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AND PONDKEEPER

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Laurence E. Perkins

Head of the life-size model of a coelacanth made by Mr. P. R. Chapman (Hendon Aquarists' Society) and exhibited in the London Aquarium at South Bank

VOL. XIX No. 3 1954

Editorial

DAME 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.

Mr. Rusbridge in his fish house

AQUARIST 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 piping. This system, Mr. Rusbridge had reckoned, would afford ample warmth for tropicals 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 proprietory 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 were kept merely as a convenient and near-to-hand source of food.

The first record of fish being kept and cared for in ornamental ponds, as domestic pets, dates from the end of the tenth century. In the *Wu lei hsiang chih* (*Account of the Mutual Influence of Things*) we read: "If goldfish eat the refuse of olives or soapy water then they die; if they have poplar bark they do not breed lice." Although for long the book was ascribed to the poet Su Tung-p'o (1036-1101) the ascription was always doubtful, and modern scholars now ascribe it without question to the monk (Kao) Tsan-ning (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 just about a thousand years ago the Chinese knew that soapy water was toxic to fish, and that some attempts had been made to control fish-lice (? *Argulus*) by means of poplar bark.

The first ample account of goldfish was written by Chang Ch'ien-tê in 1596. Entitled the *Chu sha yü p'u* (*Book of Vermilion Fish*) it is altogether a remarkable book; for the author describes his own beautiful goldfish, how he bred them and sheltered them from the cold in winter and the heat in summer, how he changed the water, and how he siphoned off the dirt and droppings. It is unfortunate for the historian that he tells us nothing of the diseases of fishes; for the internal evidence suggests that he could if he had wished to. He was a young man who knew much about goldfish, their breeding, care and management. About the year 1588 his family moved to Su-chou, and by 1590, when Chang was only thirteen years old, he was an experienced aquarist. We have it on his own authority that, after spawning some goldfish, "the fanciers in Wu were eager to seek my advice, and swarmed like ants to solicit, and they continued to do so for several months. I have thoroughly learned for myself the principle of the business, and when I look at those which the fanciers breed there are none like mine."

Certainly by this time, or a little later, something was known of fish diseases, and attempts were made—whether successfully or not we may never know—to treat sick fish. In 1695, the *Ti ching ching wu lüeh* was published. The authors, Lin T'ung and Yü I-chêng, write: "The diseases of fish are two, named lice and named plague. (If they are thin and have spots they breed lice; the remedy is to wash a new brick in dung and put it (into the water). If the scales open out as if falling off (? dropsy), this is plague; the remedy is to rub with new blue calico.) The (causes of) death of fish are three. If they swallow soapy water they attain the first death; or the refuse of olives, they attain the second death; or the juice of walnut husk, they attain the third death."

Years after this (in 1688 to be precise) Chên Hao-tzü wrote the *Pi ch'uan hua ching*. In translation the title means *The Mirror of Flowers*. 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 (? *Ichthyophthirius*), called fish wind, promptly throw in liquid ambar 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 lumps 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 judgment. 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'uan hua ching* 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) recognised seven different varieties of goldfish. They were: the common goldfish, the duck's egg (egg 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 upturned. . . . 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 bacterial 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 caperer were distinct breeds; for the *Notice* mentions that they came from Yang-chou in

Kliangnan, 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 lettered 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 tortoise.

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" 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 condition inimical to the parasites. He admits that the treatment failed when other aquarists tried it, but, in the light of what we now know from Chinese sources, the simple explanation may be that when Mr. Derham conducted his experiment a quantity of dung was introduced with the turves.

European Records

Europe seems to have lagged a very long way behind China in the care and maintenance 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 *Opescula Subseciva* (1765) and puts forward the naïve theory that when the fish are poured out of the 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 1880, when the French naturalist, Michel Girdwoyn, published *Pathologie des Poissons* bearing the long sub-title *Traité des Maladies, des Monstruosités et des Anomalies des Oeufs et des Embryons*. Other biologists followed in his wake, and at the turn of the century (1904) the great German biologist, Bruno Hofer, stepped into the field with his *Handbuch der Fischkrankheiten*. For long the book remained the standard work on ichthyopathology, and remains to this day a valuable source of reference.

The intervening half-century, however, saw great advances in science and to some extent Hofer'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 (*Les Maladies des Poissons d'Eau Douce d'Europe*), in 1922 Wilhelm Roth (*Krankheiten der Aquarienfische*), in 1935 Wilhelm Schaperclaus (*Fischkrankheiten*) and in 1940 A. P. Markewitsch (*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 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 in 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 leave 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 when we take 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)

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

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

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 size, for as most readers know, the new born fry of *Xiphophorus helleri* are comparatively small beings.

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

Photos: K. Horner

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 one which was obviously very different from the others. It was noticed that many of them were expelled with their bodies rather bent but they very quickly straightened to a normal shape and swam about. There were really two monsters in the brood, one of which appeared as a little round ball, being a partially developed embryo, and the other which, although it was apparently fully developed and full of life, did not straighten itself but remained wriggling furiously in the bottom of the trap. This little specimen was removed to a small container for closer examination and the following points were noted.

Its belly was rather distended and ruddy suggesting that delivery was a little premature. Its body was very badly bent with the result that the caudal fin touched the body near the right eye. Also its body had an arched bend starting 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 body to the left. The right pectoral fin not only curved forward 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 beak, 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

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Marine Aquarium Keeping

by JOHN B. BOURSOT

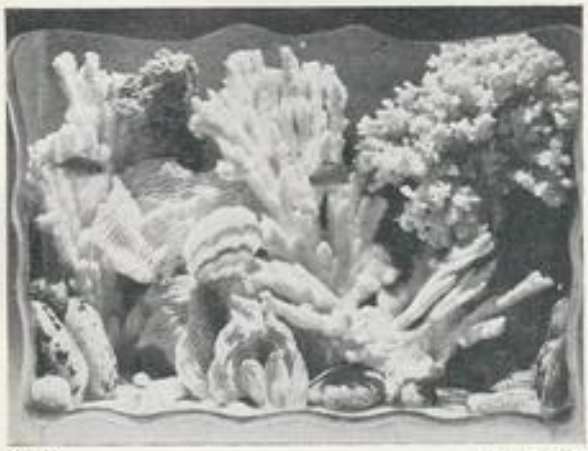

Photo: J. B. Boursot

Squirrel fish swimming against a coral background in a marine aquarium belonging to the author

IF it is true that one fresh-water aquarium is sufficient incentive to establish others, it is doubly so of sea-water tanks. In the narrow confines of the previous article and this, its concluding sequel, no attempt has been made to present the reader with anything like a complete survey of the marine aquarium; for, so vast is the biology of the sea with its complex relationships between animals and animals, and animals and plants in countless major and minor variations of the same yet ever-changing environment, that a dissertation on only a few hundred square yards of shore or open water would alone require volumes.

Three very simple appliances have proved invaluable to me in the manipulation of my tanks; a long wooden forceps, a celluloid funnel shaped like a dunce's cap but open at the apex, and a 1¼-inch bore celluloid tube a few inches longer than the water is deep. The use of the forceps is obvious, and a small, pointed, four-inch wooden stick the thickness of a knitting-needle grasped at various angles in the tip of the forceps facilitates the removal of tiny pieces of ignored food or undesirable matter from otherwise inaccessible places. As many fishes are bold enough to snatch a morsel of food from the tentacles of a small anemone before the coelenterate has had time to engulf it, I have devised a transparent guard. A square, cut from a sheet of celluloid, is twisted in the fingers into a dunce's cap and stuck with a plastic cement which dries in a few minutes. The hole at the apex should not be too small, and any angles should be trimmed with a pair of scissors so as to leave straight rims at both ends. Any slow-feeding animal at the bottom of the tank may be temporarily covered by gently lowering the device over it.

The celluloid tube is used to avoid a spreading cloud when newly washed sand is being returned to the bottom of a full tank after having been sucked out during siphoning. The procedure is as follows: the tube is stood up vertically on the sand at the bottom of the tank while the upper free end of the tube is fitted with the inverted dunce's cap to form a funnel for the clean, drained sand to be washed down the tube by pouring aquarium water on to it from a cup. When all the sand has collected at the bottom, the tube may be gently lifted out. The pile of sand is then pushed with the forceps where it is wanted. If the sand be 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 substantiates 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 another animal exposed to the 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 portion another is added 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 forceps 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

[illegible] is beyond all question. It must never be forgotten that what is to us an infinitesimal modicum on the head of a pin is a huge repast in the tiny stomach of the average aquarium fish. It is a good plan to feed the [illegible] every other day or oftener if they so desire. Underfed specimens gradually shrink, and may almost reach the point of disappearing.

A small rubber tube tied to a guide stick is not only useful for siphoning off the bottom, but also for dislodging sediment from behind coral and rocks. By applying the submerged tip of the tube as closely as possible to the debris, and lightly sucking up a little water into the tube and then blowing it out sharply in the right direction, the sediment can be forced out into the open where it is easily removed.

In Quest of Squirrel-fish

Common enough, though seldom seen, are the beautiful squirrel-fishes that prowl the reefs of coral seas during the hours of darkness. Recently I arranged a tank for the reception of a species found on the western shores of tropical Central America. As the last bus from the capital put me down in the dreamy little port of La Libertad the crescent moon was sinking into the west behind a silhouette of coconut palm and thatched huts, leaving the light of a thousand stars to pierce the velvet darkness that lay over the watery wastes of the deep Pacific. As the landward-coming waves struck bottom and broke with muffled roar, vast swarms of plankton diffused a faint blue star-like luminescence through the tumbling water. The ethereal phenomenon was carried even further when fragile organisms, torn from the windy surface of the sea by the shoreward-rushing surf, gleamed for an awful moment, stranded, on the wet sand.

Barely visible to the east the low, massive forms of ancient, storm-battered cliffs were veiled in blackest night. Eroded into terraces and caves and riven by centuries of angry seas, the harsh conglomerate has been softened into a wonderland of rocky channels and quiet pools ranging from a few inches to several feet in depth. Beneath their surface lies another world; a world where invertebrates rule and gaudy fishes linger for a while or depart with the tide; where delicate tube-worms bearing crowns of feathery gills vanish at a passing cloud, and pearl-white hydras peep from crannied rocks. Splitting the inky water with the torchlight revealed breath-taking banks of golden brown sea anemones, each with an emerald centre. Others, of a different sort, and massed in their thousands, adorned the steep face of submerged rocks with the deep plush of their blue-green tentacles. Immense numbers of solitary polyps lent splashes of colour to the dwarf forests of greyish-brown seaweed. Purple-spined urchins like fancy pincushions advanced majestically over the rocks in search of food, and milk-white sea-slugs, waving feathery gills of light crimson, browsed in the gardens of purple sea-fans. Shy damselfish awakened from sleep winced in the torchlight and staring-eyed clingfish, gorgeously clad in powder blue and black mottling, slumbered motionless as porcelain figures on the chalky rose, green and mauve quilts of calcareous algae. Every now and then a pair of topaz eyes would gleam in the beam of light. Close inspection disclosed a small, heavy-clawed pistol shrimp whose diminutive shots rang out clearly through the dark, still water.

By now an intriguing ledge of slippery rock plastered with pink chalky coralines and emblazoned with a rich flora of anthozoans had emerged from the receding tide. Cautiously descending to it from where I stood I came upon a small pool of unknown contents. A yard further on, and the light of the torch was lost in impenetrable darkness. Nothing lay beyond but the black heaving waters of the bay which occasionally welled up through a shallow gully to smother the pool in foam. It was late and the tide was on the turn. In high expectations I flooded 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 tunics of chinese red, the larger ones darted for shelter, one even skipping 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 dazzled 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 tarried 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 crystallised 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 possibly 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 mouths 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."

[illegible] is beyond all question. It must never be forgotten that what is to us an infinitesimal modicum on the head of a pin is a huge repast in the tiny stomach of the average aquarium fish. It is a good plan to feed the [illegible] every other day or oftener if they so desire. Underfed specimens gradually shrink, and may almost reach the point of disappearing.

A small rubber tube tied to a guide stick is not only useful for siphoning off the bottom, but also for dislodging sediment from behind coral and rocks. By applying the submerged tip of the tube as closely as possible to the debris, and lightly sucking up a little water into the tube and then blowing it out sharply in the right direction, the sediment can be forced out into the open where it is easily removed.

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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 *Hyphessobrycon gracilis* (Reinhardt). 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 at the base of the caudal fin above and below which was a reddish iridescent patch. All the fins were clear, and unmarked. The eyes had a golden gleam.

The identification had to be made while the fish was alive and swimming, so it was not possible to measure it, or count its scales and fin-rays. It was 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 iota* (Durbin). The error was due to the fact that in Eigenmann's plate 22 the figures of this species and of *Hyphessobrycon 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 Hyphessobrycon

Soon after its introduction it was tentatively identified in America as *Hyphessobrycon 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 *Hyphessobrycon* 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 upon its appearance in spirits as seen under magnification; under these conditions it presents aspects unfamiliar to the aquarist. But the incorporation of notes made from the living fish are 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. Bases of the anal and under side of the caudal peduncle black to dusky. Lips dusky. Dorsal lobe and upper part of the iris cherry-red in life."

By "dorsal lobe" is meant the front, pointed part of the dorsal fin.

The Real H. gracilis

Hemigrammus erythrozonus is native to British Guiana. It was originally collected at Erukin by Eigenmann, and described by Durbin in 1909. The real *Hyphessobrycon gracilis* has been seen in the aquarium, and was described and figured by Arnold and Ahl (*Fremdländische Süsswasserfische* 1936). It is translucent grey-green, 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 it 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——

by
RAYMOND YATES

MOST 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 doubt if 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 generate either A.C. or D.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. Those 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 boat. The second cable is connected to a wire-netting basket attached 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 blood of the fish a substance known as acetyl-choline, which has a stupefying effect but which disappears rapidly once 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 fry are not affected at all. The longer the body of the fish the more susceptible it is. Effects also vary with different species. Perch and grayling are quicker casualties than chub or roach. Pike and eels 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 type of transfer for use on crockery, furniture and the like. Sooner or later it was inevitable that tropical fish would appear and two large transfers are now on sale at the larger sizes of *Symphysodon discus* and a coral fish which somewhat resembles the chocolate gourami (*Sphaerichthys osphromenoides*). Each transfer is about six inches by three inches, the two together on one sheet costing 2s. 6d. They are called "Kaylee Real Paint Transfers" and are manufactured by Kaylee Transfers Ltd., Long Eaton, Notts.

* * *

Aquarium literature and some aquarist writers, including myself, have fallen into the error in the past of referring to merbromchrome as chromate of mercury, which it is not. It is the trade name for a water-soluble salt of dibromoxymercurifluorescene. Its actual method of manufacture is 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 for 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 scheduled, and the poison 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 *Aquariums* and *Gold fish*, two first-class books written by the Editor of *The Aquarist* and priced at 2s. 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 Mielche. 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 *Aphyosemion*. Recently I saw a large exhibition tank, holding roughly 45 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 fish-keepers 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 choosey 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 dropsy, cichlids are bullies and plant wreckers, anabantids 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.

Aquatic Agonies

"He wants one of the fishes in your aquarium."
"Certainly lady—hard or soft roe?"

A page for the beginner contributed by

A. BOARDER

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.

Photo: Laurence E. Perkins

This picture shows the spread of duckweed on a natural pond. A smaller patch in a garden pond will provide shade and reduce algae growth

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*)

Hand-Spawn

A critical appra

Photographs by

Ova being extruded from a female shubunkin

Gentle pressure releases the milt from a male shubunkin

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 be moved around as the eggs are extruded, then they will scatter in the normal 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 spurts 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 anals 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 Goldfish

E. PERKINS

E. PERKINS

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 handspawning and one which was responsible for my interest in it, is that it openes up possibilities into the study of hybridisation. Unfortunately, I

Size of the female veiltail makes it difficult to employ two hands in "stripping"

have had neither the time nor the accommodation to proceed with the scheme.

The Favoured Point

Perhaps the point in its favour which interests most aquarists when they hear of it is the apparent possibility of stripping the fish before they set out for work in the morning, thus relieving themselves of the anxiety as to the welfare of the eggs which usually follows a normal spawning. This again, however, is not so simple as it sounds. Fish which apparently show no desire to spawn will sometimes commence in late afternoon, and if attempts have been made in the morning which have shown the fish to be not quite ready, then this very treatment may precipitate just such a spawning. It may be argued that this can be avoided by separation of the sexes, but again, even this can fail since females will, on occasions, rid themselves of ova. For the ordinary aquarist perhaps the best method is to pay great attention to the quantity and type of aquatic plants used and to so arrange them that it is physically quite impossible for the fish to devour more than a low percentage of the ova although should they devour 50 per cent. or more the remainder will usually prove more than the aquarist can rear correctly.

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 (*Macrognathus 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 its sharp-pointed greyish-coloured snout peeping out. It soon forgot this astonishing habit after a week or two of community tank life, and unless the tank was unusually disturbed 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 tropicals. 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*

Photo: *H. Joel*

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 *Caltha* (Ranunculaceae), 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. *C. 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, *C. palustris* v. *alba*. *C. 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, *C. palustris* v. *nana plena* which only grows about nine inches high, but has many small, round double flowers, yellow in colour.

Another uncommon plant for shallow borders is the dragon's head plant or *Dracocephalum palustre*. The plant will not get too rampant and only grows 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 lung wort. 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 mottled 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.

Fins and their Adaptations in Fish

by

Dr. J. L. CLOUDSLEY-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 evolution of a swim-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 lower teleosts, which are bottom-living, and relatively poor 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 air-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 this 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 it 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, rather like the barbs on an arrow. In those fishes like pike (*Esox lucius*) 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 fishes 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 not infrequently possess cryptic (concealing) coloration and resemble the weed in which they live, and their fins are usually transparent. It should be remembered that the propulsive forces that move a fish through the water are produced by the longitudinal muscles of the body. The tail 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 stream-lined body form of typical pelagic fishes. These are nearly always associated with a reduction in the efficiency of swimming which is compensated by some type of protective mechanism such as spines or cryptic coloration. Thus the John Dory (*Zeus faber*) is so thin that its speed is very slow, but the fish is so 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, which have no swim-bladder, 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 in the normal position 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 eys 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 orientates 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 eques*) 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 koelreuteri* (described in *The Aquarist*, Vol. XIII, page 281) and *Boleophthalmus* 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 (*Malthe vespertilio*), 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 use of fins as wings by various genera of flying-fishes such as *Exocoetus*, *Gastropelecus*, *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 Exocoetidae the pectoral fins act as aerofoils 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 lumpsuckers (e.g. *Lepadogaster gouani*) 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 attach themselves to sharks and other larger fishes, thus obtaining free transport; but they are predaceous 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 (*Trachinus vipera* 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 (*Syasceia verrucosa*) 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. Faintness and collapse often occur, sometimes followed by death.

The angler-fish (*Lophius piscatorius*) is a sluggish creature, most inconspicuous 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 elasmobranchs 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 (*Lepidosiren paradoxa*) 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.

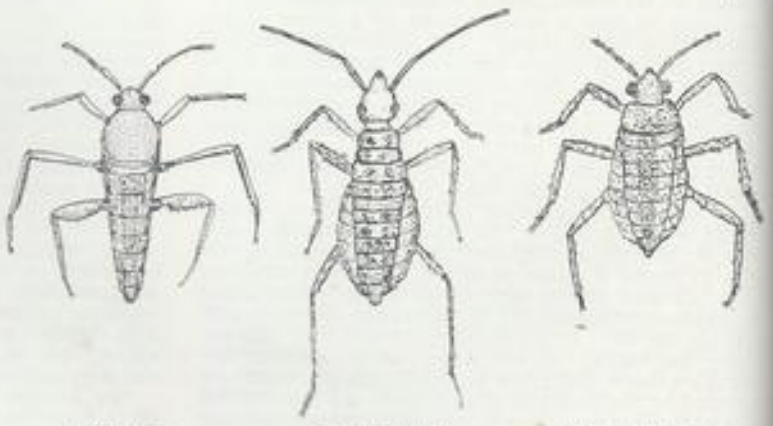
FRIENDS & FOES No. 25 — Pond-Skaters (2)

VELIA, MESOVELIA and MICROVELIA

PHYLUM:—Arthropoda, from Greek *arthron*—joint, and *podos*—foot.
CLASS:—Hexapoda, from Greek *hex*—six, and *podos*—foot.

THE genus *Velia* has only one British representative — *Velia currens*, 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 part 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.



Velia (¼ in.) *Mesovelia* (¼ in.) *Microvelia* (⅛ in.)

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 probosces with which to pierce the flesh of their prey.

C. E. C. Cole

OUR EXPERTS' ANSWERS TO READERS' QUERIES

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

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 aeneus*?

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 used rather than bushy or feathery-foliaged 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

The tropical catfishes (Corydoras) are not ready breeders in the aquarium but general conditions required are described above

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 striplight is kept burning for about fifteen hours every 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 mope 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-foliaged 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.

Bathe 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 bloodworms, gnat 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.

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 functioning 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 neon fish in my aquarium. One of them is beautifully coloured and very active; the other one appears to have 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 salty 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 treatment. Keep the aquarium shaded from bright light. Dissolve one tablet of 0.46 grains acriflavine in eighty drops 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 acriflavine after an interval of five days. On the other hand, your fish may be old, or just temporarily indisposed. Try tempting it to eat 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. Do you think it has some disease?

The symptoms you describe may be due to old age. Platys are not very long-lived fish—three years seems to be about the limit of their life-span in the aquarium—and 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 worried male, and fed up on live food. Shallow water made slightly saline with common salt often acts as a tonic for a run-down fish.

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, uneaten 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 trematode (flat worm). These can be harmful and I know many aquarists 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 and are there any coloured water plants other than green?

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

There are many plants growing in rivers, brooks and ponds 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 wild would succeed in your tank. After all, most of the plants aquarists use in their cold tanks are native wild ones.

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 gentles 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 eggs will be laid thereon. 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.

only point to watch is that they are sure to contain many live creatures, some of which may be good and others harmful. Unless you are able to recognise the good from the bad you may be in for more trouble than it is worth. It would take too long to tell you here about all the animals to be found, but if you care to get a copy of *The Freshwater Life of the British Isles*, by John Clegg, you will realise what the plants may hold. Try your library for the book.

I have tried to introduce red ramshorn snails into my community tank on more than one occasion but they always die. Why 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. Of course, if your tank is a cold water one and the snails were bought from a shop, they may have come from a tropical tank. These red types are mostly bred in tropical water and so if you put them into cold water they might soon die. You could also make a test by having a small receptacle, say a jam jar, to try a few out by themselves. If they lived there it would prove that there is something wrong with your tank, or that the fish were attacking them, as this is also a possibility.

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

It sounds as if there is something decaying or causing pollution in your tank. I should remove as much as possible of the water and replace with fresh tap water. Draw up with the siphon tube as much of the mulm 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. You have probably been over-feeding and the uneaten food has turned foul. Many aquarists feed a certain average 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 cannot 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 *Pontederia cordata*, but 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 *Elodea canadensis*.

Is it safe to use old coldwater cisterns for rearing goldfish, or should they be painted first with bitumastic 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 brickbats 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 fry the water need be no deeper than nine inches.

Photo: Laurence E. Perkins

Old water cisterns floated over with cement internally make useful containers for goldfish fry. Those shown are used by Mr. A. Boarder

TROPICAL FISH-KEEPERS' REFRESHER COURSE: *by Pisces*

Badis badis

ORDER:—Percomorphi, from Greek *perke*—the perch and Greek *morphe*—form or shape.

FAMILY:—Nandidae—probably from Greek *nannos* or Latin *nanus*—dwarf, plus *idae*-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 peaceable fish.

There is no fixed colour pattern. The fins are usually decidedly bluish, 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 clear 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.

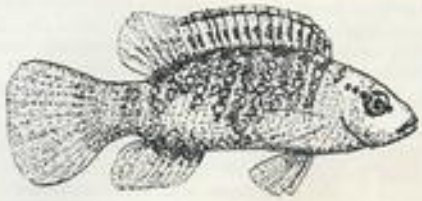
Body shape, except when the female is much swollen with roe, is similar for both sexes, and is rather disconcerting to aquarists who have heard that hollow belly is a sign of sickness in a fish. The concern of these people will be heightened when they observe the many queer attitudes in which this creature 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 joint, 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 upside down 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 position of the eggs. Being on the ceiling, as it were, it is impossible for any sediment to settle upon them.



Badis badis

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 most members 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. Treharne, 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 the fluid to be examined is placed on one side of the lens and the eye is applied to the other side while 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 time-saving 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 quite silent, is made in plastic and, used with a filter, can filter and aerate 80 gallons of water a day.

our readers write

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

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

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 9.15 a.m. spaced at intervals of three to five minutes, and during the period she remained calm and placid. All the young were quietly delivered curled head to tail and attempted 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 45 seconds, but was none the worse for this. In most cases, once free from the mother they swam for the plants so 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 ate this material.

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 attacks 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 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. Brearley'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 teaspoonfuls 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 time the remaining fishes appeared to take a new interest in life and became healthy inhabitants again.

J. M. Skinner,
Nr. Wakefield.

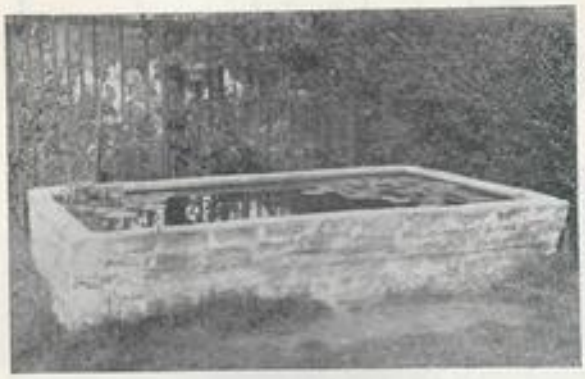
The Bennett Cure

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.

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 grow 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.

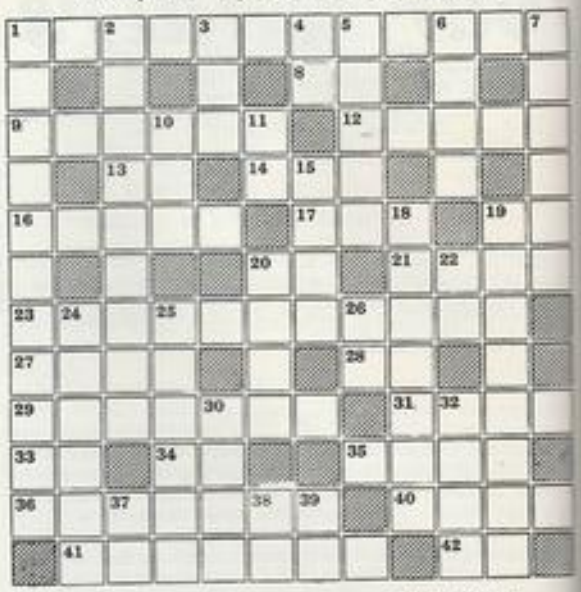
My ponds freeze in very cold weather to about two inches depth but I drill several holes in the ice and after four years I have not lost a full-grown fish during the winter. This year I am building a fish house to hold six breeding ponds for selective breeding, with shelves to take aquaria. There are 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.

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

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1 Heat a rose most (anagram) (12)
8 Weight of a dozen (2)
9 Sting ray genus (6)
12 A little egg (5)
13 Doctor starts on mollies (1, 1)
14 Possess (3)
16 *Runilus ranilus* (5)
17 Slippery fish (3)
19 Mixed type of piscator (2)
20 Oranda gives alternative (2)
21 Snakeless country, by Patrick (4)!
23 River gauges (11)
27 Musical instrument (4)
28 Not positive current (1, 1)
29 Harlequin is one (7)
31 Tropical this suits tropical fish, naturally (4)
33 Not out (2)
34 Lad in the reeds (2)
35 This group following 33 would form an arthropod (4)
36 What hearing aids do (3, 4)
40 The archer fish is one and makes this at its victim (4)
41 Famed Russian horseman (7)
42 Else (2)

CLUES DOWN

1 This *formosa* is 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 (6)
10 A military boss (1, 1, 1)
11 No (2)
15 Were (4)
18 Bloodsucking aquatic worm (7)
19 Angler (8)
20 The tentmaker (4)
22 Famed make of motor car (1, 1)
24 Pertaining to Iran (6)
25 What the planter does (6)
26 Thanks for a half tank! (2)
30 Poems of a kind (4)
32 Returning sound (4)
37 Half the Dory will act (2)
38 Motoring body (1, 1)
39 —— and a football one (1, 1)

PICK YOUR ANSWER

1. Which of the following generic names is not derived from the Greek? (a) *Elassoma*. (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. *Barbus serrimensis* is native to: (a) East Africa. (b) North Africa. (c) South Africa. (d) West Africa.
4. *Hyphessobrycon flammeus* was named by: (a) Ahl. (b) Boulenger. (c) Myers. (d) Regan.
5. A fish with the trivial name of *erythrogaster* may be expected to have: (a) a black dorsal fin. (b) purple lips. (c) a red belly. (d) yellow eyes.
6. *Limnobium stoloniferum* is very similar in appearance to: (a) crystalwort (*Riccia*). (b) fairy moss (*Azolla*). (c) floating fern (*Ceratopteris*). (d) frog-bit (*Hydrocharis*).

G.F.H.

(Solutions on page 72)

News from AQUARISTS' SOCIETIES

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

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

IN a contest with the **West Middlesex Aquarists' Society** the Slough, Windsor and District Aquarists' Society won by 22 points to their opponents' 14 points. Entries for the contest totalled 76. On the same evening Mr. T. Jelley (F.B.A.S.) gave a talk on the aims, principles and policies of the F.B.A.S.

* * *

BOOKS for the aquarist was the subject of a talk given by Mr. B. McDowell to members of the **Rochdale and District Aquarist Society** recently. Mr. McDowell reviewed a number of aquarium books and pointed out the superiority of British aquarium journals over their American counterparts, handing round copies to emphasise his remarks.

* * *

ENGLAND'S oldest aquarium club, the West Surrey Pondkeepers' and Aquarists' Club, has decided on a change of name. In future the club is to be known as **Guildford Aquarists' Club.** The annual show this year is to be postponed owing to difficulties in obtaining a suitable hall, but members will be staging an exhibition in October to keep the hobby before the local public.

* * *

THE trophy to be given by the F.B.A.S. at next month's annual show of the **Southampton and District Aquarists' Society** will be awarded for fantail goldfish and not common goldfish as reported previously.

* * *

A REVIEW of recent research into functions of the fish swim bladder was included in a talk given by Dr. G. Gunliffe of Bristol University to the **South-Western Aquarist Societies Association** at Bristol Zoo last month. Mr. R. Forest Jones (Pontypool) presided over the meeting.

* * *

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

* * *

PRIVATE lakes in the vicinity of **Sleaford and District Aquarist Society** are to be visited by members this month. The May meeting of the society took the form of a social evening for members and friends.

* * *

HEADQUARTERS of the aquarists' club "Pisces" have been changed to Elccas Broadway Society Halls, North Street, Plaistow, London, E.13, where meetings will be 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 guppies to the **Newcastle upon Tyne and District Aquarists' Society** recently, and outlined his aspirations, difficulties and failures in breeding these fish.

* * *

MEMBERS of the **Hounslow and District Aquarist Society** recently spent an evening at the Thameside Tropical Nurseries at Shepperton, Middlesex. At a table show held in the club room for three classes of livebearers, winners were Mr. A. Vance (black molly), Mr. T. Ballard (blood red platy) and Mr. T. Boult (red swordtail); during the judging Mr. L. Dunstone gave a talk on coldwater fishkeeping.

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A FILM of the spawning activities of Siamese fighting fish and black widows was shown by its maker Mr. R. Young, at a recent meeting of the **Hastings and St. Leonards Aquarist Society.** Chairman of the society Mr. H. C. Pepper has given a talk on a successful spawning of glowlight tetras. The new headquarters of the society are at the Junior Library, Brassey Institute, Hastings, and meetings are held there on alternate Wednesdays at 7.30 p.m.

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PRIZES for the past season's monthly competitions arranged by the **Greenock and District Aquarist Society** have been presented by the chairman to Messrs. W. Blair (tropical) and L. R. Scott (coldwater), both winners in their respective classes receiving a shield suitably inscribed.

BARBS 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.

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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.

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WHEN Mr. W. L. Mandeville spoke to members of the **Bristol Tropical Fish Club** on fish "facts and fallacies," he said that he was in favour of lower wattages for heating aquaria and expressed the opinion that a rise in temperature of 15°F. was the ideal for aquaria in living rooms. The speaker said that an estimate of required wattage could be obtained by dividing the product of exposed tank area in square feet and temperature "lift" required in °F. by three. Mr. Mandeville also judged a table show of labyrinth fishes.

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

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CARE and maintenance of marine aquaria was the subject of a talk given by Mr. J. P. 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.

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BEDFORD **and District Aquarists' Society** entertained Kettering and District Society members at an inter-club competition judged by Mr. J. H. Gloyn (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.

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JOINT secretaries of the **Bath Aquarists' Society** are Mr. and Mrs. F. L. Edwards (19, Kensington, Bath). Meetings of the society are held on the second Thursday of each month, 7.45 p.m., at the Y.M.C.A., Bath, and visitors to the city are welcome to attend.

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AN outing to Kew Gardens, Surrey, was made by members of the **Aylesbury Aqualife Association** last month.

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SEVENTH annual general meeting of the **Willesden and District Aquarists' Club** saw the re-election of all the club's officers for a further year. The annual dinner for members was held on 22nd May and trophies gained by members during the past year were distributed.

F.B.A.S. Judges

THIRD annual conference of judges of the Federation of British Aquatic Societies was held in April, and was attended by Mr. E. Chapman and Mr. A. Snape (vice-president and representative of the Federation of Northern Aquarium Societies). Reporting on the work of the Judges and Standards Committee during the past year, committee secretary Mr. J. H. Gloyn mentioned the success of the "Star Scheme," the points system established for plant judging, standards for the red-eyed red, albino and red Tuxedo swordtails and the amendments made to furnished aquaria pointing made in conjunction with the F.N.A.S. Discussion of procedure for judging classes in which "standard" varieties and "non-standard" varieties may be exhibited side by side was held, and a resolution passed that in the opinion of the conference all fish in such classes should be judged. Standards for coldwater fishes were also discussed and concern expressed at the number of different standards found to be in existence for the same fishes.

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 amphibia. On the stand of *The Aquarist* at this event Mr. A. Boarder will be present to meet readers and answer queries. (Royal Horticultural Hall, Vincent Square, Westminster, S.W.1. 10th-12th June.)

Pond Life Study

A CHANCE for an interesting and refreshing week-end 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 this course is Miss B. M. Gilchrist, 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.1.

Bulletin Review

Walworth Aquarist

THE April number of the **Walworth Aquarist Club's** bulletin is the eighth to be issued. It is a duplicated magazine and the current issue contains twelve pages of reading matter, size approximately 6 ins. by 8 ins. Breeding records, 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 content from compost. Editor R. D. Cosham seems to have little difficulty in obtaining contributions and previous issues have contained articles on live foods, aquarium and shade construction, water plants and a host of other subjects of interest to aquarists. Bulletin editors who would like to exchange should write to Mr. Cosham at 3, Calais Street, Camberwell, London, S.E.5.

Tropical Waters

THIS publication, the official bulletin of the **Orange County Aquarium Society, U.S.A.,** and now in its third year, is a four-page issue printed on glossy paper with an attractive title page, a number of articles on varied subjects and several well-spaced advertisements. The Editor, Mrs. A. Marschall, of 618, No. Beverley Drive, Fullerton, California (to whom all enquiries for exchanges should be made), is fortunate in having as a regular contributor, Mr. Henry A. Nichols, F.A.I., well-known aquarist and one-time staff member of the American aquatic magazine *The Aquarium*. Mr. Nichols' "Worldwide News Letter" contains information from F.A.I. members the world over, including Bombay, London, Czechoslovakia and Karachi.

Peterborough Aquarist

BRISK, straight-from-the-shoulder editorials are a feature of this magazine. Issued by the **Peterborough and District Aquarists' Society,** current numbers contain the usual society news and views and an informative series of articles dealing with those reptiles and amphibia that can successfully be kept by the beginner to herpetology. The front cover of this bulletin is unusual in that it carries a hand-coloured representation of the society's badge. Applications for exchanges should be made to Editor G. Stockdale, 2, Home Place, Eastgate, Peterborough.

R.W.

Secretary Changes

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

Ashton-under-Lyne and District Aquarium Society (Mr. G. R. Rhodes, 5, Market Avenue, Dukinfield, Cheshire); **Friends Aquarist Society** (Mr. B. J. Wildy, 101, South Croxted Road, West Dulwich, London, S.E.21); **Hastings and St. Leonards Aquarist Society** (Mrs. G. Bresthen, 1, St. Peter's Road, St. Leonards-on-Sea, Sussex); **Kirkcaldy and District Aquarist Society** (Mr. J. Taylor, The Pharmacy, Main Street, Methilhill, Leven, Fife, Scotland); **Skipton and District Aquarist Society** (Mr. H. Bullivant, 46, Roughaw Road, Skipton, Yorks).

Aquarist's Calendar

10th-12th June: **National Aquarium Exhibition** at the Royal Horticultural Hall, Vincent Square, Westminster, S.W.1.

10th-12th June: **Northenden Community Association Aquarist Club** open show and exhibition of furnished aquaria at the Church Rooms, Kenworthy Lane, Northenden, Manchester.

11th-12th June: **Chester and District Aquarist Society** Annual Open Show at the Drill Hall, Volunteer Street, Chester. Details from show secretary, Mr. C. Morrison, 22, Belgrave Place, Handbridge, Chester.

12th June: **Federation of British Aquatic Societies** General Assembly, 2.30 p.m. at Friends House, Euston Road, London, N.W.1.

21st June: **British Herpetological Society** (London Group) meeting, "Crocodiles and Tortoises," 7 p.m., at the meeting room of the Zoological Society of London, Regent's Park, London, N.W.1.

1st-3rd July: **Southampton and District Aquarists' Society** fifth annual open show at the Avenue Hall, Southampton. Schedules and entry forms obtainable from show secretary Mr. R. C. Golesworthy, Westways, Romsey Road, Nursling, Southampton.

2nd-4th July: **City of Salford Aquarist Society** open show at the Drill Hall, Cross Lane, Salford, Lancs. Details from secretary Mr. W. Wainman, 249, Eccles New Road, Salford 5, Lancs.

16th-17th July: **Macclesfield Aquarium Society** annual show at the Brocklehurst Memorial Hall, Macclesfield.

22nd-24th July: **Bath Aquarists' Society** open show of tropical and coldwater fishes and aquaria at the Pump Room, Bath. Show schedules from show secretary Miss A. Gurney, 41, Sydney Buildings, Bath.

31st July-7th August: **Blackpool and Fylde Aquatic Society** fourth annual open show at the Victoria Street Congregational School Rooms, Blackpool. Schedules available from show secretary Mr. W. Robinson, 3, Derwood Bank, Warton, Preston, Lancs.

3rd-4th August: **Leicester Aquarist Society** display in the Horticultural Marquee at the Abbey Park Show, Leicester.

19th-21st August: **Portsmouth Aquarists' Club** open show at the Royal Engineers Drill Hall, Portsmouth. Entry forms from show secretary Mr. G. Ilverson, 24 Bertie Road, Southsea.

21st August: **Romford Aquarists' Society** annual open show of tropical fishes at the Lambourne Hall, Western Road, Romford. Schedules obtainable from show secretary Mr. A. C. Speller, 21, Cedar Road, Romford.

25th-28th August: **Leicester Aquarist Society** annual show at St. Mark's School Room, Belgrave Road, Leicester.

26th-28th August: **Stockport and District Aquarist Society** annual show. Details from secretary Mrs. J. Pay, 23, Oakfield Avenue, Friesswood, Manchester 16.

2nd-4th September: **Stoke Newington and District Aquaria Society** annual show at the Library Hall, Church Street, Stoke Newington. For entries write to Mr. E. G. Gatehouse, 115, Bouverie Road, London, N.16.

3rd-4th September: **Walthamstow and District Aquarists' Society** annual show. Details from show secretary Mr. J. Browning, 28, Sperling Road, Tottenham, London, N.17.

4th September: **High Wycombe and District Aquarist Society** show in conjunction with the High Wycombe and District Show. Details and schedules from show secretary Mr. R. Adkin, 7, East Drive, Totteridge, High Wycombe, Bucks.

10th-11th September: **Bethnal Green Aquatic Society** fifth annual show, with six open classes for club furnished aquaria. Venue: Men's Institute, Bethnal Green. Show schedules from Mr. W. A. Richardson, 16, Whitman House, Roman Road, London, E.2 (closing date 13th August).

The Aquarist's Badge

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

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

New Societies

Arnold Aquarists. *Secretary:* Mrs. V. Tra... 20, Thirlmere Gardens, Wembley, Middlese... *Meetings:* First Monday each month, 8 p.m., ... Preston Road Lawn Tennis Club, Wembley.

Ayr and District Aquarist Club. *Secretary:* Mr. J. Dempster, 51, Wellington Street, Ay... Scotland.

Malvern and District Aquarist Society. *Secretary:* Mr. R. T. Clooney, 94, Madresfie... Road, Great Malvern, Worcs.

Norwich Fish-keepers' Circle. *Secretary:* Mrs. H. E. Roper, 2, Marl Pit Lane, Dereha... Road, Norwich. *Meetings:* First Wednesd... each month, 8 p.m., at Crispin Hall, Pitt Stree... Norwich.

For Your Show—sheets of gumm... labels of fish names, award labels, etc... obtainable at small cost from The Aquaris...

Torquay Aquarium

NEGOTIATIONS for the establishment of ... public aquarium at the Marine Spa, Torqua... are now in progress between the sponsor of th... project and Torquay Corporation.

Crossword Solution

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

PICK YOUR ANSWER (Solution)

1 (c). 2 (c). 3 (b). 4 (c). 5 (c). 6 ...