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Editorial

THERE are, no doubt, many aquarists who sometimes permit themselves to dream of tank-surrounded days with nothing much else to do but to watch the fishes and dabble aquatically. In this happy state there is always a not fully explained providential dispensation which has removed the necessity of earning a living, that tiresome requirement that keeps the keen aquarist away from his fishes so much. It's a glorious dream and for most fish-keepers it stays like that; a few, however, light on the seemingly ideal notion of turning their fish interests into a business to escape from the dreariness of the office, factory, workshop or whatever it is. These few write annually to *The Aquarist* about it. "What chance do I stand of making a living?" is the question.

Answering them is difficult. The memory comes back of someone known to us who many years ago as a boy asked a leading zoologist if it would be wise to try to make a career in zoology. No, was the answer; opportunities were too few, and the advice was seriously given that the wisest course would be to enter some profitable although humdrum business so that zoological interests could be followed and enjoyed in leisure time. Things have changed—it is doubtful if the same advice would be given to-day. But what of the aquarist?—dare it be suggested that what is an enjoyable hobby might become a heartbreaking and tedious full-time job? Should the risk of damning enterprise be taken by stressing the financial hazards of fish-keeping on a commercial scale? So much depends on the individual, and our enquirers are, of course, unknown to us.

Certainly we would never advocate the step for someone whose hope was for profit alone. For the person seeking only the pleasures of doing what he most wants to do and showing preparedness to meet any difficulty, some encouragement might be justified. Such a one is, of course, most likely to make his own way regardless. When personal doubts are present it is probably better to accept this advice—don't risk it!



Photo: G. W. Allan
An attractive tropical species from Madagascar—*Brodia tricolor*, described in an article by Cairo aquarist G. W. Allan on page 221

Aquarium and Pond Goldfish Varieties

13. Supplementary Types

IN previous issues of *The Aquarist* I have dealt with the varieties of goldfish as recognised in the Federation of British Aquatic Societies' handbook, with the addition of the London shubunkin. In addition to those I have described are a few types with telescopic eyes which are mentioned.

The moor should always have these telescopic eyes and the following are also recognised: the telescopic-eyed scaled fantail, the telescopic-eyed calico fantail, the telescopic-eyed scaled veiltail and the telescopic-eyed calico veiltail. With all these types of fancy fish the eyes must be enlarged and protruding from the orbit. The cornea is clear and the whole eye must be devoid of colour. Although standards are given for these types it is very rare to find classes for them at shows. Generally only one class is provided for fancy goldfish and all those not specially provided for must be shown in this class. Sometimes telescopic-eyed veiltails are shown but few good fantails of the type are seen.

It is unusual to find classes for the eight main varieties and so one cannot expect separate classes for those mentioned above. Exhibitors should read their schedule carefully and where a particular type is not provided with a class, this fish can be shown under "Any other variety fancy goldfish."

As with the moors it is essential to be very careful when setting up a tank for any other type of telescopic-eyed fish, as this feature is so easily damaged. Although they may be kept in ponds out of doors it is safer to see that any fish good enough to exhibit is kept under cover in the winter.

My list completes the fish recognised as types of goldfish by the Federation and some may wonder why I have not described the nymph. This fish is not recognised, and in

my opinion rightly so. The name is given to a single-tailed veiltail, if such an expression can be used. In breeding any type of double-tailed fancy goldfish it will be found that a few fish turn up with single tails. These are just runts and not worth keeping. It would then be quite wrong to recognise as a distinct type any fish which was a throw out produced by accident when trying to breed a specific type.

I know that it would be very convenient to be able to find fancy names for the many and varied types of fish which can crop up when breeding a particular variety. I often think how nice it is for the guppy breeders, as, when trying to breed double swords, if a fish turns up which is deficient it can be classed either as a top sword or a bottom sword. In fact there can be very few shapes of tails for which a name has not been found. How handy it would be for me to be able to give fancy names for all the runts which persistently turn up among my own strain of red-scaled fantails!

Now and again fresh types are imported from China, which are a break-away from the recognised types. I saw a fantail from there which had all the scales cup-shaped, instead of being flat. This gave the fish a pearly appearance. Then last year the "bubble-eye" was imported, an ugly fish if ever there was one. These were hailed with great interest by some of the very people who refused to recognise the fantail a few years ago. Goldfish have also been imported with an oddly shaped or placed dorsal fin, but as these fish are always likely to crop up in any well-established strain of fancy goldfish, I do not see the need to try and introduce new varieties at the present moment.

In following issues I shall deal with the other cold-water fishes which have been allotted standards by the Federation, such as the hi-goi carp, the golden orfe, the golden rudd and the golden tench.

A. Boarder

Some Notes on Fin Rot and White Spot

by A. BREARLEY

FUNGUS and parasitic infections in tropical fish are an annual source of much loss among aquarists and breeders, and often prove difficult to clear up. Among fungus infections, one of the most persistent troubles is fin rot, which is liable to attack almost any fish with flowing finnage. Among parasitic infections, white spot is one of the most common, as it occurs in almost every type of aquarium fish.

Fin Rot

Fin rot is considered to be caused by the filamentous fungus organism, *Saprolegnia*. It generally attacks a fish only after the fins have become damaged by fighting, or contact with rough stone work or gravel. The fungus spores infect these small wounds, and in due course the fin develops a ragged edge where the tissue has begun to rot.

A simple and effective method of dealing with this disease is as follows: catch the fish and hold it in a small net, at water level. Then, in cases where the fins are badly affected, trim off the ragged edge of the fin with a pair of sharp scissors, so that it is cut back to still healthy tissue. (If the infection is still in the early stages, very little of this trimming will be needed.) Then paint the trimmed edges with full-strength T.C.P. Antiseptic. Allow

a few seconds for the T.C.P. to penetrate, before placing the fish back in the aquarium.

As a further precaution, add a teaspoonful of T.C.P. to every twelve gallons of the tank water, every third day, for three weeks. This treatment will generally clear up even the most stubborn cases of fin rot. In mild cases, the actual treatment of the fish itself, is not necessary. The simple addition of T.C.P. to the tank water, in the proportions given above, will often effectively cope with the infection.

White Spot

White spot is caused by a protozoan parasite—round globules which, when mature, measure about 1/75 in. in diameter. The small white or greyish spots that appear on the fins or skin of the fish, are really small blisters, each containing one or more parasites.

When fully grown, the parasites leave the fish, by penetrating the outer skin, and sink to the bottom of the tank, where they secrete a soft, jelly-like enclosing cyst. Here they reproduce and multiply by division. After about 36 hours, the young parasites can be seen swimming

(Please turn to page 222)

The Lace Plant and Fish of Madagascar

by G. W. ALLAN
(Cairo)

THE aim of every aquarist and scientist who takes an interest in ornamental fish and aquatic plants is to have at least one specimen of the Madagascar lace plant in his collection. But so far few have succeeded in fulfilling this aim, for the plant is still very rare and seldom available to amateurs. Only occasionally does somebody get hold of more than one specimen and is therefore in a position to study the life of this really beautiful plant.

Already several articles have been written on the Madagascar lace plant—*Aponogeton fenestratis*—some by scientists who were able to study it on the spot, i.e. in Madagascar itself, or else in specially prepared aquariums. Nevertheless, so far as I know, no mention has been made of the fact that there exist different kinds of lace plant. Until recently I was under the impression that the name *Aponogeton fenestratis* designated one particular species. However, my personal experience and studies lead to the conclusion that there are at least three different varieties, perhaps even species.

Three Varieties of Lace Plant?

(1) The first and most common kind—discovered by the French scientist Poiret—grows in relatively deep water and has extremely long leaves, often up to 60 or 70 cm. long. Stem and leaves as well as the lace structure of the latter are coarse. The colour of the leaves is a brownish-green. The bulbs are especially big. It is worthy of note that the plant grows very fast even under less favourable light conditions. Because of its considerable height this variety can be grown in big aquariums only. Moreover, the leaves though giving the impression of being hard and solid are, especially considering their size, quite fragile.

(2) The second kind is much prettier. Its leaves are considerably shorter and broader than those described above, and its colour tends to a darker green. It is rarer too, as the plant needs more light and clear acid water. It grows more slowly than the common variety and seldom reaches a height of more than 30 cm. The leaves are often as broad as 5 cm. The typical lace structure becomes visible on older plants only, while in younger plants the "lace" is not transparent. The leaves are firm and solid.

(3) The third variety is specially remarkable for the extremely fine lace structure of the leaves which appears already at an early stage, before the plant has reached 10 cm. in length. This kind is by far the most beautiful of the whole group, but unfortunately also the rarest. Even in the most favourable light it grows very slowly and develops only under specially good conditions.

My collection comprises more than 100 plants of the above-mentioned varieties. This has given me ample opportunity to observe that the three kinds need different conditions to develop well. Whilst the first, common variety can do with comparatively little light, the other two require best light conditions; soft water is an absolute necessity to all of them. I had previously believed that only heavy clay or ordinary soil should be used for these plants. However, it has been proved in practice that just



Photo:

G. W. Allan

Two varieties of the Madagascar lace plant. On the left is the plant with the long thin type of leaf

as good results can be obtained by planting them in sand. All my specimens of *Aponogeton fenestratis*, which I have transplanted under different conditions, grow well and have taken strong root. There are symptoms that wholesale propagation may become possible.

Besides the above-mentioned species, I possess also some 50 plants of *Aponogeton ulvaceus* as well as lilies, which have already propagated themselves. Also from Madagascar are a number of very pretty little ornamental fish which can be kept easily and are very suitable for small aquariums. They are the so-called *Haplocheilichthys*—very similar to the *Aplocheilichthys panchax*—and secondly, the *Bedotia tricolor* which greatly resembles the Australian *Melanotaenia*, both in colour and shape. So far I have learnt little about either, but I hope very much to succeed in breeding them this summer.

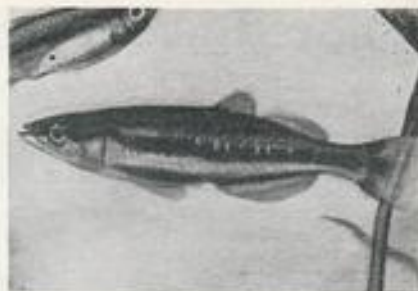
Miniature Tropical Fish of Madagascar

Many articles concerning Madagascar plants, especially *Aponogeton fenestratis* (lace plant) and *Aponogeton ulvaceus* (or cellophane plant) have appeared in aquatic societies' journals, but practically nothing has been reported regarding miniature fish found on this great island. Several specimens of some particularly interesting species from Madagascar have recently been secured by me, enabling me to study them and ascertain their usefulness as aquarium fish. First among these are some specimens of *Bedotia*.

They belong to the family of Atherinidae and are related to *Melanotaenia*, (better known among aquarists as the



The dissimilar appearance of the female (left) and the male (right) of *Bedotia tricolor* is shown by these illustrations from Strelakowsky and in the painting by A. Fraser Brunner reproduced at the bottom of the page



Australian rainbow fish) which they resemble in the shape of the body.

The prettiest species of *Bedotia* already known to science are *Bedotia geayi* (Pellegri) and *Bedotia tricolor* (Pellegri). The males of both species differ little from each other. The male of *Bedotia tricolor* is more streamlined, its tail proportionately slightly larger and the lower part of the body whiter than *geayi*. Also the well pronounced golden white semi-circle in the caudal fin of *geayi* is almost invisible in *tricolor*. The second dorsal fin of *tricolor* has 19 rays, that of *geayi* only 17.

The female of *tricolor* that I had the opportunity to photograph and of which Mr. A. Fraser-Brunner was able to make a painting when visiting me recently, has an absolutely different shape of the body. If they had not bred and produced some young ones which are now living in my aquarium, one could not believe them to be a pair. The photos and the reproduction of the water-colour plate give a good notion of this curiosity.

Bedotia species are found in the Eastern part of Madagascar in large quantities in the cool mountain streams and lakes of Mangoro in the Highlands, as well as in the warmer rivers and swamps of the still little-explored, lower lying Eastern forest districts of Tamatave. The latter are the preferred habitat of *Bedotia geayi*, being less vigorous swimmers than *tricolor*, which prefer cooler and more oxygenated waters and have been found going up mountain streams situated 2,000 ft. and more above sea level.

The specimens of both of the above-mentioned species had been sent to me by a well-known ichthyologist and missionary, Father Brunel, who had collected them in the districts referred to above. In addition to the two principal species already described it appears that there are several other varieties and crossbreeds of *Bedotia*, but very little is yet known of these. The size of *Bedotia* varies between

three and six inches, depending on their age and the district where they are found.

The picture on page 219 shows the streamlined shape of the male. The colouring of his finely scaled body is steel green on the top with a metallic reflection; the lower part is coppery white. Starting at the ventral fins a fairly broad, blue-black band runs up to the anal fin; another still broader, dark-blue band starting near the eye and leading into the caudal fin runs along the centre of the body. This band is broken up by several oval, perpendicular, iridescent green-coloured spots.

The female of *Bedotia tricolor* compared with the male is, as already mentioned before, a plain fish and slightly shorter but deeper in the body. The blue-black centre band is very narrow and has no iridescent spots. The dorsal and anal fins are shorter and rounder, with little colour in them. The shape of the tail is the same as that of the male.

It is important to note that *Bedotia* easily gets used to aquarium life. A pleasant and active fish which even takes dry food, it should become, if made available through the trade, a real pet, as it is not only pretty but also an easy breeder under favourable conditions.

In addition to *Bedotia* there are several new species recently discovered on Madagascar Island, among them the miniature *Pachypanchax romalonanus*, and another fish now under observation in my aquarium, the *Eleotris cohizonae*, of the family Gobiidae, which will be described as soon as more experience of them is gained.

Some Notes on Fin Rot and White Spot

(Continued from page 220)

freely through the water, in search of a new fish host. They cannot long survive without a host.

Various chemical agents are recommended for the treatment of white spot—such as quinine hydrochloride, ammonium sulphate, and methylene blue. The writer's own experience, however, is that the most positive results—without harm to the fish or the aquarium plants—are obtained by using T.C.P. in the following way.

Raise the temperature of the aquarium to 82°–85°F., and shade from direct light. Then add two teaspoonsful of T.C.P. to each twelve gallons of water, repeating this dosage daily, for a total of three days. Continue the increased temperature and reduced lighting for seven to ten days, then commence reducing the temperature by 2°–3° per day, until the normal 75° is reached. This treatment will generally clear up even a bad attack of white spot.

The action of this treatment is to attack the white spot parasites in their vulnerable cyst "division" stage, when they are on the tank bottom.



"Fin and Mouth" and White Spot Disease

by W. HAROLD COTTON

SOME three-and-a-half years ago I suspected the introduction into this country of at least two different kinds of virus disease.

Diseases of this nature were reported from the Continent by Schäperclaus as far back as 1927, by H. Raabe in 1935, Benisch in 1937 and by Weissenberg, Nigrelli and Smith from America, also in 1937. In the main they dealt with infections of marine fishes, but since then there have been a number of records dealing with brackish water fishes, but little, if anything at all, appears to have been written about fresh water and domesticated fishes.

Most of the descriptive matter relating to virus diseases concerns *Lymphocystis*. I have recorded two occurrences of this during the past two years, so that it is comparatively rare and shows no sign of developing or becoming a serious problem. As in the case of all virus diseases, the causative organism—a filterable virus—is ultramicroscopic and cannot therefore be diagnosed by ordinary microscopical technique. Fortunately, however, *Lymphocystis* is characterised by the development of aggregations of tubercles of a greyish white colour massed together in a raspberry-like formation and growing generally at the base of the dorsal fin extending towards the top of the head. These growths are abnormally enlarged cells, the physical characteristics of which, interesting as they are, need not concern us here.

I have seen this disease on *Premnas biaculeatus* and *Amphiprion percula*, both, I believe, direct imports from their native habitats. In both cases the disease was restricted to the species, some of which recovered, and there was no epidemic in the collection generally, nor did it spread to other tanks.

The Fin and Mouth Virus

The characteristic features of *Lymphocystis* is such that diagnosis is easy. The two cases I examined were during the past two years, but prior to this I had reported suspected virus disease, but had been unable to determine any diagnostic feature which could in any way be considered confirmatory.

At first I was inclined to think that some of the doubtful cases were an early manifestation of *Lymphocystis*, the fishes dying prior to the development of the characteristic tubercles, but in all cases there were complications owing to the presence of parasites and other pathological features which may or may not have had any bearing on the disease I was looking for, but served considerably to complicate the investigations.

It is only recently that I have had a batch of living (and rapidly dying) specimens, absolutely free from parasites or any other questionable pathological feature which have, without any shadow of doubt, been the victims of a virus infection, comparable in many ways to foot and mouth disease in animals. This experience has been considerably heightened by the fact that a previous batch of fishes from the same source in which the virus disease was suspected, provided all the complications of a parallel set of infections

by *Costia necatrix*, the new white spot *Nyctotherus*, and a suspected *Ballantidium*.

The circumstances are such that it is reasonable to assume that the virus infection from the multi-infected fishes infected the disease-free and remarkably clean home-bred fishes. Hard luck for the owner but a very fortunate occurrence for my own observations and subsequent experiments.

The batch of fishes from which I took my specimens began to die off in large numbers within 24 hours of the discovery that all was not well. My informant told me they had fin and mouth fungus and were dead within a few hours of this fact being noticed.

Similar information had been provided about the previous batch of imported fishes and I had found in these that the mouth and the ends of the caudal fin were heavily impregnated with *Saprolegnia mycelia* with sprouting hyphae and the usual discharge of millions of spores. Amongst the matted tangled filaments were the three parasites previously mentioned and it was virtually impossible to decide what was the killing factor, so intense was each infection.

The new batch of fishes, however, displayed a different state of affairs. The first few dead ones were perfectly clean and free from parasites and what had appeared to the



Characteristic signs on fish infected with *Lymphocystis* virus—left, "raspberry tubercles," and fin and mouth virus—right, mosaic bleaching

naked eye to be mouth and fin fungus was, in effect, no more than a milky opacity, no fungoid mycelia being present. I lost no time in obtaining a collection of apparently healthy fishes together with some showing only the mildest symptoms. One or two were killed for immediate post-mortem and the remainder were introduced into one of my own tanks in which the fishes were known to be clean and disease-free.

The freshly killed specimens displayed the same milky white opacity around the mouth and the ends of the caudal fin rays, which were splitting. I could recognise no organic change internally and all the organs were clean and apparently normal.

Of the infected fishes introduced into my own tank all but one died within four hours, and within six hours the first of my own fishes—a paradise—showed signs of indisposition and lassitude.

Within the next two hours, a male guppy, two females and one female golden guppy and the other paradise fish, were all indisposed. Within 10 hours of introducing the infected fishes, the first paradise fish had died, and within 24 hours, the remainder followed. There were two survivors, a female sword from the infected stock and a head-and-tail-light fish from my own stock. The originally infected fishes were swords and speckled mollies.

Of the fishes which died one or two only displayed no other symptom beyond collapse of the dorsal fin, lassitude and a slight off-balance in swimming until the moment at which they just sank to the bottom of the tank, made one or

two wild efforts to reach the surface and then went to the bottom and expired. The remainder displayed much more positive symptoms which should make it possible, if there are no parallel infections, to recognise the disease.

Positive visual symptoms had no relation to the time which passed between infection and the death of the fish. Some which lingered 12 to 24 hours displayed no visual symptoms whilst others which lasted only six hours displayed unmistakable evidence, and vice versa. I can only assume that the visual symptoms depend upon the passage of the virus in its development and where present are due to the virus acting upon the outer tissues as well as the internal organs.

Bleaching of Colour

The visual appearance may be likened to the mosaic virus of plants. The trouble always begins with a rather sudden lassitude and collapse of the dorsal fin and tightening of the caudal fin. This may be followed within an hour by the whitening of the lips of the fish and the tips of the caudal and, probably, dorsal fins with slight end splitting. One large or a number of smaller smoky white patches may occur on the body. These patches are a bleaching of the colour and not so opaque or well defined as may occur in some sporozoan diseases such as that which causes neon disease. The general appearance of an infected fish is illustrated. A close inspection of such a fish may also show a rapid and quite unnatural quivering of the lips quite distinct from normal mouth movements.

In most cases the death of the fish occurs before the bleached patches spread over much of the body, but in a few isolated instances this bleaching has extended over the whole of the body.

Unfortunately, from a post-mortem point of view, these positive symptoms disappear very quickly after death and the bleaching is almost impossible to discern in a few hours. The same is true of the whitening of the lips and fin tips. The raggedness remains, but, unless the fishes have been kept in remarkably good condition and were quite unaffected by anything else, then normal fungus growths begin and the whole picture is lost.

As will be gathered from this description, the disease is acutely virulent, but it is also selective of species in a community tank. Where there is infection it might quite easily destroy all the inmates of one or two species, leaving the remainder quite untouched. I have not yet determined which species are most susceptible but it appears that swords and mollies and probably most livebearers take it badly.

Resistant Individuals

Even in an infected species there are a few fully resistant members. The surviving swordtail from the originally infected stock in the tank which was infected by them, is still alive. My own ancient and very hoary head-and-tail-light, already two years past the normal tenure of life of its species, has passed through all this trouble unscathed. Two months ago, in order to lower the resistance of these two fishes, heating of the air-cushioned tank in which they were accommodated was discontinued and they have both since been living as coldwater fishes, with temperatures down to 60° F., and for the past three weeks in the company of a shoal of golden rudd. Neither of these two fishes shows the slightest sign of indisposition, and the young female swordtail is actually growing and in first-class condition.

It is possible that resistant fishes from a batch may be carriers and that a lapse of time may occur after an original bout of infection before the trouble breaks out afresh, but I have had no opportunity of discovering this possibility as

yet. My golden rudd have not contracted anything from the sword.

I have not found any specific cure for the trouble. It is unaffected by temperature and was not retarded either by increasing or lowering the temperature.

I have come to the conclusion that the best course to adopt at present, is to let it run its course in the infected tank, and that fishes which survive 21 days from the onset of the disease may be regarded as safe for transfer to other tanks, but only after a 12 hours bath in a mercurochrome, Sudan red or EF 1001 bath.

The most important thing is to take care in the sterilisation of all implements, and that, incidentally, includes the hands. Anything which is likely to be passed from the infected tank to any other should be washed in strong Dettol or similar disinfectant, and afterwards tap-washed in clean water.

As so little is known of the disease it may be as well to clean and dry out the infected tank and then re-establish completely afresh.

My own infected tank has not been so treated and apart from evaporation make-up, has not been disturbed. Fishes added during the past month are quite happy and there have been no casualties from any cause whatever, but it still may be too early to conclude that the danger is past.

During a recent visit to one of the clubs I was advised that aureomycin had been used in a case where the symptoms described indicated the possibility of virus disease, and the results had been very encouraging. It is, however, not possible to come to any definite conclusion in an isolated instance where the disease has not been diagnosed specifically.

New White Spot Disease

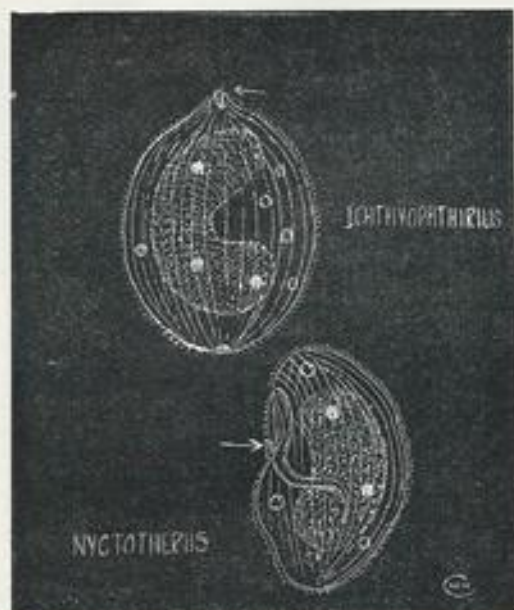
I mentioned earlier the new white spot disease, *Nyctotherus*, as occurring in conjunction with virus disease. This was the second occasion on which I had encountered, or maybe, to be quite honest, recognised this disease.

Some few weeks previous to my investigations into the virus infection I had received specimens from a Lincolnshire club which the sender had informed me had been the victims of an outbreak of white spot, which had defied all the normal treatments.

The specimens sent were mainly swordtails, well packed and in a very fresh condition, and the parasites were alive and kicking, a fact which never fails to give me a thrill. The fishes had all the appearance of a very ripe white spot infection and anyone could have been forgiven diagnosing *Ichthyophthirius multifiliis* as the culprit. The almost indiscernible visual difference—which one doesn't even realise until one *knows* there is a difference—is that the spots are a fraction creamier in colour than the usual white spot.

Microscopical examination of the living parasite is itself not an immediate clue to the new organism. Such Infusoria have an irritating habit of changing their shape, especially under the pressure of a microscope slide cover glass and when swimming amongst organic detritus. It is necessary therefore to watch them for some time until they are swimming clear and adopt their basic shape. This is very true of *Ichthyophthirius* which is very plastic in some circumstances, and it was equally true of the organism which I examined for the Lincolnshire people. However, when the organisms had settled down, were swimming freely and most of them had assumed their customary shape it became obvious that here was a totally different species from *Ichthyophthirius*. The large macronucleus characteristic of the latter as a well-defined horseshoe, was present, but not so defined in shape. The outstanding distinction was the cytopharynx (mouth organs) combined with the body shape differences.

The body shape of *Ichthyophthirius* is regular and slightly



Greatly enlarged views of the parasites of white spot (top) and new white spot (*Nyctotherus*). Arrow indicates position of the cytopharynx in each

oval with a short ciliated cytopharynx at the top of the narrow end. The body shape of the new organism is a rough flattened oval. The opening to the cytopharynx is on the flattened side, runs dorsally, curves up into the middle, recurves downwards, and ends posteriorly in the organism.

It became obvious immediately that whilst the ordinary well-known white spot belonged to the order Holotricha, the new one was a member of the order Spirotricha, and its outstanding cytopharynx arrangement located it amongst the family Spirostomidae. I came to the conclusion that it was the genus *Nyctotherus*.

Species of this particular genus have been recorded by various protozoologists as parasitic in man (Schaudinn, 1899), in cockroaches (*Leidy* and *Zuleretta*) and in water beetles and frogs. One species, *Nyctotherus piscicola*, is reported by *Entz*, 1913, but I have not had the opportunity of comparing his descriptions with my own specimens. The third edition of *Protozoology*, by *Richard R. Kudo*, records only two species, one in the colon of cockroaches and the other in the colon of frogs and toads. Mention is made of the presence of these parasites in amphibia, but not in fishes.

The figures herewith are not intended to be physiologically accurate, but are an impression from actual specimens showing the distinctive characteristics.

The only life cycle of *Nyctotherus* which I have seen is that outlined by *Wichterman* in relation to *Nyctotherus cordiformis* as it occurs in *Hyla* (the tree frogs), and if this is true of the species which infects fishes, it does not follow the same pattern as *Ichthyophthirius*. Unfortunately my material for study has been limited to three sources of infection, and in the two cases of living specimens I was unable to keep them for very long.

The basic thing which arises from what observations I was able to make is that the organism does not respond to normal treatments which are effective with *Ichthyophthirius*, and the reason for this is almost certainly that *Nyctotherus*

development is not accelerated by temperature rise to encourage the formation of swarm spore cysts. There seems to be evidence that temperature rise may encourage binary sub-division and a consequent intensification of the infection, and it was indeed this fact which inspired the sending of the original specimens to me.

Ichthyophthirius can be treated chemically by the comparatively easy extermination of the swarm spores by a variety of chemical means, but the effective cure depends really upon the temperature rise which induces encystment and the production of the more sensitive swarm spores. The free-swimming *Ichthyophthirius* itself is generally resistant to the chemical treatments we use and since *Nyctotherus* does not appear to encyst that explains why it is untouched by the normal treatments.

A much more drastic form of treatment is needed and I found encouraging results by immersing the fishes for 15 seconds in a Dettol bath of one teaspoonful per quart of water, at aquarium temperature. No benefit whatever is gained by temperature rise and, in fact, it may be beneficial to lower the temperature some 3° to 4° F. for two days before giving the baths. After bathing in the Dettol solution the fishes should be washed in clean water and the Dettol should not be allowed to get into the aquarium.

In concluding this record of what I believe to be quite new diseases of domesticated fishes in this country may I make the point that any information which might lead to the unravelling of the life history of such organisms, their cause or cure, is a benefit to aquarists generally? When I talk to members of aquarists' clubs they often mention things which have happened in the past when it is much too late to gain any progressive knowledge such as one might have obtained from an immediate investigation of the fishes concerned.

Cacti in the Fish House

IT is possible to raise cacti from seed and to flower them in as short a time as a year. Many of the small and attractive types such as the *Mammillaria* can be flowered in the year following the sowing of the seed, and many more will flower in their second year. Some people have the idea that cacti should never be watered, but this again is a wrong idea. Without suitable watering these plants will not grow any more than ordinary plants would. The main skill which is required for the successful cultivation of these plants is that of watering. Enough must be given to encourage growth but if too much is given the roots may rot and the plant will die. One very simple rule of watering can be given. Water well and then give no more until the soil in the pot has dried out completely.

The soil for cacti should be very porous, as unless there is plenty of drainage the plants can get water-logged and the roots will rot. A very suitable potting medium for cacti can be mixed from ordinary John Innes Potting Compost, to which some more sharp sand and broken brick is added. The above compost is too heavy with loam for cacti but the extra roughage will mean that the soil is made much more porous. Any soil which holds the moisture too long is dangerous for these plants. If growers would prefer to mix their own potting soil here is a formula which will produce good results. Take two parts loam (old rotted turves), one part bacterised peat, one part sharp sand. Mix well and to each bushel add $\frac{1}{2}$ oz. ground chalk or limestone; $\frac{1}{2}$ oz. sulphate of potash; $1\frac{1}{2}$ oz. superphosphate and $1\frac{1}{2}$ oz. of hoof and horn grit. Some broken brick—about $\frac{1}{2}$ to $\frac{3}{4}$ inch pieces—can be incorporated with some of the soil for placing in the pot just over the crock; this assists drainage.

AQUARIST AT HOME:

Dr. F. N. Ghadially

(SHEFFIELD)

Interviewed by JAS. STOTT

WHEN I made arrangements to call on Dr. F. N. Ghadially of Sheffield I had a feeling that when I made the visit I should see something interesting and probably unusual in this aquarist's establishment. My expectations were realised before I had been in Dr. Ghadially's company five minutes. First of all, however, let me tell you something about this aquarist. He is a doctor of medicine and lecturer in morbid anatomy and histology at the Sheffield University; a position he has occupied for three years; prior to this he was working at a London hospital.

He has been interested in fish keeping for six or seven years and, research forming part of his professional activity, it seems only natural that his approach to fishkeeping should be mainly experimental. Furthermore, as might be expected, his work in this direction is concerned with the study of diseases and physical defects or deformities. Nevertheless several of his forty tanks are given over to the breeding of good-quality fishes for he is, despite this scientific activity, interested in the exhibiting side of the hobby and fancy. He is the president of the Sheffield Aquarist Society and has held this office for two years.

Dr. Ghadially has his fishroom situated in the basement of his home but this is, perhaps, better described as a laboratory and breeding department combined. Tanks are not confined solely to this room, however, but are to be seen placed in various positions about the house. There is one tank, for instance, situated in the lounge, which is fitted as a cabinet aquarium. Designed by the doctor, it is indeed an attractive display and can be seen in the photograph illustrating this article. Whilst directing the reader's attention to the photograph I might mention the fact that the piece of sculpture to be seen on top of the cabinet and the smaller pieces on the shelf underneath are the work of this aquarist, who is also practically interested in art as a sculptor and painter in oils. Readers of this magazine will also know his name as a fellow contributor.

An interesting feature in the basement fishroom is the tropical pool situated in one corner. Rectangular in shape, it measures 8½ ft. long by 4½ ft. wide and 16 inches deep. It is built directly on the stone floor and the pond walls are constructed of bricks. The base is concrete laid within these walls and on top of the stone floor. Running diagonally across this concrete base is what may be described as a flue, opening out on two adjacent walls of the pool. It is built of bricks and the top is formed by a sheet of stainless steel cemented in position with aquarium cement or glazing compound.

In the completed pool one end of this flue is open, into which is inserted a gas heater and the other end leads into a brickwork flue box from which metal stove piping is used to couple the flue box with the chimney of the basement fireplace. The heater consists of a length of three-quarter inch iron pipe which is sealed off at one end and fitted with an air and gas mixer at the other end. The mixer was taken from an old gas ring and securely fixed into the end of this two feet length of iron piping. Along this length of pipe were made a number of holes one-sixteenth of an inch in diameter from which the gas-air mixture emerges and is ignited. Metal feet are fitted to



Photo:

J. Stott

the heater so that it is maintained in the correct position when operating in the flue. This gas heater is rather similar to the gas poker only, of course, considerably longer. A length of rubber tubing connects the heater with the supply and control tap situated on the wall near to the pool.

Dr. Ghadially informed me that he finds this a convenient and economical method of maintaining a large quantity of water at a suitable temperature for rearing purposes and that several thousands of fishes have been reared in this pool up to the present. The amount of swimming space which this pool provides, supported by adequate feeding, allows the fishes to attain good size.

In the November, 1953, issue of *The Aquarist* the doctor contributed an article describing a mechanical feeder he has constructed. This particular device is used for feeding the stock in the pool. With this swimming space available and a steady supply of food (dry) throughout the day, provided at regular intervals by the mechanical means and supplemented by two or three feedings of live food per week, quick growth and good development is produced.

As stated previously a considerable number of tanks in the fishroom is given over to experimental activities, and for some time the doctor has been investigating the various congenital malformations which occur in barbs, particularly in tiger barbs. In some of these tanks could be seen an amazing collection of malformed and defective fishes of this species. It is interesting to relate, however, that while the study of these defects and cause is being made, close observations are kept for any possible natural variations occurring which may be interesting and/or attractive when attempts will be made to fix them and so produce new varieties.

No doubt quite a number of readers, especially those who attended the assembly of the F.N.A.S., at last year's B.A.F., will be aware of Dr. Ghadially's ability as a cinematographer. His film on the brown acara, which was shown at that assembly, is not only interesting but the kind of film which, both in quality and subject matter, fulfils a long felt want by society organisers of film evenings. A second film, by this aquarist, has recently been completed on fish, reptiles and amphibia. This is a colour film. Other films are in the making, and one which is half way to completion is devoted to the subject of fish foods and feeding.



A page for
the beginner
contributed
by

A. BOARDER

HARDLY a week goes by throughout the year when I do not receive at least one query from an aquarist with reference to his tank becoming murky. In fact very many beginners vow that it is impossible to keep a coldwater tank as clear as a tropical one. I have seen many bad tanks myself (and who hasn't?) and so I feel sure that I shall be excused if I deal with the subject at some length in an endeavour to try to clear up the problem, and the tanks, in this article.

Let me make one point clear at the outset, and that is, I know that it is possible to have a coldwater tank for years in a living room with the water beautifully clear and the plants and fishes quite healthy. I am looking at two tanks now which were set up over five years ago and, except for the weekly servicing, they have not been emptied or completely cleaned out during that period. These tanks are 24 ins. by 12 ins. by 15 ins., and were based with some sharp sand so that it was about three inches deep at the back and an inch at the front. Three or four small rocks were placed in each tank and several plants of *Vallisneria spiralis* var. *torta* were planted. One or two *Sagittaria natans* and some *Egeria densa* were added and the tanks were filled with tap water. The tank has never been overcrowded with fish, but from time to time some have been removed and others added. At the moment there are six young fantail goldfish and five small paradise fish in the upper tank and five small fantails and five small paradise fish in the lower one. The fantails have a body length of about one and a half inches and the paradise fish are a bit smaller.

I like the fantails in these tanks as they are so handsome and they do not rush about like many tropicals; I find them very restful. My usual procedure is to remove the fantails to the open pond during the late summer and replace them with some young ones of the current year. Once a fish gets two or more inches long (body length) I consider that it is better to place it in larger quarters. I never think that a tank looks attractive with too large fishes in it, apart from the fact that it is more difficult to keep the larger fishes healthy. The rocks in the tanks have not been moved and are now covered with a fine downy blanket weed. This is left alone except that at the weekly cleaning I run the siphon tube through this weed to remove all the mulm which always collects there. The twisted vallis is the original plant as far as I know; occasionally a piece gets broken off and is either replanted or removed. Many runners have grown out from the original plants but I find it the easiest plant of all to keep within bounds, and the tips of the leaves rarely reach the top of the water.

The *Sagittaria natans* I do not like so much. The leaves have a tendency to collect brown algae, especially in the winter months, and the leaves never look as green as the vallis. The *Egeria densa* and similar plants tried, will always grow straight up to the top and then run around, shading the rest of the tank from the light. This plant has

to be pruned fairly frequently. I have tried hair grass but this has a tendency to collect blanket weed and is so shallowly rooted that it gets pulled up when trying to clear the blanket weed. I have had fair success with *Ludwigia* but find that a much better plant for my purpose is *Callitriche autumnalis*. This is a type of starwort, and I find that it grows quite well in my tank. Its pale green leaves are very attractive. The plant does have a strong tendency to grow up to the surface but it can be bent back to re-root or the top can be cut off and rooted.

Now although these two tanks keep quite clear I know that I could have the water milky and foul in less than a week by giving just a little too much dried food for a day or two. Also if the strong sunlight entered the tank for too long a period the water would turn green. I am sure that if aquarists would only stop feeding the fish at the first sign of water pollution things would soon right themselves. If you leave a murky tank and go on holiday for a week or two, providing no one feeds the fish, the water will usually be quite clear on your return.

When using dried food it is essential that it is sieved through a fine sieve so that the powder form is all removed. Fish will always go for the largest pieces and the fine is often left to cause trouble. During the warmer months of the year, when the fish are feeding well, much of this fine matter will be eaten by the fish as they suck over the bottom of the tank, but when the water gets colder and the fish lose their appetites the fine food will be left. A sure sign of this trouble is when a film of mildew forms over the compost.

If this film does form it should be removed as fully as possible with the siphon tube and no more food should be given for a few days. I have often stressed that fish, especially all types of goldfish, will eat at the maximum when the temperature of the water is in the region of 65°F. As it gets colder so do the fish eat less.

There is no doubt that algae, both brown and green, do thrive when there is an abundance of carbon dioxide in the water, and this condition can be caused by over-feeding. It must also be realised that if the water is in a healthy condition the fishes will also be healthy, and vice versa. May I make this suggestion to all those aquarists who find their tank has gone cloudy? Just stop all feeding for at least a week before trying out any other remedy and I feel sure that the water will soon clear and remain so as long as you do not again over-feed.

Be very careful how you feed to fishes in the outdoor pond. Whilst the weather is cold—no food at all, but if the weather turns mild for a few days and the temperature is up to the fifties, one or two small pieces of earthworm can be offered. Give these bits where they can be seen and give no more if the food is not soon cleared up. If the pond water has been frozen over for some time see that plenty of fresh tap water is run in as soon as a thaw arrives. I find that nothing tends to foul a pond quicker than a thick coating of ice for a week or so.

Making Sure that Fish Keep Alive

by W. L. MANDEVILLE

(Continued from the December, 1953 issue)

ALL living things that eat to live, are divided into three main categories. The meat eaters or carnivores, the vegetarians or herbivores, and those, like ourselves, which eat anything and everything—the omnivores, and the differing anatomical structure which enables a creature to obtain the essential food elements from various sources, must be our first concern. In fishes, as in other forms of animal life, the predatory carnivore is equipped to catch and kill; we do not encourage him in our community tanks unless he will confine his catching and killing to *Daphnia*, and other small crustacea, which we augment with larval forms of life small enough to be taken. But we do cultivate many fishes which live on carrion—the prepared flesh of shrimp, crab, herring, etc.—and these fishes, together with the true carnivores, differ considerably in their digestive organs, from the true herbivores.

The difference that concerns us most, is in the length of the intestine, there being quite a short intestine in the carnivores, and much longer in the herbivores. This is easily remembered if we think for a moment of the common frog. In the tadpole stage, the intestine is very long for the size of the creature, and this enables it to digest the algae that form its principal diet, but the rapid growth and metamorphosis into the frog stage does not apply to the intestine, which remains comparatively short, to digest the diet of flies, etc., in the carnivorous adult stage.

This short intestine is essential to the carnivores, as the rich protein diet on which they thrive, releases the food elements quickly, and the detrimental residues must be excreted quickly if toxins are to be avoided; the short intestine enables this to be accomplished. On the other hand, the food elements from vegetable sources, or the carbohydrates from cereal sources, require more processing within the digestive tract if the full nourishment is to be obtained, and the omnivores and herbivores have the longer digestive tract to do this.

Obviously, a bulky carbohydrate diet is slow starvation to any carnivore, as it passes through the short intestine before the available nourishment can be extracted, even if the digestive juices were capable of processing the ingested material, and on the other hand, a diet too rich in animal protein might distress the true herbivore, because the detrimental residues are retained too long within the longer intestinal tract, forming gases and toxins before being excreted. This is a frequent cause of casualty among barbs and livebearers, and when *Daphnia* and larvae are given to these fishes, it is wise to allow at least 24 hours fasting, if these satisfactory additions to diet are to follow fairly consistent feeding on prepared food from cereal sources.

The principal food elements that concern us have been mentioned—proteins and carbohydrates; fats are of no importance in fish diet, neither can they digest them, and having no temperature requirements to cater for, the necessity for fat does not arise. The oils which replace the fats in the tissues of fishes are obtained from the proteins and carbohydrates in their food.

All live foods are rich in animal protein, and further sources of protein are the earthworm, steamed fish, shrimp,

crab, mussels and almost anything from the fishmonger's slab, especially those very useful herring roes, raw or cooked. All protein is quickly assimilated and converted into energy (that is why the breeder uses so much of it to bring his stock into breeding condition) but the necessary frequent feeding from carrion sources, must be accompanied by watchfulness for pollution.

Carbohydrates not only provide immediate energy, but can also be stored within the tissues of the fish as oil, which in periods of dormancy or during starvation periods, are converted by the liver into blood sugars and into energy. This is important to the goldfish fanciers, who have longer periods of dormancy to consider than their tropical counterparts, and a diet of oatmeal porridge, made as for breakfast, is advisable a month or so before winter dormancy arrives, and the same form of porridge, with one of the protein sources mentioned above mixed in, will keep most of the tropical barbs in good health, and is ideal for all the livebearers. Although we may provide the essential food elements, these will not suffice if the necessary vitamins are absent.

Vitamin A (usually associated with D), is found in dried full cream milk, a useful addition to any prepared food, as this vitamin promotes growth. Vitamin B affects nerves, skin and digestion, and the germ of wheat is the most fruitful natural source, and we find it in Bemax and similar products. Vitamin C, essential for gland activity and blood condition, is found by the fishes in algae, crushed lettuce, spinach, etc., and must usually be added to the diet of herbivores. Vitamin D is obtained from halibut oil and from cod-liver oil; it is also included in the commercially packed dried full cream milks, and a deficiency of it leads to rickets, and poor bone formation in fishes. Vitamin E is important to all breeders, for a deficiency of it leads to sterility. All fishes find it in live foods; herbivores can find it in spinach and lettuce. The important thing to remember is that cooking, over-long storage, and light, will destroy these vitamins, and they are best added just prior to feeding.

Every aquarist knows that fishes will snap readily at live, moving food, and when food—no matter how suitable in content—is first given, it must be given sparingly until the fishes become accustomed to the unusual form or colour of it. They will soon associate the movement of a cover glass, or the disturbance of the surface of the water with feeding, and try the new food, and if it is good, they will soon come again. This is where dry prepared food of good quality is most useful, for as it becomes immersed, the minute crackles which we cannot hear, are sufficient to attract even blind fishes to the feeding ground.

What is the practical application of all this theory? There is no difficulty—other than finding it—with live foods. With prepared carrion, a drop of cod liver oil mixed in before giving, will replace the vitamin removed by cooking; the same oil, or halibut oil, will improve oatmeal porridge, and any dry food is improved by the addition of a spot of these oils allowed to percolate into the food overnight. A complete and very satisfactory dry food is provided by mixing a teaspoonful of dried full-cream milk with a tablespoonful of Bemax or similar cereal, and adding some of the carrion food before feeding.

The final process of any digestive system is the removal of the waste residues in the form of excreta, and with all the ills that fishes are heir to, none is more prevalent, or more distressing, than constipation. The great value of *Daphnia* lies in the fact that it is an attractive moving

(Continued at foot of opposite page)

Breeding and Rearing Siamese Fighters

by A. HUGH OWEN

EARLY in October of last year a pair of line-bred blue Siamese fighters were purchased from a friend and placed in two separate aquariums. These were fed on a plentiful supply of live-foods.

On 22nd October I placed the pair together in a well-established aquarium 36 ins. by 12 ins. by 12 ins. The plants were *Vallisneria spiralis* and a plentiful supply of blanket weed. There were no surface plants and the water level was dropped to nine inches. The pH of water in the breeding tank was 7.4. No adjustment was made to the pH and its reading remained at 7.4 throughout breeding, hatching and rearing the fry. The water was tap water which had matured in this tank for some months.

On placing the pair together the male took a great interest in the female and displayed continuously to her, spreading his glorious caudal (tail) fin like a fan, and with gill-plates extended like an Elizabethan collar advanced on the female. The next day the male was hard at work building his nest. Now, when I have bred fighting fish in the past the male always used bits of plants and plenty of blanket weed in the construction of the nest, binding the whole together by means of a sticky substance which he releases through his gill-plates together with plenty of bubbles. In this instance, although there was a plentiful supply of blanket weed he ignored this and other plants completely, only using bubbles in its construction.

He took three days to complete his nest, which measured three inches in diameter and half-an-inch in depth. The female also helped a bit in building the nest but the male drove her away every time she blew a few bubbles. Spawning took place at 10.30 a.m., when the male was observed wrapping his body around that of the female, after persuading her under the nest, the two fish then gently sinking to the bottom of the aquarium.

After spawning was completed, the male's attitude changed and the female was driven to shelter under a stone at the back of the aquarium. The male potted about the nest moving the eggs and gathering others that lay scattered on the blanket weed at the bottom of the tank. This was one of the reasons why blanket weed was used, as the male could easily gather the eggs from this as they were easily seen. On examining the under side of the nest through the glass, eggs could easily be seen between the bubbles. In spite of the male's ferocious attacks on the female, she insisted on coming out from behind the stone every now and then to blow a few bubbles under the nest, then making a hasty retreat to her refuge.

The eggs hatched in 28 hours at a temperature of 74°-78°F., and young could clearly be seen with yolk sacs attached moving about the surface of the water, and sinking to the gravel bed, where the male was rushing around picking up about three or four youngsters separately in his mouth and taking them back to the nest, where he would spray them to the underside of it. The female also helped in doing this and the male took no notice of her



Photo: A. Hugh Owen
Male Siamese fighting fish pictured beneath his bubble nest at the surface of the water

as he was too busy himself. Eighty-four youngsters were counted.

The male and female were removed and separated. In three days the yolk sacs had disappeared and Infusoria was supplied by heating up water from a vase where some cut chrysanthemums were placed four days previously. On examining this water by means of a low-power microscope, the slipper animiculae (*Paramoecium*) was seen in plenty by placing a small drop of this water on the microscope slide. Half-a-pound jam jar of this water was placed in the aquarium three times a day. Every other day a small pinch of dried egg was given. The young grew quickly on this, and brine-shrimp eggs were given on the fourteenth day. Later, they were fed on earth-worms mashed by means of worm-shredders, to make the particles of worm small enough for fry.

Making Sure that Fish Keep Alive

(Continued from opposite page)

food, rich in protein, covered by a chitinous shell which is laxative to fishes. This laxative effect is about all that is left when *Daphnia* is dried, but it is a very valuable inclusion in our fishes' diet for that very reason, but a better method of combating any constipation arising through dry-food feeding, is to add a drop of medicinal paraffin to the dry food, allowing it to percolate into the mixture before feeding.

Finally, it is necessary to stress that no alteration is indicated in your feeding programme if all is well. If alteration is necessary it will be indicated by symptoms of vitamin or diet deficiencies, and the understanding reading of the principles outlined here, may help you to correct those deficiencies ready for the continuation of this series, which will deal with breeding.

IN THE Water Garden—by Dr. W. E. SHEWELL-COOPER

IT is surprising how little people know about lilies. Some have grown Madonnas, others have used arums to decorate some beautiful church at Eastertime. A few have heard about tiger lilies, but when you think that there are about 400 species, it makes you wonder why gardeners don't grow them more. The name lily comes from the Celtic word *Li*, meaning whiteness. Some lilies are delicate, but many are hardy, healthy and robust, and do well in any ordinary garden. A beginner should always start with the easiest to grow, and as he gradually increases his knowledge, he can be more venturesome.

Most lilies do well as cut flowers. They should never be cut, however, with too great a length of stem, or with too much foliage, because if this is done, the bulb below may be seriously injured. Lilies grow under a remarkably wide range of conditions of soil. Taking it all round the majority of them, however, insist on good drainage. I have seen some most wonderful effects when lilies have been planted close to the edge of a pool and their glory has been mirrored in the water below. Remember that all lilies like shelter, and many of them don't mind partial shade. See that they have all the moisture they need when they are in active growth and they will flower well.

The simplest way of tackling the job of soil preparation, is to dig out holes a foot wide to a depth of about 18 inches, and then put in at the bottom a three-inch layer of brickbats or clinkers for drainage. Then, if you want to be very particular, you can make up a mixture of one part soil, one part sedge peat, and one part pure sand, and put this into the hole, firming it well. I always add, in addition, a fish fertiliser with a five per cent. potash content at four ounces to the square yard. Don't be discouraged by these special instructions. Lilies will grow even if you don't take this trouble. But if you can be careful, then you will find that the lilies will last for a very large number of years and will give a magnificent display each season.

Planting Time

I am sometimes asked about the best time for planting the bulbs, and the answer is that it very much depends when the lily bulbs are imported. Probably the ideal time to plant would be immediately after the flowers have faded. You can plant at this time of the year or as late as in March for the more tender bulbs. I have had excellent results from plantings carried out in November. As to depth, this of course varies with the size of the bulb, but a good general guide is to see that the planting is carried out so that the bulbs are about three times as deep in the ground as their greatest diameter.

Even if you cannot carry out the special preparations advised, it is possible to take the trouble to place a little sand just below the bulb at planting time, so as to make sure of draining away any surplus moisture, and thus prevent the bases of the bulbs from rotting. It does help to mulch the ground with sedge peat after planting. I usually put on a top dressing three inches thick, and then this helps to smother the weeds. Very occasionally it is necessary to pull up an annual weed by hand, but by and large these mulchings save time and labour. In very light, sandy soils, it may be necessary to give extra feeds, and in that case, "Liquinure" can be used when the plants are about half grown. It is easy to dissolve this in water and to give about half pint of feed per plant. Some people repeat the dose 10 days later.

I always say that it's possible to divide varieties into three big groups. One, the early flowering, in which you find the Nankeen lily, the Martagon lily, as well as *L. tenuifolium* and *L. Hansoni*. Then there are the mid-

season flowers, of which *Lilium regale* is one of the best known. *L. sulphureum* is another in this group, as is the leopard lily and the scarlet Turk's cap lily. In the late flowerers, the number one of the group is undoubtedly the tiger lily. This is followed by *Lilium Henryi* which often bears stems seven or eight feet long, and thus the bulbs have to be planted about 10 inches deep. The third good species in this group is *L. auratum* which bears artistically shaped stems with a lovely gold band running through its petals.

You can go on dividing and sub-dividing lilies to your heart's content. There are the true lilies, for instance, sometimes called the trumpet-shaped lilies, like the Madonna. There are the bell-flowered lilies, such as *Lilium canadense*; the heart-shaped lilies, like *Lilium himalaya* which often grows 12 ft. high, and which I saw doing so successfully at Birkhall when I was walking round the gardens with Her Majesty the Queen. There are the open-flowered lilies like *Lilium oratum*, and the Turk's cap lilies like *L. Hansoni*; while of course one must not forget the erect-flowered lilies like *Lilium Philadelphicum*.

Ready Growers

Somebody is now going to say, "Well, which are the easiest lilies to grow? Could you give me a list of those. I am only a beginner and I want to make a start." Certainly! I have grown all types of lilies, and I think that the following are absolutely fool-proof and you ought to be able to do them well in any garden: *L. candidum*; *L. dauricum*; *L. Wilsoni*; *L. Hansoni*; *L. Henryi*; *L. Martagon*; *L. Maxwelli*; *L. pardalinum*; *L. pardalinum giganteum*; *L. pardalinum Parryi* (Napier's var.); *L. pyrenaicum*; *L. regale*; *L. Thunbergianum* Orange Queen; *L. tigrinum splendens*; *L. umbellatum*; *L. umbellatum erection*; *L. Willmottiae*.

Now somebody is going to say, "Well, my soil around the pool is somewhat moist. Could you possibly give me a list of lilies that will grow in such a situation?" Yes, I can do that, and I must leave you to make your own choice. Some of them you will see are, fortunately, in both lists. Here then are the best lilies for a moist situation: *L. carolinianum*, *L. Catesbaei*, *L. columbianum*, *L. columbianum* var. *Ingramii*, *L. cordatum*, *L. giganteum*, *L. giganteum* var. *Yunnanense*, *L. Humboldtii*, *L. Humboldtii* var. *Bloomerianum*, *L. Humboldtii* var. *magnificum*, *L. Kulshan*, *L. michiganense*, *L. nevadense*, *L. nevadense* var. *fremense*, *L. Parryi* (Napier's variety), *L. Roehlii*, *L. Shuksan* and *L. Star of Oregon*.

Book Notice

Goldfish, by Anthony Evans. Foyle's Handbook. 87 pages. Black and white photographs and line illustrations. W. & G. Foyle, Ltd., 119-125, Charing Cross Road, London, W.C.2. 2s. 6d. net.

THIS book deals solely with the common goldfish and its fancy varieties and is concerned with the maintenance of these fish in ponds and aquaria. A chapter each is given to the coldwater aquarium and the goldfish pond, and two chapters describe the fish. Other chapters give advice on selection and feeding, on breeding methods and on care in ill-health. "Shows and showing" is the title of a chapter contributed by Mr. A. Boarder, which is a guide to the exhibition of goldfish for the novice. An appendix outlines a method of garden pond construction. Photographs of the varieties of goldfish described are reproduced in the book, and these are the work of Mr. Laurence E. Perkins.

AQUARIST'S Notebook



by
RAYMOND YATES

IN recent months there has been a marked decline in the public attendance at aquarist shows all over the country, and it is commonly agreed that there are now too many shows and that public interest in them is falling off. In many instances the standard of the shows themselves is declining although this is by no means general. Many aquarists are refusing to compete because they feel their fish have no chance against some of the rarer and more colourful specimens which will be entered by a few experts. There is no question that certain species of fish are unfashionable to-day at shows and it is the exception, rather than the rule, for them to get an award, irrespective of how good they may be.

A case in point is the rather large section called "Any Characin." This includes a wide variety from the neon to *Metynnis*, and frequently the larger fish take the prizes. This section could very well be split into two:—(1) Small Characins and (2) Large Characins—and it would then be possible for the smaller members of this family to get awards. Barbs are another example. Almost any show schedule will list dozens of entries of tiger barbs (*tetrazona*) with the result that this variety is practically certain of obtaining one placing, if not more. Some fish (such as *Barbus lateristriga*) are almost always ignored by judges, and we are reaching a stage when fishkeepers are just not entering the less spectacular types of fish which they know from experience cannot win.

Very much the same position obtains in the "Any Other Variety" section, the commoner fish are being pushed out by more recent or more colourful and definitely more expensive fish, again with the accent on size. Anyone conversant with present day shows could draw up a list of fish which are unlikely to obtain any award and which it is just about a waste of time entering. This list would certainly include (*inter alia*) the three spot gourami, black line tetra, silver tetra, platinum tetra, pencil fish, *Barbus schuberti*, *Barbus semifasciatus*, *Barbus lateristriga*, *Barbus everetti*, mouthbreeders, *Cichlasoma nigrofasciatum*, *Nannacara*, catfish and loach (where no special class for these), Australian rainbows, white clouds, penguin, *H. pulcher*, feather fin, lemon tetra, *H. ulrey*, Buenos Aires tetra, beacons, blind cave fish, bloodfin, flying barb and most of the *Rasbora*.

It must be remembered that the judges find themselves in a difficult and unenviable position. They are faced with a large number of first-class fish who possess few, if any faults. In these circumstances it is only natural that the larger and more colourful exhibits or rarer specimens select themselves and get the awards. Some judges appear to eliminate all but four or five specimens in a class after a cursory glance, and then concentrate on these for the awards. The only merit about this method is that the judging is completed much sooner than would otherwise be the case. As it is some clubs complain that judging is done too quickly, and I heard recently of a case where a judge disposed of roughly 140 entries in exactly two hours, rather less than a minute per entry. Naturally, this is all very disappointing for the unsuccessful competitors and their interest wanes.

On the other hand judges are human, and if they are to do the job thoroughly many hours of hard work face them, and I have heard of cases where the judges have worked all through the night. It is a thankless task being a judge and if we are to retain the best people at this job the work must be made easier. Clubs may well ponder the advisability of making sweeping changes in the classifications available to entrants for their next show. Remember the little aquarist is the backbone of the hobby, not the expert.

The problem of what to do with old safety razor blades is always with us but they have several uses for the aquarist. There are many ways of cleaning the inside glass of aquariums but none is so efficient as scraping with a razor blade in a long holder. It is surprising how many fish keepers have what appear to be misty tanks when in reality there is a thin film of algae on the front glass which could be removed in seconds with the aid of a razor blade scraper. The film of algae falls to the bottom of the tank and is then quite easy to siphon out. It is generally too much trouble to wipe the blade after use and, if it comes to that, a waste of time, so that a new "old" blade should be put in for the next cleaning operation.

Tanks should be scraped in this way at least twice a week and it should be remembered that the outside glass gets very dirty, particularly indoors in winter. A tank which gets electric light only also films up very quickly and needs this service just as much as those exposed to daylight. For cutting up live food into fine portions there is nothing better than an old blade and a wooden block—the results are superior to any other method. Efforts have been made to remove algae from the leaves of large plants by scraping with a razor blade but the results are poor and inevitably end in disaster.

Tubifex has to be washed and washed well after purchase before being really safe for use in the tank. This can be done by putting it in a large clean bucket and refilling several times or by merely allowing a gentle flow of water to fall into the bucket. None the less these methods are slow and messy. A still better way is to put the *Tubifex* into a large, fine-meshed and rather deep net, hold this under the tap and allow the cold water to fall into the net with some force. Particles of dirt are quickly broken up and all sediment disappears.

Nowadays many aquarists control a large number of tanks from a single thermostat—a method which is open to question. As a thermostat burns no current the saving is in the cost of additional thermostats (which are deemed unnecessary) and less wiring is required. On the other hand all the tanks are at the mercy of one single thermostat and if this should go wrong heavy loss follows as a matter of course. With this in mind only fairly new instruments are used in such circumstances and the fish keeper feels that all is well. There is, however, another risk—the heater.

If the heater in the governing tank burns out, the water in that tank will get colder and thus turn on the thermostat which will remain on. Unless this is noticed (which is unlikely) the temperature in all the tanks governed will continue to rise with possibly fatal results. It is important, therefore, that the heater in use in a governing tank should be fairly new and of reliable manufacture.

Heaters should never be removed from tanks unless absolutely necessary. They will give good service for years in many cases if left untouched but constantly moved they burn out much quicker, and this is the more true of old heaters which have been undisturbed for a long period.

At sometime or other everyone who keeps fighting fish

has provided them with a mirror to see what would happen, and their reactions are well known. On the other hand few have tried the effects of showing other fish their own faces. It is certainly amusing and quite instructive. My own experience is that cichlids are quite alarmed by their own appearance and start back from the intruder with obvious distrust. Cichlids have such expressive eyes on occasions and this is one. Paradise fish bristle with rage in true *Betta* fashion but swordtails cannot get near enough to the mirror and give the impression that they are very much in love with their own reflection.

Some time ago a fish appeared in aquarist shops which was sold under the title of "Palestine mouthbreeder." Although the fish which this specimen was supposed to represent is fairly peaceful and safe in a community tank if well fed and not too large, the fish in question were very wild indeed. Some dealers had considerable losses before it was realised how savage this particular variety could be—in one instance the whole tail of a blue gourami disappeared within a minute of a "Palestine mouthbreeder" being introduced. In another instance thirteen fish were lost in a few moments in a community tank when several of these wild fish were put in.

Aquarists should never introduce new varieties or unknown varieties to their tanks until they are certain that no harm will befall the other occupants of the tank. Many people have bought puffers, only to return them next day to their dealer when they found their existing fish with badly bitten tails. Be wise before the event and, if you are in doubt about any particular fish, ask an experienced fish keeper for his views. Many people have asked my advice in this way and I have on several occasions saved newcomers from making (for them) a very bad buy.

Recently I had the pleasure of visiting Mr. J. R. Shaw of Moston, Manchester, who is well known in the north as a very enthusiastic and successful exhibitor. During 1953 Mr. Shaw entered fish in nine northern shows and the measure of his success can be judged from the fact that in these he obtained 73 awards including 27 "firsts," with 35 actual trophies. Although Mr. Shaw keeps many different kinds of tropicals he specialises in characins and *Aphyosemion* varieties with the accent on the latter.

As a breeder he has also had some very good results with *Aphyosemion* and I asked him if he had any hints to pass on to readers of *The Aquarist* in this direction. He mentioned that he usually breeds these fish in small tanks, 18 ins. by 8 ins. by 8 ins., and uses old tank water with the addition of roughly a third portion of boiled water and two teaspoonfuls of sea salt. If possible he prefers to add about half a gallon of distilled water and also uses a peat bag. He finds sea moss or bladderwort excellent as a spawning medium but notices his fish favour bladderwort of the two. The young can safely be left with their parents.

For the blue gularis he adopts a slightly changed routine. At a temperature of 72°F. he finds the eggs hatch at varying times but never sooner than four weeks, five days after spawning, and not later than six weeks. For this fish he puts in three handfuls of peat and uses *Riccia* for spawning purposes. The parents are left in the tank for a fortnight and then removed. He favours live feeding for all his fish, in particular *Daphnia*, white worm and glass worm. He has some excellent specimens of *Metyonius roosevelti* and *Schreimulleri* and is at present endeavouring to obtain a brood of *Pelmatochromis* using the plant pot and saucer (nesting box) method.

It is well known that *Corydoras* cannot stand salt and in this connection Mr. Shaw mentioned some ill luck he had with clown loach (*Botia macracantha*) which are seemingly equally unable to stand the effects of salt in the tank.

Apart from his aquatic interests Mr. Shaw is also a nurseryman and an expert on chrysanthemums, on which topic he has lectured all over the country and given several B.B.C. talks. He tells a good story of a chrysanthemum show where the "Best in the show" was nearly awarded to a bowl of roses. Imagine the feelings of exhibitors at a goldfish show if, in similar circumstances, a tropical was awarded "best fish in the show."

Some time ago I was looking round a fish house which was next door to a large market gardener's establishment. Someone had had a bright idea and had obtained a large number of broken plant pots from the nursery, washed them and crushed them into small fragments. These fragments were about half-an-inch across and large numbers of them had been used as a form of compost in cichlid tanks. The effect was certainly striking.

FRIENDS & FOES No. 21

NEPA

PHYLUM:—Arthropoda, from Greek *arthron* joint, and *podos*—foot.

CLASS:—Hexapoda, from Greek *hex* six, and *podos*—foot.

ALTHOUGH quite common, this creature may easily escape notice because of its remarkable resemblance, both in colouring and shape, to a dead leaf. The "stalk" of the leaf is the breathing tube of the insect. Normally lurking in the mud at the bottom of a pond, it is dependant upon atmospheric air to maintain life. Removal of the breathing tube does not destroy its ability to obtain air, however—it seems merely an aid to enable the insect to remain below water in the most favourable position to ensnare its prey.



Back view of *Nepa*, slightly larger than life size

Water Scorpions

The first pair of legs are so modified that they resemble a pair of open penknives, the first joint snapping back into a groove in the second joint. Any unwary insect which ventures between these two blades is immediately seized and held in a vice-like grip.

The eggs are curious in being fringed with a number of hair-like appendages at one end. The young *nepae* climb freely about submerged plants and possess only small, short breathing tubes. Until the clytra develop, the body segments are plainly visible.

Hardly likely to be introduced into aquaria, but eggs could be placed in garden ponds with plants taken from natural pools.

C. E. C. Cole

THE AQUARIST

OUR EXPERTS' ANSWERS TO READERS' QUERIES

A short while ago I completely changed the water in my tropical aquarium, but in a few days most of my fishes were dead or dying. I found out soon after that the water had been heavily chlorinated. If I have to change the water again, how can I make it safe for fish life?

Water may be de-chlorinated by dissolving one grain (by weight) of sodium thiosulphate in every gallon of water. Be that as it may, it is not a wise plan suddenly to move fish used to one sort of water to another. The shock often leads to trouble. When you have to re-establish a tank, it is a good idea to save some of the water from the old aquarium and add it to the new; and even this water should be allowed to stand for a week or more to mature.

I set up a tank with plants taken from local waters. After a few weeks all the plants died away, though I placed a top-light over the aquarium. Can you tell me why these water plants died in my aquarium?

Plants taken from the wild often fail to establish themselves in an indoor aquarium. This failure to get established is more likely to take place during the winter than the summer, for most of our native plants rest from late autumn to early spring. Besides, the change of water and temperature would not suit them. Even in the summer time, wild plants do not settle down very well indoors, for the light indoors is very poor compared to that outdoors. It is better in the long run to buy cultivated water plants from a reputable dealer.

I feel rather worried because a scum keeps forming on the top of the water in my new aquarium. Will this scum do any harm, please?

Do not worry. The scum may be nothing more serious than traces of oil working out of the mastic used to glaze the aquarium. On the other hand, much decaying plant life can cause an oily-looking scum or film on the top of the water. The best thing you can do is to draw sheets of newspaper over the top of the water every now and again until no more film remains. It might be added, however, that an oil-heater used in the same room will cause a scum to form unless the cover glass fits closely to the top of the aquarium.

The water in which I keep some axolotls is always turning green, and I have been wondering whether this green water would be suitable for feeding to young fish, say, the fry of rosy barbs?

We have had no experience of using green water obtained from an axolotl tank for feeding fry. But we have used the green water from a tank of terrapins (water tortoises) with great success. In fact, we have used green water from a terrapin tank stood in sunlight to raise many a brood of barbs.

Please can you tell me the names of some books containing good colour plates of tropical aquarium fishes?

The best colour plates that we have come across in our reading are those found in *Exotic Aquarium Fishes*, by William T. Innes. *Freshwater Tropical Aquarium Fishes*, by Hervey and Hems, contains several good colour plates of tropical fishes. We suggest you look these two books up in your local reference library.

During the last few months I have been reading as much as I can on the tropical fishkeeping hobby, but I have found that most of the books I have read were published sometime before the last war. I wonder whether you would supply me with the names of a few post-war books dealing with our hobby?

As was to be expected, the war resulted in a dearth of aquarium literature, though several good books were published in Germany during the early war years. In America, Mr. William T. Innes continued to bring out new editions of his classic *Exotic Aquarium Fishes*. Directly the war ended publishing houses in this country soon

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.

brought out many fine books on the hobby. Of these, we can commend to you *The Goldfish*, by Hervey and Hems, and *Freshwater Tropical Aquarium Fishes* by the same authors.

I have two male swordtails, one more developed than the other. The other day I noticed that the fully-grown one was paying court to the smaller one, dashing up to it, and showing off in front of it. Can you please explain this (to me) most unnatural behaviour?

There is nothing unusual in the behaviour you have witnessed. Male swordtails often pay court to other males, but will not dally too long with them when there is a nice large female in the aquarium with them. But are you sure that the larger fish is "making up" to the smaller one? Two male swordtails in an aquarium often develop an intense dislike for each other, and will fight on every possible occasion. Sometimes it is better to separate them before serious damage is done.

I feel rather concerned about a new aquarium I have had made for me. The glass sides do not fit very closely, and quite a lot of the putty or cement shows on the inside. Will this cause any harm?

The fact that a lot of the cement shows on the inside of the aquarium between glass and frame does indicate rather poor workmanship, but we do not think you need worry about it. Make sure the cement is pressed hard against glass and frame all the way round, and give the aquarium a good soaking, with several changes of water, before finally setting it up for the fish.

Can you help me, please? I have a community tank housing among other fishes a large gourami and a Siamese fighting fish. For a long time I have noticed that the other fishes in the aquarium are terrified of the gourami, which chases them away from food and into the plants. A few days ago I found the fighting fish in a very bad way, unable to swim properly. I suspected chill or swim-bladder trouble, and took steps to relieve the condition. But my efforts have not met with any success. The fighting fish just stays moping in a corner of a hospital tank, and looks in a very poor way. Do you think the gourami is to blame?

We do think the gourami is to blame for the trouble. Large gouramis can cause no end of trouble in a community tank of smaller fishes. We imagine that your fighting fish has been kept away from food over a period, and probably sustained several bad knocks on the side and gills which have led to a progressive loss of condition. Kept by itself, and tempted with live food, the fish does stand a chance of making a recovery.

How can I stop the effects of condensation rusting up the top bars of my framed aquarium?

You can obtain from some of the larger dealers specially constructed clips to support the cover glass a mere fraction away from the metal frame of the aquarium. Have you thought about melting paraffin wax with a small quantity of white vaseline and applying this to the top of the frame? This mixture makes an excellent water repellent, and is harmless to the fish. It is best applied while the tank is empty, so that it can be run well into the corners of the underside of the frame. Another dodge is to cut four lengths of rubber tubing the length of the sides and ends and slit them down the middle with a razor blade. Force the rubbers over the edges of the frame, so that a rubber

pad or cushion is formed on which the cover glass may rest. Water collecting on the cover glass will run off the rubber tubing and be prevented from contacting the metal frame.

I have been told that mollies and platys like algae in their diet. Can I use Bemax as a substitute?

Certainly. Bemax is a very good substitute for algae, and most green-food-loving fishes thrive on it.

Recently I bought a pair of rosy barbs. The male was much fatter than the female, and a few days after purchase I found him dead. When I made an incision in his underparts a lot of watery fluid seeped out. Can you tell me what was wrong with this fish?

We think your rosy barb died of dropsy. Fish with dropsy look very bloated, and towards the end the edges of the scales stand out from the body giving the fish a very rough appearance. One cannot do very much for dropsy, and bad cases are best put out of their misery.

Please can you tell me anything about the breeding habits of *Symphysodon discus*?

We have not heard of *S. discus* being bred in this country, but it has been bred several times in America. It needs the sort of conditions that suit angel fish; that is, deep, clear acid water, and wide-leaved plants or slabs of slate or frosted glass on which to spawn. So far as we know, the fish breeds like the angel fish.

All went well in my aquarium for several months, then, all of a sudden the fish started to die off like the proverbial flies. The water remains crystal clear. I did add some plants to the aquarium which were taken from a friend's tank.

Something may be poisoning the water, or altering the pH value to such an extent that fish cannot live long in it.

We advise you to check up on the following points: Have you any metal objects in contact with the water? Are any drops of water falling off metal objects into the water? Have you any fresh paintwork in contact with the water? Have you placed any rockwork in the aquarium during the last few weeks? Lumps of marble or limestone or rockwork with a calcareous content will soon alter the pH value of the water to such an extent that some fishes will soon die in it. Has your compost been obtained from a reputable dealer? Some so-called aquarium shingle has limestone chippings in it which soon make the water very hard or possessed of a high alkaline content. With careful checking over all such points we feel sure you will soon hit upon the cause of your trouble.

I keep a large pair of angel fish in a community aquarium. Some time ago the pair spawned, using the broad leaf of an Amazon sword plant on which to lay their eggs. As the other fishes in the tank were all around, I cut the leaf off the plant and put it in another aquarium kept at the same temperature. Although some of the eggs turned white, I succeeded in raising a good number of fry. Is it unusual for angel fish to spawn in a community tank? And did I do right in removing the eggs to another tank to hatch out?

Angel fish often spawn in a community aquarium but, unless the tank is a large one, and the parent fish can keep intruders away, few baby fish ever reach maturity. You did quite right in removing the leaf containing eggs to another tank to hatch out. So long as the eggs are not chilled in the process, little if any harm is done to them. But once the eggs are placed in their new surroundings, it is a good idea to keep the water moving around them by means of artificial aeration; for sediment settling on angel fish eggs often leads to their developing fungus disease.

COLDWATER FISHKEEPING QUERIES answered by A. BOARDER

I understand that white worms are good food for aquarium fish. How can they be bred?

White worms or enchytrae are very useful as a food for fishes, especially for young fancy goldfish when about two months old. Aquarists have their own special methods of breeding these but I find the following very successful. I use small concrete boxes as shown in the accompanying illustration. These are made in a mould with one part cement and three parts sharp sand. Mine are 14 ins. long and seven inches wide, with a depth of three inches. The box is almost filled with damp peat and a little sand. A small hole is made in the compost and a few white worms are placed there. A piece of damp bread, cooked potato or porridge is then placed over them. The box



Photo:

Laurence E. Perkins

A trough made with concrete, suitable for white worm culture

must be kept covered with a piece of glass and darkened. I find that my best plan is to place several boxes one above the other so that the base of one shuts out the light from the one below. After a few days the worms will start to multiply, when some can be picked out with tweezers from below the food. The boxes should not be kept too hot or too cold; between 50° and 60°F. seems all right for them. See that the peat does not dry out, but also do not have so much water that it can be poured away. If the worms cannot be picked out easily, place a ball of peat and worms over slight heat with a bit of glass on top. The worms will soon crawl on the glass when they may be washed into the tank.

I have a pair of scaled fantails from which I should like to breed some youngsters. Both fish are very good shapes but one has a single anal. Shall I chance breeding from them?

A great deal depends on the strain they came from. If they have been bred right over a number of years you may be quite all right breeding from them. The fish with the single anal may have been from a batch of young where only one or two had this feature. All the others may have had the double anal. From your first generation it is possible that there will only be about ten per cent. of single anal fish and the others may be perfect. The danger will arise if you breed from these youngsters with a single anal, as the proportion of their young with single anals may double in the next generation.

You always emphasise the need for plenty of space when rearing fry of fancy goldfish. Last season I placed many fry in a good conditioned out-door pond but lost nearly all of them. I only saw a few water boatmen in the pond. Do you think they were to blame?

It is a fact that the space question is more important even than feeding where young fish are concerned. The trouble with out-door ponds is that there are so many

pests which can prey on the fry. The earliest ones are the *Hydra*, then come the larvae of various dragon flies and water beetles. Then you have to contend with water boatmen and perhaps the tadpoles of newts. I think that the best way to rear numbers of fry is to move all you possibly can as soon as they are free swimming from the hatching tank. See that no small pests are introduced into the new tank with the fry. And do not use the same water plants as were in the hatching tank. Give these youngsters as much space as possible but do not put them out into an out-door pond until they are an inch long over all. This will give them a much better chance of survival. When you have fry in any outdoor pond it is essential that you visit the pond every night and then quietly search the surface with the aid of a strong torch. It is surprising what pests you can find and catch by this means.

I want to breed bitterling carp but cannot find much information about it in any books. What compost should I have on the bottom of the tank for the mussels?

Several articles on the breeding of the bitterling have appeared in *The Aquarist* at various times. The female fish lays her eggs into a live mussel with the aid of an ovipositor. To be successful at breeding these fish it is necessary to see that the mussels are healthy. This will only happen if you have the right conditions for them in the tank. Mussels cannot move about in sharp sand but prefer mulm or mud. An old established tank should be used, one which has not had the mulm removed for a long time. Have no fish in the tank other than the bitterling and then providing you have both sexes and healthy fish they should breed all right. The male has brighter colours than the female and is generally larger. Use plenty of live foods for conditioning the fish and watch to see that the mussels do not die. A decaying mussel in a tank can cause pollution very quickly.

I have an aquarium 12 ins. by 6 ins. by 6 ins. and shall be pleased if you will advise me which coldwater fish I can keep in it and how many.

I do not want to disappoint you but there is no doubt that tanks as small as this would present difficulties even for experienced aquarists. I know that they are cheap, but they may prove dear in the long run. If there is one thing essential for the successful keeping of coldwater fishes it is plenty of space. The absolute maximum of fish your tank will hold will be three inches of fish; all I dare recommend for the tank is one goldfish not more than two inches in body length, or two small paradise fish.

I am having trouble with the *Cobomba* in my tank. It does not grow very well and under a microscope the leaves appear to be covered with minute, white moving particles. These are also on the glass of the tank. What is the cause, and treatment to get rid of them?

The moving particles seem to me to be Infusoria, probably *Paramecium*. These are very good food for small fishes but larger fishes will ignore them as long as there is plenty of other food available. They usually thrive in water which contains a fair amount of decaying vegetation or food. Stop all feeding of the fish for a fortnight and you may find that the Infusoria disappear. It will also help if you siphon out as much as possible of the mulm at the bottom of the tank, remove plenty of water and re-fill with fresh water. A table-spoonful of sea salt to the tank will also be of benefit.

I have to move to a house where there is no electricity. I have a 24 ins. by 12 ins. by 12 ins. coldwater tank but I want to illuminate it. Can I get over this difficulty as I shall have only paraffin lighting?

You need not worry about top lighting for the tank but you will be able to place a small paraffin lamp at one end of the tank. Have a reflector kept clean so that the

light is shone on to the end glass and then arrange a suitable screen in front of the lamp so that the lamp and direct light are not seen from the front. If you see that the water plants are not too thick at that end you will be surprised at the good effect obtained from this end lighting.

I have a shubunkin which has blood-red lines on some of its fins. There is no sign of fin rot or fungus. I have tried the salt treatment but it is no better. What is it and what can I do to cure it?

The fin congestion can be caused by more than one thing. I think the most frequent cause is that some tiny flukes are attacking the fin. Give the fish a bath in Dettol, a half teaspoonful to a gallon of water, and do not leave the fish in for more than five minutes—less than that if it turns over. When giving the fish the treatment keep it in a net in the solution so that it can be removed as soon as necessary.

My shubunkin has a small lump under the chin. It shows no discoloration. How can I cure the trouble?

As long as the lump does not get bigger and does not become inflamed I should leave it alone. It is probably a cyst, and may not do much harm. It can be a tumour, when it may grow and eventually burst. If it becomes angry looking, paint the spot with an equal mixture of iodine and glycerine.

I recently bought two fantails from a shop and put them in with my other fish. Within a fortnight both had died. What did they die of? My tank is 18 ins. by 10 ins. by 10 ins. and had in it three fish about two inches long.

I expect the reason for the fish dying was that the earlier occupants of the tank had established themselves well and when you added the new ones, there being such a small area of water surface the weaker and newer fishes "went to the wall." When you had the three fishes going well in the tank why one earth did you not leave well alone? Your tank will only hold about seven inches of fish at the most. It does not hold more than one and a half cubic feet of water and if you imagine that in such volume in a lake there are normally as many fish as you are trying to keep in the tank you are very much mistaken. I should think that the main reason for the death of your fish was lack of oxygen, but it is unreasonable to guess at the cause of death in any fish.

I have an indoor tank which contains two shubunkins, one comet and one goldfish, in all about eight inches of fish in a 18 ins. by 12 ins. by 11 ins. tank. The glass and plants become covered with a brown deposit which looks unsightly. How can I get rid of it?

The deposit is a form of algae which often grows in a tank where there are too many fish or too much food has been given. Only give as much food as the fish can eat in a few minutes, and give live foods only for a fortnight, if you can. Some aquarists are finding that a small piece of coal placed at the back of the tank where it is not seen too much, helps to keep the water clear. You can try this out and I shall be glad to know of the result.

I have some young goldfish which appear to be attacked by gill flukes. From *The Aquarist* I have obtained a method of treatment to effect a cure but it does not say whether the tank should be treated or not. I have two snails in the tank. Can they be attacked or be carriers of the flukes?

As a rule the flukes stay on the fish, but if the attack has been of long standing it is advisable to give the tank a good clean out and a disinfecting. Dettol can be used for this in a fair strength, say a teaspoonful to the gallon of water. I advise that when any fish have been treated for flukes they be placed in a clean fresh container and given another bath after a week. They can then be replaced in the original tank. I think that the snails can be attacked by the flukes and also that they may be the carriers. You can get along without snails so why use them?

Some Experiences with "Bubble Eyes"



The peculiar facial expression which results from the over-development of the eye-sacs of the bubble eye goldfish is well shown in this view

THE water bubble-eye goldfish does not seem to have been very favourably received amongst the fish fanciers in England, many of whom express the opinion that it is extremely ugly which, when one considers the peculiar types already popular—i.e. the lionhead, oranda, moor, etc.—seems rather harsh. For my part, I have found them amongst the most interesting coldwater fish that I have kept up to date and I have had over twenty varieties during the past thirty years and have thirteen at the moment. I say this because I find so many people who write and talk on fish that they have never actually kept; indeed, there are some who pose as authorities and attempt to direct societies when their experience of fish is limited to a period of two or three years.

I have found the bubble-eye interesting for a variety of reasons, not the least of which is their obvious intelligence. They appear to become very tame and even inquisitive at quite an early age and this, quite naturally and without design on the part of the aquarist. Moreover, they appear to be very robust and quite capable of holding their own in this climate, which might make them suitable pond fish. Although this winter I have had a slackening in the movement of veils and moors the bubble-eyes in the same container are as active and hungry as ever. I was privileged to see the first spawning in this country and the degree of conformity was really amazing, especially to one such as myself who has concentrated on veiltails and who knows, only too well, their lack of conformity. There were no fish with anything that could properly be called a dorsal fin out of over 2,000 fry, though some did show the lumps and knobs so familiar with lionheads. So far as I could see there were no single-tailed specimens though, of course, quite a fair proportion showed only one anal instead of the required two.

Mouth Paralysis

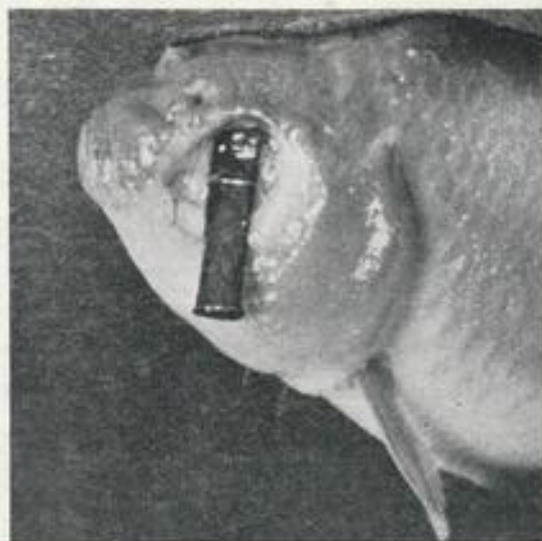
With those I have I found what appeared to be a tendency to develop paralysis of the jaws following the first sign of bubble development, which commenced when they were four weeks old. This accounted for the death of five specimens and I was of the opinion that the trigeminal nerve which passes under the eye and ramifies to serve the jaws, had been put out of action by the pressure of the bubble development. I don't know whether it is at all possible to contact any of the Chinese sources of these fish but it would be interesting to know if this is a weak

by N. E. PERKINS

(Photographs by LAURENCE E. PERKINS)

point with these specimens. As for growth, I have found them more than equal to the other varieties and have one specimen of four inches overall length which, for five months, is pretty good going.

One very interesting specimen lacks entirely vertical stabilisers in that it is devoid of anal fins as well as the dorsal. Apart from the fact that it has a rather naked appearance, its action when swimming illustrates, beautifully, the importance of vertical finnage. Its movements are erratic and lack control in the horizontal plane whilst it appears to be quite unable to dive straight on to a piece of food, approaching it in a circuitous manner. This, however, has not prevented it from keeping pace with the others as regards growth nor does it seem less robust. One very noticeable feature of this fish is the way in which the caudal has developed. It has tended to turn up more and more, the two upper lobes of the fantail attempting to fulfil the function of the absent dorsal, so that the upper



Left side of the head of a seven-weeks-old bubble eye goldfish. The eye and "bubble" have been removed to reveal the branch of the trigeminal nerve supplying the upper jaw. For clarity in presentation the nerve is supported on a wedge of black paper



"Pearl-scaled" bubble eye goldfish mentioned below. Its scales resemble those of a new variety of fantail recently introduced from China by Mr. T. Horman, first importer of the bubble eye

edges of the caudal fins describe an angle approaching 90 degrees with the line of the body.

Another peculiar specimen has an interesting scale formation which gives the body a corrugated appearance along its length, and the scales, apart from their peculiar convexity, do not seem to have the reflecting tissue equally disposed over their surfaces, the other margins appearing quite dull.

Bubble-eyes appear to colour at a very early age if kept at a high temperature and even if kept without heat, as those of mine, they start turning before six months. Altogether I find them very chubby, likeable creatures.

Aquarium Value of Red Ramshorn Snails

by W. H. MACEY

ALL the colourful species of snails are fairly well known, yet their behaviour still appears to be uncertain.

This is a pity, because the fishkeeping hobby has an exceptionally favourable opportunity to utilise the red ramshorn snail in particular, which is without a doubt one of nature's most valuable scavengers, even if all her aquatic and terrestrial creatures are included. These beautiful snails are not only excellent scavengers, they also provide food for both fish and plants, act as a safeguard in the aquarium, and they haven't a single serious fault.

Water snails are often accused of eating the leaves of plants, but this cannot refer to the ramshorns, for they always die rather than eat a healthy leaf of any of the better-known plants, while the common *Egeria densa* is probably as tender, and edible to the snail, as any of the choice plants. Even a fresh lettuce leaf is not eaten by this particular species until it becomes sappy or on the point of decay. In addition, the leaves of plants often get damaged, and at times riddled with holes, where no snails exist, so it is quite possible for them to be erroneously accused.

Like most aquatic creatures they will eat fish eggs, but they should never be allowed in the spawning tank, or

the eggs should be removed immediately after the fish have spawned. Most other species of water snails have an annoying habit of rapidly increasing in numbers to become a nuisance with their excreta, but this overcrowding with the red ramshorn snail is often automatically controlled, due to so many aquarium fish being fond of their young offspring.

Ramshorn snails have an enormous appetite and are continually on the move, eating algae all their lives with little respite. Seldom are they given any special food, yet they exist, and appear to thrive on the algae alone.

Benefit to Plants

Actually, in the aquarium these snails remove the algae from the leaves of plants, to enable the plants to breathe more freely, and they provide an excellent, if not the very best type of manure, for the benefit of plant life. Hence the reason for plants growing much faster, and being of a much better quality, where these snails are present. They consume that vital portion of the sediment—decaying animal and vegetable matter—to assist in keeping the water clear and pure for the welfare of the fish. As safeguards in the aquarium, they give ample warning when things go wrong. They immediately lose their brilliant colour, and they all cling in mass formation at the surface long before the fish show any sign of distress.

Unfortunately, all the other colourful water snail species appear to have one or more little annoying faults, but none are serious.

The habit of the black ramshorn snails is similar to the red, but they are not so pretty; the adults and their offspring appear to escape the attention of the fish more so than the red, so are more liable to become overcrowded.

The popular Australian red snail (*Isadorella pyramidata*) is a good scavenger, but it often increases in numbers rapidly, and when overcrowded develops cannibalistic habits, eating one another to leave empty shells on the floor of the aquarium to resemble a miniature battle field. They also kill the young of other species, and although they are very pretty as youngsters and while in the cold-water aquarium, under tropical conditions the colour of their shells soon fades badly to mar their beauty. Like the ramshorn snail, they live and thrive under tropical or cold water conditions.

The yellow winkle (*Paludina vivipara* var. *contecta*) is a coldwater creature, and may be the most beautiful of all water snails, but it has such a small appetite, and is continually burying itself in the sand to leave pot-holes. Its value in the aquarium can only be for appearance.

The Malayan snail (*Melania tuberculata*) is also a good scavenger, but it increases in numbers very rapidly and, as its work is done mainly in the dark, its value in the aquarium is of less importance.

Assuming adult ramshorns are controlled to roughly one to every gallon of water, everything in the aquarium should run smoothly with the minimum personal attention, and the picture would then be more natural, and more or less complete.

Post-Mortem Examination of Fishes:

W. Harold Cotton, F.R.M.S., F.Z.S., 39, Brook Lane, King's Heath, Birmingham, 14. (Phone: Highbury 1693)

Specimens should be sent direct to Mr. Cotton with full particulars of circumstances, and a fee of 3s.

It is important that the following method of packing fish be adopted:—Wrap fish, very wet, and loosely in grease proof paper and then in wet cloth. Re-wrap in grease proof or wax paper and pack around with cotton wool in tin box. Despatch as soon as possible after death, with brief history of aquarium or pond conditions.

Nannostomus anomalus is a Ready Breeder

by JOHNSON H. HOOD

WE are told that *anomalus* means abnormal (referring to the absence of the adipose fin) but there is nothing grotesque or bizarre about this delightful and elegant fish. Of a quiet disposition and a retiring nature, it can, nevertheless, be perfectly at home in a collection of small fishes, adding interest to the aquarium with its pert, sprightly movements, its poised elegance and quiet beauty. Should this fish be required for display purposes only it would be much better to obtain two males, for I find males will constantly be "making up" to one another and giving a daily display of rich coloration seen usually only at breeding time.

For the aquarist with very limited space *Nannostomus anomalus* is a very suitable subject to try one's hand at breeding, for they will spawn in very small tanks and one would not be burdened with hordes of baby fish with no space to rear them. A spawning of 40-50 is a satisfactory effort and first attempts often produce 20-30 only. Successive spawnings usually produce a greater number of eggs, and I have found the average number of fry to the spawning was 65-70 in adult fish.

Sexual Differences

Before relating my breeding experiences here is a description of the visible sexual differences. Out of condition both sexes are very similar, being dark brown-olive on the back, white on the belly, and decorated on the sides by two bands of colour. The lower one is blue-black extending through the eye to the tip of the nose, and the upper one a thin glistening golden line reaching and extending into the eye. The above description fits the female fairly well, but for the male add touches of red in the dorsal, caudal and anal fins, together with bright blue tips to the ventral fins and a touch also to the anal to complete the picture. At breeding time the male undergoes considerable changes. The body takes a reddish tinge with a heightening of the red coloration in the fins, while the black line deepens to twice its width and intensity of colour and appears edged with red instead of gold. Against this display the blue tips of the ventrals really stand out vividly. There is little change in the female except that her normal colours become more pronounced.

I will first record briefly the method used for my last spawning and will then append the tolerances in water conditions I have found to prove successful. A tank 20 ins. by 10 ins. by 10 ins., base-heated, was filled eight inches deep with rain and tap water in the proportion of three parts rain to one part tap. A small quantity of peat covered the bottom and a covering of floating plants consisting of Indian ferns, *Riccia*, *Salvinia* and bladderwort filled the surface. The pH was 6.8 and the hardness 6°. The temperature stood at 78°F. during the spawning period and no protection from light was provided during the hatching period.

The brood fish had been conditioned separately on *Cyclops*, white worm and a few small bloodworms, in alkaline water with a pH of 7.4. When placed in the

breeding tank the reaction to the acid conditions was immediate and the general heightening of the colours very noticeable. Next morning they were spawning. The female positioned herself under a leaf and the male, swimming alongside, pressed his body against hers with the vents touching, and after intense quivering a single egg was left stuck (sometimes) to the leaf. This was repeated for about two hours. As the female was still plump the fish were left and the next day the spawning procedure was repeated, after which the fish were removed. I noticed no attempt to eat the eggs on the part of the parents but I suppose females do vary.

Eggs not Easily Seen

Owing to the small size of the eggs (which are clear) and the fact that they are attached to the underside of the plants, the eggs are very difficult to detect, and so I can only give an estimated time of hatching, which I would place somewhere between 24 and 48 hours. To complicate matters further it takes the fry about five days to become free-swimming, so do not be in a hurry to discard your breeding effort as a failure. The fry are very slender and are adept at hiding, so be satisfied if you can detect only one for there will be many more.

On the sixth day after spawning I could count 25 fry, some free-swimming, some not, so pond Infusoria was warmed and added. On the twelfth day micro worms were offered and taken. Before the fry were three weeks old their tails assumed a whitish colour and appeared "moth-eaten." This is quite natural and was retained until the fish were eight to ten weeks old, when they were about three-quarters of an inch long and were replicas in miniature of the parents. A final count revealed 77 fish, which were reared mainly on *Cyclops*, of which they are very fond.

To give some idea of how accommodating *Nannostomus anomalus* are, I have bred them in water which varied in hardness from 3° to 10° and the pH value from 6.5 to 7.2. The following points may also be of assistance. Cultured Infusoria is satisfactory but pond Infusoria is better. The fry, once passed the Infusoria stage, can be reared on micro and Grindal worms. I think acid water is preferable to alkaline for breeding as it stimulates the parents. I have only once ever seen an egg eaten, when it fell directly in front of the female. I found fallen eggs hatched successfully with base-heating. The fry can eat larger food than is usually imagined. Supply a reasonable amount of cover for the female in case the male becomes too boisterous. Mr. W. T. Innes states that they are difficult to induce to spawn. Have a try and I am sure you will be able to pat yourself on the back!

Twenty-Five Years Ago

THE second annual report . . . [of the Merseyside Aquarium Society] . . . shows an increase of 35 members during the period under review (1927-28), making a total of 99, including "Junior Members" . . . Referring to the number of autopsies which have been performed on fishes, the report states that "It seems likely that in time it will be possible to 'black list' certain districts and waters which appear to be infected with various diseases and so make this section of considerable importance to the angler as well as to the aquarist." This would certainly be practical work. (From *The Aquarist*, February, 1929).

OUR READERS

Write—

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



Holed Angel

WE were interested to see the photograph of an angel fish with a hole through its back (*The Aquarist*, January), as we too, have one with a hole in the identical spot. Ours was received in a consignment from Germany about six months ago, and noticing its deformity we did not place it for sale after quarantine but put it in a community tank, for it seemed a pity to destroy an otherwise healthy fish. It has now grown to five inches and shows no concern over its deformity. We wonder if your correspondent also received his fish from Germany, and if so is there likely to be any inherent weakness in this strain for breeding purposes?

THE KINGFISHERIES,
Beckenham, Kent.

Cabomba in Flower

FROM time to time one sees articles or letters in your columns announcing the rare event of *Cabomba caroliniana* in flower. I have a 36 ins. by 17 ins. by 17 ins. tank and for three years have had this plant in bloom for months on end, winter and summer, providing the length of the branch is at least three feet.

In June last year my wife, disgusted with the prolific growth of this plant—its numerous fronds smothered the tank and made observation of the fish difficult or impossible, cut the whole plant back six or eight inches during my absence. I was not pleased, having intended to show the plant in flower. However, I decided to experiment and scrounged some additional sprigs from friends who had obtained their original supply from a different source; each of these plants has done well, and each is now in bloom on those branches I have allowed to extend to three feet or more (one is 62 inches).

Cuttings in a 18 ins. by 10 ins. by 10 ins. tank remain small and show no signs of bloom. Good depth of gravel and some accumulation of fish muck is necessary. Occasional addition of potash (once a month) in the form of N/10 potassium permanganate, and to keep growth vigorous and deep green, plenty of light and a temperature of 75°F. or more are given.

V. H. LEWIN, *Secretary*,
Oxford Aquaria Society.

Parthenogenetic Guppies

IN your January issue of *The Aquarist* appears a letter from one of your readers under the above heading. If it may be of interest to readers, I have over a number of years known of several similar cases, not only concerning guppies but with other livebearers too, and in each and every case, where all the facts were available, there has been no difficulty in arriving at a reasonable conclusion.

In so far as the present case is concerned there is no evidence whatsoever, from what has been already stated in the letter, to suggest it is a case of parthenogenesis.

W. G. PHILLIPS,
Kenton, Middlesex.

[PARTHENOGENESIS: development of an egg without fertilisation to produce a new individual. A form of reproduction seen normally in some of the lower animals.]

Aquarium Rusting

YOUR contributor Mr. C. W. Massey, in his article (*The Aquarist*, October, 1953), certainly gave advice that is of interest to all aquarists who use steel framed aquariums. I would suggest that our troubles might be solved by the manufacturers of these frames before their products are sold.

In the metal finishing trade it is an accepted fact that paint applied directly on to clean steel offers little or no protection whilst paint applied to steel which has been efficiently rustproofed will last indefinitely. Just over three years ago I had the framework of my aquarium shotblasted to clean off all the old rust and scale and then zinc sprayed, followed by aluminium spray, by the Schori Metallising Process Limited, of Brent Crescent, N.W.10. After three years the framework is still in perfect condition; the sprayed deposit of pure metal appears to be unaffected and I have not had any trouble at all with the breeding of fish, neither have I observed any toxic effects.

I would respectfully submit that this is a method of protection well worth investigation by manufacturers who would then earn the thanks of all aquarists who have spent weary hours rubbing down rusty frames.

R. BROADSTOCK,
London, N.W.10

In at the Birth

PROBABLY professionals in the ranks of the aquarists will have innumerable opportunities to be "in at the birth" of the live-bearing species, spending, as they do, longer hours with their fish than most of us, to whom fishkeeping is a hobby, can possibly do. There must be a large number of amateurs like myself, who spend only a very short time each evening in aquatic company, so that I felt extremely lucky to-day, that my Christmas holiday should coincide with the birth of 18 guppies.

For a long time I have been asking myself questions about all the tiny details connected with the birth. How big are they at birth? Do they appear head-first? Is the actual birth of each a protracted affair? Do they appear singly?—and so on. To-day, I found the answers. At 11.30 a.m. I looked at the potential mother in my

tank and saw she was very large. At 11.45 a.m. a casual glance started a three-hour vigil for I saw a baby swimming near the mother and I promptly sat down to await the next arrival. It was not quite so easy, because a few minutes later my wife handed me a cup of tea; I took a sip, put the cup and saucer down, turned to the task in hand, and there were two babies instead of one! Still, I determined not to miss the next—and I'd got an answer to some of my own questions—the birth is very quick and the babies appear singly, being practically the same size at birth as those I'd seen in previous hatches 24 hours or so after birth.

I found the young ones were being born at the rate of one every seven or eight minutes, though occasionally two would arrive close together. By watching carefully the contour of the "black spot" on the female it was possible to anticipate the next arrival by a few seconds, for a slight bulge appeared as the baby began to push outwards, and with the help of a very cheap lens, looking into the mother from behind, it was possible to make out the baby's eyes. In two or three seconds the head appeared, right way up; a wriggle, and the baby was on the bottom of the tank. Sometimes the baby was shot out with rather more force, and in this case went immediately to the surface, but it was more usually found to lie on the bottom for as long as five or six minutes before making an attempt to reach the surface.

For the first few seconds of their life, there appeared to me to be an inflation of the under part of the body, which subsided as I watched, and I would be interested to hear more of this, for I am unable to draw any conclusions as to what it may be, partly through lack of a good lens, but mainly through lack of anatomical knowledge.

As I have indicated, I watched the birth of 16 out of 18 guppies over a period of three hours, and I thought there may be quite a lot of keen aquarists who have not yet been as fortunate as I have been to-day.

I. W. BRASSINGTON,
Cannock, Staffs.

I HAD placed a pair of guppies, a female zebra, and a female moon platy in a newly set up 3 ft. by 15 ins. by 15 ins. tank. I was aware that the guppy was due for delivery, and I was more than usually observant.

At about 7 p.m. I noticed that the guppy was sinking slowly to the bottom of the tank; I kept a close watch and, to my surprise, I noticed that two young fry were delivered at the same time. As I have only been keeping tropicals for a few months, and never having actually seen a delivery of young fry before, the excitement took all thought of timing the deliveries, until the eleventh fry was delivered. By that time another set of "twins" had been born, yet the rest were born singly. The female seemed to have two, at shortly spaced intervals, then a longer rest, then two more.

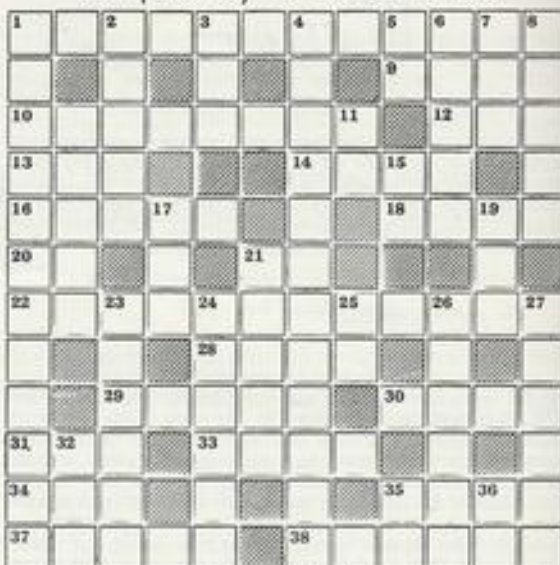
The eleventh was born at 7.41 p.m., then 7.43, 7.50, 7.55, 8.03, 8.14, 8.16, 8.19, 8.21, 8.29 p.m. The time 8.03 p.m. produced another set of twins, making three sets in all. Within seconds of being born, the fry were free swimming, and did not surface to inflate their swim bladders as I had read. The guppy seemed to swim about ordinarily, and just delivered fry wherever she happened to be, near the surface, or on the bottom.

I noticed that the fry were born doubled up head to tail, with the head and tail emerging from the vent last. The tank was filled to capacity, and only sparsely planted; it was brightly illuminated so that I had an uninterrupted view. I do not know whether or not it is usual to find fry born in pairs, but three sets out of 21 fry seems a record to me.

J. D. DEARDEN,
Accrington, Lancs.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- | | |
|--|--|
| 1 Parents of dried fish food (5, 7) | 28 Fish my foot! (4) |
| 9 Food according to a rule (4) | 29 Aquarists' name for a freak (5) |
| 10 Semi-transparent fish (1-3, 4) | 30 — monster; a large poisonous lizard (4) |
| 12 Ink returns in this marginal note of a Hebrew bible: Read (3) | 31 18 across as a noun (3) |
| 13 Got back a garment (3) | 33 Acid fibrous planting medium or a fuel (4) |
| 14 Fruit of a ripe arthropod (4) | 34 She raised Cain (3) |
| 16 Egg-shaped (5) | 35 Large natural water (4) |
| 18 Saturate with liquid (4) | 37 Breeders' term for fathered (5) |
| 20 Sapper (1, 1) | 38 Mouth to be vulgar, but a gourami to the aquarist, and probably an oculator to a pedant (6) |
| 21 Short saint (2) | |
| 22 Main interest of most hot tank fans (8, 4) | |

CLUES DOWN

- | | |
|--|--|
| 1 Tote six boots to make these hard cases (3, 9) | 17 Spawn of the devil fish? (3) |
| 2 The last or perfect stage of insect life (5) | 19 A bass beheaded is a foolish thing (3) |
| 3 A sprite among returning water fleas (3) | 21 Twenty (5) |
| 4 Usually an old tub of green water for isolating sick fishes (8, 4) | 23 Shellfish wept for by the walrus (6) |
| 5 The same in short (2) | 24 I do sop a higher crustacean (6) |
| 6 Very small white worms for fish food (5) | 25 The French part of a leech (2) |
| 7 By (usually) cent or annum) most of the perch (3) | 26 Sire is the source of these lovely flag flowers for the pond (6) |
| 8 Ink follows 21 for this result of neglected tanks (5) | 27 A necessity for the tropical fan (6) |
| 11 Masculine pronoun of her- ring (2) | 32 Latin prefix commonly encountered by aquarists. Refers to the egg (3) |
| 15 As it is in scarus (2) | 35 Hand-written book or paper (abbrev.) (2) |
| | 36 See 20 across (1, 1) |

PICK YOUR ANSWER

- "... and dead fish are no keeping wares." The missing word in the old proverb is: (a) Daughters, (b) Meat, (c) Milk, (d) Sons.
- Jordanella boridai* was named by: (a) Goode and Bean, (b) Meek and Hildebrand, (c) Müller and Troschel, (d) Weber and De Beaufort.
- The red-finned barb is the popular name of: (a) *Barbus callensis*, (b) *Barbus callipterus*, (c) *Barbus setivimensis*, (d) *Barbus sinuatus*.
- Chiroseps goodii* is popularly known as: (a) The blue chin, (b) The blue chromide, (c) The blue fm, (d) The blue perch.
- According to some authorities a cure for dropsy in fish is: (a) Ammonia, (b) Digitalis, (c) Hydrogen peroxide, (d) Methylene Blue.
- Aponogon crispum* is native to: (a) Brazil, (b) Ceylon, (c) Japan, (d) Mexico. G.F.H.

(Solutions on page 242)

WHEN Dr. F. N. Ghadially visited a meeting of the **Ashton-under-Lyne and District Aquarists' Society**, he gave a talk on tiger barb breeding and also showed his own film "Breeding the Brown Acara." The home aquaria trophy of the society has been won by a junior member—Mr. J. Lawton of Stalybridge.

THE **Beshill and District Aquatic Society** has made excellent progress with its plan to celebrate last year as Coronation Year by donating aquaria to children's homes, hospital wards, etc. A furnished aquarium with collecting boxes attached was displayed in a number of local shops with the co-operation of their owners during the year, so that in addition to aquaria already installed the society is now in a position to donate further tanks and is inviting inquiries from children's homes in the Beshill area. Chairman of the society, Mr. W. C. Bradbrook Chiswell, has announced that he will present a challenge cup to be awarded to the member most successful at table shows during 1954.

MEMBERS at the well-attended annual general meeting of the **Brighton and Hove Aquarists' Society** heard the chairman describe last year as a difficult one for the society because of uncertain tenure of headquarters and unexpected resignations of officials leaving the country. Well-known contributor to *The Aquarist*, Mr. L. R. Brightwell, was elected president of the society; secretary is Mr. R. Cheal.

A TROPICAL aquarium has been installed at the Belgrave Children's Hospital, Brixton by the **Brixton Aquarist Society**. The Mayor of Lambeth made the presentation on behalf of the society.

AT the annual general meeting of **Burton-on-Trent and District Aquarists' Society** Mr. W. A. W. Cox was elected president. Mr. W. Harris (secretary) and Mr. H. Cotton (treasurer) were re-elected. The financial statement (presented by the chairman in the absence of the treasurer) showed a balance in hand of £11 after commencing the year with a slight debit balance. In his annual report the secretary said that although progress had not been spectacular a working basis had been established. During the past year he said the society had become a member of the Midland Association of Aquarist Societies, and a breeders' section and an entertainments committee had been formed. During the coming year it was hoped to engage lecturers through the M.A.A.S., provide subjects for discussion and arrange social activities.

TAKING a tip from a recent lecture by *The Aquarist*, contributor Mr. Raymond Yates, **Bury and District Aquarist Society** have increased the number of classes in their 1954 show schedule to over 50. Included in the 12 sections are one for tropical aquatic plants and one for vivaria. Besides the 18 challenge cups and trophies there will be other prizes and prize cards. Benching for the show will be on a Sunday (a boon to many) and a Monday, and it is intended to be open to the public for five days, 4th to 8th May. Show Secretary is Mr. G. D. Grimshaw, 1, Garston Street, Bury, Lancs.

RECENT speakers and subjects at **Colindale Aquarist Society** meetings have been Mr. G. Smith (Beacon fish), Mr. A. Kendall (guppies) and Mrs. T. D. Smith (fighters). Annual general meeting of the society was held last month.

TABLE show for breeders' fishes (four specimens bred in 1953) staged by the **Dunstable and District Aquarists' Society** gained a first award for Mr. M. A. Green. Second and third places were gained by Mr. W. J. Holdstock. Mr. J. Mayne acted as judge of the 12 entries.

SHOW committee of the **Forest Hill and District Aquaria Society** has prepared a detailed programme for this year, including special arrangements for encouraging entries from novices. It is hoped to increase the range of 10 plaques and shields now available in the society as awards.

News 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.

AFTER questions put to a five men "brains trust" drawn from well-known figures in the world of aquaria, members of the **Hendon and District Aquatic Society** at a recent meeting enjoyed partaking of their own birthday cake, presented to them on the occasion of the fifth anniversary of the formation of the society.

USEFUL notes for the beginner in aquarium-keeping are now included as a regular feature in the news bulletin issued by the **Kettering and District Aquarist Society** each month.



At **Hampstead Aquatic Society's** social evening Mr. "Mac" Wilson (left) gave a display of conjuring. Here he is seen with the Society's new vice-president Mr. George Cansdale and one of his pets. Mr. Cansdale presented cups to the Society's members who had been awarded these at last year's shows.

NEW project to be launched by the **Lancaster and Morecambe Aquarists' Society** in conjunction with the management of the Morecambe Winter Gardens is the establishment of a "Palm Court Aquarium." It is hoped that this will provide a popular attraction for holiday visitors, particularly during inclement weather. The society is to finance the scheme from its own funds, and the exhibit will open at Easter.

ANNUAL general meeting of the **Leicester Aquarist Society** was held last month. Mr. N. J. Ballard was elected president, Mr. W. F. G. Meese, chairman, Mr. J. H. Williams, treasurer and Mrs. W. Gascoine was elected unopposed for her fifth year of office as secretary.

DECISION taken at the annual general meeting of the **Leyton Aquaria Society** was to concentrate the society's activities in the exhibition aspect of aquarium keeping this year. Show secretaries of societies in the Home Counties are invited to send open show schedules to Leyton's show secretary, Mr. W. Isod, 187, Newport Road, London, E.11. Also on the society's programme for 1954 are table shows for over 80 varieties of fishes, tropical and cold-water, and visits to fish farms and public aquaria.

MONTHLY meeting night of the **Oldham and District Aquarist Society** has been changed from the second to the first Wednesday of each month. In addition a discussion meeting is held each month on the third Wednesday.

FILM strips available for hire from the **Peterborough and District Aquarists' Society** are "Aquariums" (part I and part II, 30 and 23 frames respectively); "Water Plants" (44 frames) and "Life in the Pond." Lecture notes are also available with the first two subjects. The films fit the standard projector and are loaned for 10s. including registered postage to hire. Applications should be made to Mr. R. Whitehead, 32, Low Cross, Whittlesey, Nr. Peterborough, giving good notice of dates required.

IN conjunction with three other local societies **Pisces Aquarist Club (Dulwich)** has formed a friendly group for meetings at which discussions, shows and quizzes are held. A full programme is prepared for the next six months, and it is hoped to form a junior section to the club. Mr. Harvey Buck is secretary, 6, Havelock House, Honor Oak Road, Forest Hill, London, S.E.23.

FIRST meeting in 1954 of the **Rochdale and District Aquarist Society** included a talk on shows and showing given by Mr. A. Shaw. The society's annual general meeting will be held on 1st March.

SECRETARY Mr. A. G. Brien was re-elected at the annual general meeting of the **Surrey Aquarists' Circle** and other officers elected were Mr. C. Parslow (chairman), Mr. W. Walters (treasurer) and Mr. R. G. Fowler (show secretary).

MEETINGS this month to be held by the **Tyneside Aquarium and Biological Society** will include a talk on livebearers by Mr. T. Innes and a show of egg-laying fishes bred by members. This follows a show of live bearers staged at the second meeting of the society last month.

TROPICAL fish and aquaria was the subject covered by Mr. W. McInerney in his talk to members of the **West Surrey Pondkeepers' and Aquarists' Club** reported in the January Bulletin of the Club. Constant aeration for tanks was not favoured by the speaker, who said that it is bad for fish when aquarists overstock their tanks and then try to remedy this with artificial aeration. Mr. McInerney described some species imported from the Belgian Congo which he had been able to breed and said that there were others with which he was still experimenting and hoping for success in time.

"The Canadian Aquaria"

THE above is the title of the official publication of the **Canadian Aquaria Society** (president Mr. W. L. Whitem, Apt. 25, 118, Vaughan Road, Toronto, Ontario, Canada). In the December, 1953, issue it is announced that an offer made by the society to the Toronto Board of Control to construct a 10,000 dollars aquarium in the Riverdale Zoo has been accepted. The City is to rent the aquarium to the society for a nominal

sum and to pay for structural changes. It is hoped to open the aquarium during the coming summer.

Notts "Bulletin"

MR. A. L. KIRCHIN contributed an interesting article to the December, 1953, issue of the Nottingham and District Aquarists' Society monthly Bulletin entitled "Artificial Seasons." In this the author draws attention to typical monthly variations of water temperature seen in various tropical regions from which many aquarium fishes originate. These variations lead to the suggestion that seasonal breeding may occur in the tropics just as it does with our own native fishes, and the need for experiments to see if artificially induced fluctuations of temperature in tropical aquaria throughout the year can be helpful to breeders is urged. Annual outing of the society is planned for Sunday, 30th May, when members will be visiting Chester Zoo and Aquarium.

F.B.A.S. Meeting

AT the annual general meeting of the Federation of British Aquatic Societies held in December last the chairman Mr. T. E. Butt presented a pen and pencil set to the secretary Mr. R. O. B. List on behalf of the Federation in recognition of his good work. A vote of thanks was given to the chairman for his services in his first year of office. Mr. A. Fraser-Brunner, who has recently returned from his overseas fishery investigations, was unanimously elected to the office of vice-chairman. Representatives from 35 societies in the Federation were present at the meeting.

Oversea Society

A NEW aquarists' society has been formed in Brazil reports Mr. D. G. Armstrong. Its title is Nucleo de Aquarismo, Sociedade Geografica Brasileira and its secretary is Mr. Verany Ricardo, Rua Formosa, 367-19, andar Edificio C.B.I., Sao Paulo, Brazil. The society sponsored the first aquarium exhibition ever to be held in Sao Paulo last November.



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 above (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 xvi, to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

New Societies

Doncaster Naturalists Society. Secretary: Mr. L. C. Shimwell, 58, Albany Road, Balby, Doncaster. Meetings: Second Wednesday each month, 7.30 p.m., at The Elite Cafe, Hall Gate, Doncaster, Yorks.

Spelthorne Aquatic Circle. Secretary: Mr. A. J. W. Wilson, Parkside, 180, Uxbridge Road, Feltham, Middlesex.

Universal Sports Club Aquarist Section. Secretary: Mr. E. G. Whitehall, Universal Sports Club, Universal Works, Dosey, Stafford.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:

British Herpetological Society (Mrs. Monica Green, 49, The Greenway, Colindale, London, N.W.9); **Boreham Wood and District Aquarist Society** (Mr. C. W. MacRae, 23, Aldenham Road, Radlett, Herts.); **Bromley and District Aquarists Association** (Mr. E. W. Neale, 2, Archer Road, Orpington, Kent); **Enterprise Aquatic Society** (Mr. H. Russell Holland, 96, Ridgeview Road, London, N.20); **Feltham and District Aquarist Society** (Miss Irene Evans, 101, Raleigh Road, Feltham, Middlesex); **Harrogate Aquarist Society** (Mr. J. G. Buller, 2, Woodfield Drive, Harrogate, Yorks.); **Haslingden Aquarium Society** (Mr. R. Barton, 12, Wells Street, Haslingden, Rossendale, Lancs.); **Kodak Aquarist Section** (Mr. A. G. Collier, Kodak Recreation Society, Kodak Hall, Wealdstone, Middlesex); **Norfolk and Norwich Aquarist Club** (Mr. R. D. Aldridge, 4, Taylor Road, West Barham, Norfolk); **Paisley Aquarist Society** (Mr. H. Hutton, 7, Moorfoot Avenue, Glenburn, 3, Paisley, Scotland); **Skipton and District Aquarist Society** (Mr. F. Cherry, 71, Newmarket Street, Skipton, Yorks.); **Southend, Leigh and District Aquarist Society** (Mr. D. H. Connor, 60, Tinsarn Avenue, Westcliff-on-Sea, Essex); **Tottenham and District Aquatic Society** (Mr. P. S. Kodsell, 13, Minster Road, South Tottenham, London, N.15); **Wembley and District Aquarium and Pool Association** (Mr. S. H. Samson, 32, Lancelot Road, Wembley, Middlesex); **Workshop and District Aquarist Society** (Mr. J. Marlow, The Police House, 27, Bakesstone Moor, Whitwell, Nr. Workshop, Notts.).

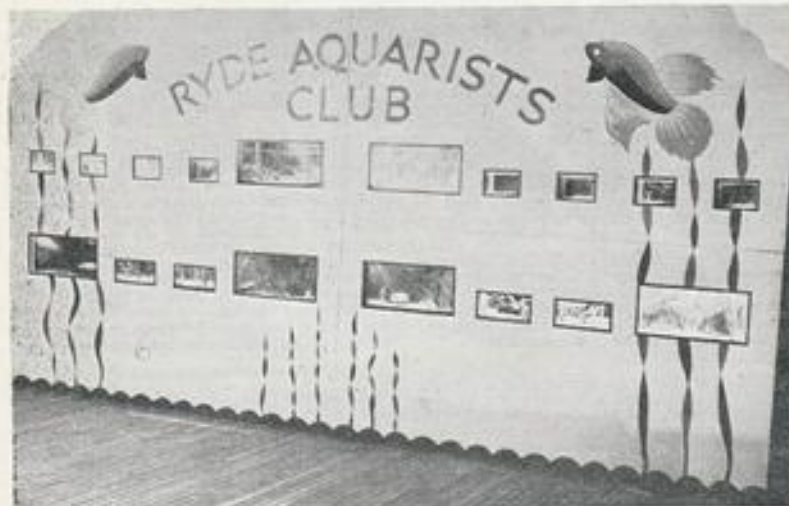
Aquarist's Calendar

26th February: **British Herpetological Society** (London Group) lecture "The General Anatomy of Reptiles" by Dr. Malcolm Smith, 7 p.m., at the Linnean Society's Rooms, Burlington House, Piccadilly, London, W.1.

27th February: **Horniman Museum** lecture "Some Aspects of Aquarium Keeping" with coloured films, by Capt. L. C. Betts; 3.30 p.m., at Horniman Museum, London Road, Forest Hill, London, S.E.23. Admission free.

27th February: **North London Aquarists' Society** prize-giving, dinner and social evening.

12th April: **British Herpetological Society** (London Group) meeting "Snakes and Lizards," 7 p.m., at the Linnean Society's Rooms, Burlington House, Piccadilly, London, W.1.



Ryde Aquarist Society staged its first show of tropical and coldwater aquaria in conjunction with the Isle of Wight Budgerigar Society and the display is pictured above

Crossword Solution

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

PICK YOUR ANSWER (Solution)

1 (a), 2 (a), 3 (d), 4 (c), 5 (b), 6 (b)

