DAMRE Rumour has for some time now been whispering that the aquarium hobby is on the decline, and it seems desirable to enquire about her sources of information. Is the aquatic trade shutting up shop? Are aquarium societies being disbanded and shows being cancelled? Have masses of used aquarium equipment been dumped on the second-hand market? We have not noticed any of these signs.

True that trade is not as good as it has been, but then for a time it was too good to last anyway, and any complaint of falling custom from the aquatic trader will be echoed by many of his counterparts who deal in other commodities. A marked rise in the cost of essential items for living has made it necessary for most of us to curb our expenditure on things which can take second place. It is true too, that some societies have been finding it difficult to keep members, and they have perhaps been more vociferous about this than others which have not had the same trouble. Yet new societies continue to be formed and popularity of ventures such as this month's National Aquarium Exhibition in London is as great as ever with exhibitors. However, if the present period can be regarded as a tricky one, it is all the more important for all sections of the hobby to be united in facing any difficulties. Clubs, for example, should review some of their activities rather critically to see that they are not trespassing on the province of the trader; traders should not attempt to place blame on societies for trade slackness and withdraw support from society exhibitions. So much good has come from the two working together in the past, and now is not the time to alter this.

The facts above, together with others which present themselves to us through our valued contact with a large cross-section of aquarist readers, convince us that nothing has really happened to stop the hobby's development, let alone reverse its progress. Restraints on trade there may be, and everyone hopes these will not last, but do not let Dismal Jimmies make more of the situation than that.
AQUARIIST AT HOME:

Mr. A. V. Rusbridge
(HERNE HILL)

_interviewed and photographed
_by LAURENCE E. PERKINS

The day I chose to visit Mr. Rusbridge earlier this year heralded the cold spell and the thermometer on the Air Ministry roof was showing a temperature of 24°F. It was, therefore, with some misgiving that I gave the door-bell a tentative prod.

Mr. Rusbridge greeted me with an expected remark concerning my choice of date but allayed my fears by telling me that his losses had been miraculously few in view of his state of semi-unpreparedness. Having removed from another district last August, his spare time had been fully occupied since then with the job of constructing a fish house, and his plans for heating it had not fully matured when the sudden and severe drop in temperature occurred, giving his heating system a searching test which proved it wanting under such extreme conditions.

Emergency Heating Measures

The fish house measures 18 ft. by 9 ft. by 8 ft. high, the floor of the central passageway being 3 ft. below ground level. Built as a greenhouse, it has a double-glazed roof, half match-boarded walls, with glass above which is covered on the inside with hardboard. Heat, supplied by an Ideal boiler installed inside the fish house, is conducted around the walls via 110 feet of two inch pipings. This system, Mr. Rusbridge had reckoned, would afford ample warmth for tropicaels under the average winter conditions, but it was with mixed feelings that he made his first inspection on the initial morning of February's cold spell. His thermometer was reading 50°F., and some of his fish looked in bad shape. Without wasting further time, he left the house and speedily purchased an oil stove, which succeeded in raising the temperature to 70°F. by 5 p.m. Counting his losses, Mr. Rusbridge considered himself fortunate in arriving at the small total of three and these not of great consequence.

The fish house contains, at present, thirty 24 ins. by 12 ins. by 12 ins. tanks of which six constitute a rather novel feature. These are wood-framed, being constructed of 1½ ins. square timber joined with small brackets at the eight corners. They are glazed with 24 oz. glass and 32 oz. glass bases. In response to my natural enquiries concerning leakage, risk of collapse, etc., Mr. Rusbridge said that although he would hesitate to have such tanks indoors or to move them, they had served him well for over three years and would shortly be joined by some more that he is making, for he hopes to increase the total number of tanks to 50.

Having no use for show tanks, all his aquaria are fully planted for the sake of water-conditioning. The stock at present comprise silver tetras, white cloud mountain minnows, red and green swordtails, perma black mollies, three spot gouramis, red wagtail swords and black swordtails, but most of this assortment will be restricted to black swords and perma black mollies when Mr. Rusbridge begins seriously to get down to his plan of specialising in the breeding of these two types of fish. Part of this scheme involves the use of several tanks per brood of youngsters so that members of the same brood can be fed on different diets and their respective developments compared. With his present stock he tries everything, including all proprietary brands of food, various dehydrated cat foods mixed with Bemax, shredded garden worms and, of course, Daphnia and live foods when available, although he doubts the wisdom of using Tubifex worms.

With plenty of space still available in his large garden, Mr. Rusbridge is looking forward to constructing a large pond with steps leading down to viewing panels let into the sides, but at the time of my visit the weather had precluded all possibilities of his making a start on the many ambitious schemes this enthusiastic hobbyist has in mind. Mr. Rusbridge is a member of The Pisces Aquarist Club (Dulwich) but ruefully confesses that his fish house takes up so much of his leisure time that there is insufficient left to earn him the title of an active club-member.

One of the wooden-frame aquaria used by Mr. Rusbridge, showing the metal brackets used to strengthen the corners.
Past and Present Treatment of Disease

by G. F. HERVEY

ALTHOUGH there is evidence to show that fish were kept in ponds at a very early date, in the main these ponds were not ornamental but "stews," and the fish kept merely as a convenient and near-to-hand food. The first record of fish being kept and cared for in ornamental ponds, as domestic pets, dates from the end of the century. In the Wu lei hsiang chih (Account of the Influence of Things) we read: "If goldfish eat the flesh of other fish, or of salted fish, they die; if they have bark they do not breed lice." Although for long the book was ascribed to the poet Su Tung-p'o (1036-1095), the ascription was always doubtful, and modern authors hesitate to question the monk (Kao, 918-999). It is possible after all that the goldfish were not ornamental, but kept in a monastery pond as a source of food, but the passage at least shows that at least a thousand years ago the Chinese knew that goldfish were toxic to fish, and that some attempts had been made to control fish-lice (Ångula) by means of poplar

simple account of goldfish was written by Ch'en-te in 1596. Entitled the Chiu shih yü p'u ("Stewed Fish") it is altogether a remarkable book; it describes his own beautiful goldfish, how he kept them in summer, how he changed the water, and how he bred them. It is unfortunate that he tells us nothing of the diseases of the internal evidence suggests that he could if he had to. He was a young man who knew much about the breeding, care, and management.

In 1588 his family moved to Su-chou, and by then he was only thirteen years old, he was an expert in his own authority. He later on his own authority published some goldfish, "the fanciers in Wu to seek my advice, and swarmed like ants to continue to do so for several months. He thoroughly learned for myself the principle of how and when I look at those whom the fanciers are some like mine."

by this time, or a little later, something was the diseases, and attempts were made—whether or not we may never know—on sick fish. The book in question was Tsi-chung tang huang liang published. The Tsi-chung tang huang liang and Yu I-chêng, write: "The diseases named lice and named plague. (If they are spots they breed lice; the remedy is to put in dung and put it (into the water). If they come out as falling off (droppings), this is plague; if it rub with new blue calico.) The (causes of) lice are three. If they swallow soapy water they are the death; or the refuse of olives, they attain their end; or the juice of walnut husk, they attain their end."

It is, in fact, in 1688 to be precise) Chên Hao-tâu (in 1688 to be precise) Chên Hao-tâu (in 1688 to be precise) Chên Hao-tâu mentions the title which first appeared in Flinders. It is a book on gardening, but it contains chapters on the rearing of birds, animals, fish and insects. In the chapter on goldfish there is a rough and ready (but none the less interesting) description of goldfish breeding, with advice on protecting the eggs and raising the fry. Towards the end of the chapter Chên writes: "If the fish turn white (? Saprolegnia) and there is floating foam on the water, quickly change it for new water for fear it may hurt the fish. And by taking banana leaves and roots broken very small and throwing them into the water it is possible to cure the fish. But if the fish are thin and come out in white spots (? Ichthyophthiriasis), called fish wind, promptly throw in liquid amber bark or white poplar bark, and they will be healed. Or take a new brick and bury it in dung and let it remain so for one night; take it out and dry it and put it into the jar, and this also may cure the wind. If there are frothy streaks on the water, or they eat pigeon's dung, the fish are sure quickly to die; so you must use heaps of dung to cure them. If the fish fall ill through eating willow catkins by mistake, they may also be cured by the use of dung."

To the modern aquarist all this may read as an old wife's tale and as just so much nonsense. He would do well to pause and reconsider before he passes final judgement. The present writer has before him a letter, written in January, 1952, from a Chinese breeder living in San Francisco. "I am," the letter reads, "a goldfish fancier for all my life, and am always carrying that book (the Pi ch'un hua ch'ing of 1688) with me as a reference."

Eighteenth Century Manuscript

In 1772, there was sent from Peking to Paris a 22-page manuscript on goldfish. It was written by the French Jesuit missionaries in Peking and sent to M. Bertin, the then Secretary of State for France and a noted patron of literature and art. This Notice, or Mémoire, was accompanied by a very beautiful scroll (6m. 25cm. long and 405mm. wide) on which were painted in gouache ninety-two goldfish, life size, "all at Peking in the palaces of the emperor and in the houses of several princes." From the Notice we learn that, by this time, the Chinese (at least the Chinese of Peking) recognized seven different varieties of goldfish. They were: the common goldfish, the duck's egg (eggs fish), the dragon-eyes (telescope), the sleeper, the caperer, the nymph, and the lettered fish.

The sleeper appears to have been nothing less than a fish suffering from derangement of the air-bladder; for it is described as: "a kind of goldfish which remains almost always at the bottom of the water, belly upwards and as it were lying on its back. . . . Sometimes it swims at the bottom in the manner of other fishes to search for its food; also sometimes it rises to the surface, but it is a distressing state for it and it returns very quickly to lie on its back belly upwards; it even swims in this position." The caperer appears to have been a deformed fish. It is described as "ordinarily curved lengthwise, because its head and tail are turned up. . . . When this curious fish wants to swim it bends its head towards its tail, then its tail towards its head, and makes ceaseless somersaults from top to bottom and from bottom to top, sometimes also sideways." It suggests an internal bursal infection of either the alimentary tract or the muscles, but modern Chinese breeders make the claim that these fish can be artificially produced by pouring the fish from one container to another many times daily. Few fish, however, survive the treatment. Certainly the Chinese of 1772 were under the impression that both the sleeper and the caperer were distinct breeds; for the Notice mentions that they came from Yang-chou in
Kiangnan, and about fifteen years earlier one of the leading mandarins of the province presented some to the ruling emperor; "they pleased, and have caught the fancy of a crowd of admirers and amateurs of goldfish."

The lattered fish is an obvious and confessed fake. The Notice explains that breeders painted a Chinese character on the back of the fish with a pencil dipped in arsenic diluted in the urine of a toadfish.

By this time (1772) the now-famous salt treatment was known; for at the end of the Notice we read "that these very delicate fishes are afflicted by little lice, and that they (the Chinese fanciers) rid them by rubbing them with salt water."

It is of extreme interest to the historian to note that long before the end of the eighteenth century the Chinese breeders of goldfish had made some attempts to discover treatments for sick fish. The salt treatment (used to this day for the control of fungus—Saprolegnia—and other ailments) was well known. The use of dung as a cure for fish diseases also appears to have been practised, probably not without success, for something like it has been used in modern times as a control for white spot (Ichthyophthirius).

Mr. Arthur Derham, in The Breeding of Fancy Goldfish (1926), writes: "A remark by Bartmann, the well-known German breeder, once tempted the writer to experiment on the lines indicated below. . . . In a tank where fish had been bred freely, and which was "carrying" fish, a number of white spot occurred, perhaps too many, an outbreak of white spot occurred, and many fish died. Into this tank was thrown, spread all over, old rotted turves, sifted through a quarter-inch mesh. This settled naturally on the bottom, and this was continued for several days until there was a layer about one-and-a-half inches deep at the base. It took about ten days for the water to clear... and when it did clear... there was no trace of white spot. . . . We treated four tanks in this way, and although white spot has been introduced into two of these tanks since, it died out, and no trace of the disease is now seen." Mr. Derham suggests that the turves created a complex environment that the parasites could not adapt to.

In Europe, the European Records show a long way behind China in the care and management of fish in ponds. In 1765, Job Baster, the Dutch naturalist, received twelve goldfish from England. He introduced four into one of his ponds and eight into another. A few days later he found four fish dead and floating on the surface of the water. The other eight he never saw again. He records the incident in his Oepsana Subscura (1765) and puts forward the theory that when the fish are poured out of a jar into the pond, they are stricken with fear, swim rapidly to the bottom, and get stuck so deep in the mud that they cannot extricate themselves, and so suffocate. At least after that experience he did the right thing—without knowing why—because when he received his next consignment of goldfish he tied the container to a rope, lowered it into the water, and allowed the fish to swim out of their own accord.

In point of fact, though we may reject some of the early Chinese practices as being rather primitive and haphazard, at least we must give the Chinese of the eighteenth century the credit for having discovered the salt treatment for sick fish. It may fairly be said that this was the dawn of ichthyopathology. The dawn, however, was a long one; for nothing more seems to have been accomplished for about a century. In fact, it was, perhaps, not until the end of the nineteenth century, a full hundred years after the Chinese had discovered the salt treatment, that any serious attempt was made to investigate the disorders of fishes. During the first half of the nineteenth century, a few naturalists may have done some work in this direction, but their work, if it exists, was spasmodic, and no serious work seems to have been done until 1860, when the French naturalist, Michel Girdwood, published "Les Maladies des Poissons et des Oeufs et des Embryons," followed in 1862 by the German biologist, Bruno Hoffer, who introduced the method of treating sick fish with salt water. The book remained the standard work on ichthyopathology, and remains to this day a valuable source of reference.

The French half-century, however, saw great advances in science and, to some extent, Hoffer's book is now sadly out of date. Modern biologists have experimented with new drugs, and the general advance of medical science has enabled the ichthyopathologist to draw conclusions that, in turn, have enabled him to make many forward strides in his own particular field. In 1908, R. De Drouin de Bouville published "Les Maladies des Poissons d'Eau Douce d'Europe," in 1922 Wilhem Roth "Krankheiten der Aquarienfische," in 1935 Wilhelm Schaperlaus "Fischkrankheiten," and in 1940 A. P. Markewitzk's "Diseases of Fresh-water Fishes" (written in Russian), brought new treatments for sick fish to the front. Many other workers, particularly in Germany and Holland, have published important papers on recording satisfactory new treatments for fish diseases and controls for parasites that infest fishes.

Little Advance Made

On the whole, however, it must be said that the treatment of fish diseases the aquarist has not been very well served. Inevitably much of the work done by biologists has been on commercial fishes, and that is not always of much help to the breeder of aquarium fishes. Many of the records are to be found only in scientific journals, to which the average aquarist has no access. The books and papers of the German, Dutch and other Continental biologists are of little help to the average aquarist, since they are written in a language that he cannot understand. The numerous letters and articles in the aquarium journals are not always so reliable as they should be, and we have much to be desired. In the main they represent no more than the personal experiences of an individual aquarist, who has obtained a satisfactory result largely by luck and the outcome of a happy guess, rather than by scientific observations and experiments with many different species over a prolonged testing period.

In conclusion, the inescapable fact remains that, so far as the aquarist is concerned, the only satisfying work is that of a mere handful of reliable workers, whose reports are from time to time published in the aquarium journals. It is not much that will go into consideration the vast amount of ink that has been spilled on other subjects and, I suggest, far less important ones—that concern the aquarist.

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)

Specimen should be sent direct to Mr. Cotton with full particulars of circumstances, and a fee of $5.

It is important that the following method of packing fish be adopted—Wipe fish very wet, and Foods 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. Dispatch as soon as possible after death, with brief history of aquarium or pond conditions.

THE AQUARIIST
Observations on a Monster Swordtail

by W. J. BREADMORE

The word monster in this account is used to indicate something greatly deformed and not a fish of great age, for as most readers know, the new born fry of Xiphophorus helleri are comparatively small beings.

Setting up a tropical aquarium for the very first time three months ago a friend gave me a pair of youngish swordtails. After a few weeks it was evident that the two-inch fish, was soon about to increase my stock so she was removed to another tank. Later it was seen to be very busily engaged in chasing and eating some fry which had arrived so she was, therefore, placed in a breeding trap.

These pictures show different features of the fry "monster." The light circular areas above the gill covers resemble those seen in normal fry and suggest that the monster had a single body. Two pairs of eyes and two mouths are distinguishable. The centre picture shows the attitude shown by the fry at birth, with bent body and bent tail.

A further twenty-five fry were soon delivered, including which was obviously very different from the others. It was noticed that many of them were expelled with their tails rather bent but they very quickly straightened to a normal shape and swam about. There were really two in the brood, one of which appeared as a little earth with a partially developed embryo, and the other which, although it was apparently fully developed was on the point of life, did not straighten itself but remained buried in the bottom of the trap. This little earth was removed to a small container for closer observation and the following points were noted.

The fry was rather distended and ruddy suggesting that it was a little premature. Its body was very badly bent with the result that the caudal fin touched the body at the right eye. Also its body had an arched bend from just behind and below the dorsal fin with the result that when the fish was lying on a flat surface the downward trend of the tail had the effect of tilting the fish to the left. The right pectoral fin not only curved instead of being in a flat plane but was also joined to the body in such a way that it was set at a forward angle

instead of pointing to the rear. When this small fish was viewed head-on it was noticed that it appeared to have three eyes, the centre one of which seemed to be set looking straight ahead.

This "eye" when studied from this angle appeared to be identical to the other two in size and shape even to the extent of presenting a single unbroken golden iris. When viewed from above, however, the "eye" showed a very different character by appearing as two eyes fused together at the after end and possessing a common cornea at the fore end. The dorsal fin, like the right pectoral, was held erect so that the rays of the fin pointed forwards to about the same degree as they should have pointed to the rear. On the underside of what must be described as the left-hand head there appeared an additional feature in the shape of a small black, nose or snout, consisting of soft almost transparent tissue.

I have given as detailed and as accurate as possible description of the physical deformities of this baby fish as far as could be seen at this early stage. Obviously, these deformities were of sufficient severity to have a major effect on behaviour. Fortunately, I was on leave at the time of this occurrence and so had unlimited time at my disposal to spend in viewing its antics through a magnifying glass. During the first thirty-six hours it repeatedly ended up on its back as a result of attempts at movement. This was doubtless due mainly to the arching of the tail and its tendency to tilt the body to the left. The fish seemed to be incapable of righting itself when this happened or possibly may have been disinterested, but in either event it had to be assisted back to an even keel as it was considered that its chances of survival would be better if it were the right way up.

Later it either managed to avoid tipping itself over or possibly may have learned now to correct the situation if it arose, because it was seldom found inverted after the second day. Due to the extensive curvature of the body and tail any swimming action by the fish by which it could reasonably have expected to travel forwards merely resulted in it spinning like a top with clockwise motion. Sometimes these exertions were accompanied by a tendency to drift (Please turn to page 55)
Marine Aquarium Keeping

by JOHN B. BOURSOT

More than half an inch deep it is well to prod it and move it about from time to time to allow the escape of any noxious gases.

Sea anemones seem to shed their skin with considerable frequency and, as there are no waves to wash away the old slough, it is advisable to remove it with a small stick or forceps, else it will float round the tentacles or, in time, form a ring of old skin round the base of each animal causing it much discomfort and delay in unfolding its tentacles for a meal. The absence of tides in the aquarium may lead to the wisdom of procuring anemones from extreme low-water mark or beyond where they do not miss the twice daily fall of the tide which leaves many anemones clear of water and air. This does not necessarily mean that they cannot be left uncovered for twenty minutes or so while the tank is being cleaned, especially if they are periodically splashed with the fingers.

Feeding Marine Fishes

Most marine fishes eat heartily, and must be kept well fed. However, extreme caution must be exercised in preventing uneaten food from lying on the bottom. In this I am most punctilious, preferring to feed all the inhabitants of a tank individually, including the scavengers, rather than allow these latter creatures to eat their fill and leave what they do not fancy to foul the tank. This may sound complicated, but in the average home aquarium the number of specimens is well within reach of individual attention. For neon-sized fish I proceed as follows: a piece of raw beef or fish is scraped with a sharp razor blade “with the grain.” Enough scrapings to cover half the top of an ordinary lead pencil are then swept off the blade with the little pointed stick, already referred to, and dropped into the tank. As the fishes consume each particle until a few minute particles are seen floating about unheeded. This is the signal to stop. With practice this stage will be anticipated. For barb-sized fishes and up, food may be cut into conveniently swallowed pieces which are then dropped into the water one by one, or in twos and threes depending on the voraciousness of the fishes. The larger ones will rush in first and the smaller ones last, but the moment interest wanes, cease feeding. Dried foods are similarly administered; a few grains at a time until all the fishes are satiated. Next I lightly impale a piece of food of pinhead size or larger (according to what has to be fed) on the end of the pointed stick which is then grasped at varying angles between the forcepts and thrust down to the hermit crabs and other bottom feeding scavengers. All shrimps I feed in like manner, and individually. Anemones are correspondingly dealt with, though larger food is offered. The final move is the one to which I pay paramount attention. With the aid of the wooden forceps I remove all uneaten food down to particles as small as the head of a pin. Although this meticulousness is, perhaps, unwarranted, its benefits justify the few extra moments spent in its execution by not overburdening the filter with unnecessary impurities and by assuring clear, odourless water and clean sand. That most aquarists give too much
In Quest of Squirrel-fish

Common enough, though seldom seen, are the beautiful fish that prowl the reefs of coral seas during the dark of night. Recently I arranged a tank for the exhibition of a species found on the western shores of Central America. As the last bus from the capital down in the dreamy little port of La Libertad the moon was sinking into the west behind a silhouette palm and thatched huts, leaving the light of a street lamp to pierce the velvet darkness that lay over the wastes of the deep Pacific. As the landward-comingsnack bottom and broke with muffled roar, vast planks of plankton diffused a faint blue star-like luminescence through the tumbling water. The ethereal phenomena carried even further when fragile organisms, torn from the windswept surface of the sea by the shoreward-rushing stream for an awful moment, stranded, on the wet rockfaces visible to the east the low, massive forms of storm-battered cliffs were veiled in blackest night. Overhead terraces and caves and riven by centuries of sea the harsh conglomerate has been softened into a bed of rock channels and quiet pools ranging from several feet in depth. Beneath these lurks another world; a world where invertebrates rule and fishes linger for a while or depart with the tide; delicate tube-worms bearing crowns of featherly gills at a passing cloud, and pearl-white hydras peep from the rocks. Splitting the inky water with the torch, illuminated breathing banks of golden brown sea anemones each with an emerald centre. Others, a sort, and massed in their thousands, adorned the bases of submerged rocks with the deep plush of their tentacles. Immense numbers of solitary polyps of colour to the dwarf forests of greyish-brown Purple-spined urchins like fancy pincushions scattered over the rocks in search of food, and sea-slugs, waving feathery gills of light crimson, dived in the gardens of purple sea-fans. Shy damselfish and seep wound their way over the twilight and staring glassfish, gorgeously clad in powder blue and black, shimmered motionless as porcelain figures on the green, and mauve quilts of calcareous algae and then a pair of topaz eyes would gleam in the light. Close inspection disclosed a small, heavy-set shrimp whose diminutive shots rang out through the dark, still water.

The whole scene is an intriguing ledge of slippery rock plastered with chalky coralline and embellished with a rich array of anthozoans that had emerged from the receding tide. Descending to it from where I stood I came upon a pool of unknown contents. A yard further on, and far beyond but the black heaving waters of the bay which occasionally welled up through a shallow gully and the pool in form. It was tide and the tide was on high expectations I floated the pool with light. There was not a stir. Then, as if by magic, two or three squirrel or soldier-fish were suddenly there swimming over beds of wine-red anemones. Resplendent in their tunic's of chine red, the larger ones darted for shelter, one even slipping down the gully to vanish in the open sea; the smaller, less brightly coloured ones were slower. Hastily I dipped one out with my left hand aided by a sieve in the right, but in a trice the fish had jumped over the edge and was lost in a fury of swirling water that flooded the pool. When the tumult of bubbles and foaming brine had subsided, I tried anew. The fish was still there, but intensely alert. Gripping the torch between my teeth I netted the dizzled creature as easily as before, and gently raised the sieve to the surface. There was a sudden blur of glittering scales and the fish was gone for ever. The warning roar of an approaching wave hurrying out of the darkness scarcely gave me time to scramble clear ere it burst upon the pool in wild confusion. When quiet returned the pool was empty.

Mildly disappointed, I thought the two pistol shrimps collected earlier in the evening scant compensation, so I hurried to search for a few more in a slight unevenness in the rocky floor near high-water mark. The playing torch beam was met by a mad flurry of darting shadows that in the next instant crystallized into six young squirrel-fish, as still as statues, in about four inches of water. With cupped hands I lifted out three and carefully deposited them in the collecting jar and departed, wondering what the next high tide would bring that I would not be there to see.

Observations on a Monster Swordtail

(Continued from page 53)

to a new location but any movement of this nature appeared to be purely fortuitous and uncontrolled.

This then was the nearest approach that it ever made to swimming. Further, it seemed quite incapable of rising from the floor of the container and as this was felt to be possible due to its inability to surface to charge its air bladder an experiment was tried on the third day, when it was exposed to the air for brief intervals. Either it was unable to take advantage of the opportunity offered to it or else it declined to do so, but in any case it showed no marked change after the treatment. Of course, one cannot rule out the possibility that the two heads may not have been in agreement on this point or for that matter on any other questions which arose.

It was obvious from the outset that the chances of this little monster reaching a ripe old age were indeed very slender. There appeared to be little or nothing one could do to counter the additional hazards involved, which included feeding difficulties. On the fifth day, just when I was feeling a little less anxious about its survival and had convinced myself that it was in good running order, the little rascal, without showing any signs of deterioration, just died. Naturally, I have wondered whether my clumsy attempts at helping it along may have contributed towards its death or whether it was doomed from the start. I have thought since that had it been allowed to lay on its back its mouth would certainly have been better placed for bottom feeding.

Although I am not in favour of breeding traps because the parent fish always appears to feel most uncomfortable in them, it must be said in their favour that if one is to secure oddities such as this then a trap is essential, for without it this fish would probably have escaped detection, but not from its hungry mother. Finally, I now have some doubt in my mind after this experience as to the sagacity of the old proverb which tells us that "two heads are better than one."
Observations on a Monster Swordtail

(Continued from page 53)

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What is the “Glow-light Tetra”?  

by A. FRASER-BRUNNER

In The Aquarist for September, 1938, the present writer described and illustrated some new introductions to the aquarium. Among these was a characin which was identified as Hyphephosbyron gracilis (Reinhart). It was a rather plain fish with some pleasant iridescent reflections on the body. There were no spots at the shoulder, a faint lateral stripe, and a conspicuous round black spot on the base of the caudal fin above and below which was a reddish iridescent patch. All the fins were clear, and unmarked. The fish was known as a glow-light tetra.

The identification had to be made while the fish was alive and swimming, so it was not possible to measure it, and even the exact finnage in the specimens is uncertain. But when compared with the illustrations in the only existing general work of reference on characins—that by Eigenmann published between 1917 and 1927. Later on, when the fish died, examination showed that it was actually Hemigrammus icta (Durbin). The error was due to the fact that in Eigenmann’s plate 22 the figures of this species and of Hyphephosbyron minimus have been inadvertently transposed.

Because the fish was not available in quantity, and not attractive enough to arouse much interest among aquarists, I did not bother to publish this correction. Much later, however, after World War II, aquarists became possessed of the beautiful little species known as the glowlight tetra. This is a gracefully-formed, translucent fish with a shining red stripe along the side, a gleaming red patch on the upper part of the eye, and red on the front of the dorsal fin; there are two small dark spots at the root of the caudal fin.

Hemigrammus—not Hyphephosbyron

Soon after its introduction it was tentatively identified in America as Hyphephosbyron gracilis, and in the later editions of Wm. T. Innes’ “Exotic Aquarium Fishes” it is given this name, followed by a query in brackets. This appellation has become more or less current among aquarists and it is therefore regrettable to report that it has been applied incorrectly for the second time in aquarium literature.

To begin with, this fish is not a Hyphephosbyron as at present understood, but a Hemigrammus. These two genera are very closely related, perhaps inseparable, and it is to be hoped that before long an up-to-date study of them will be made. All we have at present is Eigenmann’s definition, and the only character by which he distinguishes Hemigrammus is the extension of the scales on to the caudal fin. By this criterion the glowlight tetra belongs to that genus, for there are scales at the root of each caudal lobe, bearing the dark spots already mentioned. Once placed in the right genus, it is not difficult to find the species in Eigenmann’s monograph. It fits very well into the description of Hemigrammus erythrozonus (Durbin). It is not necessary here to go into the structural details, which are of small interest to the aquarist, but it will be worth quoting Eigenmann’s description of the colours. It should be borne in mind that this description is based first of all on its method of in situ magnification; under these conditions it presents aspects unfamiliar to the aquarist. But the incorporation of notes made from the living fish is significant and should convince the most sceptical.

Eigenmann states:

“No true humeral spot; pores and margins of the first three or four scales in the lateral line heavily outlined with dusky and a group of large chromatophores just behind the eye on the head give the appearance of a humeral spot. Web of distal half of dorsal, almost all of the caudal, all of the ventrals, pectorals, and the web between the first seven anal rays dusky. Often a faint little dark spot at the base of each caudal lobe, no true caudal spot. Scales of the back and upper one-third of the sides outlined with dusky. A broad stripe without chromatophores, cherry-red in life, extends from the head to the caudal and half-way to the end of the middle caudal rays. Below this lateral stripe a dusky stripe two scales in width extends the length of the body. The belly and a streak on the sides, from just above the bases of the anterior ten anal rays to the mandible, without chromatophores. Body silvery, with an iridescent silvery band along the side, in the centre of which is a very narrow black line; all the fins are clear. This, one of the less brilliant of the group, is not likely to be much sought after by aquarists. It is to be found from British Guiana southward to Paraguay.”

Cacti in the Fish House

Many growers of cacti get rather disappointed when their plants do not flower readily. This is often their own fault for going in for types which do not flower until they are of a fair size. Such kinds as Opuntia (the prickly pear type), do not flower very readily and often only when they get a good size and have some winter warmth. One of the favourite kinds for flowering is the genus Rebutia. These are small types which can flower in one or two years from seed. The plants keep small and the flowers are quite large in comparison with the plants. I have seen a plant an inch across with a dozen flowers around the base, each one an inch across. The genus Mammillaria is a very large genus with at least 300 different species, and these plants flower as readily from seed as any genera. Another free flowering type is the genus Notocactus, and many good flowering types will be dealt with in later issues.

When arranging a shelf for cacti see that a fillet of wood is placed round the edge so that some gravel can be placed on it. This will mean that when the pot is placed on the shelf there is every chance that surplus water can run away, which could not do if the drainage hole was standing on a flat plane. Many cacti are stood on open racks and this is not a good method as draughts can do harm to the roots.
AQUARIST’S Notebook

M ost aquarists have heard of the electric eel and know something of the way this fish reacts and many have wondered what the effect of an electric shock would be on their own fish in their own aquariums. In the event of some electrical fault occurring, it was with interest, therefore, that I came across an account of electric fishing in English rivers in the November, 1953, issue of Yorkshire Life Illustrated. I had never heard of this method before and it is widely known in the hobby. It appears that electric fishing is the method employed to reduce the number of unwanted coarse fish in trout rivers, the point being that these fish eat up the food which would otherwise be available for the trout, and thus make life harder for the latter. The first experiments in this line were undertaken well over 100 years ago by private individuals but since 1951 this has been done by the Electric Research Association in collaboration with the Ministry of Agriculture and Fisheries, the Scottish Home Department and the Freshwater Biological Association.

Portable motors are installed in flat-bottomed boats and powered by A.C. current. Where A.C. is used the electrodes are mounted on cane poles and held under water up to six feet apart as the boat drifts downstream. These fish which are within the effective electrical field surface, belly upwards, due to cramping of the muscles. The great majority of these fish recover completely unless they have actually been in direct contact with the electrodes. With D.C. current, one cable from the dynamo is attached to a steel chain suspended in the water over the side of the vessel. The second cable is connected to a wire-netting basket fitted to a long pole, and held under water. Direct current flows from the chain to the basket, electrifying the water. Fish within the effective range are drawn into the basket, which acts as a net. D.C. produces in the body of the fish a substance known as acetyl-choline, which has a stupefying effect but which disappears rapidly when the fish is removed from the electric field. This method has its limitations.

Electric fishing is not at present recommended for waters over 20 feet wide or where the depth is much more than four feet. Large fish are more readily affected than small ones and dry are not affected at all. The longer the body of the more susceptible it is. Effects also vary with the species. Perch and grayling are quicker casualties than roach. Pike and eel recover more quickly than any other fish, and can even survive contact with the electrodes. Individual body fitness and the time of the year also affect results.

In recent months there has been quite a boom in the better drays for use on crockery, furniture and the like, or later it was inevitable that tropical fish would appear and two large transfers are now on sale at the larger well-known dealers. A good-looking brown and a coral fish which somewhat resembles the chocolate gourami (Sphaerichthys paradoxus). Each transfer is about six inches by three together on one sheet costing 2s. 6d. They are called “Kaylee Real Paint Transfers” and are manufactured by Kaylee Transfers Ltd., Long Eaton.

Aquarium literature and some aquarist writers, including the trade name for different fish, have fallen into the error in the past of referring to the latter as chromatium of mercury, which it is not. The immediate effect of such fish on the other inhabitants of the tank, its actual method of manufacture and use are still secret. It has many advantages over iodine and is used largely in U.S.A. in place of iodine. The stain leaves a relatively permanent deposit of a bactericidal agent. It does not burn, irritate or injure the body tissues and penetrates deeply. It has no obvious effect on fish although fatal to white spot. Varied tank dosages are given in aquarium books varying from four to 16 drops of a 2 per cent. solution to each gallon. Personally I find two drops of a 2 per cent. solution to each gallon quite sufficient to clear white spot in about four days. There is little call for this chemical in this country and few chemists have it in stock. It is worth mentioning for the sake of those who have not bought it before that it is not sold over the counter, a proof of purchase register has to be signed on purchase. It is quite cheap: about five fluid ounces will cost 1s. 6d.

There are many rather expensive books available to-day which give very full accounts of the hobby from many angles. Newcomers to the hobby, however, do not wish to pay high prices such as these and they frequently find it hard to obtain such books from the local public library. Borrowing these expensive books from established aquarists is nowadays no easy feat and they are therefore somewhat at a loss. Yet there are several excellent books available on the hobby which give a great deal of information at a low price, well within the reach of all, and they are all to be recommended, either for personal reading or for passing on to friends newly interested. These are Aquarisms and Goldfish, two first-class books written by the Editor of The Aquarist and priced at 3s. 6d. each, and also two books issued by Messrs. Spratt’s Patent Ltd., entitled Tropical Fishkeeping (price 1s. 6d.), and Modern Fishkeeping (price 9d.),—about coldwater aquaria. The cost is negligible for much useful information and all these four books are just the thing to give as small prizes at club meetings or for table shows. Best of all, pass them on to interested non-aquarists, they’ll become even more interested with these books.

Having some parasitic trouble in a 30 ins. by 15 ins. by 12 ins. tank I decided to risk things and give relatively large doses of peroxide of hydrogen—which I have recommended previously for many aquatic ills. I gave one tablespoonful twice a day for five days taking care to introduce this very gradually into the aerator stream, making sure no fish were in the immediate vicinity. At the moment of writing none of the large number of community fish has been adversely affected and all seem in excellent health. The point of interest, however, is that all blue-green algae has completely disappeared, and there was quite a lot of it in the tank.

The Portsmouth Aquarists’ Club Magazine drew my attention to a description of a rather unusual fish found in certain stretches of the Amazon which is mentioned in the travel book Amazonia, by Haakon Mielcke. The description given by the author is as follows:—“The fish you see most of in the river here have two pairs of eyes, one pair turned upwards watching for insects, the other pair looking ahead and below for possible dangers. The upper pair projects above the water, the lower remaining under the surface. These four-eyed fish are seen all over the river in the shallows, travelling in shoals, and the first time you see
them you think they are snakes swimming across, because the two upper eyes leave a thin wake in the water. When you paddle closer, the fish increases speed suddenly, slashes with its tail and rises up like a speedboat, racing across the surface with its entire forepart out of the water, steering itself with just the last stump of its tail-fin.”

Considering the large number of tanks in dealers’ shops it is nevertheless something of a rarity to find that fish on view to the general public have spawned, or better still, raised a brood. It is hardly surprising that this is so when one considers the noise and the bustle of the shop, constant interference with tanks and the fact that many other fish of the same species or different species may be present. Apart from livebearer broods which happen willy-nilly, few egglayers oblige, but it does happen occasionally with bubble-nesters, large and dwarf cichlids, _Rivulus_ and _Aplocheilus_. Recently I saw a large exhibition tank, holding roughly 4 gallons and some 70 large specimen fish of about 30 different species. In this tank two zebra cichlids had spawned on a rock, hatched out a brood of over 300 youngsters and successfully kept the remaining fish at bay. In actual fact the other fish were penned in a little less than half the tank, the parent zebras taking it in turn to mount guard and make violent attacks on any strange fish which ventured to stray too close. All this in front of an interested audience of 20 or more customers. The only fish in the tank which seemed to be successful in eluding the attentions of the angry parents was a panchax (_Aplocheilus lineatus_) which seemed to go unnoticed at the surface.

One piece of advice which I always give to other fishkeepers is never to dispose of sick or ailing fish if there is any possibility of using them for experimental purposes. We know so little about the reactions of fish and about the toxic effects of certain substances and chemicals that every chance should be taken to try these out where subsequent loss is unimportant. Aged fish which are past their best and diseased fish which are not in immediate danger but unlikely to be of much practical use again are excellent subjects for toxic experiments. Using fish in this way, losses are of no consequence and yet a lot may be learned which may save better fish at some future date. We are very hazy as to the amounts of certain chemicals which fish can stand and if records are kept much useful information is forthcoming.

It is useless, of course, to try the effect of a certain chemical at a specific strength on one single fish. The result proves nothing. Only when the same result is obtained after experiments with four or five different fish under similar conditions is it worth recording. Broods of unwanted, weak-coloured livebearers are also useful for this purpose. It may seem rather a cruel fate at first sight but it is no more cruel than the common method of feeding unwanted fish to larger fish, and certainly much more instructive and of use to the hobby in general. Aquarists will be surprised at some of the results they obtain which seem to be quite contrary to the book, such as fish swimming about without concern in water containing iodine, meths or surgical spirit or T.C.P. Experiments to have any value must be recorded. One point which always annoys me is the vast wastage of “guinea pigs” in dealers’ shops, who throw away sick or unsuitable fish when some keen amateur fish doctor would be glad of them to try out new theories.

Two good stories told me by a lecturer recently which are worth passing on. The aquarist had been treating a tank with methylene blue and at this moment a non-aquarist friend came in, as they so often do when they are in the way. Said the newcomer: “What a delightful colour your water is, wherever did you get it?” “Between ourselves,” said the exasperated fishkeeper, “I had it sent all the way from the Danube.” The other story refers to a clever questioner at a club lecture who asks the speaker the colour of the flower of a certain non-flowering aquatic. “I am glad you asked that” says the lecturer, “because I happen to know. It is the colour of the first Queen Elizabeth’s wedding dress.”

Every aquarist has his pet varieties and his pet aversions. The longer one has been in the hobby the more omnivorous one’s taste, but some species and some groups impress themselves upon you by their adaptability, long life, freedom from disease and general deportment. To my mind the characins take pride of place because they can be relied upon to fulfil all these conditions. There are countless varieties of characins and all but a few are small in size and make excellent aquarium fish. They are frequently very colourful and always spread their fins well so that they never let you down when a friend calls “to see the fish.” They are good neighbours and less than one per cent. of them ever bully or indulge in fin nipping or other unpleasant pursuits. Disease is rare, only white spot with some species and neon disease being usually encountered. They are not choosy eaters and will get along for weeks and months with a minimum of attention. Prices are no longer high except for a few new importations. Quite a large number are now proving easy to breed but it is true that they are not so co-operative in this direction as some other types. Only _Corydoras_ of the other fish families meet all these requirements and they are nothing like so active. Barbs are big, boisterous, prone to spawn binding, fin rot and dropy, cichlids are bullies and plant wreckers, amano-bantids are a very mixed crowd, livebearers are here to-day and gone to-morrow, but the characin is here for good. He makes no enemies and a host of friends. If statistics were available surely characins would top the list as the fish which gives the hobbyist fewest losses and fewest headaches.

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_Aquatic Agonies_

"He wants one of the fishes in your aquarium."
"Certainly lady—hard or soft toe?"
During this month the activities of your pond fishes should be at the maximum, and if the adult ones have shown no signs of spawning it may be necessary to check over everything to see if there is any particular point which has been neglected. Most healthy goldfishes should spawn by June, although some seasons they may not do so until well into that month.

Pond fish are usually in fairly good health now, for if they had developed any troubles through the late winter they should have recovered by this time. It is surprising how soon the health of a fish improves when the longer and warmer days arrive. See that you do your part now by providing as much of the right kinds of food as possible. I have often stressed the importance of feeding live foods. Earthworms are as good as any food and should not be too difficult to obtain. Where goldfish types are concerned there is no need to stick rigidly to live foods, and the diet can be varied by feeding once a day with a good mixed packet food. Bemax can be given, also a hard brown-bread crust for the larger fishes.

Examine the pond water and if it appears dull and murky remove a good quantity and fill up with tap water. Do not worry if the water has turned green; I know that this can make the fishes practically invisible to you, but there is no doubt that the fish themselves like it this way and are more likely to remain healthy than if the water was too clear. When the water temperature is somewhere in the region of 60°F the fish may spawn, but the temperature is not the only cause of fish spawning. See also that there is a good supply of water plants suitable for the fishes to spawn in; keep these in one corner of the pond where it is fairly easy to remove the plants with eggs once spawning is nearly over.

Goldfish will spawn on any type of water plant, or even anything which looks like a plant, but it is a fact that some plants give more protection to the eggs once they are laid. Plants like hornwort are ideal for the purpose, but any fine-leaved plants will do almost as well. I have noticed, however, that the fish prefer to spawn in a rather dense mass of floating plants in the shallows of the pond. They will spawn anywhere in the pond when in the mood, but by providing a shallow part you will do much to encourage the fishes to spawn.

If you have young fish hatched earlier in the season you will be able to examine them to see that only the best are kept for stock and for showing purposes. Where fancy varieties of goldfish are being bred it is essential that any fish which does not show the necessary requirements for that particular type should be discarded. The retention of a number of runts will mean that less space and food can be given to the good fish, and only by experience will you realise how much this can influence whether a fish becomes a show specimen or not.

Now is a very good time to set up a fresh tank, either for coldwater or tropical fish. The reason is that the water plants will have a much better chance of getting established than at any other time of the year. So many beginners go wrong with their plants at the outset and they are then disappointed when later on things are not well with the tank. Whatever some people may think about the desirability of having plants in a tank, I am sure that not only will the tank look better but the fishes are more likely to be happier and healthier with at least a few plants. Very few aquarists start off without plants but I wonder how many go wrong when they first introduce them to the tank?

Most bought plants are just unrooted cuttings and as such are not likely to make much headway for a time. I know that it is almost impossible for beginners to curb their impatience; the tank has to be bought, set up and stocked with fish the same day, which is all wrong. A much better and cheaper method is to place all unrooted cuttings in separate two-pound jam jars and see that there is in them some mulm from an old established tank or pond. Otherwise place a little garden soil in the bottom. Place the cutting in but do not worry about pushing the stem under the soil. Roots will soon be made, especially if the jars are placed in a sunny window. Once the plants are rooted and making new growth they may be carefully transferred to the tank, seeing that most of the soil adheres to the roots whilst doing so. If some of the compost is scraped away and the roots placed into position, some more sand can be dropped over this so that the roots are covered.

When introducing fresh plants into an established tank it is a good plan to treat all fresh plants in the same way. (Please turn to page 62)
There are so many people to-day who talk, write and even give exhibitions of hand spawning of goldfish, that a little criticism of the method is, perhaps, desirable. That the proposition is workable has long been known to aquarists and it is many years now since I first experimented with the idea. Although this might suggest that the practice is in common use amongst the more advanced aquarists, this is certainly not the case. Why, then, has the principle not been more widely accepted?

Suppose we take the points put forward as being of so much advantage over the more normal method. Perhaps the greatest stress is laid upon the supposed fact that here is a quick and simple method for crossing two particular fish (which suggests that they have persistently refused the normal method). This is very misleading to the beginner, even when the statement is prefaced by remarks concerning the absolute necessity for the fish to be in breeding condition. The fact is that eggs cannot be forced from a fish not in condition without the probability (amounting almost to a certainty) that she will suffer considerable damage which may well lead to her death. If she is in the required condition (i.e. if eggs are extruded immediately she is handled) then there is no necessity to hand-spawn since normal breeding must surely occur providing the male is also in condition. If he is not, then hand-spawning will not make him so but may more likely lead to his death.

Goldfish Fertility

It is claimed that a higher rate of fertility is assured by handspawning but I am inclined to think that this exists solely in the minds of the particular enthusiasts for, as is well known, the eggs of the goldfish are adhesive and do not lend themselves readily to artificial methods as do those of trout. It is suggested that if the eggs are moved around as the eggs are extruded, then they will scatter in the regular manner. In my opinion and experience this is quite definitely not so for no matter how carefully the performance be carried out, it is quite impossible to simulate those little sprits of eggs that occur as a result of body movement and other more complex causes when natural spawning is in progress. Examine any type of aquatic plant after a natural spawning and you will never find the eggs in clusters and all adhering to one another; even when blanket weed is used, which might well be expected to cause this, it will be found that although many eggs are gathered in a small area, they nowhere touch one another.

The eggs of handspawned fish, however, will collect in nodules or in such a manner that many are touching and this is not conducive to a successful hatching. In any event, the percentage of fertile eggs in a controlled natural spawning can be well over 90 per cent., even with one male as a partner, so that even if we accept the high figures of fertility put forward for hand spawning, they do not give a true picture of the state of affairs since low fertility in natural spawning (when it occurs) can be occasioned by such a variety of causes: condition of water, amount of spawning medium, chemical content, etc. I have noticed that most of the advocates of this method are people with little or no experience of the more rotund types of goldfish, their statements (and exhibitions when held) apparently concerning the shubunkin, a very normal-shaped fish, similar in outline to the trout, and certainly not difficult to breed by normal methods.

Suppose we consider the artificial method as it affects the more advanced types. First it will be found that, after grasping the fish with one hand, there is little room left for manoeuvring with the other to extrude the eggs or milt. Secondly, it will be found, especially with the males whose bodies are usually more firm, that owing to the steepness of the curve of the body, the possibility is that the fingers will slide off in such a manner as to have the effect of drawing back the milt rather than expelling it. If the fish is very ripe then milt will be expelled when the stomach is gently stroked with one finger from the position of the ventral fins to the anal but, as I said before, why? —since, obviously, a fish in this condition will breed normally.

Secret of Success

In my opinion the method is interesting but in no way does it solve the usual beginner's problem of conditioning fish and it is here that the secret of success mainly lies. Of course, there are points which can be put forward in
The female veiltail can conveniently be held in one hand

...in favour but none of these really concern the normal goldfish breeder. It is useful, for instance, to a research worker in genetics, for there is no likelihood of the odd few eggs being gobbled up which would upset the final figures. From my experience, however, two properly conditioned fish do not start egg-eating until the final stages of the spawning so that if they be removed to a tank with fresh plants at the first sign of this habit, then the number they will be able to consume will be very small indeed. Another use of handspooling and one which was responsible for my interest in it, is that it opens up possibilities into the study of hybridisation. Unfortunately, I

My “Spiny Eel”

ALTHOUGH disdainfully referred to by my family as “that worm,” after it had lived in my aquarium for 18 months, I came to look upon my spiny eel (Mastacembelus aculeatus) as rather a special pet. Unfortunately a heater failure has resulted in the loss of this somewhat uncommon creature.

When first purchased and placed in the community tank it immediately disappeared into the compost, and after vainly searching for upwards of half-an-hour I eventually spotted a sharp-pointed greyish-coloured snout peeping out. It was a spiny eel’s astonishing habit after a week or two of aquairium tank life, and unless the tank was unusually crowded had no hesitation about occasionally swimming in company with the other fishes in the tank, especially when food was given. It was, however, most active when the top lighting was switched off, and at other times generally lurked on top of the compost amidst a thicket of plants.

One eminent authority states that this fish is strictly carnivorous, but I found that my spiny eel managed to exist for at least four to five weeks at a time without live or flesh foods of any kind being given. Furthermore, no other fishes disappeared during these times, although the snail population may have been depleted. I found its favourite food was Tubifex or chopped earthworms, both of which were consumed in large quantities.

The spiny eel is sometimes on sale at dealers’ shops and, although my specimen measured only about six inches in length, I have seen one almost eight inches long. Coming from India and Burma, this fish is worth a place in the aquaria of those who seek the less common tropicaals. One word of warning, however: it strongly resists all attempts at capture by tunnelling rapidly into the compost. If you wish to move it, either to fresh quarters or for show purposes, you must be prepared to completely strip and empty the tank of all plants, rocks and almost all the compost.

R. Whitehead
In the Water Garden in JUNE by Astilbes

Loosely fitted paving stones round a pond form narrow channels in which marginal plants can be set.

Many formal ponds are constructed with a separate marginal trough in which water-loving plants can be grown. They are usually made so that about a foot of soil can be placed in the bottom to give the plants every chance of thriving. Normally, plants in ponds can receive some nourishment from the droppings of the fish, but most pondside troughs have edges which prevent fish from swimming therein. When preparing such partitions it is a good plan to place in them a few turves, grass side down, as this method will ensure that there is plenty of goodness in the soil to encourage the best from the plants. If turf cannot be obtained John Innes Potting Compost can be used.

When planting such positions it must be realised that most of the suitable plants will soon flourish and increase. Do not overdo the plants or before long they will grow into one another and the whole effect will be spoilt. Where ponds have already been made this method of planting may not be possible unless some form of pocket was made in the first instance. This omission can be overcome by planting your pondside subjects in flower pots; those with holes round the sides are very good. These pots can then be wired up and hung from pegs just outside the pond. If galvanised wire is used it will last a long time and the small amount of galvanising will not harm any fish in the pond. By this method of suspension the plants can be given an inch or two of water depth if necessary.

There are many plants which will be suitable for such positions and some of the following will be found to do well. The genus Galba (Ranunculacea), which embraces the kingcups, will mostly do well in these positions. Most of their leaves are a glossy green and are quite attractive. The flowers of the common type are yellow but some species have white or pinkish-white flowers. G. palustris is a very strong-growing plant, a native one but quite showy when in flower. The roundish leaves are followed by many flowers rather similar to giant buttercups. It will grow about a foot in height and is quite hardy. There is also a white variety of this plant, G. palustris v. alba. G. natans is often referred to as the floating marsh marigold and this is a suitable plant for covering a fairly large area. The stems will run about over the mud and the stem nodes will take root. It can be seen from this description that this is not a plant for a very small spot. There is a dwarf form of this species, G. palustris v. nana plena which only grows about nine inches high, but has many small, rounded, double flowers, yellow in colour.

Another uncommon plant for shallow borders is the dragon's head plant or Dracunculium palustre. The plants will not get too rampant and only grow about a foot high. The flowers are small spikes carrying rose-coloured flowers rather similar to those of miniature antirrhinums. A plant somewhat like the former one is Physostegia virginiana, which can be grown at the water's edge or in the trough. This plant has long pointed leaves and the flowers are held on a spike, rosy-pink in colour. I have known this plant called the obedient flower, for if the flowers are bent in any direction they retain this position.

One plant which is normally grown in a shady part of the herbaceous border can be tried at the pond side, but not in a depth of water. This is Pulmonaria or lungwort. The flowers are produced quite early in the year and are uncommon in that they are of two or three different colours, blue, pink and pinkish-red. The leaves are moulded with white and so look very attractive even when the plant is not in flower. This plant can be raised from seed or the plants can be increased by division of the root-stock. Where small ponds are being dealt with it is imperative that only the smaller growing types are used, as very tall subjects can soon look out of place and will spoil the general effect.

Stepping Stones

(Continued from page 59)

So many people go wrong in trying to set a fresh plant in a tank which has a large number of flourishing plants already there. It can be realised quite easily how difficult a task the new plant has to get settled when most of the compost is riddled with roots from the other plants. You would not think of trying to introduce a fresh plant to your garden by pushing it into a mass of established plants, and therefore you should not try to do the same thing in the tank, which after all is a miniature under-water garden.

If your tank gets a fair amount of light it will be almost certain that the water becomes green through the growth of the tiny plant life known as algae. Water plants can become coated with this and after a time it turns a very dark, blackish green and looks unsightly. I know of nothing better when this happens than to introduce some tadpoles to the tank. If they are very small the fish may eat quite a number but as they grow so fast it is certain that many will soon grow too big for the fish to eat. If you can procure some toad tadpoles they are not likely to be eaten by the fish and so become, in my opinion, the finest scavengers it is possible to have.

For helping to keep the water clear from algae in a pond it is a very good plan to have a good-sized patch of duck weed growing there. The shade provided by this will deter the algae and will be appreciated by the fish. Some will even be eaten by them when they are hungry. It need not be allowed to spread all over the pond as then the fish will not be seen, but it is very easy to net out all that is not required.

THE AQUARIST
Fins and their Adaptations in Fish

by Dr. J. L. Coudsley-Thompson

In an article entitled “Rhythm in the Underwater World” (The Aquarist, Vol. XVIII, page 137-8), I discussed the mechanism of swimming in fishes and pointed out that with the exception of the swimming-bladder, the pelvic fins of the bony fishes, or Actinopterygii, were freed from their primitive lifting function in which they acted as “aerofoils” (as they still do in sharks and dogfishes), and became available for use as brakes and for delicate movement control. In many of the low or tetrapod fishes, which are bottom-living, and relatively poorer swimmers like the catfishes, there is still a large anal fin which tends to lift the tail and this is balanced by the movement of the pectoral fins. Indeed the mastery over their environment that the higher fishes have acquired depends largely upon the freedom given by the use of the swimming-bladder as a hydrostatic organ.

In the more specialised forms, however, the pectoral fins are placed high up on the body. The plane of their expansion is vertical so that they produce a large drag and only a slight lift in braking. Nevertheless it would be sufficient to make the fish rise in the water were it not counterbalanced by the relatively anterior position of the pelvic fins, the significance of which has long puzzled morphologists.

Fins and Locomotion

The anterior dorsal fin acts primarily not only as a keel but also helps the fish in turning by increasing lateral pressure on the water: that it is usually erected before a fish begins to turn is easily verified by a glance at the inhabitants of an aquarium. The posterior median fins increase the lateral surface area during undulations of the body, and thus give additional purchase in swimming. At the same time they stabilise the direction of movement, much like the barbs on an arrow. In those fishes like the barb (Sema bicus) that dive on to their prey from above, the posterior median fins are enlarged and serve accurately to control the direction of the dive.

The normal function of the pectoral and pelvic fins has already been mentioned. In addition, however, many are able to approach their prey without moving the body, by means of vibrations of the various fins, although this is not their normal mode of swimming. Such fishes infrequently possess cryptic (concealing) coloration and enable the weed in which they live, and their fins are usually transparent. It should be remembered that the explosive forces that move a fish through the water are produced by the longitudinal muscles of the body. The dorsal fin is not used as a paddle or rudder, but turns are executed by means of lateral movements of the head.

During the course of evolution there have been many departures from the streamlined body form of typical fishes. These are nearly always associated with a reduction in the efficiency of swimming which is commonly accompanied by some form of protective mechanism such as camouflage. Thus the John Dory (Zeus faber) is so thin that its speed is very slow, but the fish is inconspicuous when seen from in front that it can approach its prey unnoticed. Similarly, the angel-fish (Pterophyllum scalare) is very much compressed, but there the function is protective and these fishes possess a brilliant coloration which renders them inconspicuous among the plants of their natural habitat.

Specialised Locomotory Adaptations

Skates, rays and angler-fish are considerably flattened dorso-ventrally. Although they can swim vigorously they are slow and propel themselves by means of their enlarged pectoral fins. Such flattening is a modification correlated with the bottom-living habit and so naturally it occurs more frequently among selachians, whits herrings, mullets, and bladders, than in teleosts. Nevertheless the true flat-fishes such as plaice, halibut, sole, turbot and the like are flattened to an extreme degree but in this case the fishes are compressed laterally and come to lie on their sides. The asymmetry of these fishes develops during growth, for they hatch as fry that swim vertically and only after an account of the flight and have an eye on each side of the head. After a time, however, one eye moves round the top of the head on to the other side, the dorsal fin grows forward on to the head and, metamorphosis completed, the little fish seeks the bottom where it lives thereafter. The adult flat-fish swims by means of rhythmic contraction and relaxation of the somatic body muscles but as it lies on its side, the waves of movement operate vertically.

There are two main groups of flat-fishes; the “flounders,” including halibut, plaice, lemon sole, and flounder, which have the eyes on the right-hand side of the body; and the true soles, turbot and brill in which the eyes are on the left-hand side. The upper surface of a flat fish usually bears a close resemblance to the background, and these fishes have a marked ability to change colour so that they match their environment, whether sand, gravel or mud.

The sea-horses (Hippocampus spp.) provide one of the few examples of fishes that swim by means of their dorsal fins. Their tail has become a prehensile organ with which its owner can hold on to fronds of sea-weed, and the fish originates itself by means of its pectoral fins. Sea-horses live among weeds in tropical and sub-tropical seas, and different species show varying degrees of camouflage. An extreme example is afforded by the sea-dragon (Phyllopteryx aqua) of Australian waters, whose outline is fantastically distorted and broken up by filaments from all over the body which stream out into the surrounding water and create a most deceptive resemblance to sea-weed.

Crawlers and Climbers

The tropical mud-skippers Periophthalmus holbrooki (described in The Aquarist, Vol. XIII, page 281) and Beloophthalmus spp. crawl and climb with great agility when out of water and can jump for distances of several feet. Their pectoral fins are elongated and muscular, as is the tail, and the fish leaps by bending the latter forward and then suddenly straightening its body.

The bat-fish or frog-fish (Malta vasperiato), which inhabits the shallow waters of the West Indies, also crawls on its pectoral fins. It is said to assume a toad-like attitude when on the land, the head pointing slightly upwards and both pectoral and pelvic fins acting as limbs.

Finally, mention should be made of the case of fins as wings by various genera of flying-fishes such as Esoxcoetus, Astropterus, Pantodon, and the flying-gurnard Dactylopterus volitans. (For an account of the flight of flying-fishes, see The Aquarist, Vol. XV, page 77.) In the Esoxcoetidae the pectoral fins act as aerfoils and are raked back so that the lift force they provide coincides with the
centre of gravity. These fishes break the surface of the water at full speed and then glide through the air, but in Dactylopterus the fins are actually fluttered up and down, although the flight is feeble.

Non-locomotory Functions of Fins

Fishes that live in situations from which they are in danger of being carried away often develop suckers. In the gobies and lump suckers (e.g., Lepadogaster gosani) the pelvic fins have become modified to form a sucker by which the fish clings to stones in exposed places near the shore. In the remoras, on the other hand, the sucker is formed from the first dorsal fin. By means of it the fish attaches itself to sharks and other larger fishes, thus obtaining free transport; but they are predaeous in habit and leave their hosts in order to catch and eat their food.

In the gurnards the first three rays of the pectoral fins are separated from the remainder and are modified as feelers. The fish walks on them over the ground, fingering and feeling for its food. The streaked gurnard (Trigla lineata) especially relies almost entirely on its feelers, but manages nevertheless to catch small crabs and other animals that cannot get out of the way quickly enough. The other gurnards feed in the same way, but also use their eyes when chasing fishes and other active creatures. Fin rays are often modified as spines which serve as weapons of attack or defence as in the stickleback and perch. In some fishes such as weevers (Trachininae virens and T. draco) sting-rays (Trygon pastinaca) and the dragon— or scorpion fish (Pterois volitans) they are connected with poison glands.

The effect of the stings of most poisonous fishes is said to be very painful and that of the ugly sea-toad (Syanoea terricola) has been described as atrocious and spreading up the limb of the part attacked. Men recently stung have become delirious, hitting and biting anyone near them, throwing themselves about and insisting that the injured part be cut off. People have even been known to amputate the injured part themselves. Painless and collapse often occur, sometimes followed by death.

The angler-fish (Lophius piscatorius) is a sluggish creature, most inacquisitive when hiding in sand or among seaweed. But the first spine of the dorsal fin is detached from the remainder and is greatly elongated. It terminates in lobes of skin which can be moved freely and conspicuously by means of muscles inserted into its base. By this bait or lure, smaller and more active fishes are tempted to their fate for when they approach they are quickly swallowed by the enormous mouth of the angler. Another accessory use for fins is in reproduction. In male dogfish and other clasmobranchs the pelvic fins serve as intromittent pairing organs, and are known as "claspers." In sword-tails (Xiphophorus spp.) and other tropical fishes of the family Poeciliidae the tail and anal fins are elongated for the same purpose.

Perhaps the most extraordinary function for a fin is found in the lung-fish (Lepidocephal paraadoxus) which lives in the swamps and marshes of South America, where the water is stagnant and deficient in oxygen. The adult fish rises to the surface to breathe but the eggs would not receive sufficient oxygen for their development from the water but for the fact that during the breeding season the pelvic fins of the male enlarge and become covered with blood-red vascular filaments. These oxygenate the water which the attentive father fans over the eggs.

Thus not only are fins used for swimming and braking, but in certain fishes they are used for functions as diverse as flying, adhesion, mating, offence, defence, and respiratory purposes while in other cases various fins may be reduced or absent. Indeed, they provide a fine illustration of adaptive radiation.

FRIENDS & FOES No. 25

VELIA, MESOVELIA and MICROVELIA

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

CLASS—Hexapoda, from Greek hes—six, and podos—foot.

THE genus Velia has only one British representative — Velia curra, commonly known as the water cricket. Only one-quarter of an inch in length, it has a more robust body than Gerris. Nymphs are a uniform black in colour, but adults show two distinct orange lines running down the lower two-thirds of the back, and of the abdomen also appears orange. Occasionally, winged specimens are found. Velia is found on both ponds and streams, where it haunts the vicinity of the bank, feeding upon small creatures which fall upon the water surface. Eggs are laid upon floating vegetation.

There are three species of Microvelia, only one of which, Microvelia reticulata, is widely distributed, frequenting similar locations to Velia. It is about one-twelfth of an inch in length, and dark brown with white markings on the elytra (wing cases). Wings may or may not be present, however, and where absent tufts of white "hair" are found on several of the abdominal segments near the outer edges.

Mesovelia grows to about an eighth of an inch in length, and likes to hide itself among vegetation. It is occasionally found with wings, but more usually without them. Its habits are like those described above. Its back has a greenish tint, with various black markings.

All these "water bugs" are equipped with sharp pointed proboscises which pierce the flesh of their prey.

C. E. C. Cole

THE AQUARIST
OUR EXPERTS’ ANSWERS TO READERS’ QUERIES

I am troubled with cloudy aquarium water. Can you please tell me how to improve the look of it without having to empty it all away and start afresh?

Cloudy water may be caused by feeding the fish with more food than they can eat at one time or by the wrong sort of rockwork being used to decorate the aquarium. For instance, old bricks and lumps of marble and the like will soon disintegrate and give the water a milky or dusty appearance. On the other hand, your aquarium may be getting too much strong light. This would encourage the growth of free-swimming algae which soon turns the water pea-green. We advise you to keep the floor of the aquarium free of all uneaten food and sediment; and if the aquarium is getting plenty of direct sunlight or bright electric light, try and tone it down by introducing more plant life along the back and two ends. If the water is very green, do not add fresh water to clear it. Fresh water only prolongs the green period. Just shade the aquarium from strong light, and wait for the water to clear of its own accord.

Can you please give me some information about breeding Corydoras catfishes?

Generally speaking, all the Corydoras “cats” need alkaline water and a temperature in the sixties or low seventies. They prefer rather shallow water and a fine sanded bottom covered with a thin layer of brown sediment. One or two large smooth pebbles or pieces of thick slate should be placed on the floor. Plants with wide-leaved foliage should be given rather than bushy or feather-foliated species. To bring Corydoras into condition, give them plenty of chopped earthworm or scraped red meat. When the female is about ready to spawn, her lower sides and underparts will become faintly red, and she will become noticeably plumper than the male. These fish may choose to deposit their eggs on the side of the aquarium rather than on the rockwork or leaves of some plant. The eggs hatch out within three or four days, and the fry soon disappear into the sediment covering the bottom. When the eggs have hatched out, it is advisable to remove the parent fish to another tank.

Laurence E. Perkins

Many queries from readers of “The Aquarist” are answered by post each month, all aspects of fishes 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.

I cannot keep my aquarium free of mossy and filamentous algae which smothers the rockwork and plant life under a green blanket. My tank gets little or no natural light, but an electric strip-light is kept burning for about fifteen hours a day.

We think your aquarium is getting too much strong light. Seven or eight hours of bright light every day is enough to keep the average aquarium in perfect condition. In the meantime, remove as much as you can of the algae by scrubbing the sides of the aquarium and rockwork with a pad of clean linen or muslin tied to one end of a stick, and picking over the plants by hand; but make sure your hands are perfectly clean and free of soap before introducing them into the aquarium.

I wonder whether you can tell me why a male Molly died. I bought it a few days ago and placed it in an aquarium already stocked with zebra fish, swordtails and platys. From the start it seemed to moan in corners, and did not seem very interested in food. I am rather puzzled about this fish’s death because it was a young fish, and I bought it from a reliable dealer.

Even the most careful and reliable dealer cannot guarantee how a fish will act after it has left his establishment. Some fishes do not like being moved, and mollies in particular do not always take to a sudden change of water. Your fish might have been a weakling, and the shock of being netted and carried home would not do it any good. And perhaps your tank is overcrowded. Mollies like plenty of space and well-oxygenated water maintained at a temperature of about 75° F. They really prefer a large aquarium to themselves. It should be planted with plenty of bushy-foliated plants, and as these fish eat lots of mossy algae, it does not matter if the aquarium is stood in a sunny position or is illuminated for several hours at a time by electric light. Some aquarists who have studied the natural conditions of mollies add about a level teaspoonful of kitchen salt to every gallon of water contained in the aquarium. But once salt has been added to the aquarium, do not add any more because if you do the plant life will turn sickly and pollute the water.

How can I rid my aquarium of planarian worms?

Quite a lot of them can be got rid of by hanging a small piece of washed raw meat in the aquarium overnight, and throwing it away first thing in the morning. Another way to deal with them is to remove the fishes, add a few drops of household ammonia to the water, and raise the temperature to about 90° F. Keep the temperature high for a few days, then empty the water away, wash the compost and plants, and set up afresh. When fresh tap water is used to fill an aquarium, leave it to mature for a few days before introducing any fish.

My tiger barb has developed an ulcer on one eye. Please advise me as to treatment.

Barbe the fish’s eye with a solution of one eighth of an ounce of boric acid in a quarter of a pint of tepid water. Repeat treatment every other day for a week or so. If the condition does not improve, apply two drops of a one per cent. solution of protargol to the eye. Drop the solution on to the centre of the eye with a glass dropper whilst the fish is held out of the water in a net.
I have made a zinc hood for my aquarium, but a fishkeeping
friend has told me that even if I paint over the zinc it is likely
to poison the water. Is this true?

We are sorry to have to tell you that your friend is quite right. Zinc, brass, copper, bronze and galvanised iron are not
good to have in contact with water inhabited by fish. A hood
collects a great deal of moisture, and this soon causes the paint to peel away and leave the bare metal exposed. Drops of water falling from this into the aquarium would soon result in your fish becoming diseased and
generally out of sorts. Hoods made of aluminium or sheet tin are not so dangerous to fish life, but even these
need to be kept well painted.

I am a newcomer to tropical fishkeeping and wonder whether
you could give me any information about the sort of food I can
give to my fish besides the prepared dried foods sold by dealers.

The majority of fishes prefer and enjoy better health
when they are given plenty of live food such as blood-
worms, great larvae, chopped earthworms, Tubifex worms and so on. But they will also enjoy occasional feeds of
any of the following scraps from the table: finely minced washed liver or kidney, shredded white fish such as cod, chopped mussels or cockles—before the addition of any
flavourings—very small quantities of grated cheese, finely
crushed wafer biscuits and the like. In fact, most fishes will
eat most of the things us humans eat, but a few species
are very conservative in their eating habits and would
rather die of hunger than eat anything outside the few
foods which nature has ordained they should eat.

I can obtain all the Daphnia I need for my collection of tropical
fishes, but have read somewhere that too much Daphnia makes aquarium fishes thin and ill. Is this true?

Daphnia is laxative, and too much of it does tend to
keep fish on the lean side. But we doubt whether feeding
it to fish in too great a quantity makes them ill. Perhaps
the reason why fish become thin and ill-looking is because
Daphnia alone does not provide all the elements that some
species need in their diet to keep them in robust health. Alternate your fishes’ diet of water-fleas with chopped
earthworms or finely chopped scraps from the table. Better still, give them a sprinkling of a good dried food
when they appear to be looking for something to eat.

COLDWATER FISHKEEPING QUERIES answered by A. BOARDER

The surface of my tank is frequently covered with tiny bubbles
and what appears to be a film of oil. What is wrong and how
can it be cured?

This sounds as if there is something decomposing in the
tank. It may be dying water plants or rotting, unclean
food. The bubbles could be from foul gases or they may
have been blown by the fishes at the surface when trying
to get more oxygen. In any case the water is not in good
condition or this would not happen. Bubbles on the top
in the mornings might suggest that the tank is overcrowded
with fish, or even plant life, as these do not give off oxygen
in the dark. Go easy with the dried food for a fortnight,
service the tank and all may be well.

Some snails in my tank have some small grey worms on them,
what are they likely to be and are they harmful?

The small worms appear to be a kind of fluke or tremato-
dode (flat worm). These can be harmful and I know many aquatic
keepers who will not have a snail in their fish tanks because they suspect them of being carriers of flukes. I am
inclined to agree with their point of view. If they were
my snails I should destroy them immediately. If you try
to disinfect it is possible that what would kill the flukes
would kill the snails as well. My bet is that the snails will
die under disinfectant treatment before some of the
flukes.

Which coldwater fishes can be added to a coldwater tank
are there any coloured water plants other than green?

You can add to your tank golden or green tench, dace,
 bleak, golden or ordinary Rudd, minnows, gold and
small sunfish—providing, of course, that you do not
overcrowd it. You will not be able to keep healthy fish
than an inch of fish to each 24 square inches of surface
of the tank. Several coloured water plants can be obtained
and a handsome one is Ludwigia dulcissima. A red form
Myriophyllum can also be used. The light green forest
Vallisneria spiralis torta show up well against the dark
of hornwort, and if your tank is large enough a Nymphaea
could be used for a bright yellowish green effect.

There are many plants growing in rivers, brooks and so on
in the district where I live. Can I collect some for planting
in my indoor coldwater tank?

Almost any water plants which you find growing would
succeed in your tank. After all, most of the modern
aquarists use in their cold tanks are native wild ones.

I have had an electric air pump given to me and have fitted
it up as an aerator. Now I notice that green algae is forming
on the diffuser stone. Will this growth stop the proper function-
ing of the aerator?

In time the green growth will completely clog the minute
holes in the stone and prevent bubbles of air from escaping
into the water. Your best plan would be to remove the
stone from the water, scrub it with a stiff-bristled brush
pour boiling water over it, then return it to the aquarium.

I have two nean fish in my aquarium. One of them is beauti-
fully coloured and very active, the other is a drab grey and
lost a lot of its colour and stays out of sight for most of the time
behind a stone. It has little or no interest in feeding time.

What is wrong with it?

If the fish is becoming coated with a sort of scum, then it
may have contracted velvet disease. Treatment for this
consists in placing the victim in salt water: one heaped
teaspoonful of ordinary kitchen salt to every four gallons
of water. Raise the temperature a few degrees above
normal, and keep it this way for so long as fish is under
a treatment. Keep the aquarium shaded from bright light.
Dissolve one tablet of 0.46 grams acrifinavine in eighty
drums of water and add five drops of this solution to every
gallon of water contained in the hospital tank. Keep the water
well oxygenated. Repeat the dose of acrifinavine after an
interval of five days. On the other hand, your fish may
be old, or just temporarily indisposed. Try tempting it
by dropping small white worms or Tubifex worms in
front of its nose. Sometimes a fish will make a rapid
recovery once it has been tempted to eat again.

A platy I have in my aquarium has quite suddenly become
very thin as though wasting away, and seems to take little or
no interest in food or the other fishes swimming around it.
Why do you think it has some disease?

The symptoms you describe may be due to old age.
Platys are not very long-lived fish—they three years seem
about the limit of their life-span in the aquarium—
when they go into a decline, they do so very rapidly.
A female fish often goes very thin after dropping a large
number of young, but she will soon recover her former
plumpness if she is given a few days’ rest from a worries
male, and fed up on live food. Shallow water made saline
with common salt often acts as a tonic for a rundown fish.
SUMMER LIVE FOODS

Can you tell me how to produce live foods for fishes?

Many types of live foods can be bred by the aquarist. Garden worms thrive in decaying leaves in a dark, cool and damp position. The culture of white worms was described by me last month. Maggots or grubs can be bred by placing a piece of liver or a dead fish in the garden under some cover. Leave sufficient space for the flies to get at it and soon they will hatch, and the maggots soon hatch out in warm weather and if the substance is laid on a screen the maggots will drop through. They should then be cleaned by allowing them to crawl about in sand for a day or two. This business can be very smelly and so you had better not breed them near the house. *Daphnia* or water fleas can be bred in large sinks or similar containers. Some water from an old established pond should be used and then start off as for breeding a culture of Infusoria. When plenty of Infusoria can be seen in the water you can introduce a few *Daphnia*. They live on the micro-organisms in the water and will soon increase. You must keep up the supply of Infusoria and change some of the water occasionally. A water butt in the garden will often provide plenty of larvae of mosquitos and blood worms. You can also gather frog tadpoles which are an excellent food for most fishes and do a good job of scavenging the tank before they are eaten.

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**I suggest you try** to introduce red ramshorn snails into my community tank on more than one occasion but they always die.

**Who is this?**

I have found that if the water is in any way impure the snails are among the first occupants of a tank to die. This suggests that the water in your tank is not in good heart. If you were to place a red ramshorn snail in the tank a few days after it has been filled with water, then it will probably die for more trouble than it is worth. It would take too long to tell you here about all the animals in the tank. I have noticed that if you put them in cold water they might die. You could also make a test by having a small beaker, say a jam jar, to try a few out by themselves. If you lived there it would prove that there is something wrong with your tank, or that the fish were attacking them, or there is also a possibility.

I have a nine-gallon coldwater tank and suddenly a white substance has formed on the surface of the water. Now the fish are up there fins and hiding away. What is the cause please?

It sounds as if there is something decaying or causing disease in your tank. I should remove as much as possible of any dead fish. I would suggest you feed the water and replace with fresh tap water. Draw up the siphon tube as much of the muck from the base of the tank as you can, even if it means sucking up some of the compost. The compost can be renewed if necessary, but I have probably been over-feeding and the uneaten amount throughout the summer but forget that as the water turns colder the fish can eat less. If the same amount of food is given when the water is cold the fish will eat it and it starts to decay. This condition can cause a film to form on the water's surface, a white mould to grow on the compost and the water to turn milky.

I notice that the sand at the bottom of one of my tanks goes black; what is the cause of this?

I expect that the blackness is caused by decomposition of uneaten food. This sometimes happens in a tank but does not necessarily cause trouble although its appearance does mar the picture. If the sand were not visible from the front glass you would not know anything about it and so would not worry. Only the top of the sand should be visible from the front glass. Steady up on the dried food feeding and all may clear up. You can also siphon out some of the affected sand and replace with freshly washed.

Can you advise me as to the number and variety of water plants for a pond about fifty feet square?

Do not overdo the plants. In any well kept pond the water plants will grow apace. Remember they never get a check like ordinary garden plants during droughts. Try to envisage your pond in a couple of years time. I should only use one water lily and not more than four other plants for above surface growth. These can be any of the reeds, a Sagittaria, or *Fontedera cordata*, or only a small piece of each need be used. All have a tendency to spread. You will also need some under water plants and can choose from: *Lagarosiphon major*, *Egeria densa*, *Ceratophyllum demersum*, *Myriophyllum spicatum*, *Fontinalis antipyretica*, *Aponogeton undulata* and *Bladda canadensis*.

Is it safe to use old coldwater cisterns for rearing goldfish, or should they be painted first with bituminous paint?

Old cisterns make good containers for young fish and the illustration shows several such tanks in use. The best method to adopt is to fill up all large holes with wooden plugs and then float the whole inside surface with a mixture of one part cement to one part fine sand. When this has set wash out well to remove all the free lime. If necessary some brick bats can be placed in the bottom to bring up the base (the depth of these tanks is rather too much for fry). Of course they need not be filled to the top if this is not done, but it is better to be able to get at the fry nearer the top of the tank. For rearing goldfish the water need be no deeper than nine inches.
Badis badis

ORDER:—Percomorphi, from Greek perch—the perch and Greek morpho—form or shape.
FAMILY:—Nandidae—probably from Greek nannos or Latin nannus—dwarf, plus -idä-suffix added to form family names.
SPECIES:—Badis badis, based upon native name.

No popular name has ever been coined for this two-and-three-quarter-inch jewel from India, probably because the scientific name is so easy to pronounce and spell. Nor, since the war at any rate, has it been much propagated in this country. Yet it is an interesting, colourful and usually peaceful fish.

There is no fixed colour pattern. The fins are usually darkly marked, but may have, particularly in the dorsal fin, a broad edging of brown, orange or pink. The intensity of the blue varies from fish to fish. The body colour may be brown, pink, yellow-brown, or any combination of these. It may be of other markings or overlaid with a chain-like pattern of black. Through the centre of the eye and extending both a little forward and to the rear is a characteristic line composed of a series of small dots.

Body shape, except when the female is much swollen with roe, is similar for both sexes, and is rather nonconcerting to aquarists who have heard that hollow belly is a sign of sickness in a fish. The concern of these people will be heightened when they observe the many queer attitudes in which this creature remains motionless for minutes at a time. When, in addition to the evidence of their eyes, someone whispers in their ears that B. badis will eat only live food, they are finally discouraged and turn away, unless curious enough to wish to experiment.

Feeding and Breeding

These fish will always do better on live foods, but not many fish won’t. They can be weaned partially, if not completely, by soaking dry fish foods in blood from liver or the week-end joints, or from pulped earthworms. An alternative would be to mix dry food with a small portion of raw fish or liver sausage. All these things disguise the smell and taste of the dry food while making it more satisfying and complete.

When ready to spawn the male fishes will begin to pursue the females and unready males. By this time the females will be recognisable by their swollen bodies, and selection of the best couple can be made. Place them together in a temperature of approximately 80° F., and add to the furnishings of their tank a well-scrubbed flower pot laid on its side. The male will enter this, inspect it, and clean the roof of this earthenware, man-made cavern. Then the female will be enticed inside, whereupon she will lay her eggs upon the prepared area, assuming an upswept position to do so. Her part of the spawning ceremony complete, she risks damage if she lingers or approaches the eggs again. To preserve her whole it is wise to remove her from the aquarium altogether, leaving the male in undisputed possession.

Under such conditions he assumes control of the nest, fanning the eggs continuously to keep them spotless. In this he is favoured by the female, as is it impossible for any sediment to settle upon them.

Within two to two-and-a-half days the eggs will hatch. It now becomes problematical whether or not the male fish will devour the newly hatched fry. If he has been well fed for some time beforehand he may not, but if at all hungry the chances are that he will, so it is safer to net him out.

Copious supplies of Infusoria are needed to feed the babies for the first few days. Their mouths are smaller than those of their family, so a “young” culture is better for them than an “old” in which the larger Infusoria have taken control. By all means follow with the larger kinds, and carry on if possible with rotifers before switching to brine shrimp, Cyclops nauplii, minute Daphnia, micro worms, etc., etc.

Probably why large numbers of fry fail to develop is lack of adequate supplies of live food. A check on the cultures before introduction into the tanks is a wise precaution. Many well-coloured jars of water contain little else but bacteria. One simply cannot assume, and I know some aquarists do, that brown water must contain large numbers of Infusoria. A microscope will show otherwise in many cases.

New Accessories

“Micro View,” marketed by W. Treherne, Cliveden, Cockett New Road, Swansea. Price 7s. 6d.

MICRO View is a delightfully simple hand lens for the examination of small living organisms in water. A drop of fluid to be examined is placed on one side of the lens and the eye is applied to the other side whilst the instrument is held up to the light. Only a small drop of fluid is required or else it becomes difficult to keep the motile organisms in focus for long. The greatest value of the instrument to the aquarist is the timesaving way in which it allows cultures of Infusoria to be checked for living contents before they are used for baby fish. The mounting for the lens is strong and durable and to avoid damage to the lens surfaces Micro View is supplied in a small leather pouch in which it can be conveniently carried in a waistcoat pocket. The picture shows the actual size of the lens.

From America comes news of a new aerator without moving parts, working on a “thermal principle” and using electricity as a source of energy. It is said to be quiet, is made in plastic and, used with a filter, can filter and aerate 80 gallons of water a day.

THE AQUARIIST
In at the Birth

As a modest beginner in tropical fish-keeping I read with utmost interest the letters concerning livebearer birth, in The Aquarist (February). I have a large community aquarium and an 18 ins. by 10 ins. tank which, by dividing with a glass panel, I use for breeding. I had in this aquarium a guppy and a platy each expecting a first delivery of young. By a stroke of luck I was able to watch both deliveries, one within three days of the other, and the following are my observations, comparing the two fishes.

The guppy delivered her 14 young between 8.05 and 8.05 a.m. spaced at intervals of three to five minutes, and during the period she remained calm and placid. All the young were quickly delivered curled head to tail and instinct to swim when about one inch from the mother. All sank to the bottom and made "hopping" efforts to swim which caused them to resemble Daphnia in motion.

No pairs were delivered.

The platy delivered 28 young at erratic intervals (between one and 15 minutes) between 10.45 p.m. and 12.22 a.m. She was extremely active and many fry were delivered on the run." They were delivered in all types of positions—head to tail, head first, tail first, and some remained in a ball as if covered by transparent material from which they break free. Some were delivered slowly and some shot out; one hung tail first from the mother for at least 10 seconds, but was none the worse for this. In most instances free from the mother they swam for the plants as fast it was almost impossible to follow their course.

One pair of fry was delivered. Because of her activity, the mother often ran into a newly born fry but ignored it and made no attempt to eat any.

During the long intervals between deliveries a clear, jelly-like substance, either in a ball or a long stream, fell from the female platy, which appeared to know that no fry was being born because she immediately turned and swam away.

W. E. Bowman
London, N.11.

White Spot Treatment

I read all articles appearing in your magazine concerning white spot with relish, and digest carefully with the aid of a little sea salt, having regard to the varying conditions in respective tanks. I am convinced that white spot takes in varying forms and that, without the experience and facilities possessed by Mr. Cotton, it is impossible for the average aquarist to identify one form from another. I have tried numerous remedies for this disease and am now convinced that quinine can be lethal, but remain unconvinced that heat treatment alone is sufficient. In fact, the variety I cultivate appears to thrive on heat. Mr. A. Brearey's T.C.P. remedy interested me considerably, particularly as I have heard of a similar treatment using "Iglodine" and would like to report the following experience: Some weeks ago I was called in to service a hospital tank and found all the fishes literally plastered with white spot. The only chemical available at the time was T.C.P., six teaspoonsfuls of which I added to the 12 gallon tank. One week later the tank was perfectly clear, the only casualties being three guppies out of approximately 45 assorted fishes.

An outbreak occurred in my own stock tank at about the same time which resisted all attempts with the aid of T.C.P. or quinine plus heat, and I finally siphoned my tank down to a depth of two inches, topped up with fresh water, added salt and reduced the temperature to 78-80°F., from which the remaining fishes appeared to take a new interest in life and become healthy inhabitants again.

J. M. Skinner
St. Wakefield.

The Bennett Cure

I wish to thank all correspondents who have written to me about their success with the swim bladder disease cure. One reader wrote: "After four attempts to reach the surface my fish finally made it... my fish is now swimming normally." I am sorry I did not say what to do with the fish after the treatment, which is to place it in a jar floating in the aquarium until temperatures are equal.

To Mr. Mandeville, who mistook the treatment for a puncture outfit for mending rubber balls—at no time did we claim the cure would repair a perforated swim bladder. In fact, I do not think a fish with a punctured swim bladder can be cured. I will certainly send to Mr. Cotton a fish that has been cured from swim bladder trouble, after it has died from old age.

F. A. Wolfe, Vice-chairman,
Lichfield and District Aquarist Society.
The AQUARIST Crossword
Compiled by J. LAUFGHLAND

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**CLUES ACROSS**
1. Heat a rose most (anagram) (12)
2. Weight of a dozen (2)
3. Sting ray genus (6)
4. A little egg (5)
5. Doctor starts on mollys (1,1)
6. Passes (3)
7. Runless rude (5)
8. Slippery fish (3)
9. Mixed type of piscator (2)
10. Oranda gives alternative (2)
11. Snakeless country, by Patrick (4)
12. River gauges (11)
13. Musical instrument (4)
14. Not positive current (1,1)
15. Harlequin is one (7)
16. Tropical this suits tropical fish, naturally (4)
17. Not out (2)
18. Lad in the reeds (2)
19. This group following (33) would form an anthropod (4)
20. What hearing aids do (3,4)
21. The alpaca fish is one and makes this its victim (4)
22. Named Russian horseman (7)
23. Else (2)

**CLUES DOWN**
1. This form for the mosquito fish (11)
2. Grayling (9)
3. S. American river from which comes popular tetra (3)
4. Sic (2)
5. Popular name for sea air (5)
6. A water lily (4)
7. Salmon fry (9)
8. A military boss (1,1)
9. No (2)
10. Were (4)
11. Bloodsucking aquatic worm (7)
12. Angler (8)
13. The tentmaker (4)
14. Pamed make of motor car (1,1)
15. Pertaining to Iran (6)
16. What the planter does (6)
17. Poems of a kind (4)
18. Thans for a half tank! (2)
19. Returning sound (4)
20. Half the Dory will act (2)
21. Motorbicycle (1,1)
22. - and a football one (1,1)

**PICK YOUR ANSWER**
1. Which of the following generic names is not derived from the Greek?
   (a) Elioma. (b) Gymnocorymbus. (c) Quintana. (d) Symphysodon.
2. A type of lionhead goldfish with a veil-tail is known to the Japanese under the name of: (a) Demekin. (b) Maruko. (c) Shukin. (d) Watonai.
3. Barbula serrata is native to: (a) East Africa. (b) North Africa. (c) South Africa. (d) West Africa.
4. Hypostomus flumosus was named by: (a) Ahl. (b) Boulenger. (c) Myers. (d) Regan.
5. A fish with the trivial name of epergaster may be expected to have: (a) a black dorsal fin. (b) purple lips. (c) a red belly. (d) yellow eyes.
6. Limnobia quadrifurca is very similar in appearance to: (a) cyprinus (Blusa). (b) fairy goby (Azeila). (c) floating fern (Graptem] (d) frog-bit (Hydrocharis).

(Solutions on page 72)

The AQUARIST

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A Reader's Ponds

As an enthusiastic pond-keeper I thought your readers might be interested in the photographs of one of my ponds and a feeding time scene. The pond is about nine feet by six feet and four feet deep, with shelves 18 inches below the surface to hold boxes for the plants to grow in. As can be seen in the feeding photograph there is a channel around the pond which can be separated from the main part by lowering the water level.

In this channel at breeding time I drop the plants bearing the eggs so that the fry can hatch and there in safety until I transfer them to a nursery pond. I keep about 35 fishes in all, goldfish, golden orfe, tench, catfish, shubunkins and one minnow. The shubunkins I take out in May to breed separately but their eggs go in the channel with the others to hatch. I have not yet been successful with the orfe.

My ponds freeze in very cold weather to about two inches depth but I drill several holes in the ice and after four years I have not lost a full-grown fish during the winter. This year I am building a fish house to hold six breeding ponds for selective breeding, with shelves to take aquaria. There are many aquarists in the Crayford and Dartford area but we have no aquarist society. I think something should be done about this.

CHARLES S. EARL, Crayford, Kent.

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The camera catches only the swirl of water as a fish rises to take the offered worm. The pond channel referred to in the letter above is seen to the right of the picture.

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70
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 Aquarists' Directory of Aquarium Societies will be sent free to any reader on receipt of a stamped, self-addressed envelope.

—- BARES were the subject of a talk given by Mrs. W. Meadows and also the fish for which a table show was staged at a meeting of the Dunstable and District Aquarists' Society attended by 22 members.

—- MEETINGS of the Derwent Aquarist Club are held on the fourth Thursday evening of each month and new members are welcomed. The secretary is Mr. D. Jenney, 30, Addison Road, Derby.

WHEN Mr. W. L. Mandeville spoke to members of the Bristol Tropical Fish Club on the subject of a talk given by Mr. J. J. Brown to members of the Bexhill and District Aquatic Society last month. The speaker illustrated his talk with living specimens from his own collection of marine animals as well as printed illustrations of specimens he has kept successfully.

B.F.A.S. and District Aquarists' Society entertained a Kettering and District Society members at an inter-club competition, for which Mr. J. H. Glyn (F.B.A.S.). A new trophy, the Copper Challenge Shield, was presented to Kettering, the winners of the competition. The event is to be made an annual one for the two societies. Best fish in the show award was for a pair of tiger barbs exhibited by a Bedford society member, Mr. A. Seymour.

FOUR aquaria displayed at a local flower show. Shirley and South Birmingham Aquarists' Society arranged considerable public interest. Forthcoming lectures arranged by the society include some reptiles, coldwater fish breeding and freshwater biology.

PRIVATE lakes in the vicinity of Sleaford have a cachet with aquarists to the extent of being the scenes of well-rehearsed society nocturnal forays. Sympathy with the society was extended by speaking engagements held by members this month. The May meeting saw the society held at the home of a member, where refreshments were arranged.

HEADQUARTERS of the aquarist's club of Sleaford has been changed to Elgin Road, Broadmeadows Society, Hall, North Street, Plewsow, L.L.B., where meetings are held on the first and third Thursdays of each month at 8 p.m. Table and breeders' shows are a feature of every meeting of this society.

Mr. C. GRAHAM of Leeds gave a talk on "Reptiles of the World" to the Newcastle upon Tyne and District Aquarists' Society. The society recently purchased, and lost his aspirations, difficulties and failures in husbanding these fish.

MEMBERS of the Hounslow and District Aquarists Society recently spent an afternoon at the Jamaica Tropical Aquarium at Shepperton Middlesex. At a table show held in the afternoon, the class of frogs and newts, were Mr. A. Vance (black toad), Mr. T. Boulton (Spanish bullfrog), and Mr. T. Boulton (red toad), during the judging of Mr. L. C. Smith, was a talk on coldwater fishkeeping.

Mr. C. C. Turner of Bishop Auckland showed a series of the spawnings of St. Mary's, Leviathan and Dr. Jackson. At a recent meeting of the society, St. Leonards Aquarists Chairman of the society Mr. H. C. Scott presided when a talk on a successful spawning of this species was given. The new headquarters of the society are at the Junior Library, Bracey, Hastings, and meetings are held there on the third Wednesday of the month.

Mr. George Consdale (hand outstretched) is seen giving members of Hampstead Aquatic Society some hints on handling a snake, following his lecture on snake-hunting in West Africa. Mr. Consdale is vice-president of the Hampstead society.

CARE and maintenance of marine aquarium was a theme of a talk given by Mr. J. J. Brown to members of the Bexhill and District Aquatic Society last month. The speaker illustrated his talk with living specimens from his own collection of marine animals as well as printed illustrations of specimens he has kept successfully.

N.A.S. Show

MANY entries have been received for the National Aquarium Exhibition in London this month, and have been sent from a wider area than in previous years. The exhibition is to include a non-competitive display of reptiles and amphibians. On the opening day of the show at this event Mr. A. Boarder will be present to meet visitors and answer questions (Royal Horticultural Hall, Vincent Square, Westminster, S.W.1. 10th-12th June.)
Pond Life Study

A CHANCE for an interesting and refreshing weekend in the country presents itself in the University of London Extension field study course on pond life arranged at Haslemere, Surrey, for the evening of 2nd July to the evening of 4th July. Lecturer responsible for the course is Mr. R. M. Cadman, B.Sc. Animals will be collected from the ponds in the gardens of Haslemere Educational Museum and identified and studied. The course is open to anyone interested, and the cost is only ten shillings; an application form will be supplied by Deputy Director (Extension), Department of Extra-Mural Studies, Senate House, W.C.I.

Bulletin Review

Walworth Aquarist

THS Annual number of the Walworth Aquarist Club’s bulletin is the eighth to be issued. It is a double-page magazine that contains twelve pages of reading matter, size approximately 6 ins. by 9 ins. Reading reviews, book reviews and the secretary’s page figure prominently amongst the contents. One interesting article describes the catastrophic effect of using hydrochloric acid to remove the lime deposit from the tank. Editor R. D. Coshum seems to have little difficulty in obtaining contributions from members, and several useful helps for the hobbyists of interest to aquarists. Bulletin editors who would like to exchange should write to Mr. Coshum at 3, Calais Street, Camberwell, London, S.E.9.

Tropical Waters

THIS publication, the official bulletin of the Queensland Aquarist Society, contains articles on various topics. The Society’s annual report is included, as is a list of the officers for the year 1957. The number of members has increased to 217. The Society is still in the second year of its constitution. The bulletin is well illustrated and contains many valuable pieces of information for the hobbyist. For those interested in tropical waters, this bulletin is a must.

Aquarist’s Calendar

10th-12th June: National Aquarium Exhibitions at the Royal Horticultural Hall, Vincent Square, Westminster, S.W.1.
10th-12th June: Northbrook Community Association Aquarist Club open show and exhibition of furnishing aquaria at the Church Rooms, 11, Kennington Lane, Northbrook, Manchester.
11th-12th June: Chester and District Aquarist Society Annual Open Show at the Avenue Hall, Curtain Road, London, E.1.
11th-12th June: Federation of British Aquarium Societies Annual Open Show at the Avenue Hall, Curtain Road, London, E.1.
16th-17th July: Macclesfield Aquarium Society open show at Macclesfield Memorial Hall, Macclesfield.
22nd-24th July: Bath Aquarium Society open show of tropical and coldwater fishes and aquaria at the Pump Room, Bath. Show schedules from show secretary Miss A. Gunney, 41, Southernhay East, Bath.
31st July-7th August: Blackpool and Fylde Aquarium Club open show at fourth floor, Victoria Street Congregational Church.

Pond Life Study

A CHANCE for an interesting and refreshing weekend in the country presents itself in the University of London Extension field study course on pond life arranged at Haslemere, Surrey, for the evening of 2nd July to the evening of 4th July. Lecturer responsible for the course is Mr. R. M. Cadman, B.Sc. Animals will be collected from the ponds in the gardens of Haslemere Educational Museum and identified and studied. The course is open to anyone interested, and the cost is only ten shillings; an application form will be supplied by Deputy Director (Extension), Department of Extra-Mural Studies, Senate House, W.C.I.

The Aquarist’s Badge

PRODUCED in response to numerous requests from readers, this attractive silver, red and blue 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 in the usual metallic gold and the other having a brooch-type fastening, are available.

To obtain your badge send a postal order for 3s. 9d. together with the Aquarist’s Badge Token cut from page 51, to Aquarist’s Badge, The Aquarist, The Britis Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

New Societies

Arnold Fish-keepers’ Circle. Secretary, Mrs. J. E. Cooper, 94, Acland Road, Great Malvern, Worcs.
Norwich Fish-keepers’ Circle. Secretary, Mrs. E. H. Cooper, 1, Marl Pit Lane, Dereham, Norfolk.
Malvern and District Aquarium Society. Secretary, Mr. T. C. Deacon, 94, Acland Road, Great Malvern, Worcs.

Torquay Aquarium

NEGOTIATIONS for the establishment of a public aquarium at the Marine Spa, Torquay, are now in progress under the sponsorship of the Aquarium Society and Torquay Corporation.

Crossword Solution

HETEROSOMATA 8
E H I O Z R L T
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E M O N DVN MY
ROACHE ELIPL
A L A OR ERIN
NILEOMETERS
DRUM A ECC
RASBORA HEAT
IN EDI SECT
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COSSACK OR

PICK YOUR ANSWER (Solution) (1 c.) (2 c.) (3 c.) (4 c.) (5 c.) (6 c.)