noticeably extended snout. It has a rudimentary tail fin which distinguishes it from other species. Both the snake pipefish and the worm pipefish are likely to be encountered on the shore, though, unless the aquarist has a very large aquarium (and an aquarium of unusual height which can more than accommodate the pipefish when stretched out vertically, for they will not readily adapt to a life of exclusive horizontality).

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There is, however, one tiny British pipefish which deserves our attention. The worm pipefish, *Nerophis lambriformis*, grows to a length of about five inches, and this fact alone recommends it most strongly to the interested aquarist, for so many other species are of quite an unmanageable size for the average aquarist. The worm pipefish looks quite unlike most of its relatives, being smooth, dark skinned and rather snub-nosed. It is, however, quite an active little animal and, if maintained in health, should prove a joy to its owner.

The tropical marine enthusiast need take less trouble in collecting specimens (even though this means spending more and, in my opinion, missing half the fun!) for these are many tropical varieties of pipefish sold by aquarist supply agents. I have no experience of keeping these varieties myself, though I understand that they are similar to our native species as regards behaviour and breeding, and they share, too, the drawbacks (which I shall outline later on) of being very delicate creatures and very finicky feeders. One point in their favour is that several tropical species are much smaller than most of our native species.

The aquarist wishing to observe pipefish himself will be presented with two possible sources of supply. The native marine enthusiast need look no further than the shore line. He should choose an unpolluted area in the spring or summer and he should search low down the shore at low tide and preferably on a spring tide, that time occurring twice monthly (at the time of the New Moon and the Full Moon) when the sea retreats further than at any other time. One may find pipefishes in all sorts of strange places: in tight, rocky crevices, under stones and especially under those large stones which are found in the runlets of sea water which flow amongst the rocks and through the sand on the low shore at extreme low tide.

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FISH HOUSE PLANNING

by Pete Watson

ECONOMY, efficiency, minimum overheads, maximum output and maximum use of available facilities, are well used terms of the present era. They are terms that should also be observed by any hobbyist who has, or is contemplating, a tropical fish house. Economy and its allied subjects should always be uppermost in the mind irrespective of whether the fish house is used to breed and rear fish, rear show fish, or just used as a home for a rather large collection. Unless, of course, you happen to be one of the fortunate ones who has an unlimited supply of time and money.

Through the years I have progressed from one form of fish house to another and with each step I believe I have become a little wiser and a little bit more organised. With this accumulated experience as a basis I offer the following as guidance to those who may be setting-up a fish house or perhaps contemplating doing so.

Naturally enough my collection first grew above the one or two community tanks with my first serious attempts at fish breeding. The start was made in a totally unsuitable collection of tanks scattered round an RAF married-quarter dining room. On leaving the forces I took over an unused bedroom of a new bungalow, only to be given marching orders, this time from my wife, before the condensation and humid conditions ruined the place. I then moved out into a shed bought secondhand from a local farmer which, after some modifying and much insulating, served well for some time. It was, however, inconvenient and labour creative, rather than labour saving owing to its remoteness from the mains water supply, its lack of adequate drains and some rather unsafe electrics.

Next came a new shed, purchased from garden shed suppliers who advertised a construction technique that could meet any size or design requirement, but who became foxed by an order for a 12 ft. by 6 ft. shed with no windows. I intended to construct skylights in the roof but adopting the usual procedure of keeping correspondence as concise and to the point as possible I did not mention this. In the end they did supply what I required, which was a shed roughly

twice as long as it was wide, with no windows and a door in one end. At 6 ft. wide the shed allowed 18-inch tanks down each side and still left some 3 ft. in the centre free for working. I had previously found that a shed of 'square' construction created problems, such as overlap of tanks in the corners of the fish house, or wasted space when trying to prevent this overlap, dark corners and a waste of space in the centre of the fish house if this space was not large enough to accommodate a block of tanks. For the new fish house I was also able to lay a solid concrete floor with a built-in drain leading off to a soak-away dug in the garden, and install safe electrics. My main problem was again the water supply, or rather the lack of it. I could now dispose of waste water inside the fish house but I still had the problem of the use of a hose pipe or buckets to get my fresh water into the fish house.

I had realised by this time that a fish house that was to be both practical and economical really needed the following:

- (a) A solid concrete floor with built-in drain.
- (b) Plumbed-in mains water supply.
- (c) Safe electrics.
- (d) Effective insulation.
- (e) Overhead light source.
- (f) Sink and small work surface.

The listed items are in no particular order, and are not meant to suggest a fish house could not be run without any of the items. What I am suggesting is that if you are building a fish house and you can incorporate all of the items listed then you will find that much less time is consumed in such tedious work as water fetching and carrying, and other maintenance tasks, and that more time can be devoted to the fish. After all you will not have built the fish house just so that you can get a bit of exercise by carrying buckets of water. Other items could have been added to the above list such as a tank for storing and ageing water, provision for air supply, and so on but I do not feel that these will affect the overall design of the fish house.

Basic Requirements

I have managed to incorporate most of the basic requirements in my latest fish house which I have just finished building and equipping. It was constructed very much as a do-it-yourself project on a pay-as-you-go basis and is exactly twice the linear size of the previous fish house at 24 ft. by 12 ft. It is in fact an extension to an existing flat-roof garage, and required planning and building permission from the local council. Other than the flat roof and the cavity walls, the shell of the building is of little interest.

With pitched-roof fish houses much space and heat can be wasted in the virtually unusable roof space, so rather than create a false roof I chose the flat-roof design. The cavity-wall design was used for two reasons, the first being the insulation factor and the possible use of a cavity-wall insulating process at a later date, and the second, which was of more practical origins, was that with single-thickness walls support piers are required at regular intervals. These piers would present problems with the arrangement of the tanks and framework along the inside walls, because by necessity they would jut out some four or five inches into the fish house.

The roof was lined on the inside with (safe to use) asbestos sheets and the cavity between the roof and the asbestos sheets was filled with fibre glass. The asbestos sheets were sealed on the fish house side and given several coats of water-based swimming pool paint in an effort to prevent moisture reaching the roof joists. The inner walls, which were rendered, were also coated with swimming pool paint, as much for its light-reflecting properties as for its sealing properties in this instance—although any seal against the humidity and dampness can only be an advantage.

The skylights, which were used in preference to windows in the wall, merit special mention. These can save, and possibly earn, money in several ways. Primarily, the more natural sunlight that is utilised for both its lighting and heating properties the less will be the electricity bill. Fewer, or no windows along the wall allows more tanks to be accommodated, in a more regular and better organised arrangement. Also, tanks situated near the skylights can provide bonus crops of plants.

It would be a digression to describe the construction and positioning of the skylights, but they should be at least double-glazed, and triple-glazed if possible. When planning the number of skylights and their positions it is as well to bear in mind that it is, within reason, easier to shade off excess light than to enlarge the light area at a later date. An area giving too much light and heat in the summer will save electricity in the duller days of autumn, winter and spring. As a rough guide, a room that is 8 ft. from floor to ceiling requires a light source area of around one-tenth the floor area. Carefully positioned skylights can also ensure that the maximum amount of light is directed

to the areas where it is most required and dark corners and the need for artificial lights above tanks can be eliminated.

From the roof we now move to the floor and that most important item, the drain. No fish house is really complete without this facility. Those with fish house experience will know that for a number of reasons the floor is perpetually wet, especially if like myself they are firm believers in regular water changes. If, when the floor is laid, it is sloped to a drain at the lowest point, much of the water spillage will drain away naturally, thus minimizing the need for mopping-up. The drain outlet should if possible incorporate a mud trap of some sort to avoid blocking the soak-away or the sewer pipes with mulm or gravel. I am not suggesting that gravel is washed down the drain on purpose, but when syphoning tanks, washing gravel and such like, some inevitably gets washed away, and over a period this could accumulate.

Water Supplies and Electrics

On to the water supply, and this is perhaps equal with the drain as one of the most important facilities. With a plumbed-in water supply there is no inconvenience of the hosepipe, or the tedium of bucketing from the nearest tap, and more to the point the fish house door does not have to be opened and closed anywhere near as often. Thus the heat that we spent good money producing is retained in the fish house longer. A suitable size sink with perhaps a draining board is also a useful extra and can be used for the washing of equipment, small tanks and gravel, and again improve the self-containment of the fish house.

The most dangerous and yet often one of the most neglected facilities in a fish house are the electrics. Safe electrics in a fish house are a pretty tall order yet essential for the safety of both your person and your property. The new electrical safety requirements have ensured better protection for the user of electrical accessories where there is the potentially lethal combination of electricity and water, but I have found that in a fish house the main danger points are not at the actual equipment, but at the connections made between the equipment and the electrical mains supply, be they switches, plugs and sockets or connection strips. In most instances the reason for this is the high humidity of the fish house and the resultant water vapour that condenses on the connector.

Ironically most of us will endeavour to select what we consider the best and safest electrical appliance available, often without prejudice to cost. We then tend to connect that piece of equipment to the electrical mains with any plug or connector that comes to hand. Often a connecting strip must be used between the equipment and the supply point and these are perhaps bought cheaply as an after-

Continued on page 147



OUR EXPERTS' ANSWERS TO YOUR QUERIES

READERS' SERVICE

All queries **MUST** be accompanied by a stamped addressed envelope.

Letters should be addressed to Readers' Service, The Aquarist & Pondkeeper, The Butts, Brentford, Middlesex, TW8 8BN.

TROPICAL QUERIES

Of the scats and monodactylids known to the tropical aquarist, which species are most likely to settle down and live well in a fairly spacious all-glass aquarium?

Monodactylus argenteus is the fish I would choose. Given slightly salty water, a temperature in the seventies (°F), a diet embracing a variety of live flesh, dried and green food (lettuce, duckweed and so on) it should flourish for years and make a most attractive looking aquarium inmate. A word of warning, however: *M. argenteus* in its large sizes tears at, and eats, aquarium plants, especially those with lacy or tender foliage.



Monodactylus argenteus

I am making a serious study of fish culture and water management and would be pleased to receive the titles of some books dealing with advanced techniques in fish farming in temperate and tropical countries, water purification and

July, 1977

by Jack Hems

circulation, and the cultivation of aquatic plants in indoor aquaria.

You can hardly do better than read C. F. Hickling's *Fish Culture* (Faber & Faber 1971), Stephen Spotte's *Fish and Invertebrate Culture* (Wiley-Interscience 1970) and Colin Roe's *Manual of Water Plants* (Shirley Aquatics, N.D.).

I have a 48 in. × 24 in. × 24 in. all-glass tank stocked with two tinfoil barbs, one lemon-finned barb and one silver shark. I would like to add a few more big fishes to this tank to make a good show. Please give me the names of a few suitable species.

Are you aware that the tinfoil barb and the lemon-finned barb grow as large, if not larger, than a plump herring? And even a silver shark may attain more than 8 in. Therefore your tank will not look bare or have much swimming space to spare when a couple of years are out. However, you do have room for, say, a couple of all-black sharks or a pair of *Trichogaster pectoralis*.

Eggs laid by my angel fish on several occasions have turned white and fuzzy in the space of a couple of days. What has gone wrong?

The water may not have been clean enough. Scrupulous cleanliness is essential. Another thing, there is more chance of success if the water is soft and gives an acid reaction. The light might have been too bright. A diffused light is best. Our booklet called *Angel Fish—King of the Aquarium* is packed with valuable information on breeding and keeping angel fish. We can send you a copy for 58p post paid.

Would you please give me some information on the full size, country of origin, general disposition, feeding and breeding habits of *Herotilapia multispinosa*?

H. multispinosa grows to about 4 in. and ranges from Costa Rica to Nicaragua. Generally speaking, it is a peaceable species and quite suited to a community tank inhabited by fishes of about its own size or not too timid or delicately built to be intimidated by its appearance and bulk. *H. multispinosa* takes live and prepared foods readily. Spawning is quite common and the site for deposited eggs is usually a stone or fissure in some rockwork. After the fry have hatched out they are moved to depressions in the sand. As a rule, both sexes make good parents.



Hetrotilapia multispinosa

What type of electric lighting is best for my tropical aquarium?

As I have had no experience of the latest development in aquarium lighting, namely a lamp named True-Lite, I cannot say whether the claims made for it are justified or not. I tried Gro-Lux lighting years ago but found it promoted too much algae. I then went back to warm white lighting because I found that my plants grew just as well under it as under Gro-Lux (if not better) but the colours of the fishes looked less bright. If you go in for fluorescent lighting (warm white or Gro-Lux) use a 20-watt lamp over a 2 ft. tank, a 30-watt lamp over a 3 ft. tank and a 40-watt lamp over a 4 ft. tank. Keep the fluorescent light on for about 14 hours a day.

I should like some detailed information on the breeding procedure of *Corydoras aeneus*.

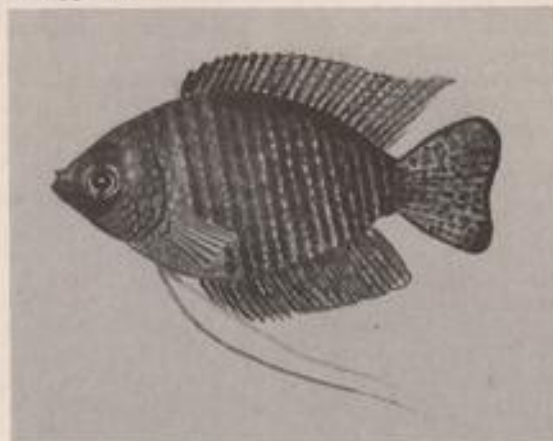
The bloated female is pursued by the male. Then, when the couple are ready for spawning, she hurries around the aquarium looking for a previously cleansed spot on the glass, leaves of plants or stones on which to deposit her eggs. She carries these between her close-pressed ventral fins. Apparently she takes the sperms ejected from the excited male into her mouth and then spits them onto the prepared surfaces before placing the batches of eggs into position. After hatching, the fry drop to the bottom of the tank and search in the interstices of grit or among sediment for minute live food or tiny particles of fresh dried food.

Is it necessary for an aquarium keeper to buy an air pump and filter in order to keep a 24 in. x 15 in. x 12 in. tank in a clean and wholesome condition?

Provided a tank is stocked with the right sort and quantity of underwater plants and the fishes are not too many for the space at their disposal, then a tank can remain in perfect condition for years. Remember, however, that algae must be scraped off the front or viewing glass every so often, excessive sediment siphoned away periodically, and water lost by evaporation replaced with clean rain water or mains water boiled and then cooled down to aquarium temperature.

Always after a year my male guppies die and the females follow soon after. Before the females die they usually develop bent spines or hollow sides. What shortens guppies' lives and leads to these deformities?

Guppies are not long-lived fish and they are approaching the end of their days when they have reached eighteen months to two years. Male fish usually die first. A few months before the females die they deliver small broods of young, or no broods at all, and show a general deterioration in physical activity and appearance.



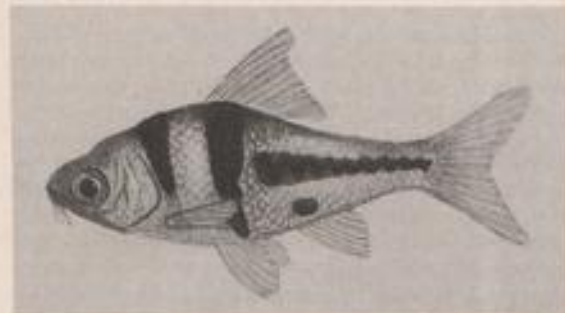
Dwarf Gourami

I had a spawning of dwarf gourami and all the free-swimming fry were sucked into my box filter and died. How can I get over the difficulty of keeping my tank spotless and yet preserve the lives of gourami fry?

Cut out filtration and just use an air-stone to release a gentle stream of bubbles into the water to keep it moving and well-aerated. Feed the fry very carefully and when they have made some progress introduce a species of *Corydoras* catfish to scavenge on the bottom. Remove any moulds or patches of sediment that form on the bottom with a dip tube.

I have just purchased two small *Barbus lateristriga*. Please give me some information on the maximum size, preferred food and conditions best suited to this species.

B. lateristriga attains about 6 in. and requires, when full grown, plenty of swimming space. In its larger sizes it is an avid eater of tender plant life. Ordinarily, however, it flourishes well on a mixture of prepared foods, meat and the safe live foods such as whiteworms and earthworms or gnat larvae collected from a vessel filled with water and kept outdoors (during the summer months). A temperature in the middle to upper seventies is suitable and water on the soft side and giving a slightly acid reaction is advised.



Barbus lateristriga

Please could you give me the names of some tropical fish suitable for a 24 in. x 15 in. x 12 in. single species tank which, when planted, would make an attractive feature in a room and yet would not require a great deal of heat, specialised dietary requirements or too much time-consuming attention?

The White Cloud Mountain minnow, neon tetra, Schubert's barb, *Barbus ticto*, half-striped barb and the diminutive live-bearing *Heterandria formosa* would meet your needs. All are peaceable, easy to feed on well-balanced prepared foods, do not pull the plants to pieces nor give their owner much work in cleaning

up apart from a periodical siphoning of the bottom to remove accumulated sediment and occasional scraping of the front glass to remove green algae. With regard to temperature, though it would be advisable to start them off at the same temperature as that in which they have been kept in a dealers' shop, a slow drop to a temperature in the upper sixties to low seventies (°F) will do them no harm.

How can I sex and breed the red-tailed black shark?

Observe the shape of a number of well-grown fish of about the same body length. It is reasonable to assume that the more heavily built fish are females; the slender ones males. As two or three red-tailed black sharks sharing a tank do not grow at the same rate on account of their bullying one another and keeping the more timid among them away from food, it is best to isolate healthy-looking fish in different tanks and feed them well on live food, shredded raw meat and a well-balanced dried food. When a fish looks markedly plumper than the other members of its kind place 'her' in a thickly planted tank with a streamlined companion. Few spawnings of the red-tailed black shark have been recorded. It seems that egg-scattering occurs after or during a lot of wild chasing among water plants. Soft water giving an acid reaction and a temperature in the low eighties (°F) are recommended. An American writer says rocks and caves are sometimes used as spawning sites. A large tank is necessary. Even so, there is no guarantee that two fish that look like a true pair will spawn.

Is it true that the plecostomus catfish has never bred in captivity?

Lately several spawnings of *Plecostomus* (*Hypostomus*) catfish have been brought to my attention. The explanation, I fancy, lies in the fact that over the last few years more than one species of *Hypostomus* is known to have been introduced into this country and abroad and in all probability one or two of them will breed in a tank if conditions suit their requirements.

OBITUARY

IT IS WITH great regret that we report the death of Morris D. Cluse, president of the Goldfish Society of Great Britain.

A founder member of the G.S.G.B. he had been actively engaged in the events and running of the Society since the beginning. His work on committees was unceasing with special emphasis latterly on the Standards Committee where he played a large part in the revision of the Standards Book.

He held the office of chairman for a number of years before taking over the presidency. His quiet insistence on having all matters dealt with in a clear and concise manner greatly helped in the success of many projects. As a result of a lifetime spent in

keeping and studying goldfish he came to be regarded as an authority on genetics and this gave rise to the publication of many articles in the aquatic press and many many more in the Society's own publications. His observations on the scale formation of the Pearl-scale and Hammered Metallic varieties of goldfish are on record and it was his pleasure to bring these varieties to the show bench where he often had success.

We shall all remember him with affection and miss the help and advice he was always ready to give. His passing is a great loss to the G.S.G.B. and to the hobby to which he was devoted.

We extend to his wife and family our sincere sympathy in their bereavement.

W. L. Wilson, Vice-President,
Goldfish Society of Great Britain.

GOLDWATER QUERIES by Arthur Boarder

I am about to construct two pools and want to have one lower than the other so that a pump can raise the water from one to the other and run back. What height should the higher one be? Is it better to use a strong polythene liner than to make the pond with concrete?

It is much easier to make ponds with a good liner such as Butyl or Plastolene. The height you make the one pond is a matter of choice. You can construct a waterfall with a small pool or two so that the water can become oxygenated and a type of charcoal and sand filter can be incorporated. The type of pump will depend on the height you wish to raise the water and the rate of flow. I will add the address of a firm from which you can get a catalogue to enable you to make your choice or you can tell the supplier just what you require and he will be able to advise you. When constructing the waterfall, lay a channel of liner material before laying any rockwork. This will cut out the risk of leaking. As for any publications you can buy to give you instructions on making your pools, my book "Coldwater Fishkeeping" will be the kind of book you need.

I have made a garden pond, 6 ft. x 4 ft. x 2 ft., and wish to stock it with colourful fish. I would like to know if I should stock it with Koi or Shubunkins please?

It will be far better to stock your small pond with Shubunkins. Koi, although handsome fish, are not the type for a small pond. The Shubunkins are very colourful and will be far better for you than the Koi as these fish reach much too large a size for your pond. Shubunkins do not lose all their colour after three years or so, as you appear to think.

Last year I removed a couple of pails full of water weed from my small pond and this year the water has become cloudy and green. Why is this?

The water weed helped to keep the water clear by choking out the Algae. Now the pond has insufficient plant-life to keep the water pure. You had better empty all the water out and then as the plants grow again they will tend to clear the water. If you can get a good supply of Duck weed, this can be spread over the surface of the water. It will shade out much of the light and so tend to keep all clear of algae. Once the water is clear you can remove any unwanted Duck weed with a strong hose. Playing it from one side to the other and so rolling up the weed to make it easy to rake off.

Over the past few years I have bred a number of common goldfish and now feel confident to try my hand at the fancy types. I have made a large tank for rearing and would like to know if it is better to leave the tank bare of sand and plants or to use them both? I thought of getting Fantails, Veiltails and Orandas to start with, but where on earth do I get good quality fishes?

The using of sand and plants in a rearing tank is rather a matter of opinion. A bare tank is safer for hatching and for a week or ten days. After that I think that the presence of growing water plants will help the fry to grow. They will be continually browsing among the plants and finding infusoria as food. I think that, with your limited space, it will be better to stick to one variety of fancy goldfish and the Fantail is the hardier one of the three you mention. If you get more than one type, there is always the temptation to pair up mixed varieties and the progeny are then just a waste of space and food. As for you buying large fish to start with or small ones, this is a matter of expense. The cheaper and smaller ones will probably have to be kept for a full year and grown on. I am enclosing an address from where you should be able to get the fish you require.

I am proposing to construct some all glass tanks for my fish house. Is there a good sealant on the market and what thickness of glass should I use?

You will find one of the modern sealants as advertised in *The Aquarist* excellent, and a great improvement on the old putty types. The thickness of glass depends on the size of your tanks. The size known as 32oz., is all right for tanks up to 24 inches long and over that quarter plate. Very large tanks may need toughened plate. Wired glass or opaque glass is all right for the base and even all except the front glass need not be transparent, but of a cheaper or old kind. Make sure that all edges of the glass are cut clean and there is then no need to use very much sealant, even a thin application is sufficient to make a lasting seal.

I have an all glass tank, 36 x 15 x 24in., with a hood and fluorescent lighting. Will this lighting be enough to encourage plants to grow with a water depth of 24 inches?

The time for your lights to be on will depend on the amount of light reaching the tank and the type of water plants you grow. Some kinds such as *Ceratophyllum demersum*, (Hornwort) will grow well in deep

water and with a poor light. You will have to experiment with plants and the amounts of light you give, to see which gives the best results. It is not easy to recommend any specific time to keep artificial lighting on for unless all the other factors are known.

What size of gravel do you recommend for a coldwater tank?

I like what is known as washed river grit. This should not be too fine nor too coarse. If there are some pieces of grit over 2mm in diameter, it is possible for this to get into the tube of your cleaning siphon and block it up. Too fine a sand tends to pack down very hard and is not as good for plants.

Can you suggest some good plants for a coldwater tank, and where they should be placed?

When planting up your tank see that the front third of the tank is free from plants or if any are used, they should be at the ends only. You must keep a fair space clear in the front to enable you to see your fishes and to make it easy to clean out much of the mulm at each weekly servicing. Plants for back and ends, away from the front can be: *Egeria densa*; *Lagarosiphon major*; *Ceratophyllum demersum*; *Hygrophila polysperma*; and for the centre of the base: *Vallisneria spiralis*. Try to hide the back corners with tall plants but there is no need to plant too many specimens as they will soon grow and could become too dense after a few weeks.

I am enclosing a list of coldwater fishes which I propose to keep in a tank. Do you think they will agree?

The fishes should agree as long as they are not crowded. The orfe is not suitable for a small tank as this fish grows very quickly and would soon outgrow your tank. Also it needs plenty of oxygen and is far better kept in a good sized pond. The Crucian carp is not very attractive for a tank and there are several types of goldfish which are more suitable for your purpose.

Can you tell me where I can get water plants sent to me by post please?

I am enclosing an address for you but you could have found the information you needed in any issue of *The Aquarist and Pondkeeper* magazine.

I have had a Moor and a Nymph for eight years and would now like to breed some fancy goldfish. Where can I get a pair of Moors, a pair of Veiltails, a pair of Orandas and a male Nymph?

You can get the pairs of fancy goldfish you require from the address I am enclosing but I am not sure about a Nymph. This type of goldfish is not very popular and is not seen very often these days. Personally I do not think it deserves a varietal name as

this kind is often produced as a throw-out when breeding Veiltails. It is actually a single-tailed Veiltail and if such a fish turns up as a throw-out it is not much of a variety to concentrate on.

I would like to breed Orandas and at the present time I have some in two tanks. The temperature of the water is 75-80 F., and I understand that the fish should have winter treatment at 40-45 F for them to spawn. What do you suggest? Can I put the fish in the garage for a few weeks?

I do not recommend you to keep your fish in a garage as it could be too dark and cold for them. Orandas, as with other fancy goldfish with flowing finnage, are not too happy at a low temperature as it can bring on fin-congestion. I think that such fish should not be kept at any temperature at 50°F or below.

Although it is said that goldfish spawn better when they have had a cold water in the winter, I do not think that this is the only condition which encourages fish to spawn. I am of the opinion that it is the condition of the water as far as the oxygen content which has more effect. Also I have found that the lower sixties (F), is the average temperature of water in which my fish have bred over many years. This does not mean that they will not spawn at temperatures as low as 50°F, nor as high as 75°F. If you wish to lower the temperature of the water in your tanks, there is no need to move them from your living room. Just remove some of the water and replace it with cold water straight from the tap. Change about a third and take the water by siphon from the upper layer of water, as this is likely to be the warmer. Replace by using a water-can fitted with a fine rose. This allows the water to enter the tank without disturbing the plants or base compost. It also ensures that plenty of oxygen is included and that much of the effects of chlorination can be removed.

I have a tank 42 x 12 x 14 in. well planted and containing four fantails, each 2½ in. body length. Can I add more fantails with safety? I have no filter nor aerator.

Your tank could hold about twenty inches of body length of fish. However, this is not the only point to consider. Will your tank look any more attractive? Will the fish thrive as well and they will be as free from troubles? I consider that an over-crowded tank never looks as well as one which is understocked. A tank with too many fishes in it looks more like the old-fashioned fishmonger's tank crammed with goldfish hardly able to avoid brushing each other as they swim. Should you decide to add any more fantails, do not exceed three of the same size as yours and make sure that they are quarantined before putting them in with the others.

KOI QUERIES

by Hilda Allen

My question is about external filtration. I have a pond 14 feet by 9 feet by 2 feet deep made with a P.V.C. liner which has been established for two years.

I have a pump, so there is plenty of aeration and my fish consist of Koi, Golden Orfe, Silver Rudd, Goldfish and one Tench making a total of 23 fish altogether. 3 more Koi, now in quarantine, will be introduced into the pond soon so I need a filtration system. I am considering buying a power-filter with a capacity of 1½ gallons and an output of 150 gallons per hour. Would this meet my requirements of filtration and could it be used for removing dirt and mulm from the bottom of the pond?

In my opinion no power filter could cope with filtering a pond containing 26 fish and approximately 1,500 gallons of water (allowing for your lilies and marginals). Any filter requiring carbon and filter wool would be quite inadequate. As you already have a fountain pump this could be used to operate an under-gravel filter, either inside or outside the pond. The filter area should be not less than one quarter of the pond area which in your case would be thirty square feet. The pump you mention is a 24 Volt/Mains Transformer type which has been proved very satisfactory for continuous operation and it should be capable of turning over your pond water once every 6 or 7 hours. This would be adequate for your mixed collection of fish but remember that the pump must be kept running for 24 hours a day. It would be advisable to have a second pump on hand as a stand-by as most pumps need occasional cleaning and servicing. The bottom dirt can only be removed by bottom drainage or by syphoning or, in extreme cases, by a contractor's type self-priming, unchokable pump. Some water should be changed, at least once weekly, by removing some of the soiled, bottom water and topping up with fresh water from a hosepipe. You would be wise not to add any further fish to your existing pond as it will soon be over-stocked. Fish, especially Koi, need growing space.

Bearing in mind the limitations of an ordinary garden, what dimensions would be suitable for a pond specially built for Koi and how many fish could it be stocked with for them to reach their full size? Would they be likely to spawn under these conditions and how do you think the home-bred Koi compare with the Japanese varieties?

A pond of around 150 square feet should be adequate

but a little larger if possible as it is not easy to enlarge a pond once built. Many people have regretted not making larger Koi-ponds at the outset possibly because it is difficult to imagine a few small Koi could ever require such an enormous amount of space. Koi-ponds should be deeper than average and up to 4-5 feet deep. Such a pond could be stocked with between twelve to eighteen Koi. It is difficult to be more precise as growth rate is not always predictable as besides space available, it also depends upon water hygiene and good feeding. Koi, like other fish, will spawn when they are sexually mature and if the water temperature is maintained at around 65°-70°F which can be from late May onwards in outdoor ponds. When comparing home-bred Koi with the Japanese-bred varieties it must be remembered that the Japanese fish are bred from high class breeding stock that are unlikely to ever be exported. Koi bred here can obviously only be bred from the Koi generally available through importation. If health is the criterion, these are good reasons for supposing that home-bred Koi should be healthier and more disease-free than imported specimens.

Some very good Koi are being bred here already and selective breeding techniques coupled with a knowledge of genetics are producing recognized varieties of Koi in large numbers. The years of hard work by Japanese breeders should not be wasted or allowed to be ruined by indiscriminate "flock" spawnings but patience and knowledge should be the key words in producing good, healthy, British Koi.

A few weeks ago I made the mistake of introducing some Koi into my pond from an indoor aquarium. Three of them appear to have settled down but the fourth developed fungus which I treated with aquarium salts. This proved ineffective and the fungus attacked and rotted away first the tail and then the body of the fish. I then treated it with a proprietary substance but the Koi died as a result of the most vicious type of fungus I have ever seen. I shall be pleased to have your comments on this and any advice you may have for keeping Koi.

At least in your letter to me you supposed, correctly, that the problem was caused by chilling. This would undoubtedly be the case as at the time you put the Koi outside the weather was extremely cold and the difference in water temperatures was probably at least 20°F. If the Koi were small enough to have been in an aquarium, then this could be disastrous and it would have been better to have kept them

Continued on page 150

FISH HOUSE PLANNING continued from page 140

thought. The electrically safety conscious hobbyists would give the connecting strip an adhesive tape covering, but I have seen many left just as they are. Although potentially dangerous, in the home the connecting strip may survive several years. In a fish house, however, where the humidity is extremely high and condensation commonplace, the connecting strip can expect but a short life. Even when better-quality and supposedly waterproof connectors are used the danger is still there. In my experience it is but a matter of time, a year, maybe two, before water vapour penetrates, condenses, and gives that film of water that creates conditions for electrical arcing. Or should you happen to touch the connector the film of water will now provide a rather unpleasant connection between you and the electrical mains.

What do we do then? Well we first organise ourselves to use as little electricity as possible and for the electrical equipment that we need to use, make as few electrical connections inside the fish house as possible. For instance, site air pumps or blowers outside the fish house and run the air supply lines in through the wall. Space-heat the fish house as opposed to individually heating tanks, which is probably uneconomical anyway, and site all light switches and power points outside. It is easier to construct a weather-proof electrical panel outside the fish house than it is to waterproof the same equipment inside the fish house.

To some these measures may seem a little drastic but consider for a moment the electrical safety regulations governing a domestic bathroom, which are particularly stringent because of the proximity to water and the high humidity expected. Yet a bathroom rarely has the volume of water nor the prolonged concentration of humidity that a fish house has. It may be initially inconvenient to situate electrical equipment that is frequently handled outside the fish house, but if neglectful of our own safety what of our wife, children, or friends, who may in our absence be called upon to operate our fish house equipment?

The Tanks

Next in line for discussion are the tanks and their organisation in a fish house. A natural tendency when setting-up a fish house is to fill it with tanks already to hand then supplement these with any that can be purchased cheaply secondhand. However, before spending any money one should get out a pencil, a rule and a piece of graph paper and plan the size and overall arrangement of the tanks. An hour spent sketching and planning at this stage can save time, money and effort later. Once a clear idea of the fish house tank requirements are arrived at, false economy can be avoided by purchasing only the

tanks that will suit your needs, and disregarding those that do not fit in with the plans. Changing the plans to suit the tanks available is often an unwise step. A fish house can rarely be organised and efficient if there is a hotch-potch of large and small tanks that give the user all manner of problems in day-to-day running.

Thought should initially be given to the basic ratio of growing-on tanks, breeding tanks and stock or community tanks. As the majority of fish in a fish house are those growing-on, then the tanks that will house these fish should be considered first. An insufficient number of growing-on tanks to accommodate the fry bred will bring about over-crowding and all the problems therewith, whilst on the other hand insufficient breeding tanks to fill the growing-on tanks will mean that you are not able to make full use of the tanks available. Similarly, with stock tanks and community tanks, an insufficient number of these may result in a shortage of breeding pairs, whilst too many could at worst be deemed a luxury. However, with stock and community tanks there is no great problem, as growing-on tanks could at a push become stock tanks and vice-versa. The real aim should, however, always be to get the correct arrangement of large and small tanks that suits your particular fish house functions.

Tank Ratios

To get an idea of what is meant by tank ratios, assume that we wish to breed Angel fish. Firstly we would require a permanently set-up tank in which the breeding pair would be housed. Secondly we require a small tank in which to hatch the eggs artificially, as poor results are usually had from leaving the eggs with the parent fish. Thirdly growing-on tanks are required to raise the fry. A good pair of Angel fish can be expected to spawn every 8 to 10 days, and will continue to spawn for several weeks once they have started. Assuming that just 250 fry are successfully raised from each spawning, by the end of a 12-week period (by which time the first batch should have reached a saleable size) there could be around 2000 Angel fry in various stages of growth. If the fry are to be housed in tanks at a density of say 100 fish per tank then some 20 growing-on tanks are required just to grow-on the Angel fish fry from one pair of fish, over the 12-week period. As a further example consider a pair of Rosy Barb. These would require the use of two stock tanks, one for the male the other for the female. A separate breeding tank is required, and we will again assume that from a single spawning we successfully raise 250 fry. The fry will remain in the breeding tank for about the first fortnight before the tank can be released for other spawnings. If this procedure is now considered

over a 12-week period, and time is allowed for the tank to be set-up and the fish to spawn, we could have about 250 fry produced every 3 weeks, which will result in around 1,000 fry to house in growing-on tanks over the 12-week period. At a density of 100 per tank this would require 10 growing-on tanks.

The figures discussed are but approximations based on experience and are intended to give only an idea of what to plan for. Personal organisation, efficiency and above all, requirements, will determine whether more or less fish can be, or even want to be, bred. Practice is so often at variance with theory and I find that my own tank ratio breaks down to eight growing-on tanks for every one breeding tank, with a back-up from one stock tank and one tank for growing-on future breeding fish. Or put another way, one breeding tank requires eight growing-on tanks to accommodate its output, with the support of at least two stock tanks. What I have tried to put over is not a formula for breeding and raising fish as frantically as possible, but an idea of what to plan for if fish are to be bred in any quantity. So often fish are bred without any real thought for their well-being thereafter and in my opinion there is no credit to a person who has successfully bred a pair of fish, if he cannot house the resultant fry without overcrowding.

I do not propose to discuss the actual size of the various tanks mentioned as these are very often a matter of personal preference within accepted parameters. I would, however, mention that to grow fry to a saleable size in the 12-week period I mentioned earlier, at a density of 100 per tank, I aim for a minimum surface area of 600 square inches, and the tank would also have the benefit of strong aeration/filtration, and frequent water changes.

Number of Tanks

Having considered the ratio of tanks and arrived at some idea of what might be required the ratio must then be converted into the total number of tanks that the fish house will hold. Ample space must be left for such things as door openings, work areas, etc, but for economy the objective should be to house as many tanks as possible in the space available. If a space is filled with water it will retain heat longer than would air in the same space, and assuming a complementary surface area the more water contained in the fish house the more fish we can house.

When setting-up a fish house the ability to make your own all-glass tanks can be a big advantage from the cost point of view. The tanks can also be made to within a fraction of an inch to your own specific size requirements. I mentioned earlier that for a density of 100 fish per tank a surface area of 600 square inches should be aimed at. If then we are thinking in terms of tanks that are 12 inches wide, a length of 50 inches is required, or at 18 inches wide

a length, to the nearest eighth of an inch would be 33½ inches. Similarly if our length of tank is governed to 35½ inches our width to the nearest eighth would then be 16½ inches. And if necessary tanks can be made to that accuracy. If commercially manufactured tanks are to be used the whole concept changes, as the arrangement of the tank support framework and the tank dispositions are now governed by the size of the tank and it is now the fish house that has to be organised to the size of the tanks. If one wishes to use commercially made tanks a compromise could be made by filling the larger areas with these tanks then making your own tanks to fill up any remaining space. The emphasis is again to fill as much space as possible.

My own arrangement for growing-on tanks (and remember that these form the bulk of the tanks in a fish house) is a little unconventional in that they are just 6 inches deep. Using Dexion as the support framework I am able then to get one tank per foot of height space available, and this gives an access space above each tank of something less than 6 inches, which I find adequate for netting and maintenance. The advantages in using tanks of this depth are (a) more tanks can be accommodated, (b) the initial cost per tank is less, and (c) they are much easier to maintain. However, should one be careless enough to over-feed, problems will arise much sooner due to the relatively small volume of water per tank, but with an efficient filtration system and a disciplined water-changing routine one has to be very neglectful to create such problems. As for the effects of the shallow water on the fish, I have observed none. I have many times separated a batch of fry into a selection of tanks of various depths and observed no disparity in growth rate or general well-being of the fish. In fact the shallowness of the water has often been advantageous in that it has presented food closer to fry that would otherwise starve rather than go looking for it.

Although initially expensive I use galvanised Dexion for support framework for the tanks, mainly because of its versatility. It can be used in construction of the framework so that there is little or no lost space between tanks on the same level, which is an important consideration. If one uses a framework construction that necessitates, say, a 2-inch gap between each tank for an upright support and 2 inches at each end of the framework, the total space lost on just one unit can be considerable. For example, consider a unit that is just five tanks high and is five tanks wide. If 2 inches is lost between each tank and at each end the total space lost on the complete unit will amount to 5 ft. of tank space. Dexion can be arranged so that there is no space lost between tanks, or at the ends of the units, and all that is required to construct the framework is a hacksaw, a couple of spanners and a little bit of common sense. Wood or angle iron supports are the possible alternatives, but in

addition to the upright support problem I dislike wood because of its tendency to rot and warp in humid conditions, and I disregard angle iron because of its construction problems and lack of versatility. I would also recommend the use of galvanised Dexion over the ordinary enamelled Dexion because of its greater resistance to rust. Two other important considerations in favour of Dexion are that it can if necessary be bought and constructed a piece at a time as money allows, and in years to come if a particular member should need renewing it can be done without disturbing the whole set-up.

Air Supplies

On then to the air supply for the fish house. There is little doubt that an adequate air supply is necessary, and what is normally required is a large volume of air at low pressure. What supplies the air will be governed by the size of the fish house, the number of tanks, and the equipment requiring air for its operation. Air and its production and use in a fish house is a subject on its own which I do not intend going into here, but whatever the source it should be capable of producing more air than is required, so that it is not run, as it were, flat out. If all available air is used something will suffer when the output of air slowly drops off owing to wear and tear at the source.

Filtration is yet another important factor in the fish house. It can make the day-to-day running easier, or if the wrong type for the particular needs of the fish house is selected, it can be the source of extra work and expense. Having used most filters over the years I have now settled on those that require the least amount of attention and are the cheapest to run, and inevitably they are the simplest in operation.

A fish house may have a need for a power filter, or one or two internal, or external air operated mechanical filters, but a large number of these filters in a fish house will increase the cleaning work load and running costs through filter medium replacement. The simplest and cheapest filter that I am aware of is a modified undergravel filter, comprising an upturned funnel buried in a pile of gravel in a corner of the tank. The funnel has a few holes punched around its largest diameter, which is then placed on the tank bottom. A hole is punched through the neck of the

funnel where the funnel cone narrows to form the spout, and an air line is inserted. The funnel is buried in the pile of gravel to within an inch or so of the top of the funnel spout, and when air is supplied to the funnel it operates as an undergravel filter. The initial cost is low, running costs are nil, because air would probably have been used in the tank anyway, and the maintenance is virtually nil. With the exception of breeding tanks I use this type of filter in most of my tanks and find that with a balanced fish density and feeding routine the filter has no problems keeping the water clear. It also eliminates the need for power filters with their wandering electrical supply cables and their inlet and outlet pipes that always seem to be in the way.

In small breeding tanks I do not filter the water whilst the fish are breeding and the eggs are hatching, but I do aerate. When the fry are free swimming I use a sponge rubber filter. Again the initial cost of this type of filter is low, running costs are nil, and maintenance takes the form of washing the sponge when the breeding tank is emptied. It also has the advantage of not endangering fry.

Most aspects of setting-up and management of a fish house have now been covered. The coverage has intentionally not been in depth, for in this article my aims were not to advocate how things should be done, but to give an overall awareness of items to be considered. I would emphasise that initial planning is most important. Builders would not consider erecting a house without first drawing up plans, engineers could not build without their blueprints, and it is a remarkable hobbyist who can set-up an efficient fish house without first planning.

Planning does not just apply to the building and the equipment, it must also apply to the day-to-day management of the fish house. The object of a fish house is to be able to keep, breed or rear a larger number of fish, and to be able to look after those fish in a better manner. If the fish house is so disorganised that the majority of your time is spent fetching and carrying water, mopping-up, cleaning out filters, and fixing electrics, there will be little time for the fish. All that you will have created will be a lot of extra work and expense, and perhaps finish up with less time for the fish.

KOI QUERIES *continued from page 146*

feeding indoors until May at least; or until the outside temperature rose sufficiently to lessen the shock of transfer.

Fish in such a weakened condition would develop all kinds of problems and it is possible that the Koi suffered from Tail-Rot. Fungus is a secondary infection where there has been damage to the skin or when the fish is severely weakened by other forces.

The original cause should be treated first but I do not know of any cure that would be successful if the fish had been seriously damaged by adverse conditions. Any advice for keeping Koi is based on consideration of living creatures, which can all be subject to disease. It is up to us to keep them in good condition so that they can strongly resist any infections that may occur, but it is a matter of experience. Most of us learned the hard way I suppose and I wish you better luck with your surviving Koi.



Cordylus warreni subspecies.

GIRDLE-TAILED LIZARDS

by Chris Mattison

THE Girdle-tailed lizards, sometimes known as Zonures, (owing to their previous generic name *Zonurus*), belong to the genus *Cordylus*, and as such form a large part of the family *Cordylidae*. Although there is a certain amount of variation within the family as a whole, the Girdle-tails, of which there are about thirty species and subspecies, are all very similar in general appearance and all demonstrate the feature which gives them their popular name, that is, that the tail consists of a series of bands, each made up of a ring of hard, spiny scales.

The entire group is exclusively African, and the

Girdle-tailed lizards fill an interesting ecological niche, paralleled by other totally unrelated groups around the world; for instance the agamid, *Uromastyx*, from Middle Eastern desert regions, and the iguanid, *Hoplocercus*, from South America. Members of the *Cordylidae* inhabit rocky outcrops of rocks, or kopjes, throughout their range, and use as retreats the fissures formed among the large boulders. Having dived into an appropriately sized crack, the lizard then presents its pursuer with its very spiky and unappetising tail.

The largest of the group is aptly named *Cordylus*

giganteus, or Sungazer (from the position it assumes when basking in the sun), which at a total length of fifteen inches is a very imposing creature. This species is endowed with a particularly spiky, club-shaped tail which can be used defensively to good effect by being threshed from side to side. Its coloration consists of a rich brown dorsally, becoming paler on the flanks, with a rusty hue on the chin, throat, and underneath the limbs. Like the other members of its genus it gives birth to two living young.



Cordylus polyzonus.

This large lizard often excavates its own burrows into which it retreats when threatened. Its head is adorned with four backward-pointing, elongated scales (occipital spines), which serve to dig into the sides of the burrow and act as anchors if the lizard is pulled backwards towards the mouth of the burrow.

An interesting habit of the Armadillo lizard, *Cordylus cataphractus*, is to grasp its own tail in its mouth when alarmed, thus presenting only the spiny dorsal region to its aggressor, and protecting its more vulnerable underside. However, captive specimens can only rarely be persuaded to perform in this manner. This species is uniformly yellowish-brown in coloration. *Cordylus warreni*, of which there are several subspecies, is often marked with white specks and blotches on its dark grey or brown back. This medium sized (approximately ten inch) Girdle-tail is restricted to the mountain regions of Transvaal and Zululand.

Of the smaller species, *Cordylus jonesi*, which occurs in very large numbers in parts of southern Africa is a uniform rusty brown in colour, excepting the underside which is slightly paler. *Cordylus vittifer* is known as the Red Girdle-tailed lizard although its coloration closely resembles that of the previous species. It is distinguished, however, by being slightly longer, and in having the lower part of its face and throat region much paler in hue than the rest of its body. *Cordylus cordylus*, *C. polyzonus*, *C. capensis*, and several other species make up the genus, many of them living in fairly restricted areas. Several species are frequently imported by specialist dealers and distributed through the pet trade, and a further species that might also be met with occasionally is the closely related *Pseudo-*

cordylus subviridis. Although this belongs to a genus in which the tail is not so heavily armoured, its resemblance to Girdle-tailed lizards is quite obvious if the scale arrangements are studied. As an alternative means of protection these lizards possess tremendously powerful jaws which can give a painful but, of course, harmless bite. By bracing its jaw muscles the lizards can also wedge themselves into the crevices in which they live, making it almost impossible to extract them. In this species there is a marked sexual dimorphism, the males being larger, and having particularly massive jaws, making their heads bulge at either side when viewed from above. They are also brightly marked with yellow and orange flanks, as opposed to the females' olive-green coloration.

To keep any of the above species in captivity the main requirement is a hot, dry environment with plenty of rocks to provide hiding places. The temperature immediately below the heat source should be around 90° to 100°F., but the lizards must have a cooler place to which they can retreat. A night-time temperature of seventy to seventy-five can be supplied by a light bulb arranged beneath their tank, or the latter may be positioned above a radiator, etc. Most insects are relished as food, and the larger species will often take young mice, or even strips of lean meat. Vitamins may be added to the water, which should be available at all times, or sprinkled on the food in order to compensate for the lack of natural sunlight. As for cage furnishings, succulent



Pseudocordylus subviridis.

plants may be added in order to provide an aesthetically pleasing set-up in keeping with the natural habitat of this type of lizard, but these should be chosen only from amongst the more robust varieties, especially where the larger species of Girdle-tails are concerned, otherwise they will quickly become battered and unattractive.

Healthy specimens of any of the species mentioned make splendid vivarium subjects being long-lived, hardy, and easily displayed animals. Breeding should be no problem given correct conditions, and the relatively large young present no difficulty in rearing.

THE ARAWANA

AND ITS RELATED SPECIES

by Barry Black

THE FAMILY Osteoglossidae is an extremely ancient family of fishes of which four sub-families exist. *Osteoglossum* (Vandelli 1829) and *Arapaima* (Cuvier) in tropical South America; *Scleropages* (Schlegel and Muller 1829) in Borneo, Sumatra, Thailand and Northern Australia; and *Heterotis* (Ehrenbaum) in tropical Africa. All are very large fish, the smallest being 18 inches in length, the largest said to attain 15 feet so only young specimens are suitable for the home aquarium. They are primitive fish and possess unusual characteristics such as the stout scales and lung-like swimbladder which functions as an accessory breathing organ. They also have a bony tongue and are related to the fossil Clupeoids of the Jurassic age.

Osteoglossinae

This sub-family comprises the most well known and most often imported species; *Osteoglossum bicirrhosum*, the Silver Arawana; and *Osteoglossum ferreirai*, the Black Arawana. Both fish inhabit slow moving watercourses of northern South America and are often found in huge shoals close to the surface. The Silver Arawana grows to a length of 48 inches and is therefore of considerable importance to the natives as a source of food, but unfortunately it is difficult to catch because it can quite easily jump out of the fisherman's seine net. It is a greyish silver colour with large iridescent scales veined with blue and red. All fins, especially the anal and ventrals, are long and flowing, the dorsal being shorter than the anal. The mouth is large and has one pair of sensory barbels, black to blue in colour, projecting from the lower lip. In young specimens there is a dark spot behind the gill cover which disappears as the fish gets older.

Arawanas are usually imported as fry approximately 2-3 inches in length and occasionally they still have their egg sacs unabsorbed. It is said that these young fish are captured by killing the parent fish and removing

the young from the mouth of the male, as Arawanas are mouthbrooders. To raise young Arawanas successfully they must be kept on their own as they will fight with each other and eventually die of starvation. The water level should be low, approximately 6-8 inches, temperature 82 F. and the water slightly acidic. A good deal of plant cover must be provided so as to make the fish feel secure and a not too bright light supplied. Arawanas are predatory from birth and will snatch at anything living, especially *daphnia* and brine shrimp. In addition to *daphnia*, white worms or *tubifex* can be given but if the young fish will not accept these then baby guppies will undoubtedly be taken. After a few months the fish can be transferred to a larger tank with a greater water depth. Young Arawanas grow extremely fast and should reach 12 inches by the end of the first year. At this size they will be able to eat almost anything including meat, prawns and earthworms.

The Silver Arawana can be kept with other species of fish as long as they are of the same size or larger because small fish would be considered as food. Large specimens of Arawanas can be maintained in the same aquarium as they are extremely tough fish when mature. Arawanas have been spawned occasionally in large tanks and are known to be mouthbrooders. The male takes up the eggs and broods the fry for about 3 weeks, after which they begin to disperse. The male can be distinguished from the female by the longer lower jaw which projects above the upper jaw.

Black Arawanas are infrequently imported into this country and when seen usually command a high price. They are found only in a limited area of northern South America, principally in the Rio Negro region. This species was unknown to man until 1966 and has become very popular in the United States of America. It has jet black barbels and black fins edged in gold. The body is black with a gold stripe above the lateral

line. It eats much the same food and has very similar habits but it is less hardy than its common counterpart.

Scleropaginae

There are two species in this sub-family both of which live in Borneo, Sumatra, Thailand and Northern Australia. They are *Scleropages formosus* and *Scleropages scheichhardti* both imported under the common name of Asiatic Arawana. *S. formosus* grows to 36 inches and can be distinguished from *Osteoglossum* by its much shorter anal and dorsal fins, the fin ray counts being: *Osteoglossum* D. 42-46 A. 50-55; *Scleropages* D. 20-21 A. 26-27. It is also more laterally compressed than the Arawana having ten fewer lateral scales. These two species were found to possess an unusual helical organ on the fourth gill arch which was first thought to be an accessory breathing organ but was later discovered to be a filter. Water which has passed over the gills passes through this filter where phyto- and zooplankton are trapped in a mucus. This mucus is then carried down into the stomach providing a vital food during the dry season. The other members of the *Osteoglossidae* family have also been found to possess this curious organ.

Scleropages is dark olive in colour becoming silvery towards the belly. The iris is gold. It too is a predator and can be accustomed to dead fish and meat in captivity. To my knowledge this fish has not been bred in the home aquarium but in the wild it spawns in a depression in the sand. According to Fahrman the eggs are taken up by the female.

Heterodinae

Heterotis niloticus is the sole member of this sub-family and is found only in the larger north equatorial

rivers and lakes of Africa. It grows to approximately 30 inches and is basically predatory although it can filter out phytoplankton. This fish is dark olive to grey in colour and is different from the preceding family in that it has no barbels. *Heterotis* is not a mouthbrooder but hollows out a depression in the sand amongst dense vegetation. The nest measures about 4 feet in diameter and is between 8-12 inches deep. The eggs are laid in this hollow where they stick together until hatching takes place 48 hours later. The yolk sac on the fry is absorbed after 6 days and the young begin to leave the nest, returning to it regularly. The brood fish watch over them until they disperse.

Arapaiminae

The *Arapaima*, *Arapaima gigas*, is the largest freshwater fish in the world. It is said to grow to an astonishing length of 15 feet and a weight of 440 pounds, although the largest recorded specimen was only 7 feet long. The *Arapaima* is a dull lead grey colour with a tinge of red towards the rear of its body. It is common over the Amazon Basin area of tropical South America and is a highly prized food fish, the flesh being salted and dried. Like the rest of the *Osteoglossidae* family it too builds a large nest in which the eggs are laid. The *Arapaima* is only suitable for large tanks and is therefore more often seen in public aquariums.

The family *Osteoglossidae* comprises an extremely fascinating group of fishes partly because they attain large sizes and partly because they are living fossils. So anyone with a large aquarium should consider the advantages of keeping one of these truly remarkable fish.

B.K.K.S. NEWS

THE B.K.K.S. A.G.M. was held at The Post House Hotel, Leicester on Sunday, 15th May, with a near capacity hall full of members. As promised, the business of the meeting was kept down to the minimum time and a very interesting programme of events started sharp at 11 a.m. with the latest film from Japan on the 12th Airinkai National Koi Show held in November, 1976, at Osaka, which included some marvellous shots of Koi as well as the preparation, judging, selection and prize-giving.

Other features included an amusing tape-slide lecture and live talk by Dr. David M. Ford, an auction of surplus equipment, a "Brains Trust" and the usual popular raffle.

Roland Seal remains in office as Chairman and Editor, Mrs. Phyllis Goode takes over as General Secretary and Advertising Manager from Jose Freestone, Malcolm

Waumsley remains as Treasurer and Membership Secretary and Valerie Frost as P.R., but the rest of the committee will now come from the various sections in the nationwide society so that as many members as possible will be represented. A membership which is now on the 600 mark.

Probably the most successful event staged by the society last year was the first National Koi Show held at Edgbaston and Ron Hodgson was able to report on the progress being made in preparations for "Koi 77" to be held at the Botanical Gardens, Edgbaston on Sunday, 4th September. The latest great news is that we will be having two Japanese judges—Dr. Dodo and Dr. Kawaguchi—both experts and already friends of many of the B.K.K.S. members who visited Japan in 1975 and 1976. No pool keeper can afford to miss this show, never mind Koi-keepers, it promises to be a knockout.

PRODUCT REVIEW

Mystere "Twin" aquarium air pump. £4.62 exclusive of V.A.T. Mystere "Single" aquarium air pump. £3.00 exclusive of V.A.T.

Sole distributors: Peterama Ltd., Bilton Estates, Warehouse Lane, Chelmsford, Essex.

I would like to say right away that the Mystere "Twin" was given a trial run in a 44 in. by 15 in. by 12 in. tank furnished with two flat-bed undergravel filters. The immediate effect after plugging in was a rush of air bubbles and water up and out of the two lift pipes: more indeed than I thought possible from a pump of no great size and such modest price. I then attached, with the aid of suitable connectors and some pinch-cocks to govern the flow of air along the different lengths of plastic tubing, a bottom corner filter, a sponge filter and a regular stone diffuser. The performance was perfectly satisfactory. A further boost in air pressure can be obtained by joining the twin outlets V-wise, with two short lengths of tubing, to a T-piece and using this as a distribution point. Aquarists will be interested to learn that the noise level of this pump is lower than in some higher-priced diaphragm air pumps and the general appearance, finish, design and mechanical construction leaves nothing to be desired. The "Single" aquarium air pump has enough power to operate two or three air-stones or suitable filters and, not unexpectedly, is much quieter than its big brother.

Both these Mystere air pumps are guaranteed against defects in workmanship and materials for a year. They also conform to the new electrical safety regulations. Each pump is packaged in an attractive card box—ideal for a gift to some fishkeeping friend or member of the family. They also come with a well-printed instruction leaflet and a spare rubber diaphragm. Other replacement parts are readily available. My one adverse criticism concerns the flex supplied to connect these magnificent little pumps to the mains: it is too short; about 33 in. to

be precise. We all know or should know that a greater length of twin flex is needed to rest this type of pump well above water level to preclude water siphoning out of the aquarium when or if the electric supply is switched off. JACK HEMS.

Tetra Algae Tablets. A product of TetraWerke, W. Germany. Obtainable in this country from all good stockists.

There are few things more irritating in the freshwater aquarium than persistent growths of algae. More particularly when they start to envelop and strangle choice plants or, perhaps, spread a slimy or cobwebby sheet of unattractive blue-green over the compost and, not content with that, invade and cover the glass.

TetraWerke rightly claim, so I have proved, that the above product will eliminate unsightly and time-consuming (in cleaning and siphoning) algal growths in a matter of days. Of great importance is the fact that neither the higher plants nor the fishes suffer adverse effects during or after treatment.

A packet of 12 algicidal tablets, sufficient to treat some 52 gallons of water, comes with a special holder that can be affixed to the glass, in a vertical or horizontal position, with the aid of a suction disc. Optimum effectiveness of the tablets is obtained when an air-stone or filter circulates the water around them and distributes the algae-killing substances over the whole of the interior of the aquarium. The effective life of the tablets—they do not disintegrate in water—persists for several weeks. As the algae dies it should be removed from the aquarium. Siphoning is as good a method as any. While treatment is in progress, the user must abstain from passing the water in the aquarium through peat, carbon or synthetic resins. Neglect of this advice will, I fancy, render the algae destructive properties of the tablets useless.

JACK HEMS.

BOOK REVIEW

Key to British Stoneflies (Plecoptera). By H. B. N. Hynes (F.W.B.A., £1).

Key to British Freshwater Megaloptera and Neuroptera. By J. M. Elliott (F.W.B.A., £1).

THE Freshwater Biological Association's illustrated scientific keys are essential for identifying whole groups of waterlife. In many ways they are the freshwater counterpart of the famous Liverpool Marine Biological Committee's memoirs. The 92-page 3rd edition of Prof. Hynes' work on stoneflies is most useful to anglers identifying their nymphs, creepers, willow-flies, early browns, February reds

and yellow sallies. It adds a few new notes, but has not brought the distribution maps up to date. Prof. Hynes, now at Waterloo University, Ontario, was formerly a lecturer at Liverpool where I found him a very friendly biologist, cycling daily into the city. His pioneer work was on the stoneflies of the Dee and Lake Bala (which I won't call Llyn Tegid). The bibliography might have included J. M. Brown's paper on Derbyshire stoneflies. It is, however, the only major guide to our 35 flatwinged aquatic stoneflies, some of which vary in wing-length according to altitude and some early-hatching small ones are identified only by detailed examination of the genitalia.

Continued on page 157



MARINE QUERIES

by Graham F. Cox

Following the article on keeping marines in small tanks (and a long argument with my parents) I managed to get permission to keep marine animals in a spare 24 in. x 12 in. x 12 in. tank. I have read several books and have not been able to find the answers to several questions:—

I have an undergravel and an external filter, will these be needed?

What are the oxygen requirements of crabs, shrimps and anemones etc.?

The tank is made with an angle-iron frame, will a couple of coats of paint be enough to protect this from corrosion?

Are there any of the commonly recommended beginners' fishes that are incompatible?

Is there a good brand of dried food suitable for feeding to damsels, clowns etc., or do I have to use frozen foods?

(1) **Filtration.** The only type of filtration which is absolutely necessary for a marine aquarium is a tight-fitting U/G filter of high turnover-rate capacity (i.e. airlifts of at least 1 in. diameter), which draws the artificial seawater through a deep (equal at least to 3 in. average depth) filter-bed made up of a first layer of coarse cockle-shell (about 1 in. deep) and a final layer of oolitic coral-sand of minimum depth equal to 2 in.

However, since you already have an external filter there would be no harm in using this as well since the only short-coming which the U/G filter has is that you cannot easily use highly-activated marine charcoal with this type of filter. With an internal or external box-filter however, the use of marine charcoal to remove the yellowish, toxic, phenol-related compounds which slowly accumulate in captive seawater is quite easy.

Warning—all highly-activated marine-grade charcoals have a very low density, i.e. they float on water. Consequently, before placing such a charcoal in your

box-filter it is important that you should pour boiling water over it (an old saucepan or basin is ideal to keep for this purpose) and leave it to stand for half an hour before use. **Remember**—"Cheap and cheerful" (i.e. low activity) charcoals are made from coal and therefore are so dense that they sink.

Their low activity (equal to 100-200 square metres per gram) is quite adequate for freshwater aquarium usage, but not good enough for the marine aquarium where an activity level in excess of 1,000 sq. metres/gram is required.

It should also be mentioned here that whereas you could use filter-wool together with the charcoal if your tank is intended to house a fish-only display, if you were considering keeping invertebrates in the aquarium it would be very inadvisable to include filter-wool since this would remove planktonic life-forms from the seawater.

(2) **Oxygen requirements of invertebrates.** The oxygen requirements of invertebrates to all intents and purposes, may be regarded as being identical to those of coralfishes, i.e. with two large diameter airlifts operating 24 hours a day plus a wooden air diffuser, there is no danger of anoxic conditions developing.

(3) **Angle-iron framed aquaria.** There is no danger of poisoning your marine-life with such a frame since iron and stainless steel (equal ultra high quality) are the only two metals which one can safely allow to make contact with seawater. It is important, however, that you paint the iron frame extremely carefully (first coat equal metal primer, second coat equal non-lead undercoat, third and fourth coats equal non-lead gloss paint) before commissioning the tank otherwise the seawater (perhaps the most corrosive liquid on Earth!) will corrode your frame away within a few months. The significance of this is that firstly your display will look very unsightly and secondly that in time the unsupported glasses which make up the tank might eventually explode!

(4) Compatibility of beginners' fishes.

(i) **Damselfishes.** Almost all species of Demoiselle fishes can be regarded as being compatible with each other on an inter-specific level, i.e. you could have a collection of one Domino damsel, one Humbug damsel, one Saffron-blue damsel and one Electric-blue damsel and would probably have no problems amounting to real aggression—just the usual inter-damsel bickering which rarely comes to anything. However few damselfishes are truly compatible in a small aquarium at an intra-specific level EXCEPT where mated pairs of fishes are concerned. That is to say that unless you (or your Dealer) can reliably sex damselfishes and thus select one male and one female damsel, I would not advise you to buy two damsels of the same species. The one exception to this rule where one is considering tanks of 3 feet (equal 1 metre) or larger is the beautiful little Filipino Saffron-blue damsel (*Pomacentrus melanochir*) which doesn't exceed 1 in.-1½ in. (2.5-3.0 cm) in length and is remarkably non-aggressive for a damselfish. **Caution** do not confuse this species with the much larger Indian Ocean Yellowtailed Blue Damsel (Ceylon, East Africa etc.). This large species superficially resembles the Pacific Ocean Saffron-blue damsel, but is extremely aggressive.

(ii) **Clownfishes.** I have never regarded this

family of small, cheap and colourful marines as suitable for the beginner's sea aquarium, because they are very prone to disease, (principally oodiniasis equal "marine velvet") in newly-established tanks and unskilled hands. However, since all the American hobby literature does recommend clowns to beginners, it should be mentioned here that the red clown fishes, i.e. common clownfish (*Amphiprion percula*), Tomato or Fireclown (*A. ephippium*), Bandless Fireclown (*A. frenatus*) and Maroon Clown ("*Premnas*" *biaculeatus*), should not be kept together in the same sea aquarium if the latter is less than six feet (equal 2 metres) long.

(5) **Marine dried foods.** Both Aquarian and Tetramarin marine flakes are very good, but all coralfishes greatly benefit from regular feeds of chopped earthworm, whiteworm, gamma-irradiated frozen Mysis, squid shellfish etc. **Caution** do not buy frozen seafoods if they are not gamma-ray irradiated. Despite the fact that these excellent (and cheap!) foods have been on the market now for over four years, the Retail division of my Company still has to deal with half-a-dozen cases each year of aquarists who have wiped out their entire collection of coralfishes with diseases introduced on non-irradiated seafood.

BOOK REVIEW continued from page 155

Perla bipunctata might have its popular name, the Great Stonefly, added.

Their nymphs inhabit running unpolluted stony water, a few willow-flies in still ponds, tarns and dykes, and the sluggish adults, which rest or run on nearby stones, crawl out at night from the mature nymphs which become recognisable by their longer black wing-pads. They mate on the ground and fly only in calm weather. The life-cycle lasts about a year, 3 in the larger species but the short-lived adults do not feed. The amateur still has much scope for adding to the natural history of stoneflies, e.g. is *Isoperla obscura* extinct in the Trent near Nottingham, its sole British haunt, and where does *Chloroperla apicalis* occur, as the only British specimens in museums have lost their labels? By turning over stones in hill-streams one soon finds their flattish, hairy-legged slender, which are slow to crawl away and swim with undulating movements. They are difficult to keep long in an aquarium and are best taken near metamorphosis at the end of May or early June. The large ones, which are voracious predators, feed on aquatic larvae, others like willow flies, which are largely vegetarian, on algae or starwort. The booklet might have included more information on their food and keeping them in aquaria as well as just killing and preserving them.

Some stoneflies have mating dances and beat their abdomens noisily against stones in courtship; other

continentals are adapted to foaming mountain streams by the mature nymph attaching itself to steep stones out of the water by a sticky crop exuded from its mouth. Some inhabit even snow at the end of winter. Stonefly nymphs often accompany mayflies, but are distinguished by 2 not 3 tails, and no gills along their sides.

Collecting and preserving rather than rearing in aquaria also characterises J. M. Elliott's new 52-page work on alder-flies and sponge-flies, etc. Halford, the anglers' entomologist, raised them from egg to adult. This is largely an updating of D. E. Kimmins' keys to these groups, published over 30 years ago. Alder-flies, also reluctant to fly, have females courting the male by scent as they run in pairs, and their life cycle takes 2 years. Their rapacious brown, mud-haunting, carnivorous larvae hunt with pincer-like jaws. Sponge-flies attach their eggs to plants above water and their nymphs seek and feed on freshwater sponges vomiting indigestible parts. These are believed to locate the sponges by moving into the gentle currents coming from them.

The southern woodland *Oonolus fulvicephalus* is the largest British neuropterous or nerve-winged insect, its smoky wings expanding 2 inches; but this booklet has no distribution notes or maps. Of course, none of these insects is a true two-winged fly, yet anglers know them generally as flies, though Halford's famous books are not listed in the references.

From a Naturalist's Notebook

by Eric Hardy

THE FEAR of conservationists that animals may be exterminated in South America before they are ever discovered by science is not without foundation. By no means have all the fishes, amphibians and reptiles in the world been listed and described. For instance, three new species of southern (Leptodactylid) frog have recently been discovered from the Andean slopes of Colombia and Ecuador with two more from Peru and one from Chile, by John Lynch of Nebraska University, while Colorado University biologists found a new Sceloporine lizard in Oaxaca, Mexico.

It has long been known that nesting colonies of birds space themselves out at pecking distance from each other. It now seems that snakes' niches in their well-populated haunts are spaced out by tongue flicking distance. Tongue-flicks can be used to measure niche (territory) size. Other interesting new observations range from social feeding in lizards, including *Anolis*, to the alarm voice of the American collared lizard by keeping a noosed female. Another American herpetologist taught a monitor lizard to perform a visual discrimination task quite simply. Four species of these large *Varanus* lizards live on the Philippines alone. The pygmy mulga monitor has quite a combat ritual for its fighting displays.

When I made field expeditions with Jerusalem Naturalists' Club in old Palestine 30 years ago, 76 species of reptile and eight amphibians were listed in the area from the Mediterranean to the Jordan rift valley. Such has been the progress in modern studies in these groups that in 1951 Haas listed 76 reptiles in the smaller area of Israel and a further 14 in Jordan only. In 1956 Barash and Hoofien listed 74 reptiles in Israel. In 1963, Hoofien, Mendelsohn and Werner listed 82 reptiles and seven amphibia.

Renaming and re-determination of species caused some of the changes, but the interest in this corner of the Levant is its variety. The present list includes 35 snakes, 17 lizards, 10 skinks, 10 geckoes, 5 turtles, 2 tortoises, a desert monitor, 1 chameleon and 1 soft-shelled turtle. There are also 3 frogs (including edible and tree-frogs), 2 toads (green and spadefoot), 1 spotted newt and 1 fire-salamander. Loggerhead, green and hawksbill turtles are rare marine stragglers. The Palestine viper is a speciality. But the present lists do not include the Nile crocodile, the Nile waran (a monitor) and one or two other

unconfirmed claims of the past, which were probably genuine.

The terrarium is therefore a necessity. Prof. Y. L. Werner at Jerusalem used this in his study of the evolution of primitive eyelid-geckoes (*Eublepharis*) from various parts of the world. Unlike the other two families of geckoes, these have movable eyelids and their backbones articulate by ball-and-socket joints. Their eggs, being twice as long as broad, are a primitive type showing how this group has evolved separately. The other families also lay brittle, hard-shelled eggs while the eyelid-geckoes lay pliable parchment eggs which require moisture. Prof. Werner kept *Coleonyx* eggs from California and Arizona between two sheets of moist cotton wool at room temperature. Earlier clutches had been lost in Tel Aviv university from their drying up, when their dependency upon moisture was not realised. After that their sand in the wooden terrarium was kept moist.



Hemitheconyx caudinclus

Photo: Prof. Y. L. Werner

Coleonyx have also been bred in San Diego Zoo, where the females produced 2 or 3 clutches of 2 or 3 eggs from May to September. At 80°F they hatched in 59-81 days. Attempts to hatch Pakistani spotted desert gecko (*Eublepharis*) eggs between moist sand and cotton wool at room temperature failed, due to mould or drying-up; but shrivelled eggs imbibed more water and reassumed normal shape. Similar eggs of West African *Hemitheconyx* eyelid-geckoes also grew mouldy when buried in moist sand after they had expanded in breadth. But Hofmann, of New York Herpetological Society has successfully bred and reared them. Rarer still, unusual *Aeluroscalabotes* eyelid-geckoes from Malaya's Mengiong River were obtained for eggs.

All geckoes lay relatively large eggs and hatch relatively large young, but they lay small clutches of 1 to 3. Communal laying has given rise to mistakenly large claims. The eyelid-geckoes' special

eggs can both lose and gain water in their arid desert haunts, like those of Australian duckbill mammals and some other Australian geckoes. Yet they are less drought-resistant than other geckoes with harder egg-shells. Their eggs, suggests Prof. Werner, may be linked with eyelid-geckoes' climbing habits, to deposit them in rock crevices instead of in the ground.

Not all fish and reptiles have females the larger sex, though this is commonly so. The large eyed little goby of rocky shores is an example, including American *Lythrypnus* whose life histories have recently been published by S. W. Wiley and San Diego Natural History Society. The bluebanded goby's courtship and nest-building were observed in an aquarium containing three gravid females and a male. After first cleaning an area beneath a shell to receive the eggs, the male rushed at one female nipping her genital area and jaws. Finally they locked jaws and drifted leaf-like about the tank. Eggs were spawned in May. Eggs are normally laid in empty sea-shells guarded by the male only.

Commercial exploitation of fish-keeping, called aquaculture, is expanding so much that the present annual production of 6 million tonnes is forecast to double by 1985. This includes shrimps, prawns and oysters, and the use of waste heat hormone-induced spawning and many more advances on the original pen-culture of fish. Though experts have controlled the biology of many fish, they cannot control the cost. In Australia, freshwater catfish (*Tandania*) breed with only a constant water level and good food. But their yellow perch (*Plectroplites*) need an artificial flood to spawn. With two mature females and three males per breeding pond, at 23°C at the bottom, irrigation water warmed by running over an adjacent paddock is used to flood them to ground level. A constant stream of bubbles from a wind-driven air-compressor ensures even top and bottom temperatures. Spawning then usually occurs between 2 and 4 a.m. on the third morning after flooding. Predation on fry by water-beetles and other surface-swimming insects is counteracted by deeper ponds.

Over 100 strings of natterjack spawn were counted on the new "scrapes" and the old big slack at Ainsdale (Southport) dunes at the end of April, but only fewer than 20 frog spawnings, the scarcest of the dunes five amphibians. Crested newts introduced to the scrapes a few years ago at the northern end of the reserve have survived in small numbers. Natterjacks also range north to Walney Island and Ravenglass.

Have you noticed darkly-marked crayfish? Unestam and Soderhall, of Uppsala University, Sweden, recently showed that crayfish resist invading fungi like their current European plague fungus by phenols and phenoloxidase which cause melanism or darkening of the fungus cell-walls. Their protective enzyme

is activated by warning glucose products in the fungus. Maybe crayfish disease can be treated with such warning glucan obtained from other fungi, even yeast or *Laminaria* seaweed.

Fishes, amphibians and reptiles unable to increase their body temperature above a certain degree, find a survival value in their ability to select the most favourable temperature in their haunts. An electronic shuttlebox which allowed fish to control their water-temperature was recently devised to study this behaviour by two Pennsylvania State University biologists, Covert and Robinson. Injection of bacteria increased this ability in goldfish with a behavioural fever. Photocells monitored the movements of the goldfish between chambers. Not only do the preferred temperatures vary among different fish, but some species have daily (circadian) changes or rhythms in preferred temperature, the goldfish having a pre-dawn peak. As one would expect with any fever, largemouth blackbass and bluegill fish increased their temperature preference by 2.6°C after injection with *Aeromonas*, a fish-infecting bacterium. Goldfish increased theirs from 27.9 to 32.7°C, 84 per cent survived at 30.5°C compared with only 64 per cent surviving at 28° and 24 per cent at 25.5°C. About 41°C is their ultimate lethal limit, 6° higher than bluegill or bass. But surely it was common knowledge that temperature affects the survival from infection by fish and reptiles, varying considerably among different types? Increasing water temperature by 3° to 18°C enabled Pacific salmon to survive a viral disease; but it sounded more learned to call survival from infection "immunological response."

It was also shown that by raising its temperature to about 40°C in the daytime, the lizard *Dipsosaurus dorsalis* survived bacterial fever even though it could not check its temperature falling to 12°C at night. This showed that fairly short-term increases in temperature are sufficient. Goldfish showed no mortality when removed to tanks at room temperature (23°C) after several days at the increased temperature.

In other words, it has taken a lot of expensive research by expensively-trained biologists to prove simply what Jack Hems and Laurence Perkins wrote in their modest little Colourmaster publication on *Your Aquarium* the other year: "The first thing to do (with fish diseases) is to raise the temperature of the water. . . ."

PLANT QUERIES

It is regretted that due to illness, this feature has been omitted from recent issues but it will be reappearing shortly and all outstanding queries submitted by readers will receive a postal reply.

VIVARIUM NOTES

by Andrew Allen

How long do Reptiles and Amphibians live? Most herpetologists will ask the question from pure curiosity, but also from a recognition that their year to year running costs depend upon the answer.

Though longevity within any group are notoriously variable, there are certain strong trends that permit the vivarium keeper to predict the probable lifespan of any species, even if no relevant records exist.

Before outlining these trends, I should indicate an important distinction. The age to which an animal survives in the wild is its *ecological longevity*, and depends upon predation and the vagaries of life in a hostile environment. In a cosseted environment, one discovers its *physiological longevity*: the natural lifespan of the animal before senility takes its toll. An actuary recording the age at death of Palaeolithic man would deduce a human life span of less than forty years. We know today that the human lifespan is nearer to a hundred years, having observed ourselves under laboratory conditions, free from risks and disease. The competent vivarium keeper discovers the physiological longevity of his charges and this may differ substantially from their lifespan in nature. For example, I have data on a large natural population of Common Lizards in which no individual has survived more than three years from birth. But at least three Common lizards have lived to six years in my outdoor vivarium.

The first strong generalization is that longevity increases with the body size of the species. There are some very elegant biological reasons for this, but for the present it matters only that the truth of the correlation has been abundantly proven. Big Reptiles and Amphibians live longer than small ones, a truth repeated in each major group. Hence it might be good sense to pay £30 for a large lizard—if you know how to keep it—given that its lifespan may be of the order of twenty years. It may be less sensible to put down the same amount on a small lizard whose lifespan is three years—unless you are a millionaire or like your pleasures to be ephemeral.

Newts and salamanders are very long-lived, even at the smallest end of the scale. I know of Smooth newts (*Triturus vulgaris*) living to 18 years, Palmates (*T. helveticus*) to 19 years, Alpine newts (*T. alpestris*) to 15 years, and the Japanese *Cynops pyrrhogaster* to 28 years. All are quite small: 2-4 inches. Crested newts (*T. cristatus*) live to 18 years, Ribbed salamanders (*Pleurodeles waltl*) to 20 years, and Fire salamanders

(*Salamandra salamandra*) to at least 30 years. All are medium sized: 5-8 inches. Among the large salamanders, *Siren lacertina* reaches 25 years and *Amphiuma means* 26 years, while the giant *Megalobatrachus japonicus* has lived for 52 years in a zoo. These ages are not necessarily maxima—just ages recorded in captivity up to this date. Other species are likely to fit the pattern, according to their size.

The smaller frogs tend to have shorter lifespans than their urodele counterparts. I have noted ages of between 5 and 10 years for Edible frog (*Rana esculenta*) Marsh frog (*Rana ridibunda*), Surinam Pipa (*Pipa pipa*), Pouched tree frog (*Gastrotheca sp.*) and Spade-foot (*Pelobates fuscus*). Common frogs (*R. temporaria*) have lived to at least 12 years in captivity and the large Bull frog (*R. catesbeiana*) to at least 16 years. 'Toads,' in the loose sense, are longer-lived than most anurans. The Yellow-bellied toad (*Bombina variegata*) lives to 20 years, as does the Midwife toad (*Alytes obstetricans*). The Natterjack (*Bufo calamita*) has lived 16 years, the Common toad (*B. bufo*) to 35 years in the wild and 54 years in captivity. Though I only know of a record of 35 years for the Giant toad (*B. marinus*), I have not the least doubt that the giant toads of South America live to at least 60 years—though only time will tell whether that herpetological intuition is correct.

The longevity of tortoises, terrapins and crocodiles requires no comment. Even small chelonians like *Testudo graeca*, the Box turtle (*Terrapene carolina*), and the European pond tortoise (*Emys orbicularis*) are known to exceed a hundred years, while some of the giant tortoises of Aldabra and Galapagos are bi- or tri-centenarians. Many crocodiles live to between fifty and a hundred years. It is safe to assume that a well-kept tortoise or crocodile will outlive its owner.

In most of the cases with which I am familiar, non-poisonous Colubrids such as the Grass snake (*Natrix natrix*) and Garter snakes of the genus *Thamnophis* have lived to between 9 and 20 years. The much larger pythons and boas regularly live between 20 and 50 years—more, perhaps, when zoos attain greater experience in their care.

The smallest, most active, lizards tend to be short-lived compared with, for example, newts of similar dimension. Several American species of *Sceloporus* are annual, and I note ages of between 3 and 6 years for the Common lizard (*Lacerta vivipara*), Sand lizard (*L. agilis*), Wall lizard (*L. muralis*), Anoles (*Anolis sp.*), chameleons (possibly through our inexperience with

this difficult group), and sundry other small lacertids, geckonids and sceloporids. Larger and/or more sedentary species live much longer: the Horned 'toad,' *Phrynosoma cornuta*, for 12 years, Green lizard (*L. viridis*) for 20 years, Slow-worm (*Anguis fragilis*) for at least 50 years, and most of the larger Iguanids, herbivorous Agamids, and Monitors for 20 years at a minimum.

Most of these figures will prove inadequate, becoming redundant as our experience of Reptiles increases work on the longevity of tortoises etc just cannot be

hurried, unlike most scientific research! But it is already evident that, with the exception of small, hyper-active lizards, the Reptiles and Amphibians are an exceedingly long-lived pair of groups. The actual magnitudes will not surprise an aquarist, but merit comparison with warm-blooded birds and mammals. Weight for weight, Reptiles far outlive their furred and feathered counterparts. This may be because the warm-blooded groups 'live faster,' if the delicious hypothesis of Sacher that all animals live the same metabolic time be true.

Cotswold Herpetological Symposium

THE Cotswold Herpetological Symposium took place at Cotswold Wild Life Park on Saturday, 23rd April, 1977, and was the third all day meeting in this now annual event. Over 100 amateur and professional herpetologists (those who study reptiles and amphibians) from all parts of Britain attended—to hear speakers, who are experts in their own branches of the subject, present papers. The morning session was chaired by Mr. John Cooper, M.R.C.V.S., and papers were read by Keith Harding, F.L.S., on "Anaesthesia as an Aid to Milking"; Bob Bell, Esq., on "The Preparation of Museum Specimens" and Dr. E. Elkan on "Fabulous Herpetology".

After an excellent lunch in the Cotswold Wild Life Park restaurant, the afternoon session was chaired by Dr. Oliphant Jackson, M.R.C.V.S.—papers were read by Prof. Angus d'A. Bellairs on "The Nose and Jacobson's Organ in Reptiles"; John Coborn, Esq., on "Some Observations on the Genus *Bitis*"; N. Millichamp, Esq., on "Reptilian Ecdysis" and D. Ball, Esq., and B. Savage, Esq., on "Certain Aspects of Captive Husbandry".

After tea a general discussion ensued on the Dangerous Wild Animal Act, 1976, chaired by Dr. Oliphant Jackson. A panel of experts including Mrs. Margaret Cooper, a non-practising lawyer, who is particularly interested in legal matters pertaining to animals, Mr. Keith Harding, a practising lawyer, Mr. John Cooper, a veterinary surgeon, and Mr. John Coborn, zoo Curator.

The complaint concerning the act, of many amateur herpetologists is that although certain "dangerous" species require a licence, there seems to be a lack of sufficient organisation in the issuing of these licences. Also each local authority has the right to charge "a reasonable fee" to cover the cost of administering the issue of a licence. In a cross section of local authorities it was found that the fee ranged from £25 to £250. Also, the annual insurance could be anything up to £500. If by introducing this law (which was originally aimed at the lion keepers) the govern-

ment intended to put off the keeping of "dangerous wild animals" then they have certainly succeeded. However, it was felt that the facts had not been fully investigated before the act was brought into force. For instance, a person who wants to keep a single, tame, 4 ft. dwarf crocodile—a relatively harmless creature—could have to fork out up to £750 per year for licence and insurance, depending on which local authority was dealing with the matter. On the other hand, a person who wished to keep a herd of 12 ft. Komodo Dragons in his front garden and a flock of bloodthirsty Wolverines in the back, would need no licence or insurance.

Another point was that the veterinary surgeon appointed by the local authority to inspect the premises of the prospective "dangerous wild animal" keeper to ascertain their (the premises) suitability, would more often than not be much less of an expert on the animal in question than the person who wants to keep the animal.

The conclusion of the discussion came when it was agreed that a liaison committee with members from each of the present Herpetological Societies and possibly from the BVZS (British Veterinary Zoological Society) should be formed, and make themselves available to advise and give guidelines to local authorities on herpetological matters, not only pertaining to the Dangerous Wild Animals Act but also to other items.

For instance, a technical point was raised pertaining to another act—"The Wild Creatures and Wild Plants Protection Act, 1976"—part of which states that it is an offence to knowingly destroy the habitat of a protected species. So, if a bulldozer driver continues to demolish a known sand lizard habitat in order to build there, after a field herpetologist has pointed it out to him—he is, technically committing an offence. The meeting finally broke up at about 6 p.m. although many of the delegates held further meetings to a much later hour.

JOHN COBORN, Curator.

In a recent edition of "The Aquarist" I described in a rather lengthy article my personal experiences with cold-water marines, but by attempting to cover almost everything I had tried in my aquaria the information given about individual species was necessarily brief. In this article I shall enlarge upon the group which I have found the most interesting, namely the Crustacea.

Prawns: if someone can tell me of a hardier creature than the Common Prawn *Palaemon squilla* I shall be amazed. In my previous article I said they can be expected to survive for at least a year. Perhaps this did not make my point quite clear, for if not too overcrowded, so that they do not succumb to the attacks of their own species, and the aquarium is not overstocked with sea-anemones, which will be continually trying to drag them into their stomachs whenever the tentacles make contact with the long antennae, they should live for several years. Though they shed their

jerk its abdomen beneath the body in order to propel itself backwards out of harm's way if approached by some predator. After a minute or so it begins to raise itself on to its feet by gently brating the swimmerets. Its appendages can be seen to be soft and flexible and any missing parts, unless they have been lost just prior to the moult, will have been replaced—if only we could do the same! Gradually its strength returns and the danger period is past.

The big problem with prawns is their aggressiveness coupled with their extreme efficiency. They are sensitive to whatever is going on in the aquarium and quickly gather round a moulting hermit crab, for instance, to take the opportunity to tear it to pieces. Even feeding them does not seem to prevent them from making a concerted attack on any other crustacean that is weakened by the moult.

The Edible Prawn *P. serratus* reaches at least double the size of *P. squilla* and when well grown makes a fine specimen for the aquarium in its own

KEEPING BRITISH MARINE CRUSTACEA

by D. S. Bum

skins frequently, every three or four weeks, they grow slowly and take a long time to reach full size. They are excellent scavengers, finding and picking up the tiniest pieces of food with the delicate pincers on the second pair of legs, and are fascinating to watch as they spend a great deal of time "preening" and polishing their hard integument and bickering amongst themselves. If one switches on a light at night, for a few minutes their eyes glow like tiny lamps.

On many occasions I have been present when a prawn has cast its skin, but I have never been able to see exactly what happens. There seems to be no preparation, except for a loss of appetite from a few hours beforehand, and the only thing one sees is the prawn literally leaping out of the old shell—in sharp contrast to the painfully slow moult of most insects. For a short time it is very weak and unable to support itself with its legs, but it does retain the ability to

right rather than merely as a useful scavenger. While the same size as its smaller cousin it is very similar, though somewhat more slender and with a long, less serrated rostrum which is slightly bifid at the tip. At this stage it seems to me to be less aggressive and robust than *P. squilla*, and on a couple of occasions I found specimens dead in my aquaria for no obvious reason. However, with full growth it inevitably becomes a dangerous beast to have and one must accommodate it accordingly.

In view of the extreme hardness of the prawn one might naturally assume the Shrimp *Crangon vulgaris* would be easy to keep too, but while this may be so in an aquarium containing relatively harmless sand—or mud-dwelling creatures, with a sandy or muddy substratum in which they can bury themselves as they would in nature, in a normally stocked aquarium they are soon preyed upon or chivvied about until

they ultimately succumb—prawns being the main culprits.

Even swifter is the fate of those somewhat shrimp-like creatures, members of the family *Gammaridae*, whose more familiar relatives inhabiting our ponds and streams are known as "fresh-water shrimps." There are a number of similar species to be found on our shores; all of them are seldom seen again when introduced to the aquarium.

Specimens of the squat lobster *Galathea squamifera* have thrived and survived many moults in an aquarium containing both species of prawn, yet without injuring the other occupants, for despite their aggressive appearance as they wave their large pincers at any moving object they see, they appear to be fairly innocuous. In their search for food the aquarist will note that it is the especially long appendages beneath the mouth that are employed rather than the pincers. Like the prawns, the squat lobsters grow very little with each moult and in this contrast strongly with the typical crabs which expand almost beyond belief when they moult. It so happens that when these crabs have escaped from their old shells the carapace of the old integument closes again and I know that I am not the only person to have taken such a skin to be a dead crab and then been perplexed at the discovery of a much larger crab in the tank. It is a fact, too, that many of the "dead" crabs one sees thrown up on the beach are in reality only cast skins.

The most aggressive of the true crabs I have kept are the Shore Crab *Carcinus maenas* and Smooth and Velvet Swimming Crabs *Portunus depurator* and *P. puber*. A tiny Shore Crab will sometimes find its way into the aquarium amongst a bunch of live mussels. At first it will probably hide away and be forgotten but sooner or later, when it has moulted a few times, emboldened by its increased size and strength it will re-appear and begin to upset the delicate "balance of power" which every marine aquarist strives to maintain. The wise aquarist will remove the crab there and then.

The Smooth Swimming Crab is a relatively small species, very common just off our sandy shores as the number of thrown up cast skins testifies. It is a very aggressive fast-moving crab, quite capable of disrupting the whole tank. The Velvet Swimming Crab is somewhat intermediate between this and the Shore Crab, but much bigger and infinitely more handsome than either. Like the Shore Crab it often buries itself in the sand, but unlike that species after reaching the required depth it gives a little shudder which causes the sand to cover it more effectively.

One could easily make a case for having an aquarium set aside just for crabs alone. One might then include the Edible Crab *Cancer pagurus* which, though dwarfing the rest when full grown and having the most impressive-looking pincers, is of a rather milder

disposition and very much more sluggish and clumsy in its movements.

In my last article I mentioned the Hairy Crab *Pilumnus hirtellus*, a new species for my aquaria and one which because of its small size I thought might be admissible to my ordinary tanks. I have now had one specimen for over twelve months and have found this to be the case, with certain reservations. I have to have some reservations because all the starfishes *Asterias rubens* introduced to the tank were chewed up by the crab, as also was one Plumose Anemone *Metridium senile*—both distasteful food items one would have thought. As it has moulted, the large (right) claw of my specimen has increased in size to a much greater extent than the rest of the body thus enhancing its interest to me. I am not too discouraged by its damage to the starfishes since almost any species in the marine aquarium does a certain amount of harm on occasions. Likewise the spider crab *Hyas araneus* cannot really be trusted and it can grow very large, but its habit of adorning its carapace with pieces of seaweed, etc., makes it well worth considering.

Finally there are the hermit-crabs, surely the most rewarding of all invertebrates in the aquarium. Only the Common Hermit *Eupagurus bernhardus* is normally found on shore and even this species moves to the sub-littoral zone as soon as it is too large to live in the shell of a Dog-whelk *Nucella lapillus*. The fact that large shells of the Common Hermit are often adopted by the anemone *Calliactis parasitica*, and that as often as the crab changes its shell the anemone will follow, makes it a most engaging creature to observe. In addition the shell is likely to be encrusted with acorn barnacles and the little fan-worm *Pomatoceros triquetter*, as well as being inhabited by the rag-worm *Nereis fucata* which reaches over the crab's right shoulder to share its food; medium-sized shells are frequently colonised by the pretty hydroid *Hydractinea echinata*. The other hermit crab, *E. prideauxii*, which lives with the anemone *Adamsia palliata* wrapped around it, is of at least equal interest in displaying one of the most striking examples of symbiosis found in nature. All these phenomena combine to make the hermit-crabs the most popular species I have, yet I find them so vulnerable to attack when they moult that the longest I have ever succeeded in keeping a specimen has been only about eighteen months. In the past, fish such as blennies and wrasse, ordinary crabs and other hermit-crabs have been to blame, but even now that most predators have been excluded they are still mutilated or killed by the prawns or engulfed by sea-anemones. The fact is, of course, that no-one really wants to keep an aquarium containing a single hermit-crab and nothing else, but this seems to be the only way to ensure their long-term survival. The intriguing problem is how they manage not only to survive in nature but to have become one of the commonest creatures in the sea.



from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists societies for inclusion on this page should reach the Editor by 5th of the month preceding the month of publication.

THE Bristol Tropical Fish Club held their annual open show in April. Entries were judged by members of the F.B.A.S. and Severnside A.A. panel of judges. The results were as follows: Best exhibit in show and Aquarist Gold Pin: R. Canning (Newbury A.S.). Highest individual points: P. A. Moye (Sudbury A.S.). Highest pointed Society: Newbury A.S. Fishiers: 1, P. A. Moye; 2, A. R. Fisher; 3, J. Gunn; 4, S. J. Bowyer. Labyrinths: 1, Mrs. S. Parrish; 2, Mrs. V. J. Howe; 3, D. Hutchinson; 4, P. and Y. Watts. Barbs: 1, D. R. Phippen; 2, R. Canning; 3, M. Strange; 4, D. and K. Clark. Herrns and Hyph.: 1 and 3, D. Williams; 2, D. and R. Clark; 4, R. Newcombe. A.O.V. Characins: 1, P. A. Moye; 2, A. N. Othor; 3, Mrs. V. J. Howe; 4, K. Hillier. Angels and Discus: 1, P. R. Fitzbett; 2 and 4, D. J. Luker; 3, C. Cowles. Dwarf Cichlids: 1, Mrs. M. C. Graham; 2, A. Phillips. Rift Valley Cichlids: 1, R. Canning; 2 and 4, P. and Y. Watts; 3, M. Gifford. Corydoras and Brochis: 1, P. A. Moye; 2, D. J. Luker; 3, Mrs. M. C. Graham; 4, K. Hillier. A.O.V. Cichlids: 1, S. Thompson; 2, R. Newcombe; 3, I. C. Sellick; 4, F. Cripps. A.O.V. Catfish: 1, P. A. Moye; 2, Mr. and Mrs. Darbey; 3, Mrs. P. Lambourne; 4, R. G. Lawrence. Rasboras/Danios/Minnows: 1, Mr. and Mrs. Darbey; 2, D. Hutchinson; 3, D. Williams; 4, K. Hillier. Sharks/Losches/Bottas/Bels: 1, R. Canning; 2 and 4, R. G. Lawrence; 3, P. A. Moye. Mollies: 1, D. and R. Clark; 2, A. Barrett; 3, D. R. Phippen; 4, A. Phillips. Swordtails: 1, R. Holder; 2, R. Canning; 3, P. R. Fitzbett; 4, A. R. Fisher. Platies: 1, W. Holland; 2, Mr. and Mrs. Darbey; 3 and 4, A. R. Fisher. Guppies (female): 1, G. Leonard; 2, W. Burton; 3, Mrs. B. Johnson; 4, J. Menhennet. Guppies (male): 1, J. Hodges; 2, Mr. and Mrs. Darbey; 3, W. Burton; 4, Mrs. L. Jenkins. Killifish: 1, 3 and 4, M. Addicott; 2, M. Pearce. A.O.V. Tropical: 1, P. A. Moye; 2, P. and Y. Watts; 3, M. Gifford; 4, D. Spence. Breeders Egg-layers: 1, Mrs. M. C. Graham; 2, P. R. Fitzbett; 3, P. and Y. Watts; 4, D. Williams. Breeders Livebearers: 1, M. Strange; 2, Mrs. J. Matthews; 3, P. R. Fitzbett; 4, C. E. Cowles. A.V. Sexed Pairs: 1, C. H. Howe; 2, R. Canning; 3, M. and B. Tame; 4, F. Cripps. A.V. Tropical (Juniors): 1 and 2, R. Howe; 3, K. Barnes; 4, R. T. Smith. Twintail: 1 and 2, J. Day; 3, D. Hutchinson; 4, J. Hodges. Goldfish and Shubunkins: 1, W. Burton; 2, 3 and 4, J. Day. Bitterling: 1, R. Canning; 2 and 3, P. and Y. Watts; 4, B. Bow. Koi: 1, 2, 3 and 4, Mrs. J. Matthews. A.V. Pond and River: 1, J. Day; 2, L. Menhennet; 3, T. Bowden. Special Award for Best Cichlid in Show, presented by The British Cichlid Association was won by D. Canning.

AT the two April meetings of the **Waltham-stow and District A.S.** the open show was the

DISINFECT NEW PLANTS AND FISH WITH



Hillside Aquatics London N12

main topic. Although entries were down on last year, all members agreed it was a success. With a steady flow of new members, ideas for next year's show are already being discussed. A warm welcome awaits anyone interested in joining. Please contact Gerry Smith, 51 Belle Vue Road, E17 or phone 527 6303.

THERE was a record attendance at the **New Forest A.S.** annual general meeting in May and in his report the Secretary was pleased to say there had recently been a substantial increase in membership, and noticeable that junior members were taking a larger part in the running of club meetings. There was also a marked improvement in the finances, and also more entries of fish in the monthly table shows. Officers elected for the coming year were: chairman and treasurer, G. Edwards; secretary, R. Travers, 6 Auckland Avenue, Brockenhurst, Hants. SO4 7RS; show secretary, P. Norup; assistant show secretary, P. Wheeler; auditor, J. Jeffery. Table show results were:—Tropical points trophy: P. Norup. Coldwater points trophy: R. Travers. Championship tropical: P. Wheeler. Championship coldwater: L. Menhennet. The F.B.A.S. judge was Alan Weaire from Southampton A.S. Prospective new members will be most welcome at club meetings on the third Monday of each month at the Community Centre, Lymington, Hants.

THE **Gosport and District A.S.** held their annual open show in April. There was a superb trophy display, trophies being given for first, second and third positions and also perpetual trophies for each class. Another feature of the show was a raffle for all card winners with cash prizes to the value of £25. Unfortunately the entries were slightly down this year owing to the fact that Redhill and Reigate and also Yeovil held their open shows on the same date, but nevertheless it is hoped to have the usual warm support again next year. The details of the new committee, following the annual general meeting, are as follows:—chairman, D. Haines; secretary and show secretary, G. Arnold, 16 The Fairway, Portsmouth, Hants, Tel: Gosham 87758; treasurer, G. Tuckwell; show manager, K. Connolly; trophy secretary, Mrs. V. Connolly.

THE results of the **Bournemouth A.S.** Open Show were:—Class B: 1 and 2, D. Goss; 3, T. A. Dowell; 4, M. Armitage. Class C: 1, M. Dore; 2, C. Turner; 3, N. J. Miles; 4, P. Lawrence. Class Ca: 1, C. Turner; 2, M. Dore; 3, A. Chaplin; 4, M. King. Class D: 1, B. Riste; 2, D. Jennings; 3, M. Jennings; 4, L. A. Yates. Class Da: 1, D. J. Luker; 2, A. Weaire; 3, J. Hoare; 4, J. V. Jeffery. Class Db: 1, R. F. Adams; 2, T. Fraser; 3, D. J. Falck; 4, A. Weaire. Class Dc: 1, D. Edelsten; 2, K. E. Taylor; 3, S. Pitcher; 4, A. I. Feast. Class E: 1, R. F. Adams; 2, V. A. Feast; 3, A. J. Jones; 4, A. Weaire. Class Ea: 1, G. F. Barkham; 2, A. R. Fisher; 3, D. Goss; 4, D. Shuttle. Class F: 1, R. F. Adams; 2, R. Bebb; 3, J. H. Jackson; 4, N. Walker. Class G: 1, J. Jennings; 2, C. Turner; 3, B. Riste; 4, G. R. Arnold. Class H: 1, K. E. Taylor; 2, D. J. Luker; 3, R. Bebb; 4, D. Goss. Class J: 1, H. Armitage; 2, C. Turner; 3, A. Weaire; 4, D. Young. Class K: 1, T. Fraser; 2, D. Goss; 3, J. F. Edwards; 4, V. A. Feast. Class L: 1, A. I. Feast; 2 and 4, H. Armitage; 3, M. Dore.

Class M: 1, A. Chaplin; 2, M. Dore; 3, J. Jennings; 4, B. Riste. Class Ma: 1, E. R. Tubb; 2, A. I. Feast; 3, G. R. Arnold; 4, R. Bond. Class Nb-M: 1, A. Arnold; 2, D. Jennings; 3, J. H. Jackson; 4, M. Jennings. Class No-T: 1 and 3, W. F. J. Crookford; 2, E. H. Chatfield; 4, M. Jennings. Class O: 1 and 2, W. F. J. Crookford; 3 and 4, L. A. Yates. Class P: 1 and 4, L. A. Yates; 2, R. Bebb; 3, R. Bond. Class Q: 1, J. F. Edwards; 2 and 3, R. Bebb; 4, E. H. Chatfield. Class R: 1, 2 and 3, A. F. Tubb; 4, R. Gray. Class S: 1, A. Chaplin; 2, G. Stacey; 3, R. Bebb; 4, M. Gale. Class T: 1 and 2, R. Gray; 3, T. Fraser; 4, D. P. Mullen. Class U: 1 and 2, W. F. J. Crookford; 3, B. Binstead; 4, P. G. Fradley. Class Ua: 1, W. F. J. Crookford; 2, R. Bebb; 3, R. F. Adams; 4, A. Arnold. Class V: 1, E. Binstead; 2 and 3, B. Coombes; 4, A. J. Jones. Class W: 1 and 3, K. Blanchard; 2, G. R. Arnold; 4, R. Bond. Class Xb-M: 1, A. I. Feast; 2, E. H. Chatfield; 3, E. R. Tubb; 4, R. Bebb. Class Xo-T: 1, R. Bebb; 2, D. Young; 3, H. Armitage; 4, A. Jennings. Class U-W: 1, H. E. Greenhalgh.

AT the last meeting of the **C.N.A.A.** in April the final of the League was decided between Merthyr and Aberdare. Also there was a knockout competition and with a very good turn out an enjoyable night for everyone was assured. The results were as follows. League championship first:—Egg-layers: 1, C. Morgan (M.A.S.); 2, M. Davies (M.A.S.); 3, P. Burton (A.A.S.); 4, P. Willis (A.A.S.). Livebearers: 1 and 2, M. Davies (M.A.S.); 3, P. Burton (A.A.S.); 4, B. Purdy (M.A.S.). Merthyr A.S. were winners by 14 pts. The knockout results were: Egg-layers: 1, M. Cooper (A.A.S.); 2, P. Willis (A.A.S.); 3, E. Morgan (M.A.S.); 4, W. Biggs (M.A.S.). Livebearers: 1, P. and Y. Watts (C.A.S.); 2, N. Clifford (M.A.S.); 3, M. Thomas (A.A.S.); 4, P. Willis (A.A.S.).

RECENT news from **Macclesfield A.S.** is that they are at present very busy doing up a float for the Macclesfield Carnival and are doing the back of the lorry up to look like the Society badge. The last meeting was a slide show on the community aquarium and the next meeting is a table show to be judged by J. Ridley. The hon. secretary is Christine Campbell, 3 Pool Street, Macclesfield, Cheshire.

FOR the open show in April of the **Southampton A.S.** there were nearly 600 entries and the results were as follows: Class Ag: 1 and 4, R. Paine (Basingstoke); 2, J. Ruthbrook (Reading); 3, R. Hard (Brighton). Class Ba: 1, R. Adams (Salisbury); 2, T. Hanna (Basingstoke); 3, D. Sheridan (Newbury); 4, R. Watts (Caerphilly). Class B: 1, D. Goss (Reading); 2, L. Yates (Petersfield); 3, P. Lawrence (Reading); 4, R. Collins (Brighton). Class Ca: 1, A. Chaplin (Basingstoke); 2, M. King (Gosport); 3, A. Norconha (Orpington); 4, G. Bailey (Southampton). Class Cb: 1, T. Fraser (Basingstoke); 2, P. Ruthbrook (Reading); 3 and 4, M. White (Basingstoke). Class C: 1 and 4, A. Tull (Salisbury); 2, Mr. and Mrs. R. Bebb (Bournemouth); 3, M. Dore (Reading). Class Dc: 1, D. Edelsten (Salisbury); 2, 3 and 4, W. Knight (Gosport). Class D: 1, D. Jennings (Petersfield); 2, V. Connolly (Gosport); 3, Mr. and Mrs. Stacey (Petersfield); 4, Mr. Sheridan (Newbury). Class Da: 1, D. Laker (Newbury); 2, P. and Y. Watts (Caerphilly); 3, F. Cripps (Newbury); 4, R. Hard (Brighton). Class Ea: 1, W. Knight (Gosport); 2, D. Goss (Reading); 3, D. Mills (Southampton); 4, Mr. and Mrs. R. Bebb (Bournemouth). Class E: 1, S. Brown (Reading); 2, A. Weaire (Southampton); 3, I. Lydford (Newbury); 4, R. Adams (Salisbury). Class F: 1, Mr. and Mrs. R. Bebb (Bournemouth); 2 and 4, V. Hunt (Plymouth); 3, J. Jackson (Basingstoke). Class G: 1, Mrs. M. Nethersall (Riverside); 2, D. Edelsten (Salisbury); 3, D. Jennings (Petersfield); 4, J. Jennings (Petersfield). Class H: 1, P. Ruthbrook (Reading); 2 and 4, J. Carpenter (Caerphilly Society); 3, D. J. Luker (Newbury). Class J: 1, A. Weaire (Southampton); 2, Mr. and Mrs. R. Bebb (Bournemouth); 3, D. V. Jones (Southampton); 4, T. Fraser (Basingstoke). Class K: 1 and 4, R. Broomfield (Reading); 2,

support, especially the German Guppy Federation, who provided the International entries, and the members who travelled from the Bristol area. Mr. Dibble and Mr. Kenwood; Wales, (Messrs. Purdy and Biggs and Mrs. Davies) and Scotland, (Mr. Kane).

THE May meeting of Bristol A.S. took the form of a symposium on ponds. Many hints were given and included the following. If you do not like digging, or cannot excavate, then go up, and build a walled pond. Always use some sort of reinforcement when using concrete especially with raised ponds. A sloping base and some sort of sump are a great help when cleaning out has to be done. The strictest attention must be paid to the temperature requirements when bonding fibre glass. One member lost both fish and water from a pond because an arrow from the garden next door penetrated the liner of his pond.

NEW members will be welcomed by the WallSEND A.S. who meet every second Monday at the Robin Hood Public House (upstairs room), High Street, WallSEND, at 8.00 p.m. Further details from the secretary, Mrs. J. Eggo, 58 Marfen Gardens, High Howdon, WallSEND.

RESULTS of the Taunton and District A.S. Open Show were as follows:—Best Fish in Show: Mr. and Mrs. Dibble of Nailsea, for a female *Brachyrhynchus Rhabdophora*. Class B: 1, B. Riste (Chard); 2, Mr. and Mrs. D. Young (Dorchester); 3, J. F. Edwards (Llanrwst Major); 4, M. Bray (Taunton). Class C: 1 and 4, B. Riste (Chard); 2 and 3, J. F. Edwards (Llanrwst Major); 3, R. Porth (Ilfracombe). Class D: 1, B. Riste (Chard); 2, D. Edleston (Salisbury); 3, D. Kerr (Salisbury); 4, P. R. Fitchett (Nailsea). Class Db: 1, R. Porth (Ilfracombe); 2, A. N. McKinley (Plymouth); 3 and 4, B. Northcombe (Taunton). Class Dc: 1 and 4, Mr. and Mrs. Watts (Gwent); 2, Mr. and Mrs. D. Young (Dorchester); 3, B. Riste (Chard). Class E: 1, Mr. and Mrs. Dibble (Nailsea); 2, Mr. and Mrs. Watts (Gwent); 3, B. Sidson (Yeovil); 4, R. Porth (Ilfracombe). Class F: 1 and 3, D. J. Jackson (Salisbury); 2, M. Bray (Taunton). Class G: 1, B. Riste (Chard); 2, J. F. Edwards (Llanrwst Major); 3, J. Edleston (Salisbury); 4, A. N. McKinley (Plymouth). Class H: 1, B. Riste (Chard); 2, J. F. Edwards (Llanrwst Major); 3, A. Marlborough (Taunton); 4, Mr. and Mrs. Fox (Dorchester). Class J: 1, Mr. and Mrs. D. Young (Dorchester); 2, Mr. and Mrs. Fox (Dorchester); 3, M. Bray (Taunton); 4, E. Barnshaw (Taunton). Class K: 1 and 2, Mr. and Mrs. Dibble (Nailsea); 3, Mr. and Mrs. Fox (Dorchester); 4, D. Kerr (Salisbury). Class L: 1 and 3, A. N. McKinley (Plymouth); 2, R. Bond (Yeovil); 4, F. Hammett (Torbay). Class M: 1, Mr. and Mrs. Watts (Gwent); 2, Mr. and Mrs. D. Young (Dorchester); 3, B. Riste (Chard); 4, J. Davis (Torbay). Class Ma: 1, J. F. Edwards (Llanrwst Major); 2, R. Porth (Ilfracombe); 3, R. Bond (Yeovil); 4, Mr. and Mrs. Fox (Dorchester). Class N: 1, D. J. Jackson (Salisbury); 2 and 3, Mr. and Mrs. Dibble (Nailsea); 4, P. R. Fitchett (Nailsea). Class O: 1, R. Bond (Yeovil); 2 and 3, D. Lee (Chard); 4, A. Griffin (Chard). Class P: 1 and 3, R. Bond (Yeovil); 2, Mr. and Mrs. Dibble (Nailsea); 4, A. Griffin (Chard). Class Q: 1, J. F. Edwards (Llanrwst Major); 2 and 3, J. R. Davis (Torbay); 4, C. Budd (Torbay). Class R: 1, R. Davis (Torbay); 2, Mr. and Mrs. Dibble (Nailsea); 3, B. Riste (Chard); 4, B. Brindle (Chard). Class S: 1, A. Marlborough (Taunton); 2, D. J. Jackson (Salisbury); 3, C. Gale (Torbay). Class T: 1, 2, 3 and 4,

Mr. and Mrs. Dibble (Nailsea). Class U: 1 and 3, G. J. Axe (Yeovil); 2, D. J. Jackson (Salisbury). Class V: 1 and 2, G. J. Axe (Yeovil). Class W: 1, Mr. and Mrs. Watts (Gwent); 2, J. F. Edwards (Llanrwst Major); 3, R. Bond (Yeovil); 4, G. J. Axe (Yeovil). Class Xb: 1 and 2, G. J. Axe (Yeovil). Class Xb-m: 1, R. Porth (Ilfracombe); 2, M. Bray (Taunton); 3, Mr. and Mrs. Watts (Gwent); 4, P. R. Fitchett (Nailsea). Class Xc: 1, Mr. and Mrs. D. Young (Dorchester); 2 and 3, Mr. and Mrs. Dibble (Nailsea); 4, J. Davis (Torbay). Class Xu: 1, G. J. Axe (Yeovil); 2, M. Bray (Taunton). Class Z: 1, 2 and 3, J. R. Davis (Torbay).

OPEN Show results of the Coventry Pool and A.S. were: Tropical Winners: Class 1: Mr. and Mrs. Darbey. Class 2: J. Moore. Class 3: S.M.I.N. Class 4: C. Burton. Class 5: C. J. Sykes. Class 6: G. Nesbit. Class 7: Mr. and Mrs. Darbey. Class 8: T. A. Cruickshank. Class 9: T.S.F.N. Class 10: Mrs. Bailey. Class 11: Mr. Bailey. Class 12: J. Fuller. Class 13: Mr. Williams. Class 14: A. C. Ford. Class 15: F. Hirst. Class 16: Mr. Cruickshank. Class 17: A. Bailey. Class 18: Mr. Payne. Class 19: F. Whitehouse. Class 20: Mrs. Cruickshank. Class 21: F. Hirst. Class 22: J. Fuller. Class 23: G. Biggs. Class 24: A. Rothwell. Class 25: T.S.F.N. Coldwater Winners: Class 1: Mrs. N. Richardson. Class 2: J. Amos. Class 3: C. Pratt. Class 4 and 5: T. Sutton. Class 6: G. Howe. Class 7 and 8: T. Sutton. Class 10: P. Orme. Class 14: J. R. Hancock. Class 15: J. Amos. Class 16: F. Orme. Class 17: T.S.F.N. Koi Winners: K1, Kohaku: K. Sale. K4, Sanke: R. Cleaver. K5, Sanke: M. Turner. K7, Unuri: A. Maude. K9, Unuri: M. Turner. K10, Bekko: R. Cleaver. K13, Anagi: R. Cleaver. K14, Anagi: R. Causer. K16, Ohgon: R. Cleaver. K17, Ohgon: R. Causer. K19, Harisake: R. Cleaver. K23, Metalic: A. Maude. K24, Metalic: M. Turner. K25, Kim/Girrin: A. Maude. K26, Kim/Girrin: K. Sale. K29, Shusui: M. Turner. Best Tropical Entry: A. C. Ford. Best Coldwater Entry: T. Sutton. Best Koi Entry: M. Turner.

FROM Gt. Yarmouth and District A.S. Mr. D. Lacey has been accepted as a 'C' Class Judge by the F.B.A.S.

IN April, St. Helens A.S. were hosts to Sandgrounders A.S. and Southport A.S. for an Inter-Club Table Show for which there were 215 entries. Results: Guppies: Mr. and Mrs. Baldwin (Sandgrounders). Platies: B. W. Carter (St. Helens). Swordtails: B. W. Carter (St. Helens). A.O.V. Livebearers: Mr. and Mrs. Baldwin (Southport). Mollies: Mr. Tinsley (Sandgrounders). Small Characins: Mr. and Mrs. Houghton (Southport). Large Characins: Mr. and Mrs. Baldwin (Sandgrounders). Small Barbs: B. W. Carter (St. Helens). Large Barbs: Mr. and Mrs. Baldwin (Sandgrounders). Small Anabantids: B. Wilson (Sandgrounders). Large Anabantids: C. Brown (Southport). Siamese Fighters: Mr. and Mrs. Baldwin (Sandgrounders). Toothcarps: Mrs. Tanker (Sandgrounders). Minnows: Mr. and Mrs. Baldwin (Sandgrounders). Danios: Mr. and Mrs. Baldwin (Sandgrounders). Rasboras: K. Chambers (Southport). Corydoras: G. Bond (Southport). A.O.V. Catfish: J. McCarthy (St. Helens). Louches: Mr. and Mrs. Muckle (Southport). Sharks: Mr. and Mrs. Baldwin (Sandgrounders). Flying Foxes: Mr. Hodge (Southport). A.O.V.: G. Bond (Southport). Small Cichlids: W. Bamber (Southport). Large Cichlids: G. Bond (Southport). Angels: Mr. and Mrs. Muckle (Southport). Rift Valley: Mrs. Stillwell (Sandgrounders). Ladies A.V.: Mrs. B. McCarthy (St. Helens). A.O.V. Coldwater: Mr. and Mrs. Houghton (Southport). Pairs (Egglayers): Mr. and Mrs. Baldwin (Sandgrounders). Pairs (Livebearers): M. Lawson (St. Helens). Best Fish in Show: G. Bond (Southport).

THE Loughborough and District A.S. meet on the second and fourth Thursdays of each month at "The Three Nuns", Loughborough and all visitors are welcome. In April A. Robinson from Lower Weedon, Northamptonshire, gave an illustrated lecture on "Survival factors of fish," which was warmly received. Also in April H. Eisterbrook from Leicester entertained club members with a highly informative talk entitled "Livebearer broods to maturity." The evening's entertainment also included a Table Show with the following results: Livebearer (pairs): 1 and 3, A. Onslow; 2, L. Somerville. Rasboras: 1, S. Purdy; 2, Mrs. N. Richardson; 3, J. Booth. Barbs: 1, M. Rowe; 2 and 3, J. Booth. Best in Show: S. Purdy.

THERE were over four hundred entries for the Billingham Half Moon A.S. open show held in April and the Best Fish in Show was awarded to C. En Wright. Class Ag: 1, Kane Family (H.M.A.S.); 2, R. Jones (H.M.A.S.); 3, L. Southern (Ind.); 4, J. Marks (Ind.). Class Ba: 1, P. Coleman (B.A.S.); 2, J. Page (H.M.A.S.); 3, D. Lunn (Stockton); 4, G. Smith (Killingworth). Class B: 1 and 2, Mr. and Mrs. Ribridge (Novou); 3, J. Page (H.M.A.S.); 4, P. Wright (Sunderland). Class Ca-Cb: 1, Mr. and Mrs. Ribridge (Novou); 2, P. Wright (Sunderland); 3, R. Lunn (Stockton); 4, K. Nunn (Stockton). Class C: 1, Mr. and Mrs. Cook (H.M.A.S.); 2 and 3, Mr. and Mrs. Smith (Killingworth); 4, P. Newton (Hartlepool). Class Da: 1 and 4, J. Taylor (H.M.A.S.); 2, S. Hay (Hartlepool); 3, Miss S. Cox (Redcar). Class Db: 1, M. Monaghan (H.M.A.S.); 2, Mr. and Mrs. McClurg (Stockton); 3, H. Sarrthwaite (Hartlepool); 4, J. Bowman (Whitby). Class Dc: 1, C. Enright (South Shields); 2, H. Harker (Hartlepool); 3, Mr. and Mrs. Hall (Novou); 4, J. King (Redcar). Class Dr: 1, H. Sarrthwaite (Hartlepool); 2, M. Moreland (H.M.A.S.); 3, M. Hunt (Killingworth); 4, M. Long (H.M.A.S.). Class Ea: 1, A. Frain (Stockton); 2, R. Wrighton (Billingham); 3 and 4, T. Kane (H.M.A.S.). Class E: 1, S. Wright (Cleveland); 2, E. W. Buck (H.M.A.S.); 3, Mr. and Mrs. Duffill (Redcar); 4, N. Whyborne (H.M.A.S.). Class F: 1, Mr. and Mrs. Ribridge (Novou); 2 and 3, K. Nunn (Stockton); 4, W. Geldhart (Stockton). Class G: 1, H. Sarrthwaite (Hartlepool); 2, B. Summerscales (Northallerton); 3, A. Mill (Billingham); 4, M. Ruffell (South Shields). Class H: 1, M. Monaghan (H.M.A.S.); 2, Mr. and Mrs. Ribridge (Novou); 3, Mr. and Mrs. Nibbs (Stockton); 4, P. Wright (Sunderland). Class I: 1, Mr. and Mrs. Ribridge (Novou); 2, D. Lunn (Stockton); 3, M. Ruffell (South Shields); 4, P. Wright (Sunderland). Class K: 1, B. Banks (Sunderland); 2, A. Stevens (Middlesbrough); 3, R. Wrighton (Billingham); 4, W. Grant (Ind.). Class L: 1, M. Cample (Mount Pleasant); 2, C. W. Buck (H.M.A.S.); 3, J. Smithson (Stockton); 4, B. Banks (Billingham). Class Ma: 1, R. McCartney (Ind.); 2 and 3, J. Page (H.M.A.S.); 4, M. Daley (Ind.). Class M: 1, L. Hunt (H.M.A.S.); 2, K. Atkinson (Stockton); 3, D. Lunn (Stockton); 4, W. Grant (Ind.). Class N: 1, S. Dodds (Stanley); 2, R. Kirkup (Mount Pleasant); 3, S. Wright (Cleveland); 4, N. Soppitt (Houghton). Class O: 1, Mr. and Mrs. Welsh (York); 2 and 3, R. Hill (N.G.L.S.); 4, Mr. and Mrs. Nibbs (Stockton). Class P: 1, M. Wilson (Stockton); 2, Mr. and Mrs. Nibbs (Stockton); 3, G. Dodd (Stanley); 4, Mr. and Mrs. Monaghan (H.M.A.S.). Class Q: 1, N. Thompson (WallSEND); 2, C. R. Gledhill (Redcar); 3, P. Riley (Ind.); 4, V. Chada (Ind.). Class R: 1, M. Monaghan (H.M.A.S.); 2, K. Greenley (H.M.A.S.); 3, R. Kirkup (Mount Pleasant); 4, Mr. and Mrs. Johnson (Stockton). Class S: 1, J. King (Redcar); 2, J. Taylor (H.M.A.S.); 3, M. Wiell (H.M.A.S.); 4, Mr. and Mrs. Duffill (Redcar). Class T: 1, Mr. and Mrs. McClurg (Stockton); 2, N. Wainwright (Hartlepool); 3, A. Harrison (Billingham); 4, Mr. and Mrs. Welsh (York). Class W: 1, T. Askew (H.M.A.S.); 2, G. Rawlinson (Stockton); 3, Mr. and Mrs. Cook (H.M.A.S.); 4, J. Praser

halamid A TABLET A DAY, SENDS WHITE SPOT AWAY
Hillside Aquatics London N12

(Billingham). Class Xbm: 1, P. Riley (Ind.); 2, B. Banks (Sunderland); 3, S. Stather (Ind.); 4, T. Moffit (Ind.). Class Xoc: 1, J. Johnson (Stockton); 2, R. Leighton (Redcar); 3, Mr. and Mrs. Nibbs (Stockton); 4, G. Smith (Killingworth). Junior: 1, C. Hay (Hartlepool); 2, A. Atkinson (Stockton); 3, S. Prosser (Ind.); 4, A. Cample (Mount Pleasant).

PROBLEMS encountered in breeding Discus had members of the **Longridge and District A.S.** extremely interested at their May meeting. The speaker was John Tinker of Preston who explained that once the difficulty of providing conditions close to those found in the Amazon which is the fishes natural habitat were overcome, the results were usually quite good. He had successfully spawned his fish several times and he let members into many of his secrets while illustrating his talk with some slides of his beautiful fish.

The table show once again provided some keen competition. The results were as follows: Small Anabantids: 1, R. Holden. Large Anabantids: 1 and 2, Mr. and Mrs. A. Lyons; 3, J. Marsh. Siamese Fighting Fish: 1 and 2, R. Holden; 3, Mr. and Mrs. B. Durham. A.O.V. Egglayer: 1, R. Holden; 2, Mr. and Mrs. B. Durham; 3, J. Marsh. A.V. Livebearer: 1, Mr. and Mrs. B. Durham; 2, R. Holden; 3, Craig Parkinson. Best in Show: Mr. and Mrs. B. Durham. Top places in the society show league are: 1, R. Holden; 2, Mr. and Mrs. B. Durham; 3, J. Marsh; 4, Nigel Bland; 5, Mr. and Mrs. A. Lyons.

OPEN SHOW results of **Port Talbot A.S.** annual show are: Class Ad: 1, M. Morgan (Merthyr); 2, E. Perkins (Port Talbot). Class Ba: 1, P. Edwards (Llantwit Major); 2, R. Bow (Blaenau Gwent); 3, M. Thomas (Aberdare); 4, S. Nicholas (Port Talbot). Class B: 1, P. Willis (Aberdare); 2, G. Best (Swansea); 3, M. and B. James (Caerphilly); 4, P. Burton (Aberdare). Class C: 1, C. and J. Richards (Sudbury); 2, G. Best (Swansea); 3, Mr. and Mrs. T. Edwards (Port Talbot); 4, J. Davies (Merthyr). Class Ca: 1 and 4, J. Edwards (Llantwit Major); 2, G. Best (Swansea); 3, C. and J. Richards (Sudbury). Class D: 1 and 2, J. Egan (Port Talbot); 3, A. V. Reed (Aberdare); 4, A. G. Walters (Port Talbot). Class Da: Mr. and Mrs. T. Edwards (Port Talbot); 2 and 3, B. Fouracre (Port Talbot); 4, P. R. Fitchet (Nailesea). Class Db: 1, G. Best (Swansea); 2, J. Egan (Port Talbot); 3, B. Fouracre (Port Talbot); 4, P. Burton (Aberdare). Class Dc: 1, M. Gifford (Caerphilly); 2 and 3, P. and Y. Watts (Caerphilly); 4, W. J. Locke (Port Talbot). Class E: 1, T. J. Sullivan (Merthyr); 2, G. Best (Swansea); 3, Mr. and Mrs. T. Edwards (Port Talbot); 4, R. D. Perkins (Presell). Class Ea: 1, J. Egan (Port Talbot); 2 and 4, C. and J. Richards (Sudbury); 3, B. Bow (Merthyr). Class F: 1 and 3, C. Morrison (Port Talbot); 2, M. Davies (Merthyr); 4, S. Bartlett (Sudbury). Class G: 1, C. and J. Richards (Sudbury); 2, J. P. Edwards (Llantwit Major); 3, E. Morgan (Merthyr); 4, C. and J. Davies (Port Talbot). Class H: 1, C. Davies (Aberdare); 2, G. Best (Swansea); 3, M. Thomas (Aberdare); 4, C. and J. Richards (Sudbury). Class J: 1, G. Best (Swansea); 2, P. Burton (Aberdare); 3, B. Bow (Merthyr); 4, P. Thomas (—). Class K: 1, J. Dunn (Port Talbot); 2, C. and J. Richards (Sudbury); 3 and 4, I. Dibble (Nailesea). Class L: 1, H. Chick (Llantwit Major); 2 and 3, A. and M. Smith (Rhonda); 4, C. and J. Richards (Sudbury). Class M: 1, H. Chick (Llantwit Major); 2, E. M. Brown (Blaenau Gwent); 3 and 4, S. Bartlett (Sudbury). Class N: 1, M. Thomas (Aberdare); 2 and 3, I. Dibble (Nailesea); 4, T. J. Sullivan (Merthyr). Class O: 1, R. D. Perkins (Presell); 2, T. J. Davies (Swansea); 3, P. Causey (Port Talbot); 4, S. Jenkins (Rhonda). Class P: 1, T. J. Davies (Swansea); 2, C. Morgan (Merthyr); 3, G. Best (Swansea); 4, S. Brown (Blaenau Gwent). Class Q: 1, D. Kenwood (Nailesea); 2, J. P. Edwards (Llantwit Major); 3, J. Egan (Port Talbot); 4, Mrs. J. Davies (Port Talbot). Class R:

C. and J. Richards (Sudbury); 2, G. Best (Swansea); 3, P. Fitchett (Nailesea); 4, J. Egan (Port Talbot). Class S: 1, B. Bow (Merthyr); 2, T. J. Sullivan (Merthyr); 3, P. Burton (Aberdare); 4, M. Davies (Merthyr) and Mr. and Mrs. R. L. Cotton (Port Talbot). Class T: 1 and 4, I. Dibble (Nailesea); 2, P. and Y. Watts (Caerphilly); 3, B. Parry (Merthyr). Class U: 1, 2, 3 and 4; C. Rupert (Port Talbot). Class V: 1, 2, 3 and 4; C. Rupert (Port Talbot). Class W: 1, C. Rupert (Port Talbot); 2, G. V. Blackburn (Merthyr); 3 and 4, N. Clifford (Merthyr). Class XBM: 1 and 2, G. Best (Swansea); 3, P. and Y. Watts (Caerphilly); 4, R. Brown (Blaenau Gwent). Class XOT: 1, M. Davies (Merthyr); 2 and 4, I. Dibble (Nailesea); 3, P. Fitchett (Nailesea). Class B-M: 1 and 4, M. Price (Port Talbot); 2, S. Powell (Port Talbot); 3, Miss S. E. Davies (Port Talbot). Class O-Ty: 1 and 2, B. Bow (Merthyr); 3, S. Powell (Port Talbot); 4, M. Price (Port Talbot). Best Fish in Show: H. Chick (Llantwit Major). Red Pin Shark (Class M).

CHANGES of officers of the **Tonbridge and District A.S.** are: chairman: J. Bellingham; vice-chairman: D. Purchard; treasurer: G. Woodhams; secretary: Mrs. J. Peas, 19 Eardley Road, Sevenoaks, Kent TN13 1XX; committee: P. Brown, M. Downes, E. Hutchins, C. Saunders, F. Farnell.

THE **Village Bar A.S.** held their annual general meeting in May when the officers elected for 1977/8 were as follows: chairman: B. Morby; vice-chairman: P. Rogers; secretary: G. Corum, 81 Baxton Road, Oldbury, Watley, West Midlands; treasurer: J. Gilligan; P.R.O.: K. Panting; social organiser: A. Shelley-Fisher. Awards for 1976/7: "Birmingham Trophy" for most best in show wins, G. Corum (seven wins). "Member of the Year", Sally Johns.

The society hope to have a stand at the British Aquarist Festival in Manchester provided sufficient interest is shown. Non-members are invited to participate. A meeting will be held at the Village Bar, Garden House Schooner Inn, Hagley Road, Edgbaston, Birmingham on 12th July between 8 p.m. to 9 p.m. when the secretary and chairman will answer questions. The society recently held a forum at a well known aquarium shop in Smethwick, it is hoped that similar invitations will be repeated.

DURING April **Medway A.S.** held an Interclub Table Show with the **Strood and District A.S.** While the judging was in progress there was a slide tape show on Angelfish. The table show was judged by P. Floyd, Sittingbourne A.S. (F.B.A.S.), the results of which were: 1, T. Hoskins (Medway); 2 and 4, C. Finnis (Strood); 3, Mr. Bailey (Medway). Also in April the society were given an excellent lecture by S. Kemp from Kingfisheries of Beckenham on the setting up of marine aquaria. Kingfisheries of Beckenham loaned a great deal of aquaria equipment (mainly marine), which the lecturer explained in detail.

The annual "Best Fish in the Club" Show took place in May, which was judged by T. King (F.B.A.S.) of the North Kent A.S. During the judging there was a "Bring and Buy Sale" in aid of Club funds. The results of the "Best Fish in the Club" Show were: 1, K. Grubb; 2, D. Bailey; 3, M. D. Berwell; 4, D. Fuller.

The society is looking forward to the remainder of the year for which they have a very varied programme comprising quizzes, slide/tape shows, lectures, table shows, and interclub table shows. Meetings are held every second and fourth Wednesday each month at the East End Hotel (near Luton Arches), High Street, Chatham. Anyone wishing to come to the meetings is most welcome, and for more information please contact the club secretary, K. Grubb, 66 Norman Close, Gillingham.

THE **Catfish Association of Great Britain** had a successful Open Show in April, and were pleased to see so many entrants and visitors. Results: Best Fish in Show and the Aquarist

Gold Pin were awarded to Mrs. Janet Boakes with a *Panaque nigrolineatus*, Bagridae: 1, Mrs. J. Boakes (Catfish Assoc.); 2, C. Rumbly (Gt. Yarmouth); 3 and 4, Mr. and Mrs. Houghton (Brighton). Callichthyidae: 1, P. and L. Hills (Aylesbury); 2, M. West (Kington); 3, P. Gillett (Catfish Assoc.); 4, Diane Raggatt (Catfish Assoc.). Clariidae: 1, P. Jones (Catfish Assoc.); 2, M. Sandford (Reigate and Redhill). Doradidae: 1, T. Woolley (Saracens); 2, Mrs. J. Boakes (Catfish Assoc.); 3, Mr. and Mrs. Houghton (Brighton); 4, M. Sandford (Reigate and Redhill). Loricariidae: 1, Mrs. J. Boakes (Catfish Assoc.); 2, P. Rushbrooke (Reading); 3, P. and L. Hills (Aylesbury); 4, May Netherwell (Riverside). Mochokidae: 1, Diane Raggatt (Catfish Assoc.); 2, May Netherwell (Riverside); 3, P. Snooks; 4, B. Sayers (Brighton). Pimelodontidae: 1, 2 and 3, Mr. and Mrs. Houghton (Brighton); 4, Fran Rogers (Catfish Assoc.). Schilbiidae: 1, Mr. and Mrs. Brook (S.E.L.A.S.); 2, D. Allison (Hendon). A.O.S. Catfish: 1 and 4, Mrs. J. Boakes (Catfish Assoc.); 2, K. Taylor (Havant); 3, R. White (Catfish Assoc.); Brochis: 1, 3 and 4, May Netherwell (Riverside); 2, K. Taylor (Havant). Corydoras (2) in and under: 1, P. Rushbrooke (Reading); 2, T. Cruickshank (Ealing); 3, C. Sykes (Catfish Assoc.); 4, P. and L. Hills (Aylesbury). Corydoras (over 2) in.: 1, 2 and 4, P. Moye (Sudbury); 3, May Netherwell (Riverside); 4, T. Cruickshank (Ealing). Corydoras Types: 1 and 3, P. Moye (Sudbury); 2, T. Cruickshank (Ealing); 4, Doris Winder (East Dulwich). Corydoras not on Size Sheet: 1, W. F. Sutton (Catfish Assoc.); 2, Doris Winder (East Dulwich); 3, John Carpenter (Catfish Assoc.); 4, Ann Greenhalf (Bexleyheath). A.O.S. Catfish Pairs: 1 and 3, Fran Rogers (Catfish Assoc.); 2, P. Rushbrooke (Reading); 4, C. Turner (Cardiff). Corydoras and Brochis Pairs: 1, T. Woolley (Saracens); 2, P. Moye (Sudbury); 3, P. and L. Hills (Aylesbury); 4, R. Dale (Bethnal Green). Breeders A.O.S. Catfish: 1, D. Allison (Hendon); 2, Fran Rogers (Catfish Assoc.); 3, R. Rogers (Breeders Corydoras or Brochis: 1 and 3, Mr. and Mrs. Sharp (Sittingbourne); 2, I. Fuller (Cannock); 4, C. Hunter (N. Kent). Special Class: 1, P. Moye (Sudbury); 2, Ann Greenhalf (Bexleyheath); 3, P. and L. Hills (Aylesbury); 4, W. F. Sutton (Catfish Assoc.). Best Catfish Class G: Mrs. J. Boakes (Catfish Assoc.). Best Corydoras or Brochis: P. Moye (Sudbury). Show Secretary's Choice: P. Moye (Sudbury). Best Pair of Fish: T. Woolley (Saracens). Best Breeders Team: D. Allison (Hendon). Best Fish in Show and Aquarist Gold Pin: Mrs. J. Boakes (Catfish Assoc.). Total entries: 236.

IN May at the **Llantwit Major A.S.** meeting the annual Senior K.O. was held. The fish were judged by all members and the result was a win for G. Lewis. The result of the junior K.O. was: 1, 3 and 4, Miss D. Lewis; 2, Master D. Williams.

A VARIED programme is arranged in the near future for the **Ealing & District A.S.** with two very different Aqua Talks from the FBAS series—Fish Fossils by Susan Turner and Keeping Koi by M. Wainman. Table Shows include the Society's own domestic trophy competitions and an all-livbearer table show.

Recently, some of the new members accompanied their more senior friends to the Hendon Congress to hear Dr. Herbert Axelrod speak; they were unsure of their reactions before they went but all agreed it was an occasion not to be missed and are looking forward to another Convention, the FBAS one at London Zoo in September. Thanks to advertising, or rather to the readers of these columns, membership has increased beyond imagination and a survey among the new arrivals revealed that they all got to know about the Society through the aquatic press and these pages in particular. There is still room for more members at the Northfields Community Centre, Northcroft Road, W.13. The Society meets on the 1st and 3rd Tuesdays of each month.

OFFICERS elected at the annual general meeting of the **North Warwickshire A.S.** were chairman: A. Skinner; secretary: Mrs. R. Hume, 69 Orton Avenue, Walmley; Sutton Coldfield, West Midlands; treasurer: K. Payne; show secretary: B. Bailey; other committee members: A. Allcock, V. Bird, A. Bailey, F. Marsden, J. Moore.

The Society meets on the fourth Thursday of each month at Pye Hayes United Reformed Church, Chester Road, Erdington, Birmingham. Lectures and slide shows are normally arranged. New members and visitors are assured of a warm welcome. Membership information can be obtained from the Secretary at the above address.

The **Midland Association of Aquarists Societies** now have a complete set of fish standards available to the aquarists, price: 50p. Also available is an information booklet, price 20p. Both booklets can be obtained from the following address: Mr. F. Whitehouse, 68 Oakden Park, Codrill, Wolverhampton, Staffs. and also at the M.A.A.S. open Show.

At the May meeting of the **Naltesa & District A.S.**, one of the members, Mr. P. Fitchett gave a short talk on the breeding habits of freshwater tropical fish. This promoted a general discussion among members about breeding various species of fish. The monthly table show was also held and the results were: Angels, Open: 1 and 3, P. Fitchett; 2, J. Williams. Novice: 1, J. Williams. Siamese Fighters, Open: 1 and 3, P. Fitchett; 2, S. Bolton. Novice: 1, S. Bolton; 2, J. Williams.

In May **Oxley & District A.S.** were guests to **Halesowen & Haden A.S.** for an inter-society match in the West Midland Aquarist League. The results were as follows: Cichlids: 1 and 3, F. and S. Whitehouse (Oxley); 2, B. Murray (Halesowen). Damio & W.C.M.M.: 1, J. and C. Carrier (Oxley); 2, J. Clews (Halesowen); 3, B. Murray (Halesowen). Catfish: 1, F. and S. Whitehouse (Oxley); 2, R. Williams (Halesowen); 3, J. and C. Carrier (Oxley). Characins: 1 and 2, B. Murray (Halesowen); 3, J. and C. Carrier (Oxley). The result was a win for Oxley by 15 points to 13. Best fish in Show went to F. and S. Whitehouse. Mr. G. Brockhouse gave an interesting talk on Anabantids. A programme of events and shows for Oxley can be obtained from S. Whitehouse, Show secretary, 68 Oakden Park, Codrill, Wolverhampton, Staffs.

At the April meeting of **Accrington A.S.** there was a slide talk lecture given by Mr. C. Whitley. This lecture was found very interesting by all persons present. A small table show was held and the results were as follows: 1, Tropical (B.I.S.) D. Hargreaves; 2, Lyretail guppies (I. Ashton). Coldwater: 1, S. Foote; 2, B. Haworth. Pairs: 1, I. Ashton; 2, D. Hargreaves. Breeders: 1, I. Ashton.

TABLE SHOW results for the early May meeting of **Brighton & Southern A.S.** were: Class B: Barbs, 1 and 3, Mr. and Mrs. Savers; 2, Mr. and Mrs. Ramshaw; 4, M. Collins. Class E: Labyrinths, 1, Mr. and Mrs. Ramshaw; 2, and 3, Mr. and Mrs. Rice; 4, B. J. Short. Class A: Furnished Aquaria, 1 and 2, R. Hard. The same evening the second leg of the Novice Trophy was held: 1, M. Evans; 2, B. Short; 3, M. Collins; 4, L. Hills. At the previous meeting the club enjoyed a table slide show and lecture on the birth of the Aquarium, which pleased everyone.

OFFICERS elected at the **Middlesbrough A.S.** are:— secretary, G. G. Owens, 43 Hemswell Gardens, Netherfields, Middlesbrough, Cleveland; treasurer, A. Smith; show secretary, B. Smith. Meetings are held at Broadway Public House, Grove-Hill, Middlesbrough, Cleveland. Fortnightly, Wednesdays. All (including beginners) made welcome. 8.00 p.m.

MEMBERS at the May meeting of the **King's Lynn A.S.** were given a very interesting talk by Mr. M. Birch of Mickfield Fish Centre, near Stowmarket, about Tropical Marines. There was also a branch show for Characins. Winners were:— 1, Mrs. J. Towler; 2, D. Benefer; 3, A. Freeman; 4, Mrs. Ozman.

Due to lack of space at the previous venue, meetings are now held at the North Star P. House, North Lynn, 8 p.m., second Thursday of each month and new members or guests are always very welcome. Club secretary is Mr. D. Mackay. Tel: Downham 3010.

OFFICERS elected at the recent annual general meeting of the **Witham and Braintree A.P.S.** were:— chairman, M. Seago; secretary, B. Meech, 338 Coggeshall Road, Braintree, tel: Braintree 25158; treasurer, J. Catchpole; show secretary, J. Bradford; FBAS delegate, R. Thoday.

After the business was concluded the meeting was entertained by an FBAS slide "Aquarium Maintenance." Thanks are due to R. Thoday who have travelled to Kent to collect the show and to K. Saxby for making it available. Meetings in future will be held at Spring Lodge Community Centre, Powers Hall End, Witham on the first Monday of the month commencing at 8 p.m. New members are always welcome as are members of other clubs who may be in the area.

F.B.A.S.

Trophy and Brooch Secretary, P. Cottle, writes "In addition to the Championship and Perpetual Trophies to be won at Open Shows, the accumulation of the actual 'cards' can lead to another acquisition—an FBAS Brooch. A total of 20 First place Cards at a Federation sponsored Show will gain their owner a Bronze Brooch. A further 25 Firsts plus the 'trade-in' value of the Bronze brings a Silver, and the next 30 Firsts will gain a real Gold Brooch.

These Brooches are not beyond reach, and in the two seasons since the scheme was introduced Brooches of all colours have been won. Complete details of the Brooch Scheme can be obtained from P. Cottle, FBAS Trophy and Brooch Secretary, 7 Cheyne Walk, Meopham, nr Gravesend, Kent.

Advance Notice. The Speakers at the 1977 FBAS Convention on September 17th will be Gordon Howes (of the Natural History Museum) talking on Characins, and Graham Cox (Waterlife Research Ltd.) on Tropical Marine Fishkeeping. Tickets £1.50 (limited to 200) from Hugh Parrish, 18 The Barons, St Margarets, Twickenham, Middlesex.

SECRETARY CHANGES

Keighley A.S.: J. S. Whitaker, 76 Providence Crescent, Oakworth, Keighley, West Yorkshire BD22 7QT.

Middlesbrough A.S.: G. G. Owens, 43 Hemswell Gardens, Netherfields, Middlesbrough, Cleveland.

Retford & District A.S.: B. D. Chester, 7 Rose Lea, Odsall, Retford, Notts.

A new secretary has been elected by the **Federation of Northern Aquarium Societies.** He is A. Darby, 1 Perrin Street, Hyde, Cheshire SK14 1LE. Tel: 061-368 4866.

VENUE CHANGES

The **Leek & District A.S.** now meet at Leek Central (Liberal) Club, Market Street, Leek, Staffordshire. The meeting time is still 7.30 p.m. and the society still meet on the last Friday in the month. At the July meeting there will be a lecture on Anabantids.

The **Witham and Braintree A. & P.S.** meetings in future will be held at Spring Lodge Community Centre, Powers Hall End, Witham.

New meeting place of the **King's Lynn A.S.** is the North Star Public House, North Lynn. The change is necessary due to lack of space at the old venue.

NEW SOCIETIES

A NEW society has been formed at Leamside, County Durham. Meeting place, "The 3

Horseshoes," Leamside. Please contact Mr. R. Riley, 32 The Meadows, West Rainton, Tyne Wear DH4 6NP for further information.

AN Aquarists' Society has been formed in Holyhead, Anglesey, North Wales. At present there are sixteen members and it is hoped to recruit many more interested members in the near future. The first meeting was on the 19th May and fortnightly meetings have been arranged at the 'Rose and Crown,' Holyhead. The following have been appointed officials:— C. Taylor, chairman; J. R. Lloyd, secretary, Craig-y-Mor, Rhosneigr, Anglesey, Gwynedd, tel: Rhosneigr 810 363; A. Owen, treasurer.

THE Cleveland section of the **Fancy Guppy Association** meet once a month with the usual table shows, raffles, speakers etc. but only deal with Guppies, showing breeding etc. Any person wishing for further information please write to Mr. M. Clarke, 3 Butler Street, Norton, Stockton-on-Tees.

MISSING TROPHIES

THE **Swansea A.S.** are anxious to trace some of their trophies which appear to be missing from their last open show in 1973. Any information of their whereabouts will be greatly appreciated. Please contact the secretary, Mr. E. L. Leach at 103 Dinas Street, Plasmarl, Swansea SA6 8LJ.

SHOW DATE CHANGE

UNFORTUNATELY **Torbay A.S.** have had to alter the date of their open show to the 23rd October but still at The Torbay Chalet Hotel, Marldon, Paignton. Details from Mr. J. Davis, 43 Haldon Road, Torquay, Devon.

AQUARIST CALENDAR

3rd July: Chard and District A.S. third Annual Open Show at Furnham School, Chard, Somerset. Details from A. Griffin, 50 Fairway Rise, Chard, Somerset, TA20 1NT. Show schedules available end of April.

3rd July: Brighton and Southern A.S. Open Show at Portside Town Hall, Victoria Road, Portside. Show Secretary, M. Rooney 66 Portland Villas Hove, Sussex.

3rd July: Grantham and District A.S. Annual Open Show, to be held at Aveling—Barfords Social Hall, Gonerby Road, Grantham. Schedules can be obtained with a S.A.E. from W. E. Neville, Show Secretary, 32 Sharpe Road, Grantham, Lincs. NG31 9BW. S.A.E. Please.

3rd July: Billingham A.S. Open Show at the Billingham Community Centre, Billingham.

9th-10th July: Romford and Becontree A.S. Open Show, Dagenham Town Show, Central Park, Dagenham. For Show schedules (April), Show secretary, R. Jones, 87 Wood Lane, Elm Park, Essex. Tel: 49 56947.

10th July: Scunthorpe and District A.S. Venue to follow.

10th July: Lytham A.S. Show Lytham Baths, Dicconson Terrace, Lytham, Lancashire (Same venue as last year). Show Schedules from Show Secretary, Mr. P. Ham, 1 Wyndens Grove, Freckleton, Preston, Lancashire, PR4 1DE. Tel: Freckleton 633182.

10th July: Goldfish Society of Great Britain General Meeting, 2.30 p.m., Small Hall, Conway Hall, Red Lion Square, Holborn, London WC2.

17th July: S.E.L.A.S. Open Show at 141 West Greenwich House, Greenwich High Road, London S.E.10. Details from T. Asquith, 49 Central Avenue, Welling, Kent. Tel: 01-854 (23).

17th July: Scarborough and District A.S. Open Show. Further details later. Show secretary J. F. Richardson, 5 Keld Garth, Pickering, N. Yorks YO18 8DG.

17th July: Sandgrounders A.S. Annual Open Show at Meols Cap School, Meols Cap Road, Southport.

17th July: Scarborough and District A.S. Open Show at Gladstone Road Junior School, Wooller Street, Scarborough. Schedules available from J. F. Richardson, 5 Keldgarth, Pickering, N. Yorks YO18 8DG.

24th July: The South Humberdale A.S. will hold its second open show at the Memorial Hall Cleethorpes. Further details from W. Drury, 223 Wellington Street, Grimsby.

29th 30th and 31st July: Tontenham D.A.S. are pleased to announce (subject to confirmation) that an Open Show can now go ahead at Alexandra Place for full details please phone Don Phillipsen, 263, 2654 Show Secretary, Mike Fowler 801 5943 Secretary.

30-31 July: The Tontenham District A.S. are holding an Open Coldwater/Tropical Show, 28 classes at Alexandra Palace Woodgreen. Full details and schedules from D. Phillipsen, 124 Holly Park Rd., N.4.

7th August: Tonbridge and District A.S. Open Show Schedules available from J. Feast, 19 Hardley Road, Sevenoaks, Kent TN13 1XX.

7th August: Koi East Anglia Open Show, Waveney Fish Farm, Diss, Norfolk. Viewing from 1.30 p.m. Further details from G. Wright, 98 Lower Cliff Road, Gorleston-on-Sea. Tel: 0493-69440.

14th August: Oldham A.S. Open Show at Wernith Park, Oldham. Information and show schedules can be obtained from A. Chadwick, 341 Broadway, Chadderton, Oldham. Tel: 061-52 0892.

14th August: Grimsby and Cleethorpes A.S. Sixth Open Show at the Memorial Hall, Cleethorpes. Batching from 12 noon to 2 p.m. Details and show schedules available from the Show Secretary, L. Curtis, 4 Swayby Drive, Cleethorpes, South Humberdale DN35 9PB.

14th August: Blackpool & Fylde A.S. Open Show will be held at the Blackpool Boys Club, Laycock Gate, off Devonshire Road, Blackpool (same venue as last year). Schedules from Miss K. C. Smith, 14 Newton Dr., Blackpool.

20th-21st August: Third Yorkshire Aquarist Festival at Doncaster Racecourse. Show secretary, Mr. B. D. Chester, 7 Rose Lea, Ordsall, Reford, Notts.

20th-21st August: Yorkshire Aquarist Festival to be held at Doncaster Racecourse. Details from B. D. Chester 7 Rose Lea, Ordsall, Reford, Notts.

21st August: Streitfield and District A.S. Open Show at Buile Hill High School, Eccles Old Road, Salford. Details from J. Brown, 18 Royston Court, 72/74 Carlton Road, Manchester 16.

21st August: Stroud and District A.S. Annual Open Show at the Subscription Rooms, Stroud. Full tropical classes plus twelve classes for Coldwater. Schedules later from Mr. J. Cole, 13, The Hill, Randwick, Stroud, Glos. 4504.

21st August: Macclesfield A.S. Open Show. Central Park School, Ryles Park Road, Macclesfield, Cheshire.

21st August: B.K.A. Severnside Group, Annual Killifish Show (Incorporated in the Stroud A.S. Open Show). Seven classes, awards for each class. Subscription rooms, George St. Stroud. Schedules from Mr. J. Cole, 13 The Hill, Randwick, Stroud, Glos. GL6 6JH.

27th-29th August: Tyne Tees Association of Aquarist Societies second exhibition of fish-keeping at Lambton Pleasure Park, Chester-le-Street. The Three Rivers Championship will be included in the programme. Further details available at an early date.

27th August: The Fourth Welsh National Open Show and Exhibition of Tropical and Coldwater Fish will be held at the Sophia Gardens Pavilion, Cardiff. Further details available from C. Turner, 146 Arran Street, Roath, Cardiff. Tel: 498982.

28th August: Long Eaton A.S. Open Show at Gregory's Rose Gardens, Toton, Nottingham. Send s.a.e. for schedule to—Mr. R. Smullen, 9 Festival Avenue, Breaston, Derby, DE7 3DH.

28th-29th August: Gt. Yarmouth and District A.S. Tropical and Cold water Fish to be held at Hapton New Village Hall (on A12 between Gt. Yarmouth and Lowestoft).

28th August: Northern Goldfish P.S. First Show at St. James Church Hall, Bolton.

28th August: Schedules and entry forms for the Northern Goldfish and P.n.keepers' Society first open show at Bolton, Lancs., are available from Mr. W. Ramsden (Assistant Show Secretary) 18, Ainsdale Road, Bolton.

29th August (Bank Holiday): Southport A.S. Open Show at "The Oak Leaf Hall" British Legion Club, Whitehouse Lane, Formby, Nr. Southport.

3rd September: Plymouth A.S. are holding their Open Show at Trinity United Reform Church Hall, Torr Lane, Hartly, Plymouth. Show schedules may be obtained from Show Secretary, J. Rondle, 80 Durham Avenue, St. Jades, Plymouth, Devon.

4th September: Castleford A.S. Open Show at the Civic Centre, Castleford. Schedules and information can be obtained from show secretary, F. Holmes, 48 Elmere Road, Ferry Pryston, Castleford, Yorks. Tel: Castleford 559485.

4th September: Bridgewater A.S. Second Open Show will be held at St. Georges Community Centre. Details from Show Secretary, D. Hilton, 31 Portland Road, Worsley. Tel: 061-790 8106.

4th September: Wellingborough Open Show (F.B.A.S.). Venue: Weavers Sport Centre. Show Secretary, A. J. Crew, 67 Swinburne Road, Wellingborough, Northants. Tel: Wellingborough 77131.

4th September: Bethnal Green A.S. Open Show, to be held at The Bethnal Green Institute, 229 Bethnal Green Road, E.2. F.B.A.S. Championship class 'K' (Danios & W.C.M.M.). Schedules and further details available from the Show Secretary, Mr. R. Dale, 14 Rutland Road, Wanstead E11 2DY. Tel: 01-989 9015.

4th September: Hoylake A.S. 10th Open Show at Y.M.C.A. Hall, Hoylake. Further information from J. Sanders, 18 Drake Road, Leasowe, Wirral. Tel: 051-600 1171.

10th September: Hounslow and District A.S. Annual Open Show to be held at the Youth Centre, Cecil Road, Hounslow, Middlesex.

10th September: Kingston and District A.S. Open Show at The Sutton Adult School and Institute, Bernhill Avenue, Sutton, Surrey. Schedules, Mr. E. Lough, 315 Ewell Road, Tolworth Surrey.

11th September: Harlow A.S. Open Show at Moot Hall, The Stow, Harlow.

11th September: Longridge and District A.S. first Open Show at Longridge Civic Hall, Willows Park Lane, Longridge, Preston, Lancs. (15 minutes from the M6). Details available later.

11th September: Mid-Cornwall Aquarists Society First Open Show at All Saints Church Hall, Falmouth. Show Schedules available nearer the date from Show Secretary Mrs. M. Hall, 15 Tukes Close, Falmouth, Cornwall.

17th September: Bristol A.S. Open Coldwater Show at Bishopston Parish Hall, Gloucester Road. Schedules from Show Secretary, E. N. Bowden, 15 Inns Court Green, Bristol BS4 1TX.

18th September: Whitby and District A.S. Annual Open Show at the Spar Pavilion, Whitby. More details at a later date.

18th September: Barnsley Tropical Fish Society Open Show. Mapplewell and Staincross Village Hall, Darton Lane, Mapplewell, nr. Barnsley. Further details from T. Busfield, 31 Coniston Road, Barnsley S71 1EL.

18th September: West Cumberland A.C. Open Show Venue: The Gadder Club, Mirehouse, Whitehaven, Cumbria.

18th September: Hastings and St. Leonards A.S. Open Show. Schedules from: Mr. C. Panell, 148 Linley Drive, Hastings, East Sussex TN34 2BY.

18th September: Wythenshawe and District A.S. Third Annual Open Show to be held at the Forum, Civic Centre, Wythenshawe, Manchester. Details available from Show Secretary, D. Carr, 7 Penarth Road, Manchester 22.

20th September: Aireborough and District A.S. Autumn Mini Show at Greenacres Hall, New Road Side, Rawden, Nr. Leeds. Schedules from G. E. Cuff, 31 Oakdale Drive, Bradford, W. Yorks. BD10 0JF. Tel: Bradford 632424.

25th September: Atlantis Fishkeeping Society First Open Show at the Aintree Institute, Black Bull, Aintree, Liverpool. Schedules will be available later.

25th September: Chesterfield and District A.S. Annual Open Show will be held at Clay Cross Social Centre.

1st October: The Ichiban Ranchu Society National Ranchu Open Show, Seymour Hall, Seymour Place, Westminster. S.A.E. for schedule to Mr. F. Hilton, 5 Woolmers Mead, Pleshey (Show Secretary) or ring for details. Bishops Stortford 870395. There will be six classes, with Engraved cups for 1st, 2nd and 3rd, plus Award Cards and Specials.

2nd October: David Brown A.S. First Open Show, to be held at Paddock Village Hall Church Street, Paddock, Nr. Huddersfield. There will be 32 classes, in 12 sections. For further details send S.A.E. to A. G. Copp, 41 Keldgate, Bradley, Huddersfield, West Yorkshire.

2nd October: Ealing and District A.S. Open Show. Venue to be announced.

2nd October: Newbury and District A.S. Open Show to be held at the Corn Exchange, Newbury, Berkshire. Show Secretary, Mrs. Shirley Canning, 6 South End, Cold Ash, Newbury, Berkshire. Tel: Thatcham (0635) 64254.

8th October: Goldfish Society Great Britain Open Show is to be held at Raynes Park, Wimbledon of Show schedules available from Mr. G. Herring, 94 Penwith Road, London S.W.18.

8th October: A.A. Jones and Shipman Aquarist and Pond Society's Second Open Show. 5p entry, trade stands, exhibitions etc. Schedules will be available from M. D. Brambridge, c/o A.A. Jones and Shipman Ltd., Narborough Road South, Leicester in July.

9th October: Hartlepool A.S. Open Show: Longscar Hall, Seaton Carew, Hartlepool. Details from Show Secretary, A. Wear, 30 Wharton Terrace, Hartlepool.

9th October: Morecambe Bay A.S. Open Show, to be held at the Lower Ashton Hall, Town Hall, Lancaster.

15th October: East London Aquarist & Pond-keepers Association Annual Open Breeders Show, at Ripple Road School, Ripple Road, Barking, Essex. Schedules available from T. Waller, 1 Sparsholt Road, Barking, Essex.

16th October: North Wilts A.S. First Open Show to be held at the Mechanic's Institute, Emlyn Square Swindon Wilts. Schedules from Q. Curtis, 80 Beech Avenue, Fineshurst, Swindon Wilts. Tel: Swindon 32920.

16th October: North Wilts First Open Show at Swindon. Details later.

22nd-23rd October: British Aquarists' Festival Belle Vue Zoological Gardens, Manchester. Further details shortly.

22nd October: Torbay A.S. Open Show at the Torbay Chalet Hotel, Marlton, Paignton. Details from J. Davis, 23 Haddon Road, Torquay.

22nd October: Huddersfield T.F.S. (at present provisional date).

23rd October: Chelmsford A.S. Open Show at the Community Centre, Broomfield, Chelmsford. Details from Show Secretary, J. I. Munro, 1 Gernon Close, Broomfield, Chelmsford. Would winners of the cups from the October 1975 show please contact the above with a view to returning same as soon as possible.

30th October: Doncaster and District A.S. Open Show at Carcroft Welfare Hall, Chestnut Avenue, Carcroft Nr. Doncaster Yorks. Details from Show Secretary, Mr. K. Lancashire, 20 Symes Gardens, Cantley, Doncaster.

6th November: Halifax A.S. Open Show at the Forest Cottage Community Centre Cousin Lane, Ilkington, Halifax. Schedules sent only on request. S.A.E. to: D. Shields "Cobblestones" Gainest, King Cross, Halifax, HX2 7DT, or Ring for details Halifax, 60116.

6th November: Blackburn Aquarist Waterlife Society Open Show. Venue at a later date. Secretary, Mrs. Jean Wolstenholme, 39 George Street, Great Harwood, nr. Blackburn BB6 7JB.

13th November: Bradford and District A.S. Open Show at Textile Hall, Westgate, Bradford. Details are available from the show secretary, J. Cornforth, 15 Weymouth Avenue, Allerton, Bradford. Telephone: Bradford 493165.

19th November: Goldfish Society of Great Britain, General Meeting, 2.30 p.m., Small Hall, Conway Hall, Red Lion Square, Holborn, London, WC2.

1, Dibble (Nailsea); 3, N. J. Miles (Kingsclere).
 Class L: 1, A. Weaire (Southampton); 2, R. Adams (Salisbury); 3, R. Broomfield (Reading);
 4, M. Kerr (Piscus). Class Ma: 1, V. Connolly (Gosport); 2, D. Sheridan (Newbury); 3, G. Arnold (Gosport); 4, R. Miller (Havant).
 Class M: 1, M. Dore (Reading); 2, Mr. and Mrs. R. Bebb (Bournemouth); 3, D. Jennings (Petersfield); 4, L. Yates (Petersfield).
 Class N.B.M.: 1, D. Goss (Reading); 2, P. Cripps (Newbury); 3, J. Carpenter (Cathfish Society);
 4, J. Bailey (unattached). Class O: 1 and 2, A. Noronha (Orpington); 3, Mrs. F. Yates (Petersfield); 4, D. Mills (Southampton).
 Class P: 1, A. Noronha (Orpington); 2, J. Jennings (Petersfield); 3, C. Hooper (Beighton);
 4, Mr. Crookford (Petersfield). Class Q: 1, Mr. and Mrs. R. Bebb (Bournemouth); 2 and 4, A. Noronha (Orpington); 3, A. Fisher (Newbury).
 Class R: 1 and 2, A. Fisher (Newbury); 3, A. Tibb (Bournemouth); 4, I. Dibble (Nailsea).
 Class S: 1, Mrs. V. Prall (Basingstoke); 2, A. Chaplin (Basingstoke); 3, E. Middleitch (Southampton); 4, Mrs. A. Arnold (Gosport).
 Class T: 1 and 2, I. Dibble (Nailsea); 3, W. West (Salisbury); 4, T. Fraser (Basingstoke).
 Class N.O.T.: 1, P. Fitchett (Nailsea); 2 and 4, I. Dibble (Nailsea); 3, A. Noronha (Orpington).
 Class Uad: 1, E. Binstead (Portsmouth); 2 and 3, B. McHugh (Isle of Wight); 4, W. Crookford (Petersfield).
 Class Ubc: 1, I. Lydford (Newbury); 2, W. Crawford (Petersfield); 3 and 4, E. Binstead (Portsmouth).
 Class V: 1, E. Binstead (Portsmouth); 2, R. Rich (Basingstoke); 3, T. Marshall (Basingstoke); 4, A. Tubb (Bournemouth).
 Class W: 1, D. V. Jones (Southampton); 2 and 3, K. Blanchard (Salisbury); 4, E. Binstead (Portsmouth).
 Class Z: 1, R. Paine (Basingstoke); 2, R. DaCosta (Newbury); 3, B. McHugh (Isle of Wight); 4, Mr. and Mrs. Shirley (Godalming).
 Class Xbm: 1, K. Connolly (Gosport); 2 and 4, B. Young (Newbury); 3, Mr. and Mrs. R. Bebb (Bournemouth).
 Class XO-T: 1, M. Strange (Basingstoke); 2 and 4, A. Noronha (Orpington); 3, A. Tubb (Bournemouth).

THERE was a good attendance at the May meeting of Corby and District A.S. and they were entertained with an interesting talk by Mr. Copeland of Nene College covering such things as fishes evolution which prompted some lively questions. The table show for Characins and Platies was judged by R. Wilson, and the results were: Characins: 1 and 2, J. Siewwright; 3, R. Elliott. Platies: 1, I. Briggs; 2 and 3, P. Hand. Meetings are held on the first Wednesday of each month at the "Shire Horse", Willowbrook Road, Corby, at 7.45 p.m. Members old and new are welcome.

THERE were 400 entries for the Gloucester A.S. open show. Results were as follows: Guppy (male): 1, J. Hodges (Kidderminster); 2, D. Parry (Gloucester); 3, D. and R. Clark (Bath); 4, Mr. and Mrs. Underwood (Warwick). Guppy (female): 1, D. Parry (Gloucester); 2, S. Grainger (Gloucester); 3 and 4, D. Hutchinson (Kidderminster).
 Platy: 1, G. Dixon (Gloucester); 2, W. Holland (Nailsea); 3, Mr. and Mrs. Dibble (Nailsea); 4, D. Parry (Gloucester).
 Swordtails: 1 and 2, C. Morgan (Merthyr); 3 and 4, G. Leonard (Bristol).
 Mollies: 1, M. Freshney (Gloucester); 2, D. and R. Clark (Bath); 3, T. Sullivan (Merthyr); 4, E. Swan (Rugeley).
 A.O.V. Livebearers: 1, 3 and 4, Mr. and Mrs. Dibble (Nailsea); 2, P. Burton (Aberdare). Barb (Barbodes): 1, Mrs. Cruickshank; 2, F. Timmins (Gloucester); 3, N. Wing (Evesham); 4, D. and R. Clark (Bath).
 Capota and Puntius: 1 and 4, M. Freshney (Gloucester); 2, F. Timmins; 3, D. Goss (Reading).
 Characin, H. H. and C.: 1, F. Timmins (Gloucester); 2, D. Williams (Merthyr); 3, J. Walton (Merthyr); 4, A. Onslow (Loughborough).
 Nannortomus and Poecilibrycon: 1, D. Parry (Gloucester); 2, G. Dixon (Gloucester); 3, Mr. and Mrs. Darbey (Wembourne); 4, I. Fuller (Cannock).
 A.O.V. Characin: 1, D. Parry (Gloucester); 2, F. Timmins (Gloucester); 3, J. Walton (Merthyr); 4, A. Onslow (Loughborough).
 Male Fighters: 1, D. J. Payne; 2, M. Davies (Aberdare); 3, D. Goss (Reading); 4, P. Fitchett (Nailsea).
 A.O.V. Labyrinth: 1, Mr. and Mrs. Dibble

(Nailsea); 2, D. Parry (Gloucester); 3, Mr. and Mrs. Darbey (Wembourne); 4, T. Sullivan (Merthyr).
 Corydoras and Brochis: 1, 3 and 4, M. Freshney (Gloucester); 2, I. Fuller (Cannock).
 A.O.V. Catfish: 1 and 2, J. Walton (Merthyr); 3, C. R. Lane (Bristol); 4, P. Taylor (North Wilts).
 Rasbora: 1 and 3, M. Freshney (Gloucester); 2, Mr. and Mrs. Darbey (Wembourne); 4, D. Williams (Merthyr).
 Danios and White Clouds: 1, D. Hutchinson (Kidderminster); 2, E. P. Swan (Rugeley); 3, Mr. and Mrs. Dibble (Nailsea); 4, Mr. and Mrs. Underwood (Warwick).
 Botias and True Loaches: 1 and 4, I. Fuller (Cannock); 2, F. Timmins (Gloucester); 3, D. and R. Clark (Bath).
 Labeos and Sharks: 1, M. Freshney (Gloucester); 2, D. Williams (Merthyr); 3, A. Dods (Evesham); 4, R. Porch (Hfracombe).
 Dwarf Cichlids: 1, Mr. and Mrs. Roan (Merthyr); 2, R. Porch (Hfracombe); 3, R. Newcombe (Bristol); 4, N. Clifford (Merthyr).
 Angels and Discus: 1, F. Timmins (Gloucester); 2, P. Fitchett (Nailsea); 3, Mr. and Mrs. Roan (Merthyr); 4, Mr. and Mrs. Davies (Gloucester).
 A.O.V. Cichlid: 1, S. Picher (Salisbury); 2, S. Thompson (Bristol); 3, D. Hutchinson (Kidderminster); 4, I. Dods (Evesham).
 A.V. Pairs (Tropical): 1, M. Freshney (Gloucester); 2, T. Cruickshank (Ealing); 3, D. Williams (Merthyr); 4, F. Timmins (Gloucester).
 Livebearers (teams): 1, 3 and 4, Mr. and Mrs. Dibble (Nailsea); 2, P. Fitchett (Nailsea).
 Bigglayers (teams): 1, P. Fitchett (Nailsea); 2, D. Williams (Merthyr); 3, R. Porch (Hfracombe); 4, C. R. Lane (Bristol).
 Killies: 1, M. Pearce (B.K.A.S.); 2 and 4, N. Wing (Ealing); 3, P. Fitchett (Nailsea).
 A.O.V. Tropical: 1, M. Underwood (Warwick); 2, F. Timmins (Gloucester); 3, M. Freshney (Gloucester); 4, G. Leonard (Bristol).
 Singletail Goldfish: 1 and 3, N. Richardson (Loughborough); 2, Shilton and Meyer (Staffs.); 4, A. Young (Loughborough).
 Fancy Goldfish: 1 and 4, Shilton and Meyer (Staffs.); 2 and 3, G. Howe (Loughborough).
 Shubunkin: 1, 2 and 3, M. Whiting (Bristol); 4, Shilton and Meyer (Staffs.).
 A.O.V. Pond and River: 1, C. Morgan (Merthyr); 2, N. Clifford (Merthyr); 3, Mr. and Mrs. Darbey (Wembourne); 4, Shilton and Meyer (Staffs.).
 Furnished Jar: 1, D. Williams (Merthyr); 2, A. Young (Loughborough); 3, N. Wing (Evesham).
 Best in Show: M. Freshney (Gloucester) Corydoras.

FIRST guest speaker for the Portsmouth A.S. in May was Keith Furbrick of Hendon who gave a really excellent slide lecture on Characins. At one point he remarked that it must be difficult for aquarists to resist keeping such an interesting family of fishes. The second meeting of the month featured a very entertaining talk on amphibians and reptiles given by Stephen Crabtree of Portsmouth who illustrated it with live specimens, the most prominent of which were the beautifully marked sand boas and geckos. Not to be outdone of course was a rather large, round frog that included in its diet such things as mice and small snakes. During the second meeting there was a table show, Characins and Cichlids. The results were as follows: Cichlids (Class D): 1, P. Smithers; 2, R. Edgington; 3, E. Binstead; 4, B. Townsend. Cichlids (Class Db): 1, R. Edgington; 2, G. Hardy. Cichlids (Class Dc): 1, E. Binstead; 2, 3 and 4, G. Hardy. Characins: 1 and 4, E. Binstead; 2 and 3, G. Hardy. The Best Fish in Show was a Pseudotropheus auratus belonging to E. Binstead.

THE Mid-Sussex A.S. May meeting was spent with an interesting lecture by J. Stillwell, of Portsmouth A.S., on Coldwater Fish. He also judged the table show and awarded the cards as follows: Rasbora: 1 and 3, B. Slade; 2, S. Frost. Damo: 1, E. and T. Tester; 2, S. Tester; 3, M. Franklyn. Labyrinth: 1, S. Frost; 2, M. Sparshott; 3, E. and T. Tester; 4, A. Temple. Further information may be obtained from the Secretary, B. Slade, Tel.: H. Heath 53747.

THE results of the Newcastle Guppy and Livebearer 3rd International 'All Livebearer'

Open Show held in May were as follows:
 Special Class—Three Matched Males: 1, Mr. Kane (Kirkaldy); 2, Herr Bubek (D.G.F.); 3, Herr Thomas (D.G.F.); 4, Herr Bracht (D.G.F.).
 Male Broadtail Guppy: 1, 2 and 3, M. Soppitt (Houghton and District); 4, Mr. Hill (N.G.L.S.).
 Male Narrowtail Guppy: 1, 2 and 3, Mr. Hill (N.G.L.S.); 4, Mr. Clegg (N.G.L.S.).
 Female Guppy: 1, Mr. Mayo (N.G.L.S.); 2, Mr. Hoerschdel (Killingsworth A.A.); 3, Mr. Thompson (N.T.F.S.); 4, Mr. Purdy (N.G.L.S.).
 Breeding Pairs Guppy: 1, Mr. Hill (N.G.L.S.); 2, Mr. Purdy (N.G.L.S.); 3, Mr. Mayo (N.G.L.S.).
 Breeders Class Guppy: 1 and 2, Mr. Hill (N.G.L.S.); 3, Mr. Kirkup (Mount Pleasant A.S.); 4, Mr. Archbold (Independent).
 Male Xiph. Helleri: 1 and 3, Mr. Thompson (Wallsend); 2, T. Marshall (N.T.F.S.).
 Female Xiph. Helleri: 1, Mr. Gledhill (Redcar); 2, Mr. and Mrs. Knibbs (Stockton).
 Breeding Pair Xiph. Helleri: 1, T. Marshall (N.T.F.S.); 2, Mr. Thompson (Wallsend).
 Breeders Class Xiph. Helleri: 1, Mr. Soppitt (Houghton and District); 2, T. Marshall (N.G.L.S.); 3, Mr. Kirkup (Mount Pleasant A.S.).
 Male Xiph. Maculatus and Variatus: 1, Mr. Learoyd (N.G.L.S.); 2, Mr. Martin (N.G.L.S.); 3, Mr. Dobble (Priory); 4, Mr. Rogan (Killingsworth A.A.).
 Female Xiph. Maculatus and Variatus: 1, Mr. and Mrs. Knibbs (Stockton); 2, Mr. Harrison (Billingham); 3, Mr. Kirkup (Mount Pleasant A.S.); 4, Mr. Dibble (Nailsea and District).
 Breeding Pairs Xiph. Maculatus and Variatus: 1, Mr. Learoyd (N.G.L.S.); 2, Mr. Dibble (Nailsea and District); 3, Mr. Purdy (N.G.L.S.).
 Breeders Class Xiph. Maculatus and Variatus: 1, Mr. Kirkup (Mount Pleasant A.S.); 2, Mr. Martin (N.G.L.S.); 3, Mr. Dibble (Nailsea and District).
 Male Poecilia Latipinna, Sphenops and Velfera: 1, Mr. Martin (N.G.L.S.); 2, Mr. English (N.G.L.S.); 3, Mr. Robinson (Mount Pleasant A.S.).
 Miss D. Knibbs (Stockton Junior A.S.).
 Female Poecilia Latipinna, Sphenops and Velfera: 1, Mr. Martin (N.G.L.S.); 2, Mr. English (N.G.L.S.); 3, Mr. Thompson (Wallsend); 4, Mr. Napier (South Shields).
 Breeding Pairs Poecilia Latipinna, Sphenops and Velfera: 1, Mr. Napier (South Shields); 2, Mr. Harrison (Billingham).
 Breeders Class Poecilia Latipinna, Sphenops and Velfera: 1, Mr. Soppitt (Houghton and District); 2, Mr. English (N.G.L.S.); 3, Mr. Dibble (Nailsea and District); 4, Mr. Purdy (N.G.L.S.); 5, Mr. and Mrs. Renton (N.G.L.S.).
 Female A.O.S.: 1, Mr. and Mrs. Renton (N.G.L.S.); 2 and 3, Mr. Dibble (Nailsea and District); 4, Mr. Kane (Kirkaldy).
 Breeding Pairs A.O.S.: 1, Mr. Purdy (N.G.L.S.); 2 and 4, Mr. Dibble (Nailsea and District); 3, Mr. Kane (Kirkaldy).
 Breeders Class A.O.S.: 1 and 4, Mr. Dibble (Nailsea and District); 2, Mr. and Mrs. Renton (N.G.L.S.); 3, Mr. English (N.G.L.S.).
 Annual Award Winners: The Robinson Trophy: Mr. Martin (N.G.L.S.).
 The Renton Trophy: Mr. Dibble (Nailsea and District).
 The Bailey Trophy: Mr. and Mrs. Renton (N.G.L.S.).
 Wallsend Aquatics Trophy: Mr. Hill (N.G.L.S.).
 The Laidler Trophy: Mr. Soppitt (Houghton and District).
 T.T.A.A. Trophy, Mr. Thompson (Wallsend).
 F.B.A.S. Championship Trophy: Mr. and Mrs. Knibbs (Stockton).
 The Laidler Shield and Aquarist Gold Pin (Best Fish in Show): Mr. Martin (N.G.L.S.).

The N.G.L.S. would like to thank the five judges (Mr. S. Croft, F.G.A.; Mr. C. Buck, F.B.A.S.; Mr. W. Cowlan, F.B.A.S.; Mr. K. Greenley, F.B.A.S. and Mr. D. Keighley, F.B.A.S.), for their services, and everyone who attended for their help and

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