MAY 1975

PetFish

PRACTICAL FISHKEEPING MONTHLY

Contents include:
A New Barb Variety
Coldwater Scene
To Plant or Not To Plant?
Development of the Medaka

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Comments and Quotes

- When fishes are crowded
- Mystery at Canoe Lake
- Salmon in the Thames

Crowding Dangers

Among the disadvantages of overcrowding fishes well known to the fishekeeper are a number of unpleasant effects resulting from the harmful substances called 'crowding factors', released into the water by overcrowded fishes of a number of species. It is known that these substances, whose chemical identity is not yet verified, can stop spawning, slow growth of young fish and increase deaths in adult fish.

One of the difficulties of studying these substances has been the time-consuming procedures involved in their recognition and assessment in water samples. An observation made on the effects of 'crowding factors' in showing the rate of heart beating in zebra fish embryos has now been utilised by biologists at the Oak Ridge National Laboratory. Tennessee to develop a laboratory procedure for quantifying 'crowding factors'. This 'bioassay' for the factors, described by A. A. Francis, Frances Smith and P. Pfisterer in the PROGRESSIVE FISHEKEEPER (U.S.A.), involves recording the heart rate in newly hatched goldfish fry by means of an ECG apparatus used medically for diagnosis of human cardiac defects. The extent to which the beat rate is slowed when extracts of 'crowding factors' are added to the water the fry are in gives an accurate indication of the amount of biologically active factors present.

Perhaps of more immediate significance for the practical fishekeeper is the note that these harmful factors are removed from water by passing it through activated charcoal, an indication that absorptive carbons of this kind can be a valuable component of filter medium in filters serving fry-rearing tanks especially.

Mystery Fish

A FISHY tale of mystery blew up in the local Portsmouth press last month when an angler retrieved from Southsea beach a 2lb 3oz fish corpse that he could not identify. Earlier, the story went, it had been found floating dead in Canoe Lake by two boys, who later deposited it on the beach. The Portsmouth angling fraternity were nonplussed. "Strangest
features of the fish" it was reported, "are that it has nearly human teeth set in a very human gum... and is practically devoid of any fishy smell". From a session with fish identification books the nearest identification was... "some form of black piranha". Could it be?

Yes, in fact, it could! Mr J. Stilwell of the Portsmouth Aquarist Society and well-known FBAS judge not only identified the piranha but recognised it as one he had sold some months ago. In his possession the piranha had grown from half an inch to more than 12 inches long over seven years. The fish had proved too much for its new owners, and investigation revealed that it had been released alive into Canoe Lake by schoolboys, and it was discovered dead a day later. Asked about his reaction to learning that his fish had been placed in a cold boating lake Mr Stilwell said "I was furious!"

Thames Salmon

THE River Thames could be the first major river of Europe and America to recover from the Industrial Revolution's polluting influence, and have adult salmon in it in 1977, it was suggested by a fishery officer of the Thames Water Authority. This was on the occasion of the release into the river at Twickenham of about 5000 alevinsalmon, reported in THE TIMES: "In ideal conditions about 25 might be expected to reach maturity out of the 5000, which are the spawn of quite a small hen salmon." For one or two to make it under existing not-ideal conditions, it is thought, "will be almost a miracle".

When one thinks of the state of the river just a few years back it is almost a miracle that there can be even a remote possibility that salmon can survive in it today.

LETTERS

Taking Up Killies

UNFORTUNATELY I did not get PFM for January so I am unable to comment on Mr Brian Tate's letter. However, as a member of the British Killifish Association I find the remarks of "A Keen Amateur" (PFM, March) offensive and 'gutless' — the latter because he (or she?) hasn't enough to put name to print, yet refers to the BKA as a closed shop. For Mr No-name's information the BKA is not a commercial business but a worldwide club of people who wish to keep killies — whose members, I might add, often have difficulty in obtaining fish because of lack of availability. So, of course, in that respect we are a 'closed' shop.

However, Mr No-name can purchase gourami, harbs, catfish etc. from his local dealer. Why not killies? Surely they should be available to the general public through this normal channel, or is it that they require a special knowledge to keep them successfully? I would suggest that it is for this very reason that they are not available from this source.

On 2nd March of this year, the West London Group of the BKA organised a Bring and Buy sale and very successful it was, too. Eggs and fish of the easier species were available to those who attended. Only a few of them were BKA members — most were local aquarists, club members and the public who had seen our advertisements. So let us have less of this 'closed shop' nonsense from persons with no name.

JOHN A. WHITE (BKA 196)

Hayes, Middx., UB3 3AD

I AM writing to say a few words in support of, not on behalf of, the BKA. I don't know how other fishkeepers started with 'killies' but I kept Platypoecilus and American flagfish before I knew that they were of this sacred sect. When I was enlightened to the fact that I was a 'killie-keeper' and that there was an Association for their fanciers it was then that the thought of joining the Association came up. At this point fish were sold to me as

Continued on page 9
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LETTERS

continued from page 472

The undersigned in a recent issue of PFM, and you kindly forwarded my enquiry immediately to Mr Renton. This resulted in a lightning response from Mr Douglas Renton, who is chairman of the Newcastle Guppy and Livebearer Society. He offered to carve one on extremely short notice for our Show. This trophy is the third one that he has carved. The first was presented to the Tyne-Toes Area Association and it was allotted to a different society each year to be awarded at their Open Show. Mr Renton carved the second one when he was asked to judge at The Aquarium Show 1974 and it will be awarded annually to the best livebearer exhibit. Currently, he is making engravings of fish on clear perspex for another type of show trophy. His Society corresponds with livebearer associations all over the world. We can be grateful that Mr Renton was kind enough to prepare his distinctive trophy upon very short notice.

The board members of the Michiana Aquarium Society are pleased to be associated in this way with our British cousins and fellow aquarists. Additionally, we believe that the Renton Trophy will add a considerable amount of character to our Show, especially in view of the prosaic and standardised form of most U.S. trophies, which need only a new screw-on emblem to be appropriate for any activity. We have decided to award the trophy for high point; a sum total of points won in each species class with 5 points for first, four for second, etc. The trophy has already engendered some ferocious competition, with one club member planning on winning it with 45 entries!

W. M. Fackert,
Michiana Aquarium Society
Elkhart, Indiana, U.S.A.

Mr S. Jacobs

In recent years the pet trade has been assailed on many sides by a variety of problems, ranging from the sale of pet foods by the supermarket chains to the recent agitation against the importation of threatened species. It has been a great strength to it to have had as National Organiser of The Pet Trade Association Ltd a champion such as Mr Sam Jacobs, and it is with great regret that we learnt of his death at the end of February. Mr Jacobs was a loyal and devoted advocate of the rights of the pet trader against the varied contingencies that have challenged the very existence of some aspects of pet trading. Mr Jacobs was one of the earliest members of the Aquatic Traders Association, founded in 1948, that was subsequently incorporated into the Pet Trade Association Ltd in 1960. From then until his appointment as National Organiser in 1967, Mr Jacobs acted as unpaid part secretary and chairman of the ever-growing membership. In 1977 he represented the trade on the London Aquarium Show Advisory Committee. He was forced by ill-health to retire in 1973 and his work was taken over by his wife Vera, who has the condolences of the trade in her loss.
Beautiful Barb from Odessa

New Barbus variety

In 1974 a new, beautifully coloured barb was distributed among aquarists in East Germany, Czechoslovakia and Hungary. Colleagues in East Germany gave it the name 'Odessa barb' because it came to them from the Soviet Union. The fish were propagated a few times and then finally came to us.

It is hard to believe, but no-one can find the slightest information as to where these fish came from. The adult barb resembles barbs of the Barbus species conchomius, cumingi, ticto and stoliczkanus and one would suppose that the home of the new fish would not be too far from that of the barbs mentioned, that is Ceylon, N. India, Assam and so on, but this is merely my own supposition. (Dr H. Axelrod, in an article on his visit to Moscow in TFH, October 1974, says that the barb had been brought to Odessa by a sailor from North Vietnam.—EDITOR.) In any case, the new barb is just as undemanding as its relations and they are very skilful swimmers. The male is moving the whole day. They eat anything and do not require specific water conditions. A temperature of 68-72°F (20-22°C) is suitable for them.

I also succeeded in photographing this fish spawning.

By RUDOLPH ZUKAL

Photographs by the author

Translated by F. MARSH
The male (left) initiates the breeding sequence by swimming around and beneath the female and butting her from the rear with his head.

The female fish is insignificantly coloured and decorated with two large dark flecks on the sides of the body. The male, however, carries a broad, blood-red, horizontal stripe from the gill-covers to the caudal fin. The male's dorsal, also, is decorated with small, black lines. In a word, these are barbs that are very soon going to occupy an important place in our tanks, perhaps at the expense of their relations, B. conchonius and others.

For the first 4 months, the young fish do not differ from each other sexually and only the two large flecks on the sides decorate their delicate, narrow bodies. Breeding this new barb presents little difficulty and in this it closely resembles...

During spawning the pair of fish press flank to flank and eggs are released into the plants. The female appears to select the spawning site.
all the common barbs, particularly the best known, the rosy barb.

For breeding, a small-sized (3-4 gallon, 15 litres) all-glass tank can be used. No bottom substrate is required but the tank should contain clumps of fine-leaved plants that can be weighted down with flat stones. Tap water that has been standing may be used or water taken from a maintenance tank topped up with fresh water; a temperature of 75-79°F (24-26°C) is required. A pair put in the tank in the evening will usually spawn willingly the following morning. If the fish are in a community tank you can often notice the stormy hunt before the spawning. In the spawning site chosen by the female, the fish press together, the male swings his caudal fin over the female’s back and with a lightning shiver the fish spawn. Some of the eggs stick to the plants, some fall to the bottom. After this hectic spawning, which lasts about three hours, the fish must be removed, for they will devour their eggs. In spite of the size of the parents, 200-300 eggs are produced. Breeding can be repeated several times a year and they do not breed only at certain seasons but throughout the year. Hatching, free-swimming stage and rearing follow exactly the same pattern as that of the barbs I have already mentioned.

I hope that soon many more aquarists will be in possession of this wonderful barb and will also have the pleasure of breeding this fish. (This barb is already being bred in England and doubtless will soon be offered for sale here.—Mirror.)
DEVELOPMENT OF A FISH—2

Growth to Hatching Time

By IAN SELLICK

Illustrations by the author

Last month’s article the development of the egg of the medaka (Oryzias latipes) was described up to the stage called gastrulation.

Towards the end of gastrulation, nearly all the yolk is covered with cells, there being a small hole, the blastopore, through which the part of the yolk containing the all droplets may bulge. Viewed from the side, the embryonic keel which will form the central nervous system is clearly visible, together with the embryonic shield or a slightly opaque margin to the keel. The keel itself is thicker at the (future) anterior end, the end away from the dorsal lip of the blastopore, due to a slight build up of cells which will go on to form the optic vesicles.

The closure of the blastopore is complete at about 28 hours, and at this stage the embryonic axis is very clear; the optic vesicles have been formed as two bulges, one either side of the keel in the anterior region. In the early stages, these vesicles are not closed off from the keel of the nervous system itself, but after a short time, about 2 hours, they are visible as discrete structures.

As the optic vesicles are forming, the main divisions of the brain become visible as bulges on the dorsal surface of the keel, best seen in side view with the keel on the horizon of the egg. These divisions are the forebrain between the optic vesicles, the midbrain and the hindbrain.

The keel can be seen to be indenting

[Diagram of the blastoderm coming to cover all the egg with a small area of the vegetal pole left uncovered. The blastopore through which the yolk plug (Y.P.) protrudes (25 hours). The cells at the future anterior end become slightly thicker to form eventually the optic vesicles and the brain.]

[Diagram of the 25 hour stage from the side, showing how the embryo sticks out from the yolk, the ‘embryonic keel’ (K). The lateral condensations of tissue that will go on to form the optic vesicles, and the eyes from these, can be seen (E).]
into the yolk sac, and there is a slight condensation of cells about midway along the keel, which will eventually form the somites, the forerunners of the muscles. This condensation of tissue is best seen when the egg is viewed with the embryo at top or bottom, the cells that will form the somites giving a ruffled, slightly more opaque quality. By this time the optic vesicles are completely separate from the forebrain, the division being easily visible as a dark groove.

However, before any somites are formed, a small vesicle, not unlike a small oil droplet in appearance, is produced in the posterior region connected to the embryo about seven-eighths of the way along its length. This vesicle, called Kupffer's vesicle, persists until about the fourth day of development, when the circulation of blood on the yolk sac commences. This would suggest that it has a storage function for some excretory product; it is possibly the site where metabolic waste is stored during the first phases of development. However, it is difficult to accept this as there is no transport system, so how does waste accumulate at this particular spot?

Beyond the head of the embryo there develops a large swelling bounded by a membrane, which is possibly the forerunner of the heart sac (pericardium). This cavity must thus expand towards the embryo and eventually come to lie beneath it. This lifts the head of the embryo off the yolk, and the cavity stretches sideways to the midbrain and forebrain. Fine strands on the surface of the yolk at this stage mark the beginning of formation of the 'blood islands'. The divisions of the brain are better defined, and start to fold into the shapes present in the adult fish.

By 48 hours, a heart rudiment, below and in front of the head, appears in the pericardial cavity, extending forward and gradually joining up with some of the blood islands in this region. Slight contractions of this embryonic heart can first be seen soon after it is formed.

Pictures on this page show under the microscope views of developing eggs. Top of page: The optic vesicles have become separated off, the keel in the head region is becoming bumpy owing to the formation of the divisions of the brain, and cells are accumulating alongside the keel, which will later form the somites (body segments) (×50). Left: nine somites can be seen as bands across the body. The eyes are well developed, and the notochord that marks the future site of the backbone is present. The pericardium that contains the heart rudiment is still spread over the anterior portion of the egg (P) (×65).
The optic cup formed from the optic vesicles is well defined, and the eye lens appears at this stage. Immediately behind the optic lobes can be seen the formation of the cavities (ventricles) of the midbrain, with expansion into the forebrain occurring at the same time. The otic vesicles can be seen behind the hindbrain, these becoming larger and more distinct in the next few hours, eventually to form the internal 'ears' of the fish.

A slight condensation of tissue along the margin of the embryo immediately posterior to the site of induction of the otic vesicles marks the beginning of formation of the pectoral fin buds. The embryo has elongated substantially to cover about half the circumference of the egg. Kupffer's vesicle is still present, but becoming somewhat indistinct, buried in the yolk.

On the third day, the heart has elongated and circulation commences in the capillaries on the yolk sac formed by the linking of the blood islands into a network. The head is completely lifted off the yolk by the pericardium beneath and in front of it. The part of the heart visible from above is the sinus venosus, which although not distinct from the rest of the heart, being a straight tube, may be distinguished by the direction of beat. The presumptive ventricle and atrium are hidden below the forebrain, but can be seen by focussing down through the nearly transparent embryo. The emerging anterior vitelline arteries appear just in front of the cells accumulating to form the pectoral fins.

The tail of the embryo lifts off the yolk, and Kupffer's vesicle disappears with the onset of the circulation. Once the tail is free of the yolk, the first contractions of the somites occur, principally in the ones more to the head end, causing the embryo to flex. Later, contractions of the posterior somites occur, causing the tail to twitch. The rate of heartbeat increases and the ventricle of the heart becomes a definite chamber formed by a bend in the tubular heart slightly to one side of the midline, below the midbrain and the optic cup. Blood corpuscles can be clearly seen in large numbers in the capillaries and in the heart, and the blood has a faint pink colour because of this.

The lens can be seen in the eye, and a small amount of pigment deposition occurs, although not enough to obscure the view of the heart below at this stage. The divisions of the brain become even more pronounced. The otic vesicles become more visible, possibly due to the deposition of the otoliths. The rod known as the notochord can be seen beneath the hindbrain and the nerve cord, and it is eventually displaced and covered by the calcified structure of the backbone vertebrae.

Development is now into the fourth day, and nearly all the major organ structures have been formed. Although they cannot be easily seen by direct observation, there are rudimentary kidneys, a liver, and all the other internal organs present. During the next 4–5 days, up to hatching, these organs develop and expand to take up the position and form found in the adult fish. Exceptions are the fins and the sex organs (gonads), the latter maturing as the fish matures after hatching as they will not be 'needed' for several months. The fins develop in the following order.

As already mentioned, the pectoral fin buds are present by the fourth day, and these develop completely before hatching. However, the only other fin to develop is a joint caudal–dorsal–anal fin, starting at the extreme tail end and growing forwards until just after hatching it occupies the position shown.

As the larvae develop over the next couple of weeks, these fins become divided off into their definitive structures as in the
adult. The pelvic fins develop slightly after the pectorals, but are difficult to observe in the egg, sandwiched between the body and the yolk, and it is only on hatching that they are really seen.

The yolk disappears rapidly in the last 2 days before hatching and the embryo often spins violently inside its egg shell. Hatching occurs by the release of an enzyme which dissolves and weakens the shell until the fish is able to break it by the action of its tail.

After hatching, the remains of the yolk sac persist for about 5 days, but the fry begin feeding actively even before this and may be fed on newly hatched brine shrimp, powdered baby food, and then, after about 2 weeks, ground white worm, very fine Duphäia and other foods may be given. Growth is rapid at 25°C, as in most killifish.

Acknowledgements

To Dr J. W. Dodson of the University of Bristol for the use of his personal laboratory and superb Zeiss microscope, without which this report would not have been possible. No less thanks is due to my two technicians, Albert Greggsby and Jim Hann, who put up with my persistent demands for the most obscure pieces of equipment.

BOOK REVIEW


For Valley cichlids have become available to the aquarist only in recent years and as aquarium fishes much still remains to be learnt about their breeding. For a much longer time, 60 years or so, the fishes of the African Great Lakes have enjoyed the attention of zoologists for reasons other than their often very attractive appearance, their behaviour and breeding habits of special interest. Cichlids preponderate in the Lakes and these fishes in particular illustrate the point of evolutionary interest that has made them the object of scientific study: despite the apparent variety of species, with all kinds of anatomical differences and variation of habit, all have developed from just a few original forms trapped in the waters of the Lakes when they were formed millions of years ago, to give what is termed a 'species flock'.

Lake Victoria, whose fishes have been subjected to detailed study by Dr Greenwood in this book, is relatively a young Lake (a mere 750,000 years) and in it there are at least 170 species of cichlids, nearly all of which occur only in the Lake and not in the rivers feeding it. The genus Haplochromis is the major one (about 150 species) plus with the other genera closely related to and derived from Haplochromis. As well as making analyses to trace the course of the diversification of the Victoria species Dr Greenwood has attempted to answer the question why cichlids in particular have undergone this process of speciation so readily and successfully when other fish families have shown so little evolutionary change.

Study of the history of the Lake reveals that it was originally several smaller lakes, which have become the single large, relatively shallow body of water seen today. This background provides the Lake with a variety of differing 'environmental niches' and its status of an 'amalgam of several lakes' has been one reason for the great range of fishes developed from the ancestral cichlids trapped there. The fact that these original fishes were not so far specialised in habits, structure and bodily function also meant that there was scope for development of several differing lines of specialisation. Why did not inter-specific hybridisation, i.e. crossing of differently developing lines, occur and so negate the whole process? The answer to this, it is suggested in the book, lies in the elaborate breeding behaviour shown by
the fishes and which in itself constitutes a barrier to crossing. Thus female recognition of and response to a definite male coloration, as in the Hoplochromis species, would cause rejection of males not conforming to the required coloration.

Specialities in feeding habits of the various Lake cichlid species are discussed, in particular detail for the Hoplochromis fishes, by Dr Greenwood, since this is another factor with a bearing on the separation of distinct species. Altogether there is a great deal in this book deserving the attention of the serious aquarist with a special interest in the cichlids, and it is noteworthy that at several points the author mentions evidence from aquarium observations of these fishes. For the aquarist who wonders what the work of an ichthyologist involves this book provides a very good sample.

A.E.


For anyone who is contemplating setting up an aquarium for the first time, this book would be an excellent investment. Its usefulness, however, does not end there, for the beginner will find encouragement for an extension of interest in reproduction and breeding of the various species. The author, an aquarist of high standing, assumes nothing. Like Mrs Beeton, who, in her recipe for rabbit pie, said "First catch your rabbit," he starts at the beginning and guides the reader's first faltering steps along a path which, by dint of a painstaking regard to detail, becomes increasingly firmer and wider.

Sixty pages and nine chapters are devoted to laying the foundation and only then is the ultimate mentioned — the stocking of the aquarium with fish. Nothing is forgotten, size of tank, quality of frame, thickness of glass, siting, heating, lighting, serving, planting, all described intelligibly, with a sprinkling of analogous comment for further clarification. The various fish families are described in detail with suggestions from which the would-be aquarist can decide on the stocking. A careful study of the wealth of colour photographs available should ensure a picture both peaceful and pleasing to the eye.

The two final chapters on breeding and diseases make this a truly comprehensive little volume which not only the beginner, but the experienced aquarist, would do well to keep at hand. A notable feature is that, in addition to a complete index at the end, there are marginal references throughout which make it easy to turn up any aspect of fishkeeping instantly.

F.C.

Meetings and Changes of Officers

ARMIDALE AS. Chairman, Mr A. F. Bronte; vice-chairman, Mr J. E. Jackson; show secretary, Mr D. Hogg; treasurer, Mr G. J. Dougal; librarian, Mr D. T. Bullen. Meetings: 2nd Monday in month.

ARMIDALE S.A. Chairman, Mr W. G. Allison; vice-chairman, Mr N. G. McManus; secretary, Mr W. J. McPhail; show secretary, Mr W. J. Price; treasurer, Mr J. W. McPhail. Meetings: 3rd Tuesday in month.

ARMIDALE B.S. Chairman, Mr J. E. Jackson; vice-chairman, Mr D. T. Bullen; secretary, Mr G. J. Dougal; show secretary, Mr D. T. Bullen; treasurer, Mr J. W. McPhail. Meetings: 1st Monday in month.

B.R.U. AS. Chairman, Mr A. E. Kirk; vice-chairman, Mr G. J. Dougal; secretary, Mr W. J. Price; treasurer, Mr J. W. McPhail. Meetings: 2nd Tuesday in month.

B.R.U. M.A. Chairman, Mr G. J. Dougal; vice-chairman, Mr W. J. Price; secretary, Mr J. W. McPhail; treasurer, Mr G. J. Dougal. Meetings: 1st Thursday in month.

B.R.U. S.A. Chairman, Mr W. J. Price, secretary, Mr J. W. McPhail; treasurer, Mr G. J. Dougal. Meetings: 2nd Tuesday in month.

B.R.U. S.A. Chairman, Mr C. W. Lossing; vice-chairman, Mr A. E. Kirk; secretary, Mr W. J. Price; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. N.S. Chairman, Mr G. J. Dougal; vice-chairman, Mr W. J. Price; secretary, Mr J. W. McPhail; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. P.S. Chairman, Mr C. W. Lossing; vice-chairman, Mr A. E. Kirk; secretary, Mr W. J. Price; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. Q.S. Chairman, Mr C. W. Lossing; vice-chairman, Mr A. E. Kirk; secretary, Mr W. J. Price; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. W.S. Chairman, Mr G. J. Dougal; vice-chairman, Mr W. J. Price; secretary, Mr J. W. McPhail; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. S.A. Chairman, Mr C. W. Lossing; vice-chairman, Mr A. E. Kirk; secretary, Mr W. J. Price; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. N.S. Chairman, Mr G. J. Dougal; vice-chairman, Mr W. J. Price; secretary, Mr J. W. McPhail; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. Q.S. Chairman, Mr C. W. Lossing; vice-chairman, Mr A. E. Kirk; secretary, Mr W. J. Price; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.

B.R.U. W.S. Chairman, Mr G. J. Dougal; vice-chairman, Mr W. J. Price; secretary, Mr J. W. McPhail; treasurer, Mr G. J. Dougal. Meetings: 2nd Sunday in month.
THE main allure of tropical marines lies in their outstanding and often bizarre colouring and patterning, and if a species falls far short of this common expectation it may be quite undeservedly overlooked as a regular aquarium inhabitant. The cloudy damsel comes very much into this category, and on first acquaintance its two-tone chocolate coloration with a patch of cream below the dorsal scarcely recommends it: it seems rather ordinary by comparison with a domino, even, whose jet black and brilliant white put it in a class of its own. But if you look more closely at the cloudy damsel you will find that there are some violet tones about it, especially in the lighter area before the base of the tail, the tail itself, and sometimes the pectoral fins. This very slight mistiness, which can seem to shift to other parts of the body under certain lighting conditions, no doubt accounts for the quite apt name of the species.

I often regret that so many of these seem to take their time to move away from dealers’ tanks after the arrival of new consignments, as they have a great deal to contribute to the beginner’s enjoyment of tropical marines. They are ideal ‘first fish’, as they seem to eat almost anything and are considerably livelier than, say, clownfish, which sometimes take quite a long time to emerge from their hiding places before they take up their everyday routine.

The cloudy damsel is often shipped at a very tender age and there are some really tiny specimens to be had, yet if there are plenty of coral hiding places they make themselves scarce if anything worrying turns up, and just as readily reappear to defy the next intruder. It is almost as though they were playing hide and seek with some of the larger and more aggressive fish, and indeed their antics are tolerated by some to an extent which would be unbelievable in the case of other species.

Even when there is no danger the cloudy damsel will ride a few inches above its coral nook and jig up and down as though it were string-manipulated from above. When you see whole groups of these little fish doing this simultaneously, the overall effect is extremely amusing.

Though I have not managed to keep these fish any longer than the average, I feel that they are rather tougher than some of the so-called starter fish. I have some now which have undergone some rather tiresome tank conditions, and apart from one short period when they went off feed they have reacted to extremes most credibly. Temporarily they have proved wonderfully tolerant and have not shown signs of aggression, and their speed and manoeuvrability have enabled them to keep out of most of the trouble they sometimes invite, so that the odd torn fin, which quickly heals, is the sole outcome.

This is another damsel which, if obtained as small specimens, will grow at a sufficiently slow pace to cause minimum embarrassment, and I have yet to experience the behaviour of a specimen much over the 2 inch mark. I could not underwrite the good behaviour of larger specimens, but I would consider them to be a far better bet as community fish than such terrors as the Beau Gregory and the blue damsel, which are more often than not the fish we first experiment with.

Such good-natured creatures deserve congenial company, and it is well worth trying them with smaller specimens of chromis species. These are also fish which like to hide amongst coral fingers, and which are as adept as the cloudy damsel in putting on the disappearing act when danger threatens. The green and the blue chromis are suitable species and are not so overpoweringly self-coloured as to draw all attention away from their suggested companions. The rather lozenge-shaped cloudy also tends to contrast well
As the information available to us about water plants grows, more and more hobbyists will find increasing interest in them. Indeed, an aquarium without plants is like a living room without furniture, even apart from their very real and important biological and aesthetic value.

By the end of 1964 a most useful aquarium plant was imported into Europe for the first time, with the scientific name of Hydrocotyle aquatic - a rather expensive plant because of the long-distance air transport required to bring it to Europe. In leaf shape the plant looked a little like Hydrocotyle vulgaris but its growth was more like the Chinese ivy or Cardamine lyrata. The plant and its flowers were studied at the University of Leyden and it was established with certainty that the plant was the tropical Hydrocotyle leucocephala from Brazil, where it is found in creeks and rivers as well as in inundated areas - mostly in clear water.

The leaves are a bright green, roundish and finely ribbed. In contrast to the small Hydrocotyle vulgaris this plant sends out strong branches. The plant will continue to grow throughout the winter if it receives sufficient light and a temperature between 20 and 24°C (68-75°F). Small
bunches of white-coloured roots grow from the underside of the leaf nodes. The plant does not require rich compost, coarse river sand being suitable for instance.

*Hydrocotyle leucocephala* will also grow as a floating plant at the surface, and then it will produce special floating leaves. It is also possible to grow it out of water, provided there is sufficient moisture present, and then a most beautiful florescence may appear. So we have here a plant with many possibilities. With its particularly beautiful shape and colour, *Hydrocotyle leucocephala* is one of our most useful aquarium plants.

Finally, a word of explanation about the name: *hydro*, water or moisture; *cotyle*, cup; *leuco*, white; *kephale*, head or crown. So it might be called the 'white crown water plant'.

![Image: plant forming small bunches of white roots at the junctions of leaf stalks and stem](image)

Below: an enlarged view of the flower produced by *Hydrocotyle leucocephala* when growing floating or above water.

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**Is it New to You?**

In last month's issue under 'Is it New to You?', the fish *Leptobarbus hovorvii* was featured, and since publication of this, further details have been given to us by an importer. It is not South American, as stated, but comes from Thailand, where it is now being bred commercially. Full body length is 15-16 inches and because the fish keeps its colour well even at this size, it is then a magnificent aquarium specimen. Given the popular name 'red-tailed silver shark', this fish is in fact a peaceful one, taking a mixed diet, and is quite as attractive as the better-known silver shark.
COLDWATER SCENE

By FRANK W. ORME

It seems that the amateur fish breeders of the British Isles are either shy or dislike publicity, for despite a reader's letter and a suggestion made in these columns some time ago, not one person has welcomed the idea of a 'Breeders' Directory' or offered support! The reason that I make that comment results from a recent letter written by a young lady of 13 years of age who lives in Barnsley, Yorkshire. Her letter stated that she was interested in keeping Bristol shubunksins and fantails, which her local pet shop was unable to supply. Could we give her the names of local breeders in her area, she enquired, together with the address of a local society? The latter question presented no difficulties. However, her main question was not so easy. There must be people within her area who are breeding the varieties that she is interested in — unfortunately I am not aware of them.

From my own experience I know that the more persistent will go to some trouble to obtain fish: I get enquiries even as far afield as Cornwall and Scotland. I am sure that many would be only too pleased to save themselves the expense of transport costs if they could obtain their requirements from a breeder nearer to their home. Again I make the suggestion that if you also feel that a directory of cold/tropical fish breeders would be a worthwhile feature of PFM, and would be prepared to give your support, write to the Editor so that he can judge, from the response, whether it would be feasible to incorporate a Directory of Fish Breeders in this magazine.

If you have had the good fortune to spawn your fish it is essential that you practise regular culling as they grow — this cannot be stressed too much. Only by continuous sorting will the best fry be given the best chance to develop fully. The culling of the young will remove poor and deformed specimens and by their removal both extra space and food will be made available to those that are kept. Crowded tanks and lack of food will produce stunted weakly fish!

The simplest method of sorting the fry is to place clean water, at the same temperature as that in which the fry are living, into a white bowl. Use a large plastic flour sieve to catch a few fish at a time and gently place them into the bowl for inspection. It will be found that they show up quite clearly there, so that any twisted, or otherwise deformed, fry can be removed. Having done this, you can place the retained fry in another bowl for safe keeping, whilst the remainder of the young fish are sorted. The tank can now be cleaned out and the water replaced, making sure to equalise the temperature so that the selected fish are not given a chill. If the fry, which you are culling, are from single-tail parents they can be returned to their clean quarters. However, if they are of the twintail variety a further inspection should be made.

Again place a few at a time into the white bowl and very carefully look at the tails; the tail of twintail fry appears spear-shaped or triangular, depending upon size, and any obvious single tails can be easily seen and removed. Now look closely at the tails of the remaining fry and it should be possible to discern those which have
split tails and those which have not (a good magnifying lens is a great help for this inspection). Remove those with joined tails and return them to their tank for growing on.

As the selected fish grow, so the sorting becomes easier — the points to look for will be given in a future article, but do not be tempted to keep anything but the best. Very few will heed the advice, for the culling will, without doubt, drastically reduce the original numbers of fry, but it should be remembered that a poor specimen will not improve whereas the better fish will suffer if overcrowded. Why waste food and space on fry that will never be of any use when both could be used to the advantage of a few good fish? Too much space cannot be given to the growing fish but too little all too often is! In raising fish make your slogan ‘Plenty of space and plenty of food equals healthy well-grown fish’ and you will not go wrong.

★ ★ ★

Speaking to a young Japanese lady recently, I learnt that her home was in Osaka, and this brought the conversation to the subject of koi and goldfish. She told me that many Japanese have pools, in which they keep fish, and it was explained that the most popular fish was the koi, which ‘is very beautiful to look at and also good to eat!’ It seems that many Japanese fishkeepers look upon their fish as both pet and food, but, as the young lady explained, it is no different from the Englishman who keeps rabbits for show and table. Although she did not think we would enjoy eating koi — because ‘English people do not understand how to prepare and cook this fish’ — she considered it made an excellent meal.

In order to drive the point home, I was told that it was quite commonplace to find the goldfish listed in a restaurant menu, and that they were delicious to eat. Well, a fish is a fish, and both koi and goldfish are members of the carp family, but I can hardly see myself tossing any of my lionheads or veiltails into the pan just to give my family a meal of fried goldfish and chips.

★ ★ ★

The winter that wasn’t! Despite all the forecasts, last winter never really arrived, and my fish remained fairly active most of the time. Although they would have taken food it was, nevertheless, withheld from the end of November until early February. On the 15th February it was decided to catch up two pairs of lionheads for conditioning. As is my usual practice, they were given a precautionary disinfectant treatment. Slerazin was used, as I have found this to be very effective and simple to use. They were then placed in separate tanks and fed on good nourishing food. Within a short time both males were showing tubercles and the females looked distinctly plump.

Spawning tanks were prepared on Saturday, 22nd February, and the males placed into their respective quarters during the evening; the following evening the females joined them. Monday was a bright sunny day; the water temperature rising to 60°F (15°C), and the males were showing interest in the females by lazily giving chase from time to time. Tuesday the 23rd started with a cold misty morning; although the mist later cleared it remained quite cold, and water temperatures had fallen to just below 60°F (15°C).

Undeterred by the fall in temperature, both pairs of lionheads were spawning and quite a large number of eggs were shed. The fact that the fish had not been fed for around 10 weeks had obviously not had any effect upon them, even though they had not become dormant at any time. Of course, they had been prepared for winter conditions and had lived off the
A question I am often asked is whether running goldfish can be bred. The answer is that the age of the fish is not really important, provided that the fish is sufficiently well grown. Most fish having a body length of 2 inches are capable of spawning if properly conditioned and I very often run a yearling male with an old female. The young males, as a rule, are more active than older specimens. In fact, one of the spawnings quoted above was from a yearling male and 3 year old female, the other being a yearling female mated with a 2 year old male. In both cases the yield of eggs was quite large with a good rate of fertility. Some breeders prefer 3 year old fish but, if the fish are large enough, and ready to spawn, why not use them? In my experience I have never found that the age of the yearling fish has any detrimental effect upon the young that are produced.

Pontederia cordata (pickerel weed) is an American native growing to a height of about 2 feet. The arrowhead-shaped leaves are carried on long stems from a thick root stock. This is one of the very few water plants that have blue flowers, which appear as flowering spikes during late summer and autumn. Happy in 6-12 inches of water.

Sagittaria sagittifolia (arrowhead). As the name implies, it has arrow-shaped leaves that stand well out of the water, up to 3 feet in height. Small white flowers. Water depth of 6 inches suits it best but it can be a rampant grower. The variety japonica is a better plant, being slower growing and more suited to the average size pool.

This short list by no means exhausts the plants available, such as the various iris varieties, but provides a basis from which suitable plants may be chosen to form the frame to the pool and provide points of interest other than the flat water surface. Finally a word of caution. Having purchased your plants, give them a thorough inspection to remove any undesirable before planting. A few unnoticed snail eggs could lead to a plague of common pond snails, and these can develop quite an appetite for submerged aquatic plants!
All-Glass Compact Aquarium

By

D. TERVER

Translated from Revue francaise d'Aquariologie

Frontal view of the complete unit showing cupboard doors giving access to shelves made within the aquarium table.

When an exhibition of equipment was held on the occasion of the Second Congress of the French Federation of Aquarium and Terrarium Keepers last year we conceived the idea of showing an aquarium that would embody the results of our continual efforts to combine the technical requirements of the aquarium with practical and aesthetic considerations. The compact aquarium described here is an all-glass tank constructed with silicone sealant and it incorporates into one unit the four sections that normally go to make up an aquarium set-up. Numbers in parentheses refer to key figures in the diagrams.

1. The 'water tank' itself (1) for use with fresh or sea water — with decor and tank inhabitants chosen accordingly.

2. Filter chamber (2). This receives water drawn from the tank, and from it clean water is returned; it has been integrated with the actual water tank. The filter material in the chamber consists of two blocks of polyester foam. These divide the chamber into a central compartment and two side sections, each of the latter linked to the main tank via an opening (inlet) made at the base of the wall separating the filter chamber from the aquarium. A water circulating pump (the model we used has an output of 1000 litres/hour), or an airlift set-up, placed in the central compartment (5) looks after the flow of water across thefilter.

3. Lighting compartment (3). This is also incorporated into the aquarium unit. Use is made of the space above water level, which is divided off from the water by a sheet of transparent PVC resting on a double internal brace (7). The three fluorescent tubes (6) are protected by themselves being placed inside glass tubes;
An 8 watt ultraviolet light tube and a small water pump (200 litres/hour) are fixed to a second panel. Water drawn from the filter chamber's central compartment is partly sterilised by contact with the ultraviolet lamp before it is returned to an end compartment.

A third panel holds the ballasts for the fluorescent tubes and a time-switch to control the length of time during which the tubes are illuminated. Diaphragm air pumps to feed the diffusers or the air-lifts can quite well be lodged in this accessories compartment or, if you want to keep them above water level, can be placed at the top of the filter chamber on a sheet of PVC resting on small glass supports glued to the partition wall to keep them clear of the filter medium and water.

Heating is achieved by combined heater-thermostats placed in the central compartment of the filter chamber. A cover (8) punched to give a number of air holes goes over the filter and accessories compartment to prevent condensation.

These are closed at the ends by silicone plugs in small hole being made in the tank at one end to take the wire connecting the light to the ballast; this hole is made watertight with silicone mastic. The protected tubes rest on cross-supports and can be moved easily when access to the interior of the tank is required. These supports are covered with silicone mastic to protect the glass tubes.

4. Accessories compartment. A second upper partition forms the accessories compartment (4), which has also been made an integrated part of the unit. All the items in it are fixed to panels that are divided into grooves formed by pieces of glass stuck on to the panels of the main unit, with this system, access is gained to the different items of equipment very simply when an emergency arises.

The first panel carries an electrical distribution board with a series of fused sockets. From these are operated the various pieces of electrical apparatus used throughout the unit.
The whole basic unit can be covered by opaque panelling (11) fixed so as to hide the filter and accessories compartments, the light fittings and the gravel covering bottom of the tank. For this, panels of black opaline, 6 mm. thick, or other decorative materials such as lattice, anodised aluminium etc., can be attached by silicone mastic adhesive. The internal surfaces of the aquarium (back and ends) can also be treated with a coat of fine sand or ground quartzite sprinkled over a layer of adhesive (spread a thin coat of adhesive with a spatula, sprinkle it with sand and allow it to dry). This procedure, not without its aesthetic value, also presents a better surface for algal growth on the inner surfaces.

The whole unit must, of course, be placed on a perfectly flat surface (8), preferably with an intermediary strip of expanded polystyrene. A metal table (9) made from welded square-section tubes can be constructed to carry the unit and then can be finished off as a cupboard or according to requirements.

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**What’s New?**

**Water Quality Control**

WHEREAS it was once difficult for the non-technical aquarist to make any useful assessment of the chemical condition of his aquarium or pond water, facilities have increasingly been made available for him to tackle this with easy-to-do tests. At first pH (water reaction) and hardness (dissolved salts) were the only objects of testing but refinements and additions have extended the scope. Now a most comprehensive range, the Tetra-Test Aquarium Water Quality Control Kits, has been made available by Tetra Werke for the measurement of freshwater hardness (general hardness, carbonate hardness and total or complete hardness), freshwater or sea-water reaction (pH, low range, high range and complete range) and fresh or sea-water nitrite content.

All the TetraTests give their results by colour changes or colour development in the water sample when the appropriate test solution is added to it. Any guesswork or indecision about assessment of colour is done away with in the pH and nitrite test kits by the provision of a colorimeter, with which it is a simple matter to match test colour obtained against the range of colours on the rotatable appropriate test colour wheel and at once read off the result (as pH value, or milligrams of nitrate per litre).

Although marine aquarists are particularly conscious of the need to make nitrite tests as an assessment of the extent to which excretory matter from the fish is accumulating in the tank water, the same risks of nitrite/ammonia poisoning can exist in freshwater aquaria, particularly those without plants. In the useful leaflet accompanying the TetraTest series Tetra state that harmful effects for some freshwater tropicaals occur at nitrite concentrations as low as 0.5 mg per litre; guppies die within a week in water with more than 3 mg of nitrite per litre.

All of the TetraTests and the TetraTest Colorimeter are attractively and sensibly packaged and there is also available the TetraTest Laboret, which comprises the entire range of equipment and reagents stowed in one box.

The TetraTest Colorimeter and water-testing reagents. A test colour wheel is shown, which can be inserted into the Colorimeter for use with the appropriate test solution.
Breeding Guppies

To Plant or Not to Plant?

By F. Campbell

WHEREVER guppy-breeders gather the controversial subject of whether bare tanks or planted tanks bring the best results invariably arises. In discussing the two alternatives it can be assumed that, so far as the hobbyist is concerned, guppies are bred for subsequent exhibition, and this can be a deciding factor in the choice of method used. Logical arguments can be put forward in favour of both systems so the eventual choice must be the one that the individual finds most suitable.

Advocates of bare tanks usually emphasize the necessity for absolute cleanliness in the production of top-class guppies. The reason being that any harmful bacteria may cause damage to fins, or a general degeneration in the condition of the fishes. Harmful bacteria, by breaking down decaying matter such as plant leaves, unsoaked food, guppy droppings, or even unsuspected dead guppies, produces an excess of carbon dioxide and a foul tank. In a bare tank, therefore, there can be no dead leaves, and anything else which might ferment can easily be seen and siphoned off.

All very well, say the planting brigade, but there is no reason why a planted tank should not be as clean as a bare tank provided that the owner exercises suitable vigilance. The provision of sufficient plants to take up the carbon dioxide produced, plus an occasional siphoning and topping up, should result in a tank which remains sweet and clean indefinitely. A healthy guppy is a happy guppy and the fish are much happier swimming in and out among plants, just as a human is happier sitting in the garden than in a concrete backyard. In addition to their contribution to cleanliness and agreeable...
conditions for the guppies, plants also have a utilitarian role. If a female guppy feels she wants to get away from it all, plants provide welcome shelter; as guppies are omnivorous they find pleasure in nibbling at the softer leaved varieties; and, of course, plants are also an excellent refuge for newly-born babies.

The bare-tank boys launch another attack. They are visiting shows almost every week and plants make it difficult for them to see the guppies which may bring home the prizes. Even when they have spotted the ones they want, by the time they are safely in the jar many plants are floating on the surface. These have to be replanted, which is not only time-consuming but interferes with the growth of the plants, which cannot give of their best if being constantly disturbed.

Undeterred, the opposition comes back with more than one answer to that problem. Use floating plants. In this way the danger of polluted gravel will be avoided and the plants at the surface will perform the same functions as they would if they were planted. When the time comes for selecting specimens for showing it is a simple matter to lift out the mass of floating plants and replace it when the fish have been caught. Another alternative. If plants are preferred which do not grow readily at the surface they can be rooted in gravel in pots. These, too, can be easily removed when netting and replaced afterwards without any disturbance to the roots.

Whether preference is for bare tanks or the various ways of using plants, the guppy-bredrer is more concerned with the quality of his charges than with the aesthetic value of his tanks. The bare tank man will delight at the kaleidoscope colour scenes which his method creates, whilst the planter will be none the less happy with the contrasting background of greenery, and so long as both are producing good guppies, each to his own.

Perhaps a few suggestions as to the choice of plants is called for. If rooting in bulk gravel the undoubted favourite among the guppy fraternity is Indian fern or watersprite. A soft-leaved plant, it offers no sharp edges on which fins can be damaged; it will not tolerate polluted gravel and at the first sign it will rise to the surface, thus warning the owner that a change is necessary; it propagates quickly, young plants forming on old leaves, which can be used floating until large enough to plant. It can be used exclusively at the surface but is far more functional when planted. Other plants which can be used floating are rajas, which forms dense clumps ideal for the sheltering of fry, and chain sword, whose sharp-edged leaves are safer on the surface than when immersed. Of the true algaes, riccia is perhaps the best choice, if considering removal for netting of fish; the humble duckweed, although I use it myself, can be a nuisance in this respect.

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The Aquarium Show '75
ROYAL HORTICULTURAL SOCIETY OLD HALL
VINCENT SQUARE, LONDON, SW1
24th - 26th October

Presented by The Federation of British Aquatic Societies

All enquiries: The Show Organiser (Tel. 01-947 2806)
PetFish Monthly
554 Gerratt Lane, London, SW17 0NY
IN our recent discussions of fish colour themes we have dealt with red and blue as the dominant features, but even at this stage it will have become evident that the task of categorising fish into colour blocks is far from being the easy matter which it seems to be. In fact, most fish are made up of combinations of colour which enable them to melt away into their natural aquascape as part of their defensive posture; it is only when they are transported to the artificiality of man-made tanks that they actually take on the decorative aspects which so appeal to us. Even the more startlingly coloured fish are seldom all-over self colours, because this runs counter to the camouflage principle. Where this does seem to apply, however, as in the case of tench and blind cave wrasses, the habit or habitat of the species gives the answer to why, perhaps, Nature chose the type of garb in question.

At this point it is well worth mentioning the extraordinary colour format and range of the African Lake cichlids, which have only comparatively recently entered our lives as the dominant features. Although there are numerous species with pattern suggestive of the more familiar Apistogramma species, there are some unusual colourings of ochre and blue which are undeniably eye-catching. The purchaser is well advised to look around for something to suit his taste in this widening range of fish, but before taking the plunge he should read up the subject well as the temperament of some of these newcomers is quite unbecoming in mixed company and it may rule them out if a mixed collection is aimed at.

I will next examine the possibilities of green as the dominant colour, and immediately we hit a snag. As most plants are green, why should we bother with a tank containing just green fish? Many will avoid the issue and leave the challenge to the more experienced in aquarium management, and still more will see it as a fit subject only for a club evening. I doubt, however, whether it need be as difficult as all that. The green fighting fish stands out as the decorative fish, par excellence, in this group, but I have already noted the shortcomings of a species which cannot be kept in any sort of numbers, and which is not long lived at the best of times.

If in some way you can get round these problems, perhaps by using a series of small tanks or by discreetly compartmenting a large tank, you will have for your entertainment and pleasure one of the finest fish in the whole field of availability. The fin and body structure of the fighter is unbelievably beautiful and the colour range is such that matching with room décor is possible to a degree simply not achievable in wild species. This fish takes a little understanding, but there are numerous books on its culture, so there is no excuse for failure.

From the singleton to the shoal is but a simple step, and the green-eyed rasbora (Rasbora dorsiocellata) immediately comes to mind. This is a tiny creature, only just over an inch long, largely olive, but with a brilliantly glowing green streak below the eye slanting obliquely across the body towards the anal fin. The black-tipped dorsal fin has a bold white base, and the overall effect is a fish of very considerable character. It is certainly one of the most charming of all the rasboras, and provided that sound specimens are obtained in the first place, it is likely to live rather longer than some other members of this group. This is a fish for a really large shoal, and one should be thinking in terms of 20-50 rather than the round dozen. It would go splendidly with a smaller group of cardinals, whose ability to turn on the green overtones in certain lighting condi-
Which Air-Pump to Choose?

Preliminary Report by the Research Committee of British Aquarists Study Society
Chairman: J. A. DAWES
Secretary: D. COOK

Up until now, when the aquarist has purchased an air-pump it has usually been very much a matter of guesswork and luck. Often he takes the advice of his dealer, who, with the best will in the world, has no real means of assessing the relative merits of a particular pump. He is largely dependent upon reports that he has had from other users, who, at most, have a very limited experience of the many makes and types of air-pumps available.

In an effort to rationalise this situation it was decided to describe air-pumps in terms that would be meaningful and useful to the user, and which would enable a direct comparison of the available models to be effectively made.

It is quite meaningless to say how many filters or air-stones a pump will operate unless (1) the depth of the water is specified, and (2) the resistance to air-flow of the particular appliance is known in measurable terms. What is required is a specification of air-flow against a given pressure of water. Of course, this rate of flow must be maintained over a period of time if the pump is to be of any real value.

Some considerable thought was given to the reasonableness of the parameters of the test required in the light of the fact that the pumps are intended for aquarium use. It was concluded that the depth of the water for the purpose of the test would be set at 750 mm. (29.5328in.), few domestic aquaria being deeper than this. No other back pressure was to be introduced into the system apart from the flow...
meter and a standard length of 1 metre of ordinary plastic air-line hose of 4 mm internal diameter.

The apparatus was constructed of copper as shown in the diagram. It will be noted that an adequate space has been provisioned above the water level to minimize the effects of foam or bubbles at the water surface. As it is possible that the ambient temperature and atmospheric pressure could have some bearing (albeit small) on the results, these parameters are recorded daily throughout the test period and maxima and minima quoted in the final results.

On the question of noise, while it is possible to measure noise, the result measurement will have little meaning for most people. Furthermore, the noise emitted will vary with the surrounding environment and the method of supporting the pump. Noise is also subjective; what is quiet to one person is noisy to another. In these investigations noise is therefore assessed at the conclusion of the testing period with the pump operating at maximum capacity while standing on a plain wooden bench, and classified on the following arbitrary scale: (1) very quiet; (2) quiet; (3) acceptable; (4) noisy; (5) very noisy.

At the beginning of a test, the pump is operated light, i.e. with no air-hose attached, for a period of 30 minutes to bed in the valves. It is then connected to the apparatus and the air-flow recorded. A further record of the air-flow is made at intervals of 24 hours for a period of 28 days (or until the pump fails, if earlier).

The results obtained are then presented in the form of a graph of air-flow against time, the average air-flow over the test period, the maximum and minimum air temperatures and pressures, an assessment of noise, value for money and any other comments which may be relevant. It is hoped to publish all results in a report along the lines of those produced by consumer research bodies. In this way, aquarists will have some form of yardstick to help them in the purchase of a pump suited to their individual needs.

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Personal Comment

continued from page 29

also additionally qualifies this versatile species under the present heading. A well-nigh perfect companion for the species just mentioned is the black Hynessobrycon herbertaxelrodi, glowing green streak running horizontally along the body preserves the beauty of plane featured by the others. Rather chubbier in body shape but no less graceful than the green eye and the foliage, and as it possesses the neon glow, it has considerable popular even in the face of competition and similar man-contrived superlatives.

I think we can ignore the green swordtails and green guppies in this review, as the former are bullies and only come into green category by the merest chance. The guppies come in a wide range of shapes and sizes and will certainly appeal to many, but this is such a man-made and ephemeral fish for long-term display purposes that I would tend to exclude it. The green acara (Aequidens portalegrensis) is just a possibility, but cannot be mixed with small fish and possesses the unwelcome cichlid habit of plant nibbling, which hardly recommends it in the present context.

How are we to show off our green fish to best advantage? I think it will be found that the majority of conventional aquarium plants are nothing like as deadening as one might assume, but groups of some of the reddish plant species may be considered. At all costs these should not be overdone — just concentrated groupings here and there are enough — and full consideration should be given to open spaces. A black background will help, as will carefully considered overhead lighting. Patches of floating vegetation may be brought into play to regulate the distribution of light, and to create pockets of comparative darkness or light shafts, as desired.

It sounds easy enough, but this is an extending exercise in skill. Ideas from readers will be welcome, as I have only touched on the possibilities.
Readers’ Queries Answered

Ravaged Plants

Is it possible I've introduced a ‘monster’ into my tank? I have bought a silver tetra and since its arrival the plants are beginning to look rather ragged. Could it be the silver tetra? I don't know the Latin name of this fish but I thought as a tetra it would be a safe fish to have.

As you don't give a description of the fish it is difficult to be certain of its identification from the common name, but the name 'silver tetra' is usually given to the Cienobrycon spilurus, and this fish may well be tackling your plants. C. spilurus is usually a hearty eater so make certain that it is getting sufficient food — this species will eat dried foods as well as live food — and supply it with some floating green plant or with scalded lettuce.

It is a mistake to assume that a 'tetra' is necessarily going to behave like, for instance, the neon or flame tetra. The name 'tetra' comes from that of the sub-family of the Characidae (Tetragonopterinae). The tetragonopterinae do include the genera Hemigrammus and Hypheosobrycon, from which many of the attractive little aquarium tetras come, but it also includes other genera such as Cienobrycon and Moenkhausia, which get large enough to help themselves to their own vegetable requirements (and even some of the Hemigrammus, such as the Buenos Aires tetra, H. caudovittatus, are going to get quite large and probably become plant-nippers).

Giant Sag.

Can you please tell me if giant sagittaria can be used in a tropical tank? I have been told that it is all right for warm water but whenever I buy it it just disintegrates in my tank.

Giant sag. (Sagittaria latifolia) does well in both tropical and coldwater tanks, requiring a period of adjustment after transfer from one to the other. You are probably buying plants that have been grown in cold-water and they are going to react to being plunged into water at 75°F. Either acclimatisate them in a tank where the water temperature can be raised over 4 or 6 weeks period to the tropical temperature or, if you do plant them in your tropical tank, don't worry about their disintegration but leave the rooted crown where it is and allow new leaves to form, which will happen in due course.

Koi Stocking

I have been told that I can only keep three small koi in my pond, which is at least 6 ft. by 4 ft. I can hardly believe this and I was hoping to keep at least six together. Should I risk the extra fish?

When stocking a pond with koi consideration has to be given to the fact that koi require far heavier feeding than, say, goldfish, and that their waste products are correspondingly greater. Allowance has to be made for this and also for the fact that their 'life-style' is rather expansive. Grown koi can create a great disturbance in a pond, continually unsettling the mud. Therefore, with koi 1 in. of fish per square foot of water surface is not too great an allowance. This would give you 24 in. of koi to your pond — or six 4 in. fish. This rule is, however, by no means the total guide line to be followed when stocking with koi. As the fish grow they will require a water depth of at least 2 ft. and moderate aeration or water movement in the pond during the summer months.

Convention Reports

WE shall never know for certain whether the alteration in the date of this year’s HENDON CONVENTION to mid-March caused the rapid deterioration in our amazingly early spring weather: enough to say that there was no break to the tradition of ‘Hendon weather’. But nor were there any breaks in

AN Index to the last complete volume of PFM is included as a Supplement to this issue. It can be removed from the centre of the magazine and placed in your PetFish Monthly binder for Volume 9. The Index gives the contents of issues May 1974—April 1975. If you missed seeing any of the issues please write to PFM enclosing 29p (including postage) for one issue, 24p each for two to six issues or £2.55 for all twelve issues.
The very latest information on diseases and cures. The lectures were accompanied by excellent slides which showed specimens and techniques of examination.

The second Spring Meeting is to be held on Saturday, 24th May, in the meeting room of the Zoological Society of London, Regent's Park. The speaker will be Dr Keith Bannister of the British Museum of Natural History, lecturing on the River Zaire Expedition. Doors will open at 1.45 p.m. for the meeting to start at 2.30 p.m. Tickets cost £1.25 and to include the cost of tea are available from Mr F. Keens, Highcliffe, Old Hill, Woking, Surrey. All interested persons are very welcome to attend the Society's meeting.

THE Aquarist Convention, although only inaugurated last year, of the Tyne-Tees Area Association of the FBAS, has already become, because of its excellent organisation and the authority of its guest speakers, a major event in the Fish Calendar. Particular praise must go to the efforts of Mr George Liddle, the Convention Manager, in organising all the many details. This year the lectures covered both specialist subjects and general ichthyological items. Mr R. Esson, chairman of the Judges & Standards Committee of the FBAS, gave an illustrated slide lecture on the coldwater side of the hobby, while Mr A. Charlton of the FGA dealt with the intricacies of guppy genetics. Mr Gordon Howes of the British Museum (Natural History) lectured on the structure and function of fishes; what can be found out about water conditions was covered by Mr W. Pearson. Miss S. Turner of the Hancock Museum, Newcastle, made a welcome return to the Convention as a lecturer.

The fisheaters in the north-east are particularly fortunate in having the opportunity to hear so many speakers on one programme and it is to be hoped that the many visitors this year will be joined by those from even further afield at future Conventions.

FEDERATION

NEW Changes to FBAS Judges’ List

NEW FBAS ‘C’ Class judges are: Coldwater, Mr C. Harding, Roath, Cardiff; Tropical, Mr N. Davies (Havant), Mr A. Weaire (Southampton), Mr G. M. Haskins (Bournemouth). The following ‘C’ Class judges will be upgraded to ‘B’ Class (having completed their 2 years at ‘C’ grading) and will be available for Open Shows from the dates given: 1st March, Mr W. A. Cowan, Mr P. W. Jenkins, Mr T. Mathews and Mr C. Wood; 7th June, Mr S. Porter, Mr K. Appleyard, Mr D. King, Mr L. Jerry and Mr R. E. Cocker; 6th September, Mr W. E. Goodwin, Mr B. R. George, Mr J. Rundle; 6th December, Mr R. O. Ott, Mr C. Corbin, Mr B. H. Risbridger, Mr R. D. Clarke, Mr A. W. Lusby. Resignations have been received from former judges, Mr J. Batts, Mr J. Gallon and Dr R. O. B. List.

Mr M. J. Williams (285 Brockles Mead, Harlow, Essex) has been added to the list of speakers. His subject is ‘Aspects of Fishing — Marine & Tropical’.
HORSFORTH & DAS members’ show was held at the New Civic Hall, Stanningley Road, Pudsey. There was an entry of 43 in the eight classes and the judge was Mr P. Moorhouse of Huddersfield. Best fish in show award went to the winning junior, Master M. Inwood, for a blue acara. Results were as follows:

Ampantids: 1 Mrs P. Wood; 2 Mr P. Smith; 3 Miss J. Nelson
Barbels: 1 & 2 Mr A. Handscombe; 3 Mr E. Bannister; C.C. and No Class: 1 & 2 Mrs. A. Handscombe; Channidae: 1 Mr P. Smith; 2 Mrs C. Conn; 3 Mr E. Bannister
Cichlids: 1 & 3 Mr P. Smith; 2 Mrs C. Conn; 3 Mr E. Bannister
LIVEBEARERS: 1 Mr S. Newman; 2 Mr C. Wood; 3 Mr E. Bannister
Juniors: 1 Mr P. Smith; 2 Mrs C. Conn; 3 Mrs E. Bannister

MRS S. WINSLADE, press Secretary of HOUNSLOW & DAS, reports: “On the 20th February members of Hounslow & DAS competed in a five-match at Hendon in an attempt to keep the fine trophy which they won at this match last year. Unfortunately, each competing club was only allowed to enter six fish (you will appreciate that it is very difficult selecting the six best fish from a club with many hundreds) and the results were as follows: 1, Bethnal Green AS, 460 points; 2, Hounslow & DAS, 462 points; 3, Hounslow AS, 443 points; 4, Runnymede AS, 430 points; 5, Tottonham AS, 422 points. You will see that the Hounslow club was very narrowly beaten into second place by only seven points and the judges confirmed that they had an extremely difficult task in deciding on the winner. The Hounslow DAS also entered nine fish in the over-spill class and here again they were beaten into second place. However, everyone who attended the match had a very enjoyable time, the highlight of which was a lecture on characteristics given by a speaker from the British Museum which lasted 2½ hours”.

MR D. PARKS from Crowborough delighted members of HASTINGS & ST. LEONARDS AS with his talk on native freshwater fishes. Mr Parks has kept a wide range of fishes in his time, abandoning tropicaals in 1959 to specialise in native species. At the following meeting, member Mr C. Waddell gave a masterly exposition and demonstration on building all-glass aquaria. Mr Waddell explained that this ‘do-it-yourself’ worked out at half the price that ready-made tanks cost. Members have also enjoyed an FBAS talk/tape/slide lecture on killifish by Mr C. A. T. Brown, which proved to be a first-class programme. Then the annual auction has also been held; this always proves popular. There were 60 lots to be auctioned which meant quite a useful sum for the club, as it retains 10% for club funds.

SITTINGBOURNE & DAS started the year with a very successful social evening at which members’ wives and children were guests. Results of the table shows at various meetings are as follows: D, Cichlid trophy, judged by Ann McDonald; 1 & 2, Mr R. Newman; 3, Mr G. Wicks. Ec. Fighter Cup, judged by Mr P. Floyd; 1 & 3, Mr T. McDonald; 2, Mr A. Sharp. Ec. Pairs, judged by Ann McDonald; 1, Mr A. Sharp; 2 & 3, Mr P. Floyd. X. Breeders, judged by Mr P. Floyd: 1, Mr A. Sharp; 2, Master A. McDonald; 3, Miss D. McDonald. A further evening was spent looking at slides taken by Mr A. Sharp.

THE following table show trophies were awarded to members of PORTSMOUTH AS: Shoutunkin shield, Mr E. Binstead; Twin-tail shield, Mr W. Evans; Lyhopin shield, Mr E. Binstead; Plant trophy, Miss J. Stillwell; Breeders Cup, tropical, Mr E. Binstead; Breeders Cup, coldwater, Mr W. Ryder; Aos Coldwater trophy, Mr E. Binstead; Table Show Points trophy, Mr E. Binstead; Junior Points, Mr P. Parsons; Junior Points, coldwater, Mr R. Bryant; Home Furnished, tropical, Mr J. Stillwell; Home Furnished, coldwater, Miss W. Ryder; Home Furnished, junior, Mr K. Curtis. Two forthcoming society events are, first, the inter-club show on the 25th May at the Portsmouth Community Centre, Maines Road, Buckland, Portsmouth; this will be open to the public from Mon 4th August until Saturday 9th August.

BRACKNELL AS have been running an interesting and varied programme, two highlights being talks with slides, one on characins by Henry White & Co. of Hendon, and the other by Mr R. Forde of Uxbridge on plants. Other interesting events have been the quiz and Fish League commencing rounds, between themselves and other clubs in the Three Counties Group. A new venue has now been chosen for club meetings, and from April the Society are to meet on the 2nd and 4th Monday in each month at the Club room, above Red Lion Public House, High Street, Bracknell. Prospective new members and visitors from other clubs are cordially welcomed at all meetings.

PRESENTATION of the 1974 Society trophies took place at the very enjoyable EALING &
BAAS (FRAS) annual dinner and dance. Mr Sandfield and Mr Sandfield won the Home Furnished Aquaria and the Memorial Furnished Aquariums respectively. The shield for highest total points for the year was won by Mr V. Valley, the Knock-Out Cup by Mr E. Tagg, the Points Cup by Mr C. Chesney, Class D, Dc and E by Mrs D. Cruikshank, E by Mr V. Valley, G by Mr E. Tagg, H.J.R by Mr Valley, Mr Hunt and Mrs D. Cruikshank, T by Mr V. Valley and the Open class in closed shows by Mr E. Burnett. The Best Fish in Show award went to Mr E. Tagg. The club congratulated Mr Valley and Mr Burnett on their enviable achievements in these awards and trophies were given to Mr T. Cruikshank and his committee for their work in the year's programme. Mr L. Sandfield has been the Secretary of the Home Furnished Aquaria Competition for 3 years, although the club members have vowed they will hold it no longer! They have enjoyed the club's shows and will continue to do so for many years to come.

NEWS from MID SUSSEX AS

The swimming pool at the local indoor pool was being used as a fish tank for the Society, and the residents were very interested in the fish. It was hoped that the funds raised would be used to support these shows and help the community.

RESULTS from NEW FOREST AS

Home Furnished Aquaria Competition, judged by Mr C. Knapp, have been announced. Mr B. Huggins won the trophy award with 77 points. Mr D. Harding, 75; Mr J. Jeffrey, 73. Mr D. Harding won the coldwater tank first award (74 points) and Mr L. Menhennett's tank came second and third (50, 55 points). Mr Knapp said that the fact that many of the tanks had been set up for several years added credit to their owners and showed what good balance had been achieved, but that more imagination in rockwork arrangement might have been displayed. Tips for showing fish at open shows was the main talk by Mr D. Harding at the March meeting. Prospective new members are welcome to attend meetings on the third Monday of the month at the Community Centre, Lymington, Hants.

THE TYNETEES AREA ASSOCIATION of the FRAS now to hold a championship sponsored by a local firm within the year 1976, and annually thereafter. As a general guide, pertinent points and proposals are listed below, and interested club secretaries are asked to write for further information to Mr J. A. Laidler, 19 Gainsford, Pontefract (phone 87156).

The Show shall be called the "Three Rivers Championship" and any club within a 35-mile radius of Durham City may compete. Classes eligible for the Championship will be designated by the TAA but will generally be the 30 accepted Open Show classes. The names of the winner of each class together with the number of points gained, shall be forwarded to the Organisers, at the conclusion of each Open Show. At the end of the season, and about 4 weeks before the Championship Show, the competitors owning the four highest points fish in each class from the entire year's total of Open Shows shall be invited to enter their fish in the Three Rivers Championship. This would result in an Open Show type of Championship with 30 classes each containing four fish only. Judging shall be by FRAS Rules. Each entrant will receive a scroll recording his or her achievement and the Best Fish in Show will be awarded the Three Rivers Championship trophy.
A lengthy and detailed slide talk on the African cichlids by Mr B. Mould and Mr D. Allison of Hendon AS also proved fascinating to the listeners.

In Brief...

... 30 members of Gloucester AS enjoyed the lecture from Mr J. Powell on coldwater fishkeeping, with a slant towards nishiki koi. Mr F. Timmins won the table show (av coldwater); (2, Mr F. Timmins; 3, Mrs M. Gray).

... The Midland Aquarist League has decided to stage bigger competitions with more scope for outside participation, the first show of the season being held on Sunday, 11th May, at Bulkington Parish Hall, Bulkington, nr. Nuneaton. The six societies of the League (Coventry Pool & AS, Goodgers End, Bedworth, Nuneaton, Hinckley and Rugby Fishkeepers) have decided to invite three other interested societies to join.

... whilst judging took place at the Bristol AS March meeting a general discussion was held on pond maintenance, rearing fry, etc. Class winners were: Goldfish, Mr W. Hammonds; Mr S. Lloyd; fantails: Mr S. Lloyd; cichlids: Mr E. N. Bowden. The Society have decided to split their 2-day show into two separate shows, each of 1-day's duration. The tropical show will be held on Sunday, 6th July and that for coldwater fishes on Saturday, 13th September.

... Torbay AS committee promised a free special outing to the juniors who helped so much at the last Open Show and now, on 18th May, the trip is being made to an aquatic nursery and then to the Bristol Zoo. Meetings in May include a lecture/demonstration by Mr F. Orsman in making an all-glass tank and a slide/tape show by Hendon & DAS on 27th May entitled 'Everyman an Expert'. Meetings are held on alternate Tuesdays at St Andrews Methodist Church School Hall, Torridge Avenue, Shiphay, Torquay, 8.00 p.m.

... The new Chairman of Amersham & DAS is Mrs W. Thompson, the society's first-ever 'madam chair'. P.R.O. Mr K. W. North reports that the Society's AGM was "its usual exciting if often argumentative gathering of lectures, film shows, outings and discussion groups have been arranged for the coming year, meetings being held on the first and third Wednesdays of the month at Amersham Community Centre, 8.00 p.m. New members are very welcome.

... A Yorkshire Section of the British Koi Keepers Association is to be set up. The chairman is Mr F. J. Ayres and the secretary-treasurer is Mr J. W. Mawson, 78 Gledhow Wood Avenue, Roundhay, Leeds 8, Yorks (s.a.e. for replies please). The newly-formed section are to construct a Japanese sand garden and pool for exhibition at the Harrogate Spring Flower Show on 24th-26th April in the Valley Gardens of the Spa town. The Northern Section of the KKKA is presenting its first koi show on Sunday, 11th May, open to all members of the KKKA. The show is to be held at 1 Avon Drive, Bury, Lanes, close to the M62 and non-competitive visitors will be very welcome (entrance fee 50p).

... A talk by Mr D. Easingwood on the construction of a coldwater fish house at a meeting of Coventry Pool & AS was supplemented by slides and diagrams and proved very interesting to the 40 members and 12 visitors present. The fish house was built for coldwater fishes and incorporates a continuous flow of water through the tanks and a pool.

... a short talk on barbs by the president, Mr H. Kuhn, to members of Lincoln & DAS was followed by the table show judged by Mr F. Toyn of Sheaf Valley AS. There were 35 entries and the first award (the Renshaw trophy) went to Mrs Evans (2, Mr McLeod; 3, Mr Pickering). Mr & Mrs C. Sellars were very successful at the Don Valley AS Open Show, winning first and third in the dwarf cichlid section, first and second in the angel class and first and best fish in the show with a Malawi cichlid.

... Mr K. Adams was the member with the highest points for the twelve months in Southend & DAS (2, Mr D. Little; 3, Mr H. Preston), B. Wylie the junior with highest points (2, C. Cheswright; 3, A. Moltino). Mr R. Wallings won the Home Furnished Competition (2, Mr P. Tolmie, 3, Mr D. King).

... Members of Abingdon AS greatly enjoyed a talk by Mr B. R. James on the successful cultivation of plants. For the coming year, the Society will be showing all the FBAS Aqua-Talks and hope to have a talk on different topics each meeting by club members. Meetings are held at the Barley Mow, Abingdon, every other Thursday (with meetings on 1st, 15th and 29th May). All aquarists are welcome.
THE EAST ANGLIAN FEDERATION OF AQUARIISTS held a show at Thetford on Sunday, 23rd March which was well attended and attracted members from Norwich, Yarmouth, Ipswich, Ely and, of course, Thetford. At the AGM, the retiring chairman, Mr W. Hard, the founder member of the organisation, was thanked for his efforts.

MR M. STRANGE of Basildon gave an interesting talk to members of SLOUGH AS on his own methods of fishkeeping. The next meeting of Slough will be on Wednesday, 21st May when there will be a talk on discus and a slide show on collecting fish in Ghana. Information from secretary Mrs E. Knight, 82 Aldin Avenue, Slough.

NEWBURY & DAS were held at Bracknell AS at the society’s table show match. The home side won by 54 points to 52. During the judging members enjoyed a slide show supplied by Bracknell AS.

THE BASINGSTOKE AS (FEAS) meeting at the end of February was a very active one with an interesting talk and slide show by Mr R. Stillwell of Portsmouth AS on coldwater fish. On 14th March 39 members enjoyed a talk and slide show by Mr F. Tomkins of Independent AS on labyrinths. On 21st March, Mr R. Blight chaired a special meeting to organise the Society’s ‘Show’ to be held during Carnival Week; it was decided to hold a closed show with emphasis on display to provide interest for the public.

THE BRITISH CICHLID ASSOCIATION is holding its Annual Convention in Birmingham on 8th June. Tickets, which include lunch, are priced at £2.00. Details can be obtained from Mr Terence Green, General Secretary, 12 Greenwood Meadow, Channer, Oxford OX9 4JG.

... At the AGM held by THE GOLDFISH SOCIETY OF GREAT BRITAIN Mr R. Whittington and Mr W. Weeks answered queries with sound advice in a question-and-answer session. The contest for ‘the most attractive fish by popular acclaim’ (eight entries) was won by a coloured moor entered by Mr W. Cook. For officers elected see Meetings and Changes of Officers. The Society have also enjoyed a talk by chairman Mr J. Bundell on the selection of breeders. He told the 40 members who braved the elements to attend of the importance of keeping records of fish and youngsters produced. Mr Bundell took along six fish which were the result of 3 years experimentation and research.

Dates for Your Diary

10th May, PORT TALBOT AS (FEAS) Open Show, MCA Buildings, Port Talbot. Schedule: Mr A. E. S. Fourease, 3 Pennafold St, Ystryd, Port Talbot, Glam., SA13 1AQ.

10th May, SOUTHEEND, LEIGH & DAS Open Show. St Clements Hall, Leigh-on-Sea, Essex. Club and individual furnished aquaria, aquascapes, nano and juvenile displays. Details: Mr E. S. Nicholls, 29 Southend Road, Southend-on-Sea. Phone: 610576.

11th May, MIDLAND AQUARIUM LEAGUE Open Show and Inter-Society Show, Bournville. Details: Mr P. Underwood, 99 Warwick Road, Kenilworth, CV3 1HN.

11th May, BourneMOUTH AS (FEAS) Open Show. Kinon Community Centre, Millburn Lane, Kinon, Bournemouth. Details: Mr J. Jeffery, 30 Breamer Avenue, Southbourne, Bournemouth BH8 4JH.

11th May, DAS. Open Show. Details: Mr P. C. New, 6 Mayfield Road, Yenni.

11th May, Gloucester AS. Open Show. The Chequers Bridge Centre, Painewick Road, Gloucester. Schedule: Mr D. Person, 243 Bodgah Avenue, Quedgeley Court Estate, Tuffley, Gloucester.

17th May, SOUTH PARK AQUATIC STUDY SOCIETY 5th Annual Invitation Coldwater Show. The Wilmslow Community Centre, St Georges Road, London, NW19. Details: Mr D. Seaman, 23 Carillon Grove, Feltham, Middlesex.


18th May, REDCAR AS Open Show. Cawston Hall, Redcar, Cleveland, Yor.

24th May, RASS 2nd Spring Meeting. Meeting Room, Zoological Society of London, Regent’s Park, Speaker: Dr. J. H. Beresford, British Museum (Natural History). Doors open 4.30 p.m. for 2.30 p.m. Tickets £1.25 (incl. tax) from Mr. F. Kenna, Highcliff, Old Hill, Woking, Surrey. All interested persons welcome.

24th May, GOLDFISH SOCIETY OF GREAT BRITAIN Meeting, Conway Hall, Red Lion Square, Holborn, London, WC1, 2.00 p.m.

25th May, BURLINGTON 9 DAS Open Show. School, St Helens, Junior. Details: Mr. M. Jones, 66 Milton Road, Braddock, North Hammersmith.

25th May, COBRY 9 DAS Open Show. Cobry Civic Centre, Coulter Road, Blakeney, Bristol. Rules: Mr A. Stow, 176 King Street, Kettering, Northants. (mid-March).

25th May, PGA INTERNATIONAL Open Show. Globe Farm Community Centre, Globe Farm Road, Stockford, Birmingham 33. Details: Mr. D. K. Beanham, 17 Pedmore Close, Shrewsbury.

29th May, PORTSMOUTH AQUARIUM Club Show. Portsmouth Community Centre, Maltese Road, Portsmouth. Details: Mr S. Welch, 133 Lammock Road, Blackburn, Lancs. (Main Event).

1st June, ACCORDING TO DAS Open Show. Amity Methodist Church Hall, Blackburn Road, Accrington (new, larger premises). Details: Mr. R. Thompson, 54 Grange Road, Padiham, via Warrington, Lancs. WILL TEL. Phone: Darwen 32476.

1st June, COTSWOLD AS 1st Open Show. Rockingham House, Youth Centre, St. Ives, Cambs. Details: Mr R. W. Wood, 31 home Road, Stroud, Gloucester. Schedules: Mr K. Maddox, 31 Kena Road, Bream, Gloucester.
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38 June. LOUGHBOROUGH & DAS Open Show. St. Anne's Church Hall. Westfield Road. Monday, June 30th. Details: Mr. E. Sheard. 171, King St. Loughborouigh, Lincs. TEL: 259.
 phone: 61759.

39 June. NEWCASTLE TROPICAL FISH SOCIETY Open Show. St. John's Church Hall. westfield Road. Monday, June 30th. Details: Mr. L. R. Lawson. 64 Grange Road. Jesmond. Newcastle upon Tyne.


53 June. SUFFOLK Fish Society Open Show. St. Margaret's Church Hall. Royston. Details: Mr. B. Guy. 30 Little Thereford Road. Royston. TEL: 2635.


60 June. PORTSMOUTH AS Open Show. Weymouth. Details: Mr. J. Stewer. 45 North Street. Weymouth.


63 June. SCUNTHORPE & DAS Open Show. Details: Mr. M. Burt. 6 Station Road. Scunthorpe.


66 June. KINGLAWSON AS Open Show. Cameron Lard. Details: Mr. T. V. S. Smith. 34 Woodside. Foreste. 34.


69 June. COUNTY GROUP Open Show. 5th June. Details: Mr. S. Anderson. Breckland. Details: Mr. J. S. T. Read. Reading. Details: Mr. T. S. Anderson. Reading. 52 classes including special branch kiss section. Details: Mr. H. Stannage. 10 Lordon Court. Newlodge. Reading. TEL: 8217. Phone: Reading 60309.

70 June. TORYAS AS Open Show. Tamworth. Details: Mr. R. W. Davis. 43 Holland Road. Tamworth.


72 June. LONDON Aquaria Society Open Show. Details: Mr. H. C. G. Owen. 175 Southend. Kent. TEL: 1XX.

73 June. AQUARIUM Magazine Open Show. Magazine. Details: Mr. T. Burton. 21 Henry Street. Richmond.


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