

THE

AQUARIST

AND PONDKEEPER



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1977**



THE AQUARIST

AND PONDKEEPER

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Mandarin Fish (*Synchiropus splendidus*) Courtesy of Tropical Marine Centre.

December, 1977

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Geophagus jurupari (Eartheater)

by W. Murray

A REMARK made by one of the speakers at the Renfrewshire Aquarist Society that *Geophagus jurupari* were seldom seen on the show bench in the breeders' class, prompted me to have a team of these cichlids ready for the next Scottish Aquarist Society Open Show, (The speakers club). I had spawned these fish before and from the notes I had made then knew that all things still being equal, I could spawn them again. These fish inhabit the rivers in Guyana and Brazil, where their borders meet. They are very peaceful and will not interfere with any of the other occupants of the tank, nor will they quarrel with each other. Their only bad trait is in their specialized way of feeding which is by sifting through the gravel, extracting food from it. It is quite impossible to keep rooted plants in the same tank as these fish because of their digging activities.

The colour of these fish is eye-catching to say the least. The sides are grayish green, lightening yellowish towards the belly, with rows of iridescent spots along the sides; this is caused by each scale having an iridescent blue dot in the centre. The head and gill-plates have a mixture of highlighted greenish-blue patches and spots. There are also pale blue streaks that run from the top of the head to the eyes, and mouth. The finnage too has greenish blue dots and light blue streaks. Comparing *G. jurupari* with the other *Geophagus* species, it will be found to be a more elongated fish. It has a high dorsum and a flattish underside. It has a very large head pointed and a large mouth with very large lips. The dorsal fin is very long and pointed and extends partially over the caudal fin which is square cut at the rear edge. The anal fin is short and pointed. Ventral fins are long with an extended first ray. The male has longer and more pointed finnage and the second and third rays of the dorsal grow much longer than the other rays. (But the latter can be misleading as once the prolonged rays are broken or nipped off they fail to grow back again). The male's body is also much slimmer and more colourful than the females.

I purchased six of these fish from my dealer. Their body length was approximately an inch which I believe would make their age three to four months. I started feeding them on cooked chopped liver and

raw fish. Once a week, I fed them some spinach or one or two processed peas, (skinned). On this diet the fish were not long in growing. I would like to mention at this point that their specialized method of feeding which I described earlier causes a lot of suspended matter in the tank if not efficiently filtered. I entered the fish house one night after work and found two of my "Earth Eaters" (that is what the generic name *Geophagus* means) dead and the other four decidedly unwell, with their fins all clamped in. I had neglected to clean the tank and attend to the filters. I had also been just topping up the tank instead of giving it a partial water change. That, and the heavy feeding, took its deadly toll. I immediately set to clean up the tank and filters and changed more than two-thirds of the water in the process. The following day the fish were a bit less listless and the day after were back to their usual perky selves. I mention this to point out that although the medium-large cichlid group are usually considered to be the most robust, the *Geophagus* can be a bit troublesome. I know of other aquarists who find them difficult to keep. The lesson I learned, and wish to share, is—It is essential to have clean, clear water with efficient filtration and to give the tank a partial water change once a week or a larger change fortnightly. I set up a 24 in. x 12 in. x 12 in. with approximately 1½ in. of washed gravel filled with aged water. The filter was of the sponge type, and air stone with medium force was also added. The temperature was 77°F and the pH was neutral. The furnishings in the tank were confined to one large flat stone. A week after introducing the pair I noticed the male fish with his head in the air bubbles coming from the air stone. Thinking there was something wrong with him I was examining him through the tank glass when I noticed about half a dozen white eggs on the stone. The fish had spawned. The action with the air bubbles was probably to help the circulation of water round the eggs.

The method the *Geophagus* use to spawn, put them in a class of their own. As the female lays her eggs on the flat stone, the male fertilizes them and both fish take turn in fanning the eggs with their pectoral fins. These actions combined make the fish "OPEN

Continued on page 373

DISCOVERY & DEVELOPMENT OF SWORDTAILS & PLATIES

Written & Illustrated by Barry Durham

JUST about everyone who has kept a tropical aquarium has kept Swordtails and Platies at one time or another. Indeed, they are usually one of the first fishes to grace that first tank and have probably done as much, if not more, to popularise the hobby of tropical fishkeeping as the guppy.

A pair of yellow wagtail platies were the first two fishes to enter into my first ever aquarium and when years later, after going through all the various stages of breeding many egg-laying fishes, my interests returned to the livebearers, a similar pair were once again one of the first inhabitants of my "new" set-up.

The Swordtail, especially if his tail extension is a good one, is the first fish to be noticed in an aquarium as he flashes past in pursuit of his mate. The Platy, too, is a fish that is noticed. The colours are usually bold and striking and cannot be missed, and now both these fishes are available in so many colour and fin varieties that they rival the most exotic of the egg-laying fishes. Yet the usual Swordtails and Platies seen in aquarium shops are just three of sixteen related species and subspecies which make up the *Xiphophorus* genus.

The Swordtail is known scientifically by the name *Xiphophorus helleri*, and the two species of Platies as *X. maculatus* and *X. variatus*. The former is slightly shorter and has a deeper body than the latter.

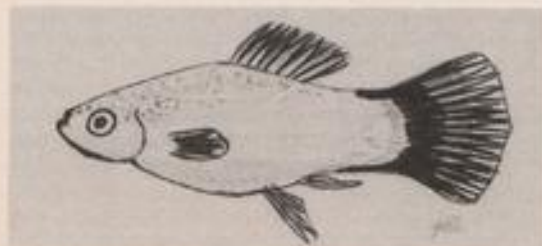
Initially there were two separate genera, the Platies being accorded one of their own—*Platypoecilus*—but the discovery of *Xiphophorus milleri* in 1960 by Dr. Robert Miller decided the issue for this species

contained characteristics which had previously been used to separate the two genera. Prior to this there had been evidence that the Platies and Swordtails were fairly closely related, not the least reason being that it was possible to get them to cross breed in the aquarium, and it was this facility which was exploited by aquarists to bring about the lovely colour variations which have made these fishes so popular.

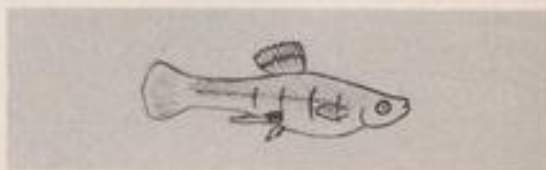
The *Xiphophorus* genus was created in 1848 by Johan Jakob Heckel with the discovery of *Xiphophorus helleri* by the Austrian botanist Karl Heller. It originally included two fishes which are now known to be unrelated to the Swordtail: *Pseudoxiphophorus bimaculatus* (now *Heterandria bimaculata*) and *Gambusia gracilis* (now *Gambusia affinis*). The word *Xiphophorus* while meaning "sword carrier" originally referred to the gonopodium, but applies equally well to the caudal extension.

The Platy was discovered in 1866 and, as its wild coloration is so variable, has been the subject of many "rediscoveries" over the years. It was then placed in the genus *Platypoecilus* and it was only after much investigation by various eminent ichthyologists that the genus was first suppressed to a subgenus by Dr. Myron Gordon and Donn Eric Rosen in 1951 and, after subsequently proving undesirable, has now been dropped altogether.

It was Rosen, working with Reeve M. Bailey who finally put the Swordtails and Platies together in 1963. They split the genus into three groups of



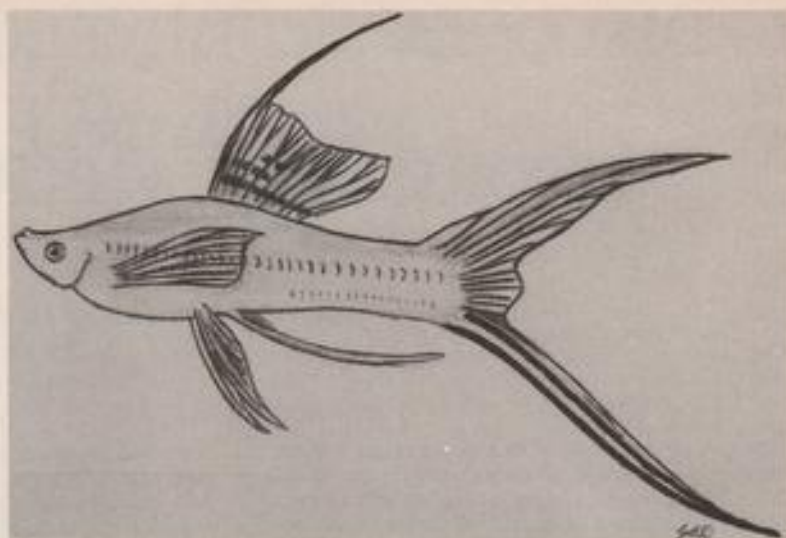
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Above: *Xiphophorus milleri*

Left: Platy

Red Lyretail Swordtail



closely related fishes and progression through the groups shows, to some extent, how the relationship between the Swordtails and Platies was established.

(While this system has been accepted by aquarists, further work on the *Xiphophorus* genus by Dr. C. D. Zander following an expedition to Mexico in 1967, has led him to put forward some amendments to Rosen and Bailey's system as well as the cancellation of the groupings. However, it seems that at present the Rosen and Bailey groupings still stand).



The shaded area indicates the distribution of the Platies, Swordtails and their close relatives.

The groupings are:

The Helleri group.

Xiphophorus clemenciae

- X. helleri alvarezii*
- X. helleri guentheri*
- X. helleri helleri*
- X. helleri strigatus*

The Montezumae group.

Xiphophorus mulleri

- X. montezumae cortezi*
- X. montezumae montezumae*
- X. pygmaeus nigrensis*
- X. pygmaeus pygmaeus*

The Maculatus group.

Xiphophorus couchianus couchianus

- X. couchianus gordonii*
- X. maculatus*
- X. variatus evelynae*
- X. variatus variatus*
- X. xiphidium*

The sixteen species and subspecies are found across a wide range of different climatic conditions along the Atlantic coast of Mexico and Central America as far south as Guatemala and northern British Honduras.

They range from almost temperate to tropical conditions; from areas of very high rainfall to very low; in waters that are deep and clear over sandy bottoms; fast flowing rivers; slow flowing streams and standing waters with plenty of vegetation. Some species live in areas where the winter temperature falls to the mid-fifties Fahrenheit; others live where the minimum temperature is in the mid-seventies. They are all purely freshwater, however, and none is found in brackish areas.

From this great range of habitats it can be seen that most are hardy fishes for the aquarium which can

tolerate almost any conditions the aquarist cares to impose.

It must be said, however, that they all do best in clean, clear aquarium water kept at a temperature in the mid-seventies.

It is highly probable that the many subspecies and geographical races that have produced some of the size and colour variations have been formed following rainy seasons when rivers overflowed and fishes were swept into unaccustomed waters. Many of course, died in this situation. Those that survived eventually adapted themselves to their new environment. Thus we get fishes from fast flowing waters with slender bodies, a short tail and enlarged claw-like structures on the gonopodium to assist in mating. The fishes from slower waters are usually deeper bodied and the gonopodial claws are considerably reduced because they are not as necessary.

Then of course there are the colour forms and fin developments created by aquarists over the years. While this has undoubtedly led to some very interesting fishes it is not true to say that swordtails and platies are easy to cross. This is the impression given by the almost infinite variety of forms which are now available—reds, greens, blues, yellows, blacks, double swords, hi-fins, etc. but it never happens in the wild, presumably because of the operation of that almost mystical "isolating factor." This means that where there are closely related species living side by side they will not interbreed providing there are both sexes of both species present.

Take away this factor in the aquarium i.e. put a male of one species with a female of another, and it is possible

to get them to interbreed. It is still not that simple, however, because genetics comes into play and even a first successful cross between wild fishes will still produce a large number of infertile offspring. Back-crossing the few fertile youngsters with the parents does not always produce the required results either, due to the complicated business of chromosome inheritance factors. Colour and fin developments have therefore resulted, initially, from years of work by dedicated aquarists, although most of the more spectacular ones such as the Hi-fin Swordtails, Lyretail Swordtails and Topsail Platies are usually the result of genetic accidents which have produced a one-off freak. That freak has still had to be nurtured and carefully bred, however, to produce and fix the new strain.

Crosses between aquarium-bred Platies and Swordtails are so much easier these days because so many of our aquarium specimens have mixed ancestry. This will no doubt lead to even more beautiful varieties being produced in the future. Indeed, it is a wonder that there is no organisation specialising in their keeping and development in this country. It would be interesting to try to categorise all the fin, tail and colour variations and then, eventually, hold a show just for *Xiphophorus* species. It would probably run to over 60 classes just for single fish!

With a basic sixteen species and subspecies plus an almost infinitely possibly number of colour and fin varieties of the three most popular Swordtails and Platies, you can see what an interesting and varied group of fishes the *Xiphophorus* genus embraces.

Geophagus jurupari—EARTHEATER continued from page 370

SPAWNERS." After fanning the eggs for approximately thirty-six hours, either the male or female take the eggs into their mouth to incubate them and protect the young. This, I would say, made the fish "MOUTHBROODERS." When feeding the fish at this time, I was horrified to see both parent fish eating with gusto the pieces of cooked fish I had dropped into the tank. That, I thought, was the end of that spawning so I removed the male and on going for the female to my joy I saw some young fry swimming in front of the female's head. Unlike most of the other mouthbrookers who refuse all food whilst mouthbrooding, the *Geophagus* can feed while brooding. The fry when counted were only twelve which, for a female who was now just under five inches, seemed a very small amount indeed. It was over two months before the fry could be separated from the female. All the time the young are with the parent fish no special feeding is necessary for the fry as any feeding given to the parent was chewed and mouthed to the young.

At two months the parent fish was still shepherding her fry around the tank although some were about an inch long. At this time I separated them from the mother. This made the young fish very nervous and they stayed in a small shoal for some time. It was not long before they were swimming about and eating the scraped liver and fish I was feeding. On this they quickly grew until at six months they were about three inches long and ready for showing. The young at this age have the same colouring as the parents with the addition of eight dark transverse bands and a dark bar running from the gill cover to the caudal. The male, when taken from the breeding tank and put back in the tank with the others, paid no attention whatever to the other females. When his mate was introduced into the same tank they paired up immediately. I have since learned that this partnership lasts their lifetime. Perhaps this also explains the loss of his long dorsal rays. As these are usually lost during the initial courtship and as the fish pair for life, he will have no need to reproduce them.



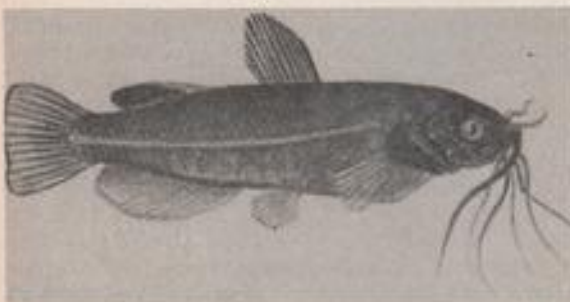
OUR EXPERTS' ANSWERS TO YOUR QUERIES

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



Horned Pout

What sort of tropical fish is a horned pout?

The horned pout is not a tropical fish. It is a North American catfish found in the wild from the Great Lakes and thereabouts and thence southwards through the eastern states to Florida. It is described in aquarium books under the formal name of *Ameiurus* or *Ictalurus nebulosus*. Years ago it was more commonly seen in dealers' shops than it is today. According to Professor G. Sterba another species of this tribe of catfish, less widespread than the above, is mistakenly sold as *A. nebulosus* and, indeed, has led to some confusion among aquarists who take great pains to learn the scientific names of their fish. This other catfish is *Ameiurus* or *Ictalurus melas*. These North American catfish are not at all well-suited to a room-temperature tank of mixed coldwater species; for as they increase in size (up to some 18 in.) they develop a great appetite for much smaller fishes and the nasty habit of chevvyng larger species around. This constant worrying of other fishes, especially after dark, leads to adverse reactions (healthwise) and unexpected deaths.

Can you suggest a method of ridding my tank of an excess of planarian worms?

Make certain that all decaying vegetation and

by Jack Hems

uneaten fish food is removed from the aquarium. Then tie a nylon thread round a thumbnail-sized piece of raw red meat washed free of blood and suspend it in the water. It will attract planarian worms like steel splinters to a magnet. Lift the meat out of the water first thing in the morning. Repeat this procedure over a period of a few weeks. If the worms do not appear to be diminishing in numbers, then take more drastic action. For instance, clear the tank of all fishes and plants and stir in a few crystals of potassium permanganate. After an hour or so drain the pinkish brown water away. Then set up and stock the tank as before. It is usually worth the extra effort to swish the uprooted plants about in several changes of water warmer than normal aquarium temperature. That is before returning them to the aquarium.

Would a pair of rams live in harmony with a pair of orange chromides?

I do not think the two species would fall out in a roomy and well-planted tank. It is necessary, however, to point out that a tank ideally suited to chromides should contain hard and salty water. On the other hand, species of *Apistogramma* flourish best in soft water giving an acid reaction.

I have set up my first aquarium as a community tank and the tungsten lighting is making a difference in the temperature of the water. First thing in the morning, that is before the aquarium light is switched on, the temperature is about 75 F (24 C). By the middle of the evening it has risen to the low eighties (°F). Will this rise and fall in the temperature kill my guppies, angels, harlequins, neons and bronze catfish?

The short answer is no. You will find that the gradual temperature change will take place at or near the surface of the water. Always the bottom and

middle levels of the water will remain at about the setting of your thermostat day in and day out. Make certain, however, that you equip your tank with first-class heating apparatus.

I should appreciate some information on the fish known to science as *Hemiodus semitaeniatus*.

This fish is widespread over the central and north-eastern regions of tropical South America and attains a length of about 7 to 8 in. It has a hearty appetite for live, dried and vegetable foods and is an active swimmer and accomplished jumper. It likes to team up with a few or several of its own kind. In short, it is a shoaling fish. As will be readily realised, as it grows to a largish size it requires a spacious tank. If there are external differences in sex, the writer does not know them.

I have filled my aquarium with soft and neutral to slightly acid water. Is it possible to keep it from turning hard and alkaline in the future?

I think so if you exclude all calcareous grits and decorative stones. Then again, when you top up always use clean rain water or medium hard tap water that has been boiled first. Further, it is recommended that you operate a peat-filled filter for several hours every day. Freshwater snails are best kept out of the aquarium on account of the lime in their shells.

Ever since I installed an under-gravel filter and took to siphoning the top layer of my compost every week, I have not been able to keep sucking loaches or catfish alive for more than about three to four months. My other fishes remain lively and disease free. Can you offer any explanation?

In all probability your so-called sucking loach and bottom-feeding catfish have starved to death. A tank kept scrupulously clean has little or nothing to offer algae eaters and bottom feeders in the way of food. Fishes that swim in the middle and upper levels of the water get what is going: the scavengers and algae eaters go without. Hence within the space of a few months they just fade away. The way to solve your problem is to introduce live food or dried food into the aquarium last thing at night, that is just a few moments before all the lights go out. And permit algae to grow on the ends and back of the aquarium.

I have read that the opaline gourami is a true species from Asia. Please can you give me its scientific name? Also, what is a moonbeam gourami?

I believe I am right in saying that a hobbyist residing in Texas in the late 1940's or early 1950's

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Opaline Gourami

developed the opaline gourami from a dark-blotched and banded sport (or sports) he observed swimming among a batch of blue gourami fry. Hence it is correct to describe this fish as *Trichogaster trichopterus sumatranus* var. opaline. Moonbeam gourami is a little-used non-formal name for *T. microlepis*, better known to British aquarists as the moonlight gourami.

I have just acquired a spiny eel called *Macroganathus aculeatus*. At the time of writing it is living on its own in a new 36 in. by 15 in. by 12 in. tank. Could I introduce other fishes into this tank without fear of bullying breaking out?

If you mean bullying on the part of the spiny eel then I can promise you that this will not occur. The other fish placed with the spiny eel must be equally peaceable. Remember, though, that spiny eels in general will not accept dried food, meat or vegetable matter. They must be given livebearer fry, tiny worms, live *Daphnia*, gnat larvae and so on. Make certain that your spiny eel gets sufficient food or else it will starve to death. Feeding a spiny eel in a community tank is not always easy unless you introduce live food last thing at night or drop a tangled ball of worms where it is lurking.



Blue Panchax

Please give me some advice regarding the food, temperature and environmental conditions best suited to the blue panchax.

Aplocheilichthys panchax flourishes well on a diet of whiteworms or well-washed *tubifex* worms dispensed via a perforated worm feeder. In addition, feedings of gnat larvae, unwanted livebearer fry, and minute

shreds of raw red meat. Maintain a temperature in the middle seventies (°F). Soft or medium-hard water of a peaty acid nature is recommended and plenty of fine-foliaged plants such as the pygmy forms of bladderwort. Other suitable plants to use are riccia, Java moss, cabomba, and so on.

What is the life-span of the keyhole cichlid?

The keyhole cichlid has a life-span of upwards of four or five years.



One-line Tetra

Having just bought a 40 in. by 12 in. by 16 in. tank, and not having kept fish before, I would appreciate some suggestions on stocking it with a mixed collection of barbs and tetras. In other words, I'd like the popular names of suitable species which would live together on peaceful terms.

Any of the following fishes would get on well together: lemon tetra, neon tetra, gold tetra, platinum tetra, flame tetra, dawn tetra (*Hyphessobrycon eos*), yellow tetra, one-line tetra, checker barb, Schubert's barb, cherry barb, Chinese or half-striped barb, tic-tic barb, Puckell's barb. There are others. For further information on suitable fishes seek out a long-established and specialist dealer and ask his advice.

Will a pair of opaline gourami attain full size in an 18 in. x 12 in. x 12 in. tank stocked with dwarf gourami?

The short answer is yes. I must inform you, however, that the male *opaline gourami* is a compulsive bully, that is in its larger sizes, so do provide plenty of plants to serve as shelter for the female. A male *opaline gourami* is more likely to bully members of its own species than fishes of another kind.

I have a tank 4 ft. long and 18 in. tall. Would this be large enough to support four fully-grown angel fish and four fully-grown keyhole cichlids?

Your tank is large enough to support six fully-grown angel fish as well as four or five large keyhole cichlids.

I have bought two Lake Malawi cichlids. They are about 3 in. not counting the caudal fin. They do not appear to be at all happy in my tank and up to the present time have not taken food. They fight each other. All this seems very strange to me. I do not know the scientific or popular names of the above fish and my dealer cannot help me. Have you any advice to offer?

Most, if not all, Malawi cichlids are aggressive by nature. Well, perhaps not so much aggressive but easily made aggressive if another fish or fishes stray into what they regard as their piece of territory. Thus a spacious tank is the first requirement to afford shelter and territory to hold against intruders. A male can be just as brutal towards a female of his own kind as towards another fish of a different species. Peace will reign for a short time while egg-laying is in progress. Prior to spawning and as soon as spawning is over bullying is the order of the day. That is generally speaking. A glass division to separate a female of a species from the male is usually necessary. Malawi cichlids flourish best in hard water giving an alkaline reaction. Temperature is best maintained in the upper seventies (°F). Feeding does not usually pose problems. Offer shredded raw red meat, gnat larvae, live *Daphnia*, various small worms, torn and scalded lettuce and a first-class flake food. Aquarium plants, except those that grow floating, are usually a waste of time and money. Furnish the tank with rocks and large seashore-type rounded pebbles on a deepish bed of well-washed fine grit or well-washed sharp or white sand.

SPECIAL ANNOUNCEMENT

Due to circumstances beyond our control, recent issues of *The Aquarist* have not been published on time. We apologise for any inconvenience this may have caused and are pleased to report that the situation is now rapidly returning to normal.

During the past year we have introduced a number of special issues on various aspects of the hobby, and readers will also be aware of the increased use of full colour illustrations. In order that this trend may continue and to combat rising production costs we have reluctantly decided that a small adjustment in price is inevitable. In consequence of this, future issues of *The Aquarist* will be on sale at 35p, which is still excellent value in comparison with most other magazines of a similar nature. Many thanks for your continued support.

GOLDWATER QUERIES

by Arthur Boarder

A few days ago I found one of my long-tailed shubunkins on the bottom of the pond on its side. It was still breathing but died soon after. I then found a couple of creatures on the bottom, about an inch long with three pairs of legs and a long segmented body. They were very dark in colour. What are they and could they have killed the fish?

The creatures were the larvae of the Great Diving Beetle (*Dytiscus marginalis*). This beetle is a strong flier and often enters a pond at night time. The larvae live on soft vegetation and small live creatures. I doubt very much if they killed your fish. They could kill a very small fish and perhaps bite the soft underside of a fish. If your fish had been so injured that it died, it is almost certain that you would have been able to see a wound. It was easy for me to recognise the pest from your description without the aid of your excellent sketch. Your fish seemed to me to be suffering from a chill. Your pond, 6 ft. x 3 ft., is liable to extremes of weather and could easily drop twenty degrees F in a night. Many of your type of shubunkins are bred under warm conditions and so may have succumbed to the shock of sudden cold. Water beetles can be caught when they come to the surface to breathe, which they do by hanging upside down there.

I stocked a garden pond with goldfish and shubunkins and all seemed to go well. I then added some golden orfe, green tench and rudd. Since then I have found an occasional goldfish dead. None seemed to be injured and only the goldfish have died. What can have caused their deaths?

It is always difficult to diagnose the cause of death of a fish on the meagre information given. The size of the pond and that of the fishes was not given. It may be that the goldfish were unhealthy when procured and that the pond was overstocked with fishes. In such a case the weaker ones usually suffer. It may be that the water was polluted and there was not enough oxygen for all the fishes. However, if any of the golden orfe were of a good size, I would have expected them to go first, as these fish require a well oxygenated water in which to thrive. Check up on the number and sizes of your fishes and if you have much over an inch of body length of fish to each square foot of surface area, thin them out as soon as possible and a complete change of water might help.

I am moving house soon and am thinking of making a concrete pond for Koi. I understand

that there could be some danger from lime from the cement. If I paint the surface with a sealant, such as Pondseal, will this make the pond safe?

I am rather surprised to learn that you intend to make your new pond with concrete. I think that it will be much easier, and certainly safer for the koi, if you use a liner instead. There are several good liners on the market and the advantage of using one is that the pond can be filled and if necessary, the fish could be introduced the same day. I have done this with no ill effects to the fishes. If you do use concrete, then when the mixture is dry, you can fill it with water for a day and then scrub it round well with a stiff broom. Repeat the process two or three times and the pond should be safe. It is only the surface free lime which is the danger and once this is removed all should be well. I would sooner use this method than add any sealant as it is probable that this could wear off in time and then let the dangerous lime out into the water.

If you do construct your pond with concrete I shall be much obliged to you if you can let me know the complete cost of cement, aggregate and sand used. I would then like to work out the comparative cost of using a good liner, providing the size of the pond is given. I feel sure that this will be of use to other readers. I already know the back-aching task that making a concrete pond can be, having had this experience years ago, but never again.

When we moved into this house we found a pond in the garden which had been filled in with rubbish. We cleaned it out and found that it is lined with mosaic tiles. It is five feet across and fairly deep. How can we treat it to make it water-proof.

The easiest method to use would be to line it with a plastic liner. Failing that you could dry it out well and paint it with one of the rubberised sealing paints on the market. It is small and will not hold many fish.

I have a tank, 33 ft. by 3 ft. by 9 in. The water is very green. I had a lot of Water Sprite growing in it but it does not seem to thrive. Why is this please?

Water Sprite (*Ceratophyllum thalictroides*) is really an annual plant but may be kept through the winter in warm water. It is not the best of water plants for a coldwater tank and there are several others I have often mentioned in my replies, which would suit your tank better. When a tank water keeps very green it is either that it is getting too much light or that there are not enough oxygenating plants therein. See that the

tank is not facing or very near to a south window and regulate the lighting according to the growth of the green Algae. This will not thrive in a poor light, but the goldfish do not seem to mind this as long as your lamp is on for about ten hours a day.

Last July I made a pond, 15 ft. x 5 ft., and two feet deep and used a Butyl liner. I washed this and filled the pond. After two days I added many oxygenators, water snails and assorted fishes. Within twelve hours all the fishes were dead, a day after so were the snails and within the week so were the plants. What could have caused this trouble?

You can rule out the Butyl liner as this material is quite safe and is used for lining drinking water tanks. I have lined a pond with this, filled it and had plants and fantail fish in the pond the same day, with no trouble whatever. The speed with which your fishes died suggests to me that the water was poisoned. It sounds very like copper poisoning as this is the effect it would have on fishes, snails and plants. Copper is very dangerous and it is said that a fifth part to a million parts of water could kill fishes. If the water for your pond came through copper pipes, then this could be the reason for the tragedy. If you have no copper pipes, are there any bits of copper in use near the pond? Failing the entry of any copper or other dangerous mineral, I can only suggest that someone has been using a strong insecticide near your pond or that someone has put something poisonous in the water. I might have thought that there had been fumes from a factory chimney, as there are several in your area, but you stated that you had another small pond which was unaffected. Whatever the cause it is certain that a poison got into the water, but how I cannot say. The speed of the death of the fishes and plants convinces me that the water had been poisoned.

We have had a garden pond with goldfish for about twenty years and had never bred any young fish. This year we added another pond and much to my surprise, about a week ago I saw a number of young fish in the pond. They were about an inch and a half long and appeared to be feeding well on the adult food. Recently the fish seem to have been reduced in numbers. Where have we gone wrong?

If your young fish were an inch and a half long I doubt if the parent fish have been eating them. Once they get to that size they are usually safe, unless you have other fishes besides goldfish in the pond. As you have a lot of water plants in the pond it is quite possible for many of the young fish to be hiding among them. Try visiting the pond at night with a strong torch and if you are quiet you may be able to see some of them. Also, if you throw some dust-fine food on the pond and remain near but very quiet, the

youngsters may come from among the plants and take the food. I have found that the safest method to adopt in order to get a good supply of fry is to remove the eggs to a safe place for hatching and rearing soon after they are laid.

I have a pool 27 feet by 9 feet with a depth of from 14 to 40 inches. Would this be suitable for Koi and will an outside filter be better than an under-gravel one?

In my opinion I prefer the outside filter as it would be easier to clean. After a time an under-gravel one begins to choke up as it filtered out the detritus from the water including the droppings from the Koi. These can be fairly copious especially if the fish are fed well. I imagine that all this must build up fairly soon and so present problems such as a filter would be much harder to clean than a container on the side of the pond.

I am soon to construct a pond and have the choice of two sites. One is in the shade most all day and the other gets a lot of sunshine. I have been bothered by green Algae in the last pond I had and so wonder which site would be the better one as far as remaining free from Algae?

I think that the choice will have to be an individual one as it is not only the sun which encourages the green Algae to form but light. The sunshine may cause the Algae to grow a little faster but some sunshine is beneficial to the fishes. In any case you can always shade out some of the sun if necessary with water lily leaves etc., but you cannot provide any if the pond is right in a shady spot.

I have three tanks, two 24-inch and one 12-inch. In them I have some Orandas. The pair spawned and I have about twenty fry only half an inch long at the most. The fry do not seem to grow much and the water plants will not grow. I have an undergravel filter with coloured gravel above it. I also have a strip light over the tanks. Can you tell me why the fry and plants do not grow?

I suspect that the fry are not growing as they have insufficient swimming space in a 12-inch tank. Space is very important when rearing fancy goldfish. Also such fry would benefit from some extra warmth, say up to the lower seventies F. This enables them to feed much better and so promotes good growth. As for the plants, I do not like coloured gravel, this smacks of under-water windmills and divers. Cut it out and get some clean washed river grit. Water plants, like ordinary ones, cannot grow well without nourishment. They should be able to obtain plenty of this from the droppings of the fish. However, if your filter is taking out all this nourishment, you cannot expect the plants to grow. I have found that

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Bedotia geayi

(Madagascar Rainbowfish)

by Phillip R. Allen

Bedotia geayi, as its common name suggests, comes from Madagascar, where it lives in small streams along the east coast. *B. geayi* grow to a length of around 3½ in., although they are sexually mature at about 2 in. They are similar in shape and finnage to the more common species of rainbow fish which are seen for sale. *Bedotia geayi* is much more colourful than all the other rainbows, however, with perhaps the exception of the Celebes rainbow (*Telmatherina ladigesi*).

There are two dark bands; one running from the mouth to the caudal fin, the other much paler band runs from below the pectoral fin to the end of the anal fin, becoming more distinct along the length of the anal fin. The body colour above the lateral line is bronze and below an off-white. The unpaired fins of male *B. geayi* are often suffused with red (particularly when in breeding condition). The tail fin (caudal) is variable in male fish. Two variations are shown in the diagram.

Female fish also have the black crescent on the tail but the tips are generally pale (or white). The anal fin and second dorsal fin in both male and female fish are edged with black, although this characteristic is much more prominent in male fish. There is also more red in these fins in male fish.

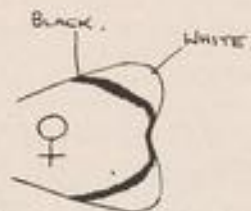
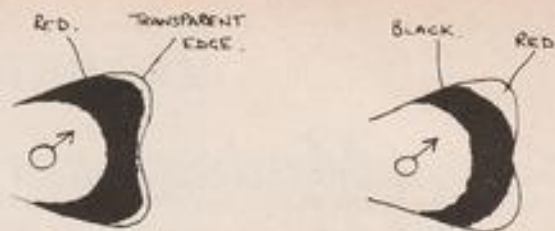
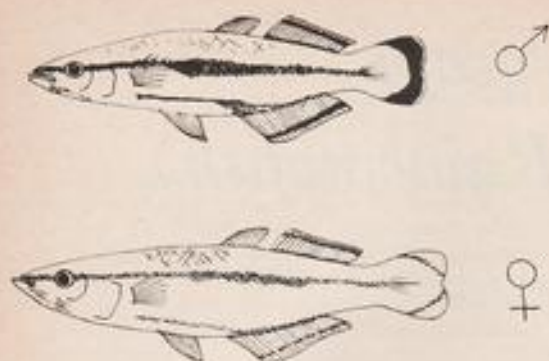
The water conditions in Madagascar, where the rainbows live, is fairly hard and alkaline. *B. geayi* does not demand this, but for breeding them it is desirable. When kept in such hard, alkaline water the colouring seems much richer, as it does in a well planted, dimly-lit aquarium.

These fish can safely be kept in a community tank and no problems should occur even when they are kept with fish much smaller than themselves—e.g., neons, glowlights, pencil fish, etc. Rainbows do, however, appreciate a reasonably large tank (not less than 30 in. long) as they are very active fish.

Feeding *B. geayi* presents no problems; they will accept most types of fish food but understandably prefer live food and fresh meat (ox heart or steak).

Breeding, as previously stated, is more successful using hard, alkaline water. The tank I find the best is small (about 12 in. × 8 in.), heavily planted with fine-leaved plants and shallow (5 in.-6 in. deep). I have used larger tanks and in spite of my earlier suggestion of keeping them in large tanks still find they breed better in the smaller ones. This could possibly be caused by the fact that in a large tank the pair may not see one another often enough to induce spawning. My first attempt to breed them was using an 18-in. tank with a nylon mop as a spawning site. The temperature was 78°F., a few degrees higher than their community tank. The two fish were heavily fed for about three weeks, the male in the breeding tank and the female in the community tank. The female was then introduced into the breeding tank early one evening. The male immediately began to display and court her, by swimming round and round her with fins fully extended. I retired to bed expecting to see them spawning when I awoke. (I should point out that when I first attempted breeding these fish, I knew little about them, except that they laid eggs on plants.) Next morning the male was still interested in her, but she appeared as plump as when I put her in. I left them together for the rest of the day and all the following day. No violent chasing took place and the female was just as plump if not plumper than when I put them together. As neither fish was very large (approx. 2 in.) I decided to return them to the community tank and grow them on a bit before trying again.

A couple of days later I added some marbles to the tank and put in a pair of zebra danios (*Brachydanio rerio*). These spawned the following day and were then removed. The zebra fry duly hatched and became free swimming. At this point I noticed several larger fry which were at least twice the size of the majority of them. They were also somewhat different in shape and I realised they were young rainbows. The young zebras and rainbows were transferred to a 4-ft. tank for growing on and the pair



of rainbows reinstated to a breeding tank.

This time, in a smaller tank, I used several sprigs of hornwort (*Ceratophyllum*), anchored to the bottom with marbles, as a spawning site. The adults were left in the breeding tank for several weeks and each day the pair spawned. They laid only about seven or eight eggs each day. At the end of every week I removed the plants and replaced them with some more taken from one of my other tanks. The eggs hatched periodically over the following couple of weeks. Two months later I had fry just hatching, some about $\frac{1}{2}$ in. long and two or three hundred between the two extremes. The adults ate throughout the spawning period and the female appeared as full at the end as at the beginning. According to one report on Madagascan rainbows, the parents can safely be left with eggs and fry, but because I feed large quantities of *daphnia*, mosquito larvae and glassworms I decided against this, thinking the adults might mistake the fry for food.

Bedotia geayi spawn very sedately in comparison to other egglayers. The male courts the female by spreading his fins and twitching in front of her. The

two then enter the plants and the female lays a single egg by brushing against the plant. The male either follows her or swims by her side, presumably releasing milt in the process. The eggs are fairly large and transparent at first. They are attached to the plants by a small thread. As the eggs develop, the eyes can be seen and they take on a more opaque appearance, prior to hatching. After hatching the fry hang onto the plants until the yolk sac is absorbed and they become free-swimming. Once free-swimming they present no problem and can be fed newly hatched brine shrimp and any other fry food small enough for them to take.

Madagascar rainbows are not seen very often in shops and when they are offered for sale are generally fairly expensive (around £1-£1.50 each) but they are handsome, undemanding fish, well worth keeping.

COLDWATER QUERIES

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most water plants grow better with an ordinary filament lamp than under a strip light. Try experimenting with lamps and times they are on to get the right lighting to benefit the plants.

I have a goldfish in my pond which is about eight years old. I have recently noticed a few raised white dots on its head. They are small ones and seem to fade away for a time and then come back. Is this a disease?

I expect that the spots are the signs of a male fish and there is nothing to worry over. You state that the spots are only on the head and gill plates and so I do not think that White Spot disease is the cause. If this

was so it is almost certain that they would be seen on the body of the fish.

I have to visit England for the '77 Koi show in Birmingham. Whilst I am over there I would like to get some good Bristol shubunkins. Can you give me an address from where I can obtain some?

I am including an address for you but when you are at the show make a few enquiries from officials and I feel sure that you will be put in touch with aquarists who have some shubunkins for disposal. Several members of the Birmingham Aquarist Society, go in for fancy goldfish.



MARINE QUERIES

by Graham F. Cox

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.

In January of this year I purchased an all-glass marine tank 36 in. x 15 in. x 12 in. and all the necessary heater, pump, U/G filter, etc. I set up and matured the system by following the instructions laid down in an article published by Waterlife Research Ltd. I allowed a period of 6 weeks before introducing any livestock to the tank which in that period had been matured with the aid of SeaMature and all the necessary tests (i.e., pH, nitrite and density) showed that the water was in good condition at a temperature of 76 F.

I went to my local dealer to purchase my first long awaited fish and came away with one Blue Damsel, one Domino Damsel and a large Hermit Crab. All were introduced into the tank very slowly by floating their polythene bags in the tank and gradually topping them up with water from the tank. All was fine for two weeks with both the fish and crab feeding well and looking very healthy so I decided to purchase another fish. I returned from my dealer with a very nice Maroon Clown and introduced it in the same way as with the others. Three days after introducing the Clown it started to act as if it were gulping in water and was swimming at an angle of 45°, also the other two fish started showing signs of distress. The following day I notice that the Blue Damsel was missing and on moving some rocks I found the Hermit Crab was in the process of eating it. That same day the Clown died and I notice that the Domino Damsel was losing its colour and was now a dull steel grey colour, he also died soon after the Clown. Other than the two Damsels losing colour there were no marks of

any kind on the fish to show why they had died.

The following day I took pH and nitrite readings which showed the water to be OK but to make sure I took a sample of both to my dealer who also said the readings were correct.

I discussed with him the possible causes and the only explanation we could come to was the possibility of an air freshener spray being used in the same room. He suggested I change 5 gallons of water which I did.

I left the system a further four weeks before introducing another Blue Damsel which seemed to be quite happy and was feeding well along with the Crab. Another two weeks went by and I introduced an Anemone and two Common Clowns. On introducing the Clowns one immediately seemed to be in distress and died the following morning. Also the Hermit Crab decided the Anemone was just what his diet needed so he was immediately removed to a separate tank. I telephoned my dealer and explained what had happened and he agreed to replace the dead Clown and also take the Hermit Crab off my hands. I was not able to go to the dealer's for a week and in that time the Damsel had developed what looked like a small cut on both sides of its body and was starting to lose colour. On the morning I went back to my dealer the Blue Damsel was found dead so I took it with me to ask what had caused its death. Unfortunately he could not say what it was for certain but thought it must have been some type of parasite.

I chose a replacement fish for the Clown that had died the week before, this time it was a

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From a Naturalist's Notebook

by Eric Hardy

FEW SIGHTS were more welcome upon entering south-east Dorset last August than its purple expanses of heathland, among the few places where all three British snakes and all three lizards dwell. But either side of the A351 from Wareham into the "Isle" of Purbeck, Furzebrook and Hartland heaths, Arne and Studland reserves still bore black patches from 1976's damaging fires from which they were only just beginning to recover.

Though Studland Heath, a peninsula reached by Ferry Road below the village of Studland on the north side of Swanage, is best known for its national nature reserve of 172 hectares for these reptiles. Arne, further west along Poole Harbour, and Hartland more inland, have a similar fauna. None apparently has any natterjacks which are restricted to a breeding pond on the left of the A351 near Ridge. Sand-lizards seem to be far fewer than smooth snakes, while adders were specially numerous on most of the heaths we visited. I was interested to find the palmate, the only newt in the area, inhabiting pools at Arne, etc., for this flat area hardly fits its montane habitat in Wales and the Pennines.

One local zoologist estimated a population of about 10,000 smooth snakes in the Isle of Purbeck, but they fluctuate according to many factors and some 80 per cent probably don't survive the first two years. Small young smooth snakes are not only the prey of birds, but their own cannibalistic species. He showed us a nine-year-old specimen of the grey form among stock he has bred to the 4th generation. The brackish, acid Little Sealake in the heart of Studland reserve is interesting as it is occupied by only three fishes, small eels and two sticklebacks. But this and its surrounding two pools have nearly half the British species of dragonfly and bog plants ranging from great bladderwort to long-leaved sundews, are in damp places like the edges of pools formed in old wartime bomb-craters.

Though Arne reserve is primarily for birds, it also harbours all the British reptiles and had lately been visited by one of the mink from a small colony in the River Frome near Wareham. I saw some good clumps of royal fern growing in the wood behind the east hide at Little Sea and by the path beyond the RSPB hut at Arne.

It is little more than a century since the slender, polished smooth snake was first claimed British in

1859 from of all places, Dumfriesshire. It inhabits drier heaths than the grass-snake, but usually near water. Its 8 to 16 young are born alive in August when they can sometimes be seen along tracksides, as below the observation hut hill at Studland reserve. It is not, of course, a Scottish snake, despite an early name of *Coluber dumfriensis* and was probably an escaped collector's specimen there. It is now confined to Hants., Surrey, Wiltshire, Sussex and Dorset and probably never extended much further. The future on Purbeck may be threatened by plans to extend excavations connected with China clay, needing access roads and bringing more people to the Arne area, though Studland is safe. Access to Studland Heath is unrestricted from either Ferry Road or Frome car park; part of Arne is an 80p admittance bird reserve, the rest, at Shipstal, is public, while Hartland Moor is Nature Conservancy land. 40 per cent of Dorset's reptile sites were supposed to have been lost in the 1976 drought-fires including 90 per cent of the important zone between Verwood, Christchurch and Wimborne. Over half of Surrey's heathland was also burned. 1977 saw the reverse with much heathland waterlogged by excessive rain.

Having recently been able to add a new beetle to the British List *Prionopus reticularis* (from the reticulated pattern on its wing-cases), the long-horned pine-borer, New Zealand's largest beetle, one wonders how many others are overlooked. This pale brown creature was resting not far from my home in Liverpool where it probably flew in the night after emerging from its pupa in imported timber, in which its grubs lives two or three years. After identification at our city museum, it was confirmed by the British Museum. Most entomologists agree that the British list of 4,300 beetles is by no means complete. In 1932 for instance the little water-beetle *Bembidion redtenbacheri* was added to the British list from Yorkshire. This prompted Mancunians to look for it across the Pennines and it was soon found to be abundant in brooks near the Woodhead Tunnel. Then it was discovered to be generally distributed in all small Pennine streams and in Cheshire generally, and elsewhere. In 1933 Mr. C. M. Legge found some grubs so abundant in dried *Daphnia* sold for fish-food when he was at Manchester Belle Vue aquarium that he took them

to the museum for identification. They were the larvae of a little moth, *Attageus pictus*. At least *Attageus* is given as a moth in Jones & Jones' standard textbook on Pests of Field Crops, but as a beetle in the museum report!

Most aquarists know caddis flies, but it needs much skill to trace an interesting ichneumon fly, *Agriotypus armatus*, parasitic on their aquatic "creepers." It also occurs in Pennine waters.

In a September visit to Norfolk Broads, from the biggest, Hickling, to Barton, both with much restriction of access to parts of their shores, I was able to judge at first hand the evidence in the 26-page brochure "The Broads—Possible Courses of Action" which the Countryside Commission had just published and sent to me. It summarises the replies of residents and local authorities to their circular on the deterioration of this famous aquatic environment in recent years, and its early designation as a national park. Most thought the latter would only partly meet the problem unless a special Broads authority or officer with new powers were established, with a new inland navigation authority, for the main problem is the enormous increase in pleasure boating. But there is opposition from sports and commercial recreational interests and landowners, farmers, yachtsmen, etc. oppose the idea of a national park there.

I was pleased to find the two huge clumps of wild royal fern still flourishing on the east side of Barton Broad. From Fenside, below Catfield, I went to the end of the blind lane west, then down what is marked "Public Staithe" on the left. A broad dyke eventually on its left is full of bladderwort, etc.; but continuing along the staithe 100 yards or so, a path on the shrubby left leads over a boggy little brook and curves left around reeds and fragrant bog-myrtle until eventually one turns right. Fortunately, reeds had recently been cut, otherwise progress is a jungle safari. Milk-parsley, food of Britain's biggest butterfly the swallowtail, grows plentifully here, as it does in my other haunt, the bog by S.W. Hickling Broad, below Decoy Lane, below Rookery Farm S.E. of Catfield. Milk-vetch is a fine, fern-leaved marsh-plant growing also in Cambridgeshire's Wicken and Chippenham Fens, Shaperuk in Somerset and Thorn Waste in S.W. Yorkshire.

A major display of world fish specimens, live and stuffed, loaned by aquaria and museums, will mark the International Angling Fair at Birmingham's exhibition centre during May 22-29. Modern developments in salmon and trout "farming" for 30-lb-plus specimens form another feature, and the adjoining Pendigo Lake will be used. But an attempt to give credence to monster theories with "photographic evidence from any world sources" seems to show a pandering to public appeal.

The most interesting part of Derrick Knowlton's



German, English and Scottish members of the author's field group at Hinckley Broad around the old water pump on Decoy Farm, a haunt of holly-leaved water naiad, milk parsley and swallow-tailed butterflies.

new 183-page, illustrated book *The Naturalist in the Hebrides* (David & Charles, £5.95), is its chapter on aquatic habitats. These islands where I enjoyed much fieldwork have several notable water-plants and water-beetles, such as the only British haunt of American *Potamogeton epihydrus* in a loch in South Uist, though it has been introduced to the Calder and canals near Halifax. Reddish alpine pondweed, and hybrid *P. prussicus* are in a Colonsay burn. The little flat American shell *Planorbis dilatata* is on Raasay and an American pondshell *Clausilia cravenis* on Harris and North Uist. The rare pipewort grows on Gunna Coll, Skye and Scalpay, with other Irish plants and insects and the Irish pondsnail *Planorbis carinatus dubia* suggesting a former land-bridge, as they aren't elsewhere in Europe. Another American plant, *Najas flexilis* is in the lochs of Colonsay, Islay, Loch Grogary, North Uist and on South Uist.

Lochs on Barra and other western isles have the Irish-American freshwater sponge *Heteromyenia ryderi*. These Americans are probably part of a Lusitanian fauna and flora, relics of times when the land masses were joined across the present Atlantic. The yellow-bordered Canary Isles and Mediterranean whirligig beetle, *Aulonyx striatus* is in lochs on Raasay and Baleshare Islands off North Uist. Another Canary Isles water-beetle, the little *Deronectes canariensis* is in a small loch on Barra, and the Pyrenean *Hydroporus foecolatus* in a mountain pool on Rhum. It is suggested that they spread north from the Mediterranean before the separation of Ireland. Borean or alpine relict water-beetles include *Dytiscus lapponicus* on Raasay, *Agabus arcticus* on Jura, and others even on St. Kilda.

Among flatworms the alpine *Planaria* is a glacial

relic on Canna and among dragonflies the boreo-alpine emerald, *Somatoclora arctica* inhabits Rhum with blue *Aeschna caerulea*. Loch Frisa in Mull has a small red variety of common trout not mentioned in Frost & Brown's book on "The Trout", and there are char in North Uist's Loch Fada and on Raasay. No amphibians inhabit the Western Isles and the Inner Hebrides have no crested newts. Smooth newts are only on Skye, Rhum and Tiree; palmates on Skye, Rhum, Mull and Scarba. The slow-worm is the only reptile on the Western Isles, but the inner isles have also common lizards and adders, even on little Scarba. Altogether an exciting place for field studies, as I have found on all too brief visits.

MARINE QUERIES continued from page 381

Fire Clown as a Common Clown of the same size was not available. Also my dealer suggested I purchase some MYXAZIN to treat the water with. A few days after this last visit the original Clown started to show signs of distress (i.e., high respiration) and the fire Clown had developed a small patch of white on its side and fin. Both of these fish are now dead and I am left with an empty tank except for the Anemone which appears to be healthy despite all that has happened. Apart from the sadness felt when losing one of these beautiful creatures I cannot continue as I have been for financial reasons. I would be very grateful for any advice and help you may be able to offer me as what started as a rewarding hobby has turned into a nightmare.

Reading "between the lines" the data you have furnished concerning your aquarium, it is possible to develop the following hypothesis to explain the deaths of your stock:

(1) Like all beginners you have almost certainly been grossly *overfeeding* your fishes, resulting in periodic pollution of the seawater which in turn would induce:

(2) *Disease in the system*, as evidenced by the high respiratory rate (= *oedimiasis*) and the continual flicking and scraping on rocks (= "flashing" caused by a *flake infestation*) which would have caused the "small cuts" which you noticed on the flanks of the Electric Blue Damsel.

(3) Additionally, unless the Hermit Crab was smaller than the Coralfishes in the tank, it was very unwise to buy him in the first place. These largely nocturnal predator/scavengers should only be kept with fishes which are substantially large than themselves.

Thus, if you are to continue in the marine hobby I would suggest the following course of action:

(A) *Disease diagnosis*—buy a good disease diagnosis/treatment/prevention chart and thoroughly study it before you restock your aquarium. This is to ensure that when disease next strikes as a result of your tank mis-management you are able accurately to diagnose the disease early enough to do something about it.

(B) *Feeding*. The twin golden rules here are:

- (1) Very little often, and
- (2) Never allow even *one* uneaten morsel of food to reach the bottom of the tank.

The method I usually suggest to beginners is that they should take a halfpenny piece and, using a good flakefood, cover the surface of the halfpenny *one flake deep only*, i.e. do not pile food up on the halfpenny. Now this amount of food (or the equivalent mass of irradiated mysis, cockle, mussel, squid, etc.) is the ration of food to last each fish in the sea aquarium per each day—no more—no less!

Now obviously this can only be a rough guideline. It will serve you in good stead until you've acquired enough personal experience and expertise to be "let loose" on a sea aquarium with a potential killer in your hands such as a full pot of flake-food or mysis shrimps. Since the above rule does not take into account the size of the fish, the species, or the individual appetite differences on an inter- and intra-specific level, it can only be a guideline to help prevent raw beginners from wiping out their first fishes.

(C) *Stocking*. Here you behaved faultlessly, i.e. you did not purchase too many creatures at first (I always recommend no more than 1 inch of fish per four gallons of seawater as a stocking norm for the first six months), but yet again I would query your wisdom in buying a large Hermit Crab to go with small Coralfishes, i.e. Damsel and Clownfish.

STARFISH

by Huw Collingbourne

THERE ARE ABOUT two thousand species of starfish. They are found in all seas and at all depths, though they are most numerous in shallow water.

But starfish are certainly not all star-shaped; there is an incredible diversity of form and size (the smallest type is less than $\frac{1}{2}$ in. across, whereas the largest measures 3 ft!) and certain species look so odd that they would not be recognised as starfish by an untrained observer. Even the comparatively few species common on British shores differ from one another remarkably and fundamentally.

For convenience I shall outline three groups of starfish which contain animals resembling one another in several basic ways. First there are the brittle stars, fragile scavengers characterised by their long, snake-like arms; secondly there are the cushion stars, squat, almost armless pentangles; and lastly that group containing all the more familiar-looking individuals including the one which we will almost invariably think of as the "typical" starfish, *Asterias rubens*, appropriately named the Common Starfish. It is with this final group that this article is primarily concerned, not only because of the ease with which these starfish may be found but also because they are, in several ways, more suitable to aquarium life than are the members of the other two groups. Not only are they, in general, less delicate than the other types, but they may also be more easily fed and are less likely to hide out of sight than are the others—many brittle stars bury themselves in the sand and cushion stars often secrete themselves in the most out of the way nooks and crannies imaginable.

The most easily discovered starfish is *Asterias rubens*; it is normally orange in colour and possesses five arms which radiate from a small, central body—the majority of species have five arms, though there are some which possess various numbers, from just four up to fifty.

Even the five-armed varieties may sometimes be seen with from three to seven arms; but such individuals should not be regarded as mutants—they are simply either amputees or animals which have regrown too many limbs in the remarkable process of regeneration.

The animal's ability to regrow limbs which have been torn off by predators is so effective that, from time to time, the starfish itself may detach one of its own limbs (if it is trapped beneath a fallen stone, for example) and thereafter simply regrow a perfect new limb in its place!

Ignorance of this ability was responsible for the

ineffective methods of control used against the starfish in times past. Being predators of oysters and mussels, starfish were dredged up from the beds of shellfish by those whose livelihood depended upon these seafoods. Once gathered, the starfish would simply be torn apart and thrown back. Nobody suspected, of course, that at least one half of each divided starfish would be likely to regrow into a complete new individual!

There is one genus of starfish, *Linckia*, which can redevelop from a piece of flesh no more than $\frac{1}{2}$ in. long, and it certainly capitalises upon this ability for, to reproduce itself, it deliberately tears its own body apart! Any piece broken off will grow into an adult starfish.

The amazing strength required to tear its own body apart is, of course, more typically employed in tearing apart the other creatures upon which the starfish feeds. Usually these creatures will be some varieties of bivalve shellfish. Anybody who has ever tried to force apart the shells (or valves) of a fully closed bivalve will appreciate the strength required to accomplish the operation. It is difficult for a man; imagine then, the problem posed to a small invertebrate such as the starfish!

However, the starfish is admirably equipped to undertake the task; beneath each arm are two to four rows of little "tube feet." These are tiny, hollow cylinders often possessing little suction discs at the ends and are frequently serviced with sticky secretions.

The feet are connected by a system of water-filled tubes and are moved hydraulically. They provide the propulsive force, enabling the animal to move over sand or stone at an average speed of two to three inches per minute (though at least one species travels at two yards per minute!)—and, more importantly, the feet provide the force required to open the shells of the animals upon which it preys.

Sticking its feet to the shells of a bivalve, the starfish may at first encounter great resistance, but it is its persistence which eventually wins the day, for the starfish will continue to apply force over a period of time until, at last, the bivalve is forced to relax its fatigued muscles.

When the valves part—even if only a very small distance—the starfish will eject its own stomach through its central body opening and will insert it, inside out, into the bivalve's shells. Digestive enzymes are then released into the mollusc and thus the flesh of the shellfish will begin to be digested whilst still outside the body of the starfish.

Continued on page 408

THE OSCAR

by Jack Hems

THIS CICHLID is widely distributed across central and north-eastern South America. It can attain a length of nearly 14 in. in half as many years. Clearly, then, the tank to accommodate a pair must be spacious: nothing less than 4 ft. will do.

The oscar is not kind to plants and it is, therefore, recommended to furnish its aquarium with lumps of granite, or some other non-calcareous stone, rather than submerged greenery, and place the stone on a deepish (4 in. or thereabouts) carpet of well-washed grit or small gravel. Under-gravel filtration plus a power-filter operated for a few hours a day helps to keep the water clear and wholesome.

At all stages of growth *Astronotus ocellatus*—to give the species its scientific name—is a notoriously gluttonous feeder, and the food given must be fleshy and of the best. Fat earthworms, expendable live-bearers (a full-size platy is swallowed at one gulp) and suitable substitutes such as raw cod or fresh haddock or red meat should be included on the menu. A young oscar grows away well on a mixed diet of flake food, whiteworms and finely shredded meat.

The oscar is famed for its beauty. Yet in the wild and in captivity, it is variable in coloration. In general, however, the ground colour is in shades of beige to chocolate (this colour predominating), marbled with irregular-sized patches of black, ivory, bright orange or fiery red. Some red spots overlaying the dark marbling are present.

Almost always the colour-pattern of young fish is more broken than that of adult fish and a fair amount of white, or greenish white, adorns the sides. Interestingly, the scales are barely visible. Indeed, the body appears to be mantled in multi-coloured suede, or velvet: a peculiarity which explains why this fish is sometimes called the velvet cichlid. *A. ocellatus* seems never to have been short of popular

names. The keen reader of aquarium literature is well aware of them: marbled cichlid, chocolate cichlid, peacock-eyed cichlid. (This latter, of course, on account of an eye-spot in the upper base of the tail.) Unfortunately, there is a tendency, in the English-speaking world, at any rate, to apply the same popular name to more than one fish and chocolate cichlid cannot be shaken out of my memory as a common name for *Cichlasoma coryphaenoides* and *C. hellabrunni*.

The sexes are hard to distinguish, except by the fuller build of the mature female and, sometimes, by the presence of three blackish brown to brown spots in a red field in the base of the dorsal fin of the mature male. When raising a family is uppermost in their minds, the female assumes a noticeably bloated appearance and the male demonstrates typical male cichlid traits of aggressive rather than tender courting behaviour, combined with a spectacular display. Breeding, however, seldom occurs until both sexes have attained a length of about 6 in. As mentioned above, it may take an oscar quite a few years to reach anything near half maximum size, for growth tends to slow up after two years are out. That is unless the fish has exceptionally good quarters, filtered and aerated water, and board.

Unless the aquarist is fortunate enough to come across a pair of well-grown oscars living in harmony in a dealer's tank, and up for sale, then it is best to buy several youngsters and hope that, the two sexes being present, they will sort themselves out into closely attached pairs—or at least one pair. A word of warning: there is no guarantee that two grown oscars, even if it is known that one is a female and the other is a male, but obtained from different sources, will hit it off all right if placed together in the same tank; for both sexes can be very unfriendly and truculent. If two do agree, then they usually

form a long-lasting and comparatively peaceful relationship. For general maintenance a temperature of about 70°F (21°C) is as good as any. To promote the reproductive urge 78°F (26°C) is better. Ordinary mains water, neither unreasonably hard nor soft is perfectly satisfactory. Adult fish should be brought into first class breeding condition on a plentiful diet of worms, large flakes (if acceptable) and chunky pieces of meat.

The courtship is rather markedly stormy. The male is never backward in coming forward and, between whiles, he cleans a stone or two ready for the reception of the adhesive eggs. Furthermore, every

Among the best foods for oscar fry are brine shrimps, rotifers, micro worms (for the first week to nine days), after which Grindal worms, gnat larvae, finely minced earthworms and crushed flake are acceptable. Some oscars make good parents and move about among many hundreds of fry with a benignant eye; others, as often happens, eat the eggs or fry in next to no time. To combat cannibalism, then, separate the parent fish from the eggs as soon as the next spawning is over. The eggs will hatch all right if the temperature is kept steady and gentle aeration is given.

Quite a few different colour forms of the oscar



Red variety of *A. ocellatus*

so often the two will lock jaws and go through sawing or wrestling motions. The eggs are large and white in colour. They are deposited in wavy, seldom straight lines. As many as 1,000 eggs may be laid at a spawning.

After the eggs have been laid, the parent fish swim to and fro near or over the stone and keep sediment from settling on it by strong fanning movements of their pectoral fins. At a temperature in the upper seventies (°F) it is not uncommon for the fry to break free from the eggs within the space of three or four days. Just prior to hatching, the parent fish usually drive furrows or troughs in the grit-covered floor of their aquarium. Now and then they will delay doing this until the fry are almost on the point of becoming free-swimming. The prime and main importance of this exercise is to house and shelter the fast-developing fry.

have reached the market over the last decade. They were pioneered by Charoen Pattabongse of Bangkok. This clever and dedicated breeder produced a red oscar that bred true in 1969: some three years after several planned spawnings. He then pioneered the development of the tiger oscar. This spectacular-looking fish shows a number of dark vertical bars on a red body.

As will be readily realised, the oscar is not a fish to introduce into the regular decorative community tank, though small (young) oscars give little, if any, trouble. It is when they attain some 3½ in., if not before, that they adversely effect the smooth-running of a well-stocked (plants and fishes) tank. A few other details readers of this article may care to know is that the oscar made its debut in aquarium circles in 1929, that it has well-developed teeth and some scales on the major fins.

STARTING WITH TOP-SPAWNING KILLIFISH

by G. Wood

Illustrated by A. Brown

KILLIFISH may be roughly divided into two categories, which are described as 'Top Spawners' (those depositing eggs in floating plants or nylon spawning mops), the eggs of which normally hatch within a 14-28 day period, and 'Bottom Spawners' (those depositing eggs in a bottom substrate, e.g. boiled peat moss). The eggs of bottom spawners normally require a period of dry storage to hatching. As usual in nature there are some species which do not stick to the rules and can be classed in either category, but it is to the first type, the 'Top Spawners', that this article is devoted.

Although the newcomer to killifish may be somewhat restricted in choice of available species, in order to avoid disappointing failure the less demanding species should be chosen. As a guide a few species which should not cause problems are briefly described below (male fish only):

Aphyosemion australe (Rachow, 1921). Known among aquarists as 'the Chocolate Lyretail'. The body of the male is dark chocolate with a greenish hue, with numerous dark spots. The dorsal, anal and caudal fins develop long white streamers with age. There is also a golden or orange aquarium strain which was developed by Hjerresen. This type has a rich golden orange body in contrast to the natural chocolate form. This species is peaceful and grows to around 2 in. excluding streamers.

Aphyosemion gardneri (Boulenger, 1911). This species is widely distributed throughout Nigeria and Cameroon and there are several colour varieties available. This is a robust species which attains lengths of 2½ in. to 3 in.

Aphyosemion bivittatum (Lönnberg, 1895). This is a very attractive species which has several colour variations, but most have a metallic blue or green on the flanks with dark longitudinal bands. The unpaired fins usually develop long streamers. This is a fairly peaceful species, although males may sometimes fight. Size around 2 in.

Aphyosemion striatum striatum (Boulenger, 1911). This is a brilliantly coloured species from Gabon. The body is dorsally grass-green with blue-violet lower down. There are five rows of parallel crimson dots along the flanks. The dorsal and upper caudal fins are edged in red with the anal and lower caudal edged in yellow. This is a peaceful, easily maintained species which grows to around 2 in.

Epiplatys dageti (Poll, 1953). This species is often confused with *Epiplatys chaperi*, under which name it is often offered for sale. The body is olive dorsally, more yellow on the belly with four or five black vertical bars on the flanks. The fins are yellowish edged in black. The form of *E. dageti* from Monrovia, Liberia has a red throat and is often referred to as the 'red-chinned Panchax'. This species grows to a little over 2 in.

Epiplatys sexfasciatus (Gill, 1862). The sides of this species are varying yellow, gold and green with six dark vertical bands and some maroon spots. The fins are yellowish edged with maroon borders. This a peaceful species which may grow to 5 in. and as with most *Epiplatys* species it is predominantly a surface dweller.

Also most of the *Aplocheilichthys* and *Rivulus* species are considered suitable for beginners.

Prior to obtaining stock of killifish an aquarium should be prepared. As most aquarists know, killifish are able to survive in very small aquaria, but to grow on well adequate swimming space is essential with tank sizes upwards of 15 in. × 9 in. × 9 in. being preferred. This is also dependant on the eventual size of the species to be maintained. Only one species should be kept in each tank. To help the fish settle down and give them a sense of security the tank sides and back may be painted green or brown. An important feature of all aquaria intended for top spawners is that they must have a tightly fitting cover as most killifish are expert jumpers and always seem to find the smallest of exit holes, so a

little caution may prevent a beautiful killifish from being found dried up on the floor. Some floating plants, e.g., Indian Fern, also help to make the fish feel at ease.

The water conditions that suit killifish vary considerably but generally very soft, slightly acid water duplicates conditions found in nature. Temperatures around 70-75 F favour most species as well as the economy minded aquarist. If the local water supply is rather hard and alkaline conditions may be improved by adding clean rainwater, but killifish being adaptable creatures can accustom themselves to various water conditions providing that the changeover is gradual. With newly acquired stock one should try to match as closely as possible the conditions to which the fish are accustomed.

When placing the new fish in the aquarium it is advisable to let them remain in a bag or jar for a while before adding a small amount of aquarium water. If the fish show no sign of distress the process should be repeated every hour or so until the container is filled, when they may be released into the aquarium.

After allowing the fish several hours to settle down they should be offered food. As with most tropical fish, killifish prefer live foods and it is much easier to encourage new fish to feed with live rather than dried foods. *Daphnia*, tubifex worms, white worms, glassworms and bloodworms are all suitable, the latter seeming irresistible to all killifish. Once the well-being of the fish has been assured other foods may be offered. Most good quality flake foods are accepted as are freeze-dried foods. One point about feeding prepared foods is that overfeeding must be avoided, and any uneaten food must be removed before decomposition occurs and causes pollution of the water.

During the first few days newly acquired fish must be observed closely with particular attention to the condition of the female, which may be damaged by a male keen to begin spawning. Extra cover such as floating nylon mops may rectify such a situation or alternatively a temporary separation of the pair may be necessary.

Once the fish are completely at ease (which may be in a matter of hours) spawning may commence, and provided that the fish are kept well nourished will continue indefinitely, depending on the lifespan of the species concerned. (Most top spawners live at least two years).

There are two main methods of propagation of top spawners:

1. Temporary set-up—egg collection

For this method the breeding pair are placed in a tank which is bare except for a couple of nylon spawning mops. The fish will hopefully spawn in the threads of nylon and every few days the mops may be removed and examined after gently squeezing



Eggs, clearly shown, on spawning mop

Spawning Mops for Killifish

Spawning mops can easily be made from nylon knitting yarn and a piece of cork, or expanded polystyrene, which are cheap and readily available. To make a spawning mop is very simple; first of all the nylon yarn must be wound round a rigid object (a hard backed book is ideal), the length of the strands can be varied, but 6 in to 8 in. is about average, and around 20 full turns of nylon are used. The loops of nylon are then tied at one end to fasten them all together, and the other end cut to give 40 single strands. The fastened end can then be attached to a cork or piece of expanded polystyrene so that when the mop is placed in the aquarium it floats and the strands of nylon hang down naturally like the fronds of aquatic plants.

Before using a newly-made mop, it must be boiled several times and rinsed well to remove any chemicals and dyestuff that may harm the fish. The colour of yarn chosen for making the mops is a matter of taste but darker colours are preferred, eg, greens and browns. To use a spawning mop, simply place it in the aquarium with the fish and after several days remove it, carefully squeezing out excess moisture. The mop can now be examined for eggs by turning over the strands of nylon and if the fish have spawned, the eggs will be revealed "like pearls in a mass of threads."

out excess water. The eggs may then be easily removed by carefully picking them off between forefinger and thumb and placing them in aquarium water in a small container (margarine tubs are ideal), which may be floated in the parents' aquarium while the eggs develop. Because the fry hatch without a yolk sac they must be fed immediately, and most species can accept microworm or freshly hatched brine shrimp at once. As with adult fish, care must be taken not to overfeed. After a few days the fry may be transferred to larger quarters for growing on, larger foods being offered as the size of the fry increases. This method of breeding is often adopted when only one pair is available for breeding, and it is very interesting to observe the development of the embryo and occasionally see the moment of emergence of the fry from the egg.

Continued on page 399



Above: *Epiplatys sexfasciatus*



Left: *Aphyosemion bivittatum multicolour*

Right: *Aphyosemion striatum striatum*



Below: *Aphyosemion gardneri*



B.A.F., 1977

A report by Jack Hems

THOSE of us fortunate enough to attend the British Aquarists Festival, held this year, as it has been for more than a quarter of a century, at Belle Vue, Manchester, found it as scintillating and as absorbingly interesting as ever.

Personally, I am always fascinated by the varied array of filters, pumps, tanks, lighting systems, new and long-established aquarium plants, foods, sealants, books, sea shells and corals, bogwood, fishes and so on offered for sale by the dealers. (Incidentally, there were 26 trade stands at this year's show.) Indeed, the aquarist can see more in the way of livestock and aids to successful aquarium keeping in one afternoon at Belle Vue than it is possible to see in a few months' journeying about the country visiting individual dealers' establishments. Oh yes, the B.A.F., organised by the Federation of Northern Aquarium Societies in collaboration with *The Aquarist and Pondkeeper*, still is one of the best places to see many tropical and coldwater species that rarely, if ever, come into the less-exalted suppliers' establishments. What ordinary dealer, for instance, with limited space, among other things, can display such a wide variety of fishes of such a size and in such a state of perfection as can be inspected annually in the scores of tanks housing the different species entered for the much-coveted title of Champion of Champions? This year some outstanding fishes were present: cyprinids, bichirs, catfish, characins, cichlids and anabantids among others including a beautifully marked pumpkinseed sunfish (*Lepomis gibbosus*). This centrarchid, in times past quite common, should be more sought after as a suitable occupant for a single species room temperature tank. It is as handsomely marked as many a New World cichlid and just about as knowing. Mr. and Mrs. H. Gough, of Wynnstay A.S. took first prize in this Champion of Champions class with their *Pimelodus clarias*—a catfish unquestionably worthy of its award. It was in superlative condition and colour and measured about a foot in length. Second prize went to Mr. J. K. Alder, of Hartlepool A.S., for a splendidly proportioned *Mylossoma argenteum*.

For those who have not come across this fish before let me say at once that it is a most spectacular-looking species, a sort of depressed or rather horizontally elongated disc in shape, sparkling silver in colour, with a vivid ribbon of orange-red and black in its long-based anal fin. Without exaggeration, Mr. Alder's fish would leave little or no room to spare on a dinner plate. Mr. S. Wolstenholme, of Heywood and District A.S., took third prize with his vibrant blue *Aulonacara rostratus*, one of the scores of beautiful cichlids indigenous to the African Lake Malawi. It can be said, in parenthesis, that only one fish has died on the stand over a period of about seven years during which time Mr. F. Mulla has been responsible for the well-being of the exhibits. A Leer's gourami (*Trichogaster leeri*), owned by Mr. J. Tabberer (Merseyside A.S.), ran away with first prize for Best Fish of the Show.

There is no denying that the societies' tableaux get better every year. First prize this year went to Yorkshire & District A.S. for a most magnificent model of York Minster, perhaps the finest exhibit seen at Belle Vue to date, or at least for more years than I can remember. Its tawny walls (in tinted polystyrene) and windows (contrived to resemble the stained glass windows of the great Minster itself) captured something of this centuries-old place of worship that dominates the Vale of York. Second prize went to Midland Aquatic Study Group for an exhibit called *twin hearts*—a tableau distinguished by its originality and neatness of design. The fact that the tanks let into the walls of this tableau housed fishes of marked interest for the layman and knowledgeable aquarist alike added much to its appeal. A diamond barb of exquisite scale-pattern and measuring some 10 in. looked the picture of health. A well-grown *Clarias angolensis*, an eel-like catfish most tenacious of life, looked duskily placid in another tank. Castleford A.S. took third prize with its clever impression of a fairground bingo stall. Ye Olde Fish Shoppe won a fourth prize for Southport A.S. and contributed enormously to the enjoyment of those who take a keen interest in the construction and ingenuity displayed in competitive tableaux.



Mr. George Cooke presenting (above) the trophy for the Best Fish in show, (above right) first prize for Society Tableaux and (right) first award for Champion of Champions.



No visitor could fail to have noticed the painstaking craftsmanship that must have gone into the making of the gypsy caravan of North Staffs. A.S. or the ancient-looking castle of Sandgrounders A.S. Nearby were other competitive stands of great attraction. A number of the tropicals on display were of eye-riveting appearance, bodies radiant with rainbow tints or bizarre in outline or finnage. I was drawn to a superb specimen of *Uaru amphiacanthoides*—one of the few peaceable cichlids, hard to come by even at the present day but known to a few aquarists in this country (especially in the London area) as long ago as the 1930's—on the stand of Northumbrian A.S. Also on this stand a fine *Ctenopoma argenteoventer*, an air-breathing bush fish or African climbing perch (Sterba quoting from earlier German sources states that this species can be successfully crossed with *Anabas testudineus*. Absolute proof of this, however, appears to be lacking), a *Labeotropheus fuellebornii* and a *Synodontis ocellifer*. The two latter species were awarded firsts. A fiery-hued *Cichlasoma meeki* in a tank on the Northwich and District A.S. begged my attention.

Most goldfish enthusiasts, I fancy, have come to expect the highest quality fish on the stand of Northern Goldfish and Pondkeepers Society. In this year's festival this society took first, second and third prizes in the breeders' class for shubunkins; the Challenge Trophy for Class 4 (common goldfish and comets); the Challenge Trophy for Class 5 (shubunkins, Bristol and London). Bury A.S. received a plethora of awards (full details of all festival awards will be

found in other pages). Quite outstanding was Bury's quartet of golden rudd moving about in a splendidly planted aquarium. This tank won first prize for best society furnished aquarium. Bury also received first prize for Novelty Aquascape. This depicted Aurora or Eos in her chariot drawn by snow-white horses. It was enchantingly executed and deserved all the admiration and praise it received. Bury's additional successes included a first prize and a third prize for plants. Merseyside A.S. ran close to Bury with its number of awards. This society's contribution to the Novelty Aquascape was both topical and sad. It was captioned 'Goodbye Belle Vue Zoo.' I delayed for a few minutes to try and take it all in: the tiny models of keepers, animals, cages, etc., perhaps a little brighter than life in their resplendent colours. Not far away the British Koi Society had a well-stocked pond. Few marine tropicals were evident. Aquarists are indebted to Mr. G. W. Cooke, B.A.F. Organizer, for the show's signal success. Praise too is hardly enough for Mr. C. Walker, the festival's manager, and his dedicated team of helpers.

colour illustrations overleaf.

COLOUR AT BAF - 1977



Above: Castleford Aquarist Society's tableau.

Below: Close-up of York Minster tableau showing workmanship in detail.



Top: "The Heart of Fishkeeping" Midland Aquatic Study Group's tableau.

Centre: North Staffs Aquarist Society's realistic gipsy caravan.

Bottom: *Aulonacara rostratus*, 3rd. award winner in Champion of Champions class.

THE AMAZON MOLLY

by Chris Storey & Jane Richards

The Amazon Molly (*Poecilia formosa*) is one of the many interesting members of the family Poeciliidae that is little known to the keepers of tropical aquaria. It is not often seen in England for, as far as we know, there are only a couple of colonies of this fascinating fish in the country at present. The eight female *P. formosa* we have under observation are instantly recognisable as mollies for they have the typical body shape of a *P. sphenops*, or a *P. latipinna*. The body is grey-green in colour with a silvery underside, and the only adornment is a faint red stripe running laterally along the length of the body. Both the dorsal and caudal fins are marked with small black dots which, on the latter, occur in an aggregation just behind the caudal peduncle. Those on the former are in rows across the fin.

The common name of the Amazon Molly is very misleading since even at the southern extent of its range it is still 2,500 miles away from the Amazon river. In fact its range is from the extreme south of Texas down to Veracruz in Mexico. Maybe this Molly takes its name from the race of women warriors of Greek mythology who were called the Amazons for, apart from four dubious cases, all Amazon Mollies so far found have been females.

In its scientific career the Amazon Molly has been placed in the genera of *Poecilia*, *Limia*, *Gambusia*, and *Mollienestia* by different authors on different occasions, but the earliest description of *P. formosa* by Girard in 1859 is the one accepted today. Girard discovered the fish whilst surveying the Texas-Mexico border for the American army.

Two interesting facts concerning *P. formosa* have led to a deal of scientific research being done on the life history of the fish. One is that of several thousand *P. formosa* individuals collected from the wild only four were identified as males. Since then doubt has been cast on the identification of these males, and it is thought that possibly they were either males of another molly species or actually mis-sexed females. This would mean all the *P. formosa* individuals collected were females.

The other is that in 1946 more than 8,000 fish were bred and reared for twenty generations and in all these fish not one was male. These two situations

needed an explanation and only recently has the answer been worked out. It has been found that *P. formosa* is a naturally occurring hybrid between *P. latipinna* and *P. sphenops*, and that it reproduces gynogenetically (a type of parthenogenesis). This means that to produce offspring the female *P. formosa* has to mate with a male but once the sperm has penetrated the egg membrane it takes no part in the further development of the new embryo. The sperm merely activates the egg to divide. None of the genetic information in the sperm is used and so the male does not contribute to the genetic makeup of the offspring. This leads to the unusual situation where all the fry are female. The explanation for this lies in the fact that fish possess two chromosomes for the determination of sex. A fish, like man, can have either two X chromosomes in which case it would be a female, or an X and a Y chromosome which is the case in males. Only one of these chromosomes can be present in a sperm or egg so the egg will only ever carry an X chromosome. Therefore the sex of the fry rests with the sperm, as a sperm may contain either an X chromosome and so produce a female, or a Y chromosome to produce a male. This is the usual situation in fish and is shown diagrammatically in Fig. 1.

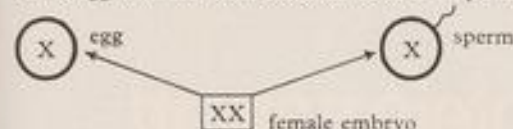
However, in *P. formosa* the genetic material in the sperm, which includes the chromosomes for determination of sex, is not used so the fry form solely from the eggs which, as stated before, have only X chromosomes. Hence the fry can only be XX and therefore female, explaining why only female *P. formosa* have been found.

As this species is composed only of females this then begs the question what do they mate with? The answer is males from other species of the genus *Poecilia*, but most readily with male *P. sphenops* and *P. latipinna*. When one looks at the distribution of these three species (*P. formosa*, *P. sphenops* and *P. latipinna*) it is found that *P. formosa* is sympatric (that is, it is found in the same habitat in the same locality) with *P. sphenops* in North-East Mexico and with *P. latipinna* in Southern Texas. Thus in its natural environment female *P. formosa* mate with male *P. latipinna* in Texas and with male *P. sphenops* in Mexico.

Usually in fish, female is XX. She can only produce eggs with an X chromosome.

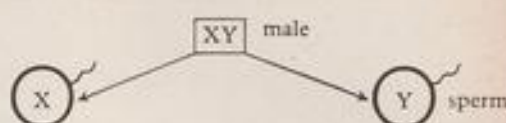


An X egg will fuse with either an X or a Y sperm to produce the embryo.



or

Male is XY. He can produce sperm with either an X or a Y chromosome.



In *Poecilia formosa* the chromosomes within the sperm take no part. The egg is unusual for it has already two X chromosomes.



FIG. 1.

The Amazon Molly was the first vertebrate found that displayed this type of reproduction and for a long time held a unique position in the animal kingdom. However, since the 1960s, reptiles, amphibians and other fish have been found that are also parthenogenetic.

The *P. formosa* we have under observation were obtained for breeding and further investigation, but although these fish are in excellent condition there has been no breeding success to date. They were immature when obtained from America and they

could still be too young to reproduce. The fish are kept in a twenty gallon aquarium and have plenty of room. The tank is planted and illuminated with a single 40 Watt bulb placed at one end. This provides light that varies from being intense at one end to very shaded at the other. The temperature is kept at 78°F, and some salt has been added to the water. We are sure it is only a matter of time before the eight *P. formosa* are breeding and producing all female broods that are all identical.

TOP-SPAWNING KILLIFISH continued from page 391

2. Permanent set-up—fry collection

For this method a permanent tank is set up with plenty of plants, e.g. Java Moss on the bottom and Indian Fern, *Riccia*, *Nitella*, etc. floating on the surface. (As with the temporary set-up, sand or gravel is not generally used). The eggs will be deposited amongst the plants and will develop and hatch naturally. There is no need to give the fry special foods as they are normally abundant micro-organisms in the water. The fry if healthy will escape the parents' attention and after a few weeks may be large enough to transfer to a rearing tank. This transfer is best done using a small scoop rather than a net so that the delicate fry are not damaged the fry may, if preferred be left to grow on in the parents' tank.

The young fish produced by both methods must be fed as often as possible and given plenty of space

if maximum growth is to be achieved. As the fish sex out the best specimens should be selected as future breeding stock.

As the beginner succeeds with the easier species, he will soon wish to try rarer and more difficult species, and the first problem likely to be encountered is the obtaining of stock. I would recommend any serious aquarist to join the British Killifish Association through which species may be obtained along with detailed information and advice. Several hundred species of killifish are known and more are being discovered almost monthly.

If any reader of this magazine has any questions about killifish or wishes me to clarify any point raised in the article, I will do my best to answer them providing the query is accompanied by an s.a.c., sent to me at 1 Higher Barn Road, Hadfield, via Hyde, Cheshire SK14 8ES.

WHAT IS YOUR OPINION?

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

Photographs by the Author



I SHOULD like to wish all my readers and contributors an enjoyable Christmas and a happy and prosperous new year. My thanks to all who wrote to me in 1977; your letters were appreciated not only by me but also by thousands of other readers. I hope you'll all resolve to send me a letter or two in 1978.

Requests for Java moss continue to reach me as I begin this month's column in the second week in October. Unfortunately, I am not yet in a position to supply readers with more samples although my remaining piece has started to grow quite well again.

No. 219 Selly Oak Road, Birmingham, is the address of Mr. J. R. Dinham, who writes: "... Regarding the pumpkinseed, about which a correspondent recently enquired: I have kept six of these fish and can recommend them as both interesting and, once mature, extremely beautiful. They appear to thrive, however, in solitary confinement. Three fish kept together and fed at proportionately equivalent rates to a solitary fish have grown to less than half of the latter fish's size. All four fish were purchased at the same time and were of the same size. There is no hostility among the three, but the solitary fish is extremely territorial and has savagely attacked any fish—even twice its size—which have been introduced into its 2ft. tank. All the fish have been fed entirely on chopped earthworms and, although I have not tested them to near starvation, appear to refuse any non-live food."

Mr. C. Morris's home is at 3 Trinity Road, Weymouth, Dorset. He sent me some interesting colour photographs of his coldwater fish and had the following to say: "Enclosed please find some photographs of my four fantails. The photographs were taken using a Pentax SFP with a standard 50 mm. lens. Some photographs were taken using photofloods and some with a Mecablitz 402 flash unit, using Fuji II film. As you can see from the shots, the tank is fairly large—36 in. x 15 in. x 12in.—for four fantails. At the time I took the photographs I was experiencing some problems with brown algae and the fish were eating their way through twelve *Elodea densa* every couple of months. So I have the tank a complete change: I replaced all the china objects (decorations) with one large piece of dark wood, then planted various species of plants around this. The plants were three bushy specimens of eel grass, three *Ludwigia*, three

really beautiful red *Hygrophila* and, of course, one *Elodea densa*—which I still have to replace every so often. However, the fish don't touch the other plants.

"I also replaced the original 20 watt tube with a 15 watt tube and had the light on for 8-10 hours per day instead of 12-15 hours. All these changes have made a considerable improvement: the plants are thriving and there are no signs of algae. I also made these changes to another tank containing tropical fish. I might also mention that I painted the backs of both tanks with a very light blue enamel paint—which has a very pleasing effect and seems to reflect some of the light, although I have no proof that this keeps the algae down. I was wondering if, from the photographs, you could tell me the approximate ages and the sex of the fantails." (Unfortunately it's difficult to tell the age or sex of a fantail from a fairly small photograph—hence I'm unable to help in this instance. Incidentally, recently I took some colour slides of my three coldwater fish. They were close-ups and showed the white gill spots that indicate that some male, coldwater fish are in breeding condition. Interestingly enough, I had not noticed the breeding condition spots with the naked eye. A strong magnifying glass might help you to identify any male fantails in breeding condition.)

Photograph 1 shows part of one of my decorative tanks, the main inhabitants of which are fifteen cardinal tetras.

Discus

Mr. T. January's address is 81 Moncrieffe Street, Walshall, Staffs. He says: "I am writing in response to the letter published in the September issue concerning Mr. and Mrs. Middleton's breeding of discus. I find it rather disappointing that people of their experience have to cross breed different colour strains of discus just to breed them and produce a colour hybrid for sale to the general aquarist—which in my eyes is a sub-standard product. You only have to look at the guppies for sale in your local shop to see what happens when you cross various colour strains or try to breed a true colour or finnage strain from them. Are we going to end up with a multi-coloured discus and no true colour strains?"

"This is possible due to the fact that some aquarists

are more interested in breeding and selling at a profit rather than breeding a true species or colour strain and conserving this fish for their fellow aquarists. P.S. If you could put me in touch with the person who wrote to you about killifish eggs, and his wife's experiences with them, in the September issue, I would be willing to send him some eggs and advice—if this should be possible." (Someone must have chopped off the name and address of the letter writer in question. A glance at the May 1977 issue shows that the original letter was written by Mrs. B. A. Ellingford, of 2 Heather Way, Gt. Moulton, Norwich, Norfolk. No doubt the letter in the September issue was written by Mr. Ellingford.)

Coldwater Fish

Photographs 2 and 3 show two of my three coldwater fish—and appropriately enough lead to a letter



written to me by Mr. R. N. Dingley, of 118 Higher Lomax Lane, Summit Estate, Heywood, Lancashire. He informs us: ". . . Some three years ago I maintained a number of tropical tanks and in due course discovered that the cost of electricity was increasing at a rate beyond my means. Having been a keen aquarist for some considerable time I decided that the time had come for a radical re-think. I ruled out other forms of heating such as gas and paraffin since I had had some experience with these forms of heating in my earlier days and again their costs were increasing. I then decided on a branch of the hobby that I had not given any consideration in the past, i.e. goldfish. The common and fancy varieties are now well and truly established. Since I do not now require the amount of electricity I required in the past, I have been able to extend considerably the number of tanks and now maintain a fish house of some twenty tanks.

I am now firmly hooked—if I may use the expression—on the coldwater side of the hobby. My main interest is the breeding of fantails, orandas and lionheads, in addition to which I maintain a number of bubble eyes, pearlscales and pom poms from which I hope to produce a strain when they are of breeding age.

"The breeding of twin-tail and dorsal-less fish is something of a challenge and one that I would recommend to any aquarist faced with increasing costs for electricity supplies. Whilst there is a number of fancy varieties on the market they are by no means as numerous as those for tropical, and one should not overlook other species such as bitterling, pumpkin-seeds, etc. In addition there are the numerous species of fish found in our ponds, streams and rivers. The spawning of both bitterling and sticklebacks is fascinating and well worth the effort involved.

"As to whether or not coldwater fishkeeping is on the increase, I am duty bound to say—yes. More and more societies are now putting on additional classes for the coldwater enthusiast, which were initially poorly attended; and it has been noticeable over the last two years in particular that entries have increased. I feel that I should also add that whilst there is a good number of exhibits around the shows, their quality, particularly in the twin-tail classes, is a long way short of good; and a fair proportion fail to meet the required standards in one way or another.

"In conclusion, and bearing in mind my last comment, I do not wish to convey or create any ill feeling towards my fishkeeping friends and hope that it will spur them on to the breeding of show quality fish that conform to the required standards." (Ironically, I have been keeping my single coldwater tank of three fish heated to tropical temperatures—

which rather defeats my attempt to save money on electricity costs; and makes the label 'coldwater' inappropriate. All my tanks are lit for the same number of hours per day and the plants in the 'coldwater' tank are all tropical plants and growing as well as those in other tanks housing tropical fish. I should like to know how the cost of heating a tank compares with lighting it—although I appreciate the fact that there are many variables. Let's take, for example, an 18 in. x 10 in. x 10 in. tank kept in an unheated room and lit by a 40 watt bulb for about six hours daily; we'll assume that the tank is not insulated. What would be the cost of heating the tank and of lighting the tank for, say, the month of December? Obviously outside and room temperatures would also play a part in governing the costs of keeping the aquarium at 75°F. I'd be pleased to receive your estimations.)

Mosquito Fish

The fact that there are, proportionally, at least as many keen hobbyists in N. Ireland as in other areas of the U.K. is not, sadly, reflected in the number of letters I receive for this feature from readers who live in Ulster; hence I was very pleased to receive letters from two young aquarists who live in N. Ireland. The first was delivered to me—and I think it's the first time a contributor to this feature has ever handed me his or her letter—by Robert Houston, who lives at 36 Carson Street, Larne. You may recall that I referred to Robert in last month's feature. He has the following to say in his letter: "I would like to tell readers about my happy experiences with an unusual livebearer, the mosquito fish—*Heterandria formosa*. I bought four specimens, at £1.00, while on holiday in Scotland. I kept them in a plastic box for a few days with the aid of a spare heater and thermostat unit that I always carry with me. Before leaving for home I noticed that there were two babies in the box with the adults; after a five hour journey I placed all six in a tank by themselves. I decided to keep the largest female in a fish-breeding pen, where I found that one or two babies appeared each week. Then, to give the adults more space, I allowed them the freedom of the tank; the youngsters were retained in the pen. I found that the adults produced four to five young per week; and now the number produced is about eight weekly. The adults are brownish with five vertical stripes and a very strong horizontal stripe running from eye to tail. I find the young to be very fast growing and the species is very easy to feed on fine dried food. I would recommend this dainty, yet hardy, species to anyone who keeps a tank of small, inoffensive fishes.

"I also have four green lizards that I keep outdoors all summer, a pair of terrapins, a fire salamander, a slow-worm, a pair of axolotls; and I have a pond well stocked with fish—including koi, tench, bitterling and

rudd, as well as the usual goldfish and shubunkins. I keep a 10 in. coldwater catfish in a pond by itself as it bites everything that moves—including fingers and inquisitive cats. My other coldwater fish are a young pair of sun bass and several golden and brown loaches.

"I grow plants without much bother; but some floating plants—particularly water hyacinth—just will not grow. For good growth I use simple light bulbs, but find that U/G filtration helps root growth and makes the plants generally healthier." (I hope to take my camera to Robert's home and attempt to photograph some of his interesting collection.)

No. 59 Bladon Drive, Belfast BT9 5JN, is the home of another young aquarist who enjoys the hobby on this side of the Irish Sea. Patric Baird writes: "My last couple of letters were concerning my experiences with tropical fish keeping; this one deals with my recently-started hobby of pondkeeping. During the Easter holidays I decided to buy a polythene pool-liner. At approximately £4.50, and giving a pool of roughly 5 ft. x 3 ft. x 15 in., I found it quite good value. Completion took just two days; and within the week five goldfish and a waterlily were installed. Unfortunately, our garden slopes—a feature that, although we have lived in the house for eight years, I had not noticed until the pond was filled.

"When buying the fish I noticed that one of them was abnormally bloated, and I thought it was full of eggs; but later it died. This was followed by the death of another goldfish—which forced replacement of these by two golden orfe, and a Bristol shubunkin which I think is a beautiful fish. In mid July I purchased a fountain/waterfall kit. I thought it was a ridiculous price at £25.00 but I suppose anything cheaper would have been of inferior quality. Since starting my pond I have emptied, cleaned and refilled it at least eight times because I like my water to remain clear. I sent to a mail order firm for some plants, which included bog bean and yellow iris. The plants would not stay in the basket and any disturbance of the medium caused soil to float out and cloud the water. Also, the red basket looked ugly; so the plants had to go. Now I have to be content with *Lemna* species and *Elodea*.

"At present I am preparing my pond for winter—feeding less to the fish and fixing up a heater, although I hope I will not need it for some time. I am hoping to breed my goldfish in the spring and would be grateful if you could recommend a book which might help me in my plans." (I recommend *Coldwater Fishkeeping* by Arthur Boarder, and *The Goldfish* by George F. Hervey and Jack Hems.)

I was saddened to learn today that economic pressures are causing the close-down of the only shop in my home town that stocks tropical fishes and plants. Obviously, like me, other aquarists and pet keepers

in the area are having to spend less on pets. My best wishes to the two lads who ran the shop; I hope that in a year or two, when the economic climate should have improved, they will consider opening a similar shop. Have many other pet shops been forced to close?

Exchange & Wanted

In the September issue, following Mr. Alan Blackburn's suggestion for an 'Exchange & Wanted' column, I asked if any reader could supply me with a male *Apistogramma borelli*. I was astonished and delighted to receive a telephone call from Mr. Gareth Jones, of Bangor, Co. Down—not Wales, as I first thought when he telephoned me!—who kindly offered to give me one of his two males. My thanks to Mr. Jones for giving me the fish; and to a colleague, Miss Gillian Sheppard, B.A. (Hons.), Dip. Ed., for collecting the fish and transporting it to the

column can work I should be pleased to publish other readers' requests—if space permits.

The next letter was written by Mr. A. W. McCabe, of 26 Cruttenden Road, Great Moor, Stockport, Cheshire. "Was it in the August edition you raised the topic of receiving or sending fish by rail? I recently received some Tanganyikan cichlids by this method. The fish, packed and insulated in a cardboard box, had taken 4½ hours to travel from Oxon. to my railway station, Stockport, which is not bad for a distance of 110-120 miles. Twice I have received fish in this way and on both occasions they arrived in perfect health and condition. I have also found that British Rail are very helpful and informative where livestock is concerned.

"By the way, that piece of Java moss you sent me is still thriving but has not yet had a good chance to get a firm hold. I have moved all my tanks out of the living-room and into my recently-completed fish



school in which I teach. Herr Borelli, as the fish was christened by my pupils, spent the day in the warmth of my classroom store, the temperature of his water being regularly checked by a thermometer borrowed from my colleagues in the science department. Herr Borelli survived the trip from Bangor to school, and from school to home, and has now settled down well in his new tank with the previously-widowed Frau Borelli. As the female fish is fairly elderly and has not had a mate for quite a long time it will be interesting to find out whether or not the two will spawn. Frau Borelli and her previous mate produced one brood of babies several years ago but the young were eventually eaten. During his short spell in school—about seven hours—Herr Borelli attracted quite a lot of attention from both pupils and staff. Having proved that an 'Exchange & Wanted'

house. It took me a week to wash all the gravel—over 100lb of it! In the August edition Doug Battle had an article on *H. burtoni*. "What nourishes the young during mouthbrooding?" I should think that: (1) mouthbrooder eggs are quite large if compared with other cichlids' eggs, e.g. *P. pulcher/A. pulcher*; (2) the brooding period varies with conditions and species; (3) the female will only release the young when they are ready to look for food for themselves; and (4) thus mouthbrooder fry have large and heavy yolk sacks to absorb, which can account for what nourishes them while in the buccal cavity. That's how I look at it from my own observations.

"P.S. Re Mr. Alan Blackburn's letter about *Geophagus pellegrini*: it is a mouthbrooder of the South African genus. The eggs are normally laid on a stone, etc., then are picked up later by the female—

in a day or two. Fertilization happens before brooding begins. They have what is known as a 'red hump'; the fish breed at 3½ in. They can be identified from Goldstein's *Cichlids of the World*. P.P.S. Regarding your idea of an 'Exchange & Wanted' column: for railing fish there is a minimum charge of £2.16 so it could be expensive to send or receive a single fish. It pays to get as many as possible."

"Davine," 9 Holford Street, Aberaman, Aberdare, Mid-Glam., S. Wales, is the address of Mr. D. Morgan; he has the following to say: "I am a newcomer to tropical fishkeeping, having first set up an 18 in. x 10 in. x 10 in. tank, for white cloud mountain minnows, just two months ago. The tank has a U/G filter and receives light from an east-facing window. The tank is not heated; but since my house has full, constant central heating I find the temperature varies from about 67-73°F. The plants—

Vallisneria, *Cabomba* and wheat plant—and a plant that a friend thinks is called "stardust." It has strong, twig-like roots and fairly thick stems of about 6 in. in length ending in three-pronged leaves. I would be grateful for any information on this plant. I put fish into the tank two days ago. They are three guppies—one of which is a male; four harlequins; two *Corydoras aeneus*; and a pair of dwarf gouramies. Both the female guppies are gravid!

Gouramies

"I find the gouramies fascinating; aren't they attractive fish?" (I think gouramies—with some exceptions—are amongst the most peaceful, interesting, attractive and easily-bred fishes. My largest tank contains a large number—I don't know exactly how many—of gouramies that include golden, thick-lipped, dwarf, blue, lace, pearl and honey gouramies.



Sagittaria, *Elodea densa* and *Cabomba*—grow very strongly under these conditions. I have eight white clouds at present and as far as I can tell they are equal pairs. Three are obviously carrying eggs and I'm hoping they might breed for me. I am thinking of adding a pair of *Corydoras paleatus* as I have read that, with care, they can be conditioned to quite low temperatures—down to 65°F I read. What do you think?

"I am now the proud owner of a 24 in. x 12 in. x 15 in. tank. This has a U/G filter operated by a (branded) pump. The heater is 125 watt—but is rarely on due to the central heating and tungsten lighting. Lighting is from two 25 watt bulbs which are on for 14 hours daily. I am hoping to persuade Santa to fetch me a 2 ft. fluorescent strip-light! The temperature is 74-81°F daily. I set this tank up just over a week ago, planting with *Sagittaria*,
December, 1977

They share their tank with several kribensis and three species of *Corydoras*. The latter fish spend most of the day on the gravel base, the kribensis usually inhabit the middle region, and the gouramies spend a lot of their time in the upper regions. Tablet food has all the fishes at gravel level when introduced. If I were placed in a position such that I could keep only one tank I would stock it with a variety of gouramies. My largest tank, like all my tanks, is a jungle of various plants and the gouramies frequently spawn amongst the floating leaves. Few of the young reach adulthood because I don't have any spare tanks into which to place them. I'm not too keen on kissing gouramies and have stopped keeping them. What are other readers' opinions on various gouramies? I'd be pleased to receive details of individuals' experiences with specific species.)

Mr. Morgan continues: "My male gourami has

donned his breeding colours, uprooted a number of my *Sagittaria*, and, as I write, is forming a nest from them. He is furiously chasing the female. He has not blown any bubbles though—which, after reading about their breeding habits, I find puzzling. I have tried lowering the water level by 1 in.; turning off the air stone; and turning down the filter slightly so as not to cause too much surface disturbance—but still no bubbles! Any idea what else I can do, please? Lastly, I would be pleased if any readers would care to write to me about anything to do with fishkeeping. I am especially interested in dwarf gouramies, kribensis and angels. Do you think a pair of kribensis would be all right in my community tank. Thank you for your kind interest. I look forward to future W.Y.O. columns." (Readers are reminded that I can no longer afford to send individual replies to specific queries. Such queries should be sent to Mr. Boarder or Mr. Hems—together with a s.a.c. for a reply. I am always pleased to publish readers queries or topics for discussion.)

Jewel Cichlid

Mr. Charles McNeill, of 15 Beechtree Terrace, Milton of Campsie, Stirlingshire, Scotland, wrote this letter some time ago. "I thought your readers might like to hear of my experiences with the jewel cichlid—*Hemichromis bimaculatus*. My first "pair" was obtained from a colleague at work and had outgrown his 2 ft. tank. They were both about 4½ in. long and were thus placed in a 53 in. × 15 in. × 12 in. cichlid community tank. For the first week they mostly hid behind the rockwork. Gradually, however, on a diet of earthworms, *Tubifex* and flake food they became more confident and were soon displaying to each other. Instead of the usual light brown body colour they would darken to an almost black shade that really showed up the tiny, metallic-blue jewels sprinkled all over their sides. According to the books, however, I was led to believe that jewel cichlids turned a fiery red colour when in breeding condition, so I put it down to old age and loss of colour. After a further week on the high-protein diet they were in tip-top condition. One evening I noticed that one was digging a pit in the corner of the tank and cleaning a rock. When the other fish approached, jaws were interlocked and they made quivering movements at each other. This went on for about two days and I felt sure that a spawning was imminent. But I was disappointed. There was nothing for the following six months.

"I had just about given up hope of spawning these beauties when I came across a tankful of brilliantly-coloured jewels, each about ½ in. long, in a Glasgow shop. I noticed also that there were about six which were the same colour as my pair at home. On asking about these fish I was told that they were the females and that all the males had the colour. What a fool

I felt! For six months I had been trying to spawn two females. So I got the dealer to bag two of the largest most colourful fish in the tank as mates for my two females.

"On introducing these to my tank, one was killed outright by the larger fish; but the other survived and had to keep the original two jewels happy. Much displaying and jaw-tugging took place after about a week; but still no eggs. I tried raising the temperature to 82°F—but still no eggs after another three weeks. I had just about given up hope when one day I decided to move the rockwork around a bit. On putting my hand into the tank I felt a nip on my index finger. It happened so fast I did not see what did it. Then I found out. I was just about to move a small rock in the corner when I felt a slimy feeling all over the back of it. When I looked down I could hardly believe my eyes: about 500 jewel eggs being ferociously guarded by the parents. I had lost quite a few by touching them but there were plenty left and the parents continued to hatch and rear these despite all the commotion.

"About one week later the parents were showing signs of pre-spawning behaviour again and I decided to give them a wee bit of privacy. I put them in a 24 in. × 15 in. × 12 in. tank, with a flowerpot, at a temperature of 82°F. The following morning I was lucky to witness the spawning. But what a shock I got; it was the small, highly-coloured "male" that was doing the laying and the big black "female" that was doing the fertilizing. After having recovered from the shock I realised that it must have been two males I had started with, and not two females. On my next visit to the shop where I had bought the other two jewels I informed the dealer of my discovery and he seemed quite amazed at the fact that all these fish he had sold as males were probably females.

"Rearing the fry presents no problems and they grow quickly on a diet of whiteworms, *Tubifex*, chopped earthworms and occasional flakes, if kept at around 82°F. I hope those who wish to try jewels find this information useful."

I should be pleased to receive your opinions on any topics—including those that follow—for inclusion in a future feature. What about making a new year resolution to send me a letter or two in 1978? The suggested topics are: (a) hatching and raising angel fry; (b) the current quality of aquarium plants on sale to the general public; (c) breeding *A. borelli*; (d) the perennial problem of outside versus under-gravel filters; (e) recording sounds made by aquarium fishes; (f) keeping dangerous, e.g. poisonous, fishes in home aquaria; (g) cultivating spatterdocks; (h) breeding the cardinal tetra; (i) aquarium backgrounds; (j) breeding smaller cichlids; (k) treating specific diseases of fishes; and (l) cultivating live foods for fishes. I look forward to receiving your opinion early in the new year. Good-bye until next month.

AN ENCOUNTER IN CORFU

by H. G. B. Gilpin

EARLY in October four of us, ornithologists, a herpetologist and flower enthusiast spent an interesting week amongst the fascinating fauna and flora of the Greek island Corfu. From our base, the Hotel Castello, a fine old building splendidly modernised for present comfort and set in twenty-five acres of lush gardens, rich in trees and flowering plants, we made daily excursions by car into sparsely populated areas where the women, often dressed in traditional costume, herd their turkeys, sheep and goats along the borders of unmade roads and the men wrest a living from the land or sea.

On one occasion we were walking along the bank of a slow moving stream, thick with aquatic vegetation, near the Corfu Golf Club, hoping to collect some of the local frogs. There was no shortage of frogs. Every step we took sent one or more "plopping" into the water. A brief shower emphasised their presence. With the first drops of rain a chorus of croaking broke out and as instantly quietened when the rain ceased. Catching them was a different matter. Handicapped by the absence of a net, we had travelled a hundred yards or more before a single specimen of *R. esculenta* allowed itself to be captured.

One member of our party, well in advance of the rest of us, suddenly gave an agitated call. We rushed over to her and pointing to a spot amongst the deeply massed water plants, she explained that, as she was walking along she disturbed a frog which, like the others we had encountered, responded to her advance by leaping smartly into the water. Slightly irritated by our lack of excitement, she added that as the frog hit the exact spot to which she was pointing it gave an agonised scream.

Observing the water was still slightly disturbed at the point where the frog had disappeared, a hand was plunged into the water, a few inches below the surface, and as quickly withdrawn, firmly grasping a snake just behind its head, its jaws still clamped across the body of the unfortunate frog and its body writhing violently

with annoyance. Slight pressure on its neck persuaded the snake to disgorge its prey, which fell to the ground, only to be instantly seized and placed in a cellophane bag. A glance sufficed to convince all present that the ophidian was not venomous and it too was temporarily incarcerated in a plastic bag and deposited for greater safety in a second similar receptacle.

Back at the hotel we examined our captures at leisure and in detail. The frog, *Rana esculenta*, in spite of its alarming experience, showed no signs of injury. No lacerations were observable on its skin and its liveliness and agility were unimpaired. It survived the subsequent journey back to this country and at the time of writing, together with the specimen previously collected, has settled down, none the worse for its adventures, in a vivarium where both are feeding freely on small slugs, earthworms, tiny snails, maggots and blowflies.

Taken in hand the snake proved to be a fine example of *Natrix tessellata*. It was two inches in circumference at the thickest part of its body and twenty-nine inches in overall length, the tail occupying the last six inches. Basically it was olive green in colour with two dark patches, one on either side of the neck just behind the head. The head broadened posteriorly and the pupil of the small round eye was slightly directed upwards. The back and sides of its body carried five rows of irregularly edged, squarish, dark brown patches and the underparts were creamy yellow boldly marked with a striking chequer board pattern in black. Two fawn lines passed throughout the length of its back. Its disposition appeared to be placid and it showed no resentment when handled.

Previous experience of keeping these snakes in vivaria had warned me of the difficulties involved in providing them with an adequate diet. Naturally their food consists of amphibians and fish and these are not always easy to provide. I did keep one for several months on a diet of tinned sardines, washed free from oil and dropped into its water pot, but ultimately they

were rejected. Consequently I decided to return the animal to the wild before we left Corfu. Before doing so the photographers amongst us wished to take colour prints and transparencies.

Our first attempt at liberation almost ended in disaster. Confined in a single plastic bag, the snake was placed in the boot of the car and we drove off in search of a place suitable both for photography and release. Unfortunately before we reached a satisfactory spot we were halted by a punctured tyre. Opening the boot to extract the spare wheel we found the plastic bag empty. Evidently by forcing its head into a corner the snake had produced a slit, less than half an inch long, and decamped. Much shifting of luggage and equipment followed but the fugitive appeared to have vanished. Finally when we had given up and were about to close the boot, we saw the snake, curled up in tight coils on a small ledge above the wheel, from which it had obviously been watching us with sardonic satisfaction. At this stage deteriorating light caused us to abandon hopes of photography and return to the hotel.

The following day was bright and sunny and again packing up our snake, this time in two bags, we again set off finally pulling up near a flat, grassy area by the side of a bridge, crossing a reed bordered river at the tiny village of Potamos. The spot was ideal for our purpose and when the camera equipment was set up we released the snake and commenced operations. Of course the animal made every effort to escape and had to be continually brought back within range of the

cameras. This harassment made it irritable and for the first time since we caught it it demonstrated the defence mechanism of its species and voided the contents of its anal glands.

Having completed our chore we stood up and looked around to find that a group of half a dozen men had collected, within a few yards, to watch proceedings. They were horrified to see us handling the snake, which they called Astridas, and did their best to explain that it was dangerously poisonous and persuade us to keep away from it. Our effort to convince them that it was harmless were entirely unsuccessful. By this time a driver had halted his bus on the bridge and his passengers were hanging out of the windows watching the performance. One man had dashed off on his motor bike and collected his two children, evidently wanting to show them how foolish foreigners who declined to accept good advice died miserably from snake bites! I am afraid we disappointed him.

Finally, fearing our audience would hunt down and kill the snake as soon as our backs were turned, I dropped it into the river. Watched by an enthralled audience, it swam across the water and disappeared into the safety of a reed bed, having I feel sure provided a topic of conversation for the whole village for some time to come.

Tesselata is probably the most aquatic of all European snakes and the area where we released it was heavily populated with frogs and fish so our snake should have found its new environment admirably suited to its needs.

STARFISH continued from page 386

Sexual reproduction in native starfishes normally occurs in May and June, and breeding behaviour is worthy of note if only for the sheer size of the operation. Literally millions of eggs may be released by a single animal; *Asterias rubens* may release two to three millions in a couple of hours—and other species may release up to two hundred million.

Hatching from the eggs the larvae join the drifting life of the plankton where they remain for about two months before settling onto some solid base to metamorphose into adult animals.

There are a few species in which the larval stage is absent. These animals may brood the eggs until the young hatch as perfectly formed miniature adults. These species normally occur in coldwater and are especially numerous in the Antarctic. However, certain species do occur closer to home; the cushion star, *Asterina gibbosa*, for example, which lives under stones and amongst beds of *Laminaria*.

As mentioned earlier, the most common native species is *Asterias rubens* and this is the variety which I would advise any interested aquarist to consider attempting to keep in a home aquarium. However, a

few basic points should be kept in mind.

They should not be kept in the same aquarium as such aggressive predators as crabs or lobsters, nor should they be kept in the same aquarium as any shellfish such as scallops, mussels or even limpets which they will certainly eat.

They should be fed with living cockles or mussels which may be bought from a fishmonger but which should be thoroughly cleaned before being introduced into the aquarium. To clean shellfish one should place them for several hours in a jar of seawater. Here they will open their valves and eject any detritus from their gut (for they are, you must remember, filter feeders). Introduce them to the aquarium in small numbers to make sure they are eaten quickly for, should a cockle die before being eaten, it will rapidly cause serious pollution.

Finally, it occasionally happens that a starfish will lose an arm for no apparent reason. In fact this is a warning sign, for this may be taken as an indication that something is wrong with the condition of the water in the aquarium. The starfish should be removed at once before its decay causes worse problems. Meanwhile the aquarist should examine the water carefully to try to locate the source of the problem.

THE BLOODFIN

by W. Murray

THE BLOODFIN (*Aphyocharax rubripinnis*) hails from the Argentine, and will come under the category of small Characin, as it very seldom grows over 2 inches in length. The overall colour of this fish is grey and its finnage, as its common name suggests, is blood red. Although usually kept at a temperature of 72-76° F, these hardy little fish have been known to survive in temperatures that have accidentally dropped to the low fifties.

My first introduction to this lively little characin was when I was looking for some background fish or, as they are sometimes called, foil fish for my community tank. I needed some small fish to compliment the larger more colourful individualists of the tank. The fish I had in mind were to be small lively ones to swim about mid water, not given to skulking in the plants and not be so brightly coloured as to distract attention from the other inhabitants of the tank. *Aphyocharax rubripinnis* filled all these requirements and had the added attraction of being a shoaling fish. I bought a dozen plus a few other small fish, and to the dozen the dealer added the three that were left in his tank for, as he put it, 'bulk buying.'

The sex difference is not very apparent, but can be noticed by the female having a slightly deeper body than the male. Care must also be taken when netting the males as they have a minute hook on the first ray of their anal fin which could get entangled in the mesh of the net. In breeding these characins it is best to use a small 18 in. x 9 in. x 9 in. tank filled with one day old tap-water to a depth of approximately six inches with some Indian fern floating on the surface, and plenty of short compact plants, hair grass, etc., planted in the gravel at the bottom of the tank. The temperature should be approximately 75° F (24°C). Plenty of live feeding soon brings them into condition. Pick out a good pair, that is a female full of roe, and a well coloured male. Place them in the

breeding tank at night an hour before the lights are extinguished. This gives the fish time to explore and become accustomed to their new home.

They usually spawn in the morning and will start by chasing one another round the tank, then leaping out of the water. That is the reason for keeping the water depth at six inches. In leaping out of the water, the pair come together, the female scattering her non adhesive eggs while the male fertilizes them. As the eggs get scattered, they fall to the bottom of the tank and get caught up in the plants, etc., in the gravel. This leaping continues until the spawning is complete. The fish will swim about separately after spawning, looking for food. They should be removed as soon as they have finished spawning as these fish are avid egg-eaters and will devour any eggs they can find. The fry hatch out in two days but are so small they are almost invisible to the naked eye. It is advisable to use a good magnifying glass to watch the fry.

Feeding the first two weeks consists of *infusoria* and egg yolk. By the end of that the young fish will take micro worm. At a month or five weeks you could start to wean them onto dried foods by mixing feeds with increasing amounts of dried food for fry. At this stage you then separate the fry into tanks prepared the day before. This is to help them grow. The fry being so small the easiest way I found to transfer them was by using a cup or some similar vessel and sinking it slowly so the surface water runs into it. As the fry tend to congregate at the surface they are drawn into the vessel making it easy to transport them to the fresh tank. The fry reach maturity in nine or ten months. I have also spawned these egg-layers with the surface of the water covered with plants. This experiment was a failure as the fish squirm onto the top of the floating plants and spawned, most of the eggs being eaten as they were unable to scatter.



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AT the annual general meeting of **Houghton & District A.S.** the following officers were elected: chairman, N. Soppitt; secretary, R. Apperley, 5 Burn Park Road, Sunderland; treasurer, Miss I. Garwin; show secretary, K. Warren. The Society holds its meetings fortnightly on Thursdays at 8 p.m. at the Community Centre, Barnwell Estate, New Peshaw, Houghton-le-Spring, and anyone interested in fishkeeping is welcome to attend.

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RESULTS of the Three Rivers Fishkeeping exhibition held at Lambton Castle in August were:—Class A: 1, Stanley; 2, Stockton; 3, Haughton; 4, Novo's. Class B: 1, B. Rishbridge (Novo); 2, M. Hall (Novo); 3, R. Atherton (Hartlepool); 4, Mr. and Mrs. Knibbs (Stockton). Class Ba: 1, D. & K. Bowers (Cleveland). Class Ca: 1 and 2, Mr. and Mrs. Rishbridge (Novo); 3, A. Howgate (Stanley); 4, K. Nunn (Stockton). Class G: 1, S. Hay (Hartlepool); 2, M. Hall (Novo); 3, J. Irwin (Stanley); 4, P. Newton (Hartlepool). Class Da: 1, K. Nunn (Stockton); 2, J. Irwin (Stanley). Class Db: 1, R. Atherton (Hartlepool); 2, G. Dodds (Stanley); 3, G. McClurg (Stockton); 4, H. Garthwaite (Hartlepool). Class Dc: 1, R. Atherton (Hartlepool); 2, S. Hay (Hartlepool); 3 and 4, H. Harker (Hartlepool). Class D: 1, Mr. Meddes (South Shields); 2, R. Atherton (Hartlepool); 3, S.

Hay (Hartlepool); 4, Mr. Wainwright (Hartlepool). Class Ea: 1, R. Atherton (Hartlepool); 2, D. Russel (Stanley); 3, Mr. and Mrs. Knibbs (Stockton); 4, P. Fry (Houghton). Class E: 1, M. Hall (Novo); 2, G. Johnson (Stockton); 3, T. Watkins (South Shields); 4, Mr. and Mrs. Knibbs (Stockton). Class F: 1 and 2, N. Lynch (Stanley); 3, K. Nunn (Stockton); 4, A. Howgate (Stanley). Class G: 1, A. Howgate (Stanley); 2, C. Hay (Hartlepool); 3, M. Hall (Novo); 4, Mr. and Mrs. Knibbs (Stockton). Class H: 1 and 4, M. Hall (Novo); 2 and 3, Mr. and Mrs. Rishbridge (Novo). Class J: 1, A. Howgate (Stanley); 2 and 3, M. Hall (Novo). Class K: 1, G. Hunt (Killingworth); 2, M. Hall (Novo); 3, Mr. and Mrs. Knibbs (Stockton). Class L: 1, H. Garthwaite (Hartlepool); 2 and 3, J. Irwin (Stanley); 4, Mr. and Mrs. Rishbridge (Novo). Class M: 1, Mr. and Mrs. Knibbs (Stockton); 2, H. Lake (Stanley); 3, Mr. Kennard (Killingworth); 4, D. & K. Bowers (Cleveland). Class Ma: 1, Mr. and Mrs. Wright (Houghton); 2, G. McClurg (Stockton); 3, H. Harker (Hartlepool). Class O: 1 and 3, Mr. Hill (N.G.L.S.); 2, K. Robinson (Stanley); 4, P. Fry (Houghton). Class P: 1 and 2, P. Fry (Houghton); 3, A. Glegg (Novo); 4, Mr. Thompson (N.G.L.S.). Class Q: 1, R. Atherton (Hartlepool); 2 and 3, N. Soppitt (Houghton); 4, G. Dodds (Stanley). Class R: 1, R. Kirkup (Novo); 2, G. Leary (Novo); 3, Mr. Leary (N.G.L.S.); 4, P. Fry (Houghton). Class S: 1, S. Hay (Hartlepool); 2, Mr. Drain (Houghton); 3, R. Kirkup (Novo); 4, A. Lyon (Hartlepool). Class T: 1, Mr. Glegg (N.G.L.S.); 2, Mr. and Mrs. Renton (N.G.L.S.); 3, R. Kirkup (Novo); 4, N. Wainwright (Hartlepool). Class U: 1, Mr. and Mrs. Low (Cleveland); 2, H. Garthwaite (Hartlepool); 3, Mrs. K. Wright (Houghton). Class V: 1, P. Fry (Houghton); 2, Mr. and Mrs. Low (Cleveland). No 1: 1, Mr. Glegg (N.G.L.S.); 2, G. Leary (Novo); 3, Mr. and Mrs. Renton (N.G.L.S.); 4, C. Minchell (South Shields). Best fish in show: Mr. Hill (N.G.L.S.) with a P. Reticulata which gained 73 pts. Best society: Novo. Best exhibitor: M. Hall (Novo). Best tableau: Cleveland. Best stand: Houghton. The Three Rivers championship result was 1 and 4, Mr. and Mrs. Rishbridge; 2, Mr. Glegg; 3, Mr. and Mrs. Kidd.

FUND raising activities within the **MID-SUSSEX A.S.** are proving very successful with sales of scrap paper and jumble sale. A sum of £12 was also raised by the club from receipts from the Dolphin Pair and this was donated to St. Nicholas Children's Home, Lindfield.

On the social side, thanks were recorded to Alan and Barbara Temple for the social evening they held in September. During the evening members present were entertained by Dr. N. Carrington with a talk and demonstration on Water Chemistry. The table show which contained some excellent fish in the novices class was judged by J. Burries and B. Slade. Cards were awarded as follows:—Novices: 1, B. Perrin; 2 and 3, P. Levine; 4, L. Pinney. Fish of the Year: 1, E. & T. Tester; 2, J. Smith; 3, A. Temple. Breeder Egg-layers: 1, E. & T. Tester.

A **LARGE** number of members and friends took part in an auction of fish and equipment at the October meeting of **King's Lynn A.S.** The bench show for Livebearers was well supported and was split into two classes—males and females. Results were:—Males: 1, Mr. Cannon; 2, Miss Osler; 3, L. Osler; 4, M. Rose. Females: 1, Mr. Brown; 2, M. Rose; 3, Mrs. Whitmore; 4, L. Osler.

Meetings are held on the second Thursday of each month at 7.45 p.m. at the North Star P.H., North Lynn, and new members or visitors are always very welcome. The club secretary is Mrs. S. George. Tel: K.L. 671610.

RECENTLY **Whitby & District A.S.** staged their second annual open show and on display were 268 exhibits in 28 classes of tropical and coldwater fish, representing entries from all over the north east and parts of Yorkshire. Results:—Barbs (large): 1, R. Lunn (Redcar); 2, L. A. Warner (Scarborough); 3 and 4, A. N. Shaw (York). Barbs (small): 1, D. & D. Forbes (Whitby); 2 and 3, D. Lunn (Redcar);

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Also in October the Society took part in the first leg of a Three Way Bettle Competition and Quiz with Bournemouth A.S. and Pisces A.S. Table show results—Breeders Cup: 1, S. Harmon; 2, P. Norup. Characins: 1 and 2, B. Down; 3, L. Rickman; 4, R. Travers. Comet Tail Goldfish: 1, 2 and 3, L. Membennett. The secretary is R. Travers, 6 Auckland Avenue, Brookhurst, Hants. SO4 7RS, and he will be pleased to supply details of membership of the Society on request.

RESULTS of the Three Rivers Fishkeeping exhibition held at Lambton Castle in August were:—Class A: 1, Stanley; 2, Stockton; 3, Haughton; 4, Novo's. Class B: 1, B. Rishbridge (Novo); 2, M. Hall (Novo); 3, R. Atherton (Hartlepool); 4, Mr. and Mrs. Knibbs (Stockton). Class Ba: 1, D. & K. Bowers (Cleveland). Class Ca: 1 and 2, Mr. and Mrs. Rishbridge (Novo); 3, A. Howgate (Stanley); 4, K. Nunn (Stockton). Class G: 1, S. Hay (Hartlepool); 2, M. Hall (Novo); 3, J. Irwin (Stanley); 4, P. Newton (Hartlepool). Class Da: 1, K. Nunn (Stockton); 2, J. Irwin (Stanley). Class Db: 1, R. Atherton (Hartlepool); 2, G. Dodds (Stanley); 3, G. McClurg (Stockton); 4, H. Garthwaite (Hartlepool). Class Dc: 1, R. Atherton (Hartlepool); 2, S. Hay (Hartlepool); 3 and 4, H. Harker (Hartlepool). Class D: 1, Mr. Meddes (South Shields); 2, R. Atherton (Hartlepool); 3, S.

Hay (Hartlepool); 4, Mr. Wainwright (Hartlepool). Class Ea: 1, R. Atherton (Hartlepool); 2, D. Russel (Stanley); 3, Mr. and Mrs. Knibbs (Stockton); 4, P. Fry (Houghton). Class E: 1, M. Hall (Novo); 2, G. Johnson (Stockton); 3, T. Watkins (South Shields); 4, Mr. and Mrs. Knibbs (Stockton). Class F: 1 and 2, N. Lynch (Stanley); 3, K. Nunn (Stockton); 4, A. Howgate (Stanley). Class G: 1, A. Howgate (Stanley); 2, C. Hay (Hartlepool); 3, M. Hall (Novo); 4, Mr. and Mrs. Knibbs (Stockton). Class H: 1 and 4, M. Hall (Novo); 2 and 3, Mr. and Mrs. Rishbridge (Novo). Class J: 1, A. Howgate (Stanley); 2 and 3, M. Hall (Novo). Class K: 1, G. Hunt (Killingworth); 2, M. Hall (Novo); 3, Mr. and Mrs. Knibbs (Stockton). Class L: 1, H. Garthwaite (Hartlepool); 2 and 3, J. Irwin (Stanley); 4, Mr. and Mrs. Rishbridge (Novo). Class M: 1, Mr. and Mrs. Knibbs (Stockton); 2, H. Lake (Stanley); 3, Mr. Kennard (Killingworth); 4, D. & K. Bowers (Cleveland). Class Ma: 1, Mr. and Mrs. Wright (Houghton); 2, G. McClurg (Stockton); 3, H. Harker (Hartlepool). Class O: 1 and 3, Mr. Hill (N.G.L.S.); 2, K. Robinson (Stanley); 4, P. Fry (Houghton). Class P: 1 and 2, P. Fry (Houghton); 3, A. Glegg (Novo); 4, Mr. Thompson (N.G.L.S.). Class Q: 1, R. Atherton (Hartlepool); 2 and 3, N. Soppitt (Houghton); 4, G. Dodds (Stanley). Class R: 1, R. Kirkup (Novo); 2, G. Leary (Novo); 3, Mr. Leary (N.G.L.S.); 4, P. Fry (Houghton). Class S: 1, S. Hay (Hartlepool); 2, Mr. Drain (Houghton); 3, R. Kirkup (Novo); 4, A. Lyon (Hartlepool). Class T: 1, Mr. Glegg (N.G.L.S.); 2, Mr. and Mrs. Renton (N.G.L.S.); 3, R. Kirkup (Novo); 4, N. Wainwright (Hartlepool). Class U: 1, Mr. and Mrs. Low (Cleveland); 2, H. Garthwaite (Hartlepool); 3, Mrs. K. Wright (Houghton). Class V: 1, P. Fry (Houghton); 2, Mr. and Mrs. Low (Cleveland). No 1: 1, Mr. Glegg (N.G.L.S.); 2, G. Leary (Novo); 3, Mr. and Mrs. Renton (N.G.L.S.); 4, C. Minchell (South Shields). Best fish in show: Mr. Hill (N.G.L.S.) with a P. Reticulata which gained 73 pts. Best society: Novo. Best exhibitor: M. Hall (Novo). Best tableau: Cleveland. Best stand: Houghton. The Three Rivers championship result was 1 and 4, Mr. and Mrs. Rishbridge; 2, Mr. Glegg; 3, Mr. and Mrs. Kidd.

FUND raising activities within the Mid-Sussex A.S. are proving very successful with sales of scrap paper and jumble sale. A sum of £12 was also raised by the club from receipts from the Dolphin Pair and this was donated to St. Nicholas Children's Home, Lindfield.

On the social side, thanks were recorded to Alan and Barbara Temple for the social evening they held in September. During the evening members present were entertained by Dr. N. Carrington with a talk and demonstration on Water Chemistry. The table show which contained some excellent fish in the novices class was judged by J. Burries and B. Slade. Cards were awarded as follows:—Novices: 1, B. Perrin; 2 and 3, P. Levine; 4, L. Pinney. Fish of the Year: 1, E. & T. Tester; 2, J. Smith; 3, A. Temple. Breeder Egg-layers: 1, E. & T. Tester.

A LARGE number of members and friends took part in an auction of fish and equipment at the October meeting of King's Lynn A.S. The bench show for Livebearers was well supported and was split into two classes—males and females. Results were:—Males: 1, Mr. Cannon; 2, Miss Osler; 3, L. Osler; 4, M. Rose. Females: 1, Mr. Brown; 2, M. Rose; 3, Mrs. Whitmore; 4, L. Osler.

Meetings are held on the second Thursday of each month at 7.45 p.m. at the North Star P.H., North Lynn, and new members or visitors are always very welcome. The club secretary is Mrs. S. George. Tel: K.L. 671610.

RECENTLY Whitby & District A.S. staged their second annual open show and on display were 268 exhibits in 28 classes of tropical and coldwater fish, representing entries from all over the north east and parts of Yorkshire. Results:—Barbs (large): 1, R. Lunn (Redcar); 2, L. A. Warner (Scarborough); 3 and 4, A. N. Shaw (York). Barbs (small): 1, D. & D. Forbes (Whitby); 2 and 3, D. Lunn (Redcar);

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4, R. Hunt (Half Moon). Characins (small): 1, R. Lunn (Redcar); 2, Mr. and Mrs. Willey (Scarborough); 3, W. Sowersby (Scarborough); 4, K. Bowers (Cleveland). Characins (large): 1, W. Sowersby (Scarborough); 2, S. Gregory (Scarborough); 3, Mr. and Mrs. Willey (Scarborough); 4, T. Kilvington (Doncaster). Angel fish: 1, K. Nunn (Stockton); 2, R. Caton (Bishop Auckland); 3, Mr. and Mrs. K. Welch (York); 4, J. James (Half Moon). Dwarf cichlids: 1, W. Sowersby (Scarborough); 2, J. Bunn (Half Moon); 3, Mr. and Mrs. McClurg (Stockton); 4, P. Jackson (Redcar). Rift Valley cichlids: 1 and 2, J. King (Redcar); 3, Mr. Hunt (Half Moon); 4, B. Summerscales (Northallerton). Large cichlids: 1, S. Oswell (Killingworth); 2, Mr. and Mrs. Whitehead (Scarborough); 3, L. A. Warner (Scarborough); 4, D. Readman (Redcar). Siamese fighters: 1, Mr. and Mrs. Knibbs (Stockton); 2, A. Stephens (Middlesbrough); 3, Mr. and Mrs. K. Welch (York); 4, D. V. Labyrinth (1). S. Gregory (Scarborough); 7, R. Leighton (Redcar); 3, J. King (Redcar); 4, Mr. and Mrs. Johnson (Scarborough). Killifish: 1, Mr. and Mrs. McClurg (Stockton); 2, Mr. and Mrs. Willey (Scarborough); 3, K. Bowers (Cleveland); 4, K. Nunn (Stockton). Tropical outfish: 1, Mr. Hunt (Half Moon); 2, Mr. and Mrs. K. Welch (York); 3, J. Hensell (Whitby); 4, Mr. and Mrs. Willey (Scarborough). Corydoras and brochis: 1, Mr. and Mrs. Knibbs (Stockton); 2, Miss D. Knibbs (Stockton); 3, R. Hasland (Whitby); 4, Mr. and Mrs. Whitehead (Scarborough). Rasboras: 1, Mr. and Mrs. K. Welch (York); 2, L. A. Warner (Scarborough); 3, A. & N. Shaw (York); 4, Mr. and Mrs. Honnor (Doncaster). Danios & W.C. M.M.: 1, D. Lunn (Redcar); 2, S. Jackson (Redcar); 3, Mr. and Mrs. Knibbs (Stockton); 4, Mr. and Mrs. Willey (Scarborough). Loach & botia: 1, Mr. Hunt (Half Moon); 2, D. Lunn (Redcar); 3, Mrs. Hunt (Half Moon); 4, Mr. and Mrs. Honnor (Doncaster). Labeo: 1, R. Caton (Bishop Auckland); 2, Mr. and Mrs. Elliker (Scarborough); 3, Mr. and Mrs. McClurg (Stockton); 4, R. Lunn (Redcar). A.O.S. Tropical: 1, D. Lunn (Redcar); 2, W. Sowersby (Scarborough); 3, D. Readman (Redcar); 4, Mr. and Mrs. Knibbs (Stockton). Pairs egglayer: 1, J. King (Redcar); 2, Mr. and Mrs. Willey (Scarborough); 3, E. & M. Perkins (Ashington); 4, B. Shackleton & Son (Half Moon). Pairs livebearer: 1, T. Kilvington (Doncaster); 2, C. Fowler (Whitby); 3, Mr. and Mrs. Honnor (Doncaster). Guppies: 1 and 4, Mrs. C. Potter (Whitby); 2, J. Bunn (Half Moon); 3, S. Jackson (Redcar). Swordtails: 1 and 2, R. Caton (Bishop Auckland); 3, Mr. and Mrs. Knibbs (Stockton); 4, Mr. and Mrs. Duffill (Redcar). Platies: 1, Mr. Hunt (Half Moon); 2, Mr. and Mrs. K. Welch (York); 3, C. Fowler (Whitby); 4, J. Bunn (Half Moon). Molies: 1, S. Bradshaw (Redcar); 2, Mr. Hunt (Half Moon); 3, T. Kilvington (Doncaster); 4, J. Bunn (Half Moon). A.O.S. Livebearer: 1 and 2, Mr. and Mrs. Duffill (Redcar); 3, T. Kilvington (Doncaster); 4, D. Lunn (Redcar). A.V. Coldwater: 1 and 2, 1, Gray (Whitby); 3, A. Metcalfe (Scarborough); 4, 1, Gray (Whitby). Breeders egg: 1 and 2, A. Steven, (Middlesbrough); 3, T. Kilvington (Doncaster); 4, K. Nunn (Stockton). Breeders live: 1, T. Kilvington (Doncaster); 2, W. Sowersby (Scarborough); 3, Miss D. Knibbs (Stockton); 4, Mr. and Mrs. McClurg (Stockton). Best exhibitor in show: Mr. Hunt (Half Moon Society), 22 points. Best fish in show: Mr. and Mrs. Duffill (Redcar Society).

THE programme at the October meeting of the **Dunoon and District A.S.** was Barbs. The F.B.A.S. slide-tape was shown on this topic and the table show was also the same subject, the places being as follow: 1, S. Hunt; 2 and 4, E. Masfud; 3, R. Andrews. The Judge was Mr. R. Thoday of Braintree.

THERE were the usual two meetings in September of the **Portsmouth A.S.** The first one featured a talk on water lilies given by R. Eason who illustrated it with some excellent slides and the main feature of the second meeting was a table show for twin-tailed goldfish varieties and native and foreign coldwater fishes. During the course of

judging, ably carried out by R. Ryder, V. Hunt conducted a quiz for the club members. The results of the table show were as follows—Twin-tailed Goldfish: 1, E. Binstead; 2 and 3, Mrs. S. Whittenham. Native and Foreign Coldwater: 1, 2, 3 and 4, E. Binstead.

IN October **A. A. Jones & Shipman A.S.** held their second open show and the results were as follow: A. V. Guppies: 1, S.M.I.N. (Nuneaton); 2, Mr. and Mrs. Darby (M.A.S.G.); 3, S. Maxfield (Leamington); 4, G. Nesbit (Nuneaton). A.O.V. Livebearer: 1, S.M.I.N. (Nuneaton) (Best in section); 2, T. Mayle (L.N.P.S.); 3, G. Nesbit (Nuneaton); 4, A. Howard (Kidderminster). Characins: 1, Mr. and Mrs. Darby (M.A.S.G.); 2, Mr. and Mrs. Underwood (Unit 59); 3, M. Wiggins (North Warks.); 4, A. Rippon (Rugby). A.O.V. Characin: 1, C. O. Sykes (Catfish Ass.) (Best in section); 2, R. Elliott (Corby); 3, T. Mayle (L.N.P.S.); 4, B. Bailey (North Warks.). Barbs: 1, 2 and 3, Colin Sykes (Catfish Ass.); 4, Mrs. D. Cruickshank (Baling). A.O.V. Barbs: 1 and 4, Mrs. D. Cruickshank (Baling) (Best in section); 2, R. Elliott (Corby); 3, Colin Sykes (Catfish Ass.). Cichlids: 1, Mr. and Mrs. Maxfield (Leamington); 2, G. Wooley (Corby); 3, Mr. and Mrs. Underwood (Unit 59); 4, T. Redfern. Rift Lake Cichlids: 1, B. Bailey (North Warks.); 2, Mr. and Mrs. Gough (Wynnstay); 3, R. Gillies (Sherwood); 4, N. Campbell (Corby). A.O.V. Cichlids: 1, B. Bailey (North Warks.); 3, L. Godwin (L.N.P.S.); 4, G. Wooley (Corby). Male Beta Splendens: 1, B. Bailey (North Warks.); 2, L. Brown (Wyre Forest); 3, Mr. and Mrs. Underwood (Unit 59); 4, Mr. Boot (L.A.S.). A.O.V. Anabantids: 1, Mr. and Mrs. Gough (Wynnstay); 2, J. Rule (Rugby); 3, T. Mayle (L.N.P.S.); 4, G. Taylor (Loughborough and D.A.S.). Corydoras and Brochis: 1, T. A. Cruickshank (Baling); 2, Mrs. D. Cruickshank (Baling); 3, S.M.I.N. (Nuneaton); 4, C. Sykes (Catfish Ass.). A.O.V. Catfish: 1 and 2, Mr. and Mrs. Gough (Wynnstay) (Best fish in section and Show); 3, Mr. and Mrs. Darby (M.A.S.G.); 4, B. Chapman (Long Eaton). A.V. Loach: 1 and 2, K. Beaver (Jones and Shipman); 3, J. Booth (L.A.D.A.S.); 4, K. Payne (North Warks.). A.V. Egg-layering Toichceps: 1, J. Silverwright (Corby) (Best in section); 2, M. Jarram (Leamington); 3, A. Bailey (North Warks.); 4, Mr. and Mrs. Underwood (Unit 59). A.V. Rasboras: 1, R. Elliott (Corby); 2, S.M.I.N. (Nuneaton); 3, Mr. and Mrs. Underwood (Unit 59); 4, G. Nesbit (Nuneaton). A.V. Danio Brachydanio, W.G.M.M.: 1, 2 and 4, J. Booth (L.A.D.A.S.) (Best in Section); 3, Mr. and Mrs. Underwood (Unit 59). A.V. True Egg-layering Pairs: 1, T. A. Cruickshank (Baling) (Best in section); 2, R. Elliott (Corby); 3, M. Wiggins (North Warks.); 4, G. Nesbit (Nuneaton). A.V. True Livebearing Pairs: 1, R. Weston (L.A.S.); 2, Mrs. D. Cruickshank (Baling); 3, T. Mayle (L.N.P.S.); 4, A. Howard (Kidderminster). Breeders A.V. Egg-layer: 1, R. Elliott (Corby); 2, B. Bailey (North Warks.); 3 and 4, T. Mayle (L.N.P.S.). Breeders A.V. Livebearers: 1 and 2, S.M.I.N. (Nuneaton) (Best in section); 3, R. Wilson (Corby); 4, T. Mayle (L.N.P.S.). Breeders Coldwater: 1 and 3, B. Emvis (L.A.S.); 2, N. R. Giles (A.M.G.K. and L.A.S.); 4, N. R. Giles (A.M.G.K. and L.A.S.). A.O.V. Tropical: 1, G. Nesbit (Nuneaton); 2, R. Elliott (Corby); 3, D. M. Hookins (Leamington); 4, Mr. and Mrs. Underwood (Unit 59). Single-Tail Goldfish: 1, B. Emvis (L.A.S.); 2 and 3, K. Sykes (Jones and Shipman); 4, R. Knight (Jones and Shipman). Twin-Tail Goldfish: 1, 2, 3 and 4, Mr. and Mrs. Viner (Leamington) (Best in section). A.O.V. Coldwater Pond or River Fish: 1 and 2, K. Beaver (Jones and Shipman); 3, Mr. and Mrs. Underwood (Unit 59); 4, S.M.I.N. (Nuneaton). Mini-Aquaria: 1 and 4, Mr. and Mrs. Underwood (Unit 59); 2, Mr. Boot (L.A.S.); 3, Mr. and Mrs. Viner (Leamington).

THE **S.I.L.A.S.** held its annual general meeting in September. The new committee is as follows: chairman, J. Walker; secretary, Mr. and Mrs. C. Brook, 47 Cross Road,

Croydon, Surrey; show secretary, S. Jeffery, 83 Abbold Crescent, Lee, SE12; treasurer, K. Houghton, P.R.O., B. Hastings. Meetings are held on alternate Monday nights at 141 West Greenwich Har, Greenwich High Road, London, SE10.

THERE were over 420 entries for the **Blackburn Aquarist Waterlife Society** open show. Results were as follows: Guppies: 1, Mr. and Mrs. B. Durham (Longridge); 2, C. Parkinson (Longridge); 3, P. Oldcorn (Blackburn). Platies: 1 and 3, Mr. and Mrs. B. Durham (Section Winner); 2, R. W. Carter (St. Helens). Molies: 1, Mr. and Mrs. Iddon (Sandgrounders); 2 and 3, B. and J. McCarthy (St. Helens). A.O.V. Livebearers: 1 and 2, P. Walsh (Blackburn); 3, Mr. and Mrs. B. Durham (Longridge). Swordtails: 1, Mr. and Mrs. Holden (Longridge); 2, N. Wallbank (Loyne); 3, Mr. and Mrs. Aldred (Hyde). Small Characins: 1, N. Wallbank; 2, L. Newton (Blackburn); 3, Mr. and Mrs. B. Walsh (Blackburn). Large Characins: 1, F. Oliver (Wrexham); 2, Mr. and Mrs. Hodge (Southport); 3, Mr. and Mrs. Ham (Lytham). Dwarf Cichlids: 1, N. Stevenson (Oram); 2, M. Whelan (Blackburn); 3, Mr. and Mrs. Underwood (Southport). Large Cichlids: 1, Mr. and Mrs. Underwood (Southport); 2, Mrs. K. Smith (Blackpool); 3, B. J. Goodyear (Darwen). Rift Valley Cichlids: 1, R. I. Payne (Merseyside); 2, Mr. and Mrs. Iddon (Sandgrounders); 3, Mr. and Mrs. Underwood (Southport). Angelfish: 1, Mr. and Mrs. T. Burton (Independent); 2, N. Stevenson (Oram); 3, D. Hughes (Longridge). Small Barbs: 1, R. W. Carter; 2, P. and H. Batchelor (Loyne); 3, N. Stevenson (Oram). Large Barbs: 1 and 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, P. and H. Batchelor (Loyne). Toothcarps: 1, B. Marshall (Blackburn); 2 and 3, Mr. and Mrs. Tasker (Sandgrounders). Minnows: 1, L. Newton (Blackburn); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Underwood (Southport). Danios: 1, P. and H. Batchelor (Loyne); 2, Mr. and Mrs. Hodge; 3, E. and B. Calow (Coral Reef). Rasboras: 1, R. W. Carter; 2, Mr. and Mrs. B. Walsh (Blackburn); 3, T. Hintsley (Coral Reef). Fighters: 1, Mr. and Mrs. Ham; 2, R. Clint (Longridge); 3, D. Garstang (Longridge). Anabantids: 1, Mr. and Mrs. Baldwin (Sandgrounders); 2 and 3, Mr. and Mrs. Lyons (Longridge). A.O.V. Anabantids: 1, B. and J. McCarthy (St. Helens); 2, Mr. and Mrs. Iddon (Sandgrounders); 3, G. Waterhouse (Sandgrounders). Sharks: 1 and 3, Mr. and Mrs. Baldwin (Sandgrounders); 2, Mr. and Mrs. T. Burton (Independent). Foxes: 1, Mr. and Mrs. Hodge; 2, P. and H. Batchelor (Loyne); 3, R. I. Payne (Merseyside). Pairs (Egglayers): 1, H. Penhall (Oram); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, R. O'Connell. Pairs (Livebearers): 1, P. Walsh; 2, Mr. and Mrs. Durham (Longridge); 3, Mr. and Mrs. B. Walsh. Breeders (Livebearers): 1, Mr. and Mrs. B. Walsh (Blackburn); 2, R. W. Carter; 3, J. Collinge (Nelson). Breeders (Egglayers 1 to 10): 1, G. and C. Bery (Blackburn); 2, Mr. and Mrs. Tasker (Sandgrounders); 3, N. Ashton (Accrington). Breeders (Egglayers 11-20): 1, R. Standen (Blackburn); 2, R. I. Payne; 3, Mr. and Mrs. Tasker. Loaches: 1 and 3, Mr. and Mrs. Ham; 2, Mr. and Mrs. T. Burton. Corydoras: 1, R. W. Carter; 2, Mr. and Mrs. Underwood (Southport); 3, J. and K. Hinchley (Loyne). A.O.V. Catfish: 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, B. and J. McCarthy; 3, Mr. and Mrs. Underwood (Southport). Juniors, Livebearers: 1, D. Garstang (Longridge); 2 and 3, P. Durham (Longridge). Juniors, Egglayers: 1 and 3, C. Calow (Coral Reef); 2, A. Hopwood (Blackburn). A.O.V. Tropical: 1, B. and B. Calow;

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2, J. and K. Hinchley; 3, Mr. and Mrs. B. Walsh (Blackburn); A.V. Marine: 1, Mr. and Mrs. Iddon (Sandgrounders); 2, Mrs. J. Caton (Longridge); 3, K. Müller (Heywood); Common Goldfish and Comets: 1, C. Wallbank (Accrington); 2, Mr. and Mrs. Tasker, Veil-tails; 1 and 2, R. Duckworth (Independent); 3, C. Wallbank; Fantails: 1, H. Penhall (Oream); 2 and 3, S. Foote (Accrington); A.O.V. Fancy: 1, B. Haworth (Accrington); 2, A. Phillipson (Accrington); 3, H. Penhall (Oream); A.O.V. Coldwater: 1, S. Foote (Accrington); 2, Mr. and Mrs. Hewitt (Oream); 3, Mr. Walsh (Accrington); Shubunkins: 1, Mr. and Mrs. Hewitt; 2, S. Foote (Accrington); 3, C. Wallbank; Moores: 1, 2 and 3, S. Foote (Accrington); Best Fish in Show won by P. and H. Batchelor (Loyne) (Danios). Best Coldwater Fish won by B. Haworth (Accrington) (A.O.V. Fancy).

TABLE SHOW results at the October meeting of the **Bristol A.S.** were as follows:—Shubunkins (bred 1977): 1 and 2, H. J. Whiting; 3 and 4, V. Cole; A.O.V. Pond or River: 1, C. Hayes; 2, E. Bowden; 3, W. Ham; 4, Miss H. Morgan; A.O.V. Fancy Goldfish: 1 and 2, V. Cole; 3 and 4, J. Day; Labyrinth: 1 and 2, Miss H. Morgan; Livebearers: 1, 2, 3 and 4, G. Price; A.O.V. Egg-layers: 1 and 2, Miss H. Morgan. The Coldwater Fish were judged by V. Capaldi.

CHANGES in committee of **Merthyr A.S.** are as follows: chairman, J. Clifford; treasurer, A. H. Morgan; show secretary, E. Morgan; points secretary, S. Evans; assistant show secretary, R. Morgan; secretary, Mrs. M. J. Hagerly; press agent/librarian, D. T. Hagerly.

ENTRIES totalled 483 for the **North Wilts. A.S.** open show. Results: Class AG: 1, Mrs. Rayner (Newbury); 2 and 3, Mrs. Rushbrooke (Reading); 4, D. Williams (M.A.D.A.S.); Class B: 1, N. J. Miles (Kingsclere); 2, J. Carpenter (Staines); 3, T. Burville (Basingstoke); 4, R. Collier (N.W.A.S.); Class CA: 1, A. Chaplin (Basingstoke); 2, N. J. Miles (Kingsclere); 3, B. Bow (Selective A.S.); 4, M. Bourne (Selective A.S.); Class CB: 1, M. Dore (Reading); 2, T. Burville (Basingstoke); 3 and 4, T. Cruickshank (Basing); Class C: 1, K. Hillier (Newbury); 2, M. Dore (Reading); 3, M. Davies (Selective A.S.); 4, T. Gardiner (N.W.A.S.); Class DA: 1 and 3, R. Canning (Newbury); 2, P. Watts (Selective A.S.); 4, Mr. and Mrs. Prall (Basingstoke); Class DB: 1, T. Burville (Basingstoke); 2 and 3, M. Bourne and T. Liton (S.E.L.A.S.); 4, D. Williams (M.A.D.A.S.); Class DC: 1, 2 and 4, W. A. Knight (Gosport); 3, P. Watts (Selective A.S.); Class D: 1, M. Netherell (Riverside); 2, D. Sheridan (Newbury); 3, M. Still (N.W.A.S.); 4, J. V. Payne (S.E. London); Class EA: 1, A. Fisher (Newbury); 2, P. Lawrence (Reading); 3, Tim and Tanya Rushbrooke (Reading); 4, T. Woolley (Saracens); Class E: 1, A. J. Jones (Salisbury); 2, S. Broome (Reading); 3, Mrs. Rayner (Newbury); 4, T. Sullivan (Selective A.S.); Class F: 1 and 3, J. Jackson (Basingstoke); 2, T. Woolley (Saracens); Class G: 1, Mrs. M. Davies (Selective A.S.); 2, R. Canning (Newbury); 3, K. Hillier (Newbury); 4, T. Woolley (Saracens); Class H: 1 and 2, T. Cruickshank (Basing); 3, W. A. Knight (Gosport); 4, P. Rushbrooke (Reading); Class J: 1 and 2, D. Williams (M.A.D.A.S.); 3, A. Chaplin (Basingstoke); 4, T. Burville (Basingstoke); Class K: 1 and 3, P. Lawrence (Reading); 2, J. Jackson (Basingstoke); 4, P. Watt (Selective A.S.); Class L: 1, C. N. Jackson (Reading); 2, D. Williams (M.A.D.A.S.); 3, R. Collier (N.W.A.S.); 4, R. Canning

(Newbury); Class MA: 1, D. Sheridan (Newbury); 2, R. Canning (Newbury); 3, N. J. Miles (Kingsclere); 4, N. Francombe (N.W.A.S.); Class M: 1, Mrs. M. Netherell (Riverside); 2, M. Dore (Reading); 3, A. Chaplin (Basingstoke); 4, R. Canning (Newbury); Class N-BM: 1, T. Cruickshank (Basing); 2, D. Blundell (Abingdon); 3, P. Parsons (M.A.D.A.S.); 4, A. J. Jones (Salisbury); Class N-OT: 1 and 2, B. Bow (Selective A.S.); 3 and 4, C. Howe (Newbury); Class O: 1, J. Miles (Kingsclere); 2, S. Manual (Selective A.S.); 3 and 4, Mr. and Mrs. Prall (Basingstoke); Class P: 1, S. Richards (Selective A.S.); 2, P. Watts (Selective A.S.); 3, N. Wallace (Selective A.S.); 4, R. Menhennett (New Forest); Class Q: 1, Mrs. D. Cruickshank (Basing); 2, T. Sullivan (Selective A.S.); 3, A. Parsons (M.A.D.A.S.); 4, R. Collier (N.W.A.S.); Class R: 1, G. Emptage (Cheltenham); 2, R. Canning (Newbury); 3, R. Menhennett (New Forest); 4, A. Fisher (Newbury); Class S: 1, R. Canning (Newbury); 2, I. Leck (Basingstoke); 3, C. Howe (Newbury); 4, T. Woolley (Saracens); Class T: 1, K. Hillier (Newbury); 2, R. Townsend (Newbury); 3, C. Howe (Newbury); 4, R. Ryan (Salisbury); Class X-BM: 1, D. Blundell (Abingdon); 2, J. Jackson (Basingstoke); 3, A. Gibson (Reading); 4, T. Monk (N.W.A.S.); Class X-OT: 1, 2, 3 and 4, C. Howe (Newbury); Class U: 1 and 2, L. Menhennett (New Forest); 3, Mr. and Mrs. Rushbrooke (Reading); 4, F. May (Reading); Class V: L. Menhennett (New Forest); Class W: 1, K. Hillier (Newbury); 2 and 4, P. Watts (Selective A.S.); 3, D. Goss (Reading).

THE Ichiban Ranchu Society held its first Annual Open Show in October. It was very encouraging to see so many high class home bred yearlings entered, which confirms the increasing interest in Ranchu. Results in this class: Class 1: First Year Metallics: 1, 2 and 4, A. Tagg; 3, F. Orme; Class 2: Second Year Metallics: 1, B. Lueley; 2 and 3, F. Orme; 4, J. Davidson; Class 3: Adult Metallics: 1, F. Hilton; 3, J. Davidson; 3, Mrs. M. Hilton; 4, J. Porter; Class 2B: Second Year Sacros: This class gave high hopes for the future and should produce some very nice youngsters for next year's show. Results: 1, 2 and 3, A. Lawson; 4, Mrs. M. Hilton. Mrs. M. Hilton won the Rose Bowl for the highest-pointed Ladies Fish. Mr. F. Hilton, Best in Show, Stanley Gover Trophy, and Aquarist Gold Pin. The new system of judging by a panel of five judges also worked successfully.

OPEN show results of the **Eboracum Aquarists** in October were:—Guppy: 1 and 3, Master A. Young (Hull); 2, Mr. and Mrs. Copley (Doncaster); Molly: 1, Mr. Hattersley (Sheaf Valley); 2, Mr. and Mrs. Welsh (York); 3, Mr. and Mrs. Ellerker (Scarboro); Swords: 1, 2 and 3, M. Jordan (Brid.); 2 and 3, W. Blundell (Doncaster); A.O.V. Live: 1, Mr. and Mrs. Richardson (Scarboro); 2, W. Blundell (Doncaster); 3, Mr. and Mrs. Chester (Retford); Barb up to 10 cms.: 1, Mr. and Mrs. Chester (Retford); 2, N. Parrand (Goole); 3, R. Smith (York); Barbs over 10 cms.: 1, M. Jordan (Brid.); 2, 1, Taylor (Brid.); 3, A. & P. Barker (York); Small Chars up to 7.5 cms.: 1, Mr. and Mrs. Richardson (Scarboro); 2, Mr. and Mrs. Millington (Sheffield); 3, G. Mortimer (Brid.); Large Chars over 7.5 cms.: 1, Mr. Thorpe (Doncaster); 2, Mr. Frisby (Hull); 1 hope (Doncaster); Rasboras, Danios and Minnows: 1 and 2, Duncan (Hull); 3, Mr. and Mrs. Welsh (York); Junior Egg-layer: 1, Master A. Collier (Goole); 2, Miss T. Hopkinson (Darfield); 3, Miss J. Rayworth (Hull); A.O.V. Catfishes: 1, Mr. and Mrs. K. Welsh (York); 2, Mr. and Mrs. Tindall (York); 3, N. Farrand (Goole); Loaches: 1, Mr. and Mrs. Toyne (Sheaf Valley); 2, P. Camfield (Castleford); 3, Mr. and Mrs. Danes (Doncaster); E.L.T.C.: 1 and 3, D. Greenwood (Immingham); 2, Master A. Young (Hull); A.O.V.: 1, Peter Sylvia (Brid.); 2, A. Frisby (Hull); 3, Mr. and Mrs. Copley (Doncaster); Sharks & Foxes: 1, G. Flinton (Scarboro); 2, Mr. Thorse (Doncaster); 3, Mr. Drake (Hull).

Breeders egg A (1.5 cms. and Breeders egg B (6-10 cms.): 1, Mr. and Mrs. Snowden (York); 2, Master A. Young (Hull); 3, Mr. and Mrs. Chester (Retford); Breeders egg C (11-15 cms.) and Breeders egg D (16-20 cms.): 1, M. P. Roundale; no more entries; Breeders live A (1-10 cms.): 1, Mr. and Mrs. Chester (Retford); 2, Mr. and Mrs. Richardson (Scarboro); 3, Mr. and Mrs. Millington (Sheffield); Junior livebearer: 1, Master A. Young (Hull); 2, Miss T. Hopkinson (Darfield); 3, Master J. Farrington (Ebor.); Fighters: 1, A. P. Barker (York); 2, G. Watson (York); 3, Mr. Elwood (Brid.); Dwarf cichlids up to 10 cms.: 1, I. Gray; 2, G. Robson (Ebor.); 3, Mr. and Mrs. Snowden (York); Large cichlids over 10 cms.: 1, R. Smith (York); 2, P. Render (Hull); 3, A. P. Barker (York); Malawi cichlids: 1, I. Taylor (Brid.); 2, T. Clowes (Deane); 3, G. Robson (Ebor.); Angels: 1, A. P. Barker (York); 2, Mr. and Mrs. Welsh (York); 3, A. Frisby (Hull); Small Anabantids up to 10 cms.: 1, M. Jordan (Brid.); 2, Mr. and Mrs. Roberts (Doncaster); 3, Mr. and Mrs. Copley (Doncaster); Large Anabantids over 10 cms.: 1 and 3, Mr. and Mrs. Copley (Doncaster); 2, W. Blundell (Doncaster); Corydoras: 1, A. P. Barker (York); 2, Mr. and Mrs. Moore (Sheaf Valley); 3, G. Flinton (Scarboro); Breeders live B (11-20 cms.): 1, Mr. and Mrs. Hopkinson (Darfield); 2, K. Smith (Brid.); Pairs egg: 1, Mr. and Mrs. Copley (Doncaster); 2, Mr. and Mrs. Danes (Doncaster); 3, M. P. Roundale (South Leeds); Pairs live: 1, W. Blundell (Doncaster); 2, Mr. and Mrs. Hopkinson (Darfield); 3, M. Jordan (Brid.); Ordinary goldfish: 1 and 3, K. Chapman (Mexboro); 2, R. Smith (York); Fancy goldfish: 1 and 2, Mr. Acton (Hull); 3, Peter Sylvia (Brid.); A.O.V. coldwater: 1, K. M. Wood (Brid.); 2, Mr. Acton (Hull); 3, K. M. Wood (Brid.); A.V. female egg: 1, A. Frisby (Hull); 2, G. Robson (Ebor.); 3, Mr. and Mrs. Danes (Doncaster); A.V. female live: 1, Mr. and Mrs. Ellerker (Scarboro); 2, Mrs. Danes (Doncaster); 3, A. Frisby (Hull). Best fish in show: Chola Barb, owned by M. Jordan (Bridlington), 75 points.

THERE has been good attendance at the **Medway A.S.** meetings from June to September, despite the fact that this was the peak holiday period. During July J. Greenhalf gave an excellent talk on Catfish, for which he brought along many species as examples, and also during that month R. Roberts gave a very interesting lecture on Killifish.

In August Ann MacDonald of the **Sittingbourne A.S.** lectured on Characins. Also in August H. Vural, chairman of the **Fancy Guppy Association**, was to have given a talk but unfortunately, due to an eye injury—and much to the Society's disappointment—he was not able to do so. However, they were fortunate in that S. Kemp from **Kingfisheries of Beckenham** (who gave a talk earlier in the year) was able to step in and save the night.

During this period an inter-club competition has been in progress for the best furnished aquaria, the results of which are as follows:—Adult section: 1, T. Hoskins; 2, S. Kemp; 3, J. Harman; 4, P. Fellos.

The society also would like to thank C. Belleic of the **Catfish Association** for stepping in and giving an excellent lecture on Catfish in September when, unfortunately, D. Lambourne could not attend.

Should anyone require further information in regard to the society's activities, or membership, please do not hesitate to contact the secretary at 66 Norman Close, Wigmore, Gillingham, or the publicity secretary at 193 Cedar Road, Strood.

FOR the **West Cumberland Aquarist's Club** annual open show there were 144 entries. The following were the results: Best Tropical: L. Sharp (West Cumb.); Best Coldwater: C. Davison (W.C.A.C.); West Cumberland Trophy for Best in Livebearers: C. Davison; Texaco Trophy for second highest pointed Class winner in Livebearers: E. Hodgson (Pennyth Aquarist's Association); Plaits: 1 and 2, C. Davison; 3, J. D. Stott (Pennyth); Swords: 1 and 3, J. D. Stott; 2, L. Sharp; Mollies: 1, Mrs. E. Knowles (W.C.A.C.); Guppies: 1,

**A FRACTION
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ALGAE AWAY**
Hillside Aquatics London N12

C. Davison. A.O.V. Livebearer: 1, E. Hodgson; 2 and 3, R. Strand (W.C.A.C.). Wastwater Trophy for Best in Cichlids: W. Allan (Independent). Dwarf Cichlids: 1 and 2, G. Calvin (Independent); 3, L. Sharp. A.O.V. Cichlids: 1, W. Allan; 2, J. D. Stott; 3, M. Ball (Independent). Dorothy Martin Memorial Trophy for Best in Barbs: E. Hodgson. Small Barbs: 1, E. Hodgson; 2 and 3, J. D. Stott. A.O.V. Barb: 1, L. Sharp; 2, Mrs. M. Martin (W.C.A.C.). Bray and Hodgson Trophy for Best in Small Characins: R. Strand. Hemigrammus and Hyphessobrycon sp.: 1, C. Davison. A.O.V. Small Characin: 1, R. Strand; 2, E. Hodgson; 3, Mrs. M. Martin. Joseph Martin Pet Shop Trophy for Best in Large Characins: L. Sharp. Headstanders: 1 and 2, C. Davison. A.O.V. Large Characin: 1, L. Sharp; 2 and 3, R. Strand. Jane Nelson Memorial Trophy for Best in collected Cyprinids: E. Hodgson. Sharks and Flying Foxes: 1, E. Hodgson; 2, Mr. and Mrs. W. Dowton (W.C.A.C.); 3, C. Davison. Rabbits: 1, C. Davison; 2, R. Strand; 3, L. Sharp. Danios and Minnows: 1, R. Strand; 2, L. Sharp; 3, R. Raphael (Independent). Copeland Killie Trophy for Best in Killies: R. B. Mitchell (W.C.A.C.). Killies: 2, R. B. Mitchell; 3, Mrs. M. Martin. Dunboyne Trophy for Best in Catfish and Loaches: F. Hodgson. Corydoras and Brochias sp.: 1 and 3, R. Strand; 2, E. Hodgson. A.O.V. Catfish: 1, C. Davison; 2 and 3, R. B. Mitchell. Loaches: 1, E. Hodgson; 2, Mrs. M. Martin; 3, J. D. Stott. Mary Martin Trophy for Best in Anabantids: R. Strand. Small Anabantids: 1 and 2, R. Strand. A.O.V. Anabantid: 1, R. Strand; 2, J. D. Stott; 3, Mrs. E. Knowles. Solway Trophy for Best in A.O.V. Tropical: 1, E. Hodgson; 2 and 3, R. Strand. P. J. Faerman Trophy for Best Pair: Mr. and Mrs. W. Dowton. Pairs, Livebearers: 1, Mr. and Mrs. W. Dowton; 2, E. Hodgson; 3, R. Strand. Pairs, Egg-layers: 1, Mr. and Mrs. W. Dowton; 2, Mrs. M. Martin; 3, C. Davison. J. D. Johnson Trophy for Best in Breeders: R. B. Mitchell. Breeders, Livebearers: 1, R. Strand. Breeders, Egg-layers (1 to 10): 1 and 2, C. Davison; 3, G. Scott (Independent). Breeders, Egg-layers (11 to 20): 1, 2 and 3, R. B. Mitchell. Rydall Trophy for Second highest pointed Class winner in Goldwater sp.: C. Davison. Common Goldfish: 1 and 2, C. Davison; 3, G. Scott. Shubunkins: 1 and 3, C. Davison; 2, R. Leckie (W.C.A.C.). A.O.V. Singletail Goldfish: 1, G. Scott; 2 and 3, C. Davison. A.O.V. Twintail Goldfish: 1, 2 and 3, C. Davison. A.O.V. Goldwater: 1, C. Davison; 2, R. Strand; 3, R. and W. McSherry (Independent). Rydal Trophy for Best Novelty Mini Jar: R. Leckie; 2, Mrs. A. L. Mitchell; 3, Master P. B. Mitchell. Restricted award—W.C.A.C. Members only: Texaco Cup: W.C. member gaining most points from open classes: C. Davison. Cumbris Trophy: W.C. member gaining second highest number of points from open classes: R. Strand. Mary Martin Challenge Trophy: W.C. member gaining most points from four nominated classes: R. Strand. Club Shield: W.C. member gaining most points from four nominated classes: C. Davison.

EARLY in October the David Brown A.S. held its first open show and eleven societies from the North and Midlands submitted good entries which totalled 177. Considering there were five other shows in the North on the same date this figure was regarded as very satisfactory. Anyone interested in the Society can get further details from the Secretary, Alan G. Copp, telephone Huddersfield 43399, who is available in the evenings after 5.30 p.m.

Results: Section A: Guppies: 1, A. Copp (David Brown); 2, J. Riley (Castelford); 3, W. Powell (David Brown). Swordtails: 1, Mr. and Mrs. Houghton (Southport); 2, J. Sykes (David Brown); 3, J. Riley (Castelford). Mollies: 1, Mr. and Mrs. Houghton (Southport) (Section Winner); 2, K. M. Fisher (Sherwood); 3, L. Hardy (David Brown). Platies: 1, J. Riley (Castelford); 2, Mr. and Mrs. Goddard (Macclesfield); 3, D. Stott (Oldham). A.O.V. Livebearer: 1, J. Shackleton (Halifax); 2, B. Foden (David Brown); 3, Mr. and Mrs. Goddard (Macclesfield). Section B: Fighters: 1, Mr. Wills (Halifax); 2, S. Moorhouse (David Brown); 3, J. Sykes (David Brown). Colias

and Gouramis: 1, D. Stott (Oldham) (Section Winner); 2, K. O'Rourke (Oldham); 3, J. Riley (Castelford). Section C: Characins (Small): 1, Mr. and Mrs. Goddard (Macclesfield) (Section Winner); 2, Mr. and Mrs. Houghton (Southport); 3, J. Cartwright (David Brown). Characins (Large): 1 and 2, Mr. and Mrs. Houghton (Southport); 3, L. Hardy (David Brown). Section D: Corydoras: 1, J. Riley (Castelford); 2, J. Cartwright (David Brown); 3, E. Schindler (David Brown). Loach and Bots: 1, J. Riley (Castelford); 2, D. Stott (Oldham); 3, T. J. Kelly (Independent). A.O.V. Catfish: 1, Mr. Hollingworth (Sherwood); 2, Mr. and Mrs. Goddard (Macclesfield); 3, D. Stott (Oldham). (Section Winner); 1, J. Riley (Castelford). Section E: Shark and Flying Fox: 1, J. Shackleton (Halifax) (Section Winner); 2, K. Hill (Huddersfield); 3, Mr. Senior (Huddersfield). Section F: Barbs (small): 1, Mr. and Mrs. Houghton (Southport); 2, M. Wood (David Brown); 3, A. G. Copp (David Brown). Barbs (large): 1, Mr. and Mrs. Houghton (Southport); 2, K. Hill (Huddersfield); 3, Mr. Swales (Halifax). (Section Winner); Mr. and Mrs. Houghton (Southport). Section G: Rainbow: 1, Miss Goddard (Macclesfield); 2, Mr. and Mrs. Houghton (Southport); 3, Mr. Wilkinson (Halifax). Toothcarps: 1 and 2, Mr. Chadwick (Castelford) (Section Winner); 3, J. Sykes (David Brown). Danio and Minnow: 1, Mr. and Mrs. Houghton (Southport); 2, R. S. Cherryholme (Barnsley). Section H: Angels: 1 and 2, Mr. and Mrs. Chadwick (Castelford); 3, A. Harris (Barnsley). Dwarf Cichlids: 1, J. Riley (Castelford). Rift Valley Cichlids: 1, R. Gillies (Sherwood) (Section Winner); 2, S. Moorhouse (David Brown); 3, Mr. Brown (Halifax). A.O.V. Cichlid: 1 and 3, R. S. Cherryholme (Barnsley); 2, R. Gillies (Sherwood). Section I: A.O.V. Tropical: 1, M. McGlynn (Huddersfield) (Section Winner). Section J: Pairs (Livebearers): 1, Mr. and Mrs. Houghton (Southport); 2, D. Stott (Oldham); 3, Mr. and Mrs. Goddard (Macclesfield). Pairs (Egg-layers): 1, Mr. and Mrs. Houghton (Southport); 2, P. Wickham (Sheffield); 3, R. S. Cherryholme (Barnsley). (Section Winner); Mr. and Mrs. Houghton (Southport). Section K: Breeders (Livebearers): 1 and 2, Mr. and Mrs. Goddard (Macclesfield) (Section Winner); 3, D. Harrop (Huddersfield). Breeders (Egg-layers): 1, J. Shackleton (Halifax); 2, D. Harrop (Huddersfield); 3, Mr. Brown (Halifax). Section L: Fancy Goldfish: 1, Mr. Wilkinson (Halifax); 2 and 3, Mr. Sykes (Leicester). A.O.V. Goldwater: 1, Mr. and Mrs. Houghton (Southport) (Section Winner); 2 and 3, Mr. Wilkinson (Halifax). Section M: Juniors (A.V. Single Fish): 1 and 3, Miss Goddard (Macclesfield) (Section Winner); 2, A. J. Copp (David Brown). Best in Show: Mr. and Mrs. Houghton (Southport).

Best exhibit by a David Brown A.S. Member: S. Moorhouse.

THERE were the usual two general meetings in October for the Portsmouth A.S. The first one featured an excellent talk conducted by Cyril Brown who illustrated it with slides. The subject was egg-laying toothcarps and the new members were really impressed with the brilliant colours displayed by a number of the species.

J. Bundell was the speaker for the second meeting. He entertained the members with a very interesting talk on goldfish. There was also a table showing that evening, the classes being goldfish, Bristol shubunkins and London shubunkins. The judge was V. Hunt, and the results were as follows: Goldfish: 1 and 4, E. Binstead; 2, J. Bundell; 3, B. Townsend. Bristol Shubunkins: 1 and 3, E. Binstead; 2, J. Bundell. London Shubunkins: 1, E. Binstead. Best Fish in Show: E. Binstead with a goldfish.

THE Longridge and District A.S. played host to the "Big Six" Show League at their October meeting and showed that despite being a fairly new Society their members have taken to showing well, scoring 23 points out of the seven classes to maintain their position at the top of the league.

The Best Fish in Show award went to Mr. and Mrs. Ham of Lytham. Results: A.O.V. Livebearers: 1, 2 and 3, Mr. and Mrs. B. Durham (Longridge). Angel Fish: 1, D. Hughes (Longridge); 2, Master P. Durham (Longridge); 3, D. Schofield (Blackpool). Siamese Fighting Fish: 1, Mr. and Mrs. P. Ham (Lytham); 2, N. Wallbank (Loyre); 3, R. Clint (Longridge). Fancy Goldfish: 1 and 2, Mr. and Mrs. Halroyd (Morecambe Bay); 3, Janet Bradley (Blackpool). A.O.V. Goldwater Fish: 1, 2 and 3, Mr. and Mrs. B. Durham (Longridge). Junior Egg-layers: 1, W. Booker (Morecambe Bay); 2, Andrew Smith (Blackpool); 3, S. L. Wilkinson (Lytham). Junior Livebearers: 1, P. Durham (Longridge); 2, C. Parkinson (Longridge); 3, S. L. Wilkinson (Lytham). Overall: 1, Longridge 23; 2, Lytham and Morecambe Bay 8; 4, Blackpool 4; 5, Loyre 2; 6, Leyland 0.

THIS year Raynes Park, Wimbledon, was chosen as the venue for the Goldfish Society of Great Britain annual open show. A near record number of entries were received, with a record number of fish being put up for auction. Judging started at 2 p.m., and 15 minutes later A. Lawman started showing films on fish disease. The two films proved very popular with discussions following each film. Despite the rainy weather a record number of people from all over the British Isles attended the show. Two visitors, both members, in particular deserve a mention, one being from Germany, a Mr. Weidmann, and the other from America, a Mr. D. Linnemeyer, who is chairman of the Goldfish Society of America. Results were as follows:—Bristol Shubunkins: 1, R. Whittington; 2, T. A. Ball; 3, H. J. Whiting; 4, W. C. Cook. Globe Eye: 1, 2 and 3, J. A. Stanton; 4, H. G. Berger. Bramble heads: 1 and 2, R. Whittington; 3, J. E. Parker; 4, G. King. Veiltails: 1, W. C. Cook; 2, D. E. Mills; 3, J. Linsale; 4, A. Green. Pearl Scales: 1, Pam Whittington; 2 and 4, A. Lassar; 3, J. Pollard. Celestial: 1 and 2, B. A. Dibley. Pom Pom: 1 and 2, J. E. Parker; 3 and 4, H. G. Berger. London Shubunkins: 1, 2, 3 and 4, Pam Whittington. Oranda: 1, 2 and 3, J. E. Parker; 4, F. Hilton. Common Goldfish: 1 and 2, D. J. McKay; 3, F. Hilton; 4, S. J. Herring. Bubble Eyes: 1 and 3, K. Speaks; 2 and 4, H. G. Berger. Matched Pairs, Bristol Shubunkins: 1, B. Cook; 2, H. J. Whiting; 3, V. Cole; 4, L. Roberts. Fan Tail: 1, J. Kingsland; 2, K. Speaks; 3, J. Pollard; 4, C. Summers. Broad Tail Moor: 1 and 2, J. Kingsland. Comet: 1 and 3, P. Stevens; 2, D. J. McKay. Novice Class: 1, B. A. Dibley; 2, A. Barnett; 3, D. Eastwood; 4, T. Longstaff. Breeders Classes: Bristol Shubunkins: 1 and 2, V. Cole; 3, J. R. Amos; 4, R. Whittington. Pearl Scales: 1, 2, 3 and 4, A. Lassar. Pom Pom: 1, 2, 3 and 4, J. E. Parker. Veil tail: 1, 2 and 4, B. Cook; 3, D. E. Mills. Bramble Head: 1, J. E. Parker; 2, 3 and 4, J. H. McNamara. Bubble Eyes: 1, D. E. Mills. London Shubunkins: 1, 2, 3 and 4, Pam Whittington. Fan Tail: 1 and 2, C. Summers. Comet: 1 and 2, P. Stevens. Oranda: 1, 2 and 3, A. Lawman; 4, I. Youngman. Broad Tail Moor: 1, 2 and 3, J. Kingsland.

MISSING TROPHIES

READERS are requested to check to see if they have any Southend Leigh & District A.S. perpetual trophies which they may have won at this society's 1975 or 1976 open shows as a few are missing. These should be returned to A. Smith, 39 Willow Walk, Hadleigh, Essex SS7 2RW.

NEW SOCIETIES

New club forming in the Paddington District. Anybody interested, please ring 262 4219 daytime or 727 7481 evenings.

A new society for Norwich. A club under the name of the Thorpe & District A.S. will be formed in January 1978. Family and junior membership welcome. Many interesting lectures already planned. Meetings to be held on the first Wednesday of each month at the Carvy Public House, Hearnear Estate, Norwich at 8 p.m. Further details from Mr. Kevin Appleton, 57 Belmore Road, Thorpe-St-Andrew. Tel: Norwich 32194.

SECRETARY CHANGES

Blackburn Aquarist Waterlife Society: J. Oldcorn, Highridge, 4 Mollington Road, Blackburn, BB2 6EG.
Yeovil and District A.S. P. L. M. Johnson, Deodar, 20 Plantagenet Chase, Yeovil, Somerset.

AQUARIST CALENDAR 1978

12th February: Sheaf Valley A.S. Open Show at the Dorman Twist Drill Canteen, Cemetery Road, Sheffield. Booking in 12 p.m. to 2 p.m. Schedules from Mr. B. Moore, 57 Nicholson Road, Sheffield S8 9SL. Tel: 662382.

12th March: Worktop Aquarist & Z.S. Open Show to be held at the Lady Margaret Hall, Holbeck, Nr. Worktop, Leeds.

23rd April: Leigh A.S. Open Show at Leigh C. E. High School, Leigh Rd, Leigh, Lancs. Details from: J. Gonsalves, 52 Penine Grove, Leigh, Lancs. WN7 5HU. Tel: Leigh 679994.

20th May: Southern Leigh & District A.S. The next open show will be held at St. Clements Hall, Leigh-on-Sea. Further details in due course.

23rd July: Gosport & District A.S. Annual Open Show.

30th July: Dorchester T.F.S. First Open Show. Details to follow later.

17th September: Whitty & D.A.S. Third Annual Open Show will be held at the 'Spa Pavilion,' Whitty. Schedules will be available at a later date from the Show Secretary.

24th September: Midlands Aquatic Study Group Open Show at the Cannock Community Centre, Avon Road, Cannock, Staffs. 37 classes. Judging to FRAS standards. Schedules available May from I. Fuller, 38 Cambrian Lane, Rugeley, Staffs WS15 2XJ. Please enclose s.a.c.

CHAMPION OF CHAMPIONS

Competition Results



1st
Mr. & Mrs. Gough
P. Clarius
Wynnstay

2nd
J. K. Alder
Mylosoma Argenteus
Hartlepool

3rd
S. Wolstenholme
A. Rostratus
Heywood

RESULTS OF OTHER FESTIVAL COMPETITIONS

Society Tropical Furnished: 1, Northumbrian, 77 pts.; 2, Halifax, 74 pts.; 3, Northwich, 69 pts. Society Coldwater Furnished: 1, Halifax, 72 pts.; 2, Bury, 70 pts.; 3, Northwich, 62 pts. Individual Tropical Furnished: 1, E. Snaith (Northumbria), 73 pts.; 2, D. Fryer (Halifax), 62 pts.; 3, J. Shackleton (Halifax), 61 pts. Individual Coldwater Furnished: 1, D. Shields (Halifax), 70 pts.; 2, D. Thorne (Northwich), 64 pts. Aquascapes: 1, H. Haslam (Belle Vue), 70 pts.; 2, K. Paine (Basingstoke), 63 pts.; 3, H. Penhall (Osram), 60 pts. Novelty Aquascapes: 1, A. Beasley (Bury), 72 pts.; 2, E. Seymour (Merseyside), 62 pts.; 3, E. Seymour (Merseyside), 54 pts. Common Goldfish and Comet: 1, B. Rothwell (N.G.P.S.), 76 pts.; 2, B. Rothwell (N.G.P.S.), 73 pts.; 3, E. Seymour (Merseyside), 71 pts. Shubunkins Bristol London: 1, B. Rothwell (N.G.P.S.), 74 pts.; 2, B. Rothwell (N.G.P.S.), 73 pts.; 3, P. Hewitt (Osram), 72 pts. Moors: 1, S. Foote (Accrington), 69 pts.; 2, S. Canavan (Merseyside), 66 pts.; 3, S. Foote (Accrington), 65 pts. Veiltails: 1, C. Waubank (Accrington), 68 pts.; 2, F. Foote (Accrington), 67 pts.; 3, P. Johnson (N.G.P.S.), 63 pts. A.O.V. Fancy Goldfish: 1, H. Penhall (Osram), 72 pts.; 2, P. Johnson (N.G.P.S.), 71 pts.; 3, P. Johnson (N.G.P.S.), 69 pts. A.O.C. Coldwater: 1, Mr. and Mrs. R. Houghton (Southport), 68 pts.; 2, H. Penhall (Osram), 67 pts.; 3, J. Buckley (Northwich), 66 pts. Guppy (Single): T. Faux (Merseyside), 65 pts.; 2, R. Neworthy (Northumbria), 61 pts.; 3, Mr. and Mrs. Darby (West Midlands), 54 pts. Guppy (Pairs): 1, J. Nimmo (Lanarkshire), 55 pts. A.O.V. Livebearer (Single): 1, K. Corbett (Merseyside), 69 pts.; 2, R. Paine (Basingstoke), 68 pts.; 3, D. Shields (Halifax), 66 pts. A.O.V. Livebearer (Pairs): 1, W. Edwards (Bridgewater), 66 pts.; 2, S. Jones (Basingstoke), 65 pts.; 3, L. Thorne (Northwich), 63 pts. Angel (Single): 1, R. Neworthy (Northumbria), 65 pts.; 2, T. Davies (Heywood), 64 pts.; 3, Mr. and Mrs. Blades (Bassettlaw), 62 pts. Dwarf Cichlids (Single): 1, Mr. and Mrs. Blades (Bassettlaw), 72 pts.; 2, C. Carrick (Castleford), 68 pts.; 3, A. Bebbington (Northumbria), 62 pts. Dwarf Cichlid (Pairs): 1, G. and C. Berry (Blackburn), 68 pts.; 2, P. Barry (Bassettlaw), 61 pts.; 3, L. Thorne (Northwich), 55 pts. A.O.V. Cichlids (Single): 1, R. Atherton (Northumbria), 76 pts.; 2, D. Mason (Bridgewater), 68 pts.; 3, I. Fuller (West Midlands), 67 pts. A.O.V. Cichlids (Pairs): 1, S. Wolstenholme (Heywood), 65 pts.; 2, C. West (Dewsbury), 56 pts.; 3, A. Reid (Lanarkshire), 52 pts. Fighters (Single): 1, Mr. and Mrs. Scott (Bassettlaw), 68 pts.; 2, Mr. and Mrs. Scott (Bassettlaw), 61 pts.; 3, J. Robertson & Son (Northumbria), 54 pts. A.O.V. Gouramis and Paradise (Single): 1, J. Tabberer (Merseyside), 82 pts.; 2, Mr. and Mrs. Iddon (Sandgrounders), 71 pts.; 3, N. Fielding (Glossop), 70 pts. A.O.V. Gouramis Paradise (Pairs): 1, Mr. and Mrs. Baldwin (Sandgrounders), 76 pts.; 2, N. Davison (Northumbria), 70 pts.; 3, M. Price (Castleford), 69 pts. A.V. Barbs (Single): 1, S. Harper (York), 72 pts.; 2, N. Stevenson (Osram), 71 pts.; 3, C. Dann (Bridgewater), 69 pts. A.V. Barbs (Pairs): 1, Mr. and Mrs. Blades (Bassettlaw), 73 pts.; 2, R. O'Connell (Osram), 65 pts.; 3, J. Buckley (Northwich),

57 pts. A.V. Characins (Single): 1, C. Carrick (Castleford), 76 pts.; 2, C. Carrick (Castleford), 73 pts.; 3, M. Price (Castleford), 70 pts. A.V. Characins (Pairs): 1, T. Wheelwright (Halifax), 66 pts.; 2, Mr. and Mrs. Scott (Bassettlaw), 64 pts.; 3, E. Williams (Lanarkshire), 54 pts. A.V. Catfish (Single): 1, J. Robertson & Son (Northumbria), 81 pts.; 2, J. Nimmo (Lanarkshire), 78 pts.; 3, J. Nimmo (Lanarkshire), 74 pts. A.V. Catfish (Pairs): 1, A. Blake (Basingstoke), 77 pts.; 2, C. Carrick (Castleford), 72 pts.; 3, J. Price (Belle Vue), 69 pts. Carps-Minnows (Single): 1, H. Baser (Merseyside), 69 pts.; 2, R. Tomkinson (Glossop), 68 pts.; 3, Mr. and Mrs. Hopwood (Blackburn), 65 pts. Carps-Minnows (Pairs): 1, B. Rowley (Bury), 73 pts.; 2, Mr. and Mrs. Blades (Bassettlaw), 72 pts.; 3, G. Horrocks (Osram), 59 pts. A.V. Characins (Pairs): 1, T. Wheelwright (Halifax), 66 pts.; 2, Mr. and Mrs. Scott (Bassettlaw), 64 pts.; 3, E. Williams (Lanarkshire), 54 pts. Egg-Laying Toothcarps (Single): 1, J. Holt (Bury), 70 pts.; 2, Mr. and Mrs. Blades (Bassettlaw), 67 pts.; 3, A. Beasley (Bury), 61 pts. Egg-Laying Toothcarps (Pairs): 1, Mr. and Mrs. Blades (Bassettlaw), 61 pts.; 2, A. Beasley (Bury), 52 pts.; 3, A.V. Losch (Single Fish): S. Wolstenholme (Heywood), 75 pts.; 2, R. Tomkinson (Glossop), 70 pts.; 3, J. Bennett (Lanarkshire), 68 pts. A.O.V. (Single Fish): 1, Mr. and Mrs. Walsh (Blackburn), 74 pts.; 2, Mr. and Mrs. Bond (Southport), 69 pts.; 3, T. Horrocks (Osram), 66 pts. Breeders Egg-layers (Points 16-20): 1, Mr. and Mrs. Copley (Doncaster), 81 pts.; 2, J. Price (Belle Vue), 78 pts. Breeders Egg-layers (Points 11-15): 1, Mr. and Mrs. Blades (Bassettlaw), 75 pts.; 2, M. Strange (Basingstoke), 73 pts.; 3, A. Buckley (Bury), 68 pts. Breeders Egg-layers (Points 6-10): 1, R. Standen (Blackburn), 72 pts.; 2, Mrs. B. Sullywell (Sandgrounders), 68 pts.; 3, A. Bebbington (Northumbria), 67 pts. Breeders Egg-layers (Points 0-5): 1, Mr. and Mrs. Blades (Bassettlaw), 63 pts.; 2, Mr. and Mrs. Gough (Wynnstay), 62 pts.; 3, S. Wolstenholme (Heywood), 60 pts. Breeders Livebearers (Points 1-10): 1, M. Strange (Basingstoke), 64 pts.; 2, M. Strange (Basingstoke), 63 pts.; 3, J. Robertson & Son (Northumbria), 60 pts. Breeders Livebearers (Points 11-20): 1, M. Strange (Basingstoke), 69 pts. Breeders (Coldwater): 1, B. Rothwell (N.G.P.S.), 2, B. Rothwell (N.G.P.S.), 3, B. Howarth (N.G.P.S.). Plants: 1, A. Beasley (Bury), 73 pts.; 2, R. Neworthy (Northumbria), 71 pts.; 3, A. Beasley (Bury), 68 pts. Marine Fish (Single): 1, K. Miller (Heywood), 66 pts.; 2, Mr. and Mrs. M. Darby (West Midlands), 55 pts.; 3, K. Miller (Heywood), 52 pts. Best Fish in Show: J. Tabberer (Merseyside), 82 pts. Best Tropical Fish: J. Tabberer (Merseyside), 82 pts. Best Coldwater Fish: B. Rothwell (N.G.P.S.), 76 pts. Best Pair of Fish: A. Blake (Basingstoke), 77 pts. Best other than Best in Show: Tropical Egg-layer: J. Robertson & Son (Northumbria). Tropical Livebearer: K. Corbett (Merseyside). Cold Water: B. Rothwell (N.G.P.S.). Most Attractive Stand: 1, (Yorks Dist. A.S.), 2, (West Midlands A.S.G.), 3, (Castleford), 4, (Southport). Individual Exhibitor with Most Awards: Mr. and Mrs. Blades (Bassettlaw). Exhibitor with Most Cards Breeders Section: M. Strange (Basingstoke).