

# The AQUARIST AND PONDKEEPER

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## Editorial

A LETTER from a Nottingham reader concluded with a "challenge" to us to publish his criticism of the contents of our journal. We do not think that the interest of the letter to readers is such to merit publication. Each reader is able to form his own criticism, and just as it would be insulting for us to assume that this was not so, so would there be complacency on our part to imagine that no criticism can be offered. Even within what to the outsider might appear as a circumscribed field of activity, there exists a number of specialities, and it is our wish to include monthly some mention of each. Hence, no single issue is likely to deal only with topics all dear to the heart of any one reader. In this respect our journal is no different from any other, and short of producing an impossibly expensive monthly with the proportions of an encyclopaedia there seems no solution to that difficulty. If, however, the interests of any section of readers are not being properly served then we do want to be told about it. For this reason we were glad to receive our "challenger's" letter. We rely to a large extent on comments in correspondence from readers to guide our selection of articles.

PLAIN speaking by Mr. Justice Danckwerts in the Chancery Division of the High Courts last month has the support of all aquarists with an interest in the rivers of Britain. Dealing with an application by Sevenoaks Rural District Council for further suspension of an order to stop pollution of the River Eden, His Lordship said, "The council would get on more quickly if the Court threatened to send them to prison . . . I am going to threaten the unfortunate councillors with a spell in gaol if they fail to show due diligence, and I shall go on kicking them as hard as possible in the hope that some little sympathy will be obtained from the Ministry as to their plight and that the Ministry will hurry things on."

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## Starting a Tropical Aquarium—2

THE previous article dealt with the preparation of the tropical tank and testing the correct temperature of the water. Once the thermostat is set to the figure to give the needed warmth the heater can be switched off and most of the water removed. The tank is now ready for setting up.

Some coarse compost must be used to cover the base of the tank. It is advantageous to use a little loam towards the back of the tank, and if this is used it is better to completely empty the water from the tank before beginning to set up. The use of loam may be a controversial matter, but it is a fact that the plants will flourish better in the early days if some is used. There is no need to use enough to set up trouble later on. About two pounds to a 24 in. by 12 in. by 12 in. tank will be satisfactory. This can lie towards the back of the tank and the compost should cover this well; it should reach the top of the lower-front frame and come at least three inches up the back and end glasses. Many set-up tanks are still seen with so much compost showing at the front that a considerable portion of the finished picture is obscured.

### Sands and Rocks

Do not use too fine a sand, a mixture of both fine and coarse is the better. The rock-work should be chosen with care as unsuitable rocks can harm the fishes. Recently, some fine *Nannostomus* were seen in a freshly set-up tank at a show, with large pieces of whitish, granite-like rocks. The fish were dying quickly, and as all the other fishes in the show were well it seemed a reasonable conclusion to draw that the rock was causing the trouble. Well-weathered Westmorland rockery stone is ideal for the purpose, and rocks or stones from the sea shore are safe if well washed. The latter should be free from sharp corners, which is more than can be said for some rocks often seen in tanks.

Do not use too many rocks; remember that each rock displaces that much volume of water and restricts the swimming space of the fishes. Try to arrange the rocks in a natural formation, and if a platform can be made at one end to raise the level of the compost it will be an added attraction. Avoid the usual beginner's error of placing a huge rock dead centre of the tank; nothing looks worse. A bit as large as your fist is usually large enough and then use, say, two pieces a little smaller so that strata are formed, gradually lessening in height from one end. A miniature canyon can be formed as long as it is not made to look too regular. Once the rocks are in position take another piece of the same type of rock and smash it up into smallish pieces. Arrange these as if they had fallen from the larger rocks, and finish off with the fine pieces strewn over the compost so that this matches the rockwork. So many otherwise fine tanks are spoiled by using totally differently coloured and varying grades of compost from the rocks. Even at the largest shows set-up tanks are still seen with black rocks on bright yellow compost, a bad matching and one which is certain to lose the club points.

With the rocks set to advantage it is time to start with the planting. If all the water was removed it will be necessary to run some more in. This must be done very carefully so that nothing is disturbed. Place a thin sheet of wood, similar to that used for backing picture frames, on the bottom and pour the water on this. About five or six inches of water will be enough for a start.

There is a wide range of water plants suitable for the tropical tank and so one can make a choice after seeing the plants growing and established. If the front part of the tank has been kept clear of rock-work, as it should have

A series of articles by "AQUARIUS" for the guidance of beginners commencing to keep a tropical aquarium

been, there is no sense in over-planting the front to obscure all the work put in arranging the rocks. Try first of all to hide the back corners as much as possible. Such plants as *Vallisneria spiralis torta* and *Sagittaria natans* can be used, and *Egeria densa* is also useful for such spots. *Cubomba caroliniana* is a fine plant for massing to hide corners or the back of the tank. Keep in mind the need for contrasting colours, as this can make a great deal of difference to the finished product.

A small clump of *Hygrophila polysperma* will give a bright green effect, especially if planted in front of or near a dark-leaved plant. A small clump of *Ludwigia mullertii* can be used well away from the *Hygrophila*, and the red backs of this plant's leaves will give fresh colour. A plant of *Cryptocoryne* or two can be used, but if a large specimen is chosen do not place it centrally but a little to one side. *C. cordata* is a good species and a small *C. beckettii* can be planted near the front of the tank.

An Amazon sword plant (*Echinodorus intermedius*) can be used towards a corner as this will make a good screen to hide frame-work. Some small clumps of the Japanese dwarf rush (*Acorus gramineus* var. *pusillus*) can be set just in front of some of the rocks to soften their appearance.

### Anchoring Water Plants

There are many other water plants suitable for the tropical tank and one can add these later on if necessary, but it is well to realise that many plants do not take kindly to being placed into a well-planted tank where most of the available root space has already been taken up. I do not like recommending beginners to use lead strips for anchoring the plants. Nine times out of ten the fixing of the lead to the stem of the plant means its complete severance, and a subsequent rot will set in or the plant will float to the surface. The correct way to plant a tank is to see that all plants have been well rooted in suitable loam before they are transferred to the tank. The roots, with much of the loam, can be planted carefully in the compost in the sure knowledge that the plant has a good chance of growing.

It is never necessary to use as many plants as would be used when setting up a tank for competition. Remember, that the plants will soon grow in the warm water and if too many are used in the first place it may be necessary to thin out at an early date. It is possible, of course, to plant your tank to the maximum and then thin out later as needed, but as most plants are not cheap this will prove expensive. A little patience, and your plants will soon fill the vacant spaces.

Make sure that all plants are safely bedded, and if necessary a small piece of rock can be placed on a plant base for anchorage. This is better than the lead strip. Once most of the plants are in position the tank can be filled. Use warm water and run it in carefully. It is quite possible that the water will look cloudy, if so remove all the water and re-fill. Any film on the surface can be removed by drawing a sheet of paper quickly over the surface of the water. Once the water is clear put the heater on and keep the lights on the top switched on for a reasonable period according to the light available in the room. The plants will benefit from plenty of light whilst they establish themselves. After about a week the fishes can be added, and this will be dealt with in the next article.

## The Variable Platy

(*Xiphophorus variatus*)

ORDER:—Microcyprini, from Greek *mikros*—small, and *kyprinos*—a kind of carp.

FAMILY:—Poeciliidae, from Greek *poikilos*—many coloured.

SPECIES:—*Xiphophorus*, from Greek *xiphos*—sword and Greek *phoros*—a bearer (old name *Platypoecilus*, from Greek *platys*—wide, deep-bodied, *poikilos*); and Latin *variatus*—changed or modified.

A GOOD specimen of *Xiphophorus variatus* is a rarity in Britain to-day, which is a great pity. Somehow aquarists have neglected this two-inch gem from Eastern Mexico for fishes which are easier to breed in good colour. Many newcomers to this hobby of ours will never have seen a living specimen, even at fish exhibitions, but some of us remember them with affection and regret. In America, however, they are still available and cost about one-and-a-half dollars a pair (about 11s. sterling).

Coloration of the females is always the same—a greenish grey with a well-defined longitudinal, saw-toothed line dividing its sides into two approximately equal portions. In fact, until thoroughly used to the two species, a female *X. variatus* and female green swordtail (*X. helleri*) are easily mistaken one for the other. The male *variatus* is the colourful partner, showing in different parts of his body red, blue, yellow, black, and orange. These colours may be arranged in any degree of intensity, but fall into two main groups, known respectively as the "yellows," and "blues."

The "yellows" have a vivid-yellow dorsal fin and in good specimens an almost equally vivid caudal fin. Yellow also predominates on the sides of the fishes, but this is liberally sprinkled with dark stippling and blue spangles. An extremely handsome creature, carrying its yellow dorsal as though it were a banner, it is nevertheless outshone by its "blue" relatives.

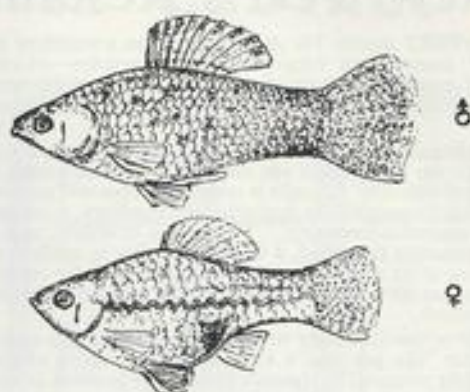
Equally regal in their bearing, the "blues" sport an intense reddish-orange tail, the colour often spreading over the body as far forward as the rear of the yellow dorsal fin. Behind the yellow head, reaching back to the beginning of



Photo:

Sam Dunton, N.Y.Z.S.

Natural habitat of the platyfish in Mexico



Male platy above, female below

the orange, the body is overlaid with innumerable blue spangles, between which an occasional yellow scale shines out.

*X. variatus* is not fussy about food, is active in a community tank without being a bully, and is extremely tolerant as far as temperature is concerned. Anything between 50° and 80° F. keeps it happy, although the lowest temperature should not be maintained for long at a time. Hardiness is derived from the experiences of the wild fishes, who apparently frequent shallow waters during flood time in their native country. The water is frequently shallow and subjected to hot sunshine by day and very cool winds and air by night. This is not to say, of course, that a domesticated *variatus*, if kept in an aquarium for months at a time in a constant temperature of 80° F. will not suffer ill-effects if suddenly transferred to water considerably cooler. In such a case, change should be gradual and spread over weeks or months.

The males are ardent suitors, and will vigorously pay court to any females in their vicinity. Unless deprived of the company of males from the time she is born, or unless she is deformed, no female *variatus* will fail to give birth to a brood or two of youngsters. The first of these will be delivered approximately five to six weeks after the female is fertilized, and are usually developed enough and wise enough to make straight for cover to escape the mouth of their mother (father should have been removed weeks before, as soon as the female was seen to be swelling with young). The best cover is afforded by a thick layer of *Riccia*, but in its absence *Salvinia* can be substituted, or extra bunches of fine-leaved plants like *Cabomba*, *Myriophyllum* and *Ambulia*, can be planted or floated in the aquarium.

Powdered-dried food can be sprinkled upon the surface for the small fry, and the mother removed and well fed with *Daphnia* in another tank. As the little fishes grow you will be puzzled by an unusual phenomenon. All will appear to be females from the shape of their fins, and soon some will develop a dark marking in the region of the vent as though they are gravid. How can this be, as all the fishes are the merest babies? Strangely enough it is the young males which have developed a characteristic marking which will gradually fade out as they grow larger, until at maturity it will barely be noticeable.

As soon as the males begin to show colour, or earlier if the gonopodium begins to develop, they should be removed

(continued overpage)

# New Year's Resolution—Notebook Keeping

EVERY month *The Aquarist* provides a wealth of information, not only in the main articles—which are primarily concerned with some aspect of fish keeping—but also amongst the various answers to readers, queries etc.

After a few months the problem of quickly locating any particular item (which one can distinctly recall having read) is very difficult. Usually it means a tedious and methodical search through all the available back numbers, to rediscover the desired information. The snag is, of course, each time information is needed, a fresh search has to be made thereby taking quite a considerable time. The need for repeatedly scanning all the back numbers can be avoided by keeping a notebook.

It is not necessary to make this a laborious task each month. In practice, it soon becomes a matter of routine rapidly to scan *The Aquarist* from cover to cover as soon as it is received, recording all items of interest. Unless you are interested in everything the total time, if a regular routine is followed, should not take more than ten minutes. To keep a useful notebook the first and foremost principle is to use a system whose whole keynote is absolute simplicity. If this is not done I am afraid the keeping of the notebook up to date will last as long as a new year resolution!

The actual book should preferably be a loose leaf notebook (make sure refills are easy to obtain). It must be always remembered that a notebook is being kept, so be as brief as possible. Merely a short indication of the subject matter, accompanied by an indication of the source, i.e. *The Aquarist*, June, 1954. Page 234.

A few main headings should be selected. These headings can be, for example:—Species; Plants; Heating; Electrical; Diseases; and so on, together with a heading for each kind of fish in your tanks. The main headings can be subdivided as often as is thought necessary. However, since

simplicity is to be the keynote keep the total number of headings and sub-headings to a minimum.

As a suggestion, each description of a fish species could be recorded as follows under the general heading: Species, fighting fish (*Betta splendens*) Aq/5/55/p29. The shorthand Aq/5/55/p29 means *The Aquarist*, May, 1955 Page 29. As a further example the following is an extract of my records for angel fish during the period January to May, 1955. I have expanded the shorthand for the purposes of illustration.

Jan., 1955 Page 275 (4). Effects of hard water. The (4) merely means the fourth answer on Page 275.

Feb., 1955 Page 237 (1) Eggs being eaten by fish.

Feb., 1955 Page 238 (3) Behaviour (kissing, etc.).

April, 1955 Page 3 Article. Refresher course (in practice a cross reference to the species heading would be made).

May, 1955 Page 35 (4) Reddening of bodies.

May, 1955 Page 35 (5) Spawning.

In addition, if a specimen of *Betta splendens* is in your tank, the same reference would be found under the heading fighting fish together with a cross reference to the species heading.

Thus, assuming the bodies and fins of my angels redden, I can get a very good idea of the cause in a minute or two, by looking up angel fish in the notebook. A quick scan shows that in the May, 1955 issue of *The Aquarist* on page 35, the problem was dealt with. Or if a new species is noted at the local dealers, a quick reference can be made under the Species heading for relatively detailed information.

To sum up, in order to keep an efficient notebook it is not necessary to record every item that you read. Just those topics which, at the time of reading, are of interest. It is surprising how useful a notebook becomes within a very short space of time.

A. P. Rayner

## The Variable Platy

(continued from the preceding page)

from the company of the females. The object of this is to enable them to mature fully and to colour before using them for mating. It is only by mating the very best that one can be sure of passing on the probability of intense coloration to the offspring. A female from a brood containing a high proportion of beautifully coloured females, although appearing just ordinary herself, might easily add a quota to the ability of her sons to develop colour pigment, and so should be used in preference to a female from a comparatively drab brood.

As previously mentioned, specimens of this admirable little fish are seldom seen at exhibitions. Where they are, they excite favourable comment, for they pose as proudly in the show tank as in their own home aquarium. Should you see a specimen or two, listen to the eager enquiries as to what they are by the people who haven't bothered to buy a catalogue, and buy some of the youngsters for your own collection.

## Fish Bowl Earrings

WOMEN'S jewellery at Tokio now includes earrings with miniature fish bowls containing live fish. Attached to a metal ring is a small glass bowl, about the size of a cube of sugar in which tropical fish can be kept. A syringe is used to fill the bowl with water, and the fish are put back into a larger tank when the earrings are not in use.

(*Oldham Evening Chronicle*)

## When the Pond Freezes

BEFORE long the heavy frosts will be upon us, and the outdoor pool will be covered with a sheet of ice. This will do no harm so long as the pool is at least 18 inches deep at one part (two feet depth is better) for there the fish will retire and lie dormant. They need no food at this time, for their life-processes are slowed down to a minimum. For the same reason there is no need to worry about the covering of ice at first, because there will be enough oxygen for the needs of the fish. Breaking up the ice-sheet is useless, because the water will freeze again between the pieces, and the result is only an untidy, jagged mass. A much better trick is to let the freezing continue until the ice sheet is about an inch thick, then to cut a round hole in it at one end, large enough to introduce some sort of dipper. Water can then be baled out until its level falls to a couple of inches below that of the ice. A layer of air then lies between the water and the sheet of ice, which will remain in position so long as the frost lasts, and so serves as a cover to protect the pond from further freezing. This is quite the simplest way of eliminating the danger of frozen fish and cracked concrete.

Don't forget that during mild spells the fish may become active, and should be given a little food. There is no natural food available at that time, and so, without feeding, they will have to draw on their reserve of fat; consequently, by the time the spring comes they will be thin and weakened, and there may be casualties.

# A Home Aquaria Cabinet

by PETER UTTON

FOR some time I was preoccupied with a number of problems relating to the keeping of aquaria in a small flat. The cabinet described here was designed to solve these problems. The problems were: (1) To keep four tropical tanks of varying sizes so that they would take up a minimum of space and enhance the appearance of the room; (2) To conserve heat and reduce electricity costs; (3) To find a place to keep odd tanks, jars and accessories, together and out of sight.

As I had two 18 ins. by 10 ins. by 10 ins. tanks on a double tier angle iron stand and also a 36 ins. by 12 ins. by 15 ins. tank on a double tier stand, I decided to put the two stands end to end and to build a cabinet which would not carry the weight of the tanks, but would surround stands and tanks and produce a more artistic appearance and give some insulating effect. The unoccupied space would be used for the storage of accessories. As my tanks were of varying sizes I decided to design the cabinet with five window openings, three above and two below. Although there would be only four tanks, the 36 in. tank would appear as if it were two. This arrangement can be varied according to the tanks used and the cabinet could be adapted to take four 24 in. tanks quite easily.

## Construction

The details of construction are as follows. The frame is prepared from ordinary deal battens  $1\frac{1}{2}$  ins. by  $\frac{1}{2}$  ins. The four uprights are 4 ft. 8 ins. in length and are grooved and screwed to four pieces 5 ft. 5 ins. in length and four pieces 15 ins. in length. Two further uprights are fixed at the front centre position,  $12\frac{1}{2}$  ins. apart. Ordinary plywood is then nailed to the back of the frame. The sides are filled in



The cabinet with doors partly opened and the lid raised



in the same way—using a better quality red plywood. I considered using hardboard but decided against this as there is little difference in the cost and plywood gives a better appearance.

Strips of mahogany are used for the front of the cabinet. These are planed and eight strips  $1\frac{1}{2}$  ins. wide and  $\frac{1}{2}$  in. thick are used. A groove  $\frac{1}{8}$  in. wide and  $\frac{1}{2}$  in. deep is then cut along the whole length of each strip. Two of the strips are screwed (from the inside) to the centre uprights and four strips to the top and bottom sections of the frame, the centre part being left clear at this stage. The grooved part of the strip is on the inside.

Two pieces of redwood plywood are used as sliding doors, and are made to fit into the grooves between the mahogany strips and the frame. Two windows are cut into each door, one above the other, and  $14\frac{1}{2}$  ins. by 7 ins. in size. These openings are surrounded by beading, overlapping the opening slightly. A strip of the mahogany is then screwed to the outer edge of each door. When closed the mahogany appears to completely surround the plywood. A handle is fixed to each door to facilitate opening and closing.

## Finishing

The centre piece consists of two mahogany strips grooved to receive a further piece of plywood. A window  $10\frac{1}{2}$  ins. by 11 ins. is cut in this and beading fixed top and bottom. The centre piece is held in position by four spring ball clips attached to the inner frame. Two knobs are screwed on either side of the window to enable the centre to be removed easily. The lid simply consists of a deal board  $\frac{1}{2}$  in. thick and attached to the frame by two hinges. The cabinet is sandpapered and treated with linseed oil inside and outside.



Screw-lid tin adapted as a lamp-holder

Glass is fitted into the window frames and is held in position by panel pins and putty. When thoroughly dry the outside of the cabinet is given two coats of clear varnish, the lid having first been stained. The cabinet has no bottom and can be lifted over the aquariums. It is not normally necessary to do this however, as there is complete access to the tanks. The doors slide open and the centre piece can be pulled out and the lid can be lifted when necessary.

The lights for the top aquariums are attached to the inside of the lid, which is painted cream. The lamp shades are prepared from screw-lid tins. A suitably sized hole is cut out of each tin lid to take the lamp fitting; the tin lids are attached to the cabinet lid by means of small metal brackets. An opening is cut out of each tin, about half the tin being

removed to allow the light to be thrown down. When the cabinet lid is raised the tin shades can be revolved in the fixed lids, so as to throw the light down on the tanks and away from the operator's eyes.

Around the inside of the frame I screwed several hooks to take planting tools, nets, etc. The floor space is used for storing jars, foods and equipment and the space on the lower 36 in. stand, in the centre, is used for an isolation tank.

The inside of the cabinet becomes very warm, especially when the lights are on. I am certain that this will result in reduced heating costs, although it is not yet possible to make a comparison as the cabinet has only been in use a few months. Acknowledgements are made to Mr. W. Burgess for his invaluable assistance in the practical construction work.

## JOURNAL of a Marine Aquarist

by L. R. BRIGHTWELL

LATELY, I have entertained the five-bearded rockling, *Matella quinquecarrata*. This little member of the cod family is easily known by its five "beards," large head and red-brown colour. Four-inch specimens are common under stones at low water. Eighteen-inch examples frequent deep water. Chiefly nocturnal, it is hardy, easily tamed, and will "wrestle" with a lump of raw mussel until it shakes off a piece of swallowable size. As with all sea animals, even the commonest, much remains to be known about it. The first, and slightly spikey dorsal fin shuts down tightly into a deep groove on the back. The function of this fin is said to be extraordinary sensitivity, even guiding the fish to food. Yet another problem for marine aquarists!

Negotiations are now afoot to purchase a site in Newhaven, Sussex for a Marine Biological Research Station incorporating a small public Aquarium. A committee to



FIVE-BEARDED ROCKLING

control the station has already been formed, members representing University College, London; Birkbeck College, University of London; Brighton College, Brighton Technical College and Varndean. Another member is the county's Inspector of Fisheries.

The site is an ideal one near the station and on a bus route from Brighton to Eastbourne; a steady supply of sea water is assured, the clock round. Local trawlermen are enthusiastic, for they will at least find a small sale for "rubbish" which at present they have to shovel overboard by the ton.



### BOOK

### R E V I E W

*Aquarium Plants and Snails; Breeding the Cichlids*, by Thos. H. Marshall. Saturn Press. 7s. 6d. each.

THESE are the last two books forming the series of six under the comprehensive title *Exotic Fish Keeping* and set a high standard. New jacket covers catch the eye but the greatest attraction of these books are the excellent photos by the author and Mr. Laurence E. Perkins, many being full or half page with the added attraction of not having appeared before elsewhere. Mr. Marshall certainly knows his plants and makes many shrewd points from the standpoint of a commercial grower. One thing which many plants need to establish themselves is patience, a factor so often denied them by the enthusiastic hobbyist.

An example he mentions is *Vallisneria spiralis*, which is often the despair of most aquarists who cannot get it to

grow. It will grow in warm or cold water, in daylight or electric light but it *must* be given time to adjust itself to altered conditions. Mr. Marshall considers the various types of water fern obtainable are in reality merely three phases of the same plant, a point which he covers in some detail. Hair grass is mentioned as being one of the most exasperating plants to grow because usually it will not stay put, increases by runners in all directions and really needs a tank to itself and scrupulous attention to the removal of algae.

Female festive cichlids are stated to be very choosy about a mate and for this reason the species is hard to breed. Pale fish are not in breeding conditions—the black streak should be very strong and the side bars really conspicuous. Orange chromides are very susceptible to changes of water conditions and need old, matured water. They are hard to sex but males are deeper coloured. No sexual differences can be given for *Astronotus*, although even four-inch fish have been known to breed. Mr. Marshall suggests that angels need deep tanks of 15 to 18 inches and will not develop properly in shallow or small tanks. They cannot stand foul water and will die quickly where other fish would last much longer. Temperatures below 65° F. are very dangerous. These fish do not gorge like other cichlids and require variety in diet. Both these books provide a wealth of information on their respective topics and are worthy additions to the modern literature available on the hobby.

RAYMOND YATES

THE AQUARIST

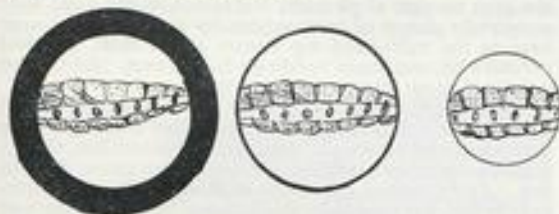
## Microscopy for the Aquarist—15 *by C. E. C. COLE*

**I**N the last article I promised to tell you how to get the best results from one of the more popular and inexpensive microscope lamps. Perhaps you have used one before—perhaps you have just obtained one. In any case, get it out and we will go through one or two operations together and note results. A little time spent now will give us sufficient knowledge to set up our apparatus quickly and obtain satisfactory results whenever we wish.

First note that the lamp housing is adjustable both for height and angle. Note which screw is tightened (or loosened) to raise or lower the lamphouse. Nothing is more annoying than loosening the wrong screw and having the lamp gently subside when all that was intended was to alter its angle.

Place the lamp about eight inches away from the sub-stage mirror. It is immaterial whether it is placed in front or to the side of the microscope. Lower the lamphouse so that its front is approximately bisected by the stage, and tilt it so that the rays of light will strike the sub-stage mirror without first encountering any obstacle.

Incline the mirror plane side uppermost so that a shaft of light is directed upwards to the microscope stage, upon which you have placed an object for examination. Use the four-inch objective (screwed into the end of the drawtube, remember) and a  $\times 5$  eyepiece. The object should be as large as you can obtain. A slide of one of the medium or larger water beetles is admirable. For test purposes it is better to use dead rather than live objects, and a properly prepared slide is to be preferred.



Spiracles of *Dytiscus* as seen with the eye too close to eye-piece (left); eye in the correct position (centre); eye too far from eye-piece (right)

Focus the object, and manipulate the mirror so that it is as brightly illuminated as possible. You will be disappointed, because the light will show as a more or less circular disc, brightest in the centre, but by no means filling the whole field of view, and dodging about with the slightest movement of your eye. While speaking of eyes, make certain that you have yours at the right spot for proper viewing. Outside the edge of the field you may see a thick black ring. This is a sure indication that you are too near the eye lens. Raise your head a trifle, until this ring disappears *but the field remains the same size as before*. This is the correct point. A little higher and you will see that the field suddenly becomes wholly illuminated but you can see less in it. This shows that you have raised your head a little too high, cutting out the extremities of the field.

Having found the right point at which to place your eye, keep it there, and slide the mirror up and down its pillar (if it has one). No appreciable difference in the area illuminated is apparent. Move the lamp farther away, adjusting mirror and angle of lamp to keep the disc in the centre of field. Again not much difference is seen. Bring the lamp as near as possible. The area grows a little in size, but not sufficiently.

Remove the front of the lamphousing, after switching off the light and leaving the housing to cool down. The heat from the lamp is felt immediately the switch is put down, and is sufficient to raise the temperature of small quantities of water quite rapidly, and to melt some mounting materials of microscope slides. This is obviously unsatisfactory, although the field illuminated is much greater than before. In addition, there is a degree of glare and dazzle in the field which makes viewing uncomfortable.

Replace the front of the lamp housing and remove the lamp to its original position about eight inches away from the microscope. Experiments with the plane surface of the sub-stage mirror are over—for the moment.



Water beetle ( $\frac{1}{2}$  in. long) viewed with  $\times 5$  eye-piece: with 4 in. objective (left), with 2 in. objective (right)

Many microscopists deprecate the use of the concave mirror at any time, but let us see what happens if we try using it. Turn it uppermost to catch the rays of light from the lamp, and without looking through the eyepiece examine the slide. When the light is directed through the slide it will be seen that the light source now appears elliptical—no longer circular. Moving the lamp further from the microscope narrows the ellipse until it is almost a bar of light. Replace the lamp and now look through the microscope at the object. The whole field is intensely illuminated, and much more evenly than before.

In fact the light might well be too intense. But we cannot reduce it by removing the lamphouse because the ellipse narrows. Replacing the lamp by one with a lower wattage—say a 25 instead of a 60—is one way of overcoming this difficulty, but we can also utilise the filter holder in front of the lamphouse to cut out excess light and at the same time even up the distribution of light over the whole area.

A piece of ground glass may or may not have been provided with the lamp. If it has not, it is cheap enough to obtain at many chemists and photographers. A piece cut to size and slipped into the filter holder will greatly improve lighting conditions, and should the light still be somewhat too intense for your eye comfort, a further piece will make conditions satisfactory, and viewing a pleasure. So it seems that at least for our present purposes, the concave mirror is far better than the plane mirror.

Nevertheless, next month I will tell you of another, and, in my opinion, a better method of obtaining a large, evenly lighted field without using the mirror at all, and go on to discuss special methods for special purposes. Until then, examine as many of the larger aquatic organisms as you can obtain, using the four-inch objective and  $\times 5$  eyepiece.

# Ways of the Siamese Fighter

by V. ARLINGTON

ALMOST the first thing people ask when they see any tropical fish is, "Where are the Siamese fighters?" for these fish have been televised and so much written about that people have become Siamese-fighter-minded. But having heard of their prowess as fighters and their wonderful courtship ways, it is rather an anti-climax when they are shown—as they well may be—a fish almost hidden in its favourite corner. The fighter (its scientific name of *Betta splendens* is so much more appropriate) has everything to make it the most exciting fish in the tank; it has beauty, it fights any invader of his territory, it is a wonderfully spectacular wooer, and yet it is often the duller fish of the community. Not by any means always acting as one might expect, and so I rather look on it as a contradictory fish. It is even contradictory in appearance.

As far as looks go the *Betta splendens* is absolutely in a class by itself. When full grown they are about two-and-a-half to three inches long. Their colouring may be black or one of the beautiful varieties of reds, blues, and greens, or it may have a cream body and red fins of the Cambodia. The body is criss-crossed with fine lines which make a fascinating diamond pattern, and it is a joy to watch the long flowing fins and the way the male uses them. But his goggle-eyed face is hideous. Seen through a magnifying glass it looks so monstrously savage it could be terrifying, but it merely adds to the fascination of this remarkable fish.

When a fully grown youngster is first put into a community tank he is so pleased with his bigger world after his isolation in a small tank or a jar (for two males cannot be kept together because they will fight) that he goes around a good deal and shows off well. He will join the other fishes in the fun of snatching at live foods or a piece of meat or fish from each other. But almost at once, he chooses his corner (invariably a fighter chooses the back left-hand corner of a tank—I wish I knew why) and tends to stay in it more and more until he spends most of his time there. He seems to lose the edge of his appetite, too, or needs less food, for he doesn't always come for it. In fact he is a thoroughly dull fish for a good deal of the time, but when he does sail across the tank with one sweep of his magnificent fins, and perhaps brake to a dead stop in the middle of a burst of speed by extending his fins to their limit, it is a sight to see and well worth waiting for.

But it is obvious that the male Siamese fighter only lives for breeding and fighting. Deprived of these two interests he gets so bored that the phrase of "dying of boredom" might apply to him as well as to people. However, one can always dispel this boredom for them and at the same time get them to display their loveliness.

If a mirror is held to the side of the tank the fighter will mistake his reflection for a rival male and try to get at him. This is one way of making him put on a display for visitors, but it is unwise to let him "attack" the glass too long for fear of bruising himself. Bruising can result in mouth fungus, a disease to which fighters seem susceptible. Once it gets a real hold it is usually fatal. A fighter will show off to advantage almost continuously if a fair-sized paradise fish is put in the same tank. This is also a bubble-nest builder

and a rather pugnacious fish. But they don't fight, for when the Siamese fighter comes after him he streaks away. But his presence annoys the fighter, keeping him alert and whenever his "cousin" comes fairly near he spreads his fins most threateningly.

But to see a male fighter at his loveliest put a female in the tank with him. He seeks her out at once. In comparison, she looks a shorn lass, but how excited her presence makes him! When he bears down in her direction he looks simply gorgeous; his colour deepens, his finnage is spread and his gill plates opened so that the membranes extend and look like a kind of Elizabethan ruffle round the throat. Probably the female will ignore him. It may be because she is not ready for breeding, but close observation would suggest that sometimes the female merely likes to feign indifference. Indeed, observation also suggests that the fighter can be contradictory in his wooing ways, too, for he doesn't always act as we have been led to expect.

Recently, I was watching the behaviour of a pair just introduced in a community tank. When he sailed over to her, she turned her back on him. Whatever he did, she took no notice. After a time he got thoroughly mad, chased her round the tank at terrific speed and really trounced her. Then both retired to separate corners, apparently to sulk. After about half an hour, the male went over to the female and began displaying his fins in lovely flowing movements. As far as mere human eyes could see, she gave no sign of pleasure, but somehow she must have conveyed a change of heart to him, for in due time he went over to the right-hand top corner of the tank, searched around a bit, and began building a bubble nest. She showed not the slightest interest in his activities.

When the nest was almost three inches long and half an inch high in one part, he went over to her and his wooing was wonderful to watch. He circled around her, slowly, almost voluptuously, with his fins trailing, his colour deepening. Again, human eyes failed to detect much responsiveness in her, but eventually she followed him under the nest for the nuptial embrace. He wrapped himself round her body, seemed to rock her a little, and as they sank slowly to the bottom she scattered a shower of eggs. The male disengaged himself, and leaving her lying on the bottom, apparently temporarily unconscious, collected the eggs in his mouth and blew them into the nest. When he was too long in embracing her again, she chivvied him and sometimes positioned herself so that he was almost obliged to embrace her.

Naturally, there was much excitement among the other fishes in the tank, for there is no delicacy like newly laid eggs, unless it be fresh fry! They collected in a busy bunch and ate the eggs as fast as they could find them. The extraordinary thing was that the fighter didn't object. When they had eaten all the eggs they could find he even allowed the more daring of them to help themselves from the nest. I don't know if this was why the female, after staying some time in the bushes to recuperate, got furious—with him. But she was so relentlessly spiteful that she soon reduced the resplendent creature to a very sorry state. Had I not rescued him he would have died. I kept a close watch on the female to see if any complications troubled her, but she was quite carefree and happy.

The Siamese fighter is said to be a good community fish. In so far as it does not injure smaller fish but contents itself, when they come too near, by making a threatening move in their direction, it is all right. But it is certainly not community-minded. Rarely does an older fighter join in a chase with the others for a bait on a string. Other species



like to keep together and are often to be seen in a cluster with the rest of the fishes in a tank. The fighter disdains such neighbourliness. If there is a female in the tank he keeps aloof from her, although one feels that they are very much aware of each other.

For the most part, a fighter likes being at the top of a tank and yet, contradictorily again, he has spells of preferring to be right down on the tank bed. Usually a fish on the bottom is an ailing fish, but the fighter is not ailing. He loves to stay, fins extended, on the gravel. He "stands" on his anal fin, beautifully balanced by the ventral fins. Occasionally, he stands on the ventral fins only, and remains slightly tilted forward, for some time. He looks very beautiful with the light showing through his spread fins. Then with a lovely liquid movement, he is gone. He can turn faster than the eye can see, and in the smallest space. He goes round the base of the rocks and through the dwarf *Beckettii*. Fighters seem very partial to this hardy little plant which, at times particularly, looks such a pretty bluish green. When the male is low down like this, the female is usually not far away, although they are apparently unaware of each other.

Siamese fighters seem to like hiding sometimes. I have sometimes found them getting as far as they can under a jutting rock or a clump of *Beckettii*. I used to be alarmed at noticing that they were rather pale but it did not signify illness, for when they reappeared they were perfectly all right. Sometimes it seemed as if they were feigning death, but why, I haven't yet found a satisfactory explanation. Loss of colour may be due to the dimmer light in their hiding places, for they appear to react to light, or lack of it, quite a bit.

Recently, to confirm observations of the behaviour of Malayan snails under certain circumstances, I kept a tank in darkness for nearly a week. There was a Siamese fighter in the tank and when I switched on the lights, the fighter

looked horrid. He was hanging in his corner and his body looked like a pallid slug. He was not dead as it first seemed, but was apparently in a deep coma. It remained still for some time and when it did begin to move it seemed to be struggling to get back to life. After a while it was swimming around and eating quite normally.

Fighters are contradictory in their food likes and dislikes, too. Generally speaking they thrive on live foods. Some won't eat anything else; others will eat meat and fish, too; others will eat dry foods as well as live foods but only certain kinds, and so on. Yet in one respect *Betta splendens* varies little, but even in this he is not by any means one hundred per cent. consistent. He is usually fearless. He seems to constitute himself guardian of the tank, for as soon as any foreign body is introduced he looms out of his corner to investigate. He may be protecting his territory, or he may be curious, for I am sure the fighter has a strong streak of curiosity in his make-up.

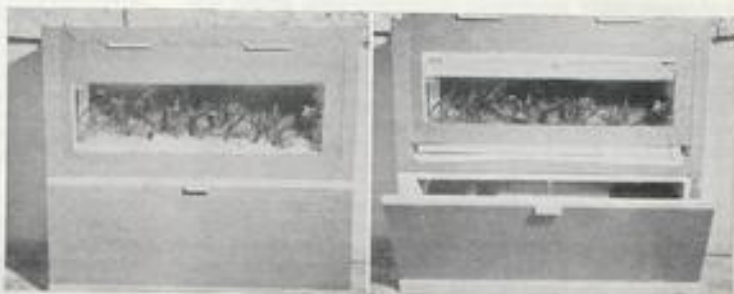
Whenever I begin cleaning or doing a little re-planting in a tank the smaller fishes go into hiding (very watchful hiding, one may add) as far away from me as they can get. But not the fighter. He likes to know what is going on. He comes forward and starts following me, or rather my hand, around. He doesn't mind if the water gets cloudy or choppy, or if plants festoon him or I give him an occasional accidental knock with my hand. He comes so close he gets in the way, rather like a robin when one is digging. Often, I have cupped a fighter in my hand and held it against the side of the tank so that I could examine it thoroughly and at leisure. They have never appeared to mind in the least and their colour remained quite normal. Sometimes I have done this several times at few-minute intervals to see if it would object, but apart from turning about a little it wasn't in the least upset, and nothing would stop it from seeing what I was doing.



THE bookcase aquarium pictured above is the design of Nottingham and District Aquarist Society member Mr. W. E. Hunt. A cupboard, made like the bookcase of bramble pine, masks the 24 ins. by 15 ins. by 12 ins. aquarium and its angle-iron stand. Foods and equipment are stored in the cupboard, which measures 24 ins. by 18 ins. by 12 ins. A raised shelf above the aquarium is removable for it to be serviced. Total cost of all materials including aquarium and accessories was fourteen pounds.

## Aquaria in the Home

TWO pictures of the 36 ins. by 12 ins. by 12 ins. aquarium belonging to Mr. A. E. Tait, of St. Boswells, Roxburghshire, are shown below. On the right the sliding front masking frame is seen partly raised in the slots which carry it, and in the same picture the door of the cupboard below the aquarium is half-open. Materials used in the construction cost less than one pound: three 12 ft. lengths of fencing rail; two 2 ins. by 2 ins. by 3 1/2 ins. battens; one board 3 1/2 ft. by 4 ins. by 1/2 in.; one sheet of hardboard 3 ft. by 3 ft. 6 ins.; 2 ft. of 1/2 in. dowelling; four large heavy-weight cardboard display placards (from local shopkeepers). The last item has been used to cover the back, ends and top of the surrounding cabinet. Lighting for the tank is incorporated above it on the cabinet's top rail. The unit is pictured before decoration.



# Pity the Poor "Hon. Secretary"

by T. L. DODGE

(Secretary, Midland Aquarium and Pool Society)

**MONDAY EVENING:** I was busy writing the monthly report to *The Aquarist*, giving brief details of the Society's activities, when the door bell rang. An 11-years-old boy asked, "Can I please join your fish club, Sir?" Fifteen minutes were spent in explaining details of the Society, its aims and objects, etc. I gave him a membership form, instructed him how to fill it in, and advised him to ask his parents if they favoured him becoming a member. Back to the typewriter to finish off my report to *The Aquarist*.

Now for Society correspondence. A letter from an old lady, "Dear Sir, goldfish are dying in my pond, what can I do?" An advisory letter follows and is put aside for posting in the morning, on the way to the office. Now let me see! There's next week's meeting; that means the contents of the combined News Letter and agenda sheet must be decided. A rough copy is typed and foolscap size paper found necessary (the stencil cutting and duplicating will be done to-morrow evening). The speaker has been fixed up, minutes of the previous meeting are in order and recent correspondence held ready for reading at the meeting.

What else? Oh yes! Have I any raffle tickets left over from the last meeting? Two complete books—should be enough. How about the raffle prize? Must buy one in town to-morrow, during the lunch hour.

**Tuesday Evening:** Society correspondence first. Ah! here's a letter from a prospective member: "Dear Sir, I have kept goldfish for several years and would like to know how I could join your Society." Prospectus and membership form sent. Another letter: "The next committee meeting of the judges' panel of the Association will be held at, etc., etc." "It is hoped you will be able to attend."

Now for cutting the stencil, and duplicating the News Letter and agenda sheets for next week's meeting. One last look through the rough copy—date and time of meeting, correct; agenda items in correct order of importance; members' sales and wants included (must be careful not to offend anyone by omission). Society notes and news checked and found in order; new members' names and addresses listed for information of the Society; change of address of one member also listed. Yes! everything appears to be in order. Stencil is duly cut, to be followed by the duplicating on the Society's machine. That reminds me! Must order more duplicating paper and envelopes from the printer. Need more postage stamps, too.

**Wednesday Evening:** No Society correspondence to-day. That's a change. The News Letters and agenda sheets are duly folded, inserted in envelopes, stamped and addressed and made ready for posting in the morning, on the way to the office.

Wife, interrupting deep concentration: "When are you going to crazy-pave the garden path? It should have been done three years ago." Self, still concentrating on addressing envelopes: "I must first finish these." Wife, snorting derisively, "Whenever I speak to you your mind is concentrated on fish, I can never get anything done, here." Self, "Yes, dear."

**Thursday Evening:** Out lecturing to a Society the other side of town.

**Friday Morning (at work):** The office telephone rings: "So-and-so speaking, Could you tell me John Doe's

address?" Telephone rings again in the afternoon: the chairman of such-and-such Society speaking: "Would you be good enough to prepare questions and answers for our quiz team next week?"

**Friday Evening:** Two days' correspondence to answer. A member is ill, another one has not attended a meeting for several months. Each one must be sent a letter.

A long-serving member is soon to be honoured with life-membership. The executive hand-painted diploma has to bear the signature of the Society chairman, then taken, during the lunch hour, to a shop to be correctly framed. It will be collected one evening, on my way home from the office.

A society member calls for a social visit. We sit before the fire, smoke our pipes and talk fish until 10.30 p.m. He takes his leave—it still leaves time to write one more letter.

**Saturday Morning:** Office telephone again; the secretary of such-and-such Society speaking: "Our lecturer for next Tuesday's meeting can't turn up; could you please oblige?"

**Saturday Afternoon:** Running around town arranging for the annual dinner and dance. Room must be centrally situated, and licensed for the sale of intoxicants. It is also necessary for juniors to be able to attend. The menu must be decided and the programme arranged to ensure a good evening's entertainment. Artistes, orchestra, M.C., etc., must be booked, menu cards, admission tickets printed, etc.

**Saturday Evening:** More correspondence to answer. One member wants to know why he hasn't received his agenda sheet for the next meeting. Half-way through correspondence when convener of the association judges' panel calls to enquire if I could judge the coldwater section of the so-and-so show on such-and-such date. We talk fish for the next hour, after which there's time for a quick glance through the sports paper.

**Sunday:** Day of rest? Not a bit of it; there's a large fish house and 20 tanks to clean. That takes all day.

**Monday Evening (meeting night):** Hurried dash home from the office, even more hurried dinner, and then a hasty preparation of articles for the meeting. Have I got everything? Minutes book, attendance register, agenda sheet, chairman's block and gavel, recent society correspondence, raffle prize, raffle tickets, etc. Yes! all seems well.

Arrival at meeting room, 10 minutes before commencement of meeting. Member "A": "Could you put me in touch with someone who has an expert knowledge of characins?" Member "B": "Do you know where I could dispose of some young fighters?" Member "C": "Blab, blab, blab," etc.

And so it goes on. Rest is an unknown quality. There's no such thing as an evening before the fire with a good book and a pouch-full of tobacco. Just imagine such an evening! It would bore me stiff.

# AQUARIST'S Notebook



by

RAYMOND YATES

THE hobbyist is always worried about anything coming in contact with the tank water in case it may be toxic. He naturally takes precautions with metals, rockery and suction discs as well as any dyes likely to be introduced. He takes great care with chemical cures and most risks are eliminated. Children can put things in tanks, however, and considerable loss can result. We have no idea how fish react to most common substances but we can be fairly sure that most things introduced to the water accidentally are injurious.

I have tried out a few experiments with (mainly) live-bearers for "guinea pigs," using 1 in 500 as a basis, that is, five drops to five fluid ounces of tank water. Some of the experiments were fatal, others quite the reverse. For example, household ammonia at this proportion is quickly fatal, death taking place in under half an hour. The fish tries hard to swim through the glass, then there is torpor and death. T.C.P. has no effect whatever at 1 in 500, but at 1 in 80 death occurs in five minutes after loss of balance and violent jumping.

Carbon tetrachloride produces jerky movement, surfacing, loss of balance, jumping, then lethargy and death in 30 minutes. Methylated spirit or surgical spirit has no obvious effect but at 1 in 80 death follows in half an hour. On the other hand photographic "hypo" had no effect except to speed up the vitality of the fish, which surprised me, and aspirin also livened the fish up after an initial period of torpor. Brandy and other spirits have much the same effect and are never fatal.

I tried out ammoniated tincture of quinine, thinking perhaps some newcomer to the hobby might use this instead of quinine sulphate for white spot at some time. I expected this to be rapidly toxic, but it proved otherwise. The fish began actively swimming, then slowed down to normal and seemed to find no inconvenience even two days later. Detergents produced little movements, then rapid fanning and surfacing. No immediate deaths followed although the fish did die about three days later.

Alum is used for disinfecting water plants, so I tried it on the fish. At 1 in 500 the fish surface and die in about four hours. Alum has a queer effect on the algae and mulm, which it seems to coagulate in a very peculiar way. Fish subjected to about 1 in 1,000 were not affected apart from surfacing and remaining there. Tobacco smoke is supposed to be very lethal but pipe tobacco smoke bubbled into the water in quantity had no effect. This also surprised me.

A lump of copper sulphate was put in five fluid ounces of water and well shaken for two minutes or so, then removed. Five drops of this resulting liquid in five fluid ounces of tank water had no effect whatever on the fish. This was not what I expected. However, five times the dose produced death in one hour, the sides of the fish being covered with a blue-white precipitate. I found iodine had no effect when tried.

The foregoing gives a vague idea of what happened in certain circumstances with particular fish. Where any unusual substance gets into the tank it is probably wisest to remove all the fish immediately—if you act quickly you may save your fish. There is quite a time lag with many of these toxic substances, so speed is the main thing.

The problem of keeping *Tubifex* alive in hot weather was brought home to many aquarists during the prolonged "Old-English" summer of 1955. Many fanciers found their supplies cut off altogether. This was because most commercial supplies come from London and dealers at a

distance stopped ordering it because supplies arrived dead after long rail journeys in heat-wave conditions. Those who were able to obtain supplies found difficulty in keeping a stock any period. If *Tubifex* is kept in running water there is no problem, but running water is out of the question in times of drought.

In winter it is fairly easy to keep a stock about the size of a saucer by putting it in the bottom of a large white-enamelled bucket, changing the water three times a day. With the temperature in the eighties this is not enough, and it should be remembered that the water from the cold-water tap in high summer is often about 66° F. Changing the water about eight times in 24 hours helped but the addition of ice cubes proved better. In U.S.A. *Tubifex* is frozen solid and fed to the fish as required, but the worms are dead and any "left-overs" in the tank would cause serious trouble.

Aeration seemed to be the answer. Using two diffuser stones running continuously I found that this cut down the necessity to change the water to only twice daily. Even so this method has drawbacks. The stones become coated with slime from the worms and function imperfectly, and the worms seem to appreciate the aeration so much that they make a ball over each stone. I found the best thing to do was to change the worms every two days to a fresh bucket, and in doing so to turn over the mass, when a sizeable knot of dead worms would be found underneath, which was thrown away. Dead *Tubifex* quickly kill off the other worms and foul the water. A clean bucket every two days helped because in that short time a thick slime covering appeared on the sides.

The other method is to put the worms in a large flat dish such as a photographic dish and keep them in half-an-inch of water with the major portion above the water. This works but looks messy, is not without odour and is not popular with the average housewife.

I am sometimes asked why tanks look misty. There are many reasons for this unpleasant effect and one would really need to see the tank in question to hazard a suggestion as to the actual cause of the trouble. Over feeding is a frequent reason, as also is too much mulm and unsuitable or too large fishes, with the result that the mulm is stirred up continually and the very fine suspension never really settles down. An aerator running full blast or running for too long a period will cause cloudiness. Water which is tending to turn green also looks cloudy; so does that which contains too much Infusoria. A film of algae on the front glass can give this effect, particularly as the algae tends to collect minute particles of suspended matter. Sometimes the cloudy water has come in that form straight out of the tap—it is surprising how few aquarists bother to check up on their tap water supply when dealing with or topping up their tanks. A misty effect can generally be removed by the use of a filter, cleaning the front glass or siphoning off the mulm regularly. Other things which help are good plant growth, removal of unsuitable fishes, care with lighting to avoid scaring the larger fishes, regulated feeding and the use of chemicals such as peat, permanganate and hydrogen peroxide.

All aquaria should be covered as, apart from conserving heat and keeping out dirt and dust, the fish are prevented from committing suicide by jumping out. Some types of fish never cause any trouble in this way, as for instance cichlids, but others will take a chance sooner or later. Most fish which frequent the top of the tank are excellent jumpers, but there are many others who feel the urge from time to time. As fish families go the livebearers are very prone to jumping, although the guppy is perhaps least liable to this fault. Platys and swordtails are quite the limit and must be covered. Just why fish jump is anyone's guess: exploration, boredom, desire for new quarters, food or to escape being chased, all are possible. If the surface is covered with duckweed or floating plants of any sort no jumping occurs, and it is worth remembering that few fish will jump when the electric lights over the tank are on. Tests prove that fish jump away from the light four times out of five. Fish moved to new quarters tend to panic and jump, particularly if the water is shallow. After dark, when the lights are out, quite a bit of jumping occurs, but this is of no consequence if the tank has a cover. Although considerable noise is made on such occasions fish never seem to suffer from contact with the cover top.

There are not as many lady hobbyists competing at shows as one might like and it is therefore all the more pleasant to report one who takes the hobby very seriously. This is Mrs. Irene Fletcher of Rochdale, whose club is quite a power in the North. Mrs. Fletcher has only been showing a little over two years but she has managed to enter some twelve shows and has won 27 firsts, nine seconds, seven thirds, three times "best in show," two diplomas, 10 cups won outright, three challenge cups, one challenge shield, six plaques and seven medals, which would be quite a record for a mere male, never mind a member of the fair sex. Mrs. Fletcher considers earthworm is far and away the best fish conditioner and makes a point of never feeding fish for 24 hours before the show. She believes in getting the fish accustomed at least one week previously to show conditions. She has some 20 tropical tanks and eight large coldwater tanks, some made of concrete, as well as a small pond. She finds natural daylight the best light in a fish-house but this has to be shaded at times. Recently, she managed to keep some spawning veiltails happy at 99° F. with the help of heavy aeration, and this takes some doing. Perhaps this lady's success will encourage other lady hobbyists to become serious competitors at shows.

I make no apology for referring once again to the Nottingham Aquarists' Society, surely one of the most go-ahead in the country. They put on a wonderful show every year, provide their members with three meetings a month with top-line speakers and give them also a free copy of the monthly club magazine (which averages 6d. a copy to produce). All this for an annual subscription of 8s. 6d.! How is it done?

The answer lies in club spirit and the fact that new members are bluntly told that every member costs the club roughly 15s. per annum and that as his subscription is only about half this amount the balance has to be made up by the member pulling his weight. Nottingham members certainly pull their weight, and one never hears of those break-away sections or opposition clubs in this area which all too often make such dreary news in other districts. With about 150 members the Nottingham Club is fairly large, and the event of the year is the show, which runs for about ten days and which is the main source of income.

Many clubs have experienced losses on shows but not Nottingham. They do things in a big way and have made as much as £450 on a show. Naturally, such a society is

well established, and the club must be one of the richest with over £800 worth of its own show equipment as well as a bank balance well in excess of four figures. Last autumn's Nottingham show was well staged and well advertised and, apart from the "fishy aspect," offered other attractions in the T.V. chimpanzee, capuchin monkeys, a mongoose, flying fox bats, Malabar squirrels, caymans, a chameleon, axolotls, terrapins and tortoises, pythons and other snakes, freshwater crayfish and Mr. George Cansdale.

A feature was the excellent display of coldwater fish other than goldfish, although these latter came in for much attention in a giant tank nine feet long, two feet wide and 15 inches high. This weighed somewhere about a ton in all and takes twelve men to lift when empty. The plate glass is half-inch but leaks occur when even small quantities of water are removed. One end of the hall was taken over by a scenic watermill complete with turning wheel and water and numerous marsh and bog plants, all locally obtained. A fine effort, Nottingham.

The price of clown loach is now becoming much more reasonable and they will be seen in more community collections as a result. Opinions differ as to the ability of this fish to resist white spot; some aquarists have found it very prone to this plague, whereas others (myself included) have found it highly resistant, even when in a tank infested with the disease. Be that as it may, clown loach are best kept to themselves because there is no doubt at all that they do not stand up to salt, quinine or any real strength of mercurochrome, and if they do get white spot the usual forms of cure are impossible. (Fishes kept on their own are less likely to get the disease than those kept in a community tank where new arrivals are always appearing.) It would seem that one or other of the anti-biotics may supply the remedy for treating this very attractive fish and perhaps some reader can suggest from experience what can be done.

Nylon nets are now obtainable and although they are a little more expensive than cotton they are more durable and do not rot. This is not to say that cotton nets are no good; with care they will give long service but they should always be thoroughly swilled and hung up to dry. Never leave a net half in, half out of your tank. This is a sure way to rot the fabric. If your tank water is thick with blue-green algae the submerged part of the netting will rot through overnight. Never leave algae on a net, it is a bit more trouble to rinse it out but it pays in the long run.

Some time ago I visited a club which held its annual show in a large hall which contained reel hoses for fire-fighting purposes. It appeared that at a previous event this hose had proved invaluable for quick and efficient filling of tanks but that subsequently quite a number of fishes had died. Water supplied for fire-fighting purposes is usually what is called "commercial" water and is not considered fit for drinking as it comes from special reservoirs. Clubs should beware of using any water for shows where the source is suspect. It is better to be safe than sorry, particularly where other peoples' fishes are concerned.

Whenever I am in Derby I always call in at the museum to look at the seven tanks on show there, which are provided by the local aquarist club. On my last visit I noticed some wonderful fossils of ancient fishes on view, some going back to 350 million years ago. Nearly all the specimens on show were large and in excellent condition. Teeth of a shark of the Devonian period were about six inches long whereas the teeth of the largest 40 feet shark of to-day are only a mere two inches in length. The exhibits are backed up by numerous pictures and diagrams on the period and give a good insight into life at that time.

# Nets and Netting Methods *by* A. P. RAYNER

**F**EW aquarists are intentionally careless when handling fish. Nevertheless there are often cases of, shall we say, faulty fish handling resulting from a failure to realise some of the inherent dangers. The usual and obvious method of catching fish is by using a net. However this apparently simple process is, at the best of times, a most nerve-wracking state of affairs for probably all species of fish.

On the face of things there could be nothing simpler than just dipping a net into a tank and taking out the desired fish. Unfortunately most fish do their utmost to avoid being caught, hence netting invariably results in a battle of wits, stamina, and frayed tempers between the netted and the netter. There are, of course, some species of fish which offer little or no opposition whatsoever; however, in the main the task is made difficult, because different tactics are usually required for catching each species (and quite often for the same fish on differing occasions). As netting is at times essential, a few words about the three main methods of netting may prove of service not only to the netter, but indirectly to the netted.

**Method 1:** This necessitates the simultaneous use of two nets, i.e., using one net to drive the fish into the other net. This is possibly the easiest way to catch a fish. However, I would not advocate the use of two nets in a well stocked and planted tank, for waving them around will soon tear up the plants and produce a state of chaos in the tank. Many dealers use this method, but in most cases it will be noted that they do not have to concern themselves with a carefully arranged decorative planting of a tank.

**Method 2:** By using a single net and one of the glass walls of the tank. This method does have the advantage of reducing the possibility of the up-rooting of the plants, etc. However, it requires a lot of care, in fact more care than is generally realised, since it is very easy to rub the body of the fish against the glass, or to trap the fins between the net and the glass. If you use this method always make sure that the netted fish is well inside the body of the net before attempting to slide the net towards the surface. By using a nice large net the fish will be able to move well away from the glass. If a space is left clear of plants near the front of the tank you will have more elbow room in which to wield the net.

**Method 3:** This involves the use of a single net, and the net alone to catch the fish. When using this method, which requires a lot of patience and a quick deft hand at netting, it is advisable effectively to close the net before lifting the net from the water. This can be done by effecting a circulatory movement of the net prior to the lifting. The closing of the net is, to my way of thinking, quite important, since it prevents the fish from unduly struggling within the net. It is this struggling that tends to damage the fins or bodies. Bearing in mind the size of the fins of average sized angels, fantails, Siamese fighters, or the caudal fins of a male sword-tail, it is clear that irreparable damage can easily be done within a few moments. Although such injuries, provided that they are not serious, tend to heal themselves, there is always the possibility of fungus developing. A further point to be noted is that when a fish is in a net it is possible to damage its gills since these often open when a fish is removed from the water, thus rendering them more prone to injury, especially if the fish is able to thrash about within the net. In addition, closing the net prevents the netted fish from leaping out of the net. I might mention that I have found black mollies, angels and guppies to be the worst offenders at this pastime.

It is often said that when a fish is difficult to catch it

should be chased around the tank until it is exhausted. I can not agree with this at all, in fact I do not think such treatment is required at any time. When trying to catch a difficult fish try switching the tank lights off for a time and then switching them on again. This will often enable the fish to be quickly netted as it rises towards the lights. Sometimes, if a fish proves really difficult by hiding amongst the plants, or in the corners of the tank, the problem can be overcome by effectively reducing the size of the tank. This is easily done by standing three pieces of glass upright in the tank, as shown in the sketch.



The glass in practice restricts the space in which the fish can swim in the tank. It will be obvious that before placing the last piece of glass in position the fish to be caught is coaxed, or allowed to enter on its own accord, into the space.

By using a large net, the handle of which is bent at right angles to the net frame, the fish can usually be removed without difficulty. The net should be placed into the space before closing the box, otherwise you may find the fish hiding beneath the net.

Now a few words on nets. I think the most important point to note is to use a large net. This makes netting easier irrespective of how you use your nets. It is better to use green-coloured nets since these are not so readily seen by the fish. However, a cautionary note—if you use a dyed net make sure that it has been thoroughly washed before use. This is because many dyes are not always fast and thus tend to run when in water. In addition there is always the possibility that the un-fast dye material might be toxic to fish.

A net should always be properly sterilised before use so as to ensure that there is no risk of spreading disease. I am sure that quite a lot of troubles are inadvertently spread from tank to tank by the indiscriminate use of nets and other accessories. Thus if you have an occurrence of that highly infectious parasitic condition *Ichthyophthirius*, or as it is better known "white spot," in one tank, and you use your net to remove a fish for individual treatment, which is, of course, not an unusual procedure, and you later use the same net in another tank without having previously sterilised it, you run the risk of transferring the "white spot" to the second tank. Nets are not expensive so the best solution is to have a net for each tank, and provided you look after them they will last for years.

A few moments spent in cleaning, sterilising by dipping into boiling water, and then hanging the net up to dry, will avoid its rapid deterioration and also what is much more important, the spread of disease. Finally, it is a good habit to give your nets a good wash immediately prior to use just in case the net has, since it was last used, become dirty.

# Development of the

by N. E. PERKINS

(Photographs by LAURENCE E. PERKINS)



Young celestial at three weeks of age ( $\frac{3}{4}$  in. long overall).  
The eyes appear normal at this stage



At seven weeks of age the young celestial ( $1\frac{1}{4}$  in. long overall) shows slight eye protrusion



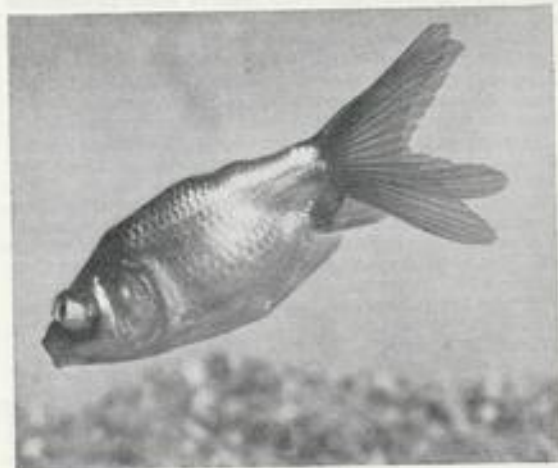
Eyes of the young celestial at ten weeks of age ( $1\frac{3}{4}$  in. long overall) are obviously protuberant

FOR many years I have harboured the desire to breed the celestial goldfish, primarily that I should be able to observe exactly how the peculiar eye formation developed. I was therefore very pleased when, in January last year (1955), I at last managed to obtain two very young specimens each of approximately  $1\frac{1}{2}$  in. body length. I chose the fish myself and, whilst making every effort to secure a sexed pair, I fully realised that I could well be mistaken with fish of this age; so that it was a pleasant surprise to find that my forecast had proved correct when, two months later, the red and silver specimen which I had selected as the male commenced a vigorous drive.

I had not expected such rapid development but, on 13th March the fish spawned, about 400 eggs being laid. Of these many were infertile, so that a count of live fish on 18th March showed that about a third had hatched—126 in all. An examination of these after a few days revealed that many would be single-tailed, although the parents are perfect in all respects. However, I allowed them all to develop for a further two weeks. Then I decided to select only those exhibiting reasonable finnage. This reduced the number to 35.

### Finnage and Scaling

In the meantime the parents were growing at a great pace and would have spawned again, but I had other private matters which made it desirable to prevent this. Of the original 126 youngsters, only one showed any signs of dorsal finnage, and this was confined to a few rays situated near the tail. There were three or four that had a small knob where the dorsal fin would normally be, and one, which I intend to keep, that had pearl scaling—a point which struck me as rather odd considering that neither of the parents show any tendency in this direction. I have,



# Celestial Goldfish

however, seen this occur with "bubble-eyes," although why only one should appear does seem rather strange.

During the early stages the fry appeared to be quite normal in eye formation and it was not until the tenth week that some began to show signs of protuberance. These now appeared as poor "globe-eyes," and a further two or three weeks passed before some of them started to show a decided upward tilt to the eyes. It soon became quite apparent that two definite types of celestial eye were being produced. One type, perfectly spherical and completely upturned, seemed to be fully developed, whilst the other, though equal in overall size and position of eye, appeared to be capable of much further development since the swelling around the eye was double, i.e., a small swelling immediately surrounding the eye was itself surrounded by a larger swelling. This second swelling was somewhat cylindrical in form, suggesting that the sides of the cylinder might, by further swelling, achieve the usual rotund shape of the celestial eye.

## Eye Development

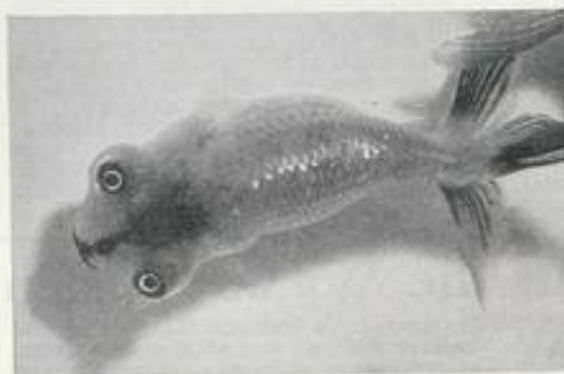
Among the fry the eye development was by no means uniform and, even now, when they are seven months old, a few have still to develop. I should imagine that these will never achieve the eye development of the others and, of course, it may be that they will never develop at all, although I hardly think this likely. Regarding colouring, 90 per cent. were undergoing change before they were three months old and some had become completely gold. Of the remainder most have become almost black, and I am hoping that a few may retain this colour, which, considering the eye-formation, should be a possibility. During the development of the eye it was interesting to notice that an outward movement of the upper margin of the pterygoid bones preceded the upturning of the eye, so that the final result, viewed head-on, gives the face a triangular appearance, the broadest part being across the eyes.

So far as growth is concerned, I have found these fish to be by far the fastest I have yet encountered among goldfish varieties, and I have kept specimens of all types except one (the pom-pon) that have so far entered the country. The parents now exceed six inches in total length and are very rotund, so that the increase in weight since the beginning

*(continued overpage)*



Completed eye development of this seven-months old celestial is seen from above to be the "spherical eye" type



"Cylindrical eye" form of this celestial (seven-months old, 3-3½ in. long overall) is likely later to resemble that of the mother fish in the picture below



Views of the 12-weeks old celestial on the left (2-2½ in. long overall) and the 14-weeks old specimen above reveal eyes beginning to turn upwards



One-year old adult celestial (5 in. long overall). Female parent of all other fishes pictured

of the year is of the order of 1,400 per cent. (from the ratio formula:  $\frac{\text{length cubed}}{\text{length cubed}}$  equals ratio of weight). Actually, the increase is a little above 900 per cent., since the original weight was three-eighths of an ounce, and the female now weighs  $3\frac{1}{2}$  ounces. The young, though only seven months old, already exceed the original size of the parents as I obtained them, several being well in excess of three inches overall.

#### Unusual Celestial Habit

One last point, which I hesitate to mention for I feel sure that it will be misconstrued, is a peculiar habit of the female. First, let me state quite clearly that the fish is in perfect health and a very robust specimen. Having made this quite plain, the following should be of interest: I have repeatedly noticed that when the amount of available food in the tank was sparse this fish has, by dint of considerable effort, turned herself completely upside down, when, by swimming at a slight angle to the bottom of the tank, the eyes were brought into use in the quest for food, and when this was found, probably in some corner of the aquarium, the correct position was again adopted and the food devoured. On some occasions she has failed to turn over at the first attempt, but by repeated efforts, sometimes quite violent, she usually has achieved her object in the end.

The eyes of these fish are certainly very sensitive for they react more violently to flashlight when being photographed than other types, and their power of vision is by no means defective as is the case with "globe-eyes." Of course, I am aware that many of the fish-wise personalities will scoff and say: "Swim bladder trouble!" In answer to that I can only say that you cannot keep and breed fishes for over 30 years as I have done without recognising a deliberate movement from one caused by imbalance.

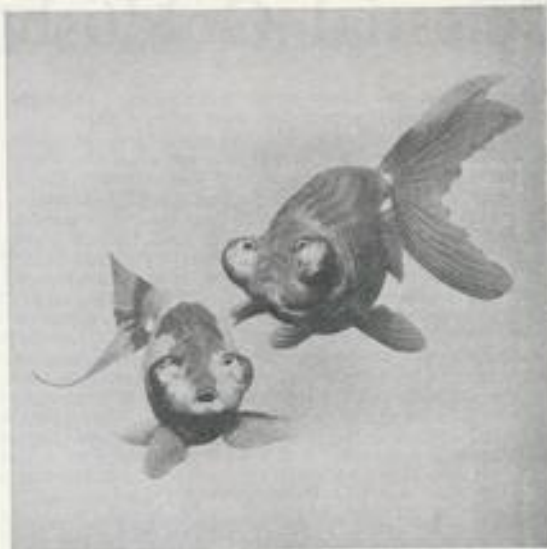


Photo:

Laurence E. Perkins

The pair of celestial goldfish pictured above and on the front cover of *The Aquarist* this month are the parents of the fishes whose development is described and pictured in the article by Mr. N. E. Perkins overpage

## In the Water Garden in JANUARY by ASTILBES

WHEN the weather is fairly open it may be possible to make some alterations or additions to the pond. The provision of a fountain or waterfall is a splendid idea, as this can make a great deal of difference to how the fishes behave during the breeding season. Extensive experiments have proved that it is when the water is well oxygenated that the fishes are encouraged to spawn. Foul water is the worst condition in which to try to get fishes to spawn. Abundance of oxygen incites the fish to make the spawning effort and the times when they might spawn are to a great extent governed by the freshness of the pond water. If one is attempting to breed golden orfe it is imperative to see that the water is of a crystal clearness and well charged with oxygen.

A fountain can help considerably towards this end although it must be realised that the provision of a fountain alone is not the only point to watch. If the water is very foul through pollution from decaying food or dead leaves in excess, it is not likely to be helped much by a fountain. This can help to introduce more oxygen to the water, but there will still probably be a lot of foul gases which cannot be eliminated just by the working of the fountain while the causes of the foulness are still present. It is not necessary to disturb the water too much as water lilies like a still pond, and running water is quite unsuitable for them. However, a small fountain or waterfall working is not likely to be enough to upset them, especially if pumps are not used for too long a period each day.

If one has been able to construct two ponds of slightly varying heights it is possible to make a small waterfall from one to the other. To lift the water from a lower pond to the higher one a small electric pump can be installed. Most of these types of pump are not suction pumps but

drive the water by means of a type of propeller. The trouble with this type is that they have to be primed before they will work properly. That is, there must be some water in the propeller chamber to create the first flow. Once the water starts to flow all is well, but if the pump is switched off the water can run back and the pump will not work again when switched on; a foot-valve should, therefore, be fitted at the intake end. This usually has a screen to prevent filth from blocking up the flow, and inside a ball valve to operate to prevent the water flowing back from the propeller chamber when the motor is switched off. Unless this ball valve is kept clean and operates correctly it will cause a lot of trouble when you wish to start the pump working again. A good plan is to see that the pump is at a fairly low level so that the water does not have to be drawn up to any height before reaching the thrusting point. The intake valve should never be so placed that it is likely to draw up mud from the bottom or get tangled up with a lot of water weed.

When a pump is fitted to cause a waterfall from one pond to another see that an overflow is correctly adjusted from the higher pond, with a small screen to prevent small fishes from being washed from one pond to another. If a second and coarser screen is fitted a short distance away from this one it will prevent floating rubbish from clogging the finer screen. Attend to the screens occasionally to make sure that the water is flowing through easily.

Types of pumps for working a fountain can be obtained which can be inserted into the pond, working on a suction method. When this type of pump is used make quite sure that the inlet pipe is well protected from mud, etc., as otherwise you will always be cleaning out the strainer; again, a double one is the better type to use.



# Common Faults in Aquarium Apparatus

**F**EW things annoy the aquarist so much as a failure of one or more items of his electrical equipment. If he is available at the time, and has a "spare" handy all is well, but otherwise trouble and loss result. Even the best heaters and thermostats fail at last, and the wise aquarist will bear in mind how long they have been in use and not expect them to last forever without replacement or repair. One dealer I know who has many tanks periodically sells off his heaters and thermostats at a low second-hand price, and replaces with new stock, thus avoiding a great deal of the risks following deterioration and wear and tear. Heaters should never be moved about from tank to tank once installed; thermostats too are best left undisturbed.

Most failures are due to one of two causes, inherent faults in manufacture and weakness in design, or careless use by the aquarist himself. Many instruments are covered by a guarantee by the makers for a period, but once this has expired only a very few makers take on the repair of even their own damaged equipment. However, a repair service for heaters, thermostats and pumps of both English and foreign makes is run by Horton and Warburton, 10, Warwick Road, Romiley, Cheshire. This firm has dealt with many thousands of repairs from aquarists all over Britain, and I thought it would interest readers to hear their views on the more common failures. Mr. L. Warburton very kindly went into the subject at some length and I have tried to summarise his remarks below.

## Faults in Manufacture

Heaters often fail due to water seeping into the tube, often as a result of the bung being a poor fit, or the cable being a poor fit in the bung. Other reasons are inferior clay formers, damp clay formers in which moisture was present from the start, perishing of internal wiring, also poor internal connections, which result in the heater failing to function in a very short time. Still other faults are where the heater is huge and cumbersome or too tiny for the power output. Mr. Warburton considers the ideal size to be 6 in. by  $\frac{1}{2}$  in. diameter.

Thermostats are made in so many differing forms that each needs to be considered on its merits. The totally submersible type seems to give most trouble because of imperfect sealing between tube and bung. The type in which a metal body is used with small insulating washers seem to be unusually susceptible to traces of damp. The partially submersible types with a top control knob frequently suffer from badly fitted bungs or threads which allows condensed water to seep in. There are some cheap models which have no easy adjustment of differential, with the result that they give too great a differential or else it is so small that the points burn out. Thermoplastic-bodied types tend to distort and alter the setting under constant warmth from the tank. External type thermostats are very good, on the whole, but provision is not usually made for preventing damage by water running down the tank side and into the instrument.

The majority of air pumps are quite well designed and strongly constructed. The small plastic models are very prone to casing damage and are far too small for the work required of them. Piston pumps are really excellent machines but need rather more lubrication and maintenance than the average amateur is prepared to give.

With heaters a lot of trouble originates as a result of excessive camouflage: partial burying and/or screening with rockery; this leads to overheating. Freedom from rapid convection of the water is essential. Standing a heater vertically in water often causes the bung to perish owing to heating by rising water. Heaters should always be horizontal or slightly inclined with the cable at the

higher end. Damage is possible with the cable at the lower end if any small amount of water enters. Carelessness with plastic cables may cause a puncture, letting water in which then runs down inside the cable and into the heater. This is a very much commoner fault than is generally recognised. Treat all cables with care. Apart from this, plastic cables are far superior to rubber. Heaters should never be connected up before immersion as this can cause a serious explosion; when tested at purchase the heater should be immersed in tank water.

Thermostat damage generally falls into two classes: damage by water and damage to the points. The former is caused either by original faults in the instrument, or more often by placing it where condensed water can drip on to it. All partially submersible thermostats should be placed at one end of the tank and the canopy or cover glass should not extend over them. The so-called totally immersible instruments will last very much longer if treated as partly submersible so that the bung and cap are kept clear of the water. There is no technical advantage in total immersion, as any thermostat is better placed at the top of the water level to avoid overheating if layers of water at different temperature occur. This is particularly noticeable in fry tanks where the fish are too tiny for their movements to stir the water.

Damage to the points of the thermostat occurs either by too fine adjustment of the differential (so that it has no definite snap action) or else by overloading the instrument. Few popular models are able to handle much more than 200 watts safely on A.C., and correspondingly less on D.C. current. The differential should never be set at less than plus or minus  $1\frac{1}{2}$ ° F, that is a total range of 3° F. Aquarists whose tanks are always at the same temperature usually get thermostat trouble pretty soon.

## Air Pumps

The majority of air pumps are very much overworked. Constant use is detrimental, especially in the smaller types, as the heat perishes the rubber parts. (A splendid idea is to connect the pump in parallel with the heater so that it operates only when the thermostat closes.) Another common fault is to employ a large pump to work only one diffuser stone. This is usually done by restricting the flow of air with a clamp on the air-line, and results in a great back pressure in the pump. Few pumps are made to deal with this (except heavy-duty types) and the diaphragm suffers. Many breakdowns are caused by dampness, so all pumps should be kept well from tanks, and preferably above water level to prevent any risk of siphoning back. Once a drop in air output is noticed a pump should be repaired. A quicker and cheaper repair is possible than where a pump has been allowed to be worked to the point of utter collapse.

Mr. Warburton now operates a pooling service for heaters which means that when a faulty heater is sent in a fully re-built heater (sometimes completely new) is sent off within a day or so, this eliminates long delays. Aquarists who insist on their own heater may have to wait four to six weeks. A standard charge of 4s. 6d. is made for repairs to heaters, for thermostats a quotation is sent by return. Prices naturally vary considerably but are never more than half the original cost and often much less. Mr. Warburton makes a very good point when he mentions that all plugs, sockets and connections should be removed from apparatus before it is sent anywhere for repair as this saves time and postal charges. Equipment should also be adequately packed to prevent damage in the post.

*Raymond Yates*

# Angel and Fighting Fish Diseases

by EARL SCHNEIDER

(New York, U.S.A.)

**M**OST noticeable symptom of the disease conveniently designated as "angel fish disease" is persistent refusal of members of this species to eat. In the early stages of the trouble fish will rush towards food and sometimes take it into their mouths; it is however, then ejected again without any, or little, being ingested. After ten days to two weeks even this abnormal behaviour is not shown, for all interest in food ceases.

Symptoms of starvation next appear, and are apparent to the experienced eye about ten days later. The stomach region between anal fin and modified ventrals assumes a pinched appearance as though it had been squeezed between finger and thumb. Colour, up to now normal, becomes intensified: the black becomes ink-black and the light areas are silver-grey. The affected fish usually assumes a characteristic position, with head facing upward and close to one corner of the aquarium. Death follows shortly after this, the entire course of the disease taking approximately six weeks.

This trouble appears to be confined exclusively to fish of the genus *Pterophyllum*. Other fishes in the same aquarium are unaffected by the sick angel fish, although when the symptoms appear amongst angel fish in a collection it is almost certain that the other angel fish in the same tank will become affected if remedial measures are not taken. Only close observation will reveal the onset of this complaint, so that early action is not always possible.

## Possible Cause of Angel Fish Disease

Investigators have at different times examined the intestinal tracts of angel fish showing the characteristic symptoms. Several different bacteria have been found in different specimens and the disease has variously been attributed to each of these in turn. My own experience and observations cause me to disagree with the belief that a single, particular causative organism is responsible.

"Angel fish disease" has appeared almost exclusively in



Photo: Laurence E. Perkins  
Angel fish are sensitive to water pollution and refusal to feed may be a symptom of this condition.

aquaria showing an excess of decomposing organic matter. Such aquaria are almost invariably also acidic in reaction from the large amounts of carbonic and organic acids formed during decomposition; hydrogen sulphide is also usually present in solution.

Sensitivity of angel fish to impurities in the water is well known. It is probable that the presence of these impurities, which would serve as toxic depressants, together with the large numbers of bacteria and Protozoa which thrive under these conditions, combine to cause the symptoms that are seen in angel fish disease. This is substantiated by: 1, the fact that angel fish in clean, well-balanced (the term is used here in its broadest sense) aquaria rarely develop symptoms of the disease; 2, fish showing early symptoms of the disease can almost invariably be cured by removal to a more suitable aquarium.

Cure of the disease can also be accomplished by siphoning the gravel from the tank and by adjusting the water reaction to near neutral by the use of sodium bicarbonate. These facts taken in addition to the failure of microscopic examination to disclose any consistent pattern of infection with one particular micro-organism appear to justify the explanation given above.

## Copper in the Prevention of Disease

The practice of keeping a small amount of copper sponge in the aquarium at all times when angel fish are the only species present will usually prevent the disease from appearing. The amount of copper to be employed as a prophylactic measure is 10 grams of copper sponge to 15 gallons of water; pure copper is used, not copper-plated iron.

Another disease prevented by the use of copper in an aquarium is the "Betta or fighting fish disease." To the unpractised eye the symptoms appear identical with those of velvet disease, which is caused by infection with *Oodinium limneticum*. Colours of the fish fade gradually, the fins become translucent, and it swims in a listless manner. In the later stages the fighting fish lies almost continuously on the bottom, rising only at infrequent intervals to gulp a bubble of air; death follows shortly after this stage.

"Fighting fish disease" differs from velvet disease in that it can be transmitted only to other fighting fish; velvet disease is highly contagious to all species of fishes. The causative organism of velvet disease is known, but the reason for fighting fish disease is undetermined.

I have found it advantageous to keep small amounts of copper in the aquarium with male fighting fish that are segregated. Four one-cent (U.S.A.) pieces are used in each quart of water and *Betta* treated in this way retain improved colour and remain aggressive for longer periods than fish without copper. This constant bath in copper solution in no way injures their reproductive capacities; *Betta* that have spent months in the presence of copper breed as freely as untreated fish.

**EDITOR'S FOOTNOTE:** In the article "Copper in the Treatment of Diseases" by Mr. Earl Schneider (*The Aquarist*, August, 1955) we stated incorrectly that the American one-cent piece is slightly larger than our farthing; in fact it is slightly smaller. The true comparison between the two coins, for use in the way suggested by Mr. Schneider, should, of course, be made from their copper contents.

## OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

Will any trouble ensue if I set plants in my new aquarium, but refrain from introducing any fishes into it for a matter of about six weeks?

It is a most praiseworthy practice to plant a tank several days or weeks before introducing any fishes into it. The absence of fish life permits the water to attain crystal clarity, and the plants to throw out roots and get a firm anchorage in the compost. When plants are introduced after the aquarium has been stocked with fishes, the aquarist often finds it difficult to keep the plants in place on the bottom.

My aquarium is situated in a poorly-lit basement. How much artificial light must I use to keep the fishes and plant life in healthy conditions?

Your aquarium will need about seven or eight hours of bright electric light every day. The strength of the bulb or lamp depends on the size of your aquarium. If your tank measures 24 ins. by 12 ins. by 12 ins., we advise you to fix two 40-watt bulbs just above the surface of the water. If the tank measures about 18 ins. by 12 ins. by 12 ins., one 40-watt lamp should suffice. Plants that grow well under electric light include *Sagittaria natans*, *Cryptocoryne* species, Amazon sword plant and fine-leaved willow moss.

A week or two ago my heater broke down and the temperature in the aquarium sank to a low reading on the thermometer before I was aware that anything was amiss. Now I have noticed that the fish are rubbing themselves on the sand and against the plants and sides of the aquarium. Do you think they have contracted some disease?

A sudden drop in the temperature of the water is bad for fish. We rather suspect that your fishes have contracted white spot disease. If they have become affected by this disease, you will notice tiny white spots or specks on the fins and body. Treatment consists of raising the temperature of the water about five to ten degrees above normal and keeping it high for at least a week to a fortnight. During this time, siphon some of the water from the bottom of the aquarium every day. Top up with boiled water allowed to cool down to the same temperature as the aquarium. Keep the floor of the aquarium free from sediment, uneaten food and decaying plant life, and keep the fishes' strength up by feeding them with chopped earthworms, *Tubifex* worms, scraped raw liver and the like.

I have been told that cichlids breed more readily in acid water. How can I make my aquarium water acid without adding corrosive salts?

Obtain some peat and empty it into several glass or earthenware jars. Pour hot water into each jar, and set the jars in some place where they may remain undisturbed. After a few days, the floating particles and lumps of peat will sink to the bottom, and the water in the jars will take on a brownish or amberish appearance. Strain this water through fine muslin into the aquarium, where it will create an acid condition, and act as a tonic for both fish and plants.

During the last two months I have lost several fishes. Some of them have developed protruding eyes; I have found some of them with the eyes missing altogether. Can you please give me some clue as to what is wrong in my aquarium?

Protruding eyes in fish may be caused by certain conditions of the water, natural or brought about by adding ammonia to the water; or by definite disease. But the eyes of fish do not vanish suddenly of their own accord. Perhaps you have a vicious species in your aquarium? Some bad-tempered and brutal species do little harm during the hours of daylight, but directly darkness falls, they get into mischief. Paradise fish are the sort of fish which often cause trouble in a community of smaller fishes. Most vicious fish attack the eyes of other fishes because they are soft and make tasty tit-bits. Next to the eyes, the gills and soft underparts are favourite portions of the anatomy to attack.

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

My 36 ins. by 12 ins. by 12 ins. aquarium is under electric light all day. I use two 40-watt bulbs in a white enamelled reflector. But though the plants I put in flourish well for a time, after about six weeks they turn yellowish and dwindle away. Please can you tell me why my plants do not grow and multiply?

The amount of light you are giving your plants is not bright enough for the majority of species. For a tank such as you have you need a lamp of at least 100 watts. But some plants will grow quite well in a subdued light. The following should do well in your conditions: *Sagittaria natans*, *S. sinensis*, *Fontinalis gracilis* and the various *Cryptocoryne*.

Please can you give me some information about breeding harlequin fish?

The harlequin fish is not among the easy-to-breed species. The species needs acid water and a clean floor planted with broad-leafed plants such as *Cryptocoryne griffithi* or *Sagittaria sinensis*. The temperature should average about 80° F. The light entering the aquarium should be soft, and if the aquarium is illuminated from overhead, the surface of the water should be carpeted with *Riccia*, *Salvinia* or similar floating vegetation.

Do you think angel fish are suitable for inclusion in a community tank?

Angel fish make decorative additions to a community tank, but they should always be placed with fishes of about their own size. Large angel fish often develop into nasty bullies, and, besides, they will soon kill and eat tiny species such as guppies and some of the smaller characins or tetras.

For some time now I have kept a small tank of tropical fishes, but I have become more ambitious and have purchased a tank measuring 36 ins. by 15 ins. by 15 ins. I intend to use two electric heaters to keep the water warm. Can you tell me the best position to fix the heaters to give uniform heat in the water, for I have been told that "cold spots" often occur in large aquariums?

Place the heaters in a horizontal position close to the floor of the aquarium. The best position is about four inches from each end of the aquarium. The heat will rise through the water and maintain a fairly uniform temperature throughout its volume.

I should like to try my hand at breeding *Anostomus anostomus*. Please can you tell me something about the conditions most suited to this fish?

Very little is known about the breeding habits of this fish, but we do know that the species likes plenty of swimming space in clear water lit by a bright overhead light broken into patchy shadows by floating plant life, or strong-growing plants rooted in the compost. The fish likes a temperature of about 80° F., and a varied diet. That is to say, chopped earthworms, mosquito larvae, *Daphnia*, scraped lean meat, minced shellfish and similar items.

Can you give me the breeding requirements of *Corydoras melanistius*?

*C. melanistius* spawns more readily in alkaline water than in acid water. Some flat pieces of stone, broad-leaved plants, or scrubbed flower pots should be introduced as furnishings. Temperature should average about 72° F. A

bottom. The male cleans a spot on leaf or stone, or even inside an overturned jar or pot, on which the female deposits her eggs. In a few days the eggs hatch out, and directly the fry become free-swimming, they drop down into the sediment where they will hunt for tiny live food such as Infusoria and micro worm. Though the parent fish rarely molest the eggs, it is advisable to remove them to another aquarium after they have spawned. *C. melanistius* is not such a ready spawner as *C. paleatus* or *C. aeneus*.

A few weeks ago I had about 200 baby angel fish in a large tank. I removed the parents after the eggs hatched out. Soon after the fry became free-swimming, they started to die off, a few at a time, every day. Now I have only a few left. Can you tell me the reason why the babies should live for a short while, then die?

It is always easier to spawn fish than to raise the fry to maturity. So many things can kill fry. For instance, a sudden drop in the temperature of the water, insufficient live food, live food which is too big to be eaten, or too small if the fry have reached a good size, too much bright light, a scum on the top of the water. It is wise to remember all

these details, and make sure the surroundings are suitable for a strong species being bred. Baby angel fish do not care for a strong light or unclean surroundings. Artificial aeration helps them to survive the most difficult period of their lives, and rather shallow water kept free from oily scum gives them a chance to gather strength and develop their tiny bodies.

I have a community aquarium housing a collection of small brightly coloured fishes—the pride of my eye. A dealer suggested that I should add a Siamese fighter to my collection. I took his advice, but soon discovered that the fighter was killing some of my most cherished fish. Did I pick a bad specimen, or are all fighting fish risky to keep in a community tank?

Fighting fish usually behave themselves when placed with fishes of about their own size, but they are definitely untrustworthy to have around in a tank containing small species such as zebra fish, male guppies and the like. The damage is usually done at night; that is, after dark, when some of the smaller fishes rest close to the surface of the water. For then the fighting fish glides up to them, and, in a split second, snatches out an eye, or rips a gill-cover to shreds. We always think fighting fish are better kept on their own.

## COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

I have a garden pool where some common goldfish have bred this year. The young ones are about half an inch long and I have netted and transferred about fifty to a tank in a cold greenhouse. I understand that the older fishes would have eaten them. What can I feed them on and is it necessary to keep them at a certain temperature during the winter?

I think that as the fry had reached the size of half an inch they are not likely to have been eaten by the parents. It is when they are very tiny that they are usually eaten. Providing the parent fish are well fed on a good mixed diet there is not much fear of them eating the young ones when these have taken on the adult form. I find that many eggs are eaten, and so are freshly hatched fry. Once the fry become real little fish and not a resemblance to mosquito larvae, they are not nearly so likely to be eaten in a pond. The amount of cover and the size of the pond make a great deal of difference however. Now that you have caught some you will have to give them special care to get them through the winter. Fifty or so youngsters will need plenty of room in which to develop. Unless they have space they will not thrive. You will only be able to keep about a dozen such fish in a tank 24 ins. by 12 ins. by 12 ins. Also, if the greenhouse is unheated, in a freeze-up the tank, if glass-sided, can crack. You had better find some form of heater to use when severe weather comes to prevent this, but there is no need to provide special heat for the fry. You must realise that they are not likely to grow much through the winter if too cold, and they will not need so much food. Your fry are large enough to feed on small types of packet foods. Any live foods such as *Daphnia* and mashed small worms can also be given. It is always safer to feed such fish on live foods if it can be done during the winter.

I have made a new pond. What do I "kill" the lime in the cement with?

This question crops up many times every month and I always appear to be answering it, but still more enquiries come in on the same matter. Normally, it is sufficient to scrub round the pond with a stiff brush about three times, washing out the pond and wiping any whitish substance from the concrete. This is usually enough but it is a good plan after the scrubbing to leave the pond filled with water for a few days. Then when emptied and re-filled it should be quite safe. Remember that the greater the extent of the concrete surface in contact with the water the stronger can the lime content be and vice versa.

My coldwater fish have suddenly started acting strangely. They have been all right for three years and now they lie on the bottom with their fins folded, can you tell me the reason?

It is difficult to suggest the exact cause. You can probably find it yourself if you go over all you have done differently in recent weeks. Have you given any strange food, has there been a good deal of smoking in the room where the fish are kept, has any fresh painting been done, has the source of water changed in any way, has any copper been allowed to come in contact with the water? If the fish were just lacking oxygen they would mouth on the surface. Their action rather suggests some form of poisoning. I should remove the fish and clean out the tank. Use fresh water and make sure that the source is quite pure. When one has kept fish for some time and then something suddenly goes wrong, it is generally due to something which has been done out of the ordinary either deliberately or accidentally.

I wish to make a raised pond in my garden and have two queries. One is what is the best kind of stone to use and how can I make it waterproof, and the second query is, how can I ensure that there is no leak between the joints of the vertical and horizontal planes?

The pond can be built up either with bricks or stone. You should use that which matches best with the remainder of the garden. The waterproofing of the whole concern is done by floating over the inside with at least an inch of good concrete made with one part of cement and two of sharp, clean sand. If the base is laid and then the sides worked on in one operation there should be no leaks at the joints. Once some of the cement starts to set or go off it is almost impossible to make a waterproof joint. The quicker the whole inside can be coated over the better.

I have been experimenting with some young uncoloured fantail goldfish to see if the application of ultra-violet rays would hasten the colour change. I found that the fish so treated did not change colour as early as some of those which were not so treated. What is your opinion of artificial aids to the colour change?

I think that I have stated before that I do not advocate the use of any artificial aids to colour change in young scaled goldfish. Even if you were able to hasten the process it would make no difference to the young, which might be bred from some quickly-changed fishes. I prefer to breed for a quick colour change. That is, I only use for breeding purposes those which have a quick natural colour change.

As for your experiment, I do not think that it was of much value. In any hatch of youngsters you will always find a few fish which change colour very early and some which change very late. Between these extremes you have many which take about nine months. When you choose your subject for the experiment you may have taken a fish which would have taken a long time to change under ordinary circumstances or vice versa. The only fairly sure way to carry out such an experiment would be to take at least a dozen fishes from the same hatching and treat them with the U.V.R., and the same number for ordinary treatment. Only then would you be able to form anywhere near reliable conclusions.

Recently I noticed that a portion of the compost at the bottom of one of my tanks had turned black, and on removing it I noticed a vile smell. I usually feed *Tubifex* worms to the fish over this spot. Do you think that some may have crawled into the compost, died and decomposed, thus causing the trouble?

The black patch is not an unusual occurrence in a tank. It is generally caused by the decomposition of some uneaten food. I do not think the *Tubifex* worms got into the compost and died. They may have been dead when fed to the fish. If they were alive when they entered the compost there is no reason why they should not live and help to clear up the trouble. Generally if less food is given to the fishes for a time the blackness will clear up. You might siphon out some of it together with some compost and then top with some clean coarse sand. Often the roots of the water plants will assist to keep the mulm fairly sweet.

I am contemplating buying a house and find that the water system uses copper pipes. Will tap water drawn through these pipes affect my fish? If so what can I do about it?

You might first of all enquire of the Water Board of that district if their water is hard or soft. If the former there may not be such danger to the fishes as lime deposits would have probably formed on the insides of the pipes, thus sealing off some of the dangerous effects of the copper. I do not see how you can make the water quite safe for fishes and I think the best plan would be to catch rain water in containers, not directly from a roof unless after heavy rains.

This should be safe. If you take the rain water from a butt which catches water from a roof it is possible that this may be contaminated by soot and sulphur from smoke. After heavy rain, when the roof has been well washed, it would be safer to catch some water for your tanks.

I put twelve shubunkins in my pond, 6 ft. by 4 ft. by 3 ft. deep. At intervals since I have lost fish until I have only two left. They have not died of fungus but they remain stationary at the surface, opening and shutting their mouths, gasping, and within 48 hours die. The only other occupant of the pond is a newt which I am unable to catch. Can you tell me why the fish died?

From your description I think the fish died through impure water in the pond. The actions of the fish suggest lack of oxygen in the water, or an excess of carbon dioxide or other poisonous gases. It is difficult to say what has caused the trouble. You say you added a dozen snails when the pond was made; these may have died and assisted the pollution of the water. You may have been over-feeding and the uneaten food has turned the water foul. Some insecticide or poisonous leaves may have got into the pond. In any case the water is foul and in such cases fishes soon die and rarely show any signs of cause of death. If fish get insufficient oxygen they gasp at the surface and then turn over on their sides. If they can be immediately placed in fresh water they soon recover and within a few minutes are swimming around as if nothing had happened. The newt would not harm the fishes. Newts can only eat fairly small fry and do no other harm. They come to the surface to breathe once they are fully developed and so take no oxygen from the water. You could catch the newt by waiting with a net, as having to get air they must break the surface of the water at fairly frequent intervals.

I have a small sunfish in a tank by itself and feed it on live foods. It is healthy and the tank keeps clear but what is troubling me is that the gravel on the bottom is covered with a soft algae. Will this do any harm and if so how can I get rid of it?

The filamentous algae will do no harm and in my opinion will do a certain amount of good. It is a plant and so can give off oxygen in the daylight to the benefit of the fish. Again it has the habit of attracting foul matter to it and utilising it. By this the purity of the water is improved.

## FRIENDS & FOES No. 42

### TRICHOPTERA (Continued)

LAST month we very briefly discussed the imagines and their breeding habits. Now we can consider the eggs and the larvae of caddis. It is impossible to depict a "typical" egg or larva. They differ widely in appearance and habits. For the moment let us confine our attentions to those species whose eggs are commonly found under water lily pads.

The eggs may be greenish, and enclosed in a soft, completely transparent, jelly like mass, hanging in a globule from half an inch to three-quarters in diameter. Individual eggs may be the size of a pin-head. Against the green background of the lily pad the whole capsule may be invisible to the untrained, casual searcher.

Lying close to it may be another, much harder capsule, about a quarter of an inch across, adhering flatly to the leaf. As the outside is slightly adhesive, small pieces of floating vegetable matter may obscure the contents from the observer. Inside the capsule will be found the eggs, arranged like a string of minute pearls in a surprisingly consistent and orderly manner.

## Caddis Flies



Views from above (left) and the side (centre and right) of two types of Caddis egg clusters on water surface

On the same leaf there may well be yet a third cluster of eggs, covered by the thinnest transparent membrane, and arranged in rows, of no set size or overall shape, but extremely orderly and neat.

Once the eggs are found, pieces of the leaf bearing them can be removed and brought home, where, if placed in a little water, development of the eggs can be observed. Part of each capsule can be removed from the leaf and observed under the microscope with a low power objective. Removal does not stop their development, and actual hatchings can easily be seen. These may take place within a few days or after several weeks, depending upon how old the eggs were when discovered.

C. E. C. Cole

Some dwarf *Sagittaria* might help if planted liberally but the introduction of one small goldfish might solve the problem. The goldfish would browse over the bottom of the tank sucking up the stones and cleaning off the algae. The sunfish is not a bottom feeder, and so most food that falls to the bottom of the tank would not be eaten by it and could encourage the growth of the algae.

**I have found a good pool for *Daphnia* but I am rather concerned as among the *Daphnia* there are many "phantom larva" and I am wondering if these are harmful to the fishes?**

Aquarists call these creatures glass worms and use them for feeding fishes, especially tropicals or young fancy goldfish. They are the larvae of a small insect like a midge and are called *Chaoborus*. These long, almost transparent worms remain still in the water in a horizontal position, and then suddenly give a flicking movement and dart quickly elsewhere. They live through the winter and in some cases may be found in quantities under the ice of a pond in the depth of the winter. They are good food for fishes but as they are carnivorous they should not be introduced where there are any small fry.

**I have bought four green tench which have developed what I think to be white spot. I intend to get some rudd and goldfish to put in with them. The tank is 24 ins. by 15 ins. by 12 ins. and I am treating the tench with quinine sulphate according to the directions given. Will this cure the white spot and will the fishes named mix?**

The quinine sulphate can cure the white spot but the difficulty is that this parasite lives under the skin of the fish for a time, when it cannot be attacked by any chemical, as what might kill the pest would kill the fish. After a time the parasite leaves the fish, drops to the bottom of the tank and encysts. After a short period a change or partition takes place within the cyst and many new small parasites emerge and swim about searching for a fresh host. It is at this time that they are best attacked by your preparation. Difficulty arises when treating coldwater fishes as the development of the parasite is considerably hastened by warmth. It is not always safe to raise the temperature of the water for coldwater fishes to more than about 80° F. However, it is possible to do this gradually, and, in fact, in hot weather your indoor tank may be at about this level. It is a good plan to change as much as possible of the water each day, removing it by siphoning all over the bottom of the tank. The fishes you mention will mix all right but on no account put clean fishes in with the contaminated ones. Any fish which is attacked by pests or is ailing is better kept apart from the other fishes.

**I am trying to get some good young veiltails, and wonder if you can recommend me where to obtain them; I want the best I can get.**

I cannot tell you where to obtain good veiltail youngsters. If there are many about I seem rarely to see them. It is a fact that fancy goldfish of good quality are very scarce and the reason is that for every good fish bred a hundred will turn out not so good. A show specimen turns up about once in every five hundred. You might think that I am exaggerating but it is a fact. Most breeders are always trying to breed the perfect fish and improve their stock. If they only get a few good ones they like to keep them for themselves, and who can blame them? The trouble is that most aquarists want to start at the top and have no patience to wait and breed up their own strain. Any fishes from a good strain are capable of breeding fishes as good or better than they are themselves, as they have been bred right and carry the genes of inheritance to pass on good ones like their predecessors. Do not be too fussy and try to buy perfect fish, but be content with some from a good stock; no matter what shape they are they can turn out something good. To give you an idea of how scarce the good veiltails are I can quote from my own recent experience. I was judging at a large show the other

## Activated Carbon

**What is "activated carbon?" How is it different from ordinary charcoal; is it advisable to mix carbon with the aquarium compost; does it react with water and how are fishes affected by its presence?**

Activated carbon is a specially prepared form of charcoal that has a greater porosity and therefore greater absorbing power than untreated carbon. It could be said that "activation" clears out materials which block many of the fine channels in ordinary carbon particles, thereby increasing the total area over which absorption can occur. No reaction takes place between carbon and water but some dissolved matter in the water will become attached or adsorbed on the carbon. There is no real advantage in mixing carbon with aquarium compost since it would soon become saturated with adsorbed material; in a filter it can be renewed periodically so that there is a continual removal of dissolved solids. This process may not be altogether an advantage since water plants are dependent for growth on some of the materials which carbon removes. Fishes are not affected by the presence of carbon except, of course, when an improvement of water condition occurs by its use in a filter working in a polluted aquarium.

week and in the coldwater breeders' class only four fishes were required instead of the usual six. Believe it or not, there was not a single team of four fishes exhibited which was near perfect, each team having at least one fish with a joined tail or other obvious fault.

**I have a small pond about twelve feet in diameter and I want to put some goldfish in. The pond is covered with a growth the locals call "duck weed." Will this harm the fish and how can I get rid of it?**

If the growth is duck weed (*Lemna*) it will be harmless to your goldfish. In fact, if given no other food they may clear it all up; some fishes, however, are more fond of it than others. You can clear much from your pond by playing a strong hose on the water, forcing the weed to one side. It can then be raked out. Also much of it can be netted out with a landing net. If the pond can be over-filled much of the duck weed will be washed away. You will probably find that the water in the pond will be very clear, as the duck weed excludes the light and prevents the growth of floating algae which makes the water look green.

## Cacti in the Fish House

**W**ATER pans containing cactus seeds by allowing them to stand in a pan of warm water, not too deep, but try to ensure that all the water can be drawn up into the pot. When drained, place the pan in a temperature of about 70° F. and cover the top with a piece of glass. Cover this with a sheet of brown paper, as the pan must be kept dark until the seeds come up. Many cacti can be up in about eight days, but some kinds take longer. Once some are up the cover must be removed but the seedlings must not be exposed to strong sunlight or they will scorch and growth will cease. Once the seedlings are growing well they may be transplanted into larger pots or pans. Where large pots are used it is possible to place several around the sides, where they will thrive well. Do not place these small seedlings into tiny pots. They may look quite novel but they do not grow very well unless the roots have plenty of room. As the proper spines develop the seedlings can be gradually placed where they can get some sunshine.

# our readers

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

## Daphnia Culture

I WAS interested in your experts' answer concerning *Daphnia* to the query published in your September issue. Though it was not mentioned, the greatest need for *Daphnia* culture is in winter time. I have kept *Daphnia* all the year round for several years now, sufficient to feed eight 24 ins. tanks that are well stocked, twice weekly in winter and almost daily in summer.

In summer I use a large beer barrel sunk in the garden, and four old glass 16 ins. by 14 ins. by 14 ins. electric storage cells are used in rotation in the fish house during winter. Nothing from the fish tanks is wasted—mulm, detritus, dead aquatic leaves, all are put in the containers to foster micro-organisms which support the water fleas. The glass cells are not artificially aerated or heated, and each one has a piece of decaying wood in it. As I draw on each cell in turn, I filter off the fleas and use the beautifully clear water to top up my aquaria, replenishing the cell with water from the outside tub, which is kept filled by nature.

According to identification points from *British Cladocera* (British Freshwater Biological Association) my cultures include both *D. pulex* and *D. magna*.

J. McCORMICK, Blackburn, Lancs.

## Bedroom Pets

IN the August issue of *The Aquarist* a query was published from a writer who wondered whether his daughter might keep an aquarium in her bedroom. For the benefit of all readers in doubt as to the happiness and health to be derived from animals in a bedroom, I humbly submit the following list of animals in my bedroom as being of undoubted value to the well-being of anybody sufficiently interested in keeping them: two freshwater community tanks of 60 and 90 gallons; three marine tanks; one vivarium containing three Indo-Malayan tokay geckoes; one vivarium for an emerald tree boa; one vivarium for two seven foot indigo snakes; one vivarium with two poisonous copperheads; one vivarium with two Egyptian horned vipers, now old stagers and with poison apparatus in excellent fettle; one vivarium containing a very robust five foot Indian cobra guaranteed to leave all impudent enough to challenge it, cold and stiff in death; one tank with a yard-long electric eel, and a small vivarium with one desert hairy scorpion in it.

JOHN BOURSOR, El. Salvador, C.A.

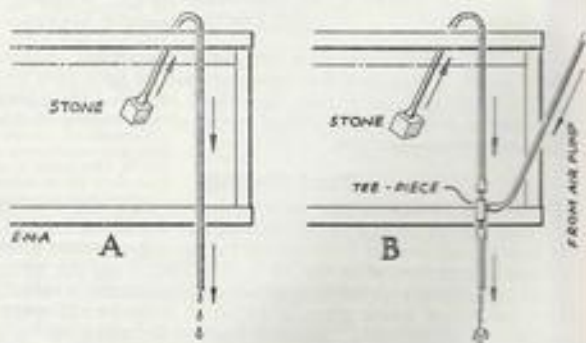
## Feeding Fry

WHEN feeding large quantities of Infusoria to newly hatched fry it becomes necessary to lower the water



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

level by some method which does not siphon out the fry. My method is to use a diffuser stone at the required level, as in figure A. This will only siphon slowly and will stop when the water level reaches the top of the stone. The



flow can be speeded up by connecting the air pump to a T-piece connection, as in figure B; the lower limb of the siphon limb should be fairly short for this to be successful.

ERIC WALLWORK, Wolverhampton.

## Society Incentives

IN "Aquarist's Notebook" for November, 1955, Mr. Raymond Yates described a new idea from Canada concerning a society challenge trophy. This idea has been in operation in the Dublin Society of Aquarists since the Founder Chairman presented the "Society Shield" for annual competition. It is awarded each year to the member with most points for attendance at meetings, shows, socials, etc., for showing fishes or acting as an official or in any way which will benefit the society.

We find this a very good idea for it helps to encourage members to put their best feet forward (but not what a "head" for the poor score-keeper; however, he gets some extra points for the job so—why worry?). Other schemes we have instituted are a tank-making class—aquarists are not easy to buy over here—and an "S.O.S. service." The latter was started chiefly to deal with outbreaks of white spot disease but now we may be called at any time during the 24 hours to help with almost anything. (When one is called from a warm bed at 7 a.m. to take in a registered wedding-cake box only to find a very dead goldfish with a

note asking why it died inside, it can be guessed where one hopes the poor fish is!)

May we take this opportunity to wish all our English friends who visited us in 1955 good fish-keeping in 1956.

E. SPURLING JEWELL,  
Secretary, Dublin Society of Aquarists.

#### Cacti Names

I WISH to record that I am in agreement with the correctness of Mr. Boarder's remarks in your December issue, concerning the report of my lecture on cacti. The errors in nomenclature were not made during the lecture but arose from the society's publicity officer's unfamiliarity with the subject and the very short time in which he could take down a few of the many names I had written on the blackboard. *Epiphyllum* was not named as the most exotic-flowering cactus but was said to be one of the showiest of the cacti which can be brought to flower easily by the beginner.

I have kept all of the cacti listed at the lecture, and this was essentially only a brief guide so that only a few plants from the extremely long list of cacti were picked out. The reception of talks on this subject has been most encouraging and I am agreeably surprised by the large numbers of fish-keepers like myself who keep cacti as a parallel interest.

S. G. LAKE, Chairman, Slough, Windsor and District Aquarist Society.

Mr. Lake kindly sent us a long list of the species of cacti listed at his lecture, and it is regretted that we have been unable to spare space to include this, which corrected the names improperly presented in the brief report of the lecture in our November issue—EDITOR.

#### Pond Making

I SHOULD like to pass on a useful tip on pond making that I have picked up in my work as a jobbing builder. It is often advised to paint on coat after coat of water glass to seal in free lime after the job is done, but I use the water glass in the water with which the rendering cement is mixed. One pound of water glass is added to a bucket of warm water and left to cool; two such buckets are adequate for a small pond (say 8 ft. by 4 ft.) and water glass is very cheap (10d. per lb.). Even amateurs can get this mix to hold on the job and it also sets like iron.

I do not recommend using more cement than one part to three of sand since cement on its own is very brittle. Use a fresh bag of cement, not stale stuff, and mix with the sand about five times before adding the water glass. If a piece of wood with a straight edge is allowed to overhang the lip of the pond to the depth the rendering is required the mixture can be worked up to this. After the rendering is applied keep it wet by repeated washing—the longer the drying the harder the finish.

G. PERRYMAN, Northampton.

#### PICK YOUR ANSWER

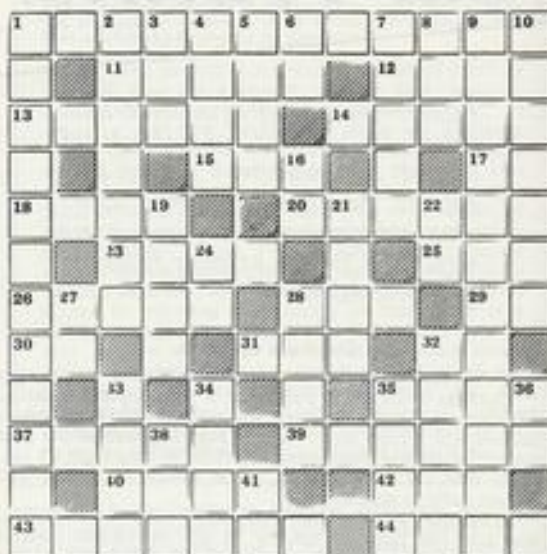
- "1. The greatest . . . are not always the best meat." The missing word is: (a) Crabs. (b) Lobsters. (c) Mussels. (d) Oysters.
2. *Anabas testudineus* (the climbing perch) was named by: (a) Bloch. (b) Day. (c) Lacépède. (d) Pallas.
3. *Apistogramma ramirezi* is native to: (a) Argentina. (b) Chile. (c) Peru. (d) Venezuela.
4. General colour of *Acanthodoras spinosissimus* (the talking catfish) is: (a) Dark brown with white markings. (b) Dark green with white markings. (c) Dark brown with grey markings. (d) Dark green grey markings.
5. Fancy breed of goldfish mottled with red, black and white, in shape of body similar to the common goldfish but with no dorsal fin, is known to the Japanese as the: (a) Kinranishu. (b) Ranchu. (c) Shukin. (d) Wakin.
6. Which of the following floating aquatic plants increase by stolons? (a) *Azolla*. (b) *Lemna*. (c) *Pistia*. (d) *Salvinia*.

(Solutions on page 214)

G.F.H.

## The AQUARIST Crossword

Compiled by J. LAUGHLAND



#### CLUES ACROSS

- 1 Dark Irish girls? No; popular tank fish (5, 7)  
11 Zebra; but not four-legged (5)  
12 Bat (4)  
13 Bruce's inspiration. Water variety spins submerged nest (6)  
14 These disturbed leaks hold water very well (5)  
15 Slippery customer (3)  
17 Measure for goldfish? (abbreviation) (2)  
18 Metal or harpoon to whalers (4)  
20 More than herpetologist: serpent worshiper! (6)  
23 To dry up or burn (4)  
25 Weapon or limb (3)  
26 Verdant (5)  
28 Decadent fish for the popular President (3)  
29 Echo answers it is (2)  
30 Wind direction (1, 1)  
31 Roe is added (3)  
32 Civil and military decoration (1, 1)  
35 Ocean poetically (4)  
37 Found in a tank or a caravan (5)  
39 Rays (6)  
40 Breed; descendants of a common ancestor (4)  
42 Sole without caudal appendage leaves a heavenly body (3)  
43 Risk pep (anagram) (7)  
44 Throw of an angler's line (4)

#### CLUES DOWN

- 1 *Cetorhinus*, the second-largest fish (7, 5)  
2 Paddy; secondary dorsal fin (7)  
3 The *Cadua* is 50 per cent. rotter (3)  
4 Leg hinge (4)  
5 Mud (4)  
6 Just an exclamation (2)  
7 Cobble, stone- or spiny- (5)  
9 Shocking fishes (5, 4)  
10 Assemblages of bodies as a connected whole, as the universe (7)  
16 Look for the answer in 7 down (2)  
19 Turnip to the Scots (4)  
21 *Styx lucius* (4)  
22 Indian Army (1, 1)  
24 An answer given (2)  
27 Sappers (1, 1)  
28 Flag-flower, a marsh plant (4)  
32 Agone (anagram) (5)  
33 May be common, Crucian, golden, leather, mirror or Prussian (4)  
34 *Leuciscus leuciscus* (4)  
35 Just short of debate it is a feature of the tentacles of the octopus (4)  
36 Written after (1, 1)  
38 Knock from level up (3)  
41 Royal cypher (1, 1)

(Solution on page 214)

#### ERRATA

It is regretted that typographical errors occurred in the article "Building Aquaria in Alcoves" in last month's issue (page 173.) The factor L in equation (a) should be expressed L<sup>3</sup> (not L<sup>2</sup>). Units for Young's Modulus on the same page should be expressed as lbs./ins.<sup>2</sup> (not lbs./in.<sup>2</sup>).



A SOCIAL evening with a hot pot supper and entertainments occupied last month's meeting of members of the **Blackburn and District Aquarists' Society**. The society reports that attendances at meetings this year have fallen but that keen interest is present in regular members.

RESULTS of the interclub furnished aquaria competition held recently by **Gravesend and District Aquarists' Society** were: 1—Medway A.S.; 2—Gravesend A.S.; 3—Thurrock A.C. Judging was undertaken by Mr. S. R. Moore.

AT the fourth annual table show of the **Hampstead Aquatic Society**, 97 exhibits were benched. These were judged by Mr. P. Hewitt (F.B.A.S. judge). A leeri gourami owned by Mr. W. T. Adams was awarded the prize for the best fish in the show.

A GOLD medal was awarded to **Derwent Aquarist Club** for their exhibit at Derbyshire Horticultural Association's three-day Chrysanthemum Show at Derby on the first Thursday, Friday and Saturday in November. The centre piece of the exhibition, which comprised eleven tanks of tropical and two of coldwater fishes was a brood of angel fish. An attractive fascia of fish designs concealed the tanks and maps clearly indicated the country of origin of the various fishes.

MEMBERSHIP of the **Aylesbury Aquarist Association** is now 41 it is stated in the December issue of the Association's News Sheet. In the early part of last month members attended their first annual dinner, which was followed by a film show.

BETHNAL Green Aquatic Society member Mr. Jack Coombs regularly services two aquaria at the local children's hospital, in addition to other work in the society that has led to him being described as "a pillar of strength in club life." As announced in last month's issue, the society is to install a further aquarium at the request of a local hospital.

AT the annual general meeting of the London Group of the **British Herpetological Society** last month the following officers for 1956 were elected: Dr. J. F. D. Frazer (chairman); Mrs. Monica Green (secretary); Mr. F. C. Brown (treasurer); Mr. K. Boyce and Mr. A. Polylbank (committee members). Address of the secretary is 49, The Greenway, Colindale, London, N.W.9.

THIS year's officers of the **Bury and District Aquarist Society** are Mr. D. Varnham (chairman); Mr. L. Barnes (secretary); Mr. G. Grundy (treasurer); Messrs. F. Jennings, M. Varnham, A. Hammond, N. Atkinson, F. Marrs (committee members). Address of the secretary is 13, Georgiana Street, Bury, Lancs.

FROM 17th January meetings of **Clapham Aquarists' Society** members will take place at St. Peter's Hall, Prescott Place, Clapham, S.W.4 every other Tuesday. Secretary is Mr. H. W. Evans, 5, Prescott Place, Clapham, London S.W.4.

A FURNISHED Aquaria at Home competition has been organized by **Edinburgh Aquarist Society** as an annual event, to the winner of which is to be awarded a silver drinking cup known as the Smith Trophy. Each member competing can enter one aquarium of any size, coldwater or tropical. Mr. A. Stark was the winner of last year's competition, in which 20 entries were made.

HEADQUARTERS of the **Erith and District Aquarists' Society** have been transferred to the Bexleyheath Congregational Church, Broadway, Bexleyheath, Kent, where meetings are held on the first Monday evening of each month. Aquarists interested in membership should contact the secretary Mr. G. W. Baker, 12, Berkeley Avenue, Bexleyheath, Kent.

AFTER discussions and a postal ballot, members of the **Goldfish Society of Great Britain** have decided to authorize investigations of these



## 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.

A copy of *The Aquarist's Directory of Aquarium Societies* will be sent free to any reader on receipt of a stamped, self-addressed envelope.

characters in the goldfish—upwardly protruding eyes, enlarged nasal septa, fluid-filled sacs beneath the eyes and domed scales, with the ultimate aim of producing additional basic varieties. Secretary of the society is Mr. C. J. Saunders, B.Sc., 300, Southbourne Grove, Westcliff-on-Sea, Essex.

THE **Hampstead Aquatic Society's** display of tropical fish and furnished aquaria came to an end at the closing of the **Hampstead Rotary Club's Hobbies' Exhibition**, on Saturday 3rd December, 1955. The society discovered from this exhibition that there are many people in Hampstead who are more than interested in this hobby and the general opinion is that an influx of new members can be expected. The H.A.S. exhibition did not go by without incident. One of the aquaria contained cichlids loaned by Mr. Lester Cozman, services secretary of the F.B.A.S. One "Texas cichlid" a rather large specimen, immediately set about the remaining three, in its usual ferocious manner, so that in a very short time the tank was in chaos with all the plants uprooted and the victims doing their best to hide away. The thermostat was knocked into a floating position and remained unnoticed for some time until one of the stewards found the thermometer registering 100° F. and promptly saved the cichlids from being boiled. The 'big fella' was removed from the tank and once again peace was restored. On Tuesday 8th December, the **Hampstead Aquatic Society** were hosts to the **Hendon Aquatic Society** for their inter-club Table Show Match. A gathering of 38 aquarists saw Hendon beat Hampstead by 27 to 13 points. The show was judged by Mr. C. W. G. Creed, F.B.A.S. judge. Results were as follows: *Class A Barb*: 1, Mr. R. Oliver (Hendon); 2, Mr. L. Bell (Hendon); 3, Mr. A. Wainwright (Hendon); 4, Mrs. B. Robertshaw (Hendon). *Class B Corydoras*: 1, Mr. Wainwright (Hendon); 2, Mr. L. Cozman (Hendon); 3, Mr. L. Cozman (Hendon); 4, Mr. L. Bell (Hendon). *Gourami*: 1, Mr. K. J. A. Pye (Hampstead); 2, Mr. A. Wainwright (Hendon); 3, Mr. R. Oliver (Hendon); 4, Mr. G. Richards (Hendon). *Cichlids*: 1, Mr. L. Bell (Hendon); 2, Mr. L. Cozman (Hampstead); 3, Mr. L. Bell (Hendon); 4, Mr. L. Cozman (Hampstead). *Breeder's Show*: 1, Mr. L. Cozman (Hampstead); 2, Mr. P. Utton (Hampstead); 3, Mr. K. J. A. Pye (Hampstead); 4, Mr. P. H. Utton (Hampstead).

MEMBERS of the **Independent Aquarists Society** erected a stand at the Islington Civic Arts and Crafts Exhibition, and this proved to be one of the most popular exhibits with the public. On show were the silver cups, plaques and prize cards awarded to the society and aquaria housing African clawed toads, American sunfish, European terrapins, fantail and comet goldfish, harlequin fish, crayfish, barbs, zebras and Siamese fighters, wall and green lizards, and a marine aquarium containing blennies, prawns, mussels and other animals collected from rocky parts of the British coast which was entered by the society's youngest member, Mr. Riches.

MEETINGS of the **Northampton and District Aquarist Society** are now held at the Y.M.C.A., Abington Street, Northampton on the second Thursday of each month at 7.30 p.m.

Visitors are welcomed at meetings. At the annual general meeting awards were presented to members by the president, Mr. A. Vernon Ashford. The **Vernon Ashford Trophy** for most points in table shows and a cup for the best fish of the year were awarded to Mr. A. Snodder (best fish was a black mollie). Mr. Lyon won the cup for the second highest points in the table shows, Mr. Butlin won the cup for the home furnished aquarium competition and the cup for the most points gained in outside shows was won by Mr. Amos.

OFFICERS of the **Southend, Leigh and District Aquarist Society** elected at the annual general meeting last month were Mr. H. A. Giles (president); Mr. L. E. Willis (vice-president); Mr. I. Cotgrove (treasurer); Mr. R. Arnold (secretary); Messrs. S. Halsey, S. Hayes, G. W. Cooke and D. Connor (committee members). In his address to the meeting the president challenged members to breed the rarer types of fishes, and it was agreed that competitions this year would be designed to encourage this. The treasurer reported a satisfactory cash balance of £65, and the society has assets of £102. It is proposed to hold more inter-club table shows this year as these have been found to stimulate interest among members.

### Leinster A.C. Show

*Tropical Furnished Aquaria*: 1, Mrs. S. Redmond; 2, J. Whelan; 3, L. French.

*Furnished Coldwater Aquaria*: 1, D. Moran; 2, S. Wells.

*Livebearers*: 1, Gallaher's Aquarists' Club (Bottomswood Guppy); 2, Mrs. E. Davidson (Merry Widow); 3, Gallaher's Aquarists' Club (Guppy); 4, A. Alexander (Swordtail Platy).

*Egglayers (24 in. and under)*: 1, Gallaher's Aquarists' Club (Rory Barb); 2, J. Davidson (*Hoplosternum Rosaceum*); 3, Mrs. E. Davidson (Black Line Tetra); 4, D. Bailey (Tiger Barb).

*Egglayers (over 24 in.)*: 1, J. J. Craig (Flying Fox); 2, G. R. Foster (Saltim Discus); 3, Gallaher's Aquarists' Club (Plymouth); 4, G. R. Foster (Flying Fox).

### Rangoon Aquarium

IT has been reported that the first aquarium in Burma is to be sited at Rangoon. Cost of the venture will be about £70,000.

### F.B.A.S. Report

SOCIETY affiliation figures for the **Federation of British Aquatic Societies** during 1955 is 100, given in the general secretary's report for the year. During the past four years this figure has fluctuated between 100 and 118. The report records the retirement of the F.B.A.S. chairman Mr. E. H. Riddle because of ill-health; the vice-chairman, Mr. A. Fraser-Brumnes, has also had to retire because of his new appointment in Singapore. Election of officers to these and other positions took place at the annual general meeting last month but names were not available at the time of going to press.

## Pakistan A.S.

DR. ANTON F. BRUN, President of the Danish Aquarium Union, and leader of the Galathea Expedition arrived in Karachi on 29th November, 1955. Dr. Brun is known internationally and has devoted his life to scientific research in oceanography and zoology. Mr. A. T. Naqvi, president of the Pakistan Aquarium Society and the Chief Commissioner of the Federal Capital of Pakistan gave a dinner in his honour; the University of Karachi also arranged a reception. Dr. Brun visited the Gandhi Garden Aquarium and Zoo and also the Departments of Central Fisheries and Zoological Survey of Pakistan, and other science laboratories of the University of Karachi, and delivered lectures and screened the world-famous Galathea Expedition film. Mr. M. Mohammad Afzal and Dr. A. R. Ranjha took him to Korangee Creek to inspect the site of the Marine Laboratory. Dr. R. Qureshi, director of the Central Fisheries Department accompanied him out to sea, where nets were thrown to collect specimens of commercial fishes found in the Pakistan sea. Mr. Masood-ul-Hasan (secretary of the Pakistan Aquarium Society) took Dr. Brun to Sakroo, where he collected a number of Pakistani aquarium fishes and plants found in Pakistani waters, and he has taken specimens to Denmark for further study.

## A.S.L.A.S. Meeting

SOME 200 people attended Dr. F. N. Ghadially's talk at Horniman Museum last November. His films "Breeding the Brown Acaea" and "Fishes, Reptiles and Amphibians" were very well received, as were some slides showing subjects of general interest including the use of various nylon products as spawning media. Owing to the short time at his disposal, Dr. Ghadially's talk was somewhat restricted but he found time to answer several questions ranging from gill flukes and the cure to virgin birth. Following his talk, Dr. Ghadially and his colleague Mr. Colton



### The Aquarist's Badge

PRODUCED in response to numerous requests from readers, this attractive silver, red and blue substantial metal emblem for the aquarist can now be obtained at cost price by all readers of *The Aquarist*. The design is pictured here (actual size). Two forms of the badge, one fitting the lapel button-hole and the other having a brooch-type fastening, are available.

To obtain your badge send a postal order for 1s. 9d. together with the **Aquarist's Badge Token cut from page vi**, to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

(of Sheffield A.S.) accompanied by Mr. Davies and Mr. Vosper of the Association of South London Aquarist Societies crossed south London to visit fellow aquarists. First call was to Mr. Ken Paswett, where black angels and mollies were admired and the distinguished visitor was presented with a cutting of a new and so-far unidentified aquatic plant. The party then moved to Mr. Bob Read of Chesham, where during the course of a torch-light tour of ponds and fish-houses, Dr. Ghadially expressed great admiration of the very fine colour of specimens of the

## Some suggestions for SOCIETY RULES

(A reprinted article from *The Aquarist* for February, 1950)

IN framing rules it is virtually impossible to provide for every conceivable possibility, nor is it desirable to do so. Fish law is not an attractive substitute for fish lore. Pseudo-legal jargon should be avoided, and ambiguity guarded against. No rule that cannot be enforced should be adopted, and the first test that any proposed rule should meet is the question "Is it necessary?" Here is a list of rules that meet the normal requirements of most societies, and which is capable of adaptation where unusual conditions prevail.

### Rules of the Society

1. The name shall be the Leamshire City Aquarium Society.
2. The objects of the society shall be (a) the study of aquatic life and, (b) the encouragement of the hobby of fish-keeping.
3. The society shall consist of president, vice-president, hon. treasurer, hon. secretary, three committee members and ordinary members.
4. The officers shall be members of the Committee by virtue of their offices.
5. Admission to membership of the society shall be by unanimous vote of the committee.
6. The annual subscription shall be: for senior members, 10s. 6d. yearly; for junior members (over 14 years and under 18 years of age) 5s. yearly. This shall cover membership for 12 calendar months from the date of election.
7. The annual general meeting shall be held on the first Thursday in June, and for the purposes of (a) passing the hon. treasurer's statement of accounts; (b) passing the hon. secretary's annual report; (c) revision of rules and committee standing orders when necessary; (d)

election of officers for ensuing year; (e) appointment of two auditors.

8. At the annual general meeting only senior members shall be empowered to vote.

9. No alteration to the rules or to committee standing orders shall be made unless the proposed alteration has been submitted in writing to the hon. secretary at least 14 days before the annual general meeting.

10. Each member of the society shall receive a copy of the rules.

11. Each officer and committee member shall receive a copy of the committee standing orders and a copy shall be available for the scrutiny of ordinary members at all ordinary meetings.

Many societies have their rules printed in booklet form, some have them duplicated at small cost; others are content to have a single copy placed in a prominent position in the society's meeting place. Supplementing the rules are the standing orders for committee. These are a guide to the committee and lay down the powers and obligations of those who take office. It is advisable for every member of a society to read standing orders for they constitute his defence against the rare officer who abuses the powers conferred upon him. Here a word may be said for the man who insists on knowing what is happening "behind the scenes." He is frequently described as a trouble-maker. On the contrary, he is frequently a trouble-preventer. When he queries an item on the treasurer's balance sheet, he performs a laudable duty. No good treasurer will resent it.

J. LAUGHLAND.

fancy goldfish in which Mr. Read specializes. A final call was made to Mr. Bob West, who is well-known for his fighters. Jars were produced and some of Mr. West's fish went to Sheffield for introduction into Dr. Ghadially's present stock. Topics discussed by the party ranged from aquarists' films to heredity in platys, and the Association hoped that the Sheffield aquarists gained a good impression of the work being done by their southern friends.

## F.B.A.S. Standards

LATEST set of printed show standards in loose-leaf form to be issued by the Federation of British Aquatic Societies consists of twelve sheets dealing with varieties of the goldfish. Three sheets describe and define the nomenclature employed, and the nine varieties each characterized and illustrated on a separate sheet are the common goldfish, the comet, the Bristol shubunkin, the nymph, the fantail, the veiltail, the moor, the oranda and the lionhead. The outline drawings are very well done and the information is clearly and pleasantly presented. Price of the set is 3s., obtainable from the Federation secretary, Mr. R. O. B. List, 1, Coronation Court, Willesden Lane, London, N.W.4. The loose-leaf folder to receive this set and other sets of standards issued by the F.B.A.S. is available from the same address price 3s. post free.

## Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies: **Friends Aquarist Society** (Mr. A. H. Gale, 23, Marmora Road, East Dulwich, London, S.E.22); **Hendon and District Aquatic Society** (Mr. G. W. Richardson, 12, St. Edmunds Drive, Stanmore, Middlesex); **Nelson Aquarium Society** (Mr. A. Baker, 14, Merton Street, Nelson, Lancs.); **Northampton and District Aquarist Society** (Mr. J. A. Catterall, 10, St. Mary's Court, Horsemarket, Northampton); **Oxford Aquaria Society** (Mr. P. Churchill); **Southend, Leigh and District Aquarist Society** (Mr. R. Arnold, 19, Kensington Road, Southend-on-Sea, Essex); **Staines and District Aquarists Society** (Mr. P. H. Whitehead, The Ship Inn, The Causeway, Staines, Middlesex); **Wolverhampton and District Aquarists' Society** (Mr. D. L. Pearce, 48, Sherwood Street, Whitmore Heans, Wolverhampton).

## Aquarist's Calendar

12th-14th January: Exhibition of Cage Birds and Aquaria at Olympia, London S.W.

## Crossword Solution

B	L	A	C	K	M	O	L	L	I	E	S
A	D	A	N	I	O	O	N	L	Y		
S	P	I	D	E	R	L	A	K	E	S	
K	P	E	E	L	C	C	T				
I	R	O	N			O	P	H	I	T	E
N	S	E	A	R	I	A	R	M			
G	R	E	E	N	I	K	E	I	S		
S	E	P	O	R	E	G	C				
H	C	D	I	D	E	E	P				
A	C	A	R	A	S	P	I	N	E	S	
R	R	A	C	E	S	O	L				
K	I	P	P	E	R	S	C	A	S	T	

PICK YOUR ANSWER (Solutions)

1 (a). 2 (a). 3 (d). 4 (a). 5 (a). 6 (c).