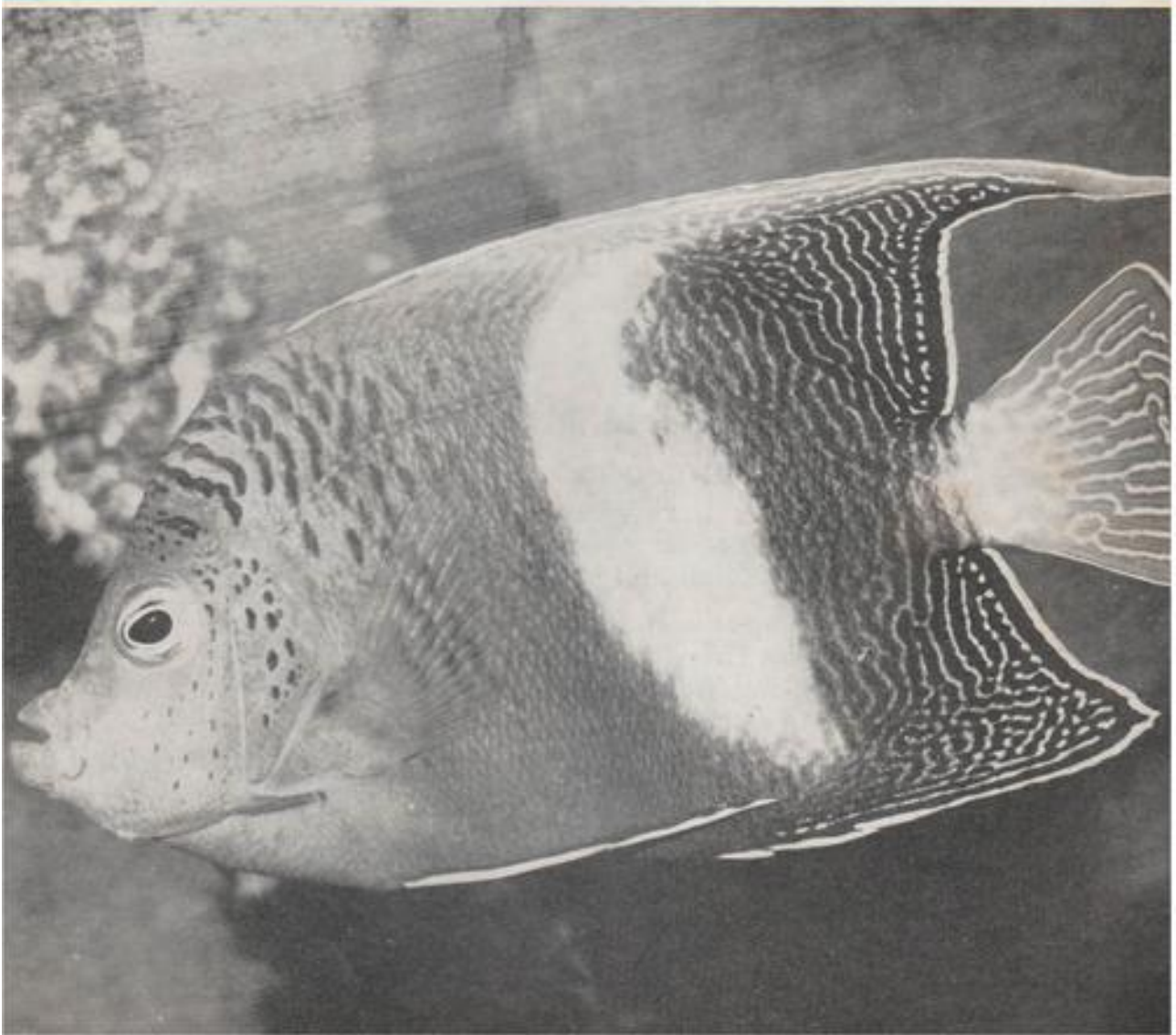


October
1970

the

Aquarist
and Pondkeeper

3/-
monthly



the Aquarist

and Pondkeeper

Printed by Buckley Press
THE BUTTS . HALF ACRE
BRENTFORD . MIDDLESEX,
Telephone: 01-568 8441.

Subscription Rates The Aquarist will be sent post free
for one year to any address for
£2 1s. 0d. Half-yearly £1 0s. 6d.

MSS. or prints unaccompanied by a
stamped addressed envelope cannot be returned and no re-
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Founded 1924
as "The Amateur Aquarist"
Vol. XXXV No. 7, 1970

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Pomacanthus maculosus

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The Editor accepts no responsibility for views expressed by
contributors.

Editor: Laurence E. Perkins

October, 1970

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GENETICS

By Don Phillimore and George Goodall

IN THE BREEDING of fancy Guppies a small working knowledge of genetics, although not essential, is very helpful, and if you intend breeding a line with specific factors, then some knowledge is a must. This does not mean that we have to delve into the mysteries of zygotes and diploids. It is necessary to accept that black is black without always going into the reason why. We know old Joe has been breeding so and so's since high button shoes and swears that he knows nothing of genetics, but we assure you old Joe is using genetics whether he knows it or not. He picks out this female and that male with abandon and his fish always come up trumps, but when he tries to work out why he chose one particular male for breeding, he will be thinking of the parents of that male and their parents and so on. The idea of a small knowledge of genetics is to avoid the time wasted in breeding a line for a couple of years and then finding out that you have been wasting your time, when you could have worked out the same computation on a piece of paper. A monk named Joseph Mendel discovered the basis of genetics a couple of hundred years ago, without the aid of even the simplest microscope, but with just a garden where he grew beans and sweet peas. He found that when he crossed two types of beans, one of a long variety and another of a small variety, the result, instead of the expected half long and half short beans, were all long beans; this was no new discovery as many people had experienced the same, but Mendel was not satisfied; he experimented to find out where the small beans had gone and slowly uncovered the secrets of genetics.

He found that when he crossed these beans, brother to sister (full sib) 25 per cent came back to being small beans and by this he realised that the small beans were recessive and the long beans dominant.

	b	b
B	B b	B b
B	B b	B b

The above diagram shows how we can work this out. B stands for long beans and b denotes small beans; it can be seen that by bringing down the b's and moving across the B's the result of Mendel's first parental (P1) cross is all Bb and as B is dominant all the young look long beans. When the symbols are unlike as Bb we call this phenotypically long beans.

	B	b
B	B B	B b
b	b B	b b

Now in the above diagram we have a quarter BB. These we call genotypes because they look what they are; we also have another genotype bb of which we also have a quarter. Now Mendel had his small beans again bb and found if he bred bb to bb time and time again they would always be small beans unless, of course, a mutation takes place.

These BB types and bb types we call homogeneous, and the Bb types we call heterozygous.

The above we can easily convert to apply to Guppies.

We must remember that we are only trying to alter one trait at a time and must not, say, try to alter a colour and a tail shape in one genetical cross. To do this it is far better to alter the shape and then the colour, as colour is easier to alter than finnage shape. So far you must agree it is not very complicated, and if we carry on in easy stages you will find that the small amount of genetics that we need to know are easily absorbed.

In Guppies, as in humans, there are 46 autosomes in twenty-three pairs. Two of these pairs are chromosomes or sex cells and some of the traits that we are looking for are carried in these, for example, Snakeskin pattern, three-quarter black, and some of the colours in certain circumstances. For these we must use slightly different symbols. The female chromosomes we call XX and the male XY. If a trait is carried on the

X chromosome then both male and female can carry it, if carried on a Y chromosome, then only the male can carry it.

	X	YS		
X	X X	X YS	X	
X	X X	X YS	X	

Fig. 1

	XB	Y
X	X XB	X Y
X	X XB	X Y

Fig. 2

As can be seen in Fig 1 the S carried on the Y only transmits itself to the males of the resultant brood. The XX females do not carry snakeskin, and no amount of crossing will make them. On the other hand, with Fig. 2, we have a trait carried on the X chromosome and the B denotes in this case three-quarter black. Both snakeskin and three-quarter black are traits that are dominant to grey, so they will always show if present. In Fig. 2 we have a male XB and a female XX. The PL parents are showing three-quarter black only in the male XB Y. As a result of this cross we have all the females heterozygous to three-quarter black and all the males grey. If we take one of the X XB young females and breed back to her XB Y father then we can successfully run a line of three-quarter blacks. If we run down the line it can be seen that we will eventually end up with XB XB females and XB Y males and from this we will always get 100 per cent true three-quarter blacks.

Snakeskin and three-quarter black are both dominant to grey, but are in themselves of equal dominance, so that if we cross an XB XB female to a X YS we get ordinary XB X heterozygous three-quarter black females and XB YS males that are showing both three-quarter black and snakeskin pattern, the snakeskin quite clearly visible on the head of the fish. The value of having dominant recognisable traits as above is illustrated when, for example, we have a line of, say, red veils that are degenerating because of too much inbreeding and a like fish of correct proportions cannot be found; then we could serve the purpose by introducing a male with one of the line-bred females. On the first cross we will have all three-quarter black females which, of course, we do not want, but we do not disregard these because we know that the trait we are looking for is hidden under the black, so we breed these full sib and start to get our red veils back again. Eventually we arrive back to square one, but we have introduced hybrid vigour from the cross out that will still improve the line. If we had used stock other than three-quarter black we would not have known when we had wiped out all the traits that we did not want as they may have been recessive and remain hidden, cropping up when we least expect and usually when we least want them. When breeding with gold or albino types hybrid vigour can be introduced by using a dominant grey.

For most of the broadtail fishes the finnage shapes

are carried in the autosomes, so it is quite permissible to alter, say, the shape of a delta caudal to that of a veil or vice versa or, in fact, to alter any of the dorsal shapes but in the case of shorttail varieties which mostly carry their finnage shapes in the chromosomes, this is a different matter. One should never try to mix broadtails with shorttails genetically; the results are rarely if ever successful and we usually end up with something in-between that are usually very mediocre and useless for breeding. The genes have been so mixed up that it would take a computer to work out the computations of just one cross. We think that this is the reason why the shorttail varieties are suffering in both size and vigour because of the difficulty of obtaining unrelated stock to cross out with or use to boost a line with hybrid vigour.

Each of the autosomes contain thousands of genes and in theory each gene should find a like partner in its opposite partner autosome to link up with, but of course, this is not always so. Seeing that it may take hundreds of genes to decide on the shape of a Guppy's tail it does not usually matter when one or two have come misplaced, but on the odd occasion it will show sometimes as a good trait and at other times a poor one. These are things that we must look for and use to our advantage whenever possible, but we must not run away with the idea that every unexpected difference is a mutation; condition and environment play an important part in the rearing of good Guppies and if, for instance, a female has been kept in a poor environment all her life and is in bad condition when fertilised, then all the genetical theories plus all the king's horses will not mend the harm done.

No amount of genetical knowledge will help you unless you keep a careful record of the crosses you have made. If you are already in the habit of making a record of your breeding then why not work the genetical line backwards to prove it works, comparing it with the records of your breeding plan. The best way to work out a genetical line is to make up a tree with the P1 at the top then F1, F2, etc., filling in the traits you want on one side and the progression of traits that you are obtaining on the other. We have done this over a period of years, and are now embarked on a Canadian idea of running three different separate lines down for six generations then crossing them over, running another six generation crossing and so on until we have done the whole operation five times. Then the idea is to cross the result back with the original lines. We have our genetical diagram mapped out, and it is surprising how we have found it running to the direct pattern that we expected. Experiments of this kind are a little ambitious for the beginner to Guppie but great fun can be had with but a little working knowledge of genetics, and an immense amount learnt about the hereditary of these fish which in our opinion are the most fascinating of the "man-made" fishes.

WHAT IS YOUR OPINION?

By B. Whiteside



MR. F. W. COLES, of Gilstead, Nr. Bingley, when he first began to keep tropical fish eight years ago, bought a number of black widows and he still has two of them. Mr. Coles does not know whether their long life is due to the local water, which is neutral and soft, or to some other reason but the fish are long-lived with him, although most of the books published give their life span as three years. The fish are not fussy as to temperature either, and do well at any temperature from 72° to 80°F. Due to a failure, Mr. Coles fish have been in water with a temperature down to 68° without ill effect. As black widows eat both dry and live food, they are an ideal community fish, being both peaceful and attractive.

Mr. G. Horder, of Wimbledon, writes on the question of plants which dislike Gro-Lux. He has found that the only plant which does so is *Nymphoides aquatica*—the banana plant. When the plant was bought, it had a good root stock and three small leaves. It was placed in a 36 in. × 12 in. × 15 in. tank with small fish, and lit by three 25 watt bulbs. It was not rooted in any way. After a month, two of the original leaves had died but four new one had taken their place and the plant had firmly rooted itself. Then a 24 in.-20 watt Gro-Lux tube was introduced and within a few weeks all of the leaves had rotted away and the tuberous roots were beginning to rot. During the time that the plant was in the tank, it was not touched in any way except for the installation of the Gro-Lux tube and the addition of a few small fish, none of which ate plants. Mr. Horder breeds blue acaras and the number of young which they produce is far too many for the tank to hold so, at intervals, Mr. Horder siphons away a few of the young and feeds them to the fish in his community tank. Thus he disposes of the unwanted fish, and ends by saying that the best food for fish is fish.

Mr. S. Jackson, of Arlesey, Bedfordshire, has something to say on the subject of coldwater fish. As a breeder of fancy goldfish—calico veiltails, fantails and moors, he is qualified to speak on the subject. He thinks that in these days of houses with smaller gardens, and in particular in council estates where portable sheds are restricted to 8 ft. × 6 ft. and smaller sizes, lack of space is the main reason for

people turning to tropicals more than coldwater fish. An 8 ft. × 6 ft. shed, after all, will provide a decent fish house for tropicals, but is of little use to a coldwater man unless his garden can accommodate a number of outdoor pools. On the other hand, Mr. Jackson has found that, during the last five years or so, with the advent of plastic sheeting used for fish ponds, his sale of youngsters has greatly increased in regard to his Bristol shubunkins and London shubunkins because so many gardeners are now incorporating a small pond in their garden schemes. Some of his customers, on seeing his fancy fish in their aquaria, have been so surprised at the veiltails, etc. (which many had never seen in their lives before, and who had to be convinced that they were really goldfish) bought aquaria for their homes and purchased veiltails, etc. from him. All of these people thought that they were as good, or better, to look at as tropicals and, moreover, as is the usual attitude of "beat the Jones's," none of their neighbours had any of these fish. To Mr. Jackson, the satisfaction comes from the uncertainty of breeding goldfish, constantly trying to get fish as near the standard laid down, and trying to get his stock better than any other which he knows. As regards the breeding of tropical fish, Mr. Jackson does not think that the challenge is the same, and he wouldn't get the same satisfaction from breeding tropicals. His opinion is that coldwater fish have been increasing in popularity over the past few years, and are continuing to increase, around his area, anyhow. In time, Mr. Jackson thinks that Koi will further increase the popularity of coldwater fishkeeping.

From Wigan, Lancs., comes a letter from 14-year-old Ian Kendrick who says that he has been keeping tropical fish for 1½ to 2 years. During this time he has progressed from one 18 in. × 10 in. × 10 in. tank, to seven tanks, including one 5 ft. tank and two 3 ft. tanks. He was attracted to fishkeeping by its simplicity, for fish cannot utter a loud bark, or cry, to awaken the household, nor do they need to be taken for walks or let out at night. They are easy to breed and can give hours of pleasure. On the question of freeze-dried foods Master Kendrick has something to say. He finds the freeze-dried tubifex excellent, and

even his four discus, which are said to be faddy eaters, tuck into these ravenously. His fish are largely bigger ones, and so he finds that the more bulky freeze-dried foods are taken more easily than the freeze-dried daphnia, which seems to break up into such small pieces that the larger species find it not worth bothering with. Master Kendrick has Gro-Lux lighting in two of his tanks and finds that it seems to force the growth of *Cabomba* past its natural rate so that it grows very quickly and gets very long, but it is not as bushy as some people would like it to be. He finds that *Cryptocoryne* grows very well under this lighting. (I would certainly agree with this last point as I find that *Cryptos.* do exceptionally well with me, under Gro-Lux). Master Kendrick ends his letter by saying that he would like to see more "junior aquarists" expressing their views, as minds which are not trained to do things the old traditional ways could easily find new and better ways of doing things. Perhaps other readers have different views on this point. (I certainly like to receive the views of younger aquarists, and a recent batch of letters which are included in W.I.Y.O.? came from younger readers. Their views are just as important and interesting as those of older readers. Perhaps younger readers who write to this column would include their age—as many do—to keep us in touch with the views of the up and coming generation of aquarists. I remember a few years ago, when I had just had my first few articles published in *The Aquarist*, and was still a student at college, I had a visit from a couple of Scottish aquarists who were on holiday in N. Ireland. I think that they were a little shocked and, perhaps, disappointed, that I was not an old man with a grey beard, but merely a young college student.)

Mr. D. Watsa, of Willerly, E. Yorks., writes about *Aponogeton* species. He finds them to grow best in temperate water, i.e. ranging from 45° to 55°F. They seem to prefer a lot of top light and tend to flourish better in slightly acid water. He finds the plants to be steady growers and that dead leaves should be removed from the crown. Although a junior, he has kept coldwater fish for three or four years, and tropicals for just over twelve months. At the age of thirteen he received a tank from a keen aquarist whose car his father had repaired. This set him off on what he calls: "this fascinating and knowledge-giving hobby."

Mr. N. Gray writes from Galampton, Nr. Brixham, Devon, on the subject of *Aponogeton* species, and says that the main problem which he has come across in dealing with these plants, is not so much the growing of them as their identification. He is fairly certain that most of the ones about which he writes are hybrids, but he tries to classify them under the general headings of *Aponogeton crispus*, *A. natans* and *A. undulatus*. He has six tanks with *Aponogeton* species growing in them and five of these are in a greenhouse, the other one

being kept indoors. The five in the greenhouse receive only natural daylight and are covered with glass; the sixth has a hood with three 60 watt bulbs. A series of two tests were carried out, with a period of eight weeks between the two. Each series comprised readings of temperature, p.H. and D.H., and all were made within a period of one hour, at 3.00 p.m., in each case. When set up, all the tanks were filled with tap water and gravel, mixed as below. All the plants were imported as tubers, and sprouted in plastic bags with enough water to cover the tuber. They were planted out when the young shoots were between 1 in. and 2 in. high. *A. crispus* and *A. natans* were planted about 1 in. apart, and *A. undulatus* about 2 in. apart. The gravel used was the "Dorset" type, and quartz; sizes ranged from $\frac{1}{8}$ in. to $\frac{1}{2}$ in., and both were mixed in some tanks, in varying proportions. The gravel was unwashed and had been dried and bleached in the sun before being used in the tanks. Mr. Gray has appended an excellently laid out chart of his results but, unfortunately, it is rather too long to include in this feature. From his experiments Mr. Gray has suggested that the following conclusions may possibly be drawn: *Aponogeton undulatus*—does not like too much sunlight, prefers deeper tanks, prefers finer gravel, does not grow well with *Najas* species, does not like being crowded, grows well with Amazon swords, grows well with *Cryptocoryne affinis*, prefers top light and grows well with other *Aponogeton* species, or combinations of the above. *Aponogeton natans*—likes strong light, prefers sunlight, prefers finer gravel and prefers to be grown by itself, or combinations of the above. With *A. crispus*, no conclusions were made, as there seemed to be little difference in the plants under the given conditions, except that it is possibly the most tolerant of them all. Some other observations made were that *A. natans* was the fastest growing species and produced floating leaves at about the fifth or sixth leaf, and that *A. crispus* was the slowest growing but continued to grow into much larger plants than the others.

Now for some questions posed by some of the above writers. Mr. Gray poses a selection of questions as a result of his experiments with *Aponogeton* species—(1) Does artificial light force *Aponogeton* species to a greater height, or is it a result of their being hybrids? Can *A. natans* be trained to produce only submerge leaves by trimming off floating leaves, and, if so, would it produce flowers? Do none of the *Aponogeton* species grow well with *Vallisneria spiralis*? Why did only 10 per cent of the *Aponogeton* species grow in a tank which contained thirty tubers of each of the three *Aponogeton* species, and one hundred plants of *V. spiralis*? (2) Do readers like to buy large generalised books or smaller books which deal with one facet of fishkeeping, and why? (sent by Master Kendrick). (3) Do you breed any "out of the ordinary" live foods?

SCIENTIFIC FISH STUDY

By Michael Lorant

MALE AND FEMALE survival rates are influenced by genetic and hormonal factors, according to present state of understanding. However, the extent of the influence of these factors is not yet fully understood.

Now, scientists of the Downstate Medical Centre, State University of New York, under the leadership of Dr. James Hamilton, Professor of Anatomy at the Centre, aided by a grant from the U.S. National Institutes of Health, are currently studying these factors in fish in order to find out the role of these genetic and hormonal factors in their survival rates and evaluate their influence on life span.

The fish species selected for this research study is the killifish, whose genetic characteristics can actually be made to order. By carefully administering either male or female sex-hormones as the fish hatchlings are fertilised, the scientists can produce YY "supermales," XX males and even YY females. Thus, they can study the effects that genetic and endocrine makeup have on behaviour and survival.

In a test, both XY (males) and YY ("supermales") fish were raised under rigidly comparable conditions, with equal numbers sharing the same fish tanks. Significant differences were found between the XY and YY fish.

For one thing, the normal males lived significantly

longer. The median life span was 415 days for the YY supermales and 501 days for the normal males.

A closer study for the survival indicates that both the Y chromosomes and the male sex hormones share responsibility for shortening the life span. The YY fish had a poorer survival rate both in the first 21 days after birth, before the sex glands began producing androgens (male sex hormones), and after the fish became sexually mature.

One complicating factor was the wide variability in androgen production by YY fish. Some YY supermales appeared to produce abnormally high levels of male sex hormones. Others were hypogonadal (underdeveloped male sex glands)—even though they were technically supermales, the androgen production was below normal.

There were preliminary indications that hypogonadal YY fish, with low androgen production, tended to survive longer than YY with normal or high levels of androgens.

According to Prof. Hamilton, "The present findings support, and are in harmony with, the concept that in many species the poorer viability of XY males than of XX females is due in part to deleterious effects of the Y chromosome and androgens in males, rather than

Continued on page 235

Picture shows a YY supermale (left) pursuing the XY male during a mating competition experiment. The white caudal leucophores on the tail fin are a male secondary sex characteristic

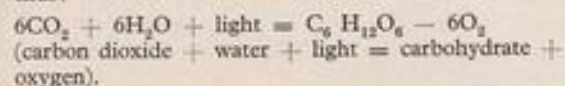


GRO-LUX FLUORESCENT LIGHTING

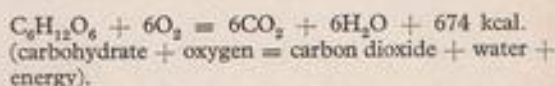
By B. Whiteside

THERE HAS BEEN, and probably always will be, conflicting views about aquarium lighting. 'Gro-Lux' fluorescent lighting has come in for its fair share of praise and blame since its introduction and use for lighting aquaria. There must be many people who, like myself, used 'Gro-Lux' without knowing exactly just what were its stated effects other than that of improving plant growth. To get further information I wrote to Mr. Cyril Phillips, the press and public relations officer of Thorn Lighting Limited, Thorn House, Upper Saint Martin's Lane, London, W.C.2. Thorn Lighting Limited are the British manufacturers of 'Gro-Lux' and they supplied me with a couple of their leaflets. I would like to thank them for their permission to use the material in their leaflets.

The 'Gro-Lux' tube was developed to encourage plant growth generally, its spectral energy being ideally suited to seen germination and rapid plant growth. It was, therefore, suitable for aquarium use. The tube gives a lavender colour appearance with a strong red and blue rendering effect. Red and blue light are especially important to green plants as they provide them with the energy for making carbohydrates (e.g., starch) by photosynthesis (the process by which the green chlorophyll in the plants' leaves and stems combine water and carbon dioxide, under the influence of suitable light, to produce carbohydrates.) In this process of photosynthesis, oxygen gas is given off as a by-product. An approximate chemical equation for the process can be written thus:



Plants and animals in the aquarium, as elsewhere, all respire. Many people think of respiration in living things as being the same as breathing-in oxygen. This is not so. Respiration occurs inside the cells of plants and animals. Food materials, such as carbohydrates, are broken down (oxidation) in the tissue cells, and energy, needed by the living organism, is released. Carbon dioxide and water are produced as by-products. An equation, roughly representing the process can be given as:



Although 'Gro-Lux' tubes emit very little yellow or orange light, the leaves of the aquarium plants present a vivid green colour, and the colours of many fishes—especially those with red or blue colours—are greatly enhanced. Although the colour renderings of the fish may not be acceptable to everyone, such fish as neons and cardinals, and red swordtails or platies, look very exciting under 'Gro-Lux'.

The Thorn Lighting Limited leaflet suggests that two watts of 'Gro-Lux' lighting per gallon of water, for ten or twelve hours per day, be tried, and adjusted as necessary. Some of the benefits of 'Gro-Lux' given in the leaflets are that the tubes are cheaper to run and give off less heat; they produce greater growth in the plants; they have five times the life of a filament lamp. I might add that healthy plants usually mean healthy fish.

The use of 'Gro-Lux' with greenhouse plants suggests that some such plants (high energy crops) benefit from the addition of tungsten filament light, as it supplies infra-red radiation which is important for the normal growth of such plants. They suggest an addition of 10-20 per cent of the total wattage. This confirms what I and other aquarium writers have said before—that aquarium plants seem to grow better under a combination of 'Gro-Lux' and tungsten lighting. Personally, I have found that plants and fish do very well under a combination of about one-third of 'Gro-Lux' to two-thirds of tungsten lamp lighting, and the colour renderings are less vivid than with 'Gro-Lux' alone. I would assume that the tungsten light supplies not only the infra-red radiation necessary, but a proportion of the missing yellow/orange light from the spectrum of 'Gro-Lux'.

I would again like to thank Thorn Lighting Limited for their permission to use the material in their leaflets and hope that it, plus my own opinions in this article, have shed a little more light on the subject of aquarium lighting, thus helping you to make up your own mind on the subject. I should be pleased to have any of your opinions or comments on 'Gro-Lux' and/or tungsten lighting in aquaria. They could be useful.

THE WORLD OF THE CICHLID (Part I)

By Steve Forster

THERE IS A general opinion among hobbyists that cichlids should not be considered as suitable tank inmates until the aquarist has gained considerable experience in fish management from the keeping and breeding of some of the less demanding species of tropical fish. In these articles the world of the cichlid will be explored from both sides of the aquarium glass and it is hoped that some of the difficulties associated with keeping cichlids will be overcome. The article is split into three parts, Large cichlids, Dwarf cichlids and those with specific requirements for domestication.

LARGE CICHLIDS

General

The world's population of large cichlids (pronounced sik-lid) is almost totally confined to the South American and African continents, the exceptions being the Texas cichlid (*Herichthys cyanoguttatus*) in North America and three members of the genus *Etoplus* native to the Indian sub-continent.

In general, large cichlids, by nature and by behaviour, are fairly belligerent and do not in any way tolerate interference from other fish. There are exceptions to the rule, for example *Aequidens maronii*, the Keyhole cichlid is one of most timid of fishes.

Another factor against many of the larger cichlids is that they do not appreciate a well planted aquarium and will proceed to uproot any plant which, in their view, is in the way. The *Acaras*, whether brown, green or blue may repeatedly lift out plants, no matter how often they are replaced by their distraught owner. With a tank full of large cichlids one can be certain that it will never be neatly furnished and therefore not the object of beauty that the normal community tank can be. At one time I had a tank in my living room which housed four Red Devil cichlids and even with a power filter in operation 24 hours a day the tank never looked clean. This resulted in an ultimatum from my wife: either ensure that the tank looked good enough to be considered as part of the decoration or remove it from the living room altogether. No matter what steps I took to enhance the appearance of their tank the Red Devils undid

them and literally signed their own deportation orders as I was forced to sell them to one of our local dealers. I called in to the store a week later and the enraged proprietor just about threw me out, he had put the fish in three different tanks and each one looked as if it had been hit by a tornado!

It is possible to maintain a planted background in a cichlid tank by employing another sheet of glass placed about three or four inches from the rear of the aquarium. Plants can be grown behind this glass safe from the unwanted attentions of marauding cichlids. Artificial plants last longer but any self-respecting cichlid will dig them up as quickly as it would natural vegetation.

Some of the largest members of the genus have been known to move rocks and heavy flowerpots and it is thought that this uprooting and excavation is not only due to breeding behaviour but may be due to the fact that cichlids have well defined or preferred swimming paths and will remove any object which interferes with this pattern.

After reading about all these cichlid failings you may be asking yourselves why you should ever consider keeping these fish at all. The answer is PERSONALITY. Man versus cichlid is as near as any fishkeeper will come to the relationship that exists between man and his dog. Your favourite tetra or killifish will never come to the surface and execute a precision barrel roll in order to get a food reward. Your beautiful black shark will never rise to the surface and let you rub his stomach and your interesting corydoras will never determinedly attack your hand any time it goes near their offspring. The cichlids will do all these things and more and if you let them, will become one of the family before you know it.

Feeding the Large Cichlids

We have one factor in keeping large cichlids which presents no problem and that is feeding. If the food is large enough to see and small enough to swallow it will be eaten. A typical cichlid menu could include large flake foods, earthworm (whole or chopped), tinned dog meats, raw fish, ox heart, tinned peas, *ad infinitum*.

Cichlids do tend to be messy eaters and as they do not eat the small particles which break off from their foods, good filtration is of utmost importance. Unlike artificial foods, foods of animal or vegetable origin are rich in micro-organisms and an uneaten pea or portion of fish will contaminate the aquarium water much more quickly than prepared foods.

The point to remember is that although cichlids are large they can still be filled and the dangers of over feeding apply just as they would with a tank full of neon tetras.

Tinned pet foods are the most likely cause of trouble as they have a high fat and gristle content. The former separates from the meat on entry to the water and either sinks into the gravel or floats like a mini oil-slick on the surface. The fish themselves will regurgitate the sinew and gristle and although not as messy as the fat, it may appear in the tank hours after feeding and is, therefore, not as easy to spot.

The best way of using tinned meats is to immerse the required amount in boiling water, which floats off the fat and gravy and enables the meat to be separated from the gristle. The remainder is almost 100 per cent soft meat and is in its most acceptable form to the cichlids.

Daphnia is not of much interest to mature specimens due to its small size but whiteworm and *tubifex* fed in lumps are eagerly taken. Freeze dried foods are also quite acceptable but tend to be a bit expensive as a fairly large cichlid will eat the entire contents of a small drum in two to three days. Another useful food, however, is pond fish pellets and one of the varieties which float are ideal as they are eaten before sinking to the bottom of the tank to become a possible source of contamination.

Housing the Large Cichlids

When deciding upon a tank for large cichlids, remember that they are indeed large and should be given as much room as possible. Many people buy small *Severum* or Oscars and do not realise that in 12 to 18 months these little fish will have grown to a size where they can swallow a one inch guppy without difficulty.

When large cichlids are crowded into a small tank they tend to become inanimate objects, lying listlessly in one corner of the aquarium and rarely moving. It is annoying to visit a show and see a nine inch Oscar stuck in the corner of an 18 in. x 10 in. x 10 in. tank, having barely enough room to turn around without touching both the rear and front glasses of the tank. When fish are kept under these conditions in a store any potential customer is immediately wary of buying the large colourless, inactive fish which is the result of such tank cramming.

The most suitable size of tank is always the largest that one can obtain or afford but tank sizes which can

comfortably house a pair of large cichlids are given under the fish descriptions.

Furnishing can be adequately described as basic, as most large cichlids need no more than a good layer of gravel, some smooth rocks and a large flowerpot.

The one item which must be well considered for large cichlids is the filter. The larger the turn-over rate the better, as most of these fish are continually digging and releasing debris into the water. The ideal combination is an external power or "bubble-up" filter used in conjunction with a large internal corner filter but even with this set up be prepared to clean the filters regularly.

Under-gravel and biological filters, although excellent in other situations, are not really suitable as the continuous excavations of the fish normally result in no gravel layer on one part of the filter and piled six inches deep on another.

When selecting a site for the heater give it as much protection as possible, i.e., behind a rock, and ensure that it is securely fixed. I once spent hours trying to trace a peculiar tapping noise only to find that a heater clip had come loose in a tank full of Convict cichlids (*C. nigrofasciatum*) and as the heater swung about in the slight current caused by the filter outlet the Convicts rushed at it and bounced it off the rear of the tank. As soon as the heater was anchored again the fish lost all interest.

Sexing and Breeding

In general the sex differences of large cichlids can be determined in three ways:

1. Fin-shaped.
2. Coloration.
3. Ovipositors.

The dorsal and anal fins of some male cichlids have longer points than the females but unless the specimens are mature these differences are not always evident and there are a few species where finnage is no indication whatsoever.

Coloration may be an indication of the male fish but, again, it is not a foolproof method as there are some species where the females are slightly more colourful. Convict and Jewel cichlids are examples of this.

The only infallible method of sexing is by comparison of the ovipositors, the males' being slimmer and pointed while that of the females' is short and rounded. I have often pondered on this method of sexing as it is of no use until the fish are ready to spawn by which time one would already have established the existence of a pair. It is true, however, that on occasions the ovipositor will be in evidence due to other factors but unless you happen to be in the store at that particular time you are back to square one anyway.

To ensure that a pair is obtained one must either

purchase a pair of proven breeders or buy about six young adults and let them choose their own mates. Although more time-consuming, the latter method at least ensures that the resultant pair or pairs are in the first flush of adulthood and not an old pair of fish which may be past their best.

Breeding is easy with some species of large cichlids and almost impossible with others but if their tank has plenty of gravel in which the breeders can dig and rocks or a flowerpot on which they can spawn, most of the requirements have been taken care of.

Pre-spawning behaviour can be quite dangerous if either of the pair are not compatible and may result in occasional fatalities. I have not, as yet, seen these if either of the pair are not compatible and may result in trials of strength result in death, but I have watched a few wrestling matches that would put the TV maulers to shame.

Jaw-tugging and abdominal butting are quite often observed and providing both are equal in strength and have the ability to last the pace, the stalemate position which results will pave the way to a long lived relationship. Cichlids do not, as is often thought, mate for life and while they certainly have preferences regarding their partners, removal or the death of either partner will not deter the remaining fish from choosing and courting another mate.

The eggs are deposited on the top or sides of the rocks or flowerpot and although few attempts are made to hide the spawning, the eggs are ferociously guarded by the parents. Both fish take turns in guarding and caring for the eggs and fry.

Pits will be excavated in the gravel before and after spawning and these are used as sites for the fry after hatching.

When the fry become free-swimming they are relatively large and do not require to be fed infusoria or similar foods and can eat newly hatched brine shrimp and micro worm without any trouble. Given adequate feeding and room for growth, the fry grow rapidly but will remain under their parents' protection as long as is necessary or until they are removed from the breeding tank.

Artificial methods of hatching are not usually necessary unless the parents have a record of egg-eating but where it is required, the usual method employing methylene blue, seems to be as good as any.

Nomenclature

I have listed below several large cichlids, ranging from easy breeders to those which tax the patience of even the most experienced aquarists. Seeing the sizes of some of these fish, one would be entitled to ask, "Where does the differentiation in size apply and when is a cichlid graded as large or dwarf?" This grading seems to be somewhat haphazard; for example, the Keyhole cichlid (*Aequidens maronii*) only attains a size of three inches but is classified

as a large cichlid, while various Malawi cichlids which grow to four inches or more are classed as dwarf cichlids. This may suggest to you that the classification is by species rather than size but this does not work either as the Blunthead Cichlid (*Aequidens curviceps*) is classed as a dwarf cichlid.

Brown Acara (*Aequidens portalegrensis*)

Without doubt, this is the easiest of all large cichlids to breed. These fish, native to Paraguay and attaining a size of 5 inches, are ideal specimens with which to start the keeping of cichlids. A friend once quipped as I was buying a pair of these fish, "Don't hang about on the way home or they will spawn in the bag". Although this was not quite accurate it was near enough the truth to illustrate the ease with which Brown Acaras spawn.

The fish had been purchased unexpectedly so there was no tank prepared for them and they were given temporary accommodation in a 16 in. x 8 in. x 8 in. three gallon tank. Both fish were approximately 4 inches long, and once in the tank they did not seem to have much room for anything other than a slow turn.

At 3 p.m. the pair had been subjected to chasing in the dealer's tank, being netted, stuck in a plastic bag, shaken on the journey home, and released into a tank which was about six times too small, yet six hours later they spawned and laid about 300 eggs. Most of the eggs hatched and the fry were extremely well cared for until the parents were removed. Being excellent parents, artificial hatching is not required or recommended. The fry grow quickly if given adequate room and will eat anything so raising them is no problem.

The sexes are easily identified by the long flowing fins of the male and although this instance shows just how much a beginner's fish *A. portalegrensis* are, do not attempt to breed them in anything smaller than a 24 in. x 12 in. x 12 in. tank or it is likely that the majority of the fry will be runts.

The Convict Cichlid (*Cichlasoma nigrofasciatum*)

This species, native to San Salvador and surrounding countries, is one of the more aggressive of the genus and cannot be trusted with smaller specimens. A pink variety developed in America is said to be more peaceful but I can honestly say that I have not noticed any difference between the types, especially when caring for young. Albino forms of natural species are normally more docile but the pink variety of the convict cichlid is not an albino, merely a colour mutation which still has the natural brown-coloured eyes.

Breeding is a matter of course once the pair have been successfully matched in a suitable tank, 18 in. x 10 in. x 10 in. will suffice for young adults but they

Aequidens portalegrensis



Cichlasoma nigrofasciatum

Hemichromis bimaculatus



should be graduated to a 24 in. x 12 in. x 12 in. as they grow.

This is one of the species where the female is the more colourful than her partner, natural specimens having brighter body stripes and a few orange speckles, while the pink females have an iridescent gold sheen on the dorsal fin and the body.

C. nigrofasciatum make excellent parents and rarely eat the eggs or young unless violently disturbed. The spawnings tend to be large, one of my pairs raised 347 fry from one of their spawnings.

The Firemouth Cichlid (*Cichlasoma meeki*)

The Firemouth is one cichlid which cannot be said to have any definite behaviour pattern; some specimens show aggression while others are extremely timid. Fully mature fish attain a size of 4½ inches in the males, while the females are slightly smaller.

The name is due to the orange/red coloration which spreads from the lower jaw along the stomach. The colour of the male is usually more predominant but when spawning is near there is little difference between either sex.

Sexes are easily identified as *C. meeki* is one of the cichlids where the males have the longer dorsal and anal fins. Although this species reproduces frequently they cannot be said to be easy breeders as they are inclined to eat the eggs or newly hatched fry if disturbed. A 24 in. x 12 in. x 12 in. aquarium placed in a quiet location will increase the chances of the parents successfully rearing their brood but if

egg-eating becomes habitual it is best to hatch the spawning artificially.

C. meeki are found in Southern Mexico and Guatemala.

The Keyhole Cichlid (*Aequidens maronii*)

The Keyhole cichlid is one of the smallest of the large cichlids (it must have come from Ireland) and is the exception to the rule as far as behaviour is concerned. These fish have no aggressive tendencies and do not interfere with plants; this excessive shyness is the one drawback in keeping them as they are rarely seen if their tank is heavily planted.

Sex differences are normally indistinguishable and it is preferable to obtain a number of small specimens and let them pair off naturally. This method of pairing also helps the fish to lose a little of their shyness as they tend to be less afraid when young and kept in numbers. They are good parents to the extreme in that they will continue to care for the fry until they are about 6 months old and have reached a size of 2 inches.

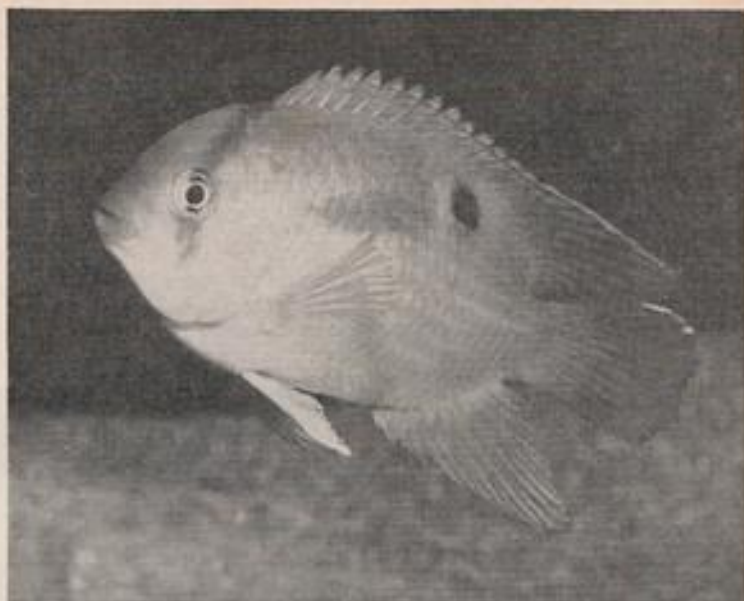
Some pairs will spend days preparing a spawning site and as soon as they have deposited the eggs they ignore them completely. Should this happen artificial raising is the answer as the parents will show this hard-heartedness after each spawning.

Some reference works advise that the male has longer finnage but I have studied hundreds of these fish in dealer's tanks and have never been absolutely certain as to any individual's sex.



Cichlasoma meeki

Aequidens maronii



The Jewel Cichlid (*Hemichromis bimaculatus*)

The Jewel cichlid is exactly the opposite to the preceding species in that it is savage, brilliantly coloured and relatively easy to breed.

It is a must when keeping these fish, that they be kept on their own as they will kill or maim other specimens, twice their size, without hesitation. Mating is also fraught with danger when pairs do not prove compatible. Should a female not be prepared to respond to the advances of her suitor, it is likely that she will be killed. If the pair are both ready, they will spawn easily, using a rock or flowerpot as the site for the eggs and not withstanding their animosity

toward other fish, *H. bimaculatus* make outstanding parents and rarely make a meal of the eggs or fry.

The sexes can be identified by the highlights or jewels on the gill plates, those of the male being more numerous and larger than those of the female. Otherwise, both fish are identical in coloration, finnage and body-shape although prior to spawning the female will visibly fatten up and may even excel her partner in colour.

The jewel cichlid is widely distributed across the African continent and in nature is said to reach a size of 8 inches, while those kept in captivity rarely exceed half this size.

SCIENTIFIC FISH STUDY

continued from page 228

solely to protection afforded by the presence of two X chromosomes in females."

In related studies, scientists attempted to eliminate the factors of competition and crowding in survival time. Instead of raising a number of fish in one tank, the investigators limited the number of fish in a tank to two—one female and either one normal XY or one YY supermale.

They found essentially the same results: survival was still poorer in YY supermales than in XY normals.

In addition, there was another significant finding. XX females in the study did not survive as well as either the XY or YY males. "This suggests that the lesser viability of YY than of XY was not due to protection of XY males by their X chromosome but was more probably attributed to the double Y genotype per se," stated Dr. Hamilton. He and his co-workers plan further studies to get more detailed information on the effects of the Y chromosome and of androgens. *The ultimate aim of this work is to achieve methods of increasing the male life-span.*

A Plant for the Pond

THE WATER FRINGE

By B. Fry



THE WATER FRINGE flowers effusively throughout the summer. This lovely little water plant is a native species but is now becoming increasingly difficult to find in the wild. Even in Victorian times it was regarded as rare. Essentially it is a plant of still and sluggish waters.

Although its foliage bears a remarkable resemblance to that of a pygmy water lily, a fact which no doubt explains its other common name of fringed water lily, it has no close connection with the true water lilies or nymphaeas at all: it is, in fact, closely related to the charming bog bean (*Menyanthes trifoliata*).

The leaves of the water fringe, then, are rounded but rather jagged-edged hearts that attain about 2 in. across. They are grass green mottled and speckled brown above and purplish below. They are raised to the surface on purplish stems that accommodate themselves well to any ordinary depth of water. Adventitious roots are thrown out from the branching stems. Propagation of the plant is effected by division

of the stems, with some roots attached, or of a large root system. New plants are also produced from seed.

The flowers are of an intense canary-bird yellow and are held about 2 in. above the surface. They measure roughly 1 in. across the open cups and have five minutely fringed petals joined at the base.

Indubitably the water fringe is a first class plant to introduce into a garden pond; for, apart from the beauty of its flowers and the attraction of its long flowering period, its masses of floating leaves afford plenty of shelter for fish and fry and inhibit the development of free-floating algae.

Water fringe is listed in various authoritative works and nurserymen's catalogues under the following formal names: *Limnanthemum Nymphoides*, *Nymphoides peltatum*, *Nymphoides peltatus* and *Villarsia nymphoides*. There is a form in cultivation called Bennett's variety or Bennett's water fringe, which has clear green lily-like pads. But this distinction appears to confer no great improvement, visual or utilitarian, on the type.

OUR READERS WRITE

A. G. E. Jessopp

I would like to express mine and my wife's deep sense of loss, at the passing of Ted Jessopp, late Chairman of the B.F.A.S.

We knew him and his wife (Betty) personally. He was a really great man, kind and warm-hearted. His knowledge of fish and fishkeeping was unequalled. He could talk on any subject connected with our hobby, in a way that made you laugh one moment, and yet gave you information that helped.

The aquatic world has suffered a great loss, and all that knew him would wish to pay their respects to him. Indeed, I hear that every post brings letters to his wife expressing sympathy in her loss.

Cheerio old friend.

Yours sincerely,
GWEN AND DON CRONIN,
 (President of Weston-super-Mare A.S.).

Hyperbole in Advertising

In the past few months members of my Club have made a comment to me about the fish dealers and the way they advertise their wares. Some advertise that they have hundreds of fish of many varieties always in stock and hundreds of tanks to put them in, but when you arrive at their premises after travelling many miles, Oh my! You find a small room with about two tanks and hardly any fish or plants for sale.

This kind of dealer may be few in number, thank goodness. Aquarists would be advised to enquire about an advertising dealer before making a long journey to purchase fish.

D. ROGERS.

Any Offers of Help?

I am responsible for Entertainments for "King's Lynn and District Aquarium Society" and at one of our future meetings would like to have a slide or film show.

My problem is finding somewhere to hire these items, or what would be even better, someone to visit us and give a talk with the slide/film show.

Can you help, please?

D. A. HUTCHESON,
 13 Fenland Road,
 King's Lynn,
 Norfolk.

Decline of Coldwater Fishkeeping

Recently, while contemplating what seems to me to be the sad state of the coldwater scene in recently attended open shows, I tried to put myself in the place of an aquarist of twenty or so years ago, who, like me, was contemplating what seemed to him to be the sad state of the coldwater scene! What could he do to arrest the decline that was all too evident to him. He would join a specialist society dedicated to his particular branch of the hobby. After joining he would work hard, become a show judge, give lectures, go to meetings, attend conventions, and spend more time and money on his hobby than he originally intended to.

What would he think today, twenty years later, to find while judging at open shows, only two classes, twin tail and single tail, with probably only two or three entries in each class?

What would he say today?

H. W. JOHNSTON,
 London, E.17.

Marine News

A new national marine society is now in the process of formation. Whilst all forms of sea life will be catered for, it is hoped the society will be able to promote serious study of Britain's own rather neglected marines. We would greatly appreciate the support of readers interested in native marines or coral fish. Marine aquarists, or interested aquarist societies, should write to either of the addresses below.

HOW COLLINGBOURNE, 19 Tan y Bryn, Pontygwaith, Rhondda, Glam.	DEREK HIGHFIELD, 119 Kent Road, Woods Est., Wednesbury, Staffs.
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Lecture Material Wanted

For our nightly meetings which are held on the third Tuesday in every month, we have slide shows, lectures, film shows and any other subject to do with the furtherance and betterment of the aquarist member in the Society. But we find that getting material for nightly meetings becomes more and more difficult and we wonder if, through the medium of *The Aquarist and Pondkeeper*, you could place an article in the News section asking if any other Society or any aquarist has anything which would be of help to our Society to keep the interest of the members.

Hoping that you can oblige to this request.

A. H. COULSON,
 Seaham (Rock House) Community
 Association,
 17 Tempest Road,
 Seaham, Co. Durham.

British Freshwater Fishes

THE GUDGEON (*Gobio gobio*)

By Arthur Boarder



ALTHOUGH THE GUDGEON is a member of the Carp family it bears little resemblance to the ordinary Carp in shape. It is a very elongated fish with a rather large head in comparison with the body. There are two small barbels at the corners of the mouth which indicates that this fish is predominantly a bottom feeder. The colour is a greenish-yellow with a much darker back and with brownish markings along the sides. The underside is silver and the fins are yellow with dark brown spots. A fish of four oz. in weight would be considered a good specimen by an angler and although this fish is small as sporting fishes are considered it is quite a lively fish and gives good sport to the angler who uses light tackle and a small hook.

The fish is well distributed in Europe but appears to be absent in the Lake District and Scotland. It prefers running waters but can be found in lakes and large ponds at times. The flesh of the Gudgeon is considered a delicacy in some parts of the world and years ago jars of pickled Gudgeon could be seen in country stores. Many of the canals of this country are well stocked with these little fish and many a boy has started his angling enthusiasm by fishing for them.

The food consists of small live creatures such as *Daphnia*, mosquito larvae, water shrimps and lice.

Soft water vegetation is also eaten and in captivity it will take most foods as given to goldfish. Maggots are a favourite bait with anglers but small pellets of bread paste will also prove an attraction.

Gudgeon spawn in May or June and prefer to do so in running water but if in lakes will usually spawn right in the shallowest parts. These fish are mainly gregarious and in the spawning time large shoals may take part. The eggs are adhesive and two or three thousand may be laid by one female in a season. The eggs lie on the bottom or on sunken vegetation and hatch in about ten days according to the temperature of the water, the cooler, then the longer will the eggs take to hatch.

As a tank specimen the Gudgeon is not very interesting as it can spend most of the time on the bottom. However, it can be bred in captivity but good clear water is essential. As the fish is a bottom feeder it may be necessary to provide a filter to prevent the water from becoming too clouded. For the garden pond this fish is not to be specially recommended as it is not likely that it will be seen very much unless the water is very clear and there are not too many water plants. There is one danger for the goldfish breeder if he introduces a Gudgeon into his breeding ponds and that is the liking of these fish for the spawn of fishes.

Harmful Bacteria in Sea Water

By Huw Collingbourne

IN MARINE WATER dead organisms decompose considerably faster than in fresh water. Soon after the animals die and begin to rot bacteria begin to multiply in large numbers. Recently one of my aquariums was affected by a sudden bloom of bacteria. In this tank (2ft. x 1ft. x 1ft.) I have a thriving community of marines, among them a large number of sea-stars. Each week I buy a pint of fresh cockles to feed to my sea-stars. Cockles and all other bivalves are notorious because they harbour large numbers of bacteria and internal parasites. Before introducing bivalves to an aquarium it is essential to put them into a small jar of sea water to eject all the filth from their gut. After I did this I made a very bad mistake. I tipped all of the cockles (about thirty) into my aquarium. That evening and night proved to be warm and the water in my aquarium became a few degrees warmer than usual. This sudden heat in a tank, already rather crowded, proved disastrous. By mid-morning the next day the formerly clear water had become dense and grey and the odour was overpowering. Every single cockle had died. Luckily only the cockles had suffered. My first job was now to remove the bivalves and try to destroy the rapidly multiplying bacteria. This presented problems. As the affected aquarium housed British marine animals I had

no heater in use and the density of the water could not safely be altered sufficiently to check the growth of the bacteria. No copper treatment could be employed as such a treatment would kill my invertebrates. Finally, after some thought, my brother and I came up with the idea of increasing the pH or level of alkalinity, from 7.8 to around 8.8. However, this would have to be done very suddenly as some bacteria multiply once every twenty minutes and if the pH change was gradual it would have no effect on the new generation of bacteria. The best method of increasing pH is by using slaked lime. Of course I had none, so, as lime is calcium carbonate and the shells of cockles are slightly impure calcium carbonate, it followed that cockle shells crushed very finely would serve to alter the pH. I crushed about six shells into a very fine powder and then dissolved the dust into a cup of hot fresh water. When this cooled I poured the liquid into my aquarium and stirred the water well. Not all of the calcium carbonate had dissolved and a white sediment covered the gravel on top of my U.G. filter. In only a few minutes the pH had increased to 8.5. Once I had done this there was nothing more to do than wait, and lo and behold, the next morning the water was crystal clear. A single large mollusc was the only fatality.

AWARDS FOR THE CHAMPION OF CHAMPIONS CONTEST

Below are the awards which are being presented at the British Aquarists' Festival, Manchester, on 10th & 11th October, 1970, to the winners of the Champion of Champions Contest.



1st Award

A Hall-marked 9 ct. gold lapel pin in the shape of "The Aquarist" badge inscribed—"Champion of Champions". A cash prize of twenty guineas together with an inscribed plaque, mounted on a hand-made Indian Rosewood back.

2nd Award

A cash prize of thirteen guineas and inscribed plaque mounted on a hand-made Indian Rosewood back.

3rd Award

A cash prize of seven guineas and a plaque similar to that of the second prize.

The entries for this contest represent the finest display of fish in the Country and are all winners of the "Best Fish in the Show" award which have been held throughout the country. Every entrant has received a gold-plated lapel pin as illustrated.



OUR EXPERTS' ANSWERS TO YOUR QUERIES



READERS' SERVICE

All queries MUST be accompanied by a stamped addressed envelope.

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

TROPICAL QUERIES

By Jack Hems

May I trouble you for some guidance on the care, general behaviour and breeding procedure of *Bedotia geayi*?

B. geayi appears to flourish best in a well-lighted aquarium filled with tapwater giving a neutral to slightly alkaline reaction. A temperature in the lower to middle seventies (°F) is about right. The species is peaceful and frequents the middle and upper levels of the water. In my experience it lives longest and healthiest on its own, that is with its own kind. Almost any dried, live or flesh food is taken. If the fish is left undisturbed egg-laying takes place every so often in fine-foliaged plants. The eggs are laid singly. Neither eggs nor fry are taken much notice of by well-fed parent fish. The newly-hatched fry eat brine shrimps, micro worms, and dust-fine dried food from the start.

I have heard of a new cichlid called a dolphin acara. Can you give me the scientific name and maximum size of this fish?

The dolphin acara is formally known as *Aequidens itanyi*. It grows to a length of about 5 in.

At a recent fish show I saw a most interesting looking catfish, with a sturdy, club-shaped body coloured slate grey large-spotted all over with black. It had long, whip-like barbels, a pair of which extended back about as far as the tail. Do you think you could tell me the name of this fish?

I guess the fish that caught your eye was *Synodontis alberti* from the Congo. A number of *Synodontis* catfish are wonderfully marked.

I would appreciate some advice on keeping and breeding *Pelmatochromis thomasi*.

This medium-sized cichlid appears to flourish well in soft water giving a neutral to slightly acid reaction. It is suited to sharing a fairly spacious and well-planted aquarium with other fishes of about its own size, but ought to be given a tank to itself. It spawns on stones or the inside (or outside) of a flower-pot, and the fry are free-swimming in about a week. They are ready to take micro worms, brine shrimps, and the like, from the start. Adult fish will accept all the regular live foods such as worms, gnat larvae, and substitutes for live foods, and meat.

Chlorinated water is the only sort of water I have to fill my new aquarium tank. What can I do to stop it killing the plants and the fish?

Stir the water vigorously with a clean stick and leave it to stand outdoors (in a clean plastic bucket) for a few hours before introducing it into the aquarium. Alternatively, fill the aquarium with the water and then set an air pump working to aerate it well. After about twenty-four hours fish may be introduced without ill effects.

What is a mosquito fish?

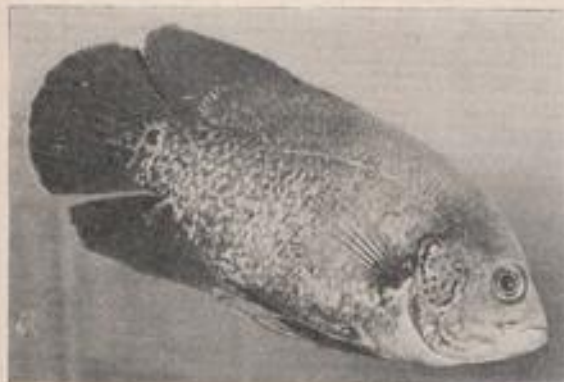
Strictly speaking a mosquito fish is any species of fish used to keep down the disease-carrying mosquito. Cyprinodonts, oviparous and viviparous, are among the most efficient destroyers of the larvae of the mosquito. William T. Innes, the great American writer on aquarium fishes, once wrote that the tiny livebearer formally known as *Heterandria formosa* was popularly called a mosquito fish, possibly because the male is not much bigger than a male mosquito!

I have heard of a corydoras catfish called the long-nose. What is the scientific name of this fish and is it usually available?

The long-nose corydoras is formally known as *C. treitli*. It is a species from Eastern Brazil and is not often available.

What is the scientific name of the red oscar and would it breed with the ordinary oscar?

The red oscar has been developed from the ordinary oscar or *Astronotus ocellatus*. It is merely a man-made colour variation of the type. I see no reason why it should not mate with the ordinary oscar. But what would be the purpose? Surely the red strain should be kept pure, or apart?



Red Oscar

Please give me some information on the country of origin, preferred food, maximum size, and disposition of the black phantom tetra.

The black phantom tetra (*Megalimphodus megalopterus*) hails from Brazil, eats any live or dried food, attains a length of about 1½ in. and is quite peaceful.

I have just been told by a friend experienced in aquarium management that fishes left to fend for themselves while their owner is away on holiday do not need the electric light left burning in their normally electrically illuminated aquarium. Is this true?

An electrically illuminated aquarium, with a good growth of plants in it, would soon become a stinking death trap for fishes if the electric light was kept switched off for more than a few days.

Can you give me a rough idea of the life-expectancy of a White Cloud Mountain minnow?

For a fish living under good conditions, about two years.

Although I give tubifex worms a jar full of fresh water every day, I can never keep any of the worms alive for a week. What is the secret of keeping the worms alive for several days?

Swirl newly-purchased worms around in two or three changes of water and empty the water and debris away to leave a tight tangle of red worms on the bottom. Only just cover the worms with fresh water and stand the jar in a cold place (but I don't mean icy cold place). Before feeding any of the worms to the fish, empty off the old water and fill the jar with fresh water. Empty all but about a tablespoonful away, then remove the worms you need. Repeat the procedure every day. The worms should stay fresh and comparatively odour-free for about a week.

COLDWATER QUERIES

By A. Boarder

I would be obliged if you could recommend a book on feeding and breeding. I am mainly interested in Golden Orfe and Koi!

Any book covering the breeding of goldfish would be suitable for you. Koi breed in a manner similar to goldfish as their predecessors were probably Crucian carp from which goldfish were developed. Orfe are not as easy to breed as goldfish as they need to be larger before they spawn and although their methods of spawning are similar to goldfish they must have a very highly oxygenated water before they will do so. A fountain or a waterfall and a fairly large pond are necessary before success is likely to be achieved.

I have a garden pond 10 ft. 6 in. × 6 ft. 6 in., with water plants and a number of fishes. Just lately the fish have gathered away from where they usually come for food and some food I placed in the pond has not been touched. Two golden orfe have died. What is the trouble?

Without doubt your trouble is that the water in the pond has become foul and lacks sufficient oxygen. When the fish take no notice of food offered it is a sure sign that the water is impure. Goldfish and most other fishes will not eat at their maximum unless the water is in a healthy state and when fishes go off their food trouble can be expected. This is hastened if more food is given as this decays and pollutes the water further. Your remedy is to change most of the water in the pond and remove any decaying matter. Then when the pond is refilled do not feed at all for about a week. Then test out the fish with a very little food which floats on the surface and if the fish do not come up for it then give no more until you see that they are on the feed once more.

I have a tank 18 in. x 12 in. x 12 in., in which two goldfish spawned. They ate most of the eggs but I saved a few. Now I notice that the fish seem off colour and the male fish has some scars on its side. What is the reason?

It is not unusual for goldfish to appear off colour after spawning. This is a strenuous business and takes a lot out of fishes. Even in natural waters many fishes die after a hectic spawning. Your trouble could have been accentuated by the fact that the fish spawned in such a small tank. You state that you had rocks in the tank. These would surely have caused the damage to the male fish. If you watch the actual chasing you will realise that the fast swimming in a restricted area could be most dangerous to the fish and the presence of rocks would be almost certain to cause some damage. Leave the fish to their own resources for a time and feed occasionally with a garden worm or two. The damage should heal up all right but watch for fungus disease on the damaged parts. You should provide a larger tank or make a garden pond if you want to breed goldfish successfully.

I have a pond which holds about 450 gallons of water. Recently it started to leak and I have painted it with Pondseal but it has again started to leak. The pond was constructed with concrete slabs on sides and bottom. Would it be any good painting it with tar?

I suspect that your trouble with the pond stems from the fact that it was constructed with slabs and some of these slabs have moved and so caused a crack to form. If the base of the pond is insecure it is not of much use trying to patch it up. If Pondseal would not stop the leaks then tar would not either. I have used Pondseal with great success and if used according to the makers' instructions will certainly make a concrete pond leak-proof.

I have lost several shubunkins in my pool although other fishes appear to be quite healthy. The shubunkins do not live for long and lie on the surface exhausted before dying. Can you give any reason for this?

When certain fish die in a pond but the others seem quite healthy it is a good idea to examine the source of the fish which died. If the water was unhealthy then one would expect all the fishes to die but when only one or two do so, especially if recently introduced, the health of the new fish should be suspect. Many fishes are imported into this country and some may not be in good health. I have heard of many dealers having had trouble with certain consignments of imported fishes and so the cause of your losses may be due to the fact that your shubunkins were infected before you received them. Shubunkins are just a variety of goldfish and they should be just as hardy as they are.

I am very interested in breeding Lionheads and orandas but cannot find any literature about these fish. Can you help please?

Orandas and Lionheads are just varieties of goldfish and they breed in exactly the same way. Any book dealing with breeding goldfish would give you all the information you need. The book, "Coldwater Fish-keeping" covers all you need to know. The only thing which may appear to be different with these fish is that they both have a hood over the head and gill plates and this feature does not form very early in the life of the fish. It is therefore necessary to have patience when breeding them as you will have to wait a year or two before the hoods form and you can tell which fish are worth keeping. The above book can be obtained from the publishers of *The Aquarist*, at 5s. 6d. post paid.

I am going to construct a pool and would like to know if plastic plant containers are suitable for water lilies and other water plants or are clay pots with holes in the sides better?

Plastic pots are all right to use but try to get some turves for compost and then cover with stones to prevent fish from disturbing the soil.

I have two catfish in a tank with goldfish and would like to put them in my pond but I have read that they can be monsters. They have never harmed my fish in the tank. Will they be all right in the pond?

The catfish will be all right in your pond and will soon grow to a large size and then eat up all your smaller fish. If they are the European catfish (*Silurus glanis*). Then they can grow to over thirty pounds in weight. They are carnivorous and with such a huge mouth they can swallow any fish well over half their own size.

Are snails any use in the pond?

The short answer is "No". If you do not intend to breed fish in your pond then it is a matter of individual choice. Water snails never yet kept a pond clean. They can eat the plants and also food given for the goldfish. They are also fond of fish eggs.

Can I put a sunbass in my garden pond? It has been in an indoor tank.

The sun bass could be safe in the pond during the warmer months of the year. If the pond is in a sheltered position and is not likely to freeze almost solid in the winter it is possible to keep the sunfish in the pond all the winter. They are found in North America and can certainly stand a fair amount of cold. If you had a heater to insert in the pond during very severe weather it is probable that the sunfish would survive safely.

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THE GIANT DANIO

By Jack Hems



Danio malabaricus, commonly known as the giant danio, has long been one of the most popular of tropical aquarium fishes. The reason is not far to seek. It is attractively coloured; it is peaceful; it is hardy; it is active; it is easy to keep. Moreover, it is not difficult to breed.

It is of the carp tribe. That is to say it is a member of the widely distributed family *Cyprinidae* and is found in the wild state in the coastal freshwaters of Malabar (hence its trivial name) and western Ceylon where, according to the best writers on aquarium fishes, it attains a length of about 6 in. In the aquarium, however, it rarely exceeds 4 in., or, perhaps, 4½ in. at most.

The basic coloration is greyish olive above and silvery white flushed salmon pink below. The sides are striped with blue and yellow, or gold. The middle blue stripe extends as far as the fork of the caudal fin. The head and shoulders are marked with gold and silver overlaid with blue blotches and bars. The fins are red fading to diaphanous grey. Almost always the female is paler in coloration and larger in the body than the male. This is certainly true of the fish when a couple are ready to spawn; for then the blue and reddish tints of the male become greatly intensified and the female displays bloated sides.

The regular 24 in. by 12 in. by 12 in. aquarium tank is not too small to spawn a pair, though a three-foot tank is better. As a rule the sticky eggs scattered by the female, as she is driven all over the aquarium by the male, come to rest in the submerged vegetation (bunched plants with feathery foliage such as myriophyllum or Java moss (*Vesicularia dubyana*) are recommended), but sometimes during the excitement of the chase (the male is a persistent and vigorous driver) the female will release eggs before she reaches the plants. If, therefore, the floor of the aquarium is carpeted with a layer of well-washed small pebbles, on which the bunched plants are weighted down, there is the chance that the eggs that do not end up in the plants will end up in the interstices of the stones, where the fish cannot get at them. (Remember that *D. malabaricus*, like most other oviparous fishes, is an avid eater of its own eggs, and must be removed from the aquarium as soon as egg-laying is over.)

It is always a good plan to separate the sexes for a month or two before breeding is attempted in order that they may be brought into first class condition. During this conditioning period the fish should be fed to repletion on the most nourishing possible food such as wheat germ, chopped earthworm, and raw lean steak.

The fish keeper with some experience will know, intuitively, when to bring a pair together. But the comparative beginner must wait and look for the signs mentioned above, that is the brighter colours of the male and the fuller sides of the female, before any attempt is made at spawning. It is best to place a conditioned pair in the tank set up for breeding last thing at night.

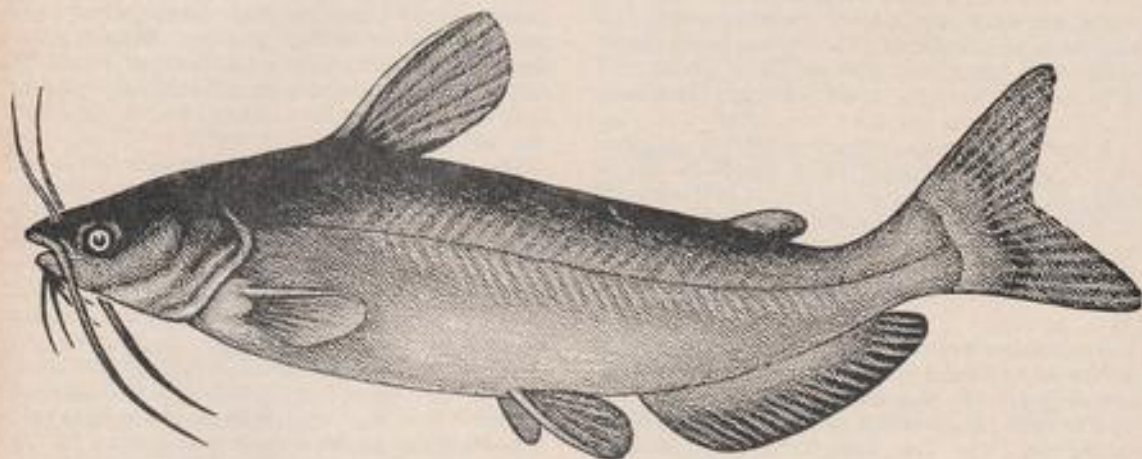
Whatever the temperature before (ordinarily a range of from about 68°F (20°C) to 75°F (24°C) suits the giant danio very well), it is essential now to raise it to the upper seventies or lower eighties (°F). In most cases the stimulation provided by a higher temperature, combined with a good light (natural or artificial) will result in chasing on the following day, though a few hours may elapse before any eggs are laid.

The eggs hatch in about two days. The glass-like fry cling to the sides of the aquarium and the plants for the next few days before they become free-swimming and begin searching around for food. For the next nine days or so a proprietary fry food may be given or, if the aquarist has the expertise to prepare it, infusoria. Drip-fed infusoria is, perhaps, the most satisfactory way of bringing on fry fast, yet without the danger of fouling the water. Common-sense will determine when the fry need larger food such as brine shrimps or micro worms or a fine-milled dried food. As the fry increase in size their colours will begin to show. Also, they tend more and more to move about in a shoal. They are a pretty sight seen swimming in clear water against a background of fresh green plants.

The giant danio is an ideal fish for the more spacious aquarium and mixes well with such beauties as the silver shark, the elegant rasbora, and the Australian rainbow fishes. Of supreme importance, too, is the fact that it is not hard on the plants and does not demand anything special in the quality of the water.

THE AMERICAN CATFISH

By J. C. Thiéfaine



I HOPE TO PRESENT a very interesting aquarium pet to you in the following article, which shows a peculiar behaviour pattern and is as convenient for the beginner as for the more advanced hobbyist: *Ameiurus nebulosus*, the Brown Bullhead, often better known in the British Isles as the American Catfish. The anglers dislike it because it will devour all the young fry it comes across. On the other hand, its flesh is appreciated by the connoisseurs, especially in the U.S.A., where there are true "Cat"-lovers. The fish belongs to the family *Ameiuridae*, and originates in the United States eastwards from the Rocky Mountains and in the Great Lakes. Despite this exotic origin (exotic does not mean tropical), the Brown Bullhead is found in the standing and slowly flowing waters of Europe, where it was introduced in 1889 and where it causes great damage to the fish population because of its great voracity.

The first apparent characteristic of the fish is the broad and flattened head which includes about 23 per cent. of the whole body length. It is more strikingly apparent in young fishes, giving them the aspect of tadpoles. This impression is reinforced when seeing them swim: they swim as effectively

as frog larvae. Older individuals are plumper and this particular form somewhat disappears. The body is naked, without scales or bony plates as in many other catfishes. It is round-shaped and laterally compressed towards the rear. The skin is slimy. *Ameiurus nebulosus* grows very big for our common aquarium sizes, up to 18 in., but specimens of 10-12 in. are more often caught. Fishes which spend their whole life in the aquarium should not exceed 10 in. in the length. They distinguish themselves from their gigantic relative, the European Catfish, *Silurus glanis*, (Europe's largest freshwater fish), in the 8 barbels (only 6 in *Silurus*) and in their fins. The American Catfish possesses a second dorsal without rays (adipose) as in many Characins, while the European Catfish possesses a unique dorsal. A second difference in the finnage is found in the anal which although well developed, yet is not as long as in the *Silurus*. In the latter one it almost surrounds the whole underside of the body and nearly connects with the tail. The body length and the weight are distinguishing factors in older fishes, as the European representative becomes much bigger and heavier (please see table).

**Table of the Differences between both
Catfish-Species occurring
in European Waters**

European Catfish (<i>Silurus glanis</i>)	American Catfish (<i>Ameiurus nebulosus</i>)
suborder: <i>Siluroidea</i>	suborder: <i>Siluroidea</i>
family: <i>Siluridae</i>	family: <i>Ameiuridae</i>
length: 120 in.	length: 18 in.
weight: 600 lb.	weight: 3 to 4 lb.
barbels: 3 pairs	barbels: 4 pairs
—1 pair of long barbels on the upper jaw	—4 barbels on the upper jaw (2 long and 2 shorter ones)
—2 pairs of shorter ones on the lower jaw, disposed as a comb	—4 shorter barbels on the lower jaw disposed as a comb
dorsal: 1, without spiny ray	dorsals: 2 —1st with spiny ray —2nd adipose (small)
anal: very long (90-95 rays)	anal: not so long (20-22 rays)

Of the 8 barbels of *Ameiurus nebulosus*, 4 are located on the upper jaw. The uppermost 2 barbels stand close behind the nostrils and they are as long as the 4 of the lower jaw. The lower 2 barbels of the upper jaw are situated at the mouth corners and they are the longest. They can reach the base of the pectoral fins. The 2 pairs of barbels on the lower jaw are of the same length as each other and disposed as a comb. All the barbels contain many taste buds which help the fish find its food. The mouth is terminal and has a wide opening which allows the fish to swallow fairly big prey. The jaws are furnished with many small teeth.

The first dorsal fin consists of a strong spiny ray and 6-7 soft rays. The second dorsal is, as we already mentioned, an adipose. The first ray of the pectorals is a hard spiny ray too. Anal and ventral fins have no spiny rays. The caudal is very little incurved or even straight-lined. The finnage formula concerning this fish is the following: D I/6-7, P I/7-9, V I/6-8, A I/20-22. By means of the spiny fin-rays the American Catfish can seriously wound the inattentive or ignorant angler or aquarist. When you have to remove it from a tank, you had better use a hand-net.

The colour of *Ameiurus nebulosus* varies from greyish-brown to black with a greenish shimmer on the sides. Sometimes a more or less apparent marbled pattern can be distinguished. The belly varies from dirty white to yellowish. The iris is golden. The colour can vary according to the place where the fish are living.

Catfishes are mainly bottom-fish. This characteristic yet does not prevent them from swimming close under the surface. Further, although they are principally nocturnal animals which remain hidden in holes or under roots during the day, my *Ameiurus*

were caught at noon in April, in a warm sunshine, just under the surface where they were swimming. I assume that the fishes were attracted rather by the sun-warmth than by the sun-light. A similar occurrence could be observed many times in the aquarium where the fishes rejected hiding-places and swam to the surface where they could warm themselves between floating plants, under the lamp.

The American Catfish takes very well and rapidly to the life in the aquarium. Individuals who had just been introduced in the tank seemed not to taste any surface food at the beginning (dry food which is not yet soaked and has not yet fallen to the bottom). They were busy with the inspection of all their new dwellings and combed the bottom actively, with the help of their barbels, for food. A colony of *Tubifex* which were living in the tank, soon disappeared. After a few days, the Ameiurids were accustomed to all sorts of foods. TetraMin and other brands, even dry water-fleas, were eaten greedily and pieces of earth-worm are dainty bits for them. After about 10 days captivity the fishes had become so familiar and tame that they made so bold as to take small bits of earth-worms from my fingers. They were only 1½ to 2 in. long at that time. However, I would not try this again with bigger fish of 4 in. and above, for fear of their teeth as they can widely open their mouth and vigorously bite their prey.

The feeding of Catfishes raises no problem if we consider them as omnivorous. At an acquaintance's of mine I have seen a fish which even eats soft French cheese and canned food for cats and dogs. Nevertheless, I want to tell you about a strange happening in my tanks. I had been feeding my *Ameiurus* for a long time with worms and various artificial foods. As I was expecting some common Sunfishes (also called Pumpkinseeds, *Lepomis gibbosus*), from a friend dwelling in south-western France where the genus is widespread, I thought it was advisable to start breeding some guppies as live food for them and which the catfishes would enjoy too. This is what I thought, but the matter developed otherwise.

The catfish-tank is 40 in. long, 12 in. wide and 16 in. high. The following occurred in summer, at a water-temperature of 60 to 64°F. I introduced some young *Lebistes* into the catfish-tank with the thought that the latter would quickly get rid of the former. However, this was out of the question and the livebearers remained alive. Some explanation may be given to this:

1. Catfishes are actually bottom fishes which seldom search for food along the surface. In the small tank of 20 in. × 8½ in. × 11 in. where I had originally kept them, they regularly came to the surface and took dry food from there. The water-level was only about 11 in. in this tank. In the 40 in. aquarium, I was unable to observe this. The fishes

were waiting until the food was soaked and had fallen to the ground. As young fry habitually frequent the upper part of the water and swim in the proximity of the surface; this resulted in the fact that brown-bullheads and guppies never met each other and so the latter survived.

2. The temperature was somewhat low for young livebearers and they never tried to swim to the lower parts of the tank where the water was colder. They remained in the upper part that received light, i.e., warmth from the lamp, where they could find hiding-places among floating plants.

I could also observe the scorning of young fry as food when I put some rickety goldfishes into the ameiurids' tank in the winter time. They also remained under the surface, although they had no plant for hiding themselves there because the tank is planted with coldwater weeds which partly die in winter. Also, in this case the predators took no notice at all of the prey, though it was absolutely possible that a 4 in. long catfish could swallow a $\frac{1}{2}$ in. young crucian carp.

As a result the Poecilins soon became very numerous and they quite rapidly invaded several aquaria, as I am still expecting the sunfishes to come. I began one year ago with 1 male and 3 females and six months later more than 200 guppies swam in five small tanks of 16 in. \times 8 in. \times 9 $\frac{1}{2}$ in. At length I discovered the ideal key to this problem. Why should I not put a catfish into a guppy-tank, as they can bear higher temperatures without damage? I therefore chose a slowly growing individual of 2 $\frac{1}{2}$ in. in the length which grew from 1 $\frac{1}{2}$ in. to 2 $\frac{1}{2}$ in. in one year and a half, i.e., only 1 in. I introduced it thus into the guppy-tank and left it there without any more surveillance. After a couple of days the number of livebearers seemed to decrease. I had at last won the battle! What also will interest you is that after a fortnight the *Ameiurus* reached 3 in. in length and after one month 3 $\frac{1}{2}$ in. Regarding the problem of nutrition, I came to the conclusion that the water depth plays a certain role. In the guppy-tank where the depth is only 9 $\frac{1}{2}$ in., predators and prey meet each other and the latter are eaten up by the former. This experience shows how the way of feeding can influence the growth rate.

Taking into account that *Ameiurus nebulosus* likes to remain hidden amongst rocks and roots and that it will avoid bright lighted places, we shall set up its aquarium with holes and caverns built with flat stones or pieces of slate. The fish will like such retreats very much. We shall only be able to succeed in a rich plantation when the fishes are not too large. Otherwise they are so turbulent at feeding times that they can uproot the plants and damage them. If you want to have a rich plantation in your tank, you may light it intensively; in this event the ameiurids'

need of shadow will be satisfied by the hiding places and some floating plants. As the fishes are very lively at feeding times and will also actively and strongly root in the soil, sand and mulm are whirled up and can suffocate thin structured plants as for instance *Myriophyllum*. You had better choose hardy plants of the genera *Sagittaria* and *Vallisneria*. Also some *Nymphaea* are quite convenient.

Fishes which are accustomed to life in the aquarium come out of their retreats also in the daytime, especially when they hear their caretaker come in the neighbourhood of the tank. I say "hear" and not "see their caretaker" because catfishes are quite sharp-hearing but very short-sighted. If you abruptly move your hand in front of the aquarium pane, they will show no reaction at all, contrary to other fishes (for instances the *Cyprinidae*) which have very good sight. But they can hear very well and they identify their master by his steps.

The behaviour of the brown-bullhead in the aquarium can vary quite a lot. The fish mostly remains hidden in a hole or under roots. When it swims slowly now and then in the tank, it looks like an ungainly prehistoric creature (catfishes are actually an ancient group of fishes and "prehistoric" is the right word), but when it has detected the presence of a worm or small crustacean on the ground, its movements become lightning-like and accurate. I have observed such rapidity and "sharp-shooting" several times in the aquarium where a catfish was living with guppies. The predator is swimming slowly and tortuously along like a snake; a guppy approaches. Suddenly the catfish directs itself towards the prey and this is instantly swallowed, like a letter into the pillar-box! It may happen likewise when the guppy swims next to or behind the ameiurid. It is detected by the many taste buds on the barbels and others on the body of the predator. Hunting for fish can better be observed at night, when the aquarium light is out. Before I switch off the light of the tank I put on a feeble lamp in the room which still enables me to see my fishes. As soon as the aquarium light is switched off, the *Ameiurus* comes out of its den and begins to hunt actively and it is not two minutes before it has caught a young guppy. The positions of the American catfish are identical with those of the tropicals belonging to the sub-order *Siluroidea*, some representatives of which (*Corydoras*-species) are very popular in the aquarium. The fish can as well lie on the bottom (which must consist of thin sand because the animal is sometimes prone to dig itself in the ground) as stand vertically, head upwards, between two plant leaves. It also can stay in equilibrium with its hind parts resting on a leaf or stone and the fore-part floating freely in the water.

And now let us conclude: brown bullheads do not

like painfully cleaned aquaria. A good mulm layer is quite convenient to them, in which they will turbulently search for food. Heating is not necessary in their tank; at 50°F they swim as well as at 75°F. They don't know about pH and dH. These are words belonging to a foreign language. Aerating also does not find any use in their tank as the fish are capable of intestinal breathing which permits them to live in dirty waters very poor in oxygen. Packed in humid moss, they can be transported for several hours and on arrival they are still alive. The most important point for keeping the American catfish is feeding. Give it solid food and never forget that it needs a great deal of nourishment! Concerning its voracity, I have a neighbour who always goes catfish-fishing with only two earthworms. The first is the bait, the second is a spare. As soon as he has caught the first bullhead he kills it and cuts it to pieces. With these pieces of catfish-flesh he catches the others! This is already known with sharks, but they belong to a different field. Also provide for shadowy hiding-places and districts in the tank. Regarding reproductions: we know that the males take care of the youngsters but my fishes are still too young and I hope to be in a position

to give further information on the topic when they are mature. The breeding should not be very difficult in larger tanks. When young, the American catfish can be kept in the community tank, but never with smaller fish which it may consider as prey. It is peaceful with larger fish or fishes of its own size. In this event, feed it at night when all is dark and the other inhabitants of the aquarium have gone to sleep. However, the fish feels better in a special and proper aquarium and you will learn much more about it in such a special tank. *Ameiurus nebulosus* is a coldwater fish without the beautiful colours of our tropicals but its interesting behaviour and quite undemanding habits make of it THE aquarium-fish. A hardy and enduring fellow whom you should try to keep. You would not regret it!

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FIRE SALAMANDERS

By Kerrogan Smith

FIRE SALAMANDERS have suffered in the past from the myth that they could survive in a fire. The myth was probably based on the colours of this amphibian, black with yellow spots or stripes, but in fact the coloration is of great service to these Salamanders. The Fire Salamander spends a lot of its time in the dark and light under small plants, where the broken black and yellow is a great camouflage! In their nature these animals are not at all aggressive; only six inches long, they are slow-moving, scale-less with soft flesh. Salamanders cannot bite and seem very vulnerable at first glance; however, they secrete an invisible poison called Salamandrin which deters most of its natural predators.

When I first acquired my pair I noticed that they seemed to ignore worms which were still, but moving worms and other insects were welcomed foods. This led me to wonder how bad their eyesight was, and so I endeavoured to find out. I first of all dragged some dead mealworms along in front of them, and the Salamanders were not slow to eat these. Whilst they were stalking these dead insects I could detect no unnatural reaction from the Salamanders. Next I

decided to determine whether Salamanders will devour any small moving objects. For this experiment I dragged a spent match in front of the Salamanders. They did indeed stalk the matchsticks and were not always willing to release the captured wood. After a few experiences with a matchstick on an evening the Salamanders would stop stalking them; they even ignored living insects. Next day they would again take insects and matchsticks, having completely forgotten the day before.

As a result of my experiments I think it is quite clear that Fire Salamanders have very poor eyesight. They can detect movement, but not any details. Fire Salamanders do, therefore, only attempt to eat moving insects because when they are still Fire Salamanders do not notice the insects, no matter how close the insect is. Also, if an insect that the Salamander has been stalking stops, the Salamander soon loses interest.

There appear to be a number of lizards which also behave like my Fire Salamanders, and it is interesting that a number of insects do stand still when predators are close by, obviously in the hope that the predators will pass by.

CARE OF THE POND

BREEDING GOLDFISH

By Arthur Boarder

WHEN THE GOLDFISH have spawned in the garden pond it is necessary to watch the fish occasionally to see that they have not suffered any harmful effects from their exertions. If the spawning has been very vigorous, with several male fish very active, it is possible that some of the female fish may be quite exhausted. Many pondkeepers find that after spawning, the fish will become very quiet and may lie low down in the water. There is nothing to worry over if this is the case and after a few days it is probable that they will all return to normal. Although many fish need building up after the breeding it is not always necessary to start feeding the fish immediately they have finished. To give food to pond fish if they are not on the feed is very dangerous and even a day or two of such action can spell trouble.

I find that some people still think that if their fish are mouthing at the surface of the water they are hungry and immediately give them food. This will only tend to make matters worse as the fish are at the surface for oxygen. When the water is lacking in oxygen, or over-charged with foul gases, the fish cannot eat and any food offered and will then foul the water worse than ever. When any fish go off their food this is a sure sign that the water has become impure and this goes for fish in tanks as well. If a very small amount of food is given and the fish do not rise at once to take it, there is a danger signal that the water has turned foul. No more food should be given and some of the water must be changed for fresh as soon as possible. It is necessary to realise that the waste matter from the fish is almost certain to foul the water to a certain extent and this will often depend on the amount of growing water plant life in the pond or tank.

This feeding of fish can be a problem as even with a fry tank it is possible to note that the fry will be eating very well one day and if the aquarist gives too much food at any time this may be more than the fry can clear up and if the water is rather warm it can become polluted in a day or so and then the fry will go off their food.

Some pondkeepers place rocks in their ponds and if they expect their fish to spawn these rocks can become a danger. The chasing of the fish can be so vigorous

that severe damage can be caused by any rocks which are in the way of the fish. Once any damage occurs to a fish it is then open to attacks by fungus disease. A regular inspection of the pond should take place and this can often be undertaken at night with the aid of a torch. It is then that any pests can be seen and caught. It is surprising how easy it is to catch some of these pests at night time. Such creatures as water boatmen and diving beetles can be found at the surface and caught quite easily after dark. Newts and their tadpoles can also be caught at the same time.

At this time of the year the water plants must have some attention. Water lilies will have produced many flowers and the dead ones should be removed as soon as they fade. Any dying leaves on the lilies should also be taken off. Other water plants may have made vigorous growth and must be pruned. Most underwater oxygenating plants make plenty of growth during the warmer months of the year and if these are not dealt with they can become so dense that the fish will be unable to find sufficient swimming space.

It is always a good plan to change some of the water in the pond occasionally. Even if a fountain or water fall is in operation it does not mean that foul water will be cleared by their action. It is possible to keep foul water circulating and still not to get rid of foul gases. The action of either fountain or fall will certainly tend to keep the water more oxygenated than still water is likely to be, but just this is not enough to freshen up really foul water.

If the goldfish in the garden pond have not spawned the pondkeeper may be a bit disheartened. There are several reasons for non-spawning. In the first place both sexes may not be in the pond and secondly the water may not be in the right condition to encourage the fish to breed. This water condition is most important as goldfish are not likely to spawn if the water is not well oxygenated. Several directions have been suggested by various writers as to how to encourage reluctant spawners to get going and these vary from a change of the water to fresh, forcing air into the water and a partial separation of the sexes.

My fantails spawned well early in the season and then did not spawn again for some time. As I had a small pond with no fish in I thought that it would be

a good idea to put one or two spawners in to see if the change of water conditions would start them off to breed. This small pond was well planted with a lily and plenty of hornwort (*Ceratophyllum demersum*); a little duckweed was on the top and the water was clear and in good condition. I fed my fish in the larger pond in the usual place and with a landing net caught up several. Now to sort out the sexes. I have never yet noticed any of the usual white raised dots on the gills of any of my male fish. In the first place it is difficult to see these signs when the fish are in a pond but even when I used to exhibit my fish I do not ever remember seeing any of these dots. However, there are other signs of the sexes but it is not easy to spot them with deep bodied fish like fantails. Having placed several in a large bowl I examined them from above. The males are always slimmer in the body and the females have a distinct cut-away from the fatness of the belly to the vent. When viewed from above this sharp curve-in shows up quite plainly. I then chose what I took to be two males and a female and put them in the small pond. After two days my guess was proved correct as the two males were vigorously chasing the female.

After some time I could see plenty of eggs on the water plants and one small bunch I put in was soon lightly covered with eggs. This bunch I removed to a hatching tank and during the evening I caught up the fish and returned them to the larger pond. I saw plenty of eggs but up to the present I have not seen a single young fish in this small pond. Plenty of fry hatched out from the bunch of weed placed in the hatching tank which was kept at 70°F., with slight aeration. However, no fry hatched out in the pond or if they did were soon eaten by some predator. I used my method of looking for fry in my concrete tanks and this is by immersing a white plastic food container under the water. Any fry can then be seen plainly as they show up against the white. Not a single fish appears to have survived in the small pond and this could be because of the presence of newts, water beetles and boatmen.

However, after the fish had been returned, it

was only two more days before the rest of the fish in the pond started to spawn. I have often found that if fish do not spawn in the pond, a temporary separation of some of them will start off a spawning. I have noticed when the fish are spawning well, a distinct fishy smell arises from the water and this may encourage other fish to spawn.

The fish were placed in the small pond on 30th June, and fry hatched in the tank on 6th July. The other fish in the large pond spawned on 4th and 5th July, and many eggs were seen. On one bunch I noticed many eggs and they were in profusion. I do not as a rule like to see so many eggs in close proximity as I have found in the past that many of them turn out to be infertile. It is a strange thing that these eggs although laid in water will adhere to anything with which they come in contact. It is also strange that very rarely do two eggs stick to one another. I watched this large spray of eggs and instead of finding that most of them turned white with mildew within two days, most of them appeared good. The hatching in this tank was fantastic. I have never seen so many fry in one tank before. When viewed at night with a torch the fry appeared as a dense cloud of midges. I am not in favour of removing fry at an early stage but I was forced to take out plenty to give the others a chance of survival.

With a saucepan I dipped out ten lots and each dip brought up two hundred at least of the fry. To estimate that well over two thousand fry hatched out in this one tank would not be an exaggeration. I know that it would not be possible for me to raise but a small percentage of them as the feeding and space problem will be more than I can cope with. The fish which hatched from the first spawning on 4th May, were by this time mostly fully coloured and this was due no doubt to the sunshine we had in June.

It has been most marked this year that many young fantails changed colour when quite small, but I fear that the size has been controlled by the lack of space. The more fish in a tank the slower is their growth, no matter how well they are fed.

COLDWATER QUERIES

continued from page 242

I have lost a few goldfish from my pond and their death appears to have resulted from teeth marks on their backs. What could have been the cause?

The marks on the backs of the fish could have been caused by a bird. It is difficult to say which one as several birds can take fish from a pond and they include: Owls, crows, kingfishers, herons, magpies, jays and even blackbirds could peck small

fish if found near the side of the pond. If you are not far from the sea then gulls could also be the cause. However, several of the birds mentioned would take the whole fish and so it is likely that the damage has been caused by a small bird. Cats can scratch a fish but usually take it from the pond. If the trouble continues you could cover the pond with green plastic netting which is now easy to procure and if well suspended would not be unsightly.

GOING METRIC

By I. G. Phillips

UNLIKE THE CHANGE to decimal currency the conversion to metric units of weight, length and volume is not taking place on a fixed date. However, most people should be aware that the conversion process is taking place right now, with many commodities carrying the metric equivalent to the Imperial measure. I have not yet seen any indication of manufacturers of aquatic equipment, such as tanks, converting to the rationalised metric equivalents, but as we should all be using metric units in the near future it is as well to consider the following in relation to our hobby. For those who wish to be technically accurate the metric standard of length are the metre and millimetre and of volume litre and millilitre, but because some of the dimensions will appear large in millimetres and small in metres, I will use centimetres primarily.

Tank Sizes

I have chosen a few standard sizes only as examples.

Imperial measure (ins.)	Metric (cms.)	Metric (metres)
18 × 10 × 10	46 × 25 × 25	0.46 × 0.25 × 0.25
24 × 12 × 12	61 × 30 × 30	0.61 × 0.30 × 0.30
48 × 15 × 12	122 × 38 × 30	1.22 × 0.38 × 0.30

The metric equivalents are given to the nearest centimetre and from the figures given it is not difficult to work out other standard tank sizes. However, for those who wish to make their own calculations, 1 inch = 2.54 cms., 39.4 inches = 1 metre. You can see that the use of the metre is hardly warranted for tanks under 4 ft.

Volume and Weight of Water

We rarely use the cubic volume of tanks as a measure but its capacity in gallons. We should also be interested in the weight, a factor often overlooked. Here are some comparisons the standard of capacity being the litre and of weight the kilogramme.

Tank Size (ins.)	Vol. (gals.)	Vol. (litres)	Weight (lbs.)	Weight (kilos.)
18 × 10 × 10	6.25	28	62.5	28
24 × 12 × 12	12.5	56	125	56
30 × 12 × 15	19.5	88	195	88
48 × 15 × 15	39	176	390	176

1 gal. water = 10 lbs. 1 lb. = 453 grammes.

1 gal. water = 4.5 litres 1000 grammes = 1 kilogramme
∴ 1 kilogramme = 2.2 lbs.

Finally, we should not forget our fish. I believe some of the more universal books give fish sizes in centimetres, and the information I have already given will enable you to make the conversion. However, for those who like simply to look at a table, here are some conversions.

1½ in. = 3 cms. 1½ ins. = 3.75 cms. 1½ ins. = 4.5 cms.
2 ins. = 5 cms. 2½ ins. = 6.25 cms. 3½ ins. = 8.75 cms.

You will see that parts of a centimetre are expressed in decimals, and that most common sizes give either whole number conversions or parts of 0.25, 0.5 or 0.75 cm., which correspond to ¼, ½ and ¾ respectively, i.e., 8.75 cms. = 8¾ cms.

THE EAST LONDON AQUARISTS

THE FULL COMMITTEE of this Association has instructed me to write to yourself, expressing deep concern about the misleading way a recent article and an individual's personal opinion, was headed and in context implied, that such article was a direct contribution from this Association.

The article in question dealt with the subject of Water Pollution, published in June. You did in fact state in the July issue that the author's name had been omitted, but we must assume that the Association, and the author's name would have been linked in any event.

We take this opportunity to state that your contributor F. Offord is not a member of this Association. Furthermore, no member of the Association can use

his membership, or the Association's name, for personal reasons, other than with the full approval of the committee.

The association appreciate that you would not necessarily be aware of the points raised in the preceding paragraph, and now being fully informed, you will see fit to publish that the inference of this Association being responsible for that article is refuted.

R. DODKINS (*Chairman*).

The editor regrets that the article in question was linked with the East London Aquarist and Pond-keepers Association, and apologises for any inconvenience that the misuse of that Society's name may have caused.



from AQUARISTS' SOCIETIES

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

THE Walthamstow and District A.S. (FBAS) were hosts to neighbouring Chingford recently when members from both Societies formed a panel to answer questions put by the audience. The Inter-club Table Show for Pairs of Tropical Fish attracted twenty-six entries and Mr. P. Tomkins judging, commented on the good quality of the exhibits. The Table Show was won by Walthamstow, who took first three places, fourth going to Chingford. The meeting in August was the first at the Society's new meeting place in Frederick Street, off St. James's Street, E.17, and saw the return of Mr. F. Tomkins, this time to address the meeting on general aspects of keeping happy and healthy fishes. New members are very welcome, details being obtainable from the Secretary, A. R. Chandler, 01-504 9165.

THE Hemel Hempstead A.S. was unable to hold a proper meeting for the last month owing to the school being shut over the holidays. The members, however, have met outside the club and one week visited a tropical fish shop in Hitchen where all had an enjoyable evening. For the next meeting, the members went to collect daphnia at a well-known local pond. The Society is thinking about starting a Club Newsletter and would like to exchange magazines and newsletters with other clubs. If any club is interested please contact Mrs. J. Collins, Press Office, 63 Pulleys Lane, Hemel Hempstead, Herts. The Secretary's address is (Mr. P. Trenwith), 51 Woolmer Drive, Hemel Hempstead, Herts. Phone 56464.

THE results of the **Glossop A.S. Open Show** were as follows: Class 1: 1, R. Tomkinson (Glossop); 2, Simpson & Horsfield (Barnsley); 3, Mr. and Mrs. Wild (Salford). Class 2: 1, Mrs. C. Kaye (Top Ten); 2, Mr. Blackburn (Sherwood); 3, Mr. and Mrs. Wild (Salford). Class 3: 1, Mr. Blackburn (Sherwood); 2, Mr. and Mrs. Heap (Belle Vue); 3, Mr. and Mrs. Grimshaw (Sunnybrow). Class 4: 1, R. Tomkinson (Glossop); 2, Mr. and Mrs. Cobb (Belle Vue); 3, Mr. and Mrs. Hesley (Barnsley). Class 5: 1, Mr. and Mrs. Heap (Belle Vue); 2, Mr. and Mrs. Grimshaw (Sunnybrow); 3, Mr. and Mrs. Beasley (Belle Vue). Class 6: 1, D. Godbhere (Stockbridge); 2, Mr. Shackleton (Belle Vue); 3, T. Faulkner (Merseyside). Class 7: 1, Master Cobb (Belle Vue); 2, Mr. Murrell (Derby); 3, P. Shackleton (Belle Vue). Class 8: 1, P. Ledger (Top Ten); 2, Mr. and Mrs. Wild (Salford); 3, Master Kaye (Top Ten). Class 9: 1, R. Tomkinson (Glossop); 2, Mr. Abell (Sunnybrow); 3, Mr. and Mrs. Grimshaw (Sunnybrow). Class 10: 1, A. and C. Lofthouse (Huddersfield); 2, Simpson and Horsfield (Barnsley); 3, S. Harrison (Huddersfield). Class 11: 1 and 3, D. Jones (Rotherham); 2, Mr. Crockett (Glossop). Class 12: 1, J. Faulkner (Merseyside); 2, Mr. and Mrs. Grimshaw (Sunnybrow); 3, Mr. Birchwood (Oldham). Class 13: 1, W. Downing (Rotherham); 2, J. Faulkner (Merseyside); 3, Miss B. Kaye (Top Ten). Class 14: 1 and 2, M. Lennox (Glossop); 3, M. Tonge (Oldham). Class 15: 1, Mr. and Mrs. Johnson (Salford); 2 and 3, A. and C. Lofthouse (Huddersfield). Class 16: 1, R. Davies (Belle Vue); 2, M. and J. Blamires (Huddersfield); 3, R. Bowling (Sunnybrow). Class 17: 1, L. Kaye (Top Ten); 2, R. Bowling (Sunnybrow). Class 18: 1,

J. Faulkner (Merseyside); 2, P. Shackleton (Belle Vue); 3, Mr. Murrell (Derby). Class 19: 1, Master G. Taylor (Glossop); 2, G. Woodfinden (Belle Vue); 3, Mr. and Mrs. Hogarth (Salford). Class 20: 1, R. and A. Johnson (Ashton); 2, M. Tonge (Oldham); 3, K. Stafford (Oldham). Class 21: 1, J. Mooney (Glossop); 2, J. Blamires (Huddersfield); 3, Mr. and Mrs. Heap (Belle Vue). Class 22: 1, M. Miller (Belle Vue); 2, Master A. Kaye (Top Ten). Class 23: 1, Mr. and Mrs. Miller (Belle Vue); 2, Mr. Beasley (Glossop); 3, Master A. Kaye (Top Ten). Class 24: 1 and 2, Mr. and Mrs. Cobb (Belle Vue); 3, Master Cobb (Belle Vue). Class 25: 1, Simpson and Horsfield (Barnsley); 2, Mr. and Mrs. Heap (Belle Vue); 3, Miss B. Kaye (Top Ten). Class 26: 1, Simpson and Horsfield (Barnsley); 2, R. Tomkinson (Glossop); 3, D. Godbhere (Stockbridge). Class 27: 1, Mr. and Mrs. Healey (Barnsley); 2, Mr. and Mrs. Hogarth (Salford); 3, Simpson and Horsfield (Barnsley). Class 28: 1, Mr. and Mrs. Cobb (Belle Vue); 2, Simpson and Horsfield (Barnsley); 3, G. Hayland (Stockbridge). Best Fish in Show: P. Ledger (Top Ten) 81 points, Cherry Barb.

AT the September meeting of the **Bedworth A.P.S.**, the members were entertained by the North Warwickshire branch of the "British Sub Aqua Club," headed by Mr. David Parker, who gave an interesting talk on diving. This was followed by an outstanding film of the Aqua Club in action. The film was narrated by Miss M. Fletcher, a Chief Diving Instructor. The Table Show for the evening was judged by D. Bennett of M.A.A.S. A junior member, eleven-year-old Colin Pratt, beat several of the more experienced members by taking two firsts and one second prize in the three classes. A.V. Coldwater: 1, Colin Pratt. Egglayers: Pairs: 1 and 2, Colin Pratt; 3, R. Shakespeare. A.V. Dwarf Cichlid: 1, Mr. and Mrs. Simpson; 2 and 3, R. Shakespeare.

THE first Open Show of the **Scarborough and District A.S.** was held in August and there was good support from members and the general public. Results: Section 1. Livebearers: Guppies: 1, B. Stabler (Hull); 2, W. Ledger (Top Ten); 3, Mr. Stephenson (York). Puppies: 1, Mr. Ward (Doncaster); 2, Mr. Ledger (Top Ten); 3, Mr. Platt (Stockton). Swords: 1 and 3, N. R. Gibson (Huddersfield); 2, P. Reynolds (Swillington). A.O.V.: 1, B. Stabler (Hull); 2, J. A. Whitley (Aireborough); 3, A. Douglas (Hull). Best in Section: B. Stabler, (Hull). Section 2. Anabantids: Fighters: 1, Mr. and Mrs. Gates (Castleford); 2, Master Kirk (Grimsby); 3, A. Douglas (Hull). A.O.V.: 1, Mr. and Mrs. Cohen (Castleford); 2, I. Hepinstall (Castleford); 3, Mr. King (Doncaster). Best in Section: Mr. and Mrs. Cohen of Castleford. Section 3. Characins: Up to but excluding Bleeding Heart: 1 and 2, Miss B. Kaye (Top Ten); 3, Mr. and Mrs. Buxton (Barnsley). Bleeding Heart and over: 1 and 3, G. Thickbroom (Castleford); 2, A. S. Allison (York). Best in Section: Miss B. Kaye of Top Ten. Section 4. Cichlids: Up to but including Kribensis: 1, S. Harrison (Huddersfield); 2, I. Hepinstall (Castleford); 3, Mr. and Mrs. Smith (Top Ten). Over Kribensis: 1, P. Carey (York); 2, B. Conlin (Selby); 3, M. Ingamells (Scarborough). Best in

Section: P. Carey of York, also Best in Show. Section 5. Barbs: Up to and including Rosy: 1, J. A. Whitley (Aireborough); 2, J. L. Dawson (Oram); 3, Master Kaye (Top Ten). Over Rosy: 1, J. A. Whitley (Aireborough); 2, Mr. Jermainy (Grimsby). Best in Section: J. A. Whitley of Aireborough. Section 6. Catfish: Corydoras: 1, and 3, A. S. Allison (York); 2, B. Stabler (Hull). A.O.V. Cats and Loaches: 1, Mr. and Mrs. Lowe (Cleveland); 2, A. S. Allison (York); 3, G. Belbin (Huddersfield). Best in Section: Mr. and Mrs. Lowe of Cleveland. Section 7. Sharks and Foxes: 1 and 2, A. Hudson (Independent); 3, Mr. Butterworth (Huddersfield). Best in Section: A. Hudson (Independent). Section 8. Rasboras, Danios and Minnows: 1, Mr. Purvis (Hull); 2 and 3, I. Hepinstall (Castleford). Best in Section: Mr. Purvis of Hull. Section 9. Toothcarps: 1, M. M. and A. Crowther (Swillington); 2 and 3, A. and C. Lofthouse (Huddersfield). Best in Section: M. M. and A. Crowther (Swillington). Section 10. A.O.V. Tropical: 1, Mr. Whitelock (Tadcaster); 2, Mr. and Mrs. Lowe (Cleveland); 3, R. Doody (Scarborough). Best in Section: Mr. Whitelock of Tadcaster. Section 11. Coldwater: Goldfish: 1, Miss E. Bone (Huddersfield); 2, Master Booth (Leeds). A.O.V. Coldwater: 1, P. Carey (York); 2, A. S. Allison (York); 3, W. Messerher (Scarborough). Fancy Goldfish: 1, Miss E. Bone (Huddersfield); 2 and 3, C. Asquith (Castleford). Best in Section: Miss E. Bone. Section 12. Pairs: Livebearers: 1, J. H. Hartley (Castleford); 2, G. Thickbroom (Castleford); 3, Master Booth (Leeds). Egglayers: 1, Mr. Hopkinson (Sheffield Independent); 2, F. Ledger (Top Ten, Huddersfield); 3, Mr. Whitelock (Tadcaster). Best in Section: Mr. Hopkinson of Sheffield Independent. Section 13. Breeders: Livebearers: 1, P. Reynolds (Swillington); 2, T. H. Hartley (Castleford); 3, G. Andrews (Hull). Egglayers: 1, M. M. and A. Crowther (Swillington); 2, Mr. Wells (Doncaster); 3, Mr. Vint (Hull). Best in Section: M. M. and A. Crowther (Long Life Medal for Best Breeder). Section 14. Juniors (up to 16): A.V. Livebearers: 1, I. Hepinstall (Castleford); 2, Master Cook (Doncaster); 3, Miss B. Kaye (Top Ten, Huddersfield). A.V. Egglayers: 1, G. Thickbroom (Castleford); 2, I. Hepinstall (Castleford); 3, Master Kaye (Top Ten). A.V. Coldwater: 1, 2 and 3, Master Kaye (Top Ten). Best in Section: G. Thickbroom of Castleford. Best in Show (Trophy, A.Y.A.S. Diploma, Aquarist Gold Pin and Subscription): P. Carey of York. Best Breeders (Long Life Medal of U.S.A.): M. M. and A. Crowther of Swillington. Best Junior: B. Thickbroom of Castleford. Exhibitors Draw: Miss B. Kaye of Top Ten.

FOR the two August meetings members of the **Grimsby & Cleethorpes A.S.** had a slide show and tape on Livebearers, and a Quiz and "Any Questions?" programme with a panel under Chairman, Mr. R. Cullum. The Society also completed arrangements for their display of Tropicals and Coldwater fish at their Stand at the Arts and Hobbies Exhibition, which was held at the Memorial Hall, Cleethorpes. Monthly Table Show result: Cichlids (under 3 in.): 1 and 2, A. Metcalfe; 3, C. Janson. Male Platies: 1, B. Jennings; 2, C. Hanton; 3, B. Cressy. A.V. Coldwater: 1, A. Metcalfe; 2 and 3, G. Riggall.

THE results of the **Chingford D.A.S. Open Show** were as follows: Club Furnished (Tropical): 1, Walthamstow; 2 and 3, Tottenham; 4, Chingford. Club Furnished (Coldwater): 1, Walthamstow. A.V. Barb: 1, S. G. Cowell (Bethnal Green); 2, J. A. Pollard (Kingston); 3, E. W. Bartlett (Chingford); 4, Mr. Bellingham (Tonbridge). A.V. Characin: 1, R. Kerridge (Harlow); 2, G. Greenhalf (Kingston); 3, J. A. Pollard (Kingston); 4, S. G. Cowell (Bethnal Green). A.V. Dwarf Cichlid: 1, G. Greenhalf (Kingston); 2, R. Bowes (Walthamstow); 3, T. R. Hine (Tonbridge); 4, Mr. Applin (Independent). A.O.V. Cichlid: 1, Mr. Jenkins; 2, D. Lane (Chingford); 3, R. Kerridge (Harlow); 4, Mrs. Bellingham (Tonbridge). A.V. Fighter: 1, C. Wood (North Kent); 2, G. Greenhalf (Kingston); 3, Mr. Applin

(Independent); 4, A. J. Boit (Chingford). A.O.V. Labyrinth: 1, S. G. Cowell (Bethnal Green); 2, R. Bowen (Walthamstow); 3, E. W. Bartlett (Chingford); 4, R. Bowen (Walthamstow). A.V. E.L.T.C.: 1, R. Kerridge (Harlow); 2 and 3, A. Pannell (Chingford); 4, Mr. Applin (Independent). A.O.V. Tropical Catfish: 1, G. Greenhalf (Kingston); 2, Mrs. B. T. Mather (Walthamstow); 3 and 4, R. J. Baker (Tonbridge). A.V. Corydoras and Brochis: 1 and 3, P. Harrison (Chingford); 2, F. West (Chingford); 4, Mr. and Mrs. P. G. Abbot (Mid Herts). A.V. Rasbora: 1 and 2, J. A. Pollard (Kingston); 3, Miss S. Gosling; 4, J. Stephens (North Kent). A.V. Danios and W.C.M.M.: 1, G. Greenhalf (Kingston); 2, Mr. and Mrs. P. G. Abbot (Mid Herts); 3, J. Stephens (North Kent); 4, Mrs. C. Poller (Chingford). A.V. Loach: 1, R. Kerridge (Harlow); 2, Mrs. R. Greenhalf (Kingston); 3, F. Lake (Chingford). A.O.V. Tropical Eglayer: 1, Mrs. S. Hedger; 2 and 3, P. W. Arnold (Bethnal Green); 4, D. Bundy (Bethnal Green). A.V. Guppy (Male): 1, R. Smith (Totterham); 2, S. G. Cowell (Bethnal Green); 3, Mr. and Mrs. Baulson (Walthamstow); 4, W. Terris (Chingford). A.V. Guppy (Female): 1, Mr. and Mrs. Baulson (Walthamstow); 2, R. Smith (Totterham); 3, W. Terris (Chingford); 4, J. Stephens (North Kent). A.V. Sweedtail: 1, W. Terris (Chingford); 2, Johnston Bros.; 3, J. Stephens (North Kent); 4, Johnston Bros. A.V. Platy: 1 and 3, R. Smith (Totterham); 2, Johnston Bros.; 4, Mr. and Mrs. Baulson (Walthamstow). A.V. Molly: 1, G. Greenhalf (Kingston); 2, D. Bundy (Bethnal Green); 3, J. Stephens (North Kent); 4, E. W. Bartlett (Chingford). A.V. Single-tailed Goldfish: 1, 2 and 3, D. Goodbody (Walthamstow). A.V. Twin-tailed Goldfish: 1, Johnston Bros. Breeders (Tropical Eglayers): 1, P. C. Allard (Chingford); 2, P. Harrison (Chingford); 3, A. R. Chandler (Walthamstow); 4, C. Stott (Walthamstow). Breeders (Tropical Livebearers): 1, G. Greenhalf (Kingston); 2, B. Mather (Walthamstow); 3, Mrs. M. Tucker; 4, P. M. Evans (Chingford). Special Awards: Aquarist Gold Pin for Best Fish in Show: S. G. Cowell (Bethnal Green). Climbing Perch. Chingford D.A.S. Cup for Best Fish in Show: S. G. Cowell (Bethnal Green). Climbing Perch. Chingford D.A.S. Trophy, Best Club Furnished: Walthamstow. Marshall's Aquaria Cup for Best E.L.T.C.: R. Kerridge. Aphy. Callitrus. F.B.A.S. Trophy, Best Breeders Livebearers: G. Greenhalf (Kingston). Vellifera Mollies. This was the first Open Show in eighteen years of the Chingford A.S. and the total entries were 250 including eight club furnished aquaria.

AT the August meeting of the Mid Sussex A.S. the Chairman, Mr. R. Johnson, sadly announced the death of the Society's Vice-President, Mr. Ted Jessop. Arrangements are being made for a trophy to be presented in his honour each year to the prize-winning fish in a particular class. It was also announced by the Chairman that the Mid Sussex and Brighton Aquarists' Societies intend to hold an annual inter club show. A trophy will be awarded to the winning society each year.

After the monthly auction of fish and plants, which was quite large, the chairman gave a talk on "Cruelty to Fish". He explained that many people went to a vet if their pet was ill or suffering and generally this would end their suffering without pain. When fish are ill it is just as easy to end their suffering by dragging them before smashing them onto a hard surface, such as concrete. As a fish has no eyelids it cannot protect its eyes from sudden light. If when it is dark in the aquarium and the lights are turned on, the fish will quickly look for an escape and can easily damage themselves on rocks, glass and other sharp objects that are in their way. This can be avoided by turning the room lights on a little while before turning on the aquarium lights. A sudden change in water temperature is also shocking to a fish and should be avoided whenever possible.

The Table Show for "Fish of the Year" Novices and Breeders Xa and Xb was judged by Mr. Ken Nutt, who awarded prizes to the following winners: Breeders (Eglayers): 1, D.

Soper; 2, N. Short; 3, J. Walker; 4, D. Leach. Livebearers: 1 and 2, D. Soper; 3, C. West; 4, J. Walker. Novices: 1, G. Leach; 2, K. J. Orange; 3, S. Corbin; 4 and 5, R. Park. Fish of the Year: 1, J. Walker; 2, D. T. Waring; 3, B. Slade; 4, D. Soper; 5, P. C. Waring; 6 and 7, C. West. Any further information about the Society may be obtained from the secretary, Mr. J. Reeve, 36 Rumbold Lane, Haywards Heath 3702, evenings only.

THE results of Leigh A.S. Open Show were as follows: Guppies: 1, H. Greenall (Leigh); 2, J. Boardman (Leigh); 3, F. Oliver (Wrexham). Platies: 1, D. Tennant (Loyne). Swordtails: 1, D. Summers (Leigh); 2, J. Faulkner (Abbot); 3, T. Hallett (Accrington). Mollies: 1, F. Bowker (Leigh); 2, Mrs. Addison (Warrington); 3, Mr. and Mrs. Pritchard (Wrexham). Small Characins: 1, G. Todd (Accrington); 2, P. Oliver (Wrexham); 3, R. McKenna (Nelson). Large Characins: 1, Master Moorcroft (Merseyside); 2, Mr. and Mrs. Lomas (Runcorn); 3, R. Rawlinson (Leigh). Small Barbs: 1, B. and C. White (Leigh); 2, D. and R. Standen (Loyne); 3, F. Oliver (Wrexham). Large Barbs: 1, C. Stewart (Nelson); 2, B. and C. Ellison (Leigh); 3, A. Baldwin (Nelson). Dwarf Cichlids: 1, F. Oliver (Wrexham); 2, Mr. Blaise (Runcorn); 3, S. McCool (Leigh). Large Cichlids: 1, D. and R. Standen (Loyne); 2, I. Whyte (Leigh); 3, Mr. and Mrs. Lomas (Runcorn). Angels: 1, R. McKenna (Nelson); 2, Master T. Spivey (Leigh). Toothcarps: 1, Mr. Crawford (Warrington); 2 and 3, B. and C. White (Leigh). Rasbora: 1 and 2, Mr. and Mrs. Beadstone (Leigh); 3, J. Alcock (Warrington). Sharks, P. Foxes; 1, S. McCool (Leigh); 2, D. and R. Standen (Loyne); 3, Mr. Moorcroft (Merseyside). Corydoras Catfish: 1, B. and C. White (Leigh); 2, A. Baldwin (Nelson); 3, D. Ridyard (Leigh). Large Catfish: 1, B. Lewis (Runcorn); 2, Mr. and Mrs. Huey (B.K.A.); 3, R. Rawlinson (Leigh). Loaches: 1, D. Boardman (Leigh); 2, J. Faulkner (Runcorn); 3, J. Boardman (Leigh). A.O.V. Tropical: 1 and 2, D. and R. Standen (Loyne); 3, C. Stewart (Nelson). Fancy Goldfish: 1, Mr. Whitley (Accrington); 2, A. Isherwood (Accrington); 3, S. Walsh (Accrington). Common Goldfish: 1, J. Dandy (Leigh); 2, H. Greenall (Leigh); 3, Mr. Whitley (Accrington). A.O.V. Coldwater: 1 and 2, Mr. Whitley (Accrington). Junior: 1, Master Moorcroft (Merseyside); 2 and 3, Master D. Spivey (Leigh). Breeders: 1, T. Matthias (Leigh); 2, A. Addison (Warrington); 3, Mr. and Mrs. Huey (B.K.A.); 1, Mr. Moorcroft (Merseyside); 2, J. Alcock (Warrington); 3, D. Summers (Leigh). Pairs: 1, Mr. and Mrs. Huey (B.K.A.); 2, Mr. Moorcroft (Merseyside); 3, E. Daniels (Merseyside); 1, Mr. Crawford (Warrington); 2, J. Boardman (Leigh); 3, J. Alcock (Warrington). Fishers: 1, D. Ridyard (Leigh); 2, D. Trosby (Nelson); 3, C. Stewart (Nelson). Large Gouramis: 1, Master T. Spivey (Leigh); 2, Mr. and Mrs. Lomas (Runcorn); 3, B. and C. Ellison (Leigh). Small Gouramis: 1, Mrs. Addison (Warrington); 2, D. Ridyard (Leigh); 3, Mr. and Mrs. Beadstone. Best Tropical Fish was won by D. and R. Standen (Loyne). Best Coldwater Fish was won by Mr. Whitley (Accrington).

WINNERS at the British Killifish Association Fifth International Show were as follows: Aphyosemon (Pairs): 1, C. Partridge; 2, G. Cattasach; 3, B. Thomson; 4, J. Harris. Rolfia (Pairs): 1, J. Himmelmann; 2 and 3, R. Clark; 4, A. Thomas. Aphyosemon (Single): 1, R. Hoop; 2, A. Thomas; 3, D. Sale; 4, H. Schoenbrodt. Rolfia (Single): 1 and 2, D. Sale; 3, A. Thomas. Aplocheilus: 1, H. Schoenbrodt. Epipilays (Pairs): 1, D. Highfield and W. Devison; 2, K. Huswald; 3, A. Thomas; 4, J. Harris. Jordanella: 1, S. Dean; 2 and 3, D. Highfield and W. Devison. Rivulus (Pairs): 1, D. Sale; 2, J. Harris; 3, A. Thomas. Rivulus (Single): 1, S. Dean; 2, C. Partridge; 3, G. Cattasach; 4, J. Harris. Nothobranchius (Single): 1, A. Thomas; 2, 3 and 4, H. Schoenbrodt. Pterolebias (Single): 1, A. Thomas; 2, H. Schoenbrodt; 3, J. Harris. Cynolebias (Single): 1, C. Partridge; 2, H. Schoenbrodt; 3, R. Hoop; 4, J. Harris. Austrofundulus: 1, H.

Wendt. Cynopocilius and Rarhovia: 1, J. Fellows; 2, C. Partridge; 3, G. Cattasach; 4, J. Harris. A.O.V.: 1 and 3, A. Thomas; 2, B. Hirst; 4, D. Sale. Breeders T/S: 1, H. Gerdesmann; 2, B. Hirst; 3, A. Thomas; 4, H. Roth. Breeders S/P: 1, D. Highfield and W. Devison; 2, D. Luhling; 3 and 4, A. Thomas. Best Pair in Show: D. Highfield and W. Devison. Best Fish in Show: C. Partridge.

THE newly-formed Port Talbot and District A.S., which is four months old, is now soundly established with forty members on the books, and a full programme of slides, films and lectures is being arranged for the coming winter months. Anyone interested in joining, please contact D. Wicks, Secretary, 8 Dolphin Place, Sandfields, Port Talbot. Beginners can be sure of a warm welcome.

THE season at Ealing and District A.S. is coming towards its climax as the Society's second Open Show approaches (4th October). In keeping with the Society's aim to pioneer new classes, this year's show will include a class for Aquascapes in addition to a Reptile/Amphibian class and all the usual classes associated with an Open Show. Schedules are still available from the Show Secretary, Mr. R. Sellers, 3a Lady Margaret Road, Southall, Middlesex.

Recent Table Shows included Dwarf Cichlids and Tropical Catfish. Both these resulted in near clean sweeps for Bob Sellers and John Batts respectively. A Knock Out competition has just got under way, twelve fish surviving the "sudden death" of the first round to go forward into the second which will be held in December. Should any Society care to exchange Newsletters/Bulletins with Ealing, please contact the Newsletter Editor—R. C. Mills, 70 Lee Road, Perivale, Middlesex.

THE speaker at the August meeting of the Harlech A.S. was the Society's president, W. Gorwill, who addressed members on "The Keeping and Breeding of the Lake Malawi Cichlids". Forthcoming guest speakers to the Society include G. H. Jennings (Kraken Products, London), Dr. J. N. Carrington (Managing Director, Inter-Pet, Dorking) and S. P. Dancer (assistant keeper of Zoology, National Museum of Wales, Cardiff). Meetings of the Society are held on the third Tuesday of each month at the Gabafla Junior School, Cobwell Road, Cardiff, commencing at 7.45 p.m. Further details are obtainable from the Secretary, M. J. Ptery, 57 Ceraun Court Road, Ely, Cardiff.

The results of the second Annual Open Show were as follows: Highest aggregate points in Show: C. W. Gorwill (Harlech). Best Fish in Show: P. L. K. Treadgold (Yate). Best Breeders Team: R. W. Hill (Harlech). Class results: Sumner Fighting Fish: 1, D. Baydon (Cardiff); 2, Mrs. C. Harding (Cardiff). Labyrinth: 1, C. W. Gorwill (Harlech); 2, Mrs. Purnford (Yate); 3, D. Baydon (Cardiff). Barbs (under 3 inches): 1, R. Newton (Penarth); 2, D. Warneant (Cardiff); 3, D. Baydon (Cardiff). Barbs (over 3 inches): 1, C. W. Gorwill (Harlech); 2, R. Richards (Rhoads); 3, B. A. Harding (Cardiff). Hemigrammus and Hypophosphorinus: 1, K. Watkins; 2, C. Harding (Cardiff); 3, Miss H. Jones (Llanwit Major). A.O.V. Characin: 1, A. Ibbertson (Llanwit Major); 2, M. Hesketh (Penarth); 3, R. Hoare. Dwarf Cichlids: 1, 2 and 3, G. W. Gorwill (Harlech); A.O.V. Cichlid: 1, P. L. K. Treadgold (Yate); 2, C. W. Gorwill (Harlech); 3, R. W. Hill (Harlech). Corydoras: 1, M.

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Williams; 2, R. Bishop; 3, Miss H. Jones (Llanwit Major). A.O.V. Catfish: 1 and 3, C. W. Gorwill (Harlech); 2, R. Wilkie (Harlech); Sharks, Loaches/Bass: 1 and 2, P. Player (Cardiff); 3, D. Warmour (Cardiff). Danios, Rasboras and White Cloud Minnows: 1, D. Baydon (Cardiff); 2, A. J. Payne (Harlech); 3, M. Heskeith (Penarth). Killifish: 1, Mrs. C. King (Keynsham); 2, R. W. Hill (Harlech); 3, R. Harris. Guppies (Male): 1, J. F. Edwards; 2, C. Hum; 3, D. Jones. Guppies (Female): 1, D. Baydon (Cardiff); 2, P. Player; 3, C. Brannon. Platies: 1 and 2, A. Ibbertson (Llanwit Major); 3, R. Hoare. Sweettails: 1, D. Noble (Yate); 2, T. Hodge (Yate); 3, C. Brooks (Harlech). Mollies: 1, Mrs. Pumford; 2, K. Williams; 3, C. Hum. A.O.V. Tropical Fish: 1, P. Player (Cardiff); 2, R. Hoare; 3, R. and S. Hoare. Breeders (Livebearers): 1 and 2, R. W. Hill (Harlech); 3, A. Ibbertson (Llanwit Major). Breeders (Egglayers): 1, P. Ibbertson (Llanwit Major); 2 and 3, C. W. Gorwill (Harlech). Snood Pairs: 1, C. Hum (Yate); 2, M. Wilkie (Harlech); 3, R. Wilkie (Harlech). Goldfish: 1, D. A. Ward (Harlech); 2 and 3, B. Harding (Cardiff). Tropical Marines: 1, 2 and 3, P. S. Nelson (Harlech). Native Marines: 1, 2 and 3, H. Collingbourne (Harlech).

THE Holyhead and District A.S., with a membership of 35 and increasing every week is making steady progress with slide shows, film commentaries, discussions and the occasional quiz. The Society staged its first fish show in July and had a most successful day. It was hard work but well worth the effort with a steady stream of visitors all day. The receipts were well worth the effort and enabled the purchase of a set of library books for the use of members.

THE Bedworth Aquarist and Pool Society's Second Open Show was well supported with 721 exhibits and 645 visitors. The Special Prize winners were:—Best Fish in Show: J. Igoe, Sherwood; Best Large Fish: Mr. and Mrs. Haines, Nuneaton A.P.S.; Best Small Fish: Mr. and Mrs. Roberts, Lucas A.P.S.; Rosedale Shield: J. Igoe, Sherwood; Bedworth Civic Cup: J. Igoe, Sherwood; Person with Most Entries: R. Tudda, Bedworth A.P.S.; Person with Most Awards: J. Igoe, Sherwood; Entry of Breeders with most difficulty in breeding—Mystery Award: Mr. Anderson, Leicester Fishkeepers; Society with most Entries Leicester Fishkeepers; Society with most Awards: Sherwood; Best Cichlid: Mr. and Mrs. Walker, Nuneaton A.V. Guppy: 1, D. Cannon, Nuneaton A.P.S.; 2, 3 and 4, Mr. Buchanan, Sherwood. A.V. Molly: 1, 3 and 4, J. Igoe, Sherwood; 2, Mr. Blackburn, Sherwood. A.O.V. Livebearer: 1, Mr. and Mrs. Jephcoate, Nuneaton; 2, Mr. Pollard, Kingston; 3, Mr. Anderson, Leicester; 4, Mr. Tedds, Bedworth. Characins under 3 in.: 1, Mr. Thomas, Lucas, A.P.S.; 2, Mr. and Mrs. Griffin, Leicester Fishkeepers; 3, R. Snell, Yate and District; 4, Edkine Padgett, Bedworth. Characins over 3 in.: 1, Mr. Robinson, Northampton; 2, Mr. Hough, North Warwick; 3, Mr. R. Tedds, Bedworth; 4, D. Sewell, Sherwood. Barbs under 3 in.: 1, Mr. Masby, Wednesbury; 2, Mr. Hough, N. Warks; 3, Mr. Ford, Haden; 4, Mr. and Mrs. Jephcoate, Nuneaton. Barbs over 3 in.: 1, Mr. Fibiger, Derby Show Group; 2, Mr. Harvey, M.T.A.S.; 3, Mr. Pollard, Kingston; 4, Padgett and Edkine, Bedworth. Cichlids under 4 in.: 1, Mr. and Mrs. Walker, Nuneaton; 2, Mr. Masby, Wednesbury; 3, Mr. Robinson, Nuneaton; 4, Mr. and Mrs. Walker, Loughborough. Cichlids over 4 in.: 1, Mr. Tedds, Bedworth; 2, T. Shealy, Coventry; 3, Edkins and Padgett, Bedworth; 4, Mr. Kirkbeck, Sherwood. A.V. Angel: 1, D. Sewell, Sherwood; 2 and 3, K. Allen, Binks and Bullows; 4, D. Sewell, Sherwood. A.V. Anabantid: 1, T. Shealy, Coventry; 2, Mr. Cooper, Derby Show Group; 3, D. Wood, Loughborough; 4, S. Bloxham, Nuneaton. Corydoras Catfish: 1, Mr. Bries, Haden; 2, Mr. Shakespeare, Bedworth; 3, Mr. Jordan, Leicester Fishkeepers; 4, T. Shealy, Coventry. A.O.V. Catfish and Loach: 1, Mr. and Mrs. Roberts, Lucas; 2, Mr. Cruickshank, Kingston; 3, Mr. Cooper, Derby Show Group; 4, Mr. Noble, Yate. Killifish: 1, Mr. Shakespeare, Bedworth; 2, Mr. Blackburn, Sherwood; 3, Mr. Cooper, Derby Show Group; 4, Mr. Clayton, Lucas. Rasbora Danio and W.C.M.M.: 1, R. Clark, Sherwood; 2, Mr. Thomas, Lucas; 3, Mr. Pollard, Kingston; 4, Mr. Bolton, G.K.N. Egglayer (Pairs): 1, Mr. Shakespeare, Bedworth; 2, D. Lomas, Nuneaton; 3, Mr. Underwood, Leamington; 4, Mr. Ford, Haden. Livebearer (Pairs): 1, Mr. Buchanan, Sherwood; 2, K. Jones, Independent; 3, J. Igoe, Sherwood; 4, Mr. Greenhalf, Kingston. Breeder (Egglayers): 1, J. Igoe, Sherwood; 2, Mr. Hurst, Coventry; 3, Mr. Anderson, Leicester Fishkeepers; 4, Edkins and Padgett, Bedworth. Breeders (Livebearers): 1, J. Igoe, Sherwood; 2, K. Jones, Independent; 3, Mr. and Mrs. Cox, Nuneaton; 4, D. Cannon, Nuneaton. A.O.V. (Tropical): 1, Mr. Ross, Independent; 2, Mrs. S. Leigh, Nuneaton; 3, W. Jones, Tamworth; 4, Smith and Wood, Leicester. A.V. Goldfish: 1, Mr. Shilton, Atherstone; 2, Mr. Hurst, Coventry; 3, Chamberlaine, Leicester; 4, K. Allen, Binks and Bullows. A.O.V. Coldwater: 1, Mr. and Mrs. Haines, Nuneaton; 2, Master Beard, Leamington; 3, Mr. Ford, Haden; 4, Mr. Haines, Nuneaton.

THE Eastern Counties Section of the F.G.B.S. held its Annual Show in August when 140 entries were received including much valued support from the members of Three Counties Section. This section took away nineteen awards including Best Breeder, which T. Errey won with a nicely matched team of colourful veils. This was his third Silver Pin and he also gained a further Pin with his Original Veil. Other silver pins were won by R. Cox for his very good Pinrail, E. Merritt with a very nice Short Dorsal Veil and Mrs. L. Myers with a Delta which finished as Best Fish in Show and a very attractive Gold-laced Female which also won Best Opposite Sex.

THE Bford and District A.P.S. July meeting reported recent successes at the Dagenham Town Show. Three firsts were obtained to follow the club's success at the show last year and also in 1968. The first win was given to the Tropical Furnished Aquarium, the other two firsts being obtained by Harry Berger and his daughter Rita in the Coldwater Section with a Single Tail and Twin Tail Goldfish, on behalf of the Club. The Annual Table Show will be held at the above Hall and is for all classes of fish on Monday, October 26th, at 8 p.m. The Clubs Monthly Table Show resulted as follows:—A.V. Molly and A.V. Barb: 1, 2, 3, and 4, in both classes was accounted for by Mrs. Rowe.

In the Coldwater Section Harry Berger took first and second places with a Bristol Shubunkin and a Common Goldfish respectively. Anyone interested in fishkeeping is most welcome to attend future meetings at the St. Laurence Church Hall, Hamilton Avenue, Barkingside, at 8 p.m. on the second Monday of each month or may obtain further information from the Secretary Ron Roth, 103 Heath Road, Chadwell Heath, Essex.

THE North Staffs. A.S. Second Open Show attracted nearly 600 spectators and 273 entries. "Best Fish of the Show" and Aquarist Gold Pin Awards were won by J. E. Greenhough of Derby Regent with his *Lepomis frederici*. The complete results were:—Breeders Livebearers: 1 and 2, Bown Bros., North Staffs.; 3 and 4, D. V. Colclough, Ind. Breeders Egglayers: 1, W. J. A. Lockett, North Staffs.; 2, D. V. Colclough; 3, Bown Bros. Pairs

Livebearers: 1, Mr. Chatwood, S.A.S.S.; 2, A. G. Hallam, North Staffs.; 3, R. Harlow, Derby Regent; 4, B. A. Hughes, Ind. Pairs Egglayers: 1, Attwood and Williams, Rubery; 2, J. Sanders, Stone; 3, R. Mayer, North Staffs.; 4, Mr. Bewick, Warrington. Guppies: 1, 3 and 4, Attwood and Williams; 2, Mrs. Whitfield, Rubery. Platys: 1 and 2, N. Furness, Rubery; 3, J. Brough, Stone; 4, G. Summerfield, North Staffs. Sweettails: 1 and 4, Attwood and Williams; 2, J. Brough; 3, Mrs. Edwards, Rubery. Mollies: 1, M. Baker, Warrington; 2, Goodwin Bros., North Staffs.; 3, R. Mayer; 4, V. Knowles, North Staffs. Rasboras: 1 and 2, J. Sanders; 3, J. Bailey, North Staffs.; 4, K. Ankers, North Staffs. Danios, W.C.M.M. and Rainbows: 1, W. S. Ash, Leek; 2, N. W. and D. J. Plant, Stone; 3, Mr. Leese, Stone; 4, J. Bailey, Toothcarps: 1, V. Knowles; 2, N. W. and D. J. Plant; 3, T. Harvey, Stone; 4, J. Sanders, Siamese Fighters: 1, Mr. Morrell, Derby; 2, Mr. Bradburn, Ind.; 3, L. Furness, Rubery; 4, A. Edwards, North Staffs. A.O.V. Anabantid: 1, R. Mayer; 2 and 4, M. Morrell; 3, W. J. A. Lockett. Barbs under 3 in.: 1, Mr. Leese, Stone; 2, Mr. Bewick; 3, V. Knowles; 4, Colclough Bros., North Staffs. Barbs over 3 in.: 1, J. Sanders; 2, A. Ankers, North Staffs.; 3, T. Haydock, North Staffs.; 4, N. Furness. Cichlids under 3 in.: 1, Goodwin Bros.; 2, R. T. Ball, Derby Regent; 3, W. J. Ash; 4, D. Clever, Rubery. Cichlids over 3 in.: 1, J. S. Booth, North Staffs.; 2, Mr. Morrell; 3, K. Ankers; 4, Whitfield and Massey, Rubery. Characins under 3 in.: 1, Mrs. Edwards, Rubery; 2, K. Ankers; 3 and 4, M. Millman, Warrington. Characins over 3 in.: 1, J. E. Greenhough, Derby Regent; 2, T. Harvey; 3, Attwood and Williams; 4, Mr. Hickman, Haden. Sharks and Flying Foxes: 1, R. Mayer; 2, Mr. Hickman; 3, R. Harlow; 4, Colclough Bros. Corydoras Catfish: 1, Attwood and Williams; 2, D. Aldred, Stone; 3, J. Pimlott, Ind.; 4, Goodwin Bros. A.O.V. Catfish: 1, M. Millman; 2, A. Bruns, Ind.; 3, T. Haydock; 4, D. Aldred. Loaches: 1 and 3, Mr. Morrell; 2, A. J. Jones, North Staffs.; 4, J. Deville, S.A.S.S. A.O.V. Tropical: 1, J. S. Booth; 2, R. Harlow; 3, Mr. Hickman; 4, K. Bruns, Ind. Fancy Goldfish: 1, T. Haydock. A.O.V. Coldwater: 1 and 2, A. G. Hallam.

THE Kettering A.S. meets on the first Friday of the month at the "George Hotel," Kettering. A Table Show is held and there is also a points system for places and also for attendance. The winner receives a cup every quarter. Recently Roger Winter gave a talk on "Cichlids" and the table show was on Anabantids which was won by Mr. Tite; second being Mr. Crick.

THE results of the Blackpool and Fylde A.S. Open Show were as follows:—Members' Furnished Tropical Aquaria: 1, B. Litter, Blackpool. Open Individual Coldwater Furnished Aquaria: J. B. Simmons, Blackpool. Open Individual Tropical Furnished Aquaria: 1, B. Litter, Blackpool. Coldwater Fish: Mrs. M. Miller, Common Goldfish and Comets; 1, A. Ingram, Blackpool; 2, C. Asquith, Castleford; 3, Mrs. M. Miller, Belle Vue. Shubunkins-Bristol and/or London: 1, B. Simmons, Blackpool; 2 and 3, S. Walsh, Accrington. Moors: 1, C. Whitley, Accrington; 2, Mrs. E. Asquith, Castleford; 3, C. Whitley, Accrington. Veittals: 1 and 3, C. Whitley, Accrington; 2, S. Walsh, Accrington. A.O.V. Fancy Goldfish, Pontails, Orandas and Loachheads: 1 and 3, C. Whitley, Accrington; 2, S. Walsh, Accrington. Koi Carp: 1, C. Whitley, Accrington; 2 and 3, C. Wallbank, Accrington. A.O.V. Coldwater Fish: 1, Mrs. M. Miller, Belle Vue; 2, C. Whitley, Accrington; 3, B. Simmons, Blackpool. Livebearers—Sweettails: 1, Mr. and Mrs. Cobb, Belle Vue; 2, Mrs. B. Newall, Glossop; 3, Mrs. Gares, Castleford. Platies: 1, H. Illingworth, Nelson; 2, D. Tennant, Loyal; 3, R. Tomkinson, Glossop. Mollies: 1, Mr. and Mrs. Grimshaw, Sunnybrow; 2, S. Harrop, Oram; 3, Mrs. W. Heap, Belle Vue. Guppies: 1, R. Tomkinson, Glossop; 2, T. Hallett, Accrington; 3, D. Truby, Nelson.

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A.O.V. Livebearers: 1 and 2, J. A. Whiteley, Aireborough. Characins—Size up to Bleeding Heart: 1, Mr. Tonge, Oldham; 2, R. McKenna, Nelson; 3, Master R. Johnson, Aireborough. A.O.V. Characins: 1, K. Parkes, Merseyside; 2, S. B. Cass, Macclesfield; 3, Mr. Attwood and Mr. Williams, Robbery Select. Labyrinth: 1, Mrs. J. Shackleton, Belle Vue; 2, A. Loman, Merseyside; 3, Mrs. J. Tonge, Oldham. Fighters: 1, P. Shackleton, Belle Vue; 2, K. McPheerson, Blackpool; 3, Mr. and Mrs. Cobb, Belle Vue. Minnows and Barbs—Minnows: 1 and 2, Mr. Tonge, Oldham; 3, Mrs. Hepinstall, Castleford. Labeco and Sharks: 1, L. Beswick, Middleton; 2, F. Mulla, Mersey; 3, B. Litter, Blackpool. Barbs up to 3½ in.: 1, H. Cranwick, Featherstone; 2, Mr. and Mrs. Wild, Salford; 3, Master I. Hepinstall, Castleford. A.O.V. Barb: 1, K. Parkes, Merseyside; 2, N. West, Blackpool; 3, J. A. Whiteley, Aireborough. Killifish: 1 and 2, F. Reynolds, N.K.A.; 3, J. Roberts, Nelson. Cichlids—Dwarf: 1, R. Davis, Belle Vue; 2, Master I. Hepinstall, Castleford; 3, Mr. and Mrs. Lofthouse, Huddersfield. Angels: 1, C. Asquith, Castleford; 2, R. McKenna, Nelson; 3, Master R. Johnson, Aireborough. A.O.V. Cichlids: 1, Mr. and Mrs. Wilks, M.A.D.A.S.; 2, R. I. Hambling, Lymington; 3, T. Spivey, Leigh. Catfish: 1, R. Davis, Belle Vue; 2, Master I. Hepinstall, Castleford; 3, Mrs. Gates, Castleford. Loaches: 1, F. Mulla, Merseyside; 2, P. Shackleton, Belle Vue; 3, Goodwin Bros., North Staffs. A.O.V. Tropical Fish: 1 and 3, Mr. and Mrs. Merris, Lymington; 2, K. Ackers, North Staffs. Pairs Classes—Livebearers: 1, J. A. Whiteley, Aireborough; 2, Mrs. Gos, Keighley; 3, R. Thomson, Glossop. Egglayers: 1, Mrs. W. Heap, Belle Vue; 2, F. Mulla, Merseyside; 3, D. Ridyard, Leigh. Breeders Classes—Livebearers: 1, Mr. and Mrs. F. Cobb, Belle Vue; 2, R. Thomson, Glossop; 3, S. Bloxham, Numaston. Egglayers: 1, Mrs. Gear, Keighley; 2, Mr. Jackson, Blackpool; 3, F. Reynolds, B.K.A. Open Individual Tropical and Cold Marine Furnished Aquaria: 1 and 2, Hewarth and Wright, Blackpool; 3, P. Moorhouse, Bradford. Single Tropical and Cold Marine Fish: 1, K. Phillips, Blackpool. Junior Classes—Livebearers A.V.: 1, Miss A. Gregory, Nelson; 2, Master I. Hepinstall, Castleford; 3, Miss J. Sheldon, Rubery Select. Egglayers A.V.: 1 and 2, Miss A. Gregory, Nelson; 3, Master F. Cobb, Belle Vue.

THIS year the Annual Congress of the **Hendon and District A.S.** will be held at Whitefield Secondary Modern School, Clarendon Road, Hendon, London, N.W.2, on Saturday, 14th November at 6 p.m.

Many of the important personalities in the hobby will be in attendance and refreshments are available for early arrivals and again during the long interval, so there is every excuse to make this occasion a day out in London.

This year the speaker will be E. Roloff of West Germany, whose lecture will include slides of new Cichlids, Characins, Bettas (among the Bettas are three new unknown species) and Killifish. His programme will also include slides of the areas in Sierra Leone that he visited and collected in showing something of the Cultures and Highlights of the areas. Early application for tickets is advised and these are priced at 6s. (junior half price). They are obtainable from Hon. Secretary, Ray Maynard, 90 Cotswold Gardens, London, N.W.2. 01-458 5826.

DUE to pressure of work, J. Hascok, the secretary of **Hampstead and District A.S.**, has had to resign. The new secretary is Mrs. V. Reich, 162 Harmond Street, London, N.W.1. Telephone: 01-485 7463. A new Public Relations Officer has been elected, and is R. Green, 43 Talacre Road, Kentish Town, London, N.W.5. Telephone: 01-485 7291. New members can be assured of a warm welcome and should contact the secretary, address as above.

THE outstanding member at the August meeting of **Yeovil A.S.** was Mrs. Grunnell. She was first in the Catfish and Loaches class, won the Quilt, and was joint winner with Miss Bush in

the Monthly Draw. Other winners were: Oldest Coldwater Fish: V. Collins. Junior Tropicals: Miss D. Forward. Junior Coldwater: N. Collins.

TABLE Shows of the two recent meetings of **Thurrock A.S.** were for Swordtails and Cats, the winners respectively being P. O'Brien and P. Hinkley. A very interesting talk on live foods was given by Mr. R. Nicholls and the second meeting was a business meeting and sale-exchange.

Setting up a furnished aquaria was the topic of the talk given by Ron Nicholls at a recent meeting. Ed Nicol and Ken Appleyard set up a tank while the talk was given and members were later asked for likes or dislikes in order to show how a good furnished aquaria should be done.

Table Show was for Barbs and results were: 1 and 2, K. Appleyard; 3, A. Riddell.

"Fish I Have Bred" was the subject Ed Nicol and Frank Harkins chose to talk about at the two latest meetings of Thurrock A.S.

Table Shows were for Pairs Egglayers and Pairs Livebearers and results were: Livebearers: 1, D. Durrant; 2, E. Nicol; 3, F. Harkins. Egglayers: 1, D. Durrant; 2, K. Appleyard; 3, P. Hinkley; 4, J. Parber.

THE summer months have been busy ones for **Belle Vue A.S.** (M/C). In July members went on a rock safari to Anglesey. The trip was very successful with members bringing back everything from small crabs to rather large chunks of rock for their aquariums. In fact it was so successful that other trips are being planned. At the August meeting a quiz was held which proved most amusing and educational.

The September meeting was important as the new committee was elected and from these eleven members will be chosen next year's officials. Also at the meeting Mr. R. E. Leggo, Superintendent of Belle Vue Zoological Gardens and President of the Society gave a most interesting talk and slide show on setting up interesting aquariums and on how and where to look for material for these aquaria. Results of the Table Show were: Seniors: 1, Mrs. F. Cobb; 2, Mrs. M. Millar; 3, Mrs. W. Heap. Juniors: 1, Master G. Woodfiner; 2, Master R. Barnaby; 3, Master J. Gee. The October meeting has been put back a week to the second Wednesday of the month because of the British Aquarists' Festival.

ACTIVITIES of the **Guildford and District A.C.** included a barbecue at the chairman's house instead of the first August meeting. At the second meeting in August a talk was given by the Show Secretary, Brian Cripps, on the hazards of electricity. He explained that if a member was to put a hand in his tank, and found he was receiving an electric shock, whoever came to his rescue should be very careful to drag him away by his clothes and not by touching his body. A good demonstration was given on another member and also the correct method of reviving. The correct way to wire up tanks was also shown. New members are always welcome at Guildford and District Labour Club, The Mouse, Guildford, 2nd and 4th Wednesdays in the month, time 7.45 p.m.

THE **Aberdeen A.S.** has been reformed after a lapse and meetings are held on the third Tuesday of each month in the Y.M.C.A. Rooms, Union Street, Aberdeen, at 7.30 p.m. Anyone who is interested in the keeping of tropical or coldwater fish will be made most welcome at any of the meetings.

At the last meeting there was a really excellent display of equipment which many members would have liked to own and was supplied by the president, Mr. S. Cox of Holborn Tropicals. Mr. Cox gave an unbiased lecture on everything that was on display. For the October meeting there is an outing to Drenside Fish Hatcheries at Aboynne. Members will meet at the car park at the foot of Bridge Street on 20th October at 6.30 p.m.

A complete programme has been drawn up for the whole season. Further details of the Society

may be had from Mr. S. Cox, Holborn Tropicals, Holborn Street, Aberdeen.

ONCE again **Yate and District A.S.** have had a successful time showing Tropical Fish. At a recent Open Show the Society showed 63 fish and won 22 prize cards. At this month's meeting J. Wheeler of Trowbridge gave us a talk on his experiences with marine Tropical Fish. The table show was for Characins and the results were: 1, B. Waters; 2, R. Adams; 3, R. Bishop; 4, S. Green. Another topic for conversation was the Skittles Social held with Bristol Aero A.S. Although Yate lost, the evening was very successful.

THERE were 419 exhibits when **North Kent A.S.** held their first Open Show of which four were individual aquaria. Mr. R. Kerridge of Harlow A.S. won the Aquarist Gold Pin and also the North Kent A.S. Cup for Best Fish in the Show with a Texas Cichlid which scored 87 pts. S. G. Cowell of Bethnal Green A.S. won the F.B.A.S. Perpetual Trophy for Labyrinth and also N.K.A.S. Cup for Labyrinth with a *Ctenopoma Kingleyi* with 82 pts.

North Kent just managed to win "The Aquarist Challenge Cup" for the Society with most points from Kingston Club.

Results—Furnished Aquaria: 1, Mrs. Jan Stephens (N.K.); 2, G. Arrow (East London); 3, C. Wood (N.K.); 4, P. Castle (N.K.). Barbs: 1, B. Harvey (N.K.); 2, J. Bellingham (Tonbridge); 3, J. Parker (N.K.); 4, Mrs. Isabel Bellingham (Tonbridge). Characins: 1, R. Kerridge (Harlow); 2, A. Smith (Croydon); 3, R. Taylor (Tonbridge); 4, B. Clare (Medway). Cichlids: 1, R. Kerridge (Harlow); 2, J. Bellingham (Tonbridge); 3, B. Harvey (N.K.); 4, P. Kendrick (Froelance). Angels: 1, J. Wilson (Catford); 2, I. Stamp (Redhill/Reigate); 3, K. Heywood (Erith); 4, R. Bowes (Walthamstow). Labyrinth: 1, S. Cowell (Bethnal Green); 2, R. Bowes (Walthamstow); 3, P. R. Kendrick (Froelance); 4, Mrs. G. Arrow (East London). Fighters: 1, C. Wood (N.K.); 2, J. Marshall (Medway); 3, C. Hunter (N.K.); 4, P. Cottle (N.K.). Eels: 1, R. Kendrick (Froelance); 2, R. Birch (N.K.); 3, K. Barrett (Kingston); 4, I. Mathieson (Tonbridge). A.V. Catfish: 1 and 4, G. Greenhalf (Kingston); 2, R. Baker (Tonbridge); 3, S. G. Cowell (Bethnal Green). Rasboras, Danio, W.C.M.M.: 1, P. Grosvenor (Kingston); 2, K. Barrett (Kingston); 3, J. Stamp (Froelance); 4, Robert Parker (N.L.). A.O.V. (Egglayers): 1, R. Kerridge (Harlow); 2, L. Laming (Medway); 3, S. Cowell (Bethnal Green); 4, Mrs. Isabel Bellingham (Tonbridge). Sexed Pairs: 1, K. Barrett (Kingston); 2, J. Marshall (Medway); 3, C. Wood (N.K.); 4, J. Bolton (Erith). A.V. Guppy: 1 and 4, Mrs. B. Elmes (W.L.G.A.); 2, S. Cowell (Bethnal Green); 3, R. Illmes (W.L.G.A.). Swordtails: 1, K. Barrett (Kingston); 2 and 3, J. Stephens (N.K.); 3, J. Stephens (N.K.); 4, D. Race (Erith). Platies: 1, B. Harvey (N.K.); 2, L. Laming (Medway); 3, G. Greenhalf (Kingston); 4, D. Wiltshire (Carshalton). Mollies: 1, J. Wilson (Catford); 2, L. Laming (Medway); 3, G. Greenhalf (Kingston); 4, J. Wilson (Catford). A.O.V. Livebearers: 1, J. Pollard (Kingston); 2, G. Greenhalf (Kingston); 3, Mrs. K. Barrett (Kingston); 4, Mrs. D. Cruckshank (Uxbridge). Breeders Egglayers: 1, Lynn Lodge (Erith); 2, Mrs. G. Arrow (East London); 3, Mrs. B. Osborn (Medway); 4, P. Grosvenor (Kingston). Breeders Livebearers: 1, K. Dryden (Croydon); 2, G. Greenhalf (Kingston); 3 and 4, J. Parker (N.K.). Single Tailed Goldfish: 1, J. Wilson (Catford); 2, J. Marshall (Medway); 3 and 4, Mr. Woodward. A.O.V. Coldwater: 1, P. Wren (N.K.); 2 and 4, Mr. Woodward; 3, J. Stephens (N.K.).

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THE AQUARIST

AT the August meeting of the **Harrogate and District A.S.**, 43 members including four new members heard a talk given by A. Firth of Bradford and District A.S. on Egg-layers. There was also an auction and a members' Table Show which Mr. Firth judged, the winners being: 1, M. Allen; 2, M. Levett; 3, M. Slinger. Meetings are held every second Tuesday of the month at the Conservative Rooms, Park View, Harrogate and all are welcome. The Hon. Secretary is A. P. Stothard, 5 Regent Ave., Harrogate.

DURING July **Merseyside A.S.** were entertained by Ken Rigby, a well known expert on Guppies and Chairman of the Judges and Standards Committee of the Fancy Guppy Association. He has a wonderful down-to-earth manner of speaking, and with the use of his magnetic board, took the listeners through the standard show outlines for male and female guppies, in a very lucid fashion.

The evening began with a new venture, a panel game quiz between four teams (of four) representing (a) The Ladies; (b) The Committee; (c) The Gentlemen; (d) The Juniors. Each team was equipped with a buzzer connected to a central panel, where Vice-Chairman Bill Kelly was duly defeated by the buzzers and made dizzy in his effort to see which of the teams buzzed first according to the lights on the panel before him. The question master was Ken Packer. The audience had its own quiz in the form of twelve questions, with a prize for the most knowledgeable lady and gentleman. The evening was a huge success and members have requested a repeat performance at a later date.

NEW SOCIETIES

FORMED in March the **Totnes A.S.** already has over thirty members and is growing steadily. The Society has already taken part successfully in Inter-Club competitions with other Societies in Devon and has a full programme of lectures, slide-shows, discussions and Table Shows. It also has a keen Junior Section. The meetings are held on alternate Thursdays at 7.30 p.m. in the free Church Hall, Totnes. The following officers have been elected: Chairman: B. Bowyer; Vice-Chairman: T. Boshay; Treasurer: R. Davis; Secretary: M. A. Sutcliffe, Cobberton, Denys Road, Totnes, Devon. Show Secretary: J. Voisey; Committee Members: H. Stoterman, K. Lambler (Junior). The aim of the Society is to cover all aspects of tropical fishkeeping, breeding and showing, and new members are welcome. The Secretary will be pleased to supply further information.

THE **Porthcawl A.S.** was formed recently and the first meeting was held on the 25th August with fourteen people to start the club.

Meetings are held every fortnight on a Tuesday at the Sportsman's Club, Porthcawl, at 7.30 p.m. All people who are interested in joining the club should contact N. J. Roberts, Secretary, 33 Maripit Lane, Porthcawl, Glam.

OBITUARY

WE regret to report the death of Mr. Harold Odum, one of the oldest members of the **Nottingham and District A.S.** Mr. Odum and his wife were for many years two very active members of the Society, and over the years he has held several posts, among them being Leader of the Scientific Section (now the Breeders' Section), Bulletin Editor, Vice-President and, four years ago, Chairman.

SECRETARY CHANGE

Hampstead and District A.S. Mrs. V. Riech, 102 Harwood Street, London, N.W.1. Tel. 01-485 7463.

AQUARIST CALENDAR

3rd October: East London Aquarists and Pondkeepers Association Annual Open Show, Ripple Road School, Barking. Schedules from J. Smith, 2 Haeh Grove, Chadwell Heath, Essex.

4th October: Castleford and District A.S. Open Show at the Boys' Modern School, Pontefract Road, Castleford. Further details from R. Illingworth, 67 Dawtrel Street, Ferry Fryston, Castleford, Yorks.

4th October: Ealing and District A.S. Second Open Show.

4th October: Suffolk Aquarist and Pondkeepers Association, Colour Fish '70. An Exhibition of Tropical and Coldwater Fish in the Art Gallery, Elgh Street, Ipswich.

10th-11th October: British Aquarist Festival, Belle Vue, Manchester.

17th October: Goldfish Society Great Britain Convention and Open Show, St. Marks Church Rooms, Belgrave Gate, Leicester, at 2.30 p.m. Details from Mrs. P. Whittington, "Pines Lodge," Ringley Park Avenue, Reigate, Surrey.

18th October: Sherwood A.S. First Open Show. Venue, Lady Brook Community Centre, Lady Brook Lane, Mansfield. Schedules from the Show Secretary, D. J. Birkbeck, 173 Petersmiths Drive, New Ollerton, Newark, Notts.

WOULD the secretary of the Midland Association of Aquarist Societies please contact the Advertisement Manager at 'The Aquarist' office.

24th October: Kingston and District A.S. Open Show. Schedules available from G. Greenhall, 39 Garth Close, Morden, Surrey. Tel: 01-337 4042.

25th October: Doncaster and District A.S. First Open Show. T. A. Barracks, Sandford Rd., Balby.

1st November: Association of Yorkshire Aquarist Societies. "Aquarist's Fair," Victoria Hall, Victoria Park, Keighley, Yorks.

8th November: Heywood and District A.S. Open Table Show, Ambulance Hall, Bamford Road, Heywood.

8th November: Hartlepool A.S. Twelfth Annual Show, Longcur Hall, Seaton Carew. Schedules available September from J. D. Watson, 42 Sydenham Road, Hartlepool.

14th November: Hendon and District A.S. Annual Congress, Whitefield Secondary Modern School, Claremont Road.

20th November: Aireborough and District A.S. Annual Open Show, Greenacre Hall, Rawdon. Schedules available September from G. E. Walker, 2a West End Terrace, Guiseley, nr. Leeds, LS 20 8LX, Yorks.

8th December: Horsforth A.S. Second Open Show at Greenacre Hall, Rawdon, nr. Leeds.

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14th March: Belle Vue A.S. Open Show to be held at Openshaw Boys Club, Crossley House, Ashton Old Road, Openshaw, Manchester 11.

25th April: York and District A.S. Open Show. Show Secretary: P. Carey, 29 Yearley Grove, Huntingdon Road, York YO3 93X.

16th May: Merseyside A.S. Open Show.

8th May: Derby Regent A.S. Open Show. Sherwood Foresters Recreation Centre (Newmanton Barracks), Osmaston Park Road, Derby. (Follow R.A.C. signs.) Schedules from R. T. Bull, 36 Queens Drive, Littleover Derby.

THE organisers of the Aquarist and Pondkeeper fish keeping Exhibition would like to thank the officials, stewards and helpers who gave many hours of their time in the preparation and running of the exhibition.



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