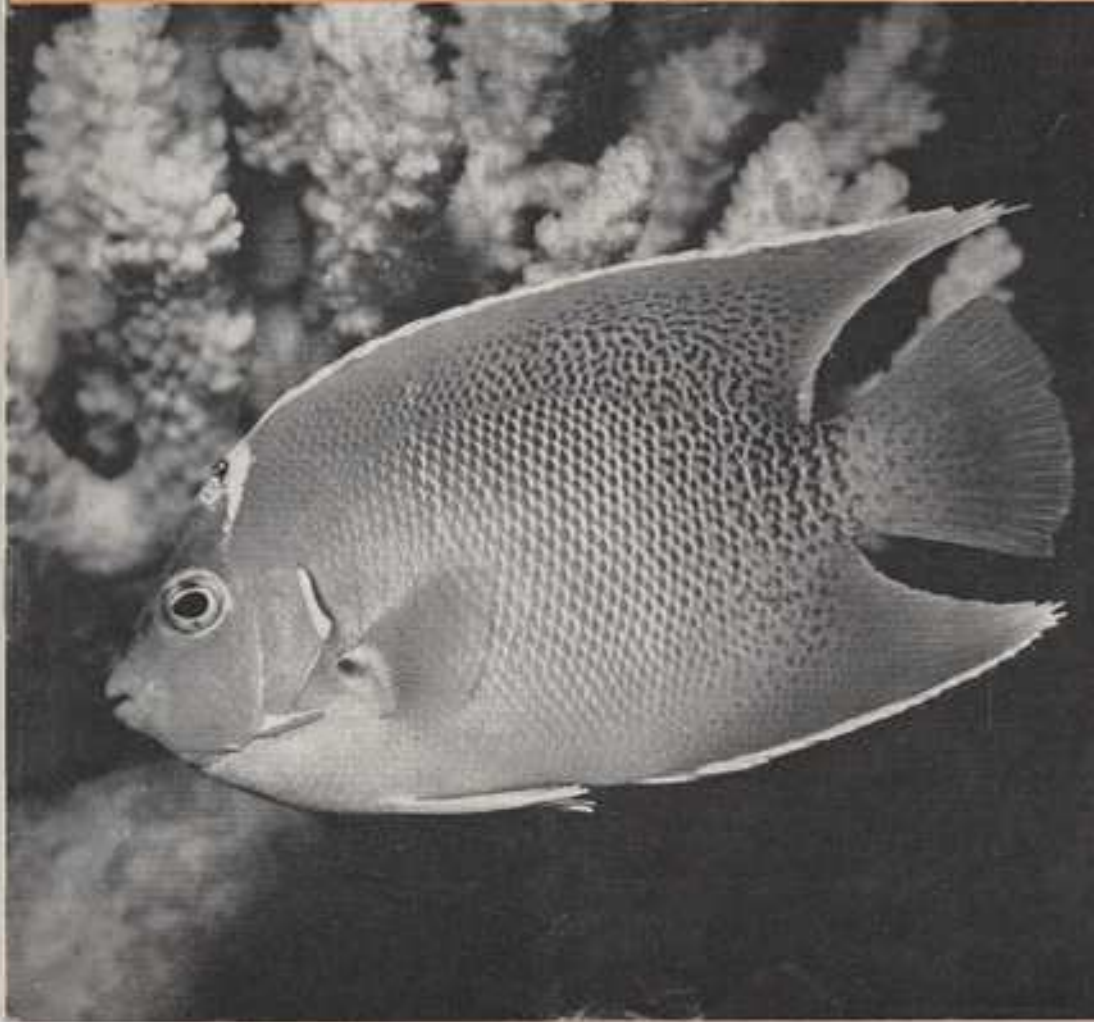


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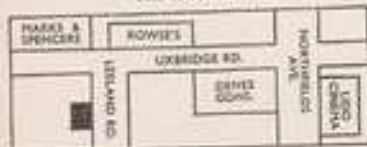
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Private life of the stickleback

by Terry Jennings

FEW people spare a second glance for the teeming hordes of sticklebacks that throng almost every stretch of unpolluted water. Nevertheless, these tiny fish that were until recently the monopoly of the small boy fishing with a bent pin, are on the way to becoming famous laboratory animals. No other species of fish has had its private life so much probed in an effort to understand the mysteries of the animal mind.

To zoologists working at several European universities, notably Oxford, Leyden and Groningen, sticklebacks are as indispensable as white rats are to many American psychologists. They have the advantage in that they can be hauled in large numbers out of almost every ditch, they are tame and hardy, and small enough to thrive in a tank little bigger than the average sized bucket. Furthermore, their sex life is a complicated pattern of purely instinctive and automatic reactions, which can be observed and manipulated almost at will.

In nature sticklebacks mate in early spring, when the water is shallow and fresh. The mating cycle follows an unvarying ritual. It begins when each male leaves the shoal and stakes out a territory for himself from which, according to the principle "my home is my castle," he drives out any intruder, male or female.

Then, at the bottom of his watery home, he digs a shallow pit carrying the sand away mouthful by mouthful. When this depression is about two inches square, the stickleback piles in a heap of weeds, coats it with a sticky secretion from his kidneys and shapes the weedy material into a mound with his snout. By diligently wriggling, rather like a fat competitor struggling through a barrel in an obstacle race, he bores a hole right through the mound. This tunnel, slightly shorter than an adult fish, is the nest.

Having finished the nest, the male stickleback suddenly changes colour. His normally inconspicuous grey colouring had already begun to show a faint pink blush on the chin and a greenish gloss on the back and in the eyes. Now the pink becomes a glowing red that makes the sides of the fish glassy and transparent to look at. The back

turns to an iridescent blue-green whose colour and brilliance can only be compared with the illuminating power of a neon sign, while the eyes become a bright emerald green. In this colourful spring costume the male stickleback patrols his territory, warding off rivals whilst he seeks a wife.

The females, in the meantime, have also become ready

For a day or two after the young sticklebacks emerge the father keeps the brood together, pursuing each straggler and bringing it back in his mouth. But soon the young fish become independent and associate with the young of other broods, sometimes forming quite large shoals.

This quite complicated pattern of activities, repeated year after year, is the stickleback's reproductive life but,



A three-spined male stickleback swimming over nest and fanning fins to aerate the eggs

to mate; their bodies have grown large and swollen with fifty to a hundred eggs. Whenever a female, by chance or design, enters a male's territory, he swims towards her in a graceful series of zig-zags, first darting sideways away from her, then moving quickly towards her. This ritual continues until the newcomer takes notice and demonstrates her interest by swimming towards her suitor with a curious head-up posture. He then turns and notices the lady towards the nest by means of a love-play that resembles, in its delicate grace, a minuet. At the nest the male makes a series of rapid thrusts with his snout into the entrance. He turns on his side as he does so and raises his dorsal spines towards his mate. Thereupon she obligingly enters the nest and rests there, her head sticking out from one end and her tail from the other. The male now prods her tail base in a rather undignified way and this stimulates her to lay her glass-clear eggs. As soon as she is relieved of her burden, the female stickleback slips out of the nest. Her mate then glides in quickly to fertilize the clutch before going off to look for another partner.

When three, four or even five females have obliged by laying their eggs, the male stickleback's mating impulses subside, his colour darkens and he becomes increasingly hostile to females. Now he guards the nest from predators and fans water over the eggs with his breast fins to enrich their supply of oxygen and help them to hatch. If the oxygen content of the water is artificially lowered, the fish senses this and responds by increasing the rate of fanning.

As was mentioned earlier, it is all so mechanical that it can be manipulated at will. To begin with, it has been found that, like the proverbial red rag to the bull, it is the red colour of the intruder's breast which provokes one male stickleback into attacking another. A male stickleback will vigorously assault quite crude models of fish suspended in the water as long as these have a patch of red painted on their undersides. Dr. Niko Tinbergen, who lectures in animal behaviour at the University of Oxford, describes how even a red mail van passing the laboratory windows at a distance of 100 yards, would make all his male sticklebacks charge the glass sides of their tanks in that direction.

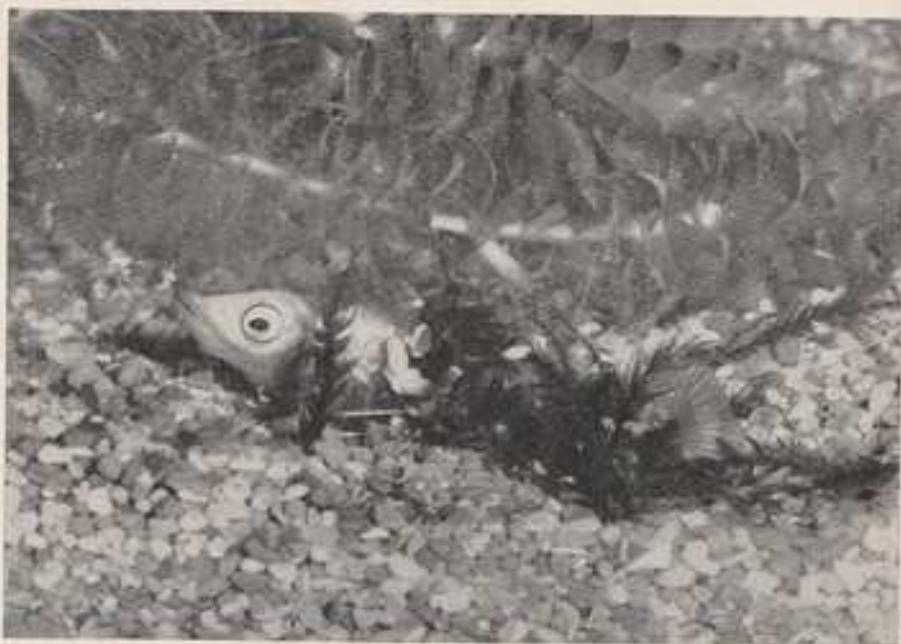
The courting behaviour of a male stickleback before a pregnant female is also dependent on at least two quite simple stimuli: the swollen abdomen of the female and the special posturing movements she makes when attracted. Male sticklebacks will court with wild ecstasy quite ridiculously unfish-like dummies provided they have a swollen abdomen, while ignoring a female stickleback which has a normal belly.

The pregnant female, for her part, will follow a red model of a fish wherever it leads; she will even make frantic efforts to enter a non-existent nest whenever the model is poked into the sand. Once she is in a real nest, she can be induced to spawn simply by prodding the base of her tail with a blunt pencil.

Such instinctive drives are only the elementary forces of the stickleback's behaviour. It is the interaction between

THE AQUARIST

Three-spined male stickleback inside nest with head and tail only visible



these drives, giving rise to conflicts, that shapes the animal's actual behaviour and Dr. Tinbergen and his colleagues have devoted a great deal of research to this subject.

When the fighting behaviour of sticklebacks was studied it was noticed that the belligerent males spent little time in actual fighting. The fighting inclinations of one of these fish, at any given moment, are in direct proportion to his proximity to his nest. At the nest itself he is a raging fury and with a fine contempt of death will recklessly ram the strongest opponent or even the fingers of an inquisitive human hand. The further the fish strays from his home, the more his courage wanes.

When two male sticklebacks meet face to face, veritable orgies of mutual self-glorification take place but it is always possible to predict with a high degree of certainty how the fight will end.

In the immediate neighbourhood of his nest, even the smallest male will defeat the largest one. The vanquished fish invariably flees homeward and the victor, carried away by his success, chases the other furiously far into his domain. The further the victor goes from home, the more his courage ebbs, while that of the vanquished rises in proportion. Arrived at the precincts of his nest, a new battle begins which ends with certainty in the defeat of the former victor.

The pursuit is repeated a few times, swinging to and fro like a pendulum which at last reaches a state of equilibrium at a certain point. This point marks the border of their

territories and here the two fish hesitate to attack. Taking on a peculiar threatening attitude, they incessantly stand on their heads and begin digging at the bottom as if they were starting to build a nest. What is happening is that each stickleback not quite daring to attack, finds an outlet for its tension in nest digging. This type of phenomenon, in which an animal finds a release for its pent-up energies in an irrelevant action, is what the psychologist would call a "displacement activity".

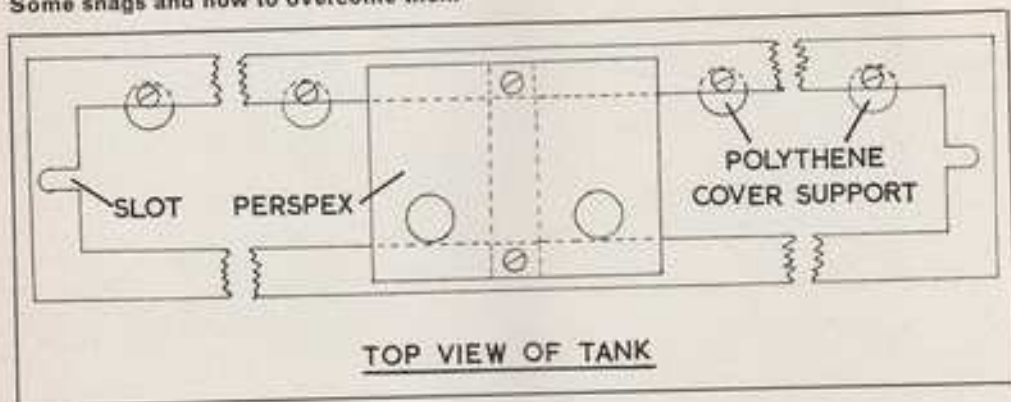
Examples of such displacement activity are not hard to find in other animals. Fighting starlings will preen themselves between bouts; in the middle of a fight farmyard roosters peck the ground as though feeding, while some wading birds put their heads under their wings and act as if asleep. Even a man, in situations of stress, conflict or embarrassment, will scratch himself behind the ear.

The behaviour of the stickleback is rigid and almost automatic, as is the behaviour of most members of the animal kingdom. Humans, and mammals in general, are in many ways a rather exceptional group specialising in "plastic" behaviour, but even this "plastic" behaviour is built up on a foundation of instincts. It is quite probable that study of the insignificant little stickleback will be able to throw light on human conflict and the nature of neuroses. The part played by hostility in the stickleback's courtship may also have a direct bearing on our understanding of human sex life.

A luxury community tank

by Ralph C. Taylor, C.Eng., M.I.E.E.

Some snags and how to overcome them



WHEN I decided to set up a community tank with soft acid water the inevitable question was "where?". All obvious locations were already occupied by tanks or immovable domestic fittings. The idea of a long narrow tank over a fireplace was proposed to my wife who agreed surprisingly readily. The fireplace is not used now because of central heating so overheating of the tank will not occur. Even if the fire were used I think that a half-inch slab of expanded polystyrene behind and under the tank would prevent undue heat cycling in any case many fish are healthier with a daily temperature change.

Having decided on a location, the dimensions were more or less fixed, the length by the chimney breast, the width by the practical problem of supporting a tank more than about 6 in. from the wall. The depth was fixed at 15 in. which I like. Thus the size became 63 in. long x 6 in. wide x 15 in. deep. I ordered a frame of this size in 1 in. x 1 in. angle with an aluminium hood. On reflection I should have used 1½ in. x ½ in. angle. I specified that there should be a flat strip from top to bottom at the back and across the centre of the bottom. No doubt trying to be helpful the maker also welded a trip across the top at the centre. This I had to saw out to get the glass in so I installed the bolted tie which I had intended to fit. I examined the tank for smoothness of welds, squareness of angles and straightness of the angle iron.

Because of the centre tie the hood had been supplied in two parts which I had to join together with pop rivets and Araldite as I had decided to use a 5 ft. fluorescent tube. Opinions are divided on the use of fluorescent tubes;

however I have eight tanks thus lit, both community and breeding, and the fish seem to do as well as in those lit by normal bulbs. There remains the risk of poisoning the fish if the tube is broken—you pay your money and take your choice. With a long narrow hood such as this, normal bulbs would have to be fitted in the top and as four or five would be needed, the wiring could look unsightly.

To support the tank was a problem. The mantle shelf was an unknown quantity, so as the tank would weigh nearly 2½ cwt. I had two gablet shaped brackets made in 1 in. x 1 in. x ½ in. angle iron, the top was 6½ in. to allow for foam polystyrene insulation behind the tank, the vertical member was 12 in. Fixing to the wall was by ½ in. Rawbolts, as near the top of the bracket as possible. The ½ in. clearance over the mantle shelf was filled with polystyrene insulation except for a supporting block in the centre which was fixed mainly to satisfy my next door neighbour—also an aquarist. Two trailing plants serve to hide the heavy engineering of the brackets.

Up to this point a tank frame has been bought and mounting arranged; we have now to consider painting, glazing, wiring, filtration, setting up and stocking.

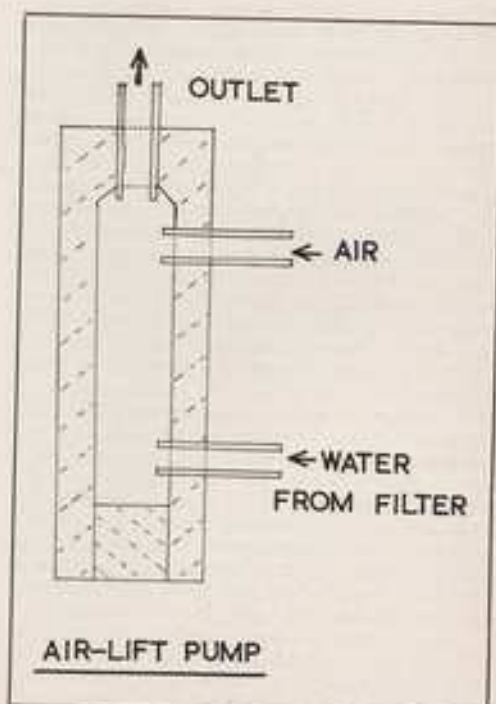
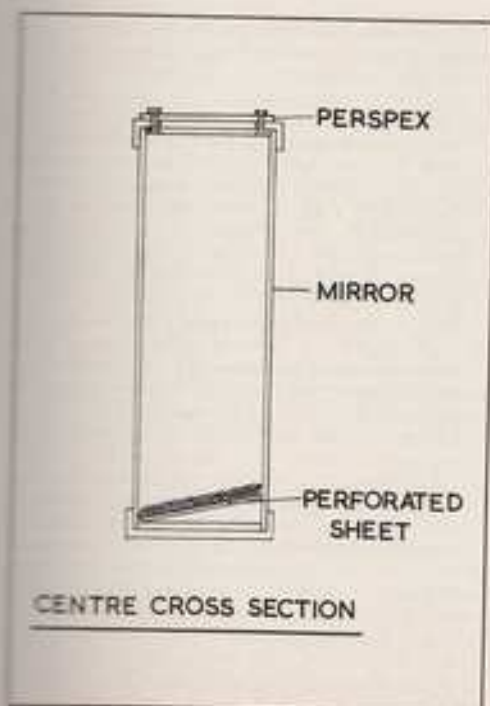
The frame as supplied was "rustproofed". This consisted of a zinc-bearing paint. Paint of this type and galvanizing are effective in protecting against rust only by being sacrificial, there is therefore the distinct possibility of zinc compounds getting into the water. Rust on the other hand, whilst unsightly, does not injure fish. Thus even though the frame was "rustproofed" I took just as much care with painting as if it had been plain

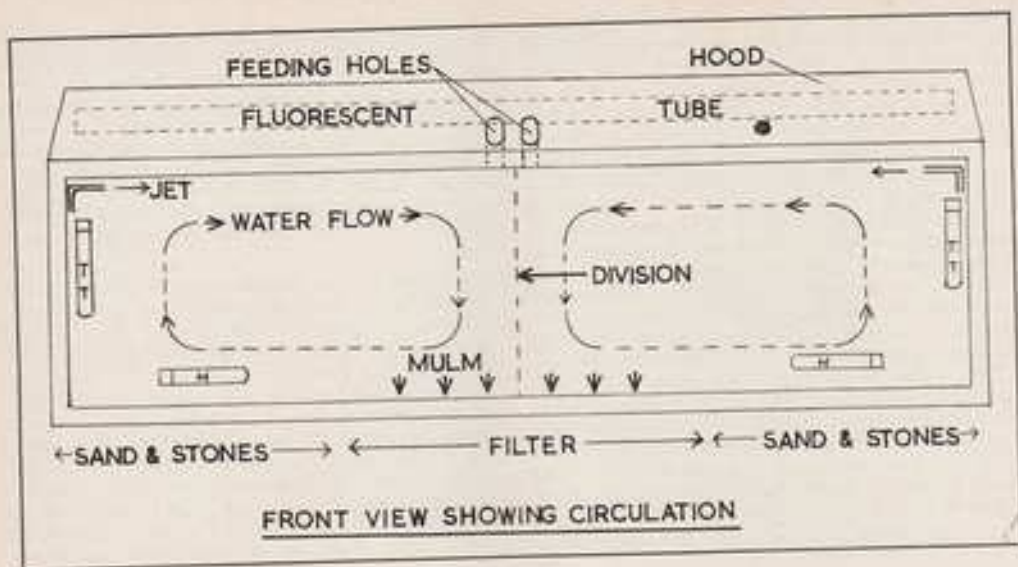
used. I applied primer and two coats of gloss paint before glazing. I also applied one coat of gold size to the inside of the frame only. However, I am getting ahead of myself. Before painting it is desirable to cut the glass as trial fitting will damage the paint and also before painting there are a few more points to consider.

I am of the opinion that a cover glass is essential and on this tank I did not want to have to move the hood or cover glasses to feed or top-up the tank. The simplest solution seemed to be to fit a piece of $\frac{1}{4}$ in. perspex, 5 in. \times 4 in., centrally on top of the tank, two 1 in. diameter holes being cut to take 1 in. polythene feeding tubes. Two holes are used to permit the tank to be divided in half, should this be desired, one hole then serves each side. To permit the back and front glasses to enter this shape of frame it is necessary to cut a nick in the top end members. These remain to carry cables and pipes so the cover glasses are rectangular. Small polythene blocks are fitted to the undersurface of the back top members of the frame and these are held by 4 BA plated screws countersunk into the frame and tapped into the polythene. The cover glasses rest on the blocks at the back and on top of the front of the frame so slope backwards $\frac{1}{4}$ in. in 4 $\frac{1}{2}$ in. I always remove the sharp edges from glass; this is

easily done by placing a sheet of medium emery cloth on a flat surface. The glass is placed on it, leaning at about 30 degrees from the vertical towards you. It is then drawn across the emery cloth, perpendicular to the plane of the glass, using only the weight of the glass. Three or four strokes are usually enough to remove dangerous edges which also cut paint. This is known as "arrising". To give further protection to the paint on the frame I covered the edges of the cover glasses with $\frac{1}{4}$ in. P.V.C. adhesive tape, taking great care not to stretch it during application.

I decided to glaze the tank myself to ensure thorough painting and to avoid the possibility of leaks through handling in transit. I bought the main sheets of $\frac{1}{4}$ in. plate glass ready cut to size but it is quite feasible to cut your own if glass is available. First clear a flat floor and put down several layers of newspaper, place the glass on the newspaper and with a finger dipped in paraffin scribe the line of the cut. Using a new wheel cutter and a solid wooden guide, scribe a line from end to end in one sweep using moderately heavy pressure. If the scrap piece is fairly wide it can easily be broken off by pressing down on the glass with a piece of wooden dowel under the line of the cut; the scribed line is kept on top





of course. Always use several thicknesses of cloth between the hands and the glass. With narrower strap it can be pushed by a strip of wood to distribute the pressure.

When cutting plate glass it is usually better to start a crack by tapping the underside of the glass under the scribed line about 1 in. from the end with the corner of the cutter or similar implement. Once a crack has started, gentle tapping will take it right along the line. Using this technique on plate glass it is fairly easy to take off a strip twice the thickness and a strip equal to the thickness is possible. Smaller amounts must be ground off. Very small amounts can be taken off with emery cloth as mentioned above. Emery wheels can be used with care, patience and goggles. The use of newspaper under the glass gives a useful set of parallel lines for laying-out, while old mirrors from demolished shops provide sources of plate glass.

As the tank we are considering has only 5 in. of water from front to back, I decided to mirror the back sheet of glass to give an appearance of greater depth. Many will disapprove of this. However, I find that once it is slightly "frosted" by signs the object is achieved. The fish already see themselves by reflection from the glass and don't fight themselves more because of the mirror. Mirror making is an interesting pastime. Once an acceptable mirror has been made for the fish it is inevitable that requests will be received for domestic mirrors.

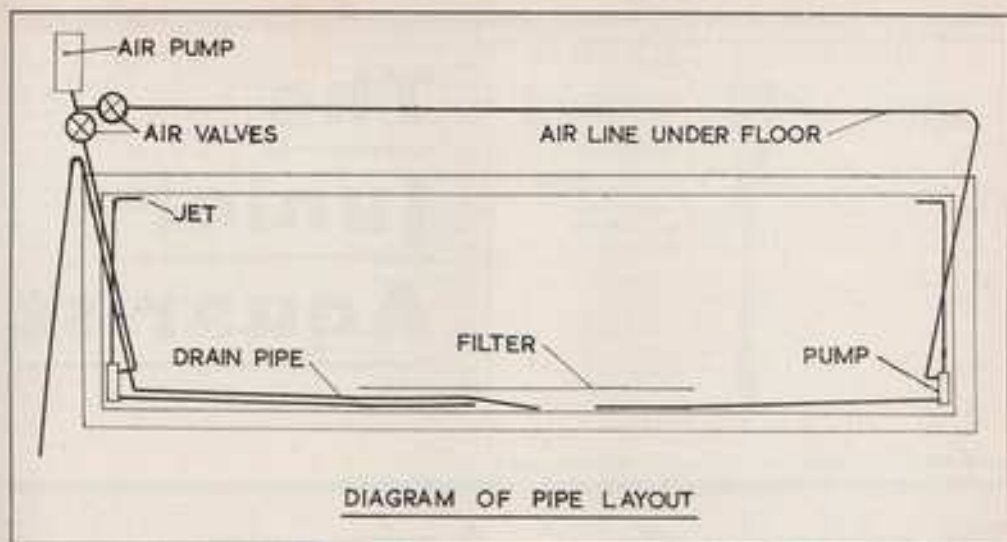
Glazing is best done using one of the advertised products. Ordinary putty will serve but leaks are likely eventually, also aquarium putty is claimed to be non-poisonous, while domestic putty is doubtful in this respect. The

front and back of the tank should be installed first. The angles of the frame are filled with compound, the edges of the glass are smeared with gold size and the glass is pressed into position. Next, fit the ends and finally the bottom. A piece of hardboard the exact width of the bottom glass will be of assistance in deciding how far to push the front and back glasses into the compound. About 1/4 in. thickness of compound should be the objective. Two pounds of putty is usually considered enough for the normal 2 ft. tank. I bought a 14-lb. tin because I expect to use more from time to time. If the putty is pushed well down in the tin and covered with a sheet of polythene it will keep for a long time.

The tank was then carried outside the house and stood on a flat surface on newspaper. Here again I differ from the experts for I use a cloth and dishwashing detergent to clean the greasy finger marks off the glass but take very great care to hose off all the detergent. The tank is then left full of water for a few days to give confidence in the glazing.

While the preceding work has been going forward I was considering aeration, filtering, heating and lighting. I decided to avoid all metals in the tank, normally good practice but particularly so because it was to contain acid peaty water. With this in mind and because of the narrow tank I found it desirable to make my own under gravel filter and air lifts.

In a tank of this shape (63 in. x 15 in. x 5 in. front to back) it is best to consider heating and water circulation as though there was a partition in the centre of the tank. Thus heaters and air-lift pumps are placed near each end.



of the tank causing water to rise at the ends and fall at the centre. I arranged an under gravel filter 18 in. long at the centre of the tank to collect the rubbish deposited by the downwards flow in this area. The air-lift pumps collect their water from under the centre filter. There is also a pipe from under the water filter to the outside of the tank to facilitate the water changing by syphoning. This avoids all chance of loss of small fish.

The air-lift pumps are made from 1 in. polythene rod. A 3 in. length is cut and a $\frac{1}{2}$ in. hole is drilled along the axis leaving about $\frac{1}{2}$ in. undrilled. A $\frac{1}{2}$ in. hole is drilled on the same line right through and this takes the outlet pipe. A second $\frac{1}{2}$ in. hole is drilled in from the side near the top and a third $\frac{1}{2}$ in. hole from the side $\frac{1}{2}$ in. up from the bottom. The second is the air inlet and the third the water inlet from under the filter. I used rigid $\frac{1}{2}$ in. polythene tube which can be formed into fairly sharp bends by heating in a flame. If this is not available the usual flexible P.V.C. can be used alone or with glass tube for sharp bends and the delivery tube which should have a right angle at the top to aim the discharged water towards the centre of the tank. Finally, a polythene or rubber stopper is fitted to the bottom of the pump and it is complete. Glass tube is surprisingly cheap and the cheapest is soft glass suitable for bending using a gas ring. The tube should be passed quickly into and out of the flame for a few seconds to allow it to warm up slowly and then kept in the flame, preferably rotating it, until it softens. After bending anneal by withdrawing slowly upwards from the flame.

The filter was made from punched Tufnol. A suitable

type is Radio Spares "Perforated Sheet, small", which is available from many of the larger radio parts stockists. I used three boards side by side to give an area 5 $\frac{1}{2}$ in. x 20 $\frac{1}{2}$ in. and these I boiled as an insurance. As the tank was about $\frac{1}{2}$ in. narrower than the boards all I had to do was to lean them against the back which gave an angle of about 15 degrees leaving a triangular gap underneath. I blocked up the ends with a few stones.

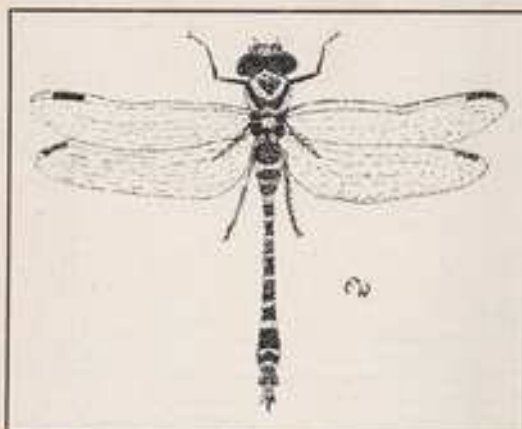
As the tank will not be overstocked I decided that the aeration provided by the pumps would be sufficient.

The tank was now placed in position with $\frac{1}{2}$ in. expanded polystyrene at the back and ends and between the angle brackets underneath.

The heaters, as mentioned previously, are at each end of the tank. To avoid the possibility of boiled fish I fitted twin thermostats on each heater; these are wired in series. I don't like taped joints so I fitted three 2-pin 2-amp sockets above each end of the tank so that each thermostat and heater has a 2-pin plug. I use thermostats with neon indicators and set them all as near as possible to the desired temperature. Inevitably one at each end does all the work, and the one which operates at the slightly higher temperature stays closed (neon off) unless the contacts of the other stick or the water is otherwise over heated. Why don't the manufacturers supply longer cables on heaters and thermostats? Some also use glass tubes which are too thin.

The lighting hood has Terry clips fitted at each end

Continued on page 105



The Junior Aquarist

The golden-ringed dragon-fly

The golden-ringed dragon-fly

by F. Wilmott

THIS dragon-fly is one of the largest in Britain (total body-length 3 to 3½ ins.) and it is on the wing from about mid-June to early September, or sometimes later according to the weather. It is easily recognised by the alternate black and yellow banding along the whole length of its abdomen and both male and female have exactly the same colouring.

The Golden-ringed Dragon-fly is one of the "Hawker" dragon-flies, which are so-called because of their hawk-like ways when hunting their prey. Also this species often patrols a particular "beat" ready to pounce on its victims. The warmth of the sun, however, appears to be necessary to even such a strong species of dragon-fly as this one and if the sun is obscured for any length of time *Corulegaster fulvoviridis* will usually disappear and can sometimes be observed settled on a tree or bush.

The abdomen of this powerful, fast-flying insect is long, slender (in proportion to its wing-area), and cylindrical. The long abdomen of this and some other species, however, allows the insect to lay its eggs on plants below the surface of the water without getting its thorax and wings wet.

As in the case of all dragon-flies, the head and thorax are large compared with the slender abdomen and these factors probably tend to cut down the speed of the insect. But on the other hand its enormous (and efficient) eyes cover a large area of the head and the large thorax is necessary to house the powerful wing muscles. This species often patrols some distance from water and its prey consists of flies, smaller dragon-flies, and occasionally butterflies.

The nymph (or immature form) is coloured brown and lives in both fast-flowing and still water and the length of the body from its head to the tip of its tail appendages is about 1½ ins.

The Golden-ringed Dragon-fly is found in central and in some other parts of Europe as well as in Asia Minor.

A noisy under-water chorus

by M. Lorant

A SOUND like a blast of static from a radio is often heard in the coastal areas of warm seas throughout the world, even when there aren't any radios around. The sound is emitted by tens of thousands of little snapping shrimps, snapping their claws vigorously enough to make a strong, click-like noise.

Shrimps are only one of many animals which make the oceans and seas a noisy place to live, according to Dr. William N. Tavolga, staff research scientist of the American Museum of Natural History who conducted extensive studies on the subject.

Dr. Tavolga observes fish sounds with the aid of a sound spectrograph, an instrument that produces a graph showing all the component frequencies of marine sounds as well as their duration. Invertebrates, like shrimps, produce a clicking or rasping noise with their claws, mandibles, and other parts of their shell-encrusted bodies.

The parrot-like beak of the octopus and the squid makes a rasping noise when they eat and mussels may produce a soft click as the threads of their shells are broken or loosened.

Fishes are more versatile than invertebrates in producing noises. They can make drumming noises and low frequency water disturbances as well as rasps. The drumming noises are produced with the swim bladder, a highly evolved organ equipped with muscles capable of vibrating up to 300 contractions per second. Drumming sounds of short duration repeated rapidly result in a rattling or hammering effect. Other drumming sounds make a long, sustained call like a foghorn. Fishes also make a noise when they swim by displacing water, especially when they abruptly change speed or direction. Some of the most interesting noises are made by Cetaceans, the class of warm-blooded mammals which includes whales, dolphins and porpoises. The toothed-whales (which include dolphins and porpoises) produce a pulse-like

clicking sound that may range well above human hearing but not above cetacean hearing, which exceeds human limits. The clicks come from a special vibrating organ within the complex of air chambers leading to the whales' blowhole. These clicks are primarily intended to locate objects by means of returning echoes. For long-distance reconnaissance, the clicks are produced slowly. As the animal approaches a target, the clicks increase. The rapid clicking results in a noise that sounds like a buzz or a rusty hinge.

Toothed-whales also make a high-pitched whistle or squeal believed to emanate from the larynx. Various whistles have been associated with alarm, fear, and mating.

The large baleen whales without teeth are not known to produce any clicks but they have a variety of sustained cries. Whalers have described the cry of the humpback whale as a moan, a groan, or a moo.

Why are there so many sounds in the sea? According to Dr. Tavolga, in the turbulent seas, sound is the most efficient long-range mechanism for supplying marine animals with the information they need about each other and their environment.

A. ramirezi

by A. Coles (aged 15 years)

Another popular dwarf cichlid

THIS perky little fellow, coming from Venezuela in South America, is famed for its beauty. Its coloration is very hard to describe as with every movement a new glowing colour comes into play. There is little sex difference as both sexes are equally coloured. The male has a redder nose than his mate and his third ray on the dorsal fin is longer. He is usually larger and has finer fin points. As spawning time approaches the belly of the female goes crimson, showing that egg-laying is near.

When spawning, flowerpots and stones should be provided. The water should be soft and aged and can be provided by having a peat bottom; pH 1 don't think matters but extremes should of course be avoided. The tank should be fairly dark without artificial lighting; aeration and plants are not necessities. The pair should be well fed on live food and dried food if they take it.

The parents select a stone or flowerpot and clean a spot where the eggs are to be laid. They spawn in the typical cichlid manner and the female guards the eggs. Sometimes the male or both sexes take charge of guarding the eggs, but the male should be removed if the female takes over otherwise she may kill him. The young break out of their eggs in 60 to 72 hours. When they are free swimming, feeding should begin with Infusoria followed by newly hatched brine shrimp and finely chopped Tubifex worms. The eggs can be hatched artificially but then the fungused ones should be removed. Some pairs of this fish will eat their eggs or fry consistently and here the artificial method is most useful. For some unknown reason wild specimens are more coloured than tank bred ones.

These cichlids are very peaceful, don't annoy other fish, (except when spawning) or uproot plants. In a community aquarium they seem to lose their individual charm among the faster-moving fish and therefore should be given a tank on their own in which they will reward the owner with their charming antics and beauty.

Waterlife pests and friends—Tubifex worm

by Bill Simms

THE common earthworm of our gardens has only one close cousin in the aquatic world, a worm called *Eisenella tetraedra*; but there are similar creatures in water—not so closely related—which are also true worms, or annelids.

The Tubifex worm is one of these and because it has been used in great numbers for feeding our aquarium fishes, this small worm has become fairly well known. But perhaps not well enough, for there are a few dangers in its use as food for small fishes.

There is a strong probability that Tubifex worms act as host to tiny organisms that can be internal parasites of fish. Some of these parasites may be fairly harmless—every living being occasionally carries passengers of this sort—but there are a few that could be a danger.

Various methods have been suggested for purging Tubifex worms of possible parasitic enemies. The best of these methods involves losing some of the food value, but it does ensure that these harmful parasites are removed.

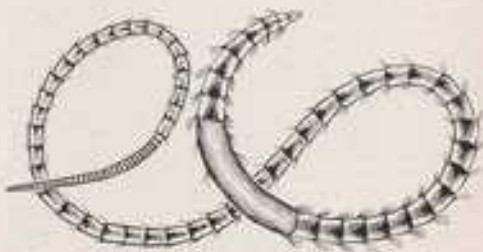
Keep the Tubifex in gently running water for 1-2 days, to allow them to clear their intestines naturally. Then chop them up finely, and rinse the result thoroughly through a fine mesh cloth. This removes all harm, but does remove good as well.

Tubifex worms live in the sludge at the bottom of both still and running water, particularly where it is polluted. They construct tubes from mud and slime, and exist in these head down. It is the narrow tail end that shows above the mud, and this we see as a cloudy red patch where there is a colony.

Along the front end of the worm are hairs, muscle-controlled so that they have a good grip on the tube. By contracting their body, using the hairs as anchorage, the tail end can whip out of sight in an instant.

Tubifex worms, like all true worms, are hermaphrodite. This means that each worm is both male and female. The thicker, smoother portion contains the sex organs. Two worms couple these together, cover the join with slime, and under this slime exchange sperms. Each one fertilises the other, so that both can lay fertile eggs.

Cocoons are used to hold the eggs in groups, and from these eggs hatch worms just like their parents—though smaller, of course. Right from an early age the young blood worms live in tubes. Collecting them is a messy business, but if a deep section of mud where they live is scooped up, and then washed thoroughly, it should be possible to pick them out.



our readers



write

Readers are invited to express their views and opinions on subjects of interest to aquarists. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.

Care of Cryptocorynes

WITH reference to Mr. Whiteside's article on cryptocorynes in the May issue, I should like to point out that washing tropical aquarium plants (and in particular cryptocorynes) in tapwater after purchase is almost certain to set them back and lead to some disintegration of the foliage. Another thing, as Mr. Whiteside himself observes, a change of environment is not liked by these aroids. I have known aquarists complain that the plants (not necessarily cryptocorynes), they have purchased from specialist growers have been "poor stock" because they have shown signs of decay soon after replanting. Seemingly not a few aquarists forget or fail to realise that the quality of water in their own tanks may be very different from that of the dealers' tanks in which the plants have lived for several months. Many years ago I used to import hundreds of cryptocorynes and other plants from Holland and places further afield. Nearly always they lost their foliage soon after setting them in my tanks. Nevertheless, in due course they made fresh growth. But one has to have patience and watch for pollution at the roots.

A plant that, in those days, often took time to establish itself was *cryptofolia*, now known botanically as *Lobelia cardinalis*. But here we must remember that this species is not a true "tropical" and my plunging the rooted stems into a tank maintained at about 77°F. did them no good. I can only presume that the dealer in Holland from whom I obtained them grew this species emerge at a lower temperature, and in soil. However, like some other North American marsh plants, *L. cardinalis* will stand a high temperature at the right season under a really bright light.

That certain plants give off root and/or foliage secretions that are inimical to other plants, and some pests, has been under investigation for some years. The Aztecs, and the peoples of Central and South America before them, knew that certain daisy weeds that grew in their maize fields prevented the maize plants from dying (from what we now believe to have been the attentions of celworms) at the roots. Quite recently a lot of research has been going on at universities and among private individuals into the root secretions of plants. Members of the

Address letters to The Editor, *The Aquarist*,
The Butts, Half Acre, Brentford, Middlesex

Coppestiae have come under most study. And, what is known as the "Tagetes effect" which, I believe, was first made known in a publication of the Henry Doubleday Research Association (of which body I was once an active member), led to a great deal of experiment on trial grounds in this country and abroad. Readers of *The Observer* may remember the weeks of correspondence in its pages following an article by that great gardener, Lawrence D. Hills, on *Tagetes minuta*. For this plant (one of the so-called African marigolds), planted in soil infested with certain parasites inimical to food and flower crops, was found to rid the soil of the harmful pests. This tagetes also makes life difficult, if not impossible, for certain rampant weeds.

It is not unlikely then, that some aquarium plants grown in our tanks give off secretions that are prejudicial to the growth of other plants. But one last word about cryptocorynes. Aquarists would be well-advised not to pour a quantity of fresh water (even though heated to exactly the same temperature of the aquarium) over a fine stand of *cryptocoryne*. Many times I have done this and a month or so later have noticed the leaves and stems in the process of decay. It has been weeks before these damaged plants have put out fresh leaves to make good the loss of the withered ones.

JACK HEMM,
Leicester.

Rearing Brine Shrimps

I READ with interest Mr. Ravensdale's reply to a query about feeding and rearing young brine shrimps (May 1967). We have managed to rear them quite successfully on a number of occasions and would like to disagree with one or two points he makes in his reply.

Only a certain proportion of eggs will hatch anyway, and so if as small a number as twelve is taken in the first place, it is quite likely none of them will hatch at all.

Secondly, *Artemia* feed on microscopic organisms and detritus swept into a median groove running most of the length of the body and from there into the mouth. Young brine shrimps would be much too large for older *Artemia* to

ingest. We therefore suggest that if the food substance being used is too large for the young shrimp, Liquify for egg layers, which is of a fine consistency, should be tried.

All that we have found necessary to rear brine shrimps successfully is straight seawater, or artificial seawater if more convenient, well aerated and kept in a warm place with a fair amount of sunlight. Enough eggs "to cover a sixpence" are used in a 5 litre tank of seawater, a few drops of Liquify are added daily and the solution topped up occasionally with tapwater as evaporation occurs.

We have found this method to be completely satisfactory and we hope it may be useful to other people wishing to rear brine shrimps.

Yours sincerely,
C. A. WOODAMEN,
Technician, Royal Holloway College.

Austrian Guppy Federation

YOU might like to know that I have been advised that the Austrian Guppy Federation are holding their 6th International Show in Vienna this year.

The Show is to be held on the 18th to the 25th June in the Natural Historical Museum (Naturhistorischen Museum) in the Burggasse 7 Vienna 1.

Exhibitors are to communicate with Mr. K. Liedl, 1110 Vienna 11, Braunhubergasse 18(2/3)11, who will be pleased to send out Schedules to interested parties.

British Exhibitors who also wish to visit the Exhibition will be most welcome and accommodation can be arranged with Austrian members.

Yours faithfully,
DR. R. O. B. LIST,
Ruislip.

Accuracy in Killifish Nomenclature

I CAN now state that *Rivulus "achilles"* has been identified as *Rivulus tenuis*.

Yet another popular Killifish has been reclassified due to a mix up when Boulenger named them; now read as such; *Aphyoseiion coerulesum* = *Aphyoseiion gioestadi*, *Aphyoseiion gioestadi* = *Rohlfia scindentalis* to avoid confusion at this stage they should be referred to as Blue-Gularis and Golden Pheasant respectively.

Yours sincerely,
E. J. SYMONS,
British Killifish Association.

The Purple Striped Gudgeon

IN this March journal you answer a question about the purple striped gudgeon or *Mogonida mogonida*. May I add to what you have said? This fish lives in the more temperate waters of Australian Rivers; many can be had in the Lachlan, Murrumbidgee and Murrumbidgee rivers. These rivers have a temperature range of from 48°F up to 86°F, so the fish can be kept at room temperature. Feeding: if live food is not available they can be weaned off live food and adjusted to dry food by first using dried shrimp for 7 days and then on to dry foods. It is advisable to starve the fish for a period of say 2 days before the switch over to dry food. I have successfully done this switch with gudgeons and with the Chanda perch and Pygmy perch, both obtained from the Murrumbidgee river system. Another gudgeon

found in this river is the Carp gudgeon, a very attractive fish smaller than the purple striped species.

Yours truly,
W. G. CAINE,
Cowabbie Street,
Coolamon,
Australia, N.S.W.

Photograph required

I HAVE tried without success to photograph my tank of tropical fish, and have been told it requires a special technique. Could any reader supply me with a photo suitable for reproduction to illustrate an article. I am quite willing to pay for a suitable print.

Yours sincerely,
Mrs E. YOUNG,
43 Speculation Place,
Washington,
Co. Durham.

Aquarium and Room Decor

WITH reference to the letter from K. Hillyer (May *Aquarist*) re "Aquarium and Room Decor" and the difficulty in placing equipment and still maintaining a pleasing appearance, I would like to show a photograph of two of my tanks (24 in. x 12 in. x 15 in.) and (18 in. x



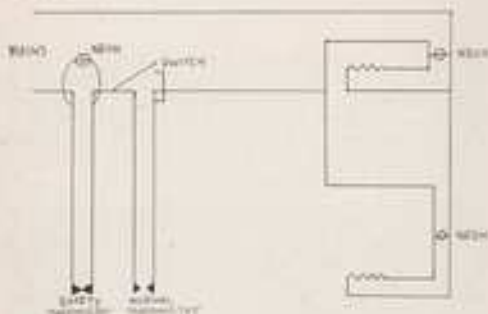
8 in. x 8 in.) and hope that it may be of some use to readers who have problems of this nature.

The basic framework is 1 in. chip-board with cedar planking for the outsides and the cover for the top tank. The horizontal section above the lower tank unclips to give access to the tank and also a shelf on which a pump, tins of food, spare tubing, etc., are kept.

Yours faithfully,
H. KIRKHAM,
Bridlington,
E. Yorkshire.

Safety Circuit

AFTER reading Mr. Allen's article in December and Mr. Hodgett's letter in March, I tried to design a safety heater circuit to be used in conjunction with their circuit.



I have lost more fish through chills caused by heater burnouts than through boiling (the score is about 20-0).

I advise that each heater be double the normal wattage for such a tank.

The additional advantage of double-sided heating ensures that the tank is of a more even temperature throughout.

HUGH SPENCE,
Kilmarnock.

Bouquet for Italian Aquaria

ON glancing through some of the 1966 issues before putting them away to leave more room for this year's, I noticed the comments in Mike Shoedy's "Around the Aquariums" (June 1966) about the one on Rome railway station (the Micro Zoo), and recalled my own very different impressions when there at Easter last year en route for a fortnight's exploration of Sicily. I found it then distressingly uncared for, with many dirty tanks and wrong labels, and even one or two dead reptiles (which I reported to a somewhat nonchalant ticket office). However, it seems that things were much improved shortly after.

In Sicily itself, at Syracuse, near the famous papyrus pool, is an aquarium that at once restored my faith in Italian public aquaria. In spotlessly clean, beautifully displayed tanks is a very wide range of freshwater and sea fish that made the Rome station collection seem very second-rate. The lighting was so good that I was able to

photograph (without flash) quite a number of the more interesting species—including pompadours, mud-skippers and some fine scorpion fish.

Yours sincerely,
W. S. ALLEN,
Guildford, Surrey.

No change of Venue

YOUR many readers may have noticed the amended announcement contained in your 'Aquarist Calendar' feature, in that the venue for the fifth annual open show of the Newport A.S. has apparently been changed. I would like to inform them, however, that the venue remains unchanged, being the same as last year; it is the name of the school that has been altered.

Duffryn Junior High School is situated on Stow Hill, approximately 50 yards from the town centre and 200 yards from Newport Station.

I would add that the members of my society are looking forward, once again, to meeting our many old friends and acquaintances on September 16th and trust that the occasion will prove as pleasurable as in previous years.

Yours faithfully,
M. J. PARRY,
Show Secretary.

Recorded Talks

I HAVE made a pre-recorded lecture and tried it out on our Society at School.

It was a success and I should be interested to hear from any other society who have tried this method.

I should also like to know of anyone who would be willing to exchange recorded lectures for the use of small societies like ours.

It is entitled "Marine Fishkeeping" and lasts 15-20 minutes.

Yours sincerely,
GEOFFREY LEACH,
(Age 14),
Bury, Lancs.

MIRACLE FREEZE-DRIED TUBIFEX

In our issue of March this year we published an advertisement by P. H. Hastings Ltd. which stated this firm was offered the sole distribution rights for Miracle Freeze Dried Tubifex.

We have been informed by T. F. H. Publications (London) Ltd. that this statement is inaccurate inasmuch as Miracle Plastics (N.J.) Corporation, being a subsidiary of their parent company T. F. H. Publications Inc., did not offer any distribution rights for their 'Miracle' products to P. H. Hastings Ltd.

Meurs. P. H. Hastings Ltd. have tendered an apology to T. F. H. Publications (London) Ltd. for the inadvertent use of the brand name 'Miracle', which has been accepted.

We regret that we unfortunately published the advertisement in question and we tender our apologies to Meurs. T. F. H. Publications (London) Ltd.

Aquaria and zoo guide

CHESHIRE

North of England Zoological Society, Zoological Gardens, Upton-by-Chester, Cheshire. Admission charge—to Gardens: Adults, 6s.; children under 14, 2s.; to Aquarium, 6d. Open daily throughout the year from 9 a.m.—dusk. Party terms (parties of 25 and over): Adults, 2s. 6d.; children under 16, 1s. 3d. Aquarium admission 6d. No reductions for parties. Description: Mainly tropical freshwater fish, 178 species of fish. Collection of fish, 2,400. Improvements have been made to the marine section and it is hoped that new stocks will be arriving soon. Some interesting species have been added to the freshwater collection including Colomesus, *Betta* Labechea, *B. Modestus*, *Barbus* *Comenius*, *B. Punctatus* and *B. Steudermani*.

DERBYSHIRE

Paa's Gardens—Zoological and Botanical Gardens (including an Aquarium), Ashover, Chesterfield, Derbyshire. Admission charge—Adults, 2s. 6d.; children, 1s. 3d. Open 11 a.m.—dusk every day of the year. Description: The aquarium section of the Zoo comprises 12 tanks and a show pool, and includes coldwater, tropical and marine sections. We endeavour to exhibit rarities, such as axolotls, clawed frogs, piranhas, parrot fish, dragon fish, seahorses etc., rather than the more common species.

DEVON

Exmouth Aquarium, Sea Front, Exmouth, Devon. Admission charge—Adults, 1s. 6d.; children, 6d. Open 10 a.m.—dusk every day, May to September; week-end during winter. Party terms on application. Description: 30 tanks ranging from 24 by 12 by 12 in. to 17 by 7 by 19 in., housing our giant turtles measuring 9 ft. long by 3 ft. Seahorses, local fish, also tropical and coldwater exhibits. Seawater is pumped up from the sea through a 700-ft. long pipe. Aquarium's shop adjoining.

Paignton Zoological and Botanical Gardens, Paignton, Devon. Admission to Zoo, 5s.; Aquarium, 6d. Open daily at 10 a.m. Party terms: Reduced rates for parties over 30 into Zoo. Description: Tropical plant house, reptile house and aquarium. 37 fish tanks showing 339 fish of 43 species, 7 terrapin tanks and 25 reptile cages 174 reptiles of 62 species. Reptiles seen: *Eurynone crocodiles*, soft-shelled turtles, and mangrove snake. Most important exhibits: *Manatus terrapin*, 30 ft. reticulated python, electric eel.

Paignton Seashore Aquarium, Paignton Harbour, Paignton, Devon. Admission charge—Adults, 1s. 6d.; children, 6d. Open every day including Sundays, 10 a.m.—10 p.m. Party terms: Organized parties 6d. per head. Description: Each aquarium tank illustrated by models and information to explain facets of the living creature. Large number of educational exhibits explaining local seashore life. All specimens are from immediate local waters. Filming studio on premises where television (B.B.C. "Look" series) films are made about marine life.

Teignmouth Aquarium, The Den, Teignmouth, Devon. Admission charge—Adults, 1s.; children, 6d. Open every day including Sundays, 10 a.m.—10 p.m. Party terms: Organized parties 6d. per head. Description: Each aquarium tank contains local seashore life. A large number of educational exhibits explain local marine life with wealth display among others.

Marine Biological Association of the United Kingdom, Citadel Hill, Plymouth, Devon. Admission charge—Adults 1s.; children 6d. Open weekdays 10 a.m.—6 p.m. (May to September to 8 p.m.). Party terms: Reduced rates for prior arrangements by letter to the Director. Description: Local marine fishes and invertebrates displayed exceptionally well in an aquarium of modern design. Seventeen tanks, largest approx. 30 ft. x 9 ft. x 3 ft.—4 ft. deep; smallest approx. 1 ft. 6 in. x 1 ft. x 1 ft.

EDINBURGH

The Carnegie Aquarium, The Royal Zoological Society of Scotland, Scottish National Zoological Park, Murrayfield, Edinburgh, 12. Admission charge—Adults, 6d.; children, 3d. Open every day of the year. Summer 11 a.m.—6.45 p.m. Winter 11 a.m.—5 p.m. Party terms: None, except for Edinburgh Corporation Schools. Description: Consists of three large halls. Tank devoted to marine exhibits including green and hawks-billed turtles, conger eels, lobsters and crabs etc., and many sea fish. Freshwater specimens include albino eels, lung fish, giant salamander, giant cuttle. Large variety of brilliantly coloured fish, both coldwater and tropical.

ISLE OF MAN

Marine Biological Station (University of Liverpool), Port Erin, Isle of Man. Admission charge—Adults, 1s.; children under 14, 6d. Open Monday to Saturday, 10 a.m.—5 p.m. All year. Party terms: Organized educational parties admitted free if prior notice given. Description: Marine, 6 large and 18 smaller tanks. Good display of sea fish and invertebrates. Please ringing.

LANCASHIRE

The Tower Aquarium, Tower Main Buildings, Blackpool. Admission charge—Adults, 5s.; children, 1s. 6d. This includes general admission which includes Tower Ballroom, Zoo, Aviaries and Ocean Room Cabaret. Open 9 a.m.—10.30 p.m. Sunday to Saturday. Description: Aquarium founded in 1874. Consists of a central block of twelve large tanks with 58 smaller tanks on the outer walls. The total collection is 348 species of fish and 24 species of invertebrates. Latest addition, Chinese grass carp (*Ctenopharyngodon idella*), *Clarias* (*Clarias aspensolis*). Aquarium speciality: British marine fish.

Marine Island, Stone Jetty, Morecambe, Lancashire. Admission charge—Adults, 4s.; children, 2s. Open daily from 10 a.m. Party terms: Parties of 20 or more, 3s. and 1s. 6d. Description: Europe's first Oceanarium; also wide selections of marine and freshwater tropicals. Local fish and coldwater fish, seals, sea lions, porpoises, alligators, turtles and dolphins. Sea circus daily at 11.15 a.m., 2.15 p.m. and 4.15 p.m. with performing clowns, sea lions and dolphins. Newly arrived: "Clipper," star dolphin performer from New York's World Fair.

Belle Vue Zoo Park Aquarium and Reptilium, Manchester, 12. Admission charge—Adults, 1s.; children, 6d. Open daily 10 a.m.—6.30 p.m. General admission to Park: 3s.; children, 1s. 6d. Party rates (25 or more): Adults, 2s.; children, 1s. 3d. Admission to Aquarium and Reptilium: Adults, 1s.; children, 6d. Description: Three huge tanks ranging from 25 to 1,500 gallons exhibit familiar favourites of the tropical freshwater world, fishes of the coral sea and specimens from our own coastal waters, rivers and lakes. Continuing through the Reptilium, a wide range of snakes, lizards, terrapins, monitors and the new world-famous breeding alligators may be viewed.

LONDON

The Aquarium of the Zoological Society of London, The London Zoo, Regent's Park, London, N.W.1. Admission charge—Adults, 2s.; children, 1s. Open throughout the year (except Christmas Day) from 10 a.m.—4.30 minutes before closing time of main Zoo at dusk at 7 p.m., whichever is earlier. From Good Friday to September, last admission to Aquarium is 7.15 p.m., closing time 7.45 p.m. Description: Marine and freshwater: 100 tanks ranging in length from 12 inches to 30 feet. Marine Hall with fish and invertebrates from tropical and temperate waters. Tropical Hall with many primitive freshwater fish and an anguilla over 5 feet long. Temperate Freshwater Hall with representative collection of European and other fish; also aquatic amphibians.

SURREY

Chessington Zoo Ltd., Leatherhead Road, Chessington, Surrey. Admission charge—6d. adults and children. Open week-ends in March. Easter to 31st October, 10.30 a.m.—5.30 p.m. early season, 8.30 p.m. full season. Party terms: 3d. each adult and children for parties of 30 or more. Description: Chessington's Aquarium, although small, has a varied collection of coldwater and tropical fish (500 in 70 species) kept in 26 tanks varying in size 24 by 12 by 18 in. to 66 by 12 by 24 in. Amphibians and reptiles are also on display as at the moment there is no separate Reptile House.

SUSSEX

Brighton Aquarium, Marine Parade and Madeira Drive, Brighton, Sussex. Admission charge—Adults, 2s.; children, 1s. Open every day of the year 9 a.m.—dusk; Christmas Day 9 a.m.—1 p.m. Party terms: Adults, 1s.; children, 6d. Description: 12 freshwater tanks, two large capacity, containing carp, eels and basses; 10 marine tanks, specimens added as available; 12 tropical tanks. Lung fish and piranha are recent arrivals. Other large tanks contain harbour seals and turtles. A sea-lion pool (great attraction to children).

WORCESTERSHIRE

The Dudley Zoological Society Ltd. (The Aquarium), 2, The Broadway, Dudley, Worcestershire. No admission charge to Aquarium. Open Monday to Sunday, 10 a.m.—6 p.m. (during summer months); 10 a.m.—4 p.m. (winter months). Party terms: 2s.—10s.; Adults or children or mixed: Adults, 3s.; children, 1s. 6d.; 10s.—20s.; Adults, 2s. 9d.; children, 1s. 2d. 251—500; Adults, 2s. 3d.; children, 1s. 5d. and over: Adults, 2s.; children, 9d. Description: Built in the Castle Crypt, the Aquarium contains 59 tropical tanks (one marine) and 18 coldwater. Several amphibians, as well as invertebrates, are also displayed. Heating is achieved by both gas boiler and electric tubular heaters. Interesting specimens include an electric eel, an African lungfish, and a 24 lb. black "shark."

The Celestial and Bubble-eye

by A. Boarder



A bubble-eye



A pair of
Celestial goldfish

THE Celestial goldfish represents a very unusual type of fish which looks little like the original. The chief characteristic about this fish is the peculiar position of the eyes. These have moved from the normal to a place almost on top of the head. They therefore gaze skywards and this accounts for the name celestial. The general shape of the fish is as for the fantail goldfish; that is an oval body with a double tail, but there is no dorsal fin. As with the lionhead the absence of this fin often creates a very uneven curve to the back. With many fishes which have no dorsal fin where this fin should be there is often a nasty bump. A clean curve from head to tail is what is required but many otherwise good specimens are spoiled by small protuberances where the dorsal is on a normal fish.

The caudal fin should be completely divided and held well out, not drooping at all. It should be forked and so must not be too straight nor rounded at the ends. The anal fins are double and not over-developed. The pectoral and pelvic fins are normal in shape, not too long. The fish can be scaled or scaleless, as in the shubunkin. The colour of the scaled can be a self which is all red or in the scaleless as for the shubunkin.

The eyes should have protuberant sockets almost round in shape and the pupils must face upwards. The minimum length of the fish for exhibition purposes is a two inch body

length. A good show specimen should have well developed eyes pointing upwards and have a good clean sweep over the back with no irregularities. The caudal fin should be held well out and be as long as half the body.

The conditions for breeding this fish are as for fantails but it is well to keep these fish in a separate container and not in a pond, especially one which contains any rocks which may have rough edges and could cause damage to the eyes. Although the eyes are in such a peculiar position this does not appear to affect the feeding habits of the fish but it is better to keep them apart from ordinary varieties as they might be slower in finding their food. When very young the fry do not show the eye as being very different from the normal fish but as the fish grows the eye gradually changes its position and moves towards the higher position. The conditioning and breeding of this variety is no different from that required for breeding fantails.

The bubble-eye is a further development from the celestial and resembles this fish except that there is a large bubble under each eye. The larger this bubble the better is the fish for exhibition purposes. The eyes are positioned more in the normal position than that of the celestial, but as for that fish it is recommended that the fish is not housed in an outdoor pond where there may be anything rough or sharp which could damage the eye bubble. The colour

"Best Fish in the Show"

Many winners of the "Best Fish in the Show" have now received their gold plated award pin from *The Aquarist*. As it is possible that some winners have not received this pin, they are requested to apply to the secretary of the Open Show where they won the award for the appropriate form. If in difficulty these forms are obtainable direct from *The Aquarist*. Upon receipt of the completed form an award pin will be sent direct to the winner.



The pin as illustrated is in the shape of *The Aquarist* badge and is inscribed—"Best Fish in the Show".

The news of this award has been extremely well received by the clubs, and the aquatic world, and there is no doubt of its popularity.

Winners of the Best Fish in the Show award are automatically eligible for entry into the Champion of Champions contest. This will be held in conjunction with the British Aquarists' Festival at Belle Vue, Manchester on 28th and 29th October, and from the excellent response received to the recent notices published in *The Aquarist* regarding the contest, it is certain that this will be an assured success, and also the highlight of this year's Aquarium Shows.

Entry forms for the "Champion of Champions" contest are available, and any secretary who has not received this form should contact: **The Aquarist (Contest), The Butts, Brentford, Middlesex.**

for this fish can be as for the celestial and it can be had in scaled or scaleless. The breeding conditions are as for the celestial and the bubbles develop as the fish grows.

There were no standards for either of these fishes in the 1947 ones issued and so the only pointings will be as for all other fancy goldfish, that is 40, for type and colour; 20 for body; 20 for finnage and 20 for condition and deportment. It will be noted that there are no points allotted for the eyes which are the outstanding characteristics in both varieties. My own suggestions for pointing these fishes could be the same for both the celestial and bubble-eye. They are: Eyes, 20; Body, 20; Caudal fin, 20; Pectorals, pelvis and anals, 20; Colour, 10; Condition, 10. Total, 100 points. With this system it would be possible to award more points for the outstanding features which differentiate these fishes from other varieties.

Another variety which is sometimes seen is known as the Pearl scale. I do not consider that this fish qualifies for a distinct variety as it is possible for the pearl appearance to occur in any of the scaled types of goldfish. This is because the scales, instead of lying flat on the body, are curved almost shell-like so that the curve of the scale stands out from the body. This peculiar shape of scale could therefore appear in a goldfish, fantail or any variety with hard scales.



Pearl-scale Fantail

Mixed worm cultures

by B. Whiteside

QUITE by accident, or should I say carelessness, I discovered that the three commonest types of worms bred and raised for use by the home aquarist, can all be raised in the same container. Such a method has its disadvantages but for, say, the guppy tank where babies and parents are not separated and fish in all stages of development are kept in the same tank, a mixture of all sizes of worms can save time and trouble. The mixture of worms can also be used in tanks which house various species of Characins which may feed on worms of various sizes.

The three types of worms which I have raised in the same container are, of course, white worms, Grindal worms and micro worms. I raise the three types of worms separately, in the usual ways, and use a small artist's paint brush to transfer each of the types of the worms from their growing containers to the fish tanks. Using only one such brush resulted in my container of Grindal worms being inoculated with worms of the other two types. All three types are thriving. My technique for raising the three types of worms together is fairly standard.

I use a standard clay seed-pan which is crocked over the four drainage holes. The seed pan is filled to about one inch from the top with a mixture of half loam, one quarter peat and one quarter coarse grit. The pan is kept placed in a shallow enamelled dish in the base of which is always kept about $\frac{1}{2}$ in. of water. By capillary attraction, the compost mixture in the seed pan is kept quite moist without being too wet. Food for the three types of worms is supplied in a shallow depression in the top of the compost by adding smallish pieces of white bread well soaked in milk, from a saucer. A small sheet of glass placed over the bread acts as a collecting ground for the different worms and these are removed with the paint brush and swished into the water in the fish tank.

The wormery is kept in a warm place and although the prevailing conditions would appear to be ideal for Grindal worms, too wet for white worms and too dry etc. for micro worms—according to the books—the worms of each of the three types are all thriving in sufficient numbers to supply one or two daily feeds to a single aquarium. Of course, I still keep separate cultures of the three types of worms for specific types and ages of fishes but I find my mixed collection of worms a useful and time saving addition to the standard separate cultures.

Perhaps, in time, one species of worm will "swamp" out the other two, but for the small cost involved the mixed collection is well worth a try. By the way, the top shelf of a heated linen cupboard is an ideal place for worm cultures, if the women in the household can be persuaded to be tolerant!

Panchax playfairii

by C. E. Ford

FOR those aquarists who would like to keep and breed a Killifish that is both beautiful, and yet not too particular about water conditions, the *Panchax playfairii* would be a very good choice.

This fish, which comes from Zanzibar, grows to about three inches and when this size should only be kept with medium-sized fishes. The predominant colour is yellow, the male being the more brilliant. His fins are a bright orange with the anal edged with red. A row of metallic green dots run through the anal and dorsal fins. The scales on the back of the male stand out slightly giving the fish a dropical appearance. The female is a lot paler with a black spot at the rear of her dorsal.

Breeding this fish is a simple procedure, my method being to use a tank 14 in. by 8 in. by 8 in. The pH and DH of the water is not essential but it should be slightly aged. I personally use water from the adult tanks which I leave set at 80°. I fill this tank to a depth of about six inches and into one corner I put a clump of Nylon wool which has been opened out and soaked for a day or so previous, but I find the use of gravel unnecessary.

After a week of conditioning in separate aquaria I introduce the pair into the breeding tank, the male about two hours before the female.

Mating sometimes starts within five minutes, the male pursuing his mate around the tank and showing off his brilliance of colour until he traps her in the Nylon wool where they tremble side by side, the female expelling one or two eggs at a time which adhere to the wool by a short thread. I leave the pair in this tank for one week, checking each day for eggs which number from as many as fourteen one day to two or three another. They are easily found in the wool being amber in colour and quite hard-shelled. I pick them off with the tips of a pair of tweezers and put them into hatching jars, one for each day's eggs. These jars are floated in another tank at the same temperature but I add a little methylene blue to prevent fungus.

The eggs hatch out in these jars in ten to twelve days and the fry are able to eat sifted Daphnia and Cyclops at birth, but I prefer to give them newly-hatched brine shrimps with finely graded dry food, feeding Daphnia and chopped white and Tubifex worms a week or so later.

Growth is rapid on the above foods the fry now being put out into an 18 in. by 10 in. by 10 in. tank and graded into other tanks according to size. The fish are easily sexed when five to six weeks old and breedable at around four months.

Around the Aquariums by Mike Sheedy

THE do-it-yourself pupils at Clowse Secondary School, near Wexham, have built themselves a 30-foot by 12-foot shed and will be spending the next few months equipping it as a zoo house, aviary and aquarium.

The project will cost around £300 and if the school had to buy the shed unit complete the cost would be over £1,000. The headmaster, Mr. John Dodds, says: "It gives the boys a sense of belonging to the school."

The specially designed shed will have aquariums running along one side and a small aviary and cages for smaller animals. The school already keeps rabbits, mice, guinea pigs and small birds. The headmaster is hoping they can acquire larger animals and fishes for the school's new "Zoo".

"It will be of help to the biology class to have specimens easily available and I am sure the art class will benefit when we stock the aviary and aquarium in the summer", said Mr. Dodds.

The Queen opened a £250,000 pavilion for small mammals at Regent's Park Zoo, London on 16th May. Mr. Charles Clore gave £200,000 towards the pavilion, which has been named after him.

The Queen, who is patron of the Zoological Society of London, was accompanied by the Duke of Edinburgh, who is President of the Society.

Sir Solly Zuckerman, Secretary of the Society, said that the Zoo's reconstruction programme had reached the half-way stage. "This new pavilion is the pinnacle of our programme and it is unique in the zoological world", he said.

During the tour of the Zoo the Queen and the Duke were joined by Princess Margaret and Lord Snowdon at the Snowdon Aviary.

The new pavilion is undoubtedly one of the most interesting additions to the London scene in the last few years and will delight many millions of visitors to the London Zoo.

Two Mole Snakes have been purchased from South Africa by the London Zoo and are the first on view in the Reptile House since before the war. They are four feet long and will grow to about seven feet. They are grey-brown in colour and are notable in producing some of the largest families amongst the snakes—sometimes having as many as 95 young at a time. At one time they were protected in South Africa because of their usefulness in keeping down rodents which are their normal diet.

Purchased at the same time are six Warren's Armoured Lizards—a species new to the collection. These creatures are insectivorous, dark smoky brown in colour with spiky tails and measure some nine inches long.

An unexpected visitor arrived in Doncaster recently and took the staff at a wholesale fruiterers by surprise.

The visitor was a Cape Gecko lizard from California, which arrived in a consignment of bananas at the depot of J. and J. H. Peters Ltd.

The lizard measuring about four inches from head to tail, is dull green in colour and has been placed in an empty aquarium at the Doncaster Museum.

As at 31st December, 1966, the number of animals at the London Zoo's collection at Regent's Park was as follows:

	No. of Species	No. of Specimens
Mammals	254	762
Birds	623	1,505
Reptiles and Amphibians ..	207	750
Fish	311	2,160
Marine Invertebrates	57	950
Land invertebrates (excluding ants, locusts and bees) ..	96	600
	<hr/> 1,548	<hr/> 6,727

The most valuable animal at the London Zoo is "Chi-Chi", the giant panda, on which a value of £12,000 has been placed.

As at 31st December the animal which has resided the longest at the London Zoo was "Percy", a white pelican, which was purchased in May 1922. Unfortunately, "Percy" died on 12th January, and the oldest inhabitant is now a giant Porter's blackish tortoise from the Galapagos Islands, which came to the Zoo in May, 1924.

During 1966 2,003,300 people visited the London Zoo, 482,600 visited the Children's Zoo and 398,600 visited the Aquarium.

Recently I saw Mr. C. H. Keeling of the Ashover Zoo, near Chesterfield, Derby, who surprised me by saying that, after due consideration, he had decided not to apply to join the proposed Federation of British Zoological Gardens. He feels that far too much emphasis is placed on "window dressing" and not enough on educational and scientific work—so consequently he feels he cannot support it.

He told me that last year the lecture service at the Ashover Zoo visited 231 schools in order to give talks.

During my visit to Chester recently, I was delighted to meet Dougie and Carol Petrie, who were looking well and informed me that the Aquarium is greatly improved since I last saw it, and many more fishes are now on display. From time to time they also display in the cold water section.

Continued on page 105

The dace—*Leuciscus leuciscus*

by J. Hems



THE dace (*Leuciscus leuciscus*), also called (in some parts of this country) the dars, dars, dóbule or graining, is a member of the carp family (Cyprinidae) and occurs throughout Europe from the Alps and Pyrenees northwards to Lapland and eastwards as far as Siberia. It is widespread in England, local in Wales, and absent from Scotland and, until recently, Ireland.

It is usually found in fairly fast-flowing rivers and streams and, from Spring to Autumn, swims in shoals (like most cyprinids it is a gregarious fish) at or near the surface. There it feeds on gnats, flies, aquatic larvae, and the like. With the approach of wintry weather it keeps to the bottom. This, however, is a perfectly natural reaction to cold; for the lower levels of the water are always a few degrees warmer than those at the top.

L. leuciscus is streamlined in shape, with the almost centrally placed dorsal fin set slightly closer to the head than to the tail. The ventral fins are situated almost level, but slightly in front of, the first ray of the dorsal fin; the first ray of the anal fin is roughly in line with the tip of the bottom ray of the dorsal fin. The pectoral fins, or breast fins, are placed in the usual position, that is just behind the gill-openings. The lobes of the caudal fin are well developed but not deeply forked. It is worth noting that the posterior edges of the dorsal and anal fins are concave or inward curving in outline. This feature helps to distinguish the dace from the similar-looking but bulkier-bodied chub. In the main the fins are faintly greyish to buff, sometimes with a pinkish tinge.

The general colour of the body is blue-green to olive-green, or brown, on the back, shading to shining silver on the sides and white on the belly. The rear margins of the scales on the upper flanks are marked with black. This gives a pretty reticulated effect. The eyes have bright golden rims.

Ordinarily the dace attains a weight of about $\frac{1}{2}$ lb. but now and then this is exceeded by several ounces. Be this as it may, a dace that weighs 1 lb. is regarded by anglers as a fine fish. The average large dace measures from 8 in. to 9 in. in length.

Dace spawn from April to May. The sexes—the males develop a rash of pimples or tubercles on their heads and the females develop fuller sides—get together and jostle

against each other in the shallows. The outcome of all this familiarity is that many hundreds of small, sticky eggs are laid among the plants and the stones. The eggs hatch within a few days and the fry make quite rapid headway on the usual diet of microscopic water life.

In the aquarium young (small) dace will do well provided you give them plenty of swimming space in clear, well-aerated water. Artificial aeration, or water dripping from a large jar (via a siphon tube) placed above the aquarium, is an aid to their comfort during warm, oxygen-depleting weather. All the regular live foods, and substitutes for live food such as shredded raw meat and shredded liver (well-washed to remove the blood), are accepted by captive dace as well as the usual dried food.

Book Review

Diseases of Fishes by C. van Duyn, Jr. Published by Little Books Ltd. at 47/6. 308 pages with 172 illustrations.

THE first edition of this book will be well known to all keen aquarists as the sole work on the subject which, while dealing with fish ailments in a very thorough fashion remains comprehensible to the layman.

Since the publication of the first edition in 1956 so much advance has been made within the realms of fish diseases in respect of therapy, new drugs and increased knowledge concerning causative agents, that the author has found the need to increase the second edition to more than twice the size of the first. Many more illustrations have been included and the work now constitutes a very fine reference book of the highest reliability for the aquarist and pond-keeper to say nothing of those engaged in fish-breeding as a profession. Divided into ten chapters, the work deals with the following aspects: Skin parasites and infections, Respiration and diseases of the gills, Diseases caused by sporozoans, Diseases caused by bacteria and viruses, Diseases of the eye, Diseases of the internal organs, Tumours in fish, Miscellaneous complaints, The medicine chest.

Limia

by Jack Hems



melanogaster



Limia melanogaster, of which too little has been seen over the last quarter of a century, is a livebearer of great merit which is now coming on to the market again. Apart from its attractive appearance and hardiness, it is always on the go, prolific, easy to feed on anything alive or dried, and peaceful with other fishes.

The species is native to Jamaica and was first described for science by the ichthyologist A. C. L. Gunther, of the British Museum (Natural History), in 1865. But it was not until the early 1930s—in 1933 to be precise—that it made its debut (in Germany first) as a tropical aquarium fish.

L. melanogaster is commonly called the blue limia or, less frequently, Stoye's limia, or the black-bellied limia. At this point, however, it is necessary to say that *L. caudofasciata*, another member of the genus from Jamaica, is also sometimes referred to as the blue limia. But whereas *L. melanogaster* seldom exceeds a length of 2½ in. (in the longer and deeper female), *L. caudofasciata* usually grows slightly larger than this (in the female, of course) and is nowhere near so well-coloured as its congener.

Sexing *L. melanogaster* is easy for the beginner for, as with other viviparous cyprinodonts, the male has a rod-like anal fin and is, to reiterate what has been said above, slimmer in outline than the female. Noticeable too is his blaze (under a bright spotlight) of matt and metallic colours. The upper part of his body is greenish to olive brown, shading down through a brilliancy of blues flashing off the scales, to a white, suffused with canary yellow, throat and belly. The anterior part of his sides is adorned with five or six narrow black bars. A black patch is present on the root of the tail. The dorsal fin is as black as black, or blue-black, around the margins, canary yellow in the centre, and black, or blue-black, in the base. The caudal fin is marked similarly. The pectoral fins are colourless or, in the language of the scientists, hyaline. A characteristic of the paler female is a black patch in the anal region, which expands and intensifies just before parturition. It is to be remarked, too, that the vertical bars that add attraction to her shining sides are usually more distinct than those of the male.

The requirements of this fish in the aquarium are a good light, plenty of plants and a temperature in the neighbourhood of 75°F. (24°C.), though a slow fall to 65°F. (18°C.) followed by an equally slow rise to the seventies (°F.) will not prove harmful. At least that was my experience with hundreds of this species in the long ago.

Although I have seen it stated otherwise, broods are large. Perhaps not in young females, but in females a year to eighteen months old (the fish has a life-span of about 2½ years) it is not uncommon for a brood to exceed sixty young.

Like most livebearers, *L. melanogaster* is not backward at snapping up its newly-born fry. Therefore, it is a

wise precaution to lower the depth of the water to about 5 in. (to facilitate the instinctive retreat of the baby fish into the tangle of plants) and remove the male to another tank as soon as the female shows the unmistakable signs of advanced pregnancy: a swollen and darkening abdomen. Furthermore, as a well-fed female is less likely to interest herself in her offspring than an under-nourished one, live food, or a suitable preferred substitute, such as scraped raw beef, should be given plentifully.

Of course, a breeding trap may be used, but I am not overfond of a breeding trap for any livebearer for, unless the trap is a spacious one, the double shock brought about by capturing a gravid female and immersing her in a small barred or perforated container does her and the young she is carrying no good.

Blue limia fry make very rapid progress on a fine grade of dried food alone, and will show plenty of colour at eight weeks. Full size is attained in six to eight months, provided the fish have plenty of swimming space in well-oxygenated water. Finally, one word of warning. Keep the aquarium in which this species is living well covered, for its proficiency as a jumper—even through a narrow aperture—must be seen to be believed.

Book Review

Keeping Tropical Fish by Leslie B. Katterns, published by Stanley Paul at 21s.

THE author of this book needs no introduction to established aquarists. As a former president of the National Aquarists Society, writer and lecturer on the subject of fishkeeping as well as a judge at the show-bench, his name is a household word wherever tropical fish are kept. The book under review was first published in 1960 and it soon became established as an invaluable aid to the aquarium keeper. Well illustrated with photographs and drawings this recent edition also has an additional chapter on the subject of breeding. Without being too scientific or technical for the tyro, this book succeeds in dealing with all the essentials of practical and fruitful tropical fishkeeping.

Coldwater fish-keeping queries answered by A. Boarder

Many queries from readers of "The Aquarist" are answered by post each month, all aspects of the fancy being covered. Not all queries and answers can be published, and a stamped self-addressed envelope should be sent so that a direct reply can be given.

Last July I bred some Bristol shubunkins and on inspection recently I noticed that a few have two anal fins. Is this a rare thing or not?

The fact that some of the youngsters have paired anal fins means that at some time in the past there were double-tailed fishes in the strain. Any fancy goldfish with a double-tail should have double anal fins. The genes of inheritance have passed on this trait to the progeny. Such fishes would be disqualified at a show for single-tailed fishes as would double-tailed fishes be disqualified if they had only one anal fin.

I have a tank 24 x 12 x 12 in., in the living room with four goldfish each about 3 in. long. Last week one of these fishes spawned and I now have some fry. Is this unusual for this time of the year?

It is certainly unusual for goldfish to spawn so late in the year. It is probably because the room temperature was fairly warm and the water in the tank in good condition. If some fresh water had been run into the tank recently this could have encouraged the spawning. You may find some difficulty in rearing the fry unless you can supply some heat, between 65 and 70° F., would be suitable.

I am looking for an alternative live food to feed freshwater Bass. I wonder if I could use white worms, Micro worms or Grindal worms?

White worms will be very good for feeding the Bass. I suggest that you breed some for winter use and then use garden worms in the warmer weather. The Micro and Grindal worms are too small to be of much use except to fry. In the January, "Aquarist", is an article on breeding white worms.

I have found a large number of transparent thread-like worms in my coldwater tank. They have their heads buried in the gravel and wave their bodies in the water. What are they and what can I do about them?

The worms are Tubifex and will do no harm. The fishes will eat them if they are hungry. However they are rather difficult for them to catch as they withdraw into the muck on the approach of a fish. These worms are often encouraged to establish themselves in a tank when there has been over-feeding with dried food. Any uneaten food soon decays on the bottom and this is a medium which the Tubifex prefer.

Can you advise me as to whether there are any good books on breeding native coldwater fishes please?

I do not know of any book dealing exclusively with breeding coldwater fish. My own book, "Coldwater Fishkeeping," deals with keeping them and has a reference to breeding at least one kind. However our native freshwater fishes all breed rather similar to the goldfish and so the directions given in this book are also suitable for the breeding of native fishes. Such fishes as—Rudd, Roach, Perch, Pike, Bleak, Bream, Gudgeon, Chub, Carp, etc., are all egg-layers and the rearing of the fry is done in exactly the same way as is used for rearing goldfish.

I have a number of eighteen-month-old Comets which I keep in a 36 x 15 x 15 inch tank. Some of them have developed red patches near the tail and all the fish seem to go mad now and

then and dash about, but do not actually rub along the gravel. Some seem to be wanting away and the tail fin has become pointed. Two fishes have died. What is the cause and cure please?

The symptoms you describe are identical with those shown by fishes attacked by flukes. The tail becoming pointed is an indication that the fins are folding up, a certain sign of badly affected fishes. They will also mouth at the surface as if trying to feed but do not do so. Give the affected fish a bath in a solution of half a teaspoon of Dettol to a gallon of water. Do not leave the fish in this solution for more than five minutes and remove them to fresh water sooner if they turn over. They soon recover when returned to fresh water. You may have to repeat the treatment after about a week.

Would you please tell me what size and type of heater I could use to keep my outdoor pond at a temperature of a minimum 34 degrees F., in winter? The pond is 12 feet by 6 by 2.

You could use an 80 foot G.E.C. cable heater as used for soil warming. These are rated at 300 watts and are polythene covered to keep out all moisture. This cable could be draped round the lower part of the pond and could be switched on at nights when there is a severe frost predicted. You could also control it with a thermostat in the water. This would be a much cheaper way to run it as it would cut out as soon as the water temperature rose above your required warmth. Alternatively you could have a 100 watt heater, as used in aquaria, which would keep open a hole in the ice.

I have been seeking a book on "Goldfish Breeding," can you advise me?

The book "Coldwater Fishkeeping" deals adequately with all aspects of goldfish breeding and contains all the essential information to enable anyone to be successful with the venture.

How can I tell the sex of my goldfish and fantails?

When the fish are in good condition and near breeding time, the male has small, raised, white pimples on the gill plates and also on the front edge of the pectoral fins. The female fish does not have these spots as a rule but shows a much fuller belly than the male. This is caused by the mass of eggs (roe), which takes up more space than the milk, (soft roe), of the male fish.



Male shubunkin showing tubercles on gill plate

Our experts' answers to tropical fish-keeping queries

Is it possible to hybridize cichlids of approximately the same length and build?

The mating of two cichlids of different species but usually of the same genus has been accomplished from time to time, but such a happening is far from common.

Could I use tufts of ordinary grass lifted from the garden to act as a spawning medium for egg-scattering species such as zebra fish or White Cloud Mountain minnows?

The short answer is yes. The grass should have the soil washed away from its roots before it is anchored in the aquarium. Furthermore, the water should be shallow (this suits spawning zebra fish and white cloud mountain minnows very well). The gradual decay of the grass will produce infusoria which will serve as a first-food for newly-hatched fry. Nevertheless, you must be on your guard against too rapid a yellowing of the grass, for this could lead to disastrous (for the fry) pollution.

Please give me the scientific name of the blind barb, its country of origin, and its behaviour and requirements in the aquarium.

Cassiobarba geertzii is the scientific name of the blind barb. This 3 in. fish occurs in certain subterranean waters in the Congo. It is as accommodating and as inoffensive as the better known blind characin (*Aequiditichthys jordani*). The usual dried and live foods and usual range of temperature suits it well.

I have bought a pair of the mid-water swimming catfish called *Epiplatys dabryanii*. What sort of treatment and food suits this catfish best?

This fish likes the company of several of its own kind. Given this, it should get along quite well in a spacious community tank stocked with fishes that mind their own business. Plenty of plants growing up to the surface will help this species to recover from its initial shyness. A temperature in the middle seventies (°F.) is advised. Also, frequent feedings with small live food.

Is it true that the arowana (*Osteolepis lineatus*), young specimens of which occasionally turn up in dealers' tanks, grow into one of the largest freshwater fishes known to science?

The arowana does reach a length of about 3 ft. but is outstripped by the arapaima (*Arapaima gigas*), another osteoglossid from tropical South America. This species, if stood on its tail, would tower above the tallest policeman.

For several years now I have maintained a 36 in. by 12 in. by 12 in. aquarium in fabulous condition. Recently, however, I set up another tank measuring 48 in. by 12 in. by 18 in. Although I have used identical lighting, compost and water as in the three-foot tank, the plants in this new tank refuse to grow. Can you suggest any reason for this?

First and foremost, the wattage of the electric lighting must be increased; for the deeper the water in an aquarium the more (brighter) light is needed to reach the bottom. Secondly, some plants will fail to survive unless they are started in shallowish water. Therefore, the best thing you can do is to reduce the depth of the water until the plants have made some headway, or, alternatively, introduce only well-developed specimens of tall-growing plants such as the larger species of *Cryptocoryne* or *Echinodorus*.

What is the technical name of the disease known as shimmyies?

Shimmyies is not a disease. Shaking of the body from side-to-side is a sign that a fish has succumbed to an abrupt change of temperature, is living in unsuitable water, or has been invaded by certain parasites. Shimmying often heralds an outbreak of white-spot disease.

I can never keep a purchased portion of *Daphnia* alive in a jar for more than about four or five days. Can you give me any advice about remedying this situation?

Live *Daphnia* need cool, well-oxygenated water and no pollution arising from dead "fleas" decaying on the bottom. A jar, unless it is a very large one, is no place for them. Empty your next purchase of *Daphnia* into a half-filled clean polythene bucket or bowl stood outdoors. In fine weather shade the container from excessive sunlight which soon leads to overheating and depletion of the oxygen in the water.

I and my family have been entertained by the antics of a silver water beetle (*Hydrophilus piceus*), which I introduced into my heated aquarium about two months ago. Do you think I have accomplished anything of scientific interest in keeping this water beetle alive in a tropical tank?

The silver water beetle will readily adapt itself to water warmer than it is used to in the wild. But few aquarists that we know of have ever tried to keep this beetle in a tropical tank. Although the silver beetle is not a predatory species the larvae is and should never be introduced where fishes are present. Another thing you must bear in mind is that the silver water beetle is an eater of water plants and an accomplished climber.

I should be grateful for some hints and tips on breeding the emperor tetra (*Neosabineus palmeri*).

This fish, like lots of other tetras, is not a ready-breeder. Be this as it may, quite a few aquarists have bred *N. palmeri* with some measure of success. The main requirements appear to be a scrupulously clean tank holding soft water giving a neutral to slightly acid reaction, a thick tangle of fine-foliated plants or a bunch of scalded coconut fibre to trap the fish's eggs, and a temperature in the neighbourhood of 80°F (26°C). As the parent fish are ardent eaters of their eggs it is necessary to remove the fish immediately spawning is over. The eggs hatch in about two days and the fry are said to grow rapidly on the usual microscopic and larger live food.

What is a geisha-girl fish?

Geisha-girl fish is just another name for *Oryzias latipes*, better-known to old-timers in the hobby as the Japanese rice fish, or medaka.

At what age does the red-tailed shark (*Lates niloticus*) reach sexual maturity?

It is generally believed that the red-tailed shark attains sexual maturity within the space of two years, or when it reaches a length of about 4 in.

I am a beginner in this fascinating hobby of tropical fish-keeping and would appreciate your advice on the following point. My guppy female produced her first batch of fry about ten weeks ago. Among them are several males, that is fish showing the red-like gonopodium. But all the fry, male and female alike, are showing so bright colours. I was assured by the dealer that all male guppies are brilliantly coloured. Did the dealer tell me the truth?

The dealer told you the truth. But what he did not tell you is that some male guppies are late in developing their bright colours. Usually, however, the late-starters turn out to be the most handsomely coloured fish. Another six weeks or so will see a great change in your fish. We are certain you will be delighted with their appearance.

On more than one occasion I have tried to keep half-beaks (*Dioscorepis*) in my tropical aquarium, but after a few weeks they have died. Please tell me where I am going wrong.

You did not give us sufficient information in your letter to aid us in finding a clue, but we hasten to inform you that

An extra half-page of queries has been inserted due to the increased number of letters received

this species should be given a tank to itself, rather shallow water made slightly saline by the addition of some seasalt, live food that haunts or rises to the surface frequently (or a small-grained dried food that floats for quite a while), and plenty of top plants. The males can be most quarrelsome and it is a good plan to keep only one male with a few females.

Is it true that a male *Betta* of more than eighteen months old is incapable of producing offspring?

This is not true, but the fact is a male fighting fish does start to lose his potency (or reproductive urge) quite rapidly when he has reached an age of eighteen months. From six months to a year is the time when a male *Betta* is at his best, that is as a stud fish.

I have been told that *Rivulus* in the wild state travel overland from one pond to another, is this really true?

Rivulus do migrate overland to fresh feeding or spawning grounds when, for some reason or another, they get the urge to do so. Of course, they choose the right time to do this as, for instance, when a heavy dew is on the ground, or after or during a fall of rain. Any *Rivulus* subjected to dry or rapidly drying conditions, would soon perish.

I have read that salt will kill catfish. May I have the benefits of your experience?

It is generally believed that catfish will succumb if salt is added to their aquarium water. Yet in the experience of those aquarists who have ignored this warning just under

a level teaspoonful of ordinary cooking salt to every gallon of water—and no more added after this—has no adverse effects. It is likely, however, that the armoured-plated catfish are less troubled by some salt in the water than the so-called naked catfish, that is catfish lacking horny shields on the sides.

There are no signs of barbels on my *Corydoras aeneus*—only blood-tinged stumps. Yet when I bought this fish six months ago it had well-developed barbels. What has brought about their disappearance?

We would say the compost in your aquarium is too sharp-edged and gritty. In the wild catfish usually haunt waters with a muddy, rounded pebble, or fine sand bottom. An abrasive grit often results in catfish wearing their barbels away, and sometimes the snout itself is worn to a bloody and disease-infected stump.

I have several fine beacons fish. What should I look for to tell the sexes apart?

In coloured-up (mature) fish the male usually displays a white patch in his anal fin. Another thing, in mature fish of about the same size the male is slimmer than the deeper-bodied female.

Is a diet which includes rather a lot of fatty meat scraps harmful to fish?

Authorities on fish nutrition say that fish are unable to digest fat properly and that fatty foods given too freely are likely to bring on diseases affecting the internal organs.

Marine queries answered by T. Ravensdale

I have been keeping marine fishes for three months now without trouble. Can you advise me if a *Zonchus* would be alright, as I have been told they are difficult.

I would strongly advise you not to buy a *Zonchus* until you have more experience unless, of course, you can afford to throw away money. I have never yet met anyone who has kept a *Zonchus* alive for more than a week or two even with a great deal of experience.

Will the "Marine Grass" one can find at the seaside live in my coral fish tank?

No. The temperature alone will kill the plant and, as a beach plant, it is used to a considerable amount of daylight which you could hardly provide without heat. The fishes will also destroy it in a very short time.

I have been offered a pair of banded coral shrimp. Will they live alright with my fish?

Without knowing what your fishes are this is a difficult question, but whatever your fishes I would not advise fork shrimps (they are in fact prawns) for they will fight constantly. One alone however will live quite happily in a community tank provided there are no predators around to eat it.

Is it practical to keep an octopus in the aquarium and if so how can it be fed?

The octopus is one of the most nervous animals in the sea and, as with all such timid, wild life, fear usually manages to win through and the first fright your octopus suffers is usually its last. Under the sea they live in holes—to which they scuttle when alarmed and if you do keep an octopus you must provide a "hole" for him to live in. A tight lid is just as essential or he will escape. Feeding should

be frequent and with shell fish which he cracks with his "beak". Only the pygmy octopus is practical in an aquarium and don't be surprised if he only lives for a few days.

Is anything being done about the marine fishes destroyed by the "Tarey Canyon" oil disaster? We hear enough about the birds.

It is not so much the oil which concerns us but the detergent used to disperse it that has caused such havoc. We all know the poisonous effect of soap in the aquarium. I am happy to report that the fish loss in the stricken area has not passed unnoticed and the "Marine Study Society of Great Britain" has formed a special committee to look into the problem. An appeal has also been launched and all interested people should contact the Secretary.

We are told to use a fine air stone in the Ozono reactor tube but I have found most fine air stones to be soluble. Is there any answer?

In order for the reactor tube to function as a "skimmer" it is necessary for the air bubbles to fill the whole width of the tube and the finest possible bubbles are recommended by the makers. Some of the fine air stones are very soluble and the answer is to make an air stone yourself from wood. A piece of Silver Birch, drilled to accept the air line and fixed with "Dow Corning" will provide all the fine air bubbles you want and will not harm the water. Ozono and reactor tubes are discussed next month in full.

How can I make up lost trace elements in my aquarium?

Rita have just introduced three new products:—Revita—Sol trace element solution, Water soft for the marine tank and Liquiglass for sealing marine aquariums. All sell at 6s. 9d.

continued from page 80

A luxury community tank

to hold the 5 ft., 80 watt, daylight fluorescent tube. The leads from the holders are taken through rubber radio grommets to 3-pin 2-amp sockets. The earth (thick) pins are connected to the lighting hood and the thin pins to the tube and the control gear for the tube. Do not try to wire this equipment unless you are quite certain you know exactly what to do. Water and electricity are dangerous neighbours.

The tank was furnished in four sections. At the left is Westmorland Green slate with all sharp edges carefully removed, this is set on edge in a compost of fine gravel, peat and Chelford Silica sand, the compost continues to give a short sandy section. The pumps and pipes are buried in the compost. The centre, over the filter, is of graded gravel $\frac{1}{2}$ in.— $\frac{3}{4}$ in. on the Tufnol covered with random $\frac{1}{2}$ in.—1 in. The gravel came from a stream near Nazareth, not in Palestine but the one in North Wales. Ideally the gravel should be from Westmorland to match the slate; however the contrast is not displeasing. Both slate and gravel were chosen for freedom from water hardening properties. The tank is completed with more Westmorland slate on the right-hand side. Plants are added to taste. I don't use lead weights; they may well be quite safe but in soft water it is as well to be sure.

Water was added by reverse syphoning through the emptying tube referred to previously. This avoids all chance of disturbing the plants or sand. I used our soft tap water with peat boiled in it for the first third of the water and clear soft water for the remainder. Distilled water can be used in part if soft water is not readily available but it lacks essential minerals; it is, however, ideal for replacing water lost by evaporation. Luckily with well fitting cover-glasses this is only a small quantity. Use of the advertised hardness testing kits is easy and interesting but chemical laboratory furnishers can supply equipment which is quicker and, if used often, more economical; they also supply universal test papers to check the pH of the water. To use them a short piece of glass or plastic tube is dipped into the tank and a spot of water is dropped on to the test paper. The colour change is compared with the reference chart to read the pH.

If expensive fish are to be installed it may be thought desirable to change the water after a few days and let it stand for a few more days before stocking. However, I am impatient so I take care to boil the gravel, sand and slate and after waiting a few days to make sure no greasy scum is formed, in go the fish. I take the usual care in equalising temperature and mixing the waters over a period of an hour or two to reduce the chance of pH or hardness shock.

I now have a tank which I consider attractive and which, should require the minimum of attention. Careful stocking and care to avoid having the light on too long will

keep the glass cleaning to a minimum. I always include catfish or sucker loaches. As this tank has sand over part of the area I chose Whiptail catfish, *Loricaria parva*, as they are slow moving and do not stir up the sand. Other fish of suitable size for this soft, peaty water include:—*Hyphessobrycon cardinalis*, *H. gracilis*, *H. heterorhabdus*, *H. innesi*, *H. pulchripinnis*, *H. Rosaceus*, *Nannostomus anomalus*, *N. marginatus*, *N. trifasciatus*, *Neolabris amoeri*, *Poeciliobrycon aspei*, *Aphyusium australe*, *A. arnoldi*, *A. bicinctum*, *A. calabarum*, *A. cognatum*, *A. gardneri*, *A. peteri*, *A. shoustedoi*, *A. splendens*, *Rasbora heterostepha*, *R. maculata* i.e. most lyre tails, many tetras, Harlequins and Pencil fish. Reference to the standard general textbooks will reveal other fish which will be happy in this type of water.

If you decide to make an over mantle community tank I hope that you get as much pleasure as I have and that this article will help you to avoid some of the difficulties.

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Around the Aquariums

of the aquarium, specimens taken from the River Clewyd. These include Eels, Roach, Flatfish, Salmon and so forth. These fish will only be on display for a few days, after which they will return them to the river.

Among the reptiles will be found the unusual *Mastomys*, the largest specimens of their kind in any British Zoo.

As many of our readers already know, Dougie Petrie is the Zoological Director of the Llanerch Zoo Park, St. Asaph, N. Wales.

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Will the many readers who have written to me over the past few months, please overlook my delay in answering your most welcome letters, but for some time I have been at home in Ireland, owing to my brother being killed in an accident in London, where he was working on a tower which gave way and he fell 75 feet to his death.

Now I am back here in England where I am again this season the Wild Animal Trainer for the Sir Robert Fossitt Circus and Zoo, and during my travels I am looking forward to meeting many of our readers, especially those of you who, in the past have written to me seeking various information which I am always glad to give, if at all I have it, and I may add many queries come from overseas.

Going marine Part 6—Diseases

by T. Ravensdale, F.B.I.S., F.M.S.S., A.M.Z.S.

Oodinium

THIS is a disease of the gills usually referred to among fresh water aquarists as "Velvet" and is, unfortunately, extremely common in the marine aquarium. It is an epidemic disease brought on by a parasitic flagellate. The tiny parasites cannot usually be seen in the place where most harm is done, the gills, and is usually diagnosed long after the disease has become quite advanced. The ailment by then affects all parts of the body. Oodinium is easily recognised at this stage for the fish loses its colour and becomes "peppered" in fine spots which take on a yellow tinge. At this stage the fish is obviously unwell and soon refuses food. The Oodinium flagellates insert blood disturbing substances into the skin of the fish. This severe irritation to such delicate parts of the fish as the gills causes a swelling which soon interferes with breathing. Following this stage a poor skin pallor becomes noticeable and sluggish movements, combined with a lack of appetite, should confirm the disease. Oodinium is often confused with poisoning. An interesting fact about Oodinium is that it seems to occur more often with West Indian fishes. The Clown fish is particularly susceptible and in view of this I personally carried out a series of experiments both in the aquarium and under the sea with under-water equipment especially obtained for the purpose. My observations showed that the sea anemone actually feeds on the skin of a stricken fish! This does not, of course, mean that only a diseased fish will seek shelter in an anemone but that, for example, a clown fish with Oodinium will fight with another in order to get into the tentacles and these arms soon clear the disease. My contention is that many other fishes are safe in the "poisonous" anemones, provided they are infested with Oodinium or a similar disease. The clown has become greatly attached to the anemone simply because it is more susceptible to catching these diseases. Cold water anemones, incidentally, are not to be trusted with any small fish for they will sting to death even the clown if brushed by the body.

The cures offered for Oodinium vary but the ones I found to be most successful were Copper Sulphate, Methylene Blue or Dicsasolve. The latter is an easy remedy to try first for it does not cause discoloration and stain the coral and is unlikely to affect the fish adversely should it not prove successful in curing the disease. Methylene Blue is, perhaps, more effective but it will unfortunately stain coral or sub sand. The "blue" should be added to the aquarium via the filter (as should all chemicals) so as to avoid too sudden a change for the fishes. The amount of "blue" used will depend entirely upon the severity of the disease and can be added to a strength which will darken the water enough to render the

fishes impossible to be seen if necessary. Filters and lights should be turned off and the temperature should be gradually lowered a full five degrees. The Oodinium flagellates are unable to survive without light or heat. Do not be concerned about the discoloration of your aquarium water for it will fade away after a while. Should it fade too quickly and not be detectable after a few days then add more Methylene Blue for Oodinium has a ten day cycle and unhatched eggs are unaffected by the treatment. Once a parasite has reached maturity it leaves the fish and drops to the bottom of the aquarium. It then splits up into eight, sixteen, thirty two, sixty four etc. parts. These parts become spores and must find a host within twenty four hours or die. Water therefore which has contained Oodinium-contaminated fish should be safe for re-use if it has been allowed two or three days to stand.

Copper sulphate can be the marine aquarist's best friend but it should not be forgotten that copper is not only toxic to many parasites but, in sufficient quantity, just as deadly to fish. Copper is a poison and should always be treated as such. A little can cure whilst a little more can kill. A maximum concentration acceptable to most coral fishes is 20 Mgs. per gallon and even this strength should only be resorted to when all else has failed. Some coral fishes can accept more copper concentration than others, so begin with at most 10 Mgs. per gallon strength. This can be increased to the maximum strength when the situation is desperate but ensure that it is so first. Have you caused a complete water change? Have you raised or lowered the water density? Varied the temperature? Your job when presented with any form of illness in the aquarium is to produce conditions insufferable to the cause of the trouble but with as little possible disturbance to the invalid. The biggest nuisance to the germ combined with the least nuisance to the fish is your ultimate. Delicate microbes are usually quite unequipped to cope with such a drastic water density change as .003 sp, if your specific gravity is 1.025, change it to 1.022 or 1.027. Do not use this method unless you are quite sure your fish is able to suffer the change; remember that he is sick.

Most chemists will prepare a solution of copper sulphate to the strength you wish. Simply give him the gallonage and ask for a solution to give you 10 Mgs. per gallon in that water. You may then dilute this at will without the necessity for constant calculations and should try your first dosage at half strength before resorting to a more powerful dose. Always try the weak solution first; do not give a large dose simply because the fish looks very badly infected. The effect copper has on a fish is to cause considerable irritation to the dermal cells of the skin. A mucus is secreted through these cells and the resulting movement of fluids through the skin from the inside,

inward as usual from the other way round, causes the parasite to loosen its hold and drift off into the water where it is then promptly poisoned by the copper.

It is most important to note that many invertebrates, especially the anemone, are completely unable to stand even the slightest amount of copper, so never allow these animals to come into contact with it. Remove them if they have been in contact with the disease and treat them as new specimens once again by putting them through the whole quarantine routine again.

Another remedy used and recommended by some coral fish experts is Acriflavine but although reports are good I have never personally experienced success with it and cannot therefore verify cures, but all treatments are worth a try; what is good for the goose etc. does not always work in coral fish keeping. My water may differ considerably to the hobbyist one mile up the road.

Benedenia

This wretched ailment is brought on by parasites rather similar to the Oodinium flagellate but in a much larger form. It also places a greater demand upon the fish. Benedenia is easily seen, usually upon the transparent areas such as fins, but the best place of all to locate and recognise this ailment is on the eye where it becomes magnified. Should any fish suddenly decide not to eat then inspection of the eyes will very often result in the discovery of some form of parasite or other. Lion fishes and large butterflies seem more prone to catching Benedenia and once a hold has been grasped on a fish the whole tank soon becomes infected. The parasite seems to affect the fish to such an extent that irritation of the skin soon becomes unbearable. A fish is completely unable to touch its own body in any way. It has no arms to scratch with and can reach no part of its own body at any time. It can therefore only relieve irritation by "scratching" on external objects and this it does by diving into the coral or rubbing up against sharp objects. This "scratching" can be just as dangerous as the parasite itself if prolonged, so act if you observe a fish diving into the sub sand, and if an external parasite is not visible then an internal one probably exists. A temperature drop should be enforced immediately and all lights should be dimmed or turned off. A more drastic cure can be enforced by the use of copper sulphate.

Ichthyophonus

Unlike Oodinium and Benedenia, which are external parasitic diseases, ichthyophonosis is caused by an internal parasite which grows in the form of a fungus. It is often caused by unclean foods and is relatively common among many of the damselfish. It can also be caused by an algae spore. It is recognisable usually by the size and condition of the belly of the fish and looks somewhat like dropsy. The belly becomes bloated and the scales are unable to lie flat. The area can even become so extended that blood can be seen. Predators fed with unhealthy fresh water fishes are liable to suffer this infection as are,

in fact, any fish fed with food that is not thoroughly clean. Streptomycin with penicillin can effect a cure and should be added at a strength of 250 milligrams of each per gallon. The British wonder drug, Penbritin, may also secure health.

Ichthyophthirius

This disease, often referred to as "salt water ick" or "white spot" is quite common in the fresh water aquarium. It is also a disease which the fresh water aquarist takes in his stride, knowing full well it is easily cured. This attitude should not be permitted where coral fishes are concerned and "ick" should rate high as a killing disease for it is precisely that. "Ick" is as easy to recognise in coral fishes as it is in fresh water and is identifiable by the large white spots which appear firstly on the fins of stricken fishes. They are considerably larger than Oodinium spots and are white instead of yellow. The white spots should be noticed on the fins and not when they have already reached the body. Coral fishes very often have a white spot on a fin usually the caudal and, provided this spot does not become larger or turn into two spots, it can be ignored for the fish will probably keep this mark for the rest of its life. "Ick" is an extremely contagious disease and will run through an aquarium like wildfire if allowed to, killing all your stock overnight. Like Oodinium this disease parasite drops from the skin of the fish when mature, the only difference being in its method of reproduction. Instead of splitting into groups of 8, 16, 32 etc., several divisions are made from which many other sub divisions are formed. Therefore the descendants from one single adult may well run into thousands. The young can live for much longer periods without a host than Oodinium and can stand much lower temperatures. In this case, therefore, the temperature is raised, as much as 10°F. The "ick" parasite bores its way into the epidermis of the fish and then slides along above the dermis. In this way it is protected on each side by a layer of skin. The holes which they create in this manner often house several immatures. When these "housing areas" become overpopulated the skin may burst and further disorders may be introduced such as an abscess or fungus. A heavily populated aquarium will suffer a far more serious attack than a sparse one, so don't overcrowd your tank. Copper sulphate, quinine or Acriflavine may be used as tonics and lighting should be reduced. A fourteen day period should be the minimum time allowed for a cure. Should quinine be used at all then the whole aquarium water will have to be changed when the disease is cured.

Next month:

Lymphocystis, Exophthalmos, Saprolegnia, Argulus, Wounds.



from AQUARISTS' SOCIETIES

THE results of the third annual open show of the Houghton-le-Spring and District A.S. were as follows: Guppies: 1, G. Martin (Newcastle Guppy Club); 2, W. Hoareman (Sunderland A.S.); 3, T. Woughton (Houghton A.S.); Mollies: 1, W. Payer (Stockton A.S.); 2, W. Payer (Stockton A.S.); 3, J. Robinson (Peterlee A.S.); Swordtails: 1, J. Collins (Stockton A.S.); 2, A. Davison (Peterlee A.S.); 3, J. Chamberlain (Stockton A.S.); Plaies: 1, A. Skoyles (Newcastle Guppy Club); 2, C. Bridge (Houghton A.S.); 3, W. Jones (Peterlee A.S.); Small Fishes: 1, P. Patterson (Stockton A.S.); 2, E. Dunn (Peterlee A.S.); 3, Mr. Lancaster (Middlesbrough A.S.); A.O.V. Fish: 1, J. Robinson (Peterlee A.S.); 2, M. Robinson (Peterlee A.S.); 3, Mr. Mason (Middlesbrough A.S.); Small Characins: 1, Mr. Bowman (Stockton A.S.); 2, R. Bentley (Newcastle Guppy Club); 3, D. Robinson (Houghton A.S.); Large Characins: 1, J. Chamberlain (Stockton A.S.); 2, W. Inneson (Peterlee A.S.); 3, J. Robinson (Peterlee A.S.); Dwarf Cichlids: 1, J. Robinson (Peterlee A.S.); 2, P. Peterson (Stockton A.S.); 3, Mr. Mason (Middlesbrough A.S.); A.O.V. Cichlids: 1, J. Paves (Peterlee A.S.); 2, M. Robinson (Peterlee A.S.); 3, W. Hoareman (Sunderland A.S.); A.V. Fighters: 1, and 2, R. Althorn (M.S.A.S.); 3, Mr. Whitlock (Tadcaster A.S.); A.O.V. Labrids: 1, Mr. Whitlock (Tadcaster A.S.); 2, Mr. Dodsworth (Hartlepool A.S.); Sharks and Labrids: 1, J. Robinson (Peterlee A.S.); 2, C. Bridge (Houghton A.S.); 3, Mr. Dawson (Newcastle Guppy Club); Rabbits and Dams: 1, J. Hill (Houghton A.S.); 2, Master J. Willinson (Stockton A.S.); 3, M. Robinson (Peterlee A.S.); Egg Laying Fishes: 1, Mr. Dodsworth (Hartlepool A.S.); 2, Mr. Squire (Houghton A.S.); 3, Mr. Greenhall (Tadcaster A.S.); Catfish and Loach: 1, Mr. & Mrs. Cleman (Stockton A.S.); 2, Mr. Pomeroy (Newcastle A.S.); 3, P. Peterson (Stockton A.S.); A.V. Goldfish: 1 and 2, Mrs. Hunt (Houghton A.S.); 3, Mr. South (Cleveland A.S.); 2, D. Robinson (Houghton A.S.); Breeders Livebearers: 1, A. Trotter (Cleveland A.S.); 2, Mr. Faircliff (Tadcaster A.S.); 3, C. Bridge (Houghton A.S.); Breeders Eggfish: 1, Mr. Faircliff (Tadcaster A.S.); 2, W. Hoareman (Sunderland A.S.); 3, Mr. Collins (Stockton A.S.); A.O.V. Fish: 1, R. Althorn (M.S.A.S.); 2, C. Robinson (Newcastle Guppy Club); 3, Mr. Whitlock (Peterlee A.S.); The Best Fish in Show was a Scar Shiner by R. Althorn (M.S.A.S.); The Blue Ribbon Trophy was won by Stockton A.S. with highest Club points. The President's Trophy was won by J. Robinson (Peterlee A.S.) with the highest individual points. The Judges were W. Catmell of Richmond, Yorks., and J. Robertson of Dunston-on-Tyne.

THE second Open Show of the Freeland A.S. was held on the 13th May, when 266 entries were hatched, which, together with the exhibition by the British Killifish Association, made an impressive show. In addition, the Fancy Guppy Association held an Open show, in which there were 46 entries. Two lectures were given during the afternoon, the first by Dr. Carr, and the second by Dr. Carrington of Interpet; the Club would like to extend its thanks to these gentlemen. Results were as follows: Best Fish in the show: Giant Australian Rainbow, Mrs. J. A. Dutton. A.V. Fry or Swardtail: 1, Margold Platy, G. Greenhalgh; 2, Red Fry, E. T. Smith; 3, Red Platy, B. Challinor; 4, Margold Platy, G. Greenhalgh. A.V. Mollie: 1, Black Mollie, J. Thorne; 2, Velifera Mollie, T. H. West; 3, Velifera Mollie, T. Brown; 4, Velifera Mollie, S. C. Jones. A.V. Barb: 1, B. Schubert, J. J. Coleman; 2, B. Schubert, J. J. Coleman; 3, Nigger barb, F. H. Vicker; 4, Tiger barb, D. Valeric; A.V. Characin: 1, N. Trifanovic,

E. Kari; 2, Dugan fu, T. Payne; 3, Red-nose tetra, B. Pearson; 4, Lepidostichus, E. Kemp; A.V. Cichlid: 1, Brown scaper, E. Kemp; 2, Tetrazoite, R. Dryden; 3, Blue acara, J. E. T. Smith; 4, P. guthriei, A. Jamison; A.V. Danio, Rainbow, White-Cold Mountain Mollie: 1, B. Trifanovic; 2, B. Trifanovic; 3, R. sarawakensis, R. Riggs; 4, Harlequin, W. West; 5, Giant danio, A. Lovett; A.V. Tooth-carp, Killifish: 1, R. Jami, T. Payne; 2, A. Anstrade, B. J. Pawley; 3, N. rathora, B. Chabonoff; 4, E. acanthopterus, B. Chabonoff; A.V. Corydoras Cat: 1, Corydoras sp., S. C. Jones; 2, C. lepida, R. Riggs; 3, C. tritini, P. Trank; 4, C. punctata, R. Riggs; A.O.V. Catfish: 1, Albino Garra, J. Thorne; 2, Micro Glanis, J. Thorne; 3, Armoured Cat, R. Stewart; 4, Albino Claris, A. Jamison; A.V. Fighters: 1, Red fighter, Mr. Durrant; 2, Fighter, Mr. Marshall; 3, Blue fighter, Mr. Durrant; A.O.V. Livebearers: 1, Dwarf Gourami, G. R. Bass; 2, Thin-lip, M. J. King; 3, Thick-lip, C. Statham; 4, Moonlight Gourami, P. E. T. Smith; A.O.V. Tropical: 1, Giant Australian Rainbow, Mr. Durrant; 2, R. T. B. Shark, D. Chenevill; 3, Black Shark, G. Greenhalgh; 4, Silver Shark, W. West; A.V. Goldfish: 1, Shubunkin, Mrs. W. Vowsey; 2, Goldfish, Mr. Vowsey; 3, Common Goldfish, Mr. Vowsey; A.V. Bristled Plant: 1, Lushpina, V. P. Vowsey; 2, Amazon Sword, Mr. Marshall; 3, Sagittaria nitens, T. Ananth; 4, Cryptocarpus, T. Ananth; Breeders Tropical Eggfish: 1, Red Fighters, Mr. Durrant; 2, Epiplatys jagati marmorata, N. W. Scolling; 3, Emperor tetra, P. H. Vicker; 4, Rony Barbs, S. C. Jones; Breeders Tropical Livebearers: 1, Velifera Mollie, F. E. T. Smith; 2, Tuxedo Swords, D. Glass; 3, Velifera Mollie, T. H. West; 4, Red-eyed Swords, C. Fisher; Individual hatched Aquaria: 1, Mr. J. Stewart; 2, Mr. T. Hamley.

AT their April mid-monthly meeting the North Warwickshire A.S. made up a number of members of the Society to answer questions, and this proved very successful. At the end of the month the Society was given a very interesting talk and film show by Eddy Brown of Tamworth. About 50 members attended and plenty of everyday fish points were raised and discussed.

THE A.Y.A.S. Open Show was held at the Railway Institute, Hull. The following were the results: Livebearers: 1, Master Anon (Chapelton); 2, Master P. Reynolds (Swillington); 3, Mrs. Barry (Swillington); Barbs: 1 and 2, Mr. and Mrs. Firth (Bradford); 3, Mrs. Barry (Swillington); Characins: 1, Mrs. Hutcheon (Snatch); 2, Mr. & Mrs. Firth (Bradford); 3, Mrs. Sides (Chapelton); Capps and Minnows: 1, Mr. P. Shepherdson (Hull); 2, Mrs. B. Cohen (Ponterfick); 3, Mr. A. Pascoe (Hull); Cichlid: 1, Mr. Tunney (Chapelton); 2, Mr. Todd (Ind.); 3, Mr. Collingwood (Hull); Gars and Loaches: 1, Mr. Tunney (Chapelton); 2 and 3, Mr. Holdsworth (Bradford); Anabantids: 1, Mr. Whitlock (Tadcaster); 2, Mr. Carden (Thorne); 3, Mr. Duffield (Thorne); Fighters: 1 and 2, Mr. Whitlock (Tadcaster); 3, Master Anon (Chapelton); A.O.V.: 1, Master P. Reynolds (Swillington); 2, Mr. Tunney (Chapelton); 3, Mr. Bean (Snatch); Toothcarps: 1 and 2, Mr. Wood (Barnsley); 3, Mr. Greenall (Tadcaster); Breeders Livebearers: 1, Mr. Tunney (Chapelton); 2, Mr. Greenall (Tadcaster); 3, Mr. Soory (Hull); Breeders Eggfish: 1, Mr. D. Cohen (Ponterfick); 2, Mr. T. Toak (Hull); 3, Mr. Holdsworth (Bradford); Pairs (Livebearers): 1, Mr. Greenall (Tadcaster); 2, Mr. Toak (Hull); 3, Master P. Reynolds (Swillington); Pairs (Eggfish): 1, Mr. Collingwood (Hull); 2, Mr. & Mrs. Firth (Bradford); 3,

Mr. Abdy (Chapelton); Goldfish: 1, Mrs. E. Hunt (Houghton-le-Spring); 2 and 3, Mr. Jackson (Sheffield); Furnished Jar: 1 and 2, Mrs. Barry (Swillington); 3, Master P. Reynolds (Swillington); Best Fish, Mr. Whitlock (Thornhill) 80 points; Fighter Plaques, Mr. Whitlock (Tadcaster); There were 239 entries in 38 classes.

THE Bury St. Edmunds and District A.S. with in contact any other Aquarists Society within a 35 mile radius of Bury. Meetings fortnightly at "The Bush", St. John Street, commencing 7.30 p.m. All new members welcome. Enquiries to Mr. G. D. Peck, 40 Park Road, Bury St. Edmunds, Suffolk.

RESULTS of the third round in the Club Championship Cup contest of Crawley College A.S. were as follows: 1, Mrs. J. H. Partridge, 79 points; 2, Mr. R. J. A. Partridge, 70 points; 3, Mr. R. A. Partridge, 77 points.

THE officers elected for this year for the Cambridge and District A.S. are as follows: President, Mr. Ekersen; Chairman, Mr. Bove; Vice-Chairman, Mr. Edney; Secretary, Mrs. G. M. Halyer; The Gemmary Lodge, Newmarket Road, Cambridge; Treasurer, Mr. N. Radford; Assistant and Show Secretary, Mr. W. Ingrave; 74 Milton Road, Cambridge; Librarian, Mr. Halyer; Publicity, Mr. G. P. River; Supporting Committee, Messrs. Able, Freeman, Halyer, Human, Sanderson, Sharp. An increase in membership and an entertaining future programme looks like ensuring one of the most successful years in the Society's history. The new rooms in the Ross and Green, corner of Newmarket Road/East Road, Cambridge. Meetings first Tuesday in the month. New members can be assured of a warm welcome and luncheon are also invited.

The Cup final did not draw about 200 people attending the most successful show ever held by the Society, which attracted over 140 entries, those being judged by Mr. Stewart of London. Details were: Best fish in Show and Best Egglayer, Snakeskin Gourami, 89 points (Mr. A. Halyer); Best Livebearer Mr. Ott; Best Goldfisher (Mr. Halyer); Best Fish breed (Mr. W. Ingrave); Class Winners, Goldfisher: 1 and 2, Mr. Halyer; 3, Mr. Bove; Guppies: 1 and 2, Mr. Ott; 3, Mr. Sharp; A.O.V. Livebearers: 1, Mr. Ott; 2, Master Soory; 3, Mr. Edney; Barbs: 1 and 3, Mr. Ott; 2, Mr. Edney; Anabantids: 1, Mr. Halyer; 2, Mr. Greenough; 3, Mr. Edney; Cichlid: 1, Mrs. Halyer; 2, Mr. Halyer; 3, Mr. Radford; Catfish and Loach: 1 and 2, Mr. Halyer; 3, Mr. River; Characins: 1, Mr. Durr; 2, Mr. G. P. River; 3, Mr. F. Able; A.O.V. Egglayers: 1, Mr. Durr; 2, Mr. Cooper; 3, Mr. G. P. River; Pairs: 1, Mr. W. Ingrave; 2, Mr. Halyer; 3, Mr. Greenough; Rosada: 1 and 2, Mr. R. Edney; 3, Mr. Ingrave; Furnished Aquaria: 1, Mr. Edney; 2, Mr. Sanderson; 3, Mr. River.

THE members of the Leeds A.S. enjoyed a new talk on "Water Gardens" by Mr. R. Waterburn of Bradford at the May monthly meeting. The results of the May table show were as follows: Marney Trophy (Platy): 1, Mr. G. Boothroyd; 2, Mr. G. Orchard; 3, Mrs. P. McCourt; Society Plaques (Egglayer Pair): 1 and 3, Mr. E. J. Bateman; 2, Mrs. P. McCourt; Novice Class: Master G. Hill. The Open Day show has been changed to Sunday, 26th November, in order to avoid clashing with another local society.

AT the second Table show of the year of the Craggie and District A.S. the first prize in the Novice class went to Mr. Newton with a Guppy, second was Mr. P. Dixon with his N. Trifanovic, and third Mr. Newton with another Guppy. The only prizewinner in the Guppy class was Mr. B. Puseell. Mr.

D. Towell took first and second prizes in the W.C.M.M. Dames and Rubens class, with a Rubens Mermaid and White Cloud Mountain Minnow. Mr. I. McGee won the Mollie class with a Green Molly. Mr. T. Summers won two prizes in the Lathin class with two C. Jells. During the judging a number of members discussed fish boxes they had constructed, the materials that had been used, the type of heating that had been installed, and the size and number of aquariums that were in use.

At a further club meeting members heard an interesting lecture on fish diseases, the cure and prevention, and all agreed that many useful tips had been picked up. Recent club activities have included a weekend in Holland and a trip to see the Black and White Mottled Show. At the third Table Show of the season Mr. B. Baker officiated as judge. The breeders livebearers class was won by Mr. B. Fennell with an entry of Liberty Mollies. Mr. Bowley won the breeder egglayer class with his Black line tetra, a notable achievement this as it was his first attempt in this class. There was only one entry for the egglayer Tooth carp which was a Tondulus Chryseus and this took the prize for Mr. Summers. In the Labrynth class three prizes were awarded, Mr. J. McGee won first with a Dwarf Gourami, second Mr. D. Towell Leon Gourami, and third Mr. N. Lee Three Spot Gourami. In the Characin class Mr. H. Small took first award with a E.A. Tetra, second being Mr. I. McGee with an A. Anconatus. The prize for Swordfish went to Mr. D. Towell with his Red Male and in the Nerode show Mr. P. Dixon took the only prize with a Serpis Tetra.

THE members' show of the Burton and District A.S. was a great success in spite of bad weather, and the excellent judging of Mr. P. Filmer, Derby was greatly appreciated. The results were as follows: Best fish in the show (Tropica) Mr. J. Hunt; Best Tailed Black Shark; Best Cold-water fish in the show; Mrs. E. Hunt (Shubunkin). The other awards were: Anabantus: 1, Mr. B. Poisson; 2, Mr. B. Porman; 3, Mr. G. Jackson; 4, Mr. H. Walker. Barb: 1, Mr. G. Jackson; 2, 3 and 4, Mr. J. Hunt; Goldfish and Loaches: 1 and 3, Mr. H. King; 2, Mr. B. Walker; 4, Mr. J. Hunt; Cichlids: 1, 2 and 3, Mr. J. Hunt; 4, Mr. H. King; Characins: 1, Mr. B. Poisson; 2, Mr. G. Jackson; 3, Mr. H. King; 4, Mr. J. Hunt; Guppies: 1 and 3, Mr. B. Poisson; 2 and 4, Mr. G. Chesser; 2, Mr. H. King; 3, Mr. B. Poisson; Mollies: 1, Mr. B. Poisson; 2, Mr. H. King; 3, Mr. J. Hunt; 4, Mr. G. Chesser; Paries: 1, 2 and 4, Mr. J. Hunt; 3, Mrs. E. King; Swordfish: 1, Mr. B. Poisson; 2 and 3, Mr. J. Hunt; 4, Mr. G. Chesser; Rubens, Dames, White Cloud Mountain Minnow: 1 and 2, Mr. J. Hunt; 3, Mr. G. Jackson; 4, Mr. H. King; A.O.V. Tropical: 1, 3 and 4, Mr. J. Hunt; 2, Mr. B. Walker; Goldfish Variety: 1 and 2, Mrs. E. Hunt; 3, Mr. J. Hunt; 4, Mr. A. Hunt; A.O.V. Coldwater: 1, Mr. B. Porman; 2 and 3, Mr. J. Hunt; 4, Mr. A. Hunt; Furnished Aquaria (Tropical): 1, Mr. B. Poisson; 2, Mr. G. Jackson; 3, Mr. H. King; 4, Mr. G. Chesser; Furnished Aquaria (Coldwater): 1, Mr. H. King; 2, Mr. J. Hunt; 3, Mr. A. Hunt; 4, Mr. B. Porman; Competitor: 1, Mrs. E. Hunt; 2, Mr. G. Jackson; 3, Mr. G. Elton; 4, Mr. C. Parker; 5, Miss Robinson. Monthly meetings are held at the Fox and Goose (Bridge Street) Burton on second Thursday of the month at 7.45 p.m. and the Secretary is Mr. B. Page, 91 Hillside Road, Linton, Burton on Trent.

THE New Forest A.S. held its Annual General Meeting recently when the secretary said that the membership is now the largest in the Society's history. The Chairman mentioned that during the past year the entertainment had been varied, and that they had had five colour slide evenings, one lecture on Goldwater fishkeeping and two Quizzes. The election of officers for the coming year resulted as follows: Secretary, Mr. R. Towers, 6 Arkland Avenue, Brockenhurst, Hants; Chair-

man, Mr. J. Jeffrey; Treasurer, Mr. D. Lema; Show Secretary, Mr. D. Harding; Assistant Show Manager, Mr. C. Knapp; Committee, Mr. Williamson, Mr. K. Hinton.

The Championship Show was judged by Mr. Stollwell of Portsmouth, A.S. and the results were: Tropical: 1, Mr. D. Harding; 2 and 3, Mr. A. Williamson; 4, Mr. D. Harding; Coldwater: 1, Mr. A. Williamson; 2, Mr. C. Harvey; 3, Mr. D. Harding; 4, Mr. E. Corill. The Secretary will be pleased to give further details of membership on application and would welcome new members at the meetings which are held on the third Monday each month at Community Centre, New Street, Lymington, at 7.30 p.m.

RECENT highlights at Southend, Leigh and District A.S. meetings have been: A Mini-tank show, a complete aquarist set up in a show jar. Prizes were awarded to E. Thompson (first and second), E. Walling (third), Mr. Papper (fourth). S. C. Halsey who judged the competition had a difficult task as this type of Table show is very popular with Southend members. He judged the mini-tanks on their pleasing appearance not on permanence nor suitability for keeping fish permanently.

Another show well supported was for Plants. Results were: 1, Mr. Papper, 75 points; 2, D. Chiverslight, 72 points; 3, Mr. Papper, 71 points; 4, D. Chiverslight, 70 points. The plantings in another show held for Swordfish was as follows: 1, S. Norris, 85 points; 2, D. Roberts, 84 points; 3, E. Thompson, 79 points; 4, J. Cooper, 78 points. The Society now meet at St. Andrew's Hall, Electric Avenue, Westcliff, Essex which is one hundred yards from Chalkwell Park. New members always welcome. For details of membership or any advice write to Secretary, Mr. J. Willis, 15 Arundel Gardens, Westcliff.

THERE was a good attendance at the May meeting of the Warrington A.S. to hear Eddie Pillingier's talk "The Other Side of the Coin". Fish of the Month was for Goldfish and the result was as follows: 1, Malcolm Watlin; 2, Mrs. Stella Bond; 3, Ron Trench. The Society has recommended recruitment and publicity as they can now cater for ever-increasing wish to attend. Spacious accommodation has been obtained at The Railway Social Club, Warrack Street, which is in Warrington Town Centre and was recently the venue for the highly successful fish show at which 250 people attended without discomfort. For further details of the Club phone contact Mr. Ron Trench, 208 Manchester Road, Warrington, or telephone 1845.

THE two meetings of the Bannockside A.S. in May consisted of a Slide and Tape show on Plants from Rugby A.S. and a talk on fish boxes construction. The second meeting was devoted to the inside of fish houses and a Table show for pairs and Coldwater. Eighteen pairs of fish were benchaled the winners being E. Smith (Fighters), E. Parry (Rory Barb), E. Parry (Guppies), Coldwater: 1 and 2, M. Rankins.

THE Hounslow and District A.S. are holding their Open Show on Saturday, 14th September, at St. Andrew's School, Hounslow, Middlesex. Last year's visitors were exceedingly well supported and a large number of very fine fish were exhibited. The number and quality of the trophies given last time evoked considerable admiration and some surprise from competitors and spectators and it is hoped to improve still further on those this year. Show Schedule are obtainable from the Secretary, Mr. D. J. Woodward of 16 Ellington Road, Hounslow, Middlesex.

AT the recent Annual General Meeting of the Association of South London A.S. the following persons were appointed as the Executive Committee: Secretary, I. G. Flintham, 101 Strand on the Green, W.4.

Treasurer, Mrs. Moore, 1604 College Road, Upper Norwood, S.E.19. Chairman, J. Thorer, 108 The Grove, Isleworth, Middlesex. Members: F. Olyra, Esq., B. Kemp, Esq., R. Dudley, Esq., and A. Tucker, Esq.

The Association is supported by fifteen member societies and is in the course of making final arrangements for the holding of an open show on 2nd and 3rd July. A series of interclub matches are also being organised and details of membership may be obtained from the Secretary. Delegate Meetings are held every quarter at the Association's headquarters at Sutton Adult School, Birchall Avenue, Sutton, Surrey and the next meeting will take place on 12th July at 8 p.m.

THE lecturer at the April meeting of the Chappeltown and District A.S. was Mr. A. Harper of Peppercorn, Stockport, and his talk and film show on Marine Fish was greatly appreciated. Any doubts one may have had with regard to keeping marine fish were soon dispelled after Mr. Harper had so thoroughly covered the "do's and don'ts" when setting up a tank. This film show, lecture and lecturer are to be highly recommended.

The first leg of the Inter-Society Show between Chappeltown, Warrack, Greenwell and Sheffield was also held in April. Chappeltown are hoping to retain the cup which they have held for two years although Warrack are at the moment leading the field. The April Table Show was won by B. Wiggings with a Royal Barb, second being G. Gregory with a Chequer Barb and third, J. Anson with an Albino Tiger Barb.

THE full results of the Oveam A.S. Open Table Show held in May were as follows: Anabantus: 1, E. Price (Gorton); 2, E. Fletcher (Glossop); 3, P. Mulla (Mansfield); Fighters: 1, E. Mackay (Ovram); 2, W. Booth (T.A.B.); 3, K. Wilberham (Ovram); Small Barbs: 1, 2 and 3, F. Gregory (Ovram); Large Barbs: 1, A. J. Parker (Mansfield); 2, H. Rodlock (Ovram); 3, R. Wilkinson (Haltwh); Labco & Shorka: 1, G. Kershaw (Heywood); 2, Mr. Sorey (Haltwh); 3, Mr. Tomkinson (Glossop); Small Characins: 1, K. Wilberham (Ovram); 2, G. Hammett (Glossop); 3, Mr. & Mrs. Charlton (Stockport); Medium Characins: 1, E. Price (Gorton); 2, A. G. Whyte (Haltwh); 3, Mr. Rowbottom (Mansfield); Large Characins: 1, I. Robinson (Mansfield); 2, P. Mulla (Mansfield); 3, R. Wilkinson (Haltwh); Dwarf Cichlids: 1, D. Cook (Glossop); 2, L. McCann (Gorton); 3, P. Mulla (Mansfield); Angel Cichlids: 1, M. Taylor (Rockdale); 2, Mr. Longbottom (Mansfield); 3, F. Woodward (Blackpool); A.O.V.: 1, Mr. Cam (Mansfield); 2, P. Hodgkinson (Gorton); 3, F. Mulla (Mansfield); Tooth Carps: 1, Mr. & Mrs. Charlton (Stockport); 2, M. Taylor (Rockdale); 3, Mrs. Hodgkinson (Gorton); Rubens: 1 and 3, F. Gregory (Ovram); 2, Mr. Hodgkinson (Gorton); Dames: 1, Mr. Leggan (Glossop); 2, A. Bentley (Ovram); 3, K. Ashworth (Ovram); Guppies: 1, Mr. Johnson (Stockport); 2, Mr. Hearnth (Glossop); 3, Mr. Hearnth (Glossop); Swordfish: 1, Mrs. Percy (Heywood); 2, W. Renshaw (Stockport); 3, A. G. Whyte (Haltwh); Mollies: 1, J. Pagan (Ovram); 2, D. Cook (Glossop); 3, N. Leman (Glossop); Paries: 1, Mr. Hodgkinson (Gorton); 2, R. Birch (Heywood); 3, E. Fletcher (Glossop); Loaches: 1, J. E. Shaw (Ovram); 2, N. Taylor (Ovram); 3, Mr. Hodgkinson (Gorton); Carfish: 1, W. Booth (T.A.B.); 2, K. Wilberham (Ovram); 3, E. Price (Gorton); Goldfish: 1, Mr. Howarth (Glossop); 2, Mrs. T. Davies (Heywood); 3, H. Pridell (Ovram); Shubunkins: 1, K. Birch (Heywood); 2, Mr. Endon (Sheffield); 3, Mr. Bannett (Glossop); Veilfish: 1, A. Phillips (East Lancs); 2, Mr. Endon (Sheffield); 3, A. Phillips (East Lancs); 2, B. Birch (Heywood); 3, H. Pridell (Ovram); Breeder Egg-layers: 1, W. Taylor (Ovram); 2, Mr. L. McCann (Gorton); 3, K. Wilberham (Ovram); Breeder Livebearers: 1, A. Bentley (Ovram); 2, A. Mathey (Rockdale); 3, Mr. Shields (Haltwh); Breeder Guppies: 1, J. Gibbons

(Haywood); 2, R. Birch (Haywood); 3, B. Fernon (Haywood); A.O.V., 1, G. Harnett (Glasgow); 2, W. Booth (T.A.B.); 3, E. Price (Gorton). Pairs: 1, F. Gregory (Ormskirk); 2, Mr. Johnson (Stockport); 3, Mr. Stray (Halsall). Ocean Fishes: 1 and 2, R. Jones; 3, E. Bolton. The Judges were: Messrs. R. Peggley, F.N.A.S., P. Moorhouse, F.N.A.S., G. R. Collins, F.N.A.S., L. Baxter, F.N.A.S., and J. Gibbons, F.N.A.S. There were 320 exhibitors and the Best on Show was awarded to Mr. J. Robinson of Merseyside whose exhibit, a Pike was awarded 85 points.

THE Leigh A.S. held their annual Open Show early in May at the Leigh Rugby Union Football Club, Leigh. Considering that other shows were held on the same day the number of entries was very good being nearly 30 per cent. up on last year's figure. A special attraction was a stand put on by members of the Liverpool Section of the Fancy Guppy Association. The judging was carried out by Mr. C. Wadley, F.R.A.S. and Mr. A. E. Bloom, F.N.A.S., both judges handled their tasks with the utmost efficiency, associated with the bodies they represent. The Trophy for the best entry in show (Tropical) was won by Mr. Thomalla (Merseyside A.S.), while the best entry in Coldwater Trophy went to Miss C. Brotherhood (Leigh A.S.).

The results were as follows: Guppies: 1, Mr. Forsyth (Liverpool F.G.A.); 2, Mr. Brotherhood (Leigh); 3, Mr. Higham (Warrington). Dwarf Cichlids: 1, Mr. Williams (Charley); 2, Miss B. Kay (Huddersfield); 3, Mr. Forsyth (Liverpool F.G.A.). Swordtails: 1, C. Vaughan (Liverpool F.G.A.); 2, A. Shaw (Leigh); 3, D. Ridyard (Leigh). Redfish: 1, Messrs. Harnett & Trench (Warrington); 2, Mrs. Jones (Valley); 3, Mr. Brotherhood (Leigh). Small Characins: 1, C. Barham (Leigh); 2, J. Boardman (Leigh); 3, Mr. Wadley (Leigh). Small Barbs: 1, Mr. Thomalla (Merseyside); 2, Mrs. Stenden (Lancaster); 3, Mr. Harnett (Warrington). Large Characins: 1, Mr. Brotherhood (Leigh); 2, Mr. Smith (Aireborough); 3, Mr. Brown (Wigan). Large Barbs: 1, K. Willet (Latham); 2, J. Kerr (Huddersfield); 3, H. Geyrshill (Leigh). Dwarf Cichlids: 1, D. Stinson (L.A.B.); 2, D. Smith (L.A.B.); 3, J. Boardman (Leigh). Large Cichlids: 1, Mrs. Jones (Valley); 2, T. Haller (Clitheroe); 3, T. Martin (L.A.B.). Amantinas: 1, D. Ridyard (Leigh); 2, J. Boardman (Leigh); 3, R. Wadley (Leigh). Fishes: 1, Mrs. Jones (Valley); 2, Mr. Harnett (Warrington); 3, L. Kaye (Huddersfield). Rabbits: 1, Mr. Thomalla (Merseyside); 2, Mr. Ellis (Valley); 3, R. Wadley (Leigh). Danios: 1, Mr. Smith (Aireborough); 2, D. Ridyard (Leigh); 3, Mrs. Stenden (Lancaster). Toothcarps: 1, J. Boardman (Leigh); 2, Mrs. Stenden (Lancaster); 3, Mr. Gempson (Salford). Loaches: 1, J. Hancock (Leigh); 2, Mr. Higham (Warrington); 3, Mrs. Whittle (Leigh). Catfish: 1, L. Kaye (Huddersfield); 2, D. Gromey (Leigh); 3, H. Silcock (Leigh). Sharks: 1, Mr. Thomalla (Merseyside); 2, Mr. Norton (Warrington); 3, C. Barham (Leigh). A.O.V.: 1, Mr. Brotherhood (Leigh); 2, H. Silcock (Leigh); 3, Mr. Bawick (Warrington). Fancy Goldfish: 1, Messrs. J. Ridyard (Leigh); 2, Messrs. A. Kaye (Huddersfield); 3, Mr. Clarke (Warrington). Common Goldfish: 1, Miss C. Brotherhood (Leigh); 2, J. D. Stinson (L.A.B.); 3, Messrs. A. & Miss Finch (Warrington). Fairy Fishes: 1, Mr. Thomalla (Merseyside); 2, Mrs. Stenden (Lancaster); 3, Messrs. D. Boyd (Leigh). Pairs Livebearers: 1, T. Haller (Clitheroe); 2, Mr. Adair (Liverpool F.G.A.); 3, Mr. Higham (Warrington). Breeder's Egg-laying: 1, Mrs. Soper (Lancaster). Breeder's Livebearers: 1, Messrs. Finch & Harnett (Warrington); 2, L. Kaye (Huddersfield); 3, Mr. Brotherhood (Leigh). Junior: 1, Messrs. S. Kaye (Huddersfield); 2, Messrs. Haller (Clitheroe); 3, Messrs. D. Boyd (Leigh). The F.O.A. Stood prize-winners were: K. Righty, Mrs. P. Righty, C. Vaughan, T. Haller, Mr. Forsyth, Messrs. Harnett & Sinner, Miss J. Fox. The best fish on the stand was a Double Scaled with 77 points entered by Mrs. P. Righty.

ENTRIES for the Open Show of the **Misenden Tropical Fish Society** totalled 320 from 29 Clubs. The Best Fish in the Show award was won by Mr. R. Parson (Merseyside) with a Titled barb. The complete results were as follows: Livebearers (Stimpia): 1, Mr. Johnson (Stockport); 2, Mr. Barrin (Bradford); 3, Mr. Mason (Worktop). Swordtails: 1, 2 and 3, Mr. P. Lodge (Huddersfield). Plater: 1, Mr. Peley (Salford); 2, Mr. Wood (Hull); 3, Mr. Birch (Haywood). Molias: 1, J. and H. Derrin (Worktop); 2, D. Kennedy (Bradford); 3, Mr. Rowden (Barnsley). Barbs (not in Nipper): 1 and 2, J. & H. Derrin (Worktop); 3, Mr. Stray (Hull). Barbs (over Nipper): 1, Mr. K. Parker (Merseyside); 2, Mr. Williams (Hull); 3, Mr. Lodge (Huddersfield). Characins (Small): 1, Mr. Williams (Ormskirk); 2, J. & H. Derrin (Worktop); 3, W. Booth (T.A.B.). Characins (Medium): 1, Mr. Price (Gorton & Opentham); 2, Mr. Whyte (Hull); 3, Mrs. B. Cohen (Pontrilas). Characins (Large): 1, Mr. J. Robinson (Merseyside); 2, Mr. Whistler (Aireborough); 3, J. & H. Derrin (Worktop). Cichlids (Dwarf): 1 and 2, J. & H. Derrin (Worktop); 3, Mr. Thomalla (Merseyside). Angels: 1, Mr. Woodward (Blackpool); 2, Mr. Booth (T.A.B.); 3, Mr. Langthorn (Mansfield). A.O.V. Cichlid: 1, Mr. L. Thompson (Mansfield); 2, Mr. A. Gies (Macclesfield); 3, Messrs. D. Lodge (Carnbrook). Toothcarps: 1, Mr. Wood (Barnsley); 2, Mr. Rowden (Barnsley); 3, Mr. Bawick (Ormskirk). Fishes: 1, Mr. Jones (Valley A.S.); 2, Mr. Booth (T.A.B.); 3, Mr. Smith (Tadcaster). A.O.V. Amantinas: 1, Mr. Price (Gorton & Opentham); 2, Mr. Beasley (Ormskirk); 3, J. & H. Derrin (Worktop). Sharks & Flying Fishes: 1, Mr. Willan (Valley); 2, Mr. F. Mulla (Merseyside); 3, Mr. Thomalla (Merseyside). Danios, Rasthoras, and Minnows: 1, Mr. Thomalla (Merseyside); 2, J. & H. Derrin (Worktop); 3, Mr. Hilder (Aireborough). Catfish and Loaches: 1, Mr. Hodgkinson (Gorton & Opentham); 2, J. & H. Derrin (Worktop); 3, Mr. Booth (Tadcaster). Pairs Egg-laying: 1, Mr. Thomalla (Merseyside); 2, Mr. Cressy (Carnbrook); 3, Mr. W. Ellis (Valley). Pairs Livebearers: 1, Mr. Mason (Worktop); 2, Mrs. Preston (Bury Vale); 3, J. & H. Derrin (Worktop). A.O.V. Tropical: 1, Mr. Dabbert (Hull); 2, Mr. D. Cohen (Pontrilas); 3, Mr. W. Booth (T.A.B.). A.O.V. Tropical or Coldwater Children's Class: 1, Master Lodge (Carnbrook); 2, A. Middleton (Gorton and Opentham); 3, C. Langthorn (Mansfield). A.V. Coldwater: 1 and 2, Mr. Phillips (Leigh); 3, Mr. Brown (Bradford).

AT an Intra-club Table Show held recently **Portsmouth A.S.** were the hosts to Kingston, Southampton, Gosport, Isle of Wight, Brighton, New Forest, Mid-Sussex and Worthing Aquarist Societies. Each club was limited to twelve entries in the Show. The classes were as follows: Breeders, Egg-laying, Toothcarps, Characins, Cichlids, Danios, Minnows, Labyrinthics, Livebearers, Rasthoras, Single Tail Goldfish, Twin-tail Goldfish, and a Plaque was awarded for the best number of points. The Judge was Mr. C. A. T. Brown from London. While the fish were being judged numbers of visiting clubs were entertained with a programme of coloured films on animal life and fish. The results were as follows: 1, Kingston; 2, Portsmouth; 3, Southampton; 4, Reading; 5, Gosport; 6, Isle of Wight and Brighton; 7, New Forest; 8, Mid Sussex and Worthing.

THE **Carlton A.S.** Open Show was the most successful show staged by the club. During the afternoon more than 1,000 visitors were admitted. Many experienced Aquarists agreed that it was a very good show—well presented and laid out. Two items were in the main responsible for this success. Firstly the generosity of Dr. Carrington of "Intra Pets" who

lensed the tanks, all new Metalams and not a leak in over 300 supplied and secondly the hard work of the members who worked night and day to ensure that each fish had its comfort and well-being looked after. All fish had aeration if required, this being supplied by a large compressed hidden in a screen, and there were no casualties.

Among the winners were prominent persons from the G.L.C. and they were most impressed, as were various members of the F.R.A.S. Judges and Standards Committee who were accompanied by Mr. Ted Jessop, the chairman of the F.R.A.S.

The major awards were as follows—Killa Trophy won by Bill Challenger with a Rivulus Miles, Golden Trophy: Best in Show won by R. J. Harris, also eligible for Aquarist Gold pin award. The winning fish being a C. thomasi. Best on Show: Champion Breeder Team F.R.A.S. plaque won by D. C. M. Duerant with a brood of Fishers. Olive Cup for Best Fancy Goldfish won by Mr. Day with a Fantail. The Intra-club challenge shield was retained by Carlton A.S. with 78 points.

AN interesting talk on "Fond Life" was given by Mr. F. Glyn James to members of the **Newport A.S.** at its monthly meeting held in June. The lecture was well-illustrated with various forms of aquatic life, including the much sought after daphnia.

The results of the Table Show held for two classes, Any Variety Amantinas and Any Variety Guppy, judged by Mr. Norman Council of Cardiff were: A.V. Amantinas: 1, Mr. M. I. PARRY (Mossleight Gwent); 2, Mr. W. Chapman (Three-Spot Gwent); 3, Mr. W. Chapman (Dwarf Gwent). A.V. Guppy: 1, Mr. B. Main (Vrithall); 2, Mr. L. Bannerman (Tadpole Superbail); 3, Mr. M. J. PARRY (Ponant Fishery).

A fortnight earlier the Society's annual "Treasure Hunt" had been held, the winners being a car party comprising of Mr. and Mrs. A. J. Payne, Miss P. Morgan, Miss B. Brown and Mr. M. J. PARRY. Organiser of the event was Mr. I. G. Phillips, the Club Secretary.

THE Newsletter of **Leamington and District A.S.** contains the final placings of the M.A.S. Shows spread over five shows and these were as follows—Century: 78 points; Advertiser: 75 points; Rugby: 71 points; Leamington: 64 points and Northampton: 47 points. Of the five members who headed lists at the M.A.S. Convention the following gained places: D. Lucas, Margold Plary; D. Lucas, 3. Scarfish—A.O.V. Coldwater: 1, Mr. J. C. Common; Goldfish: T. Dobson; 2, Aquarist Dwarf Cichlid class: F. Underwood, 1. Angel.

THE Appreciation Cup awarded by **Nottingham and District A.S.** for services rendered to the Society throughout the year has been won on this occasion by Mr. and Mrs. Goodfellow. The result of the recent Table Show for livebearers (except Guppy) was as follows—1, Mrs. Bullock; 2 and 3, Mrs. Goodfellow. The Society also heard a talk by Alan M. J. Lander, R.F.N., R.F.N., Marrow of the Sherwood Hospital on the work carried out by the hospital, and Mr. Cyril Hill also gave a talk illustrated by a very colourful display of "fish" stamps which he has collected throughout the year.

THE May Table Show results of the **Rugby and District A.S.** was as follows—A.O.V. Tropical: 1, Labov. Bicolor, Mrs. J. Smith, 81 points; 2, Black Glow Fish, Mr. A. Whitman, 80 points; 3, Reed Fish, Mr. A. Whitman, 74 points; 4, Striped Knife, Mr. A. Whitman, 74 pts. Coldwater: 1, Stripping, Master B. Main, 78 pts; 2, Golden Bould, Master B. Main, 73 points; 3, Coldwater Cat, Master B. Main, 73 points. Furnished Jar: 1, Mr. T. Wood.

THE monthly bulletin of the **Bradford and District A.S.** contains full details of the recent Intra-Society Competition held in May.

The results of their own monthly Table Show were as follows—Amphibians: 1, P. Barrett (Think Up Guppies); 2, L. Hely (Tritopus Pinnatis); 3, B. Shepherd (Three Spot Gourami); A.O.V.: 1, D. Kennedy (Wildfire Molly); 2, A. White (Platy); 3, A. White (Platy).

At the last meeting of the N.W.L.G.A.S. in which Willenden was the host, four classes were shown: Succedals, Characins, Cichlids, A.V. Labe (Dr. Fishers). The societies represented were Hampton, Hendon, Independent, Riverside and Willenden and the results were as follows: Succedals: 1, E. Lloyd (D); 2, P. Caffell (D); 3, Mr. Bichard (R); 4, A. Scudder (D); Characins: 1, J. Kettle (D); 2, T. Glass (W); 3, Mr. Backland (D); 4, J. Kettle (D); A.V. Labe (Dr. Fishers): 1, T. Glass (W); 2, P. O'Connell (D); 3, Mr. Backland (R); 4, S. Tennant (W); Cichlids: 1, T. Glass (W); 2, T. Glass (W); 3, T. Glass (W); 4, Mr. Backland (R). Best in Show: T. Glass with a Severn.

A fine talk was given by Mr. David MacIntosh (B.L.S.), and was enjoyed by all. There were about 20 aquarists and friends. Points to date are as follows: Independent 45, Willenden 25, Riverside 21, Hendon 9, Hampton 6.

The meeting of the East London Aquarist & Pondkeepers Association held on 2nd June proved to be a full and interesting one. After the usual Club business had been discussed, Mr. Pye of Romford Aquarist Club gave a most interesting talk on Tropical Plants, followed by the presentation of Award Certs to the winners of the Table Show for Labyrinth and Club Members Awards gained at the last Annual Show. The chairman presented the Breeder's Cup to Mr. P. Campbell, which he won at the Annual Show. The Table Show winners were: 1, Mr. P. Vicker, Banana Fighters; 2, Mr. G. Green, Levi Gossama; 3, Mrs. F. Harris, Desert Gossama; Breeder's Class: 1, Mr. P. Vicker, Summer Fighters; Annual Show awards: Mr. J. Smith, Individual Furnished Aquaria; Mr. J. Green, Novice Fancy Goldfish; Mr. G. Green, Home Furnished Aquaria and Mr. G. Vicker, Best Plant in the Show.

The next Annual Open Show of Fish, Plants and Furnished Aquaria is being held on Saturday, 7th October. Booking of entries will be from 8 p.m. on Friday, 6th October. Show secretary is Mr. G. Green, 70 Barton Avenue, Rush Green Road, Romford, Essex, who will be pleased to send Show Schedules on application.

OVER 200 Aquarists exhibited their fish at the Pomfract and District A.S. Open Table Show, one of the North's finest shows. There were 146 visitors to see some 500 fish on the show benches. The judges were: Mr. J. M. Blinner, F.N.A.S. and A.V.A.S., and Mr. D. Danford, F.N.A.S. and A.V.A.S. The results were as follows: Guppies: 1, G. Nash (Pomfract); 2, A. Beatty (Oven); 3, P. Harris (Bradford); Plants: 1, Mrs. Barry (Swillington); 2, J. & H. Dennis (Workop); 3, T. Tennant (Pomfract); Succedals: 1, H. Cawley (Thorne); 2 and 3, F. Lister (Huddersfield); Mollies: 1, J. & H. Dennis (Workop); 2, E. Lacey (Aberthaw); 3, L. Todd (Aberthaw); Barbs: 1, J. & H. Dennis (Workop); 2, Mrs. Barry (Swillington); 3, Mr. Beaz (Bradford); Characins: 1, Mr. Stringer (Swillington); 2, Mr. Tomp (Kochdale); 3, W. Hewson (Workop); Cichlids: 1, 2 and 3, J. & H. Dennis (Workop); Danios and Barbos: 1, E. Coker (Pomfract); 2, L. Kaye (Huddersfield); 3, A. Powell (Thorne); Angelfishes: 1, B. M. Fanchell (Tadcaster); 2, P. Harris (Bradford); 3, J. Woodhead (Huddersfield); Fighters: 1, A. Maxwell (Workop); 2, D. Broden (Barnesley); 3, E. Coker (Pomfract); Catfish and Loach: 1, G. Nash (Pomfract); 2, P. Harris (Bradford); 3, B. Hogg (Huddersfield); Toothworts: 1 and 3, A. Wood (Thornley); 3, A. Powell (Thorne); A.O.V.: 1, P. Reynolds (Swillington); 2, Mr. Beaz (Bradford); 3, P. Harris (Bradford); Breeder's Livestock: 1 and 2, J. & H. Dennis (Workop); 3, Mr.

Stringer (Swillington); Breeder's Egglayers: 1 and 2, W. Booth (T.A.B.); 3, J. & H. Dennis (Workop); Livestock Pairs: 1, A. Maxwell (Workop); 2, G. Nash (Pomfract); 3, J. & H. Dennis (Workop); Egglayers Pairs: 1, W. Booth (T.A.B.); 2, Mrs. Barron (Eaglington); 3, J. Howard (Barnsley); Goldwater: 1, 2 and 3, P. B. Hill (Thorne); Furnished Jars: 1 and 3, Mrs. Barry (Swillington); 2, Mr. Stringer (Swillington). Best Fish in Show was a "Rainbow" owned by J. & H. Dennis of Workop.

THE Hull Show at the East Park, Huddersfield Road, will be well supported by the Hull A.S. on 6th and 8th July. There will be an exhibition of tank and tropical fish, and an "Open Show". Schedules can be obtained from Mrs. Chapman, Show Secretary, Hull Aquarist Society, 19 Ethington Drive, Beverley High Road, Hull.

The two monthly meetings held in May were attended by two full lectures by Mr. A. Douglas and Mr. A. Pascock on electricity. Mr. Douglas spoke on "Do's and Don'ts" and Mr. Pascock on wiring of tanks, lights, and earthing. All members appreciated the time spent by these two qualified tradesmen and the trouble taken to ensure that all members were satisfied with the answers on all the questions asked. An exhibition was staged by the society for the Newland Homes School's Children's Society on Whit Monday.

THE Aireborough and District A.S. held their Annual Members Night on the 1st June when 41 members were present. A panel of experts was present at the meeting to answer questions about fishkeeping and this feature was greatly enjoyed. There was a record number of entries for the Table Show which was judged by Mr. P. Reynolds. Mr. Reynolds later gave a lecture on the fish which had been entered for the Show, and this gave members a good idea of why their fish won or lost. Table entries were as follows: Livebearers: 1, Mr. C. J. Burnap; 2, Mr. J. Whitley and Master D. Lacey; 3, Mr. J. Whitley; Barbs: 1, Mr. J. Whitley; 2, Mr. Fisher; 3, Mr. K. Bannan; Characins: 1, Mr. K. Bannan; 2, Mr. J. Whitley; 3, Mr. J. Whitley; 4, Mr. P. Ineson; Cichlids: 1, Master D. Lacey; 2, Mr. J. Whitley; 3, Mr. K. Bannan; Angelfishes: 1, Mr. R. Lacey; 2 and 3, Mr. P. Joyce; A.V. Pairs: 1, Mr. C. J. Burnap; 2 and 3, Mr. B. Magon; A.O.V.: 1, Mr. K. Bannan; 2, Mr. J. Whitley; 3, Mr. C. J. Burnap; Catfish and Loach: 1, Mr. P. Ineson; 2, Mr. D. Barrag; 3, Mr. K. Bannan; A.V. Jumper: 1, Master R. Lacey; 2 and 3, Master D. Lacey; A.V. Novice: 1, Mr. B. Magon; 2, Mrs. P. Ineson; 3, Mr. S. Grant; Furnished Mini-Jars (No Fish): 1, Mr. B. Magon; Best Fish in Show: K. Bannan Cup, Mr. R. Lacey.

OWING to August being peak holiday time Northwich and District Aquarist Society have decided to defer their intended convention from August until early 1968.

They wish to thank all club secretaries who replied to their letter and will issue details when they are available.

AQUARISTS' CALENDAR

8th July: Basingstoke and District A.S. Annual Show at St. John's Hall, Victoria Street, Basingstoke. Schedules from Mr. A. Marshall, 41 Pinner Close, Basingstoke, Hants.

8th July: Cheltenham & District Aquarist Society. First Open Jar Show since reformation of old society. Christ Church Hall, Malvern Road, Cheltenham. Details from Mr. E. Dearden, 42, Norwood Lane, Princesbury, Cheltenham.

16th July: Bournemouth Aquarist Club one day open show at the Rimon Community Centre, Millstone Road, Kinson, Bournemouth. Full details can be obtained from Mr. J. Andrews, 17 Pleasant Close, Parkstone, Poole, Dorset.

7th-12th August: Portsmouth A.S. Open Show.

23rd-26th August: Midland Aquarist and Pool Society. Annual Open Show at Ringly Hall, Birmingham. Show schedules from Mr. J. White, 120 Pookin Road, Kings Norton, Birmingham, 30.

26th-27th August: Harlow A.S. Aquatic Show. Secretary Mr. J. Duncan, 28 Long House Bath Fair, Harlow.

26th-27th August: Ozen A.S. Annual two-day Show.

2nd September: High Wycombe A.S. Annual Open Show at the Rye, High Wycombe. This will include a Guppy Show staged by the Thame Council section of the P.A.R.S., so to be judged under their rules. Details for both sections from Mr. C. Pike, 19 Ashley Drive, Tylers Green, Penn, Bucks.

2nd September: Yarn and District A.S. First Open Table Show. Schedules from Show Secretary, Mr. J. E. Powell, 114 Cranleigh Court Road, Yarn, Glos.

3rd September: Reigate and Radlett A.S. First Open Show. Secretary (Show) Mr. E. Ross, 2 Caroline House, Ross Road, Redhill, Surrey.

9th-10th September: Nottingham and District A.S. Open Show at the Dull Hall, Triumph Road, Nottingham.

10th September: Huddersfield Tropical Fish Society. Fifth Open Show. Secretary, Mr. L. Kaye, 8 Tartan, Huddersfield, Huddersfield.

15th-16th September: Bristol A.S. Annual Open Show at Babington Park Hall, Gloucester Road, Bristol. Hon. Secretary, Mr. W. G. Ham, 18 Imperial Road, Bristol, 4.

16th September: Newport A.S. Annual Open Show, Duffryn Junior High School, Snow Hill, Newport. Show Secretary, Mr. M. J. Parry, 45 Western Drive, Gabaia, Cardiff.

16th September: Hounslow and District A.S. open show. Balaclava School, Hounslow, Middlesex. Show schedules are obtainable from Mr. Derek Woodward, 16 Ellenside Road, Hounslow, Middlesex.

17th September: Atherstone A.S. Open Show. This is a provisional date. Show Secretary, Mr. A. W. Spencer, 15 Orchard Close, Witherley, Atherstone, Warwick.

17th September: Bradford and District A.S. second Open Show at The Textile Hall, Wombles, Bradford, 1.

22nd September: Becknall & District A.S. Open Show, Victoria Hall, Becknall, Berks. All available details from Show Secretary, Mr. B. Johnson, 18 Highfield Close, Gove, Parnborough, Hants.

24th September: Blackpool and Pylde A.S. Open Show at Harrowdale Salutation, South Promenade, Blackpool.

24th September: Midway A.S. Open Show. St. John Fisher School, Oldstone Street, Charlton. Schedules are obtainable from Mr. S. Brown, 3, Allison Avenue, Gillingham, Kent.

1st October: Heywood and District A.S. Open Show at Labour Club, Bridge Street (opposite Seven Stars), Heywood, Lancs.

7th October: M4-Herts. A.S. Open Show at St. Paul's Church Hall, St. Albans.

7th October: East London Aquarist and Pondkeepers' Association Annual Open Show. Schedules available from Mr. G. Green, 10 Barton Avenue, Rush Green Road, Romford, Essex.

23th-26th October: British Aquarists' Festival, Belle Vue Zoological Gardens, Manchester. Details from Mr. G. W. Cook, Spring Grove, Field Hill, Batley, Yorks.

12th November: N.E.L. Aquarist Society. Secretary, Mr. B. Watt, 99 Warwick, East Kilbride.

19th November: Devonshire and District A.S. Third Annual Open Show. Venue details, etc. to be announced later.

22nd November: Fur, Feather and Aquaria Show organized by the Borough Council of the London Borough of Hackney, King's Hall, Lower Clapton Road, E.5.

26th November: Leeds and District A.S. Open Day Show.

3rd December: Aireborough & District A.S. Annual Open Show.

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