The Aquarist

and Pondkeeper

NOVEMBER, 1962

MONTHLY
Vol. XXVII No. 8

TWO SHILLINGS

THE NEW INTER-PET COMBINED

HEATER-THERMOSTAT

- ★ NO LOOSE, UNTIDY WIRES.
- ★ FITS UNOBTRUSIVELY IN CORNER OF TANK.
- ★ SPECIAL NEAT CLIP FOR SECURING INTO POSITION.
- ★ PRE-SET TO 75°F. ± 1°F. BUT CAN BE EASILY ADJUSTED.
- ★ SUPPLIED IN ATTRACTIVE MULTI-COLOUR, CRUSHPROOF CARTON.
- ★ A QUALITY INTRUMENT FOR THE SAME PRICE AS A SEPARATE HEATER AND THERMOSTAT.

FULLY GUARANTEED

★

THE IDEAL XMAS PRESENT

★

RETAIL PRICE

22/6

Including P/Tax

From Your Dealer or Direct From :—

INTER-PET SUPPLIES COMPANY

CHURCH STREET, DORKING, SURREY. SALES DIVISION OF THE LIQUIFRY CO. LTD.

BIKO

The BIKO is the most powerful vibrator pump in the world. It is more powerful than some piston pumps. Double outlet pipes from separate diaphragms. (Two pumps in one, or one to spare!) Outside filter prevents dust and impurities from entering aquaria. On/off switch at side of pump. Long flex with plug attached. Extra deep solid rubber base: no vibration, absolutely silent. Consumption only 5 watts. Six months written guarantee.

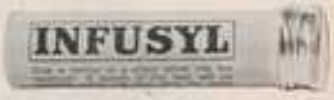
PRICE **£4-15-0d.**

HALAMID

A certain cure for White Spot and Fungus. One wholesaler wrote: "It was only 'Halamid' that kept me out of trouble." Don't wait for disease to ruin your aquarium — keep a supply handy. (A pinch every week stops algae from forming in the aquarium.)

PRICE **2/6** plus **6d** Purchase Tax — **3/-** each

INFUSYL



Essential to all breeders. Simply drop a tablet into the aquarium and *real infusoria* is produced in about an hour. Not a substitute for infusoria, but the real thing!

PER VIAL
of TEN TABLETS **2/6**

AQUARIUMSTOP

By applying a little 'Aquariumstop' to the *outside* of a tank, you can cure a leaky aquarium without having to empty the tank.

PRICE **2/6** each

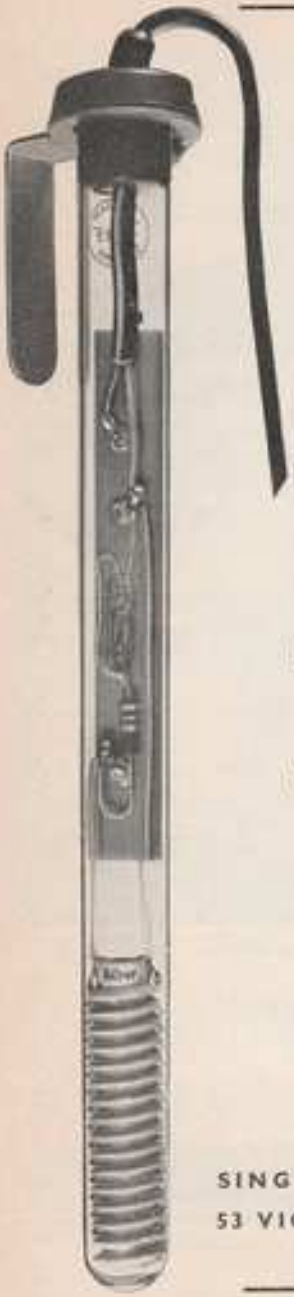
IMPORTERS OF TROPICAL FISH AND AQUARIA EQUIPMENT

HILLSIDE AQUATICS

44, WOODBERRY WAY, N. FINCHLEY, N.12

Telephone : HILLside 5430

Members of the Pet Trade Association Ltd.



The FULLY GUARANTEED

'PRESET-*matic*'

HAS ITS OWN BUILT-IN

LIFE ASSURANCE

i.e.

MSA

(MAGNETIC SNAP ACTION)

MSA IS A DEVICE USED IN ALL "Es-Es" THERMOSTATS TO ACCELERATE THE OPENING AND CLOSING OF CONTACTS THEREBY REDUCING EROSION AND ADDING YEARS TO THEIR LIFE

MSA ENSURES ACCURATE TEMPERATURE CONTROL OVER A LONGER PERIOD AND OBVIATES TV/RADIO INTERFERENCE

MSA MEANS **MORE SATISFIED AQUARISTS**

Now available in FOUR sizes

8½" 50 watts and 75 watts
10" 100 ,,
12" 150 ,,

FROM YOUR DEALER

Price 24/6 Tax paid

AN

PRODUCT

SINGLETON BROS (Electronics) LTD
53 VICTORIA STREET, LONDON SWI

The AQUARIST
AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"

THE BUTTS, HALF ACRE, BRENTFORD, MIDDLESEX
Telephone: ISLeworth 6221
PUBLISHED MONTHLY

SUBSCRIPTION RATES

The Aquarist will be sent post free for one year to any address for £1 8s. 0d. Half-yearly 14s. 0d. Canada, U.S.A. $4.00 yearly; $2.00 half-yearly.

QUERIES

Postal replies are made to all specialised queries accompanied by a stamped, addressed envelope. *This privilege is afforded only to registered readers and direct subscribers.* Subscription forms can be obtained on application. In all cases letters should be addressed to the Editor.

Correspondence with intending contributors is welcomed.

MSS. or prints unaccompanied by a stamped, addressed envelope cannot be returned, and no responsibility is accepted for contributions submitted.

The Editor accepts no responsibility for views expressed by contributors.

Contents

VOL. XXVII No. 8 1962

Aquarium in the Sun

FIVE miles from Hamilton, among the palm trees and oleander bushes of a village called Flatts, is the Bermuda Aquarium and Zoo. Over 60 species of salt-water fishes are displayed in surroundings as natural as those from whence they came. Each of the 27 tanks has its own live coral, sponges and sea anemones, taken from the reefs that encircle this archipelago of 21 square miles. Last year, 87,975 visitors went to the Aquarium.

Here are sea horses, odd-looking 'fishing' fish, which wiggle a white lure on the tops of their heads to attract tiny fishes as prey, the menacing morays, from the deep water several miles off Bermuda, and the groupers, which change colour before your very eyes. There are also parrot fish, angel fish, sergeant-majors, grunts, snappers, hinds and hamlets, among others. One shark has been in the same tank in the Aquarium for 26 years. Nearly all the fishes are caught with a hook and line. It is a delicate operation, though, because those fish caught in deep water must be brought to the surface with intervals of rest, like the deep-sea diver who controls his ascent to avoid the 'bends'. The only fishes in Bermudian waters not displayed in the Aquarium are the game fishes such as Allison tuna, marlin, wahoo and dolphin, which will not survive much more than 24 hours in a tank.

One hundred years ago P. T. Barnum, the American circus czar, was the first to take the fishes of Bermuda to America, and this summer the ocean liner 'Queen of Bermuda' carried a huge tank of rockfish, crayfish, parrot fish and others away from Bermuda for the New York Aquarium.

The Bermuda Aquarium was opened in 1928 under the guidance of the late Louis L. Mowbray, an ichthyologist who established aquariums in Boston and Miami Beach and was once assistant curator of the New York City Aquarium. In 1928 the Aquarium's building and equipment cost the Bermuda Government £11,946. To-day, it costs the island about £13,000 each year just for its operation. In the 34 years, however, the Aquarium has added a small zoo, an aviary and a museum.

Stonefishes—the

by Dr. JAMES W. ATZ

Curator, New York Aquarium

Photographs by N. Y. Zoological Society

This frontal view of a resting stonefish illustrates very well how un-fishlike it generally appears. The eyes and downwardly curved mouth are just discernible

THE stonefishes are the world's most venomous fishes. Such categorical statements are seldom safe to make when dealing with such biological variables as the strength of animal poisons and the health and immunity of creatures subjected to them, but there is no question that stonefishes are in a class by themselves.

Consider, for example, the case of the strong, healthy man who was spear-fishing on a Mozambique reef 6 years ago[1]. He accidentally kicked a stonefish so that just one of its spines penetrated his toe. Within an hour he was dead. Or consider the Australian woman who was similarly stung by a single stonefish spine that entered her big toe through a small hole in her wading shoes[2]. During the following 12 hours she passed through two crises when she seemed more dead than alive and although she eventually recovered, she suffered from shortness of breath and excessive tiredness for several months thereafter.

Two of the worst features of stonefish stings are the terrific pain and the crippling after-effects. There are appalling accounts of how men have rolled on the ground, frothed at the mouth, attacked people trying to help them or tried to amputate the affected limb, so great was their agony. Even natives whose custom it is not to show pain are usually reduced to writhing and screaming. The intense pain may last 12 hours, but some discomfort may be felt for as much as a year afterwards. Descriptions of the gruesome wounds, which sometimes take months to heal, make unpleasant reading indeed.

The great majority of encounters with the stonefish have taken place far from medical facilities or places where records are kept. Statistics are therefore non-existent, but with recent improvements in communications with out-of-the-way places, we now know that numerous stonefish stings occur—in New Guinea, for example.

Stonefishes occur over a wide area of the tropical Indo-Pacific, all the way from the east coast of Africa and the Red Sea through the Indian Ocean to Australia, the Philippines and the Tuamotu Islands. They are bottom inhabitants of shallow waters (as far as the ocean is concerned), most likely not living at depths much greater than 100 feet. Fortunately for the people who get a living from the sea in this vast region, stonefish, even though they frequent waters from a few inches to all wading depths, typically seek the shelter of some rocky or coralline bulwark, or rubble-filled areas, away from treading feet. Although seldom seen, they are not uncommon in some spots and a goodly number may be regularly turned up by a fisherman or naturalist thoroughly acquainted with the area, as Mr. George Coates of Queensland and Curator Alec Fraser-Brunner of the Van Kleef Aquarium in Singapore have demonstrated by supplying numerous living or specially preserved specimens to scientists for research.

Ordinary fish collectors carefully avoid stonefishes, and consequently few living ones have ever reached Europe or North America. We were therefore especially pleased in May of 1960, when Curator Earl S. Herald of the Steinhart Aquarium in San Francisco offered us one of his two specimens as part of an exchange in which we sent a pair of sand tiger sharks to his institution. Our specimen probably came from Eniwetok, an atoll of the Marshall Islands, and has the scientific name of *Synanceja verrucosa*. Two other species of stonefish are generally recognised, *S. horrida* and *S. trachynis*. All three look more or less alike and all three appear to have the same habits and the same degree of venomousness.

Camouflage

The stonefish is appropriately unprepossessing in appearance. Its body abruptly tapers from an oversize, flattened head to a short, blunt tail. It completely lacks the grace and symmetry associated with the typical streamlined fish. Instead of scales, its skin is covered with wart-like excrescences which extend on to the dorsal fin and the two large pectoral fins, transforming what are ordinarily thin, pliant structures into stiff, rugged ones. A finishing touch is the thick layer of slime that coats the entire fish and on which algae often grow. All this might seem unnecessarily repulsive, until the creature is viewed against a natural background. Then the many irregular bumps and depressions, the fringe that conceals the opening of the mouth, the spines that break up whatever vestiges of a contour the head might have, and, particularly, the blotched and mottled coloration, all conspire to make the stonefish look like a rough stone or a piece of dead and weathered coral.

The effect is uncanny. That it should operate in the fish's natural environment, with its countless odds and ends of coral bits, algae, shells, pebbles and debris of all sorts,

World's Most Venomous Fishes

to say nothing of small animals of various types, is perhaps not surprising. At the New York Aquarium, however, we could provide the stonefish's 100-gallon tank with only a layer of coral sand and three or four pieces of tufa, a soft, porous rock that bears a remarkable resemblance to weathered coral. Yet the stonefish blended so perfectly into this drastically simplified and artificial environment that special labels had to be put up to tell our visitors how to find it. I am sure that a number of them went away without ever seeing the fish, although they had undoubtedly looked directly at it as it lay next to a piece of tufa, its pectorals barely buried in the coral sand, motionless except for the faintly visible rhythmic breathing movements made by its gill-covers. To my repeated amazement, I found that even I, who knew exactly what the fish looked like, sometimes had to systematically scan each square inch of the bottom until—there! There it was all the time!

After we had exhibited our stonefish for several months, we changed the decor of its tank, removing the tufa and replacing it with dark, relatively smooth and hard stones. These slowly became covered with a brownish algal growth, and not long afterwards our stonefish grew an identical algal coat of its own. For a while the fish had stood out fairly clearly against the new, darker background of its tank, but it eventually became just as inconspicuous as it had previously been.

No wonder the stonefish gets stepped on, for in addition to its perfect camouflage, it has the habit of remaining exactly where it is, no matter how much commotion may take place in its immediate vicinity. So adverse to moving does the fish seem to be that it will permit a snail or shrimp to crawl over its head without response. Frequently it can be poked, pushed or hit and still it will refuse to move. It will sometimes retain its position even when the tide goes out and leaves it exposed to the air. In fact, if its surroundings remain moist, it can survive at least a whole day out of water[4].

Resting immobile on the bottom of a tidepool or coral flat, the stonefish is perfectly positioned to deliver the full force of its venom to anything coming down on it from above, for along the middle of its back is a series of 13 spines, each equipped with a pair of sacs containing venom[5]. The sacs are closely applied to the right and left sides of each spine. From each sac a tubular extension runs along a groove to the tip of the spine. The bulk of the fin, however, consists of a heavy, warty covering, inside of which the spines are ordinarily hidden completely[6]. When the fish raises its spines and retracts their sheaths, as it does when on the defence, the needle-sharp tip of each spine protrudes through a tiny hole. As the spine penetrates flesh, the sheath tightens around it, causing pressure to be applied to the sacs, which then discharge their contents through the ducts into the wound. Although the arrangement does not allow for the forceful injection of relatively large amounts of fluid into the wound, as do the hollow fangs of viperine snakes, the extreme virulence of the stonefish's poison undoubtedly compensates for any mechanical inefficiency. Moreover, inefficient as the stonefish's injection apparatus may be, it delivers considerably more venom than, say, does that of the turkey or lion fish (*Pterois*). This is probably the reason why the stonefish is so much more dangerous than other fishes with venomous spines. Three similar but not quite so well developed venomous spines are included in the anal fin, and each pelvic fin has a single one. Because of their location and structure, however, these five spines are seldom, if ever, involved in stonefish stings.

The amount of venom in each sac varies; in fact, some spines lack sacs entirely. These may be spines that have penetrated some animal in the past, because the deep insertion of a spine could very well cause serious injury to the delicate sacs, which are located not far from the tip. At any rate, the existence of "dry" spines accounts for the few instances in which people have been stung by a stonefish but have suffered no pain or other unpleasant aftereffects. Dr. Robert Endean of the University of Queensland has shown that the glands can, sometimes at least, regenerate their venomous contents, and so their usefulness may not, like the sting of the bee, be a one-shot affair. A full sac, which also includes the glandular tissue that secretes the opalescent fluid, may contain nearly 10 milligrams of actual venom, enough to kill a thousand mice. (For comparison, it might be pointed out that an unused postage stamp weighs about 65 milligrams.)

High-speed Feeding

Stonefishes use their venomous spines only for defence. For food they appear to depend on their camouflage and ability to snap up with incredible speed any morsel that comes their way.

At the New York Aquarium, Staff Photographer Sam Dunton has photographed a feeding stonefish several times. His high-speed motion pictures show that from the time a stonefish starts to move toward its prey to the time the fish snaps its mouth shut only one-sixteenth of a second elapses. The method of lying in wait and then making a short, open-mouthed leap at the unsuspecting prey must work well—at least, many of the stonefish that have been collected have had their stomachs filled with small fish. One 12-inch specimen contained 10 such fish. Stonefish also feed on shrimps and other crustaceans. One of our tankmen, Edward Dolls, has inveigled our stonefish into eating a

A 7-inch stonefish in the act of 'settling in'. With its broad pectoral fins and wriggling motions of its body it makes a slight depression in the sand, into which it sinks

Seemingly a mere lump, the stonefish lies in a corner as food (a strip of fish) is brought towards it on the end of a wire. At a distance of about 2 inches, the stonefish strikes. It jumps forward, its comparatively huge mouth opens and, too quickly for the human eye, the food disappears

variety of unnatural foods, including pieces of fresh marine fish, clam and shrimp. Mindful of the gluttony of the species, we rarely feed our stonefish all that it will consume. Fishes of its type can eat themselves to death.

Long before there were any bathers or fishermen, evolution had produced the elaborate defence mechanism of the stonefish. Presumably it was developed because it protected the stonefish from larger fishes. We do not know what effect stonefish venom has on fishes, however, because no one has performed the necessary tests. The venom is toxic to frogs, so we have some indication that it is effective on animals that are cold-blooded, like fishes. But I cannot help wondering whether stonefish poison became the kind of chemical it is because of some special effect it has on fishes. Man is a Johnny-come-lately in stonefish life compared with piscine enemies; the acuteness of stonefish poisoning in man can only be considered an unfortunate by-product of evolution.

A substance as powerful as stonefish venom could hardly escape the attention of biologists and pharmacologists, and yet up to 1959 there were only three published experimental investigations on the subject. In that year, Dr. S. Warner of the Commonwealth Serum Laboratories in Australia and Dr. Paul R. Saunders of the University of Southern California's School of Medicine published the first results of their studies on the properties of stonefish venom. Working independently, they found that it affects both the nervous and the blood circulatory systems, but its mode of action is still a mystery. During the recent conference on the Biochemistry and Pharmacology of Compounds Derived from Marine Organisms (organised by the New York Aquarium's Pathologist, Dr. Ross F. Nigrelli), Dr. Saunders declared that more is known about how the poison of the stonefish does not cause its effects than how it does. Methods of separating and purifying the toxic part of the venom have been developed[6]. Medical men have expressed interest in the stuff because of its capacity to reduce blood pressure precipitously.

In the meantime, definite progress has been made in the treatment of stonefish stings. It has been discovered that emetine hydrochloride, when injected into the wounds, provides dramatically rapid and permanent relief from the severe pain, something that no other substance has been able to do. Moreover, this drug seems to neutralise the toxic action of the poison. In 1958 another important advance was made when Australia's Commonwealth Serum Laboratories produced the first stonefish antivenin by injecting the venom into horses, in the same way that snake antivenins are often produced[7]. Although this material still has limited distribution, it has unquestionably demonstrated its worth. No longer need a stonefish sting be the drawn-out agonising affair that it has been in the past. The stonefish will always be one of the world's most dangerous fishes, but it has now been robbed of much of its terror.

Photo: Stanley Weitzman

A dissection of a stonefish spine (the head of the fish is towards the right). Lying on either side of the spine are the sacs containing the venom, which is injected through ducts not visible here

REFERENCES

1. Smith, J. L. B. Two rapid fatalities from stonefish stabs. *Copeia*, 1957, no. 3, p. 249.
2. Warner, S. Stonefish sting and its treatment. *Med. Jour. Australia*, 16th Aug. 1958, pp. 219-222.
3. Endean, R. Stonefish. *Australian Nat. Hist. (Australian Mus. Mag.)*, vol. 14, no. 1, pp. 21-23. 1962.
4. Halstead, B. W., *et al.* Stonefish stings, and the venom apparatus of *Synanceja horrida* (Linnaeus). *Trans. Amer. Microsc. Soc.*, vol. 75, no. 4, pp. 381-397. 1956.
5. Endean, R. A study of the distribution, habitat, behaviour, venom apparatus, and venom of the stonefish. *Australian Jour. Marine Freshwater Res.*, vol. 12, no. 2, pp. 177-190. 1961.
6. Saunders, P. R. & L. Tökés. Purification and properties of the lethal fraction of the venom of the stonefish *Synanceja horrida* (Linnaeus). *Biochim. Biophys. Acta*, vol. 52, pp. 527-552. 1961.
7. Warner, S. The production and assay of stonefish antivenine. *Med. Jour. Australia*, 14th Nov., 1959, pp. 715-719. Gillis, R. G. Some observations on stonefish. *North Queensland Naturalist*, vol. 29, no. 130, pp. 3-5. 1961.

Discus or Pompadour

by R. E. MACDONALD

AT times it is necessary for authors to describe the physical appearance of their subjects in some detail. To the "egg heads" this may be absolutely essential but to the less imaginative aquarist or layman it may prove to be quite a bore! In this respect I always feel that an illustration of some sort is worth a thousand words.

Many aquarists cherish the opinion that the discus fish defies any description; of course, to appreciate this conclusion one must first set eyes upon a specimen, but you will no doubt agree with me afterwards that this fish is certainly one of the most beautiful of all the cichlids.

To some aquarists the discus fish is known as the pompadour fish, to others it is known as *Symphysodon aequifasciata* meaning, roughly—the banded fish with teeth on the linkage of the lower branches of the lower jaw), while to the Amazon Indians it is known as "the King of the fishes".

It is rather a large fish and given the best living conditions it may grow to a length of 9 inches in the aquarium. It is native to the Amazon Basin and Central Amazon region of South America where it is found to inhabit the small bays along the lateral arms of the big rivers (see map below).

Discus are on the expensive side, for they may cost around £3 each for the smaller specimens and anything up to £10 each for the almost fully grown, mature fish. The high price is due mainly to difficulty in breeding and rearing and also to transportation costs, for nearly all the fish are imports and may well have begun life in the large outdoor fish farms in the U.S.A. Incidentally, is it a coincidence or not that during my travels I have observed that nearly all the fish offered for sale are females? (No remarks please about it being just the sort of thing I would notice!).

These disc-shaped fish are offered in two colour varieties —blue and brown, and for sexing purposes it is worthwhile to note that the male possesses more red colouring in the belly region and that the female is more yellowish.

During transportation they show a distinct preference to lie on their sides in their container but soon right themselves as they become acclimatised to their new surroundings. For the sake of peace and quiet I must state that discus fish are individual characters with each fish having its own peculiarities which must be considered at the time of observance.

The discus fish are not easy to keep, for there is so much that can go wrong. The least deviation from the normal environmental conditions or undue stress may seriously upset their physical or mental stability. They are extremely shy and nervous and this can affect their health in many ways, as the experienced aquarist will no doubt realise. For example: they can be terrorised out of their wits by other more vicious species, even though they may be of "king size" themselves. Treatment of this nature cannot be tolerated for long as the tormented creature will soon go off its food and will probably succumb from self-starvation. Because of this and the preferential treatment required it is advisable to keep this species in a tank by themselves where they are not subject to the whims and fancies of other fishes.

The tank should be high and large; in fact, the larger it is the better, and it should contain plenty of vegetation and hiding places as dense plant growth, submerged tree trunks and rocks are all to be found in their natural habitat. I'm not suggesting that one should necessarily provide a tank large enough to accommodate fallen tree trunks, for boiled willow root is a good substitute and more practicable, and the rocks (provided that they are not too large) will present no problems.

The water contained in the tank, however, may mean the difference between success and failure when keeping the

discus fish, and the utmost attention must be given to its nature and the following points religiously adhered to if success is required. The water should be soft and slightly acid with a reading of 1-2 DH for hardness and pH 6.2-6.8 for acidity. The temperature may lie between 75° and 86° F (24°-30° C), with an optimum breeding temperature of 78° F (25.5° C). The water should never be allowed to become old for in this type of water the fish are prone to disease. Because of this and other reasons, the water will require frequent changes. Between 20 and 25 per cent of the entire water content of the tank must be changed twice a week.

The problem of feeding is just as important, for the fish will starve themselves rather than eat monotonous and unappealing food. Discus are found to accept both live and dried food with the most satisfactory of the dried varieties being that which contains liver; of the live foods *Tubifex*, *Daphnia* and brine shrimp, *Tubifex* is found to be the most acceptable as it is similar to the food eaten by the fish in their natural surroundings.

When feeding with *Tubifex* it should be remembered that under normal circumstances the worm's body is covered with filth (they are found mainly in sewage-polluted water) and its digestive tract alive with bacterial organisms. Before feeding them to the fish, the worms should be cleansed by placing them in a bath consisting of a mixture of water and skimmed milk (equal parts by volume) for 24 hours. A fresh solution should be prepared in the same way and the worms transferred to this, where they must be kept for a further 24 hours. After this treatment, which is designed to purge them, they should be chopped to the required size (if necessary) and immersed in a solution consisting of 4 drops of mercurochrome to 2 quarts of water for 15 minutes. This procedure may prove to be rather a tedious chore at times and I am certainly going over ground previously covered by explaining the cleansing of the worms, but the benefits gained from feeding with a clean and extremely nourishing food certainly makes the energy expended worthwhile.

The discus fish is diurnal and needs about 12 hours of light per day. An allowance of approximately 2½ watts of lighting per gallon of water should prove to be ample and can be provided in the form of top lighting, remembering that this form of lighting will show the coloration of the fish to its best advantage. Never allow this species to be exposed to intense light, for if this is permitted it will make the colours appear faded and pale.

The most exciting time of all is when these fish spawn; the whole operation from start to finish is extremely interesting to say the least. Provided that the water temperature and chemistry are correct there is very little to do except to ensure that there are plenty of Amazon sword plants in the tank for the fish to use as a spawning medium.

The pairing of the fish appears to be somewhat non-selective, that is to say, provided that there is a male and female present the fish show no preference for any particular mate. Breeding may commence when the fish have reached a size of some 4½ inches.

Discus fish breed in a similar manner to angel fish (genus *Pterophyllum*) and it is at spawning time that they may be sexed with comparative ease. The female's genital papilla protrudes very strongly and is more cone-shaped and blunt in comparison with that of the male, which is pointed. The spawning colours are really impressive and apart from a few exceptions (namely various other cichlids) I have yet to see any fish that can match them!

Spawning is an exacting process during which some 250 eggs may be laid on specially cleaned sites. The eggs, which are a brownish yellow in colour, are sensitive to fungus spores and bacterial infections and a great many eggs may die as a consequence; in fact, a complete spawning may be lost. I have found that it causes no harm to assist the fish in this fight by adding 2 drops of a 5 per cent solution of methylene blue for every gallon of water in the breeding tank.

As the female lays the eggs, the male will fertilise them by constantly rubbing his sperm tube over them to permit maximum fertilisation, which in itself is a somewhat unique occurrence. After spawning the parents care for the eggs in typical cichlid fashion by fanning them with their pectoral fins and cleaning them with their mouths. They will also remove dead eggs from the spawning site to prevent any infection from spreading.

The eggs hatch after approximately 48-50 hours and the nursing phase begins. It is noticeable that during the nursing phase the body colours of the parents darken to some extent. The actual reason for this is not known with any certainty. The newly hatched fry are picked up in the mouths of the parents and transferred to various surfaces that have been previously cleaned with a great amount of care, to remain there wriggling at the end of a short adhesive thread. Sometimes in moving the fry the parents may swallow one or two but this is more of an exception rather than the rule, for adult specimens make excellent parents.

To illustrate the intense care and devotion shown by the adults for their fry I can recall the occasion when I saw a brood of newborn fry being slaughtered by a fatal bacterial infection that was rampant in the breeding tank. Nothing could stop the terrible destruction that was being wrought and even though the little fry were obviously dying and kept falling from their places on the breeding site, the parents were tirelessly picking them up, cleaning them in their mouths and returning them, quite hopelessly, to freshly cleaned spaces. The way the parents toiled against such terrible odds (alas, none was saved) brought a lump to my throat—such undemanding devotion is unfortunately only too rare, but not for the discus fish for apparently this type of phenomenon has been observed before by ichthyologists.

The interval when the fry remain on their anchoring thread is a critical phase in their lives and during this time they feed from their yolk-sac until it is consumed, a period of about 4 days, after which they become free-swimming.

For the next 5 weeks the fry feed on secretions produced by special mucous cells in the skin of the parents. It is quite amazing to watch the fry swarming around one of the adult fish apparently trying to pull it to pieces in a playful manner! Both parents are capable of feeding the fry in this way although feeding generally takes place from only one parent at a time. When the fish requires a rest it will perform a little ceremony for the transition of the fry. This may take the form of either fin contractions, a tilted stand, a flick of the body or by both parents swimming side-by-side. Whatever the act may be the fry obviously understand its meaning for they will immediately transfer themselves to the other fish.

During this period the fry's belly is filled with a yellow mass that may be seen through the belly wall after placing a strong light behind the specimen.

The fry will feed off their parents for at least 5 weeks even though there is an abundance of food present. Should they be separated from this source before this period is up they will most certainly die.

After 5 weeks the fry can be separated from their parents quite safely and fed with such delicacies as brine shrimp nauplii, micro worms, rotifers and finely chopped white worms. With correct and careful feeding the fry will soon begin to look like magnificent replicas of their parents and even though their number may be small they are well worth the trouble and heartaches that may be experienced in the struggle for success.

Lake Turtle and Amboina Box Tortoise

by ROBERT BUSTARD, B.Sc.

THE subjects of this month's article are Asian chelonians. Both could be classed as terrapins with a fair degree of accuracy, as in the British connotation 'terrapin' refers to all chelonians, other than marine species (turtles), which habitually enter the water or live under very damp conditions. The truly terrestrial species we call tortoises.

This nomenclature is somewhat arbitrary and in America the word 'turtle' embraces all chelonians, including those species that are truly land dwellers. Recent correspondence in *The Aquarist* (July, 1962: pages 82-83) prompts me to stress this arbitrary nature. By 'terrapin' we ideally think of species which are at home on land or in the water, like typical amphibians. However, we must remember that there are freshwater chelonians, such as the soft shells (*Amyda* and *Trionyx* for instance), which are totally aquatic and which are as perfectly adapted to an aquatic existence as any of the marine turtles. Like them they move clumsily on land. What should we call them in popular terms? Clearly according to the above British definition such species are terrapins, which shows how rough and ready popular names tend to be.

The lake turtle (*Geomyda trijuga thermalis*) has this name because it is featured on collectors' and dealers' lists as a 'turtle'; it is common on the island of Ceylon, from where I have received several specimens. It grows to a considerable size, and one giant female, which I had for some time, measured just over a foot, on the flat, and weighed 7 pounds. This female laid a number of large calcareous-shelled eggs measuring 50 mm. by 29 mm. (2 in. by 1¼ in.). The eggs had been deposited in the water dish so no attempt at incubation was made. There appears to be a variation in size of the eggs in different clutches from specimens from the same region. A specimen that I received from Ceylon along with my own and which joined Mrs. Pickard-Smith's collection in Sussex deposited a total of five eggs which measured 1¼ in. by ¾ in. These were laid by a much smaller specimen, which may account for the smaller size of the eggs. Had they been larger they would have been unable to pass through the gap between carapace and plastron.

Photo: R. Bustard

Ceylon lake turtle (Geomyda trijuga thermalis)

The coloration of my very large female lake turtle was a drab olive-brown on the carapace and the soft parts were a dull olive-grey. The carapace was worn quite smooth, possibly due to age, and the three longitudinal lines, which are well-marked ridges even in well-grown specimens (see the photograph) were only represented by three yellow lines. Young specimens are, as is so often the case, much more attractive. The soft parts and carapace are blackish tinged with olive but the head is marked with orange. These markings may still be found on quite large specimens and were present on two 6 in. lake turtles which I kept. In my view the prettiest size for this species is undoubtedly about 5 in. This is an ideal and most practical size to obtain, as they are large enough not to be delicate, and their attractive coloration and alert habits can be appreciated before they grow large. The raised pattern of the carapace, which is characteristic of this species, is shown in the illustration.

The amboina box tortoise (*Cyclemys amboinensis*), like the lake turtle, is a species that is less commonly seen than many other terrapins. Both, however, can be obtained quite frequently in Britain, where they can be expected to live for many years under similar conditions. In this way they are a much better purchase than the tiny, but beautiful American terrapin hatchlings which are imported in such numbers each spring and summer. The carapace of the amboina box tortoise is not particularly attractive, but the head, striped in grey and yellow, is quite striking. Box tortoises are so-called because they are considered to be terrapins which are in the process of reverting to a terrestrial way of life. Some of the American box tortoises (genus *Terrapene*) have travelled much further along the road to terrestrial life than *Cyclemys*, which still remains rather terrapin-like. The word 'box' refers to the remarkable hinges on the plastron, which enable both the front and the back portions of the plastron to be pulled upwards in

Amboina box tortoise (Cyclemys amboinensis)

Please turn to page 154

THE GOLDFISH AND ITS VARIETIES

(10) The Celestial

by A. BOARDER

THIS fancy goldfish is one of the most remarkable of all the varieties. All the fancy goldfish have been evolved from the common goldfish but the celestial has gone a long way from this fish. Its chief characteristic is that the eyes are almost on the top of the head and gaze sky-wise. Another feature is that the fish has no dorsal fin. The general shape of this variety is that of a fantail's body with no dorsal fin. That means that the body approaches an egg shape and has a completely divided tail or caudal fin. This divided tail must be forked like the fantail's and held well out behind the body, not drooping like the tail of the veiltail. The anal fins must be paired and held apart. As there is no dorsal fin there may be a bad spot where this fin is normally found and some badly shaped fish have small bumps or false fins where the usual organ is found.

The eyes of the celestial have moved around from the normal position so that they point directly upwards. The eyes are enlarged and develop their peculiar position as the fish matures. The young ones appear fairly normal in the position of the eyes, but as the fish grows so do the eyes gradually move from a normal position towards the top of the head and eventually take up a place where they look directly above the head. It may be thought that the position of the eyes would make it almost impossible for the fish to see its food, but it is a fact that this fish eats well and appears to have no difficulty at all in finding sufficient nourishment even when occupying a tank with normal goldfish. It is, however, a good plan to keep these fish by themselves, especially if any breeding is to be attempted. They are not a good fish for a pond; not because they are not fairly hardy, but because they would not be very active and show up well.

To breed them is not difficult as long as care is taken to see that the parents of the fish are of a good strain and a well-established one. Where a breeder has concentrated for some years on a strain of celestials it is almost certain that any youngsters from the strain would throw at least a good proportion of well-shaped young in a particular spawning.

Fish intended for breeding should be well fed on a mixed diet. Each day they can have a few garden worms or white worms and some wheat germ or oatmeal. Any of the usual goldfish foods will be taken readily as this fish is not a choosey feeder. If the sexes can be kept apart for a time they are more likely to start to spawn when they are introduced to one another. A well-oxygenated water is essential as there is no doubt that the presence of plenty of oxygen in the water encourages the fish to start spawning. One male to a female is quite sufficient. The old idea was to have more than one male fish to each female but I consider that if only one male is used to a female there is less likelihood of the female becoming distressed at too constant chasing.

The fry hatch in the usual goldfish fry time according to the temperature of the water, about 4 days at a temperature of 70° F (21°C), and longer if the water is cooler. As the youngsters grow it will be noticed that the eyes become enlarged and after a few months they start to move gradually away from the side of the head and take up the mature position directed upwards. Any fish that do not show the upward formation of the eyes should be discarded. Occasionally one eye will not move up as much as the other and such a fish will not be of any use for breeding or exhibiting. The Federation of British Aquatic Societies has no standard for the celestial.

Increasing enthusiasm for the keeping of marine tropical fishes was demonstrated by the interest of visitors in the stand of South Coast Aquatic Nurseries Ltd. at the British Aquarists' Festival last month. Fishes were shown in aquaria with nylon-coated frames in sea water prepared from the firm's new preparation Meersalts

Bother with Bettas

by P. DENDY

THIS isn't going to be an article on how to breed fighters, because that would be like teaching a duck to swim. Every aquarist knows how to breed fighters, even newcomers to the hobby. Fighters are easy to breed, no trouble at all; they'll breed at the drop of a hat, there's nothing to it. We all know this, of course, but if it is so simple, why isn't the market flooded with fighters and why can you usually get 7s. 6d. a pair wholesale for them when you sell to a dealer? The truth is, of course, that fighters are not so simple as everyone thinks they are, not by a long chalk.

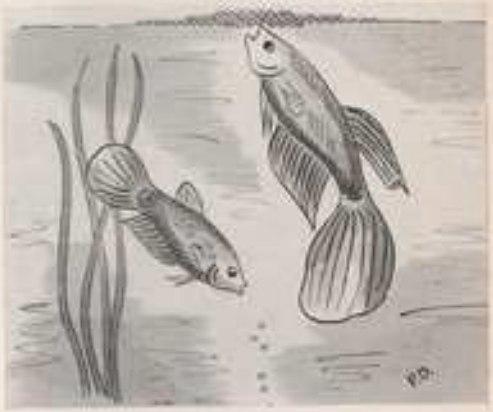
The male fighter is often a temperamental fellow and highly unpredictable. The female is usually more amenable, but even so can give quite a bit of trouble. I have been exasperated more than once by the goings on in the breeding tank, particularly when it is quite obvious that the would-be parents have never read the chapter in the fish-keeper's manual on how to breed *Betta*, and in fact simply haven't got a clue. This business of doing it all wrong is not uncommon, particularly with a maiden spawning, but things usually improve at subsequent attempts when they perfect the drill and have got the message.

One very beautiful male I had never did get the business right although he seemed to live for love and was for ever displaying. At every embrace he passed out cold just like the female and took so long to recover that his wife came to first and ate all the eggs before they could be placed in the nest. He was not discouraged, however, and did a beautiful job of maintaining the nest for a week afterwards, in spite of the fact that there never was an egg in it. Another female presented a problem as her receptive period was so short that it was extremely difficult to catch her just right. A day too early and she would have nothing to do with the male and a day too late and she had built her own nest, spawned and put her eggs in it, all without a male in attendance. She would then tend the nest just like a male until the eggs went bad, which, of course, they had to do because they were infertile.

With fighters it is often a question of luck, particularly with only one pair to work on. You may get a hefty brood at the first attempt or keep on trying with no joy at all. The obvious answer is to equip yourself with several pairs to cut down on the unpredictability. Patience is essential and attention to other general points will also help. A clean tank is important, as is the proper conditioning of the fish. More troubles are experienced by putting a pair together before they are ready, than from any other cause. Feed with plenty of live food as fighters are carnivorous. Their ardour may be increased by putting the pair in the same tank separated by a glass partition. If the male is not ready he will show little interest in the female; if the female is not ready she may suffer considerable fin damage and can even be killed by an ardent suitor. Always place a piece of flower pot in the corner of the tank to act as a refuge for the female as she may be in dire need of somewhere to hide if things get a bit hectic.

Always watch closely when the pair are first put together to see that no damage is done and if things are obviously not right then separate them for another week before trying again. Mature males give least trouble and the best results seem to come from males who are 5 to 7 months old. Males can obviously be either too old or too young to mate properly. Females give best results when they have been bred from at least once before.

After spawning the female can be removed at once, but provided that the male is not worrying her it is probably better to leave her in the tank for a day, because males seem to settle down to the job of looking after the nest better if the female is still hanging around. Net the female with care to avoid disturbing the nest too much and upsetting the male. The temperature should be fairly constant at about 80°F (27°C) during hatching. If it rises much above this the bubbles will burst too rapidly and the fry may fall from the nest faster than the male can repair it and catch and return the babies to it. If the temperature drops too far there is a danger that the eggs may become infertile. Some males must be removed as soon as the fry are free-swimming to prevent them being eaten, whilst others may safely be left for a week without attacking their babies.



The fry must always be given plenty of food right from the start as cannibalism is very common among young fighters and you might well find that some are growing quicker than the others and at their expense. The size of the brood raised will be influenced by the size of the tank and may be as high as 250 in exceptional cases. It should never be less than 100 if you are on the ball and if you are only achieving brood sizes of 30 or less then there is something very wrong somewhere.

Some very interesting figures have been obtained from experiments with *Betta* by Dr. H. B. Goodrich and H. C. Taylor on the optimum breeding temperature for these fish. They studied a temperature range of 75° and 84°F (24°-29°C) and found that at 80°F (27°C.) 75 per cent of the fighters under observation built bubble nests and that the percentage dropped sharply to zero below 78°F (25°C) and above 82°F (28°C.). They also studied the effect of temperature on the frequency of spawning of females and found that at 80°F (27°C.) the interval was 6 to 8 days and at 70°F (21°C) the interval lengthened to 20 to 23 days. Males, on

Continued overpage

Pelmatochromis arnoldi

THIS is a cichlid that is not often seen, mainly I think, because it follows the accepted pattern of cichlid behaviour. This particular cichlid, although attaining a length of only 4 inches, can be extremely vicious, as I have found to my cost.

The colour is a mixture of yellow-green and silver with a row of five black dots on each side. There is a dark line running from eye to the base of the tail and also a dark line running through the eye. The male has a red belly, which shows better at breeding time. The shape diverges from the usual cichlid type and is more or less elongated. As with the majority of the genus *Pelmatochromis* this species comes from tropical West Africa.

Feeding proved to be an easy matter, any meaty meal being greedily accepted; this diet included chunks of heart and liver, earthworms and guppies. Prepared dried food was only rarely accepted.

Although my pair of *P. arnoldi* were too vicious to be kept with any other fishes they were extremely nervous when anyone approached their tank, this nervousness only being overcome by their greed, when they would dart out from behind a rock to take any food dropped into the tank.

When the fish reached a size of 3 inches it was found that periodically the female appeared slightly tattered, a sign that the male was ready to spawn; no jaw-locking or typical cichlid wrestling was ever noticed. The pair were never separated and no serious injury was ever seen on the female.

On 5th March this year the pair were placed in a 18 in. by 10 in. by 10 in. tank whilst the 24 in. by 15 in. by 12 in. tank that they usually occupied was cleaned with a view to breeding these fish. Two days later they spawned on the inside of a 4 in. flower pot provided for refuge. The eggs, about 250-300, appeared dark in colour and were fanned by both parents. After the first day it appeared that the female cared more for the eggs although at times both would cram themselves into the pot. Three days after the eggs were laid, they began to hatch. Next day the flower pot was empty and no sign of any fry could be seen.

The parents were returned to their original tank and no further spawnings were observed until 30th April. Once again the fish had been moved to a 18in. by 10 in. by 10 in. tank as a temporary measure; spawning took place as before. The flower pot containing the eggs was removed to a 24 in. by 8 in. by 8 in. tank, aeration was applied so as to pass bubbles by the eggs and 2 drops of 5 per cent methylene blue and 2 drops of 5 per cent acriflavine solution per gallon were added. Two days later the eggs hatched and about 300 fry lay in a mass at the base of the pot; only 12 eggs were noticed to have developed fungus. Three days after hatching the fry became free-swimming and the flower pot was removed.

Feeding was commenced with finely sifted *Daphnia*. Growth was rapid and on 13th May the fry were moved to a 36 in. by 12 in. by 12 in. tank. The colour of the young fish was silver with a heavy black line from eye to tail with a golden line running above. The fins had a slight yellow tinge. At 6 weeks of age the size of the fry varied from ¾ to 1 in.; no sorting had taken place and the number was down to about 100. Feeding at this stage was *Daphnia* and Grindal worm with occasional feedings of dried foods. The black line was beginning to break and took the form of spots as on the parent fish.

At the time of spawning the parent fish had developed the typical cichlid breeding tube and the female was seen to enter the flower pot and deposit a neat row of eggs, about five or six in all, closely followed by the male, who appeared to rub his belly along the eggs. No effort was made by either parent to clean the spawning surface and some eggs were even laid on a thin covering of algae which covered the pot.

Six days after spawning the male fish died for no apparent reason; he was in full colour at the time and had been transferred to his original tank. Two days later the female was found lying on the bottom but still alive; all attempts to save her failed. The death of the adults still remains a mystery. No sign of physical injury could be seen on either fish.

At the time of writing, the fry have reached a length of 1 to 1¼ in. and are growing fast. The number is now down to 54, a mixed batch of striped and spotted fish as some of the fry still have not developed their spots. Although this is a species which must be kept on their own, they are in my opinion well worth the tank space for such an interesting and colourful cichlid.

Ralph F. Bayntun

Lake Turtle and Box Tortoise

continued from page 151

Terrapene, thus completely enclosing the animal. In *Cyclemys* only the front portion can close up to protect the head and forelimbs. Specimens available are seldom more than 6 in. in length.

If possible the vivarium for both species should be roomy enough to have a decent pool area (which can be quite shallow—4 in.) and also a portion of land for them to walk about. Naturally much will depend on what is available but I do not advise anyone to consider purchasing either species unless they are prepared to give them a vivarium with a combined land and water floor space of 3 feet by 2 feet. I have allowed my specimens the freedom of an enclosure round a small shallow pool in the summer months and if an outdoor reptilary with at least a small pool is available then accommodation need present no problem during the warmer months.

During the winter a bright light is to be recommended and the vivarium temperature should be maintained at about 70°-75°F (21°-24°C). Draughts are to be avoided. Food for both species and at all times of the year can consist of strips of raw meat, fish or earthworms.

When available, 6 in. specimens of either species should be obtained for about 30 shillings. Smaller specimens may be somewhat cheaper.

Bother with Bettas

continued from the preceding page

the other hand, were found to be able to breed every 3 days at a temperature of 80°F (27°C).

It is clear that the breeding temperature for fighters is fairly critical if the best results are to be obtained. Extremes of temperature must always be avoided and temperatures above 85°F (30°C) induce too rapid a growth in the embryos, which can lead to bent spines and abnormal fin-ray growth. Too low a temperature also may influence the development of the skeleton and make it difficult to rear well-proportioned specimens.

The Garden Pond in NOVEMBER

by ASTILBES

At the commencement of winter the garden pond needs special attention if the inhabitants are to remain in a healthy condition until next spring. Many pondkeepers fail to realise that it is probable that some of the troubles met with in the spring could have been avoided if care had been taken just before the winter. One very important task is the cleaning out of the small pond. Whether this is absolutely necessary depends on the condition of the water. If there are plenty of healthy water plants and the water is clear and in good heart there may be no need to clear it out at all.

If the water appears to be at all foul, that is, it smells rather badly or the water has a bad colour, e.g. milky looking, it is essential that the pond has a good clean. This is best done on a bright dry day. Start the emptying before breakfast if at all possible. I use a small electric pump to empty my pond and having started this early in the morning I am able to get the pond empty by mid-day. This gives good time for cleaning out. I usually get one or two pailsful of black smelly mulm from the bottom. I have one deep part of the pond and this mulm collects there. The concrete is then scrubbed well with a stiff broom and washed over from a hose. My water plants are set in separate containers which I can easily remove from the pond when cleaning it out. The fishes are placed in a spare pond or tank until the pond is refilled and the plants are returned.

The pond-cleaning gives a good opportunity to check the fishes. I try to weigh the golden tench (three) which I keep in the pond. This is no easy task as these fish are very strong and, having been bred by me in 1947. The female is much larger than the two males and is more than a tough handful to manage. I like to wrap a cloth lightly round the fish to keep it quiet and then weigh it. The cloth is then weighed to give me the weight of the tench.

If any fish lice are seen they should be removed immediately. One or two can be picked off with tweezers but a real infestation has to be dealt with more firmly. Place the affected fish in a bath of 1 gallon of water to which has been added a half teaspoonful of Dettol. The lice will leave the fish at once. Do not place small fishes in this strength; half the amount of Dettol is the dose for them. Always watch the fishes whilst they are in the solution and do not leave them in for more than a minute or two. This treatment will rid a fish of leeches and gill flukes.

When the pond is filled replace most of the under-water oxygenating plants. Only use the best of these and make a neat bunch or two. Many of these die down for the winter but should grow again in the spring. The water lilies must have all the dead or dying leaves removed. These will pollute the water in a small pond very badly once they decay. Any leaves which have fallen in the water will be removed whilst cleaning out the pond and so it is as well to leave the cleaning of the pond until most of the leaves from nearby trees and shrubs have fallen.

Whilst cleaning out it may be that many young fish that have been bred in the pond are found. Many such fish can be bred provided there is sufficient dense water plant life to form a good hiding place. Many pondkeepers ask me if it is better to remove these young fish to an indoor tank for the winter. I do not think that this is a good plan. Many such youngsters are caught up at the commencement of the winter and placed in tanks, often very overcrowded. Before long they start to die off and it is very often the case that not one survives until the spring. On the other hand if they are left in the pond they are usually quite all right. This, of course, is provided that the water is pure. It has been said that goldfish have to be about 3 inches long to winter out of doors. This is quite untrue. I have had fry no more than half an inch long overall survive in good health in outdoor tanks.

The cold does not usually harm goldfish; the danger is when the water freezes over and is in a foul condition. The bad gases are then trapped under the ice and no fresh oxygen can enter the water. This emphasises the need to clean out any pond before the frosts start if the water is not quite pure. There is no need to fear that the youngsters will be eaten by the parents as they should be quite large enough by the beginning of the winter for the older fish to ignore them. Of course, if you have been misguided enough to place a coldwater catfish in the pond as a scavenger you may not have any young fish left by the spring, as these fish will eat anything small enough to tackle.

Now we come to the debatable point, whether or not to feed the fish during the winter. Let us consider the fact first that it is possible for a healthy goldfish to go right through the winter without being artificially fed. In any reasonably sized pond, which is well planted, there will always be enough food for the goldfish. The amount of vegetable matter eaten by these fish would surprise many pondkeepers. Remember that as the temperature of the water drops so the appetites of the fishes will decrease. When it is very cold they take a very long time to digest their food in comparison with what they can do in warm weather. I think that it is safer to withhold all dried food from November to February. Any of this food that is uneaten will soon pollute the water and the fish will soon be in trouble.

The only food I would recommend during the winter is garden worms, broken up. These will usually be taken even

Continued overpage

Photo: L. E. Perkins

Small ponds benefit from an annual cleaning

A Diseased Condition of *Corydoras paleatus*

by D. A. CONROY

THE purpose of this communication is to place on record the appearance of an interesting diseased condition in *Corydoras paleatus*. As no similar cases appear to have been reported in the literature for this particular species, it is hoped that the present note may be of interest to those working on the diseases of fishes.

The first instance of the condition under description occurred in specimens of *C. paleatus* maintained in a large public aquarium in Buenos Aires. The fish developed petechiae in the posterior region of the body, and all were dead within a few hours. At that particular time, I was away from Buenos Aires, and it was not possible to obtain any specimens for examination. A short time thereafter, a single specimen of *C. paleatus*, maintained together with related genera (not *Corydoras*) in an aquarium in my laboratory, showed similar symptoms to those mentioned above. The description which follows is therefore related to my specimen, although it is emphasised that the same applies to the large number of fish that died in the public aquarium.

The diseased fish developed a number of petechiae, or haemorrhagic areas, on the posterior lateral surfaces (Fig. 1). These spots were of a bright red colour, and appeared to be situated directly beneath the dermal plates, that is to say, on the outer surface of the dermis proper. When this condition was first noted, the fish remained at the surface of the water, showing irregular respiratory movements, and responding but slowly to taps on the nearby glass. Within the space of 1 hour, these respiratory movements had become less frequent and the animal remained 'belly upwards' on the water. Approximately half-an-hour later it was dead, and I promptly transferred the specimen to a sterile container for subsequent bacteriological examination.

The external surface of the body was carefully swabbed with Lugol's iodine to remove any contaminating bacteria present, and the dermal plates were removed from the posterior region by means of sterile instruments. Small amounts of the muscle tissue were excised and aseptically added to tubes of glucose broth. A macroscopical examination failed to reveal the presence of parasites.

No growth was obtained in the bacteriological media after up to 40 days' incubation at 77° F, 25° C (the temperature at which the aquarium had been maintained was 71° F, 22° C). The other fish in the same aquarium have continued to remain healthy up to the date of writing. This would suggest that the condition is peculiar to *C. paleatus*, a suggestion borne out by the observations made on the disease in the public aquarium, where in mixed community tanks *C. paleatus* alone was the species affected.

Corydoras paleatus is a fish indigenous to Argentina (where it is known as the 'tachuela' or a 'marillito') and parts of Uruguay (where it is called the 'sapito de arroyo'). It is very common in the brooks and streams in the proximity of the River Plate, being able to withstand the somewhat lower temperatures of this region (other species of *Corydoras* are to be found in the northern provinces of Argentina, such as Corrientes, Formosa and Misiones). In the natural state it reaches a length of 7-8 cm., but specimens of 3-4 cm. are more commonly sought after for aquaria.

The family Callichthyidae, to which *C. paleatus* belongs, may be better known as the 'South American armoured catfishes' to English-speaking aquarists. The tough dermal plates that cover the body are sufficient to prevent, or at least impede, the entry of pathogens. *C. paleatus* may be left in the company of other types of fish suffering from heavy bacterial infections without the production of any symptoms whatsoever. Diseased conditions among species of *Corydoras* are virtually unknown for this very reason.

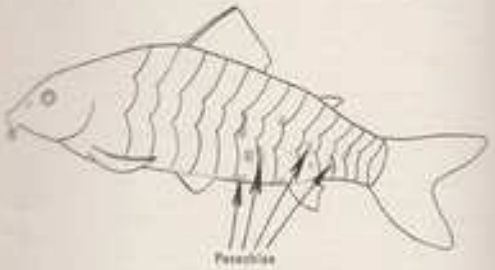


Fig. 1. Distribution of petechiae (blood spots) seen on body surface of the infected catfish

It is therefore interesting to encounter a condition in *C. paleatus* which may be classed as an epizootic, provoking as it did, a total mortality among these animals. The failure to isolate any bacteria from the solitary diseased individual that I was able to examine does not allow of the formulation of any concrete hypothesis, but the symptomatology displayed, the absence of external parasites and the high mortality rate suggest that a bacterium may have been responsible.

It may be that the primary focus of infection was the natural habitat of the fish before capture during the spring or early summer months, the symptoms appearing almost simultaneously in two isolated places.

The Garden Pond in November

continued from the preceding page

if there is ice on the pond, but there is no need to feed at all during such times. Most winters have many days when the temperature is well up into the fifties and this is the time to give the worms. Watch the actions of the fish first. If they lie low down in the water almost motionless do not feed. If they are well on the move and browsing through the weed then is the time to give a little food. Do not give too much at any time and try to keep one part of the pond free from plants etc., so that a piece of worm can be seen when thrown in, and then if a fish takes it a little more can be given.

Try to keep one part of the pond open when ice has formed. The best way to do this is to place a water-can of boiling water on the ice. A neat round hole will soon be formed. The can will not fall into the pond as the spout and handle will prevent this happening. After snow has fallen remove as much as possible from the ice and when the ice thaws run in plenty of fresh water. Should the water smell change most of it for fresh.

British Aquarists' Festival 1962

[illegible] attendance figures well above last year's, the B.A.F. at Belle Vue, Manchester, last month, was an outstanding success. Results, with summary of points gained, are as follow. **Best fish in the show:** C. Walker (Ossett), 90. Best other than best fish in show—Tropical [illegible]: Mr. and Mrs. Swanson (Merseyside), 86; Tropical livebearers: J. Taylor (Blackpool), 81; Coldwater: G. J. Bennett (Northern Goldfish), 84. **Best society furnished aquaria**—Tropical: 1, Sheffield, 82½; 2, Belle Vue, 70½; 3, Attenborough, 69. Coldwater: 1, Northern Goldfish 70; 2, Bradford, 60. **Best individual furnished aquaria**—Tropical: 1 R. Smith (Accrington), 85½; 2, C. R. Wilson (Bradford), 82; 3, C. R. Wilson (Bradford), 79. Coldwater: 1, G. Longton (Ashton), 76½; 2, J. H. Hood (Tyneside), 76½; 3, H. Pimhall (Ossett), 75. **Best aquascape:** 1, A. Duffield (Tyneside), 88; 2, H. Pimhall (Ossett), 79; 3, S. A. Abdy (Sheffield), 78.

Common goldfish and comets: 1, Mrs. D. M. Mathews (Northern Goldfish), 76; 2, L. and B. Baxter (Northern Goldfish), 74; 3, J. R. Ogus (Northern Goldfish), 70. **Shubunkins:** 1, Miss B. Baxter (Northern Goldfish), 78; 2, J. H. Hood (Tyneside), 78; 3, T. G. Baxter (Northern Goldfish), 72. **Moors:** 1, G. J. Bennett (Northern Goldfish), 84; 2, G. J. Bennett (Northern Goldfish), 80; 3, L. and B. Baxter (Northern Goldfish), 76. **Veiltails:** 1, G. J. Bennett (Northern Goldfish), 85. **Fancy goldfish, fantails, orandas, lionheads:** 1, Mrs. C. Kelly (Belle Vue), 81; 2, W. Ramsden (Northern Goldfish), 79; 3, J. H. Hood (Tyneside), 74. **A.O.V. coldwater:** 1, R. Gaskell (Northern Goldfish), 79; 2, H. H. Charlton (Northern Goldfish), 73; 3, H. H. Charlton (Northern Goldfish), 70.

Guppies: 1, G. Unsworth (Ashton), 75; 2, S. G. Stevens (Isle of Wight), 72; 3, B. E. Morris (Stretford), 69. **Livebearers:** 1, J. Taylor (Blackpool), 81; 2, J. Bower (Mansfield), 80; 3, C. Walker (Ossett), 79. **Angels:** 1, F. Partington (Middleton), 86; 2, C. R. Wilson (Bradford), 78; 3, L. Lewis (Burnley), 75. **Dwarf cichlids:** 1, S. Fleming (Sheffield), 79; 2, G. Holmes (Bradford), 78; 3, R. Smith (Accrington), 72. **Cichlids:** 1, F. Flitgarr (Derby), 84; 2, S. Wade (Attenborough), 79; 3, F. Proctor (Burnley), 75. **Fighters:** 1, C. R. Wilson (Bradford), 75; 2, L. Strapps (Salford), 73; 3, A. Fleming (Sheffield), 72. **Gouramis and paradise:** 1, J. P. Williamson (Salford), 80; 2, G. W. Cooke (Dewsbury), 78½; 3, D. Corrigal (Tyneside), 77½. **Barbs:** Mr. and Mrs. Swanson (Merseyside), 78½; 2, C. Wood (Nottingham), 78; 3, R. Collins (Ossett), 76½. **Characins:** 1, Mr. and Mrs. Swanson (Merseyside), 86; 2, R. Collins (Ossett), 82; 3, L. Lewis (Burnley), 80. **Carps and minnows:** 1, C. Walker (Ossett), 90; 2, N. Booth (Bradford), 82; 3, K. Calton (Sheffield), 79. **Catfishes:** 1, T. H. Bannister (Accrington), 79; 2, G. Taylor (Bradford), 75; 3, T. H. Bannister (Accrington), 73. **Egglaying tooth carps:** 1, F. Partington (Middleton), 81; 2, L. Lewis (Burnley), 80; 3, F. Moorhouse (Bradford), 77. **A.O.V.:** 1, J. E. Shore (Ossett), 86; 2, J. Hodgson (Accrington), 81; 3, C. Walker (Ossett), 77.

Breeders (Eggla yers): 1, J. Thorington (Dewsbury), 82; 2, F. Partington (Middleton), 80; 3, M. Dyer (Nottingham), 78. **Breeders (Livebearers):** 1, J. E. Shore (Ossett), 86; 2, R. W. Parker (Accrington), 79; 3, R. Revel (Middleton), 76. **Breeders (Coldwater):** 1, G. J. Bennett (Northern Goldfish), 86; 2, R. L. Howarth (Northern Goldfish), 78; 3, J. H. Hood (Tyneside), 72.

Plants: 1, R. Winterburn (Bradford), 94; 2, R. Winterburn (Bradford), 91; 3, Miss Lindley (Nottingham), 90.

Special prize for the neatest and most attractive stand was won by Dewsbury and District A.S., with Sheffield and District A.S. second.

Please turn to page 160

Dr. J. F. Wilkinson, president of the Federation of Northern Aquarium Societies, presented the prizes. Mr. C. Walker (right) is seen receiving the Daily Dispatch Challenge Trophy for the best fish in the show

Best furnished aquarium entered by a society was that from Sheffield and District A.S., and Dr. J. F. Wilkinson (right) is here awarding the Cussons Challenge Trophy to the Society's representative

Fourth in the competition for the special prize for the best-staged Society exhibit was Stretford and District A.S., part of whose neat stand is shown above

Central exhibit in the Accrington and District A.S. display was a tank with above-water scenery

Blackpool and Fylde A.S. were awarded third prize for their staging of aquaria

The City of Salford A.S. colourful crest surmounted the Society's compact exhibit

First award for staging went to the modern and smart stand of Dewsbury and District A.S.

Society members provided an advisory service for visitors at the stand of the Fancy Guppy Association throughout the show

Original but not prizewinning was the display of Belle Vue A.S., which took the form of a castle with drawbridge and portcullis

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

Training of Judges

THE tropical fish-keeping hobby is still so young in Britain that the first generation of judges, many of whom are still officiating, were promoted by popular demand.

They became judges because they had the necessary self-confidence and personality, had opportunities to express their opinions, saw plenty of fishes, gained experience, became better known and were increasingly called for. No doubt their initial experience was gained in their own clubs.

While it is now possible for established judges to estimate the abilities of the newcomers, the above-mentioned processes have still to be followed by those intending to become competent judges.

The Federation of British Aquatic Societies had a scheme by which volunteers were examined at a series of meetings and if a sufficient degree of proficiency was revealed the candidate was graded as either an A or B judge. An A judge was considered to be competent to deal with Open Shows. B judges were those found to have less ability but enough to judge minor shows.

Successful candidates were classified in one or more of seven categories: goldfish varieties; coldwater fishes other than goldfish; livebearers other than guppies; labyrinths; characins and barbs; other tropical fishes; furnished aquaria. The judging of guppies was conceded in the main to the Federation of Guppy Breeders Societies.

The scheme was found to have several shortcomings. Firstly, some of those living at a distance from the place of examination were unable to attend and so became excluded from the F.B.A.S. panel. Secondly, among those who achieved success in examination a series of permutations resulted: some A or B for all categories; some A or B for some categories; some a mixture of A and B in all or some categories.

Concurrently with the operation of the scheme it had become the general practice for judges to accept 15 shillings plus expenses for an engagement. The clubs, not surprisingly, favoured the A judges. Further, as most clubs have little money, they tended to engage one judge whose classification covered all the fishes in their show. Judges with mixed or part classification were under-employed. B judges were largely unemployed and all these were obstructed from gaining the experience needed for up-grading.

Alternatively, judges found themselves being invited to deal with fishes for which they had no grading. Usually they obliged, rarely failing to give satisfaction, and thereby became more experienced. In other words, we were where we came in and those able and prepared to gain experience in judging did so and became accepted, regardless of classification, among a growing number of clubs.

The F.B.A.S. found it necessary to discover a means to get more of its judges employed. The fee of 15 shillings was declared to be nothing sacred. The popular judges were encouraged to ask for a higher fee, at least for occasions that warranted it. In this respect some shows tended to be run on the cheap. At the same time Class B judges were encouraged to accept engagements for a more modest fee or no fee at all. Clubs were induced to regard these as serving an apprenticeship and several B judges have since been getting more engagements and this should help them towards having their grading reconsidered.

More recently the F.B.A.S. has agreed to invite member clubs to recommend people who they consider to be competent to act as judges. Such recommendations are considered and Class B grading may be granted forthwith. It is hoped that clubs will keep the Council informed of all Class B judges' progress so that when there is sufficient evidence of increased ability an acceptable means can be devised to effect promotion to Class A. This may involve B judges scrutinising entries in open shows and revealing their findings to the official judges present so that progress can be estimated. This, of course, could only be possible with the consent of all concerned.

In the last analysis it is the clubs who decide who is competent and who is not. If the clubs make well-considered recommendations for appointment to Class B and if the clubs will provide opportunities for experience to be gained we should soon have an adequate number of judges capable of undertaking any engagement.

The F.B.A.S. does not claim to have found all the answers to the problem of how to develop and promote acceptable judges of aquarium exhibits. I would submit that a not unimportant consideration is our state of mind. We are, presumably, in the organised hobby because it gives pleasure and an opportunity to meet people with similar interests. We like so much our fishes, plants and aquaria against others. Which is the better will always, to some extent, be a matter of opinion. If infallible devices could be invented to measure the qualities of our specimens a lot of the fun would go out of this aspect of the hobby.

A tolerant and helpful attitude among all concerned is the prime necessity.

FRANK STONE,
Chairman,
Federation of British Aquatic Societies.

I AM pleased that, contrary to his customary practice, Mr. Kelly did follow up my letter in your June issue, because I feel that his original article could have shaken the confidence of exhibitors and they must be reassured.

The present system of appointment to this list was in operation many years before Mr. Kelly raised the subject in February at the F.N.A.S. meeting, and it has produced many first-class judges in the past.

I accept Mr. Kelly's assurance that his barbs were not aimed at me, but he must remember that I have worked as co-judge with most of the others on the F.N.A.S. list and I can assure all interested parties of their capabilities. I am proud to have worked with them, and have much to thank them for.

There must always be a 'freshman' in the ranks to fill the empty places left by the retiring old hands, but their further training and testing is already in good hands. I can speak from experience. I still maintain, therefore, that Mr. Kelly did rush in with a lot of questions which he should have been able to answer to complete his article.

With regard to the training scheme Mr. Kelly hears about, I must say that although I was invited to take the chair, all the credit for this is due to the progressive Bradford Society, and the progress made does serve as an illustration of how good judges are made.

J. M. Skinner,
Nr. Wakefield, Yorks.

Reflector for Top-lighting

SOME time ago I painted my community aquarium blue and its stand and cover pink, which looked very nice. However, with the inside of the cover pink, I found that my plants were not growing very well. I hit on the idea of using some of my wife's tin-foil, which she puts over the meat in the oven, to line the aquarium cover and I find it very good, both in colour and strength. My plants are now growing very well, and I would like to pass on this information to fellow aquarists.

W. D. Ross,
Newcastle, Staffs.

F.B.A.S. Standards

THANK you for publishing my letter about the F.B.A.S. Guides and Standards. The response from your readers confirmed my suspicions that a large number of aquarists were unaware of these publications.

At a recent meeting of the Federation Council, it was decided to sell at a reduced price (7s. 6d.) a limited number of complete sets of Guides and Standards, in the loose-leaf folder, which are slightly stock soiled.

J. A. Horne,
93, Bedwardine Road,
London, S.E.19

Fishing Birds

I WAS much interested in your correspondence on owls and pond fish. A friend of mine bred some goldfish in a tub at the end of her country garden this spring. Puzzled by the gradual disappearance of her young fish she kept watch on the tub from her kitchen window. She observed a magpie actually taking fish. I have examined the adult female fish, which has a neat notch out of her tail. I take this to be further work of the magpie!

M. E. Sibb,
Godstone Green, Surrey.

Terrapins in Winter

PLEASE give me some advice on wintering baby terrapins. Mine are *Clemmys caspica*. Some books recommend hibernation for this species, but this seems rather risky to me.

J. Sumpter,
Portsmouth, Hants.

Robert Bustard writes: The safest method with any baby-size or small terrapins (with a shell length of below 3 in.) is to keep them indoors in a heated aquarium during their first winter. The water should be heated to around 70° F. (21° C.) and a 60 watt light bulb should be suspended 6-9 in. above the basking site. Water depth of 6 in. is suitable for most species and stones should project out of the water, allowing easy access to a flat dry stone for basking purposes. *Clemmys caspica* is a hardy species and I have successfully hibernated several specimens with a shell length of 4 in. out of doors in Scotland. An outdoor pool must have a portion with a depth of at least 2 ft., so that they can hibernate underneath the ice. Ponds should not contain dead or decaying leaves as these can give rise to toxic substances which may prove fatal, especially during prolonged freezing of the pond surface. In Scotland I bring indoors all American terrapins and keep them warm during the winter months but many species when larger have been successfully hibernated out of doors in pools, as described above, in the south and even the midlands of England.

An Unlikely Tale

'TIS said that a little learning is a dangerous thing, and this is amplified by a recent article in a Scottish daily newspaper, the editor of which informs me that its author is a University lecturer. The article said that the life of a goldfish can be prolonged by shortening its tail by immersion in hydrogen peroxide or in Lysol: "Your pet's tail will slowly vanish and you may put years on his life!"

As I am the "expert" (?) who replies to queries from readers in a Scottish weekly journal, much of my time is taken up in correcting wrongful advice that appears from time to time in local and national newspapers on the subject of pets. For instance, one of these papers told a reader that if she put a snail in the globe with her goldfish she would never need to change the water.

One of the things that amuse me is that while newspapers publish the misgivings of other people, they are most reluctant to publish corrections of their own errors, and the cutting I send you is a very mild published version of the letter I sent to the editor on the subject of docking goldfish's tails.

One shudders to think what the result would be if every little boy or girl who had a pet fish, or experts for that matter, followed the article's advice. Obviously the learned lecturer did not know or apply Emerson's "The wise man is the man who knows what he does not know and is willing to admit it".

Andrew Wilson,
Glasgow, C.1

British Aquarists' Festival 1962

continued from page 157

Blackpool and Fylde A.S. third and Stretford and District A.S. fourth. The Rowe Shield, presented for inter-society competition between Lancashire and Yorkshire, was won by Lancashire. Special prize for the society winning most awards went to Northern Goldfish and Pond-keepers Society and the trophy for the individual gaining most awards was won by C. J. Bennett (Northern Goldfish).

Results of the Percy Cappey Association Show held at the B.A.F. by courtesy of the F.N.A.S.) were: Males: Fantail, Multicolour and Delta, V. Partington, (Lancs.); Plagtail: H. Blackwell (Penrose); Swordtails: Colour Class, B. Beresford and J. Jeffry (Lancs.); Colletails, C. Powell, (Radlett); Females, Original, Superba and Scalloptail, W. G. Phillips (Radlett); Wedgetails, P. Scott (Lancs.); Coloured, C. Chee (Radlett); Junior Class, A. Lawrence (Penrose); Ladies' Class and Breeders' Pairs: C. Kelly, Breeders' Team, W. G. Phillips (Radlett). Mrs. G. Kelly won Best Fish in the Show award and became the first European to be awarded the Champion Medal from U.S.A. The Collins Cup for the section whose members won most awards went to Lancashire.

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.

THE **Coventry Pool and Aquarium Society** table show resulted as follows: [illegible]

* * *

RECENTLY the **Thorne A.S.** enjoyed watching a series of slides loaned from the Hendon Society.

The result of the table show for Danios was: [illegible]

* * *

THE results of the **Bradford and District A.S.** open table show were as follows: [illegible]

* * *

A TREASURE Hunt was promoted recently by the **Belle Vue Aquarium Society** in the grounds of Belle Vue Zoological Gardens. [illegible]

* * *

FOR the first time in more than two years, inter-club table shows have been held by the **Uxbridge and District A.S.** [illegible]

* * *

THE first open table show of the **Nottingham and District A.S.** was held in conjunction with the North Midlands Section of the F.G.B.S. [illegible]

* * *

THE **Leeds and District A.S.** held their annual show recently with the following results: [illegible]

* * *

AT the **Freelance A.S.** second annual general meeting, [illegible]

* * *

AT their October meeting, the **Bedford and District A.S.** were hosts to Northampton and Corby, fellow members of E.M.A.A.S. [illegible]

* * *

AQUARIST CALENDAR

1st December: Hendon and District A.S. Congress. Film and slide show with lecture by M. de Graaf, Curator of Artis Aquarium, Amsterdam, at Whitefields Secondary Modern School, Claremont Road, Hendon, London, N.W.4 at 6 p.m. Tickets 2s. 6d. (visitors 3s. 3d.) at the door or in advance from Mr. K. L. Purbrick, 3 Holme Way, Stanmore, Middlesex. Open to all aquarists.

PREPAID ADVERTISEMENTS

[illegible]d. per word (12 words minimum). Box number 2/- extra

FOR SALE

GLAZED aquaria in all sizes including 36 × 15 × 12, 7[illegible]s. [illegible]d.; 18 × 10 × 10, 17s. 6d.; 24 × 12 × 12, 39s. 6d., tanks despatched to any part of Britain, carriage extra. Plants, Accessories, Fish. Wright's, 10, Lorne Road, London, N.4. Phone Archway 3[illegible].

PERRY'S for Plants. 1st and 2nd Awards British Aquarists' Festival. Assorted selections Tropical or Cold 5s. 6d.; 7s. 6d., 10s. 6d. Val. Torta, Sagittaria Natans, 4s. per dozen. Cryptocoryne Cordata 1s. 6d. to 2s. 6d.; Willisii 2s. 6d.; Beckettii 1s.; Haerteliana 2s. 6d.; Seven assorted 10s.; Water Wisteria, Giant Hygrophila 2s. 6d.; Spatterdock 2s. 6d. each. Post 1s. All Advertised Accessories. C. R. Perry, Professional Aquarist, 615, West Street, Crewe.

WARDLEY'S Aquatic Foods and Remedies and T.F.H. Pet Books are available at YOUR local stockist, or you can obtain full details from sole U.K. distributors: T.F.H. Publications (London) Ltd., 59 Station Road, Redhill, Surrey.

WHITE WORMS, Culture and Instructions 2s. Compost 2s. 6d. Baker, 41, Barnhill Avenue, Brighton.

PERFECT Specimens, Line Bred Blue Scarftail Guppies 15s. per pair; Line bred Blue Fighters 15s. per pair; Madagascar Rainbows 4s. 6d. each, Butterfly Fish £1 each, carriage 5s. 6d. C. R. Perry, Professional Aquarist, 615, West Street, Crewe.

I.G.M. GRINDALWORMS, ever-ready source of live food. Culture; special food, compost and instructions 7s. 6d. complete.

CALLING ALL AQUARISTS. Call and see our large selection of Tropical and Coldwater fish, Plants in variety. We also stock all accessories at "The Aquarium," 192, Wellingborough Road, Northampton. Phone 3[illegible].

EASY TERMS. Extend your hobby the easy way. Air Pumps, Heaters and Thermostats, Filters, Breeding Traps, Nets, Thermometers, Frames and Stands and all accessories. Send a stamp for list "A" Joseph Sankey Ltd., Church Hill, Northfield, Birmingham 31. Phone PRIORY [illegible].

I.G.M. GRINDALWORMS, disease and pest free live food, give your fish the high glow of wellbeing.

AQUARIA FRAMES. For quality and accuracy buy direct from the manufacturer. 1 × 1 × ⅛ steel angle, 36 × 15 × 15, 28s.; 36 × 12 × 12 24s., 30 × 15 × 15, 23s. 6d., 30 × 15 × 12, 22s., 30 × 12 × 12, 22s. 6d., 24 × 12 × 12, 20s. 6d., also 18 × 10, 13s. 6d., 18 × 12, 15s., from [illegible] angle. All mitred and welds ground flush. Any size to order. Immediate despatch carriage paid. C.W.O. Money refunded if not satisfactory. For complete list, stands, shades, etc., S.A.E. J. E. Hanson, 52, Charter Street, Accrington.

I.G.M. GRINDALWORMS, from your dealer or post free if any difficulty, from E. L. Arnold, 80, Mimosa Road, London, E.7.

RUSTPROOFED Aquarium Frames, including bow and corner type. Ornamental Stands, Glazing Cement and Equipment Manufacturers—Westby's Barton, Ormskirk.

I.G.M. GRINDALWORMS, ideal live food for tropicals. Full of body building protein.

A CHRISTMAS PRESENT every month! Why not a year's subscription to the Tropical Fish Hobbyist—34/- including postage.

TROPICAL fish, fully guaranteed, over 100 species offered at lowest prices. All aquarists' requirements supplied. Personal shoppers only. Sterling Fisheries, 62, Mayes Road, Wood Green, N.22.

AQUARIA STANDS, Shades and Frames. Guaranteed square 1 × 1 × ⅛ ins. steel angle. Stands to take 2 tanks [illegible] × 12 × 36 ins. high, 30s.; [illegible] × 12 × 36 ins. high, 32s.; [illegible] × 12 × 36 ins. high, 36s.; [illegible] × 12 × 36 ins. high, 43s. Frames 24 × 12 × 12 ins. 20s.; 24 × 15 × 12 ins., 21s.; 30 × 15 × 12 ins., 23s.; 36 × 12 × 12 ins., 24s.; 36 × 15 × 12 ins., 25s.; 48 × 15 × 12 ins. [illegible] Steel angle [illegible]. Stand [illegible] × 12 × 36 ins. high, 60s. Aluminium Covers 24 × 12 ins., 18s.; 30 × 12 ins., 21s.; 36 × 12 ins., 25s. Covers despatched only with frames or stands. Any size to order. Money back if not satisfied. All Carr. Paid. C.W.O. Hockney Engineers, 30 & 32, [illegible] Street, Leeds, 1. Tel. 2[illegible].

GUARANTEED thermostat, heater and thermometer, 20s. post paid. State heater wattage. Sterling Fisheries, 62, Mayes Road, N.22.

THERE was a young lady from Ryde
Who complained that her fish always died.
Then she changed to McLynn's,
Now she breeds Harlequins
And shows off her trophies with pride.

WHITE WORM by weight—we produce the largest quantity in the Midlands. 1 oz. 4s., 4 oz. 15s., 8 oz. 28s. Live delivery guaranteed. Dore & Son, Dunford, Alcester Road, Portway, via Alve Church, Worcestershire. Wythall 2[illegible].

FANCY Goldfish fancy McLynn's fish food.

FISH HOUSE BRED. Neons, Glowlights, Angels, White Clouds, Guppies. Nights after 6 p.m. Sundays after 2 p.m. [illegible] Bury Road, Brightmet, Bolton.

WARDLEY'S give you quality, plus variety plus value—see October Aquarist for full list.

FOR a GOOD BETTA BEST feed McLynn's fish food.

TROPICAL, COLDWATER—Fish, Tanks, Plants, Heaters and Accessories. Bailey's Pet Store, 69, Southgate, Sleaford.

GUARANTEED Quality Plants—Ambulia, Hygrophila, Ludwigia, Hornwort, spiralis, torta, dwarf sagittaria all 6d., 5s. 6d. dozen; Hairgrass 6d., 5s. 6d. dozen; Indian fern, Cabomba, 1s. 3d., 12s. dozen; Water Wisteria, Giant Hygrophila, C. Haerteliana, 2s. each. Post 9d., all orders C.W.O. Over 120 varieties tropical and coldwater fish for personal customers only. Closed all Wednesday. Kingfisheries, 138, Croydon Road, Beckenham, Kent. Beckenham 3716.

WHEN IN STOKE visit Eventy's for tropical fish, plants and accessories. Finest selection for the aquarist in the Potteries. 18, Hartshill Road, Stoke-on-Trent.

CHRISTMAS is coming—what better present than the Encyclopedia of Tropical Fishes or Hans Frey's Illustrated Dictionary of Tropical Fishes. Both T.F.H. Publications of course.

TO South-West Tropical Aquarists. We can supply you with the best for your hobby. Healthy Fish, Plants and all equipment. Why not give us a call. Stevens Pet Stores, 30, Middle Street, Yeovil. 1679.

CHELTENHAM. Largest selection of Tropical and Coldwater fish in Gloucestershire. Equipment, Plants, Polythene, Plastic, Fibreglass Pools, Houseplants. Patricia Preece (Prop. Mr. B. R. James), Fisheries & Aquaria, 10, Suffolk Parade, Cheltenham. Tel. Chelt. [illegible].

TAYLOR'S AQUARIUM, 78, Manchester Road, Burnley. Tropical Fish in variety. Our top quality Plants gained for us 1st in Tropical Furnished Aquaria, British Aquarists' Festival, 1959.

WARDLEY'S sales in the U.K. have been increasing month by month for over two years. YOUR testimony as to their value.

LECTURE

WATER LILIES and garden ponds illustrated by best known collection of coloured slides on the subject. Bennett, Ornamental Pond Specialist, 52, Coombe Avenue, Weymouth.

PLAQUES, SHIELDS, ETC.

E. HOLTOM & SON, 309, Oldbury Road, Smethwick, 40. Plaques, Shields, Medals, Cups and Medallions for Aquarist and Bird Societies. Tropical and Coldwater fish centres in full colour. Write for details to above.

REPAIRS

GUARANTEED heater rebuilds, 5s. 6d. each. Send old heater and state wattage. New guaranteed heaters which will give long, reliable service, 7s. 6d. each. J. West, 7, The Drive, Welwyn, Herts.

WANTED

WANTED a few White Cloud Minnows with Blue tipped dorsal fins, good price paid. Renshaw "Seaways" Kings Ave. Skegness, Lincs.

COLOUR photos of fishes wanted by AQUATIC LIFE, oldest Aquarium magazine in English language (1915). Baltimore 6, Md. U.S.A.

WANTED. Young, dark Indian Pythons, cash or exchange. Robert Golding, 39 Redcatch Road, Knowle, Bristol 4.

TACHBROOK TROPICALS

244 VAUXHALL BRIDGE ROAD, LONDON, S.W.1

Telephone: VICTORIA 5179

SUGGESTED CHRISTMAS GIFTS

AERATORS (Vibrators)

Summit	£1 1 0
Model D. Mark II	£3 7 6
Prockter	£3 5 0
Airstreme	£1 5 0
Fairy	£1 7 6
Star	£1 16 0
Silenta	£2 15 0
Zoobeko	£2 6 0
Perfecta	£1 17 6
Aquazon	£10 0 0
Biko	£4 15 0
German Minor	£1 10 0
Montrose Minor	£1 1 0
Montrose Major	£1 4 0

BOW FRONTED AQUARIA (Angle Iron)

Complete Assembly of Tank, Stand and Canopy

24 × 15 × 12	£10 10 0
30 × 15 × 12	£14 0 0
36 × 15 × 12	£16 0 0
48 × 15 × 10	£21 0 0

Bow Fronted Bookcase

36 × 15 × 12	£19 10 0
48 × 15 × 10	£32 0 0

Aquarium Bookcase

36 × 15 × 12	£14 17 6

"PREMIER" BIOLOGICAL AQUARIUM FILTER

The most up-to-date method of Aquarium Filtration.

For 18" TANKS - 12/6

For 24" TANKS - 15/-

Other sizes available

AERATORS (Piston Pumps)

Hy-flo Junior (single piston)	£5 7 6
Hy-flo Mod. "A" (single piston)	£6 10 0
Hy-flo Mod. "B" (double piston)	£8 5 0
Hy-flo Mod. "C" (fish house model)	£12 10 0

FILTERS

Internal Corner Filters	4 6
Slim Jim External Filters	17 6
Klear King External Filters	£1 2 6
Ornamental Rock Filters	17 6
Michael's Undergravel Filters	8 6
Hykro Bottom Filter	13 6
Hykro Junior Bottom Filter	5 0
Growell Botcom Filter	8 6
Windmill Regent Internal Filters	10 0
Windmill Consort External Filter	19 6

ANGLE IRON TANKS

18 × 10 × 10 in.	£1 10 0
18 × 12 × 12 in.	£1 15 0
24 × 12 × 12 in.	£2 7 6
24 × 15 × 12 in.	£2 12 6
30 × 15 × 12 in.	£3 7 6
36 × 15 × 12 in.	£4 0 0
36 × 15 × 15 in.	£4 15 0
48 × 15 × 12 in.	£5 10 0

STANDS

18 × 10 × 36 in.	£1 7 6
18 × 12 × 36 in.	£1 12 6
24 × 12 × 36 in.	£1 17 6
30 × 12 × 36 in.	£2 7 6
36 × 12 × 36 in.	£2 15 0
36 × 15 × 36 in.	£3 10 0
48 × 12 × 36 in.	£3 12 6

PRESSED STEEL

10 × 7 × 7 in.	10 0
12 × 6 × 6 in.	10 0
14 × 9 × 8 in.	14 0
16 × 8 × 8 in.	17 6
16 × 10 × 10 in.	£1 0 0
18 × 10 × 10 in.	£1 5 0
18 × 12 × 12 in.	£1 10 0

VICTOR ALL OVER BACK LIGHT SHADE

18 × 10 in.	£1 1 0
18 × 12 in.	£1 3 6
24 × 12 in.	£1 5 0
30 × 12 in.	£1 10 0
30 × 15 in.	£1 13 6
36 × 12 in.	£1 16 0
36 × 15 in.	£1 17 6
48 × 12 in.	£2 0 0

DO YOU KNOW?

WE KEEP ALL THE LATEST EDITIONS OF AQUATIC BOOKS

Illustrated Dictionary of Tropical Fishes (Frey)	65/-
Encyclopædia of Tropical Fish (Axelrod)	60/-
Exotic Aquarium Fishes (Innes)	84/-
Diseases of Fishes (Duijn)	14/6
Tropical Fish as a Hobby (Axlerod)	39/-
How to Keep and Breed Tropical Fish (Dr Emmens)	32/6
A Manual of Aquarium Plants (Roe)	7/6
Guide to Tropical Fishkeeping (Brymer)	35/-
Saltwater Aquarium Fishes (Axlerod)	32/6
Tropical Aquarium Fishes (Gwynne Vevers)	9/6
Complete Guide to Tropical Fishes (Schneider & Whitney)	63/-
All About Tropical Fish (McInerny)	75/-
Starting Right with Tropical Fish (Gannon)	6/-
Starting Right with Goldfish (Gannon)	6/-
All About Aquariums (Schneider)	6/-
All About Breeding Tropical Fish (Schneider)	6/-
All About Guppies (Axlerod & Whitern)	6/-
Color Guide to Tropical Fish (Axelrod)	32/-
Tropical Fish (T. F. H. Pubs.)	15/-
Electricity in the Home (Warburton)	7/6

POST!!!

ALL PARTS OF THE U.K.

ALL PARTS OF THE WORLD

WE OFFER YOU A POSTAL SERVICE SECOND TO NONE—PROMPT AND EFFICIENT—ALL ORDERS ARE ATTENDED TO ON THE SAME DAY AS RECEIVED. IMMEDIATE NOTIFICATION GIVEN IF ANY DELAY IN DELIVERY

Shirley Aquatics Ltd

WATER PLANT NURSERIES AND FISH HATCHERIES—Phone: SHIRLEY

Stratford Road, Monkspath, Shirley, Solihull, Warwickshi

NOVEMBER/DECEMBER SPECIALS

PRICES UNTIL XMAS ONLY AND SUBJECT TO STOCKS LASTING

AQUARIUM PLANTS (Tropical)

MADAGASCAR LACE PLANTS
Good Plants in Leaf 15/-
Sprouting Rhizomes 10/6 each, 4 for 30/-

CRYPTOCORYNE APONOGETIFOLIA
(Syn. *C. USTERIANA*)
Beautiful Strap-Like Crinkled Leaves Reach a Length of 15"—18".
12/6 each **3** for **30/-**

APONOGETON ULVACEOUS
(The true species from Madagascar)
This is The King of Aponogetons
Large Plants in Leaf **12/6**
Sprouting Rhizomes **10/-** each (**3** for **25/-**)

ECHINODORUS LONGISTYLUS
Melon-Leafed Sword Plant
A few good plants of this variety
20/- each

ECHINODORUS GRANDIFLORUS
Good plants **20/-**
Small plants **10/-**

Echinodorus Cordifolius
7/6 each

Straight Vallisneria
(large plants)

CRYPTOCORYNE GRIFFITHII
7/6 *each* 3 *for* 20/- 6 *for* 30/-

TROPICAL FISHES

CARDINALS 7/6 each 6 for 40/-

NEONS 3/6 *each* 4 for 11/6 8 for 20/- 20 for 45

CATFISH
PALEATUS 6/- AENEUS 6/-
MELANISTIUS 7/6 LEOPARD 8/6

Red-tailed Black Sharks 10/-

HEMIGRAMMUS MARGINATUS
5/- each 7 for 30/-

LIVEBEARERS
GREEN SAILFIN MOLLY ... ... 5/- & 7/6
TUXEDO SWORDTAILS 7/6
ATLANTIC PLATY 5/-

CICHLIDS
TEXAS CICHLIDS 7/6
SEVERUM 7/6
BLUE ACARA 2/6 *each* ... ... 5 *for* 10/-
FIREMOUTHS 3/6 *each* ... ... 5 *for* 15/-
**ADULT DISCUS* £6.0.0
**ADULT ANGELS* £3.0.0
**LARGE ANGELS* 10/-
**Notice Needed to Catch*

MANY OTHER SPECIES OF FISHES FOR CALLERS

PLEASE NOTE: ORDERS CANNOT BE POSTED BETWEEN DEC. 20th & JAN. 1st

PLEASE NOTE—All enquiries requiring a reply MUST be accompanied by S.A.E. Our premises are situated on the main Stratford-Birmingham road, 8 miles from Birmingham, Midland "Red" Bus No. 150 from Bull Ring, Birmingham, passes the door; alight at "The Crown," Monkspath.
HOURS OF BUSINESS—Weekdays 10 a.m.—6 p.m. Sundays 10 a.m.—12.30 p.m. (Sunday Afternoons May–July Only)
CLOSED ALL DAY EVERY MONDAY

TERMS OF BUSINESS—Cash with order please. Fish sent by rail. Tropical minimum order £5, insulated container and carriage 10/-. Coldwater minimum order £2 plus 10/- van and carriage. Plants by post (minimum order 10/-) please add 1/6 post and packing.

Printed and Published by BUCKLEY PRESS LIMITED, London and Brentford