

The Aquarist

and Pondkeeper

AUGUST 1966



MONTHLY
Vol. XXV No. 5

TWO SHILLINGS AND SIXPENCE

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£1

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12 Vallneria
6 Myriophyllum
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6 Elodea Denia
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1 Amazon Chain Sword
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Glass Amazon
Sword Plants 4-8 inches

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Water Lettuce
Very beautiful plants

2/6
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50 plants including Marginals

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20 Pond Plants
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Algae eating
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OUR COVER—*Angelic tris*

VOL. XXXI No. 5

1966

Plague hits Irish fish

by P. F. CAPON

REPORTS from Ireland speak of a new disease that has hit the major angling rivers. The disease which has reached plague proportions has hit salmon and sea trout, virtually wiping out these important sporting fish.

The disease first appeared at Waterville in County Kerry in 1964 and has spread this spring to many other salmon rivers; in May 1966 it was reported to be present in the Shannon, the longest river in the British Isles. The disease has so far been reported from thirteen of the Irish Republic's thirty main rivers.

At present the disease appears to be limited to Ireland but it can only be a matter of time before it reaches the United Kingdom. It could be carried to this country by unsterilised angler's tackle, aquatic birds, or even by infected fish being imported as food. The Ministry of Food has refused to ban imports of Irish salmon "until the risk of spreading the disease is established." This attitude is very short-sighted for what is the point in allowing the disease into our waters before halting the flow of salmon into this country?

Once the disease reaches our shores, if Irish experience is anything to go by, it will spread rapidly.

It has been suggested that the disease may be carried to the feeding grounds that are common to all Atlantic salmon; these feeding grounds are off the coast of Canada and Greenland. As yet this has not happened or the disease would be in evidence in the rest of Europe and North America. It is to be hoped that salt water forms a natural cleansing agent for the fishes.

The disease appears to start as soon as the salmon start to run up the rivers to spawn. As they enter the estuaries

Continued on page 90

The European Tree-frog

by ERIC GILLINGHAM

IN the February issue we embarked upon a brief survey of our native *Urodela*. I now propose that we forage for a while among the *Anura* or tailless batrachians.

As far as the British Isles are concerned, our choice would be limited to five species, all of which are a little on the large side and are inclined, on this account, to be by-passed by practical vivarium keepers. For those fortunate enough to be able to maintain garden ponds or at least outside enclosures, all of these (with, perhaps, the partial exception

of the more recently-introduced *Rana risibundus*) are quite easily maintained, of course. However, for the benefit of those who contemplate keeping frogs and toads in vivaria under living-room conditions, it may be advisable to concentrate rather upon the smaller and more readily obtainable of the European varieties.

The first one of these which springs to mind is the ubiquitous little European tree-frog, *Hyla arborea*. This cheerful little batrachian is always on the market at this



Hyla arborea (female)

Full-face view even when they are not in an inflated state. Water quarters for prospective couples are best provided by the use of the old-fashioned plastic tin. Set up one of these by layering it with three or four inches of dead leaves or peat mould and sprinkle a further inch or so of soft, wet humus on them before topping off with a fairly large lump of growing turf. It is quite unnecessary to fiddle the lid with punctures intended to facilitate respiration; all the ventilation required may be provided by punching one or two small holes in each corner of the lid. Remember that once the inmates have settled down under the leaf-mould their oxygen intake via the respiration hemoforward will be through the skin—hence the necessity of maintaining a considerable degree of humidity together with a constant and rather low temperature. For this reason alone an airtight cupboard is obviously the very best place in which to deposit the box; a cool-cellar, coal-bed or any place which will not be touched by the fumes of actual fires—conditions is ideal. No detachment of any kind can withstand frost. However, you will need to provide a constant low temperature of around 40 to 50° F. By mid-March, and certainly no later than the second week of April, recover the tin from its winter niche and place it in some position where it is likely to warm up gradually.

Now is the time to prepare a suitable tank, the usual rectangular, iron-framed variety being quite suitable as long as it is fitted with a cover. Do not put water into the tank at this stage. Carpet the floor of the tank with living twigs and introduce a flower pot filled with soil and planted with some sprigs of any available plants which are bearing leaves (prayer will do and need not be actually growing). Do not supply any food as it will be ignored. When set up, the tank's interior should be sprinkled with water at room temperature several times a day and especially just before night. A small watering-can or, better still, an atomiser or scent spray, will be useful for this purpose. Continue with this treatment until the claspings of the males in the rostrum fall to a fresh tank containing a little water (some six inches depth is enough) and as much water-weed as you require. As soon as amples takes place, remove the rostrum and the claspings of the males in the rostrum. A small watering-can or, better still, an atomiser or scent spray, will be useful for this purpose. Continue with this treatment until the claspings of the males in the rostrum fall to a fresh tank containing a little water (some six inches depth is enough) and as much water-weed as you require.

have already stated, quite unrealistic of anyone not owning a large glasshouse which he is willing to devote to this endeavour, to attempt to rear a sufficiently heavy concentration of *Drosophila* (the little fruit-fly which often infests beer-cellar and places where fermentation takes place) which are essential if you contemplate the rearing of a large number of these tadpoles through their metamorphosis and, subsequently, through their next two years in maturity. It is therefore desirable, having selected (in restricted numbers according to your capacity) those individuals which you prefer, to release all newly metamorphosed frogs in some locality where they may be accorded a chance of survival. Remember: "Hambles are Best!" Areas which are profusely covered in blackberry bushes and which possess also a few handy drainage ditches, are most suitable for this purpose.

can muster at this time of year. Do not be disappointed if the primary reaction is to separate and immediately scramble out of the water—the plain fact is that tree-toads actually drink water (or rather—swimming) at any time other than the few hours in the year necessary for the fertilisation and deposition of spawn. When the spawn appears it is at first very insignificant but it soon swells out in small, almost globular, masses about the size of a golf-ball. It will immediately be seen upon hatching that the rather greenish tadpoles are noticeably more slender than those of the common frog and, naturally, they are much smaller. Thick tails are very long and quite a sharp point. They are, in common with all batrachian larvae, quite easily carried for quite a sharp point. They are, in common with all batrachian larvae, quite easily carried for quite a sharp point. They are, in common with all batrachian larvae, quite easily carried for quite a sharp point.

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Mysis arborea (male)



After this it is as well to "spoon" your clean water with ment for the first few weeks. will provide sufficient nutrients for the first few weeks. After this it is as well to "spoon" your clean water with ment for the first few weeks. will provide sufficient nutrients for the first few weeks. After this it is as well to "spoon" your clean water with ment for the first few weeks. will provide sufficient nutrients for the first few weeks.

Pond for a small garden

by JOHN KEITH



A cross-sectional view of a pool that has solved the problems of an aquarist.

ARE you a member of that growing group of aquarists who long to be the proud owners of an outdoor pool but feel that because they live in a city restrictions on space or lack of a garden make their aspirations impossible? If you do fall into this category then take heart—I was in a similar predicament. Now, my small water garden out of doors is thriving.

I possessed one tank of tropical fish and two coldwater aquariums. But being a true aquarist I was not satisfied and wanted to extend my hobby even further by enjoying the pleasures of an outdoor pool. A major problem that confronted me, however, was that the small piece of garden adjoining the house was already stocked and planted with flowers and bushes. If they were removed there would be strong words, to say the least, from another member of the household! I pondered over this for weeks. Then when I discovered a solution it was so simple I almost felt as if I could kick myself.

I obtained a second-hand china bath—they are freely available from scrap merchants at very reasonable prices—measuring 54 inches in length, 20 inches deep and 24 inches wide. It had a few small cracks in it but this problem was soon overcome by the use of one of the high quality glues which one can buy from any reputable handicrafts store. If glue does have to be used for this purpose it should be applied externally and worked well into the cracks. This work should not be carried out inside the bath as any resultant toxins could prove harmful, if not fatal, to fish and plant life introduced later. A rubber plug is the obvious solution to making the plug-hole of the bath watertight, but I found that clay suffices just as well.

As soon as the bath has been rendered watertight, cleaned and swilled, it is time for placing it in the required position. I chose a site so that the bath was in contact with, and parallel to, a six-foot high wall which served as a protective

barrier without robbing the pool of several hours sunshine each day. The bath was standing on a concrete floor and because of its two base "feet" it was quite secure but bricks placed under the base would serve the same purpose. With the aid of friends and a few trips to a gardening shop, I was able to gather enough soil to make a bank around the bath to provide the basis for a natural setting of waterside plants and shrubs.

I prepared a two-inch bed of sand and gravel on the bottom of the bath as a planting medium. After filling the bath to a level of about six inches I planted several *Vallisneria* and *Elodea* making sure that I left part of the base clear of plants so that a small tub to house a water-lily could be introduced later. Then I filled the bath completely and set to work in an effort to beautify the surrounds. On this sloping bank I planted some Reed Maces and Water Irises (the latter since having spread prolifically, I might add). An attractive rustically designed wooden fence was erected around the perimeter of the newly-made pool and its surrounds.

After three weeks of allowing Nature to take its own course I introduced a pair of low-price common goldfish. Both of them thrived and the pool now houses in addition a pair of Golden Orfe, a Tench and a Carp.

I would say categorically that a domestic bath with minor modifications is the answer to the problem of the city dweller who would like to own a small pool but sees the prospect full of difficulties. A bath has many advantages over an excavated concrete pool not least the fact that it will not crack in winter and also that trouble with uncured cement is obviated. Further, of course, a second-hand-bath is far cheaper than a pre-moulded plastic pool. The progress of my pool is remarkable. Both plants and fish are thriving. It has proved to me, at least, that the delight of the aquarist need know no bounds.

Plague hits Irish fish (continued)

by P. F. CAPON

a cotton-wool like growth appears on their mouth region and gradually extends to cover their head and eyes. The growth then proceeds to infect the fins and tail and in the final stages the body is almost completely covered. One angler describes the fish as looking as though they have been "plastered with white-wash."

The first stages of the disease appear to irritate the fish and make them abnormally restless. In the latter stages the fish drift into the bank and can easily be removed from the water by hand as they offer no fight at all. During all stages of the disease the fish refuse all food no matter how tempting. They eventually die from the disease and are to be found floating on the surface of many Irish rivers.

The disease is causing controversy amongst ichthyologists who specialise in fish diseases. One Danish expert has identified it as *colossaris*, a bacterial disease well known in American and certain parts of Europe. However, an American expert who is familiar with this disease in American fish hatcheries and who visited Ireland last year, says that *colossaris* is not the causative agent of the plague affecting the Irish fish. To confuse the matter even further an Irish veterinary worker has isolated an organism similar to, but distinct from, *colossaris*.

Aquarists, particularly those in Ireland, should take extreme care to prevent spreading the disease when collecting live food and plants. Better still, any contact between potential sources of infection and aquaria should be regarded as strictly taboo for the disease appears so virulent that it could wipe out a tank of fish in a matter of days and a trade establishment could suffer untold financial loss, and loss of goodwill that has taken years to build up by a chance infection from the wild.

I hope that I am painting the picture blacker than it really is but should this infection be as bad as reports from Ireland would have us believe then its introduction to the aquarium world could set the hobby back many years.

Whatever the disease turns out to be it appears to be similar to *colossaris* so that a description of that disease would be of interest to aquarists.

Colossaris is better known to aquarists as "cotton wool disease" or mouth-fungus. It is not strictly speaking a fungus but is caused by a slime bacterium called *Clavibacterium colossaris*. The disease starts as a fungus-like growth on the mouth. Fishes with this disease often become quite sluggish. This disease is highly contagious.

According to Axelrod (1) the disease also attacks the fins and body; he also states that the disease used to be common in mollies when they were shipped from Florida in metal cans. On arrival in other parts of the United States their mouths were almost always injured and the disease was able to take hold. Since the advent of polythene the

disease has become far less common.

Van Duin, jr. (2) states that when *colossaris* attacks a fish the whole frontal portion of the head is often eaten away before the fish eventually succumbs. Obviously, a fish in such a sorry state is wide open to attacks by other disease organisms which will make diagnosis difficult. Amongst the other diseases that will attack the fish will almost certainly be fungus which may explain the Irish fishes appearing "whitewashed."

For use with the disease in aquaria a number of cures have been suggested. Four grains of brilliant green in one U.S. gallon is said to be successful; this is used as a bath, the infected fish being immersed in the dye solution for forty-five seconds.

Swabbing the mouth or other infected parts with Lilly's tincture of merthiolate is said to arrest the disease very quickly; this drug is dissolved in water at the rate of one cubic centimetre to the gallon prior to use.

Hydrogen peroxide has been used by the author to cure two *Corydoras aeneus* of a form of mouth fungus (I was unable to identify the causative agent) by the use of 10 volume hydrogen peroxide. The use of this chemical for mouth fungus was described in my article on the chemistry of aquarium water (*The Aquarist*, April 1963, page 15).

Animal terramycin is stated to be the best material to cure the disease and should be used at the rate of 250 milligrams per 5 U.S. gallons; unfortunately, this drug is only available in the U.K. on prescription from a veterinary surgeon. Methylene blue is also stated to be useful.

From the above it can be seen that *Colossaris* is readily cured in aquaria but it is hardly practicable or desirable to dose the rivers of Ireland with, say, terramycin.

Let us hope that either this mysterious disease will simply run its course and die out, or that reports of its effects have been exaggerated.

In any case, the possibility of introducing disease from wild sources has, perhaps, been brought home to aquarists who have read this article. It is never a good idea to collect live food, plants or fish from wild sources to place with your aquarium fishes; you may get away with it for a time but in the end something will happen. Peculiar lumps may appear on your fishes; your fishes may die for unexplained reasons; you may introduce pests such as leeches, hydra or dragonfly larvae or a chance introduction of snail eggs on a wild plant may mean that all your choice plants are eaten away.

Disease and pests are introduced from the wild with great ease but eradicating them takes time and trouble—play safe, keep your fishes isolated from the wild sources of infection.

References:—(1) Diseases of Tropical Fishes by Dr. H. E. Axelrod
(2) Diseases of Fishes by C. Van Duin, jr.

Around the aquariums

by MIKE SHEEDY

A SURGEON performed a 90-minute operation as he stood knee-deep in water, his patient, a 250 lb. dolphin at Morecambe Corporation's Marineland. The delicate operation was decided upon after Wilma, the 10-year-old star performer, went off her food and became listless. Officials thought she had swallowed a brush dropped by a painter working on the dolphin pool. The water level in the pool had been lowered by 15 feet for the operation.

The dolphin's trainer, Pete Williams, could not bear to watch the operation and stayed behind the locked doors of the arena. Later the Town Clerk said: "No brush had been found."

Calling into the Marineland and Zoo at Cleethorpes the other day, I was surprised to find the place well crowded with visitors, especially holidaymakers. At the moment not many marine species are on view. The dolphins are no longer there and the large tanks are now standing empty. Later it is hoped to stock the tanks again and perhaps on a larger scale.

Not many fishes are on view at the moment but those that are will be seen at the entrance and also at the exit of the Tropical Bird House. Visitors will find a large collection of animals and birds and will enjoy the many concrete paths which go all around the zoo. The exhibits are in large well-constructed enclosures with plenty of space.

Among the exhibits will be seen the pheasant aviary, eagle aviary, owl aviary, sea-lions, seals, and many more which include a Pet's Corner and the ever-popular Children's Animal Farm. A very large cafe caters for almost all the visitor's needs and this is under the management of Mrs. Doreen Barry. Mr. Frank Reitz is no longer there as he has taken a new post in the Isle of Man. The man now in charge of the Zoo is Mr. Keith Reaney.

A most interesting collection of fish will be found at the aquarium in the Chevington Zoo. The collection is very representative of both tropical and coldwater fish, and, amongst many others, includes golden orfe, pike, carp, Siamese fighting fish, gouramies, swordtails, mollies, guppies, cichlids and the colourful tetras.

The brightly-lit, well-planted and heated tanks, look a picture and the enclosures for the pythons and lizards has been enhanced by murals (executed by students of the Kingston Art School) depicting the type of country in which the exhibits are normally found.

Calling on my old friend Mr. C. H. Keeling at Pan's Garden the other day, I dropped in at a very bad moment, for my good friend was giving a conducted tour of his zoo to a school party from Sheffield. However I had time to have a look around before I was joined by Mr. Keeling who showed me a new collection of fishes which he now has on

display. I have always admired his way of labelling his exhibits which makes the thing more interesting to the onlooker.

This season has been a good one so far for Pan's Garden, for they are getting a lot of school parties and every week the curator gives at least 10 to 12 conducted tours of the garden. He also tells me he is fully booked up with lectures for this coming winter and which will take him down to Bedfordshire, Staffordshire, Berkshire and Sussex.

Latest news from the Marineland at Morecambe is that the dolphin, which I mentioned at the beginning of this page, has died. It's a great pity, for she was a great performer and the star of the sea circus. I was watching her going through her tricks with her trainer Pete Williams only a week before the operation was performed on her. Pete will miss her very much for all trainers and presenters get very attached to their charges whether they be dolphins or lions.

As from July the entrance charges to the London Zoo and Whipsnade Park are to be increased. As a charity and a non-profit-making organisation, the Society has had to take this step because of increases in its running costs.

The last price increase for entrance charges to the London Zoo and Whipsnade Park was in January 1962. The new rates will be:

London Zoo:

Adults 7s. 6d. Previous charge 5s.

Whipsnade Park Zoo:

Adults 6s. 6d. Previous charge 5s.

London Zoo:

Children 4s. Previous charge 2s. 6d.

Whipsnade Park Zoo:

Children 3s. 6d. Previous charge 2s. 6d.

The Society intends to retain the now well-established cheap day on Mondays at both zoos, when the charges will be:

London Zoo:

Adults 5s. Children 3s.

Whipsnade Park Zoo:

Adults 4s. Children 2s. 6d.

The Zoological Society of London announced the appointment of John Malcolm Hime to be Senior Veterinary Officer stationed at Regent's Park.

Mr. Oliver Graham-Jones, the Society's present Senior Veterinary Officer, is leaving to take up a senior appointment at the Royal Veterinary College.

Mr. Hime qualified as a veterinary surgeon at the Royal Veterinary College in 1956. He entered general practice (mixed) that year. From 1957 until 1960 he was responsible for the small animal side of a mixed practice.

Continued on page 97



The Junior Aquarist

Pigeon-Holed Fishpond

by C. J. Robb

LONG ago, when we were all Catholics, every monastery and country house (especially those removed from the sea) had their fishponds to provide for the Friday dinner and other days of religious obligation. We find these ponds were situated in sheltered and sunny places within the cloister garth or garden. While a fishpond requires sunshine and light it also requires some shade and this point was considered by the pond-makers of old. We learn from the monuments that the Cistercian monks of Holy Cross Abbey, Ireland, constructed an oblong pond walled round with masonry. Above water level it was cobbled or set out course by course to cast a cool shadow where the fish could bask at any hour of the day in the shade, taking into consideration the position of the pond in relation to the cardinal points and the sun. This shading served the same purpose as the reeds and aquatic vegetation in the pond with earthen banks where fishes seek the coolness and spawn there.

A unique pond was constructed at Russborough, Co. Dublin, the home of the Earl of Milltown, in the mid-18th century. It was 40 ft. in diameter with a surrounding circular wall of brick. This wall had a 9 in. retaining wall built against the bank; then there was a cavity of 9 in. and an inner half-brick wall, pigeon-holed in every course to permit the fish to swim in and out of the cool cavity at any water level. The brickwork was built in hydraulic cement mortar and the wall was capped by a course of cut stone 2 ft. wide and bullnosed beyond the face of the pigeon-holed wall. Here we had an inner wall retreat in the cool for the fish all round the pond where they could go in and out at will. The pond makers in the days of old were indeed very skilled craftsmen who were versed in the nature and habits of fish.

Water Snails

by Cartwright Timms

MOST of us have a few snails in our tanks. We know that they are useful scavengers and that they devour the slimy green algae that grows on the glass sides.

Apart from that, snails do not interest us much. They are sluggish in their movements, apparently clinging to one piece of weed for hours on end. They certainly lack the beauty of some of the fishes that transform an aquarium into fairyland.

But let us not be too hasty in dismissing the snails. By giving them a little attention we shall find that they are creatures of great interest, fascinating in their structure and absorbing in their life histories. My own interest in snails dates back to my long-distant schooldays, when an obliging snail—species unknown, I regret to say—laid its eggs on the side of the glass jam jar that was my first aquarium. Watching the development of those eggs through a pocket lens was the beginning of a life-long interest in freshwater biology.

Only two classes of molluscs are found in fresh water, those with one shell, known as univalves which includes the snails and the limpets, and those with two shells, known as bivalves and including cockles and mussels. The pond snails belong to the *Gastropoda*, a word which is a combination of two words meaning belly and foot.

In this country we have thirty-six species of Gastropods, which vary greatly in their structure and habits. Most of them can be studied in the aquarium and probably the first thing that we shall notice, rather to our surprise, is that the snails are much more active than we had supposed. We shall see them constantly gliding over stones and among the weeds in search of the algae which is their chief food.



THE AQUARIST

Snails are not divided into clearly-defined segments as are the insects, the spiders and the crustaceans. It is true that the front part of the body has a pair of tentacles with eyes at the base and not at the tips and also a mouth, so that it is often called the head. That part of the body on which the snail glides is known as the foot, and both the foot and the head may be quickly withdrawn into the shell when danger threatens.

All the vital organs of the snail, the heart, the digestive system and the egg and sperm producing tissues are in that part of the body that is protected by the shell. Creatures like snails, slow moving and non-aggressive, could not hope to survive but for the ability to withdraw speedily into the protective shell. Just behind the mouth is a gland which exudes slime and it is this slime that enables the snail to glide with such apparent ease.

The mouth of the snail conceals a rasp-like tongue known as the radula. This is a ribbon-like arrangement bearing many rows of fine teeth, and as these teeth wear out they are replaced from behind by the radula growing forward. If one of the larger pond snails is devouring the green algae from the glass of the tank, it is possible with a pocket lens to see the radula rasping away at the slimy growth. At these times one sympathises with the gardener whose lettuces are devoured by the land snails.

The Gastropods of fresh water fall into two classes. One of these covers the gill-breathing snails which live mainly in the well-oxygenated water of fast-moving streams. In this class, except for one small family, both male and females may be found. The second class has no gills and must rise to the surface of the water to breathe. The snails of this class are hermaphrodites, each individual having both male and female organs and so able to lay eggs. Usually, however, eggs are produced as a result of mating in the normal way.

Probably the best-known pond snails belong to the genus *Lymnaea*. They have shells with a pointed spire and their tentacles are not retractile. The largest is *Lymnaea stagnalis* which has a shell two inches long. It is fairly common in the south and midlands, but becomes rarer as we go northward. A few years ago I collected regularly at a pond where this splendid snail was abundant. For some unknown reason the pond was filled in and I have to travel much further now to find *Lymnaea stagnalis*. This snail egg often be seen upside-down, gliding on the surface film of the water, much as a fly walks on the ceiling.

A much smaller snail is the Wandering Snail *Lymnaea stagnalis* which is probably the most common of all freshwater snails and which is found in lakes, rivers, roadside ponds and even in brackish water.

The Ram's Horn snails of the genus *Planorbis* are great favourites with aquarists. There are fourteen British species all having their shells coiled in a flat spiral. A peculiarity of this genus is that their blood contains haemoglobin and so is red in colour. This probably makes the blood more efficient as an oxygen carrier which helps their survival in stagnant water.

The largest species is *Planorbis cornus* which has a dark reddish shell more than an inch across. It is found in ponds, canals, lakes and slow moving rivers, and lays about sixty eggs at a time.

We have two species of the freshwater limpets. Both attach themselves securely to stones or plants and are only removed with difficulty. Although they are air breathers, they are able to live a lengthy period without air and may be watched for a long time before they are seen to rise to the surface.

At one time the study of snails meant collecting their empty shells and gummings them to a white card. In recent years biologists have become more interested in studying the living animal within the shell. And how better to do this than by observing them in the aquarium?

The Swordtail by M. J. Parry

THE swordtail (*Xiphophorus helleri*), one of the species of livebearing tooth carps, is probably one of the hardiest and most spectacular fish to be found in the home aquarium. The males, in particular, are most attractive with their long pointed swords and largish dorsal fins.

Nine colour varieties are widely available: the albino, Berlin, black, golden, green, red, red-eyed red, tuxedo, and wagtail. The original green swordtail, from which all colour varieties have resulted due to mutations and hybridisation, is native to the lowland streams of the Atlantic Drainage from Southern Mexico to Guatemala. The fish reaches an approximate body length of 4½ inches in the female, and 4 inches in the male, excluding the sword.

The main essentials to look for in potential breeding stock are good deep colours and good body shape, the female being slightly deeper bodied than the male. The pectoral pelvic and anal fins of the female should be well-rounded, whilst in the male the pectorals are rounded, the pelvic fins pointed, with the pointed gonopodium taking the place of the anal fin. The lower rays of the male's caudal fin extend to form a straight sword.

As all colour varieties of swordtails will readily interbreed it will be found a wise policy to house different colour varieties in individual aquariums.

Trout breeding at Nailsworth, Gloucestershire by R. D. Maynard

IT is not generally realised that Gloucestershire can boast of a trout farm where trout are bred to stock lakes, rivers and canals in many parts of Great Britain. Some even go to the Falkland Isles and Kenya. Not only is trout-breeding carried out on a big scale, but trout eggs are also much in demand. The eggs, 3,000 or so in each hatching-tray, are put in the hatchery which is a large underground cellar with a subterranean stream running into it from the Cotswolds. After three weeks the trout's baby eyes begin to show inside the egg. It is at this stage that the eggs are despatched to all parts of the world. They are packed in small calico trays, inside an aluminium box, and the whole thing packed with ice.

The eggs left in the hatchery hatch out on the 46th day in a 48 degrees Fahrenheit temperature. Great care must be taken to keep this temperature exact. These baby trout, known as alevins, first feed on the yolk of the egg, but after hatching out, they are fed six or eight times every day on minced liver which is almost like a pulp.

A strange thing happens about growth of the trout. In spite of having exactly the same food, the trout grow to different sizes, and they are graded into separate ponds, as the smaller trout would undoubtedly get eaten if they were not taken care of!

Now that angling is such a popular sport, some rivers have to be re-stocked several times in a year so the trout are in great demand.

There are a number of species, among which the Brown Trout is most common. Trout are easy to recognise by their speckled flanks, but the Rainbow Trout has a reddish iridescent band along its flanks and black speckles all over its body.

OUR EXPERTS' ANSWERS TO TROPICAL FISH-KEEPING QUERIES

Please tell me the country of origin, maximum size, disposition, and general requirements of a characin called *Dendrobia* (spelling?)

Strictly speaking, this uncommon fish should be referred to the family Cichlidae. It is native to the Congo and attains about 10 in. in length. It frequents the lower levels of the water and seldom, if ever, interests itself in other fishes. It is omnivorous by nature, and does well on a mixed diet of shredded meat, the usual live foods, dried foods and some vegetable matter such as soft algae and bruised or cooked lettuce or cooked spinach. Largish specimens like to nibble at the water plants.

I would be grateful for any information you can give me regarding the geographical range and requirements in the aquarium of the American cyprinodont scientifically known as *Chirotopis goodii*.

Chirotopis goodii, usually referred to as the bluefin, is found only in Florida. Its essential requirements in the aquarium are well-aerated and sediment-free water, a good light, and a temperature range of about 85°F. (18°C.) to 75°F. (24°C.).

After refilling my emptied aquarium with wormed water straight from the tap, most of the fishes I returned to it started rubbing their bodies against the plants and compost as though something were irritating their skins. Can you explain why they acted like this?

This phenomenon has been observed and commented upon many times in the past. As fish so troubled return to normal after a few days, it would seem that 'new' water does set up a temporary irritation of the skin. Anyway, it does not appear to be anything to worry about.

What is the scientific name of the porthole catfish, where does it come from, and is it harmless in a community tank?

The so-called porthole catfish is scientifically known as *Hoplosternum thoracatum*. This species belongs to the family Callichthyidae and is said to be found over large areas of Brazil, Guiana and Trinidad. In its smaller sizes it is inoffensive, but we cannot say whether it is trustworthy in its larger sizes—5 ins. to 8 ins.

Can you suggest a well-behaved catfish suitable for a tastefully planted ornamental aquarium stocked with mosquitofish (*Gambusia holbrooki*), spotted rasboras and medakas?

Yes, *Corydoras hastatus*. This catfish seldom exceeds 1 in. in length and swims most of the time in midwater. It will not disturb the plants or molest even livebearer fry, and flourishes on any small-grained dried food.

I obtained a culture of whiteworms a month or so ago, but they do not appear to be multiplying or doing at all well. I think their food is the trouble. Every time I place milk-moistened pieces of bread on the wet soil, this food turns mouldy after a day or two. The wet soil has also developed a rancid smell. What is the best way to keep *Ischyrodonta* worms?

First of all, the soil the worms are living in should be crumbly moist and not sticky wet. A mixture of leaf-mould, loam and grit makes a good culture medium. Keep it just damp. After placing a piece of glass on the soil to prevent drying out, spread a sheet of brown paper or thick card over this to exclude light. Some of the white bread sold at the present time turns mouldy in a few days. Therefore, don't use it if you can get properly made wholemeal bread. Alternatively, use porridge oats moistened with water or a little milk. Better still, feed a fairly stiff mixture of Fares (mixed with milk). Half teaspoonful of the food should be introduced into hollows scooped in the soil. As the worms clear this up without wastage (always introduce the minimum of food to start with), keep introducing more to keep pace with the multiplying worms. Don't remove any worms from the box until about a month has passed. The worms should be maintained at a temperature of about 50°F. (10°C.) to 68°F. (20°C.).

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

I have been told that a tank not in use should always be left with a small puddle of water on the bottom. Please tell me the reason for this.

If a tank dries right out the cement contracts and sometimes develops cracks between the glass and the frame. In any event, some water is almost certain to run or ooze out when it is refilled again. So always keep a little water to maintain a moist atmosphere in a used but emptied and stood tank.

I have been told that every time I empty a portion of *Daphnia* into my tropical aquarium, I run the risk of introducing a pest called *Cypris* into it. What is *Cypris* and how can I recognise it?

We would not go so far as to call *Cypris* a pest. It is a tiny, kidney-shaped crustacean with an almost transparent shell that can, and does, adhere to plants and the sides of the aquarium (look for a half-lens-sized object sticking to the glass). Some strong-mouthed fishes like medium-sized cichlids and the pugnacious anabantids will eat *Cypris*. You can also squash them—if you wish to—against the sides of the aquarium. Yet *Cypris* appear to do no harm, except in a breeding tank. There they will feast on the eggs deposited by the fish. Even so, you would have to have lots and lots of *Cypris* in a breeding tank to do any appreciable damage to large spawnings.

An hour or so after I switch the daylight on, the water in my aquarium heats up quite alarmingly. Will this rapid rise in temperature harm the fish?

A rise of a few degrees at the surface—we very much doubt whether the temperature of the water changes in the middle and lower levels—will not harm the fishes. In their natural state, fishes are neither inconvenienced nor harmed when they swim into the shallows or surface water warmed by the sun.

I have a large tank 18 in. deep (kept filled to the top), but cannot get the regular aquarium plants to flourish in it. A dealer told me that few plants will grow in my tank unless I reduce the depth of the water. Is this true?

Large *Cryptocorynes*, *Sagittarias*, and the like, should root all right and grow space in 18 in. of water, but small plants (young plants or plants that always stay small) are best started off in shallow water. Add more water as they grow. If you are using electric illumination, make certain that the light is strong enough to reach the bottom.

What is the breeding procedure of *Cephalopoma collettei*? Also, is this species suitable for keeping in a community tank?

Ordinarily this handsomely marked characin spawns on flat leaves near the surface, but sometimes it will spawn at or near the bottom. The eggs are usually guarded by the male. It is best to remove the female after spawning is over. The eggs hatch in under 36 hours and the fry need the smutti of *Cyclops* and other tiny live food. Large *C. collettei* will not attack or chivvy other fishes.

Is it true that the garden plant called creeping jenny will flourish in the aquarium?

Lysimachia nummularia, which is the botanical name for creeping jenny or moneywort, will not live for long in a tropical tank, but it will last for several months in a cold-water aquarium if it is planted in a sunny position. The golden foliaged form listed as *L. nummularia var aurea* is far more decorative than the common type.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

We have the fishing rights of a small sand pit which is still being worked. It is very deep for the most part but one part, not being worked, is 6 feet deep. Our trouble is that some of the fish we have stocked with will breed but not the Tench and Carp. It is probably because of the lack of weeds. Can you suggest a method of encouraging the fish to breed?

It will be necessary to get a good growth of water plants established in the shallowest part of the pond. The banks of such sand pits are usually too steep for some fishes for spawning. Some of your members could break away a large section of the bank with crowbars, etc., and so form a shallow part of the water. Then get some water plants established. They could be obtained from dealers advertising in *The Aquarist*, or it is probable that some of your members are aware of natural waters where there are many water plants. Some of the suitable kinds of water plants are: *Elodea canadensis*; *Lagarosiphon major*; *Egeria densa* and *Ceratophyllum demersum*. Quantities of weeds can be dragged out of a pond with rakes or grapple-type hooks thrown out on ropes. If some of this weed is anchored in the shallow water it will soon grow well. The tench and carp like to spawn in water which is so shallow that their backs may be uncovered whilst they are driving. A point worth remembering is that tench are late spawners. I have bred some in my garden pond every year since 1947, and they have never started to spawn until July. This is outside the close season for most coarse fish, and so tench fishing should not be encouraged until August.

I have lost some of my goldfish in an outdoor pond with white spot. How can I treat the pond to prevent the white spot from recurring?

I wonder if the fish are actually suffering from white spot or if it is a slight attack of fungus disease? White spot looks like small raised pimples on the body or fins. It does not appear as white woolly patches, which is probably fungus. The only thing I can suggest to clear the pond of the trouble is methylene blue. Whether it would be sufficient to kill the parasites in a pond is rather questionable as there is so much murrer in the usual garden pond that the effect of the methylene blue could be neutralised. You could try a fairly strong solution, that is add a 5 per cent. solution until the whole of the water appeared a fairly deep blue. If this did not bring about a cure I suggest that all animal life is removed from the pond for some weeks, especially during warm weather. The parasites could then be starved out.

What is the maximum stocking rate for a coldwater aquarium of 30 by 18 by 18 inches, using two aerators?

The usual amount of fish for this size tank is 15 inches of fish. That allows for an inch of fish, not counting tail to each 24 square inches of surface area. The use of aerators would enable you to keep a few more fishes alive but I do not believe in over-stocking a tank. There is nothing clever in this and fishes must have sufficient swimming space in order to thrive and not just enough oxygen. A normal coldwater pond would not house as many fish to the same area as would be kept in a tank. Overcrowded tanks never look right and the fishes do not have enough space in which to grow.

Are there any other colourful coldwater fishes besides types of goldfish which would live in a communal tank?

Other coldwater fishes for a tank are: golden tench, golden rodd, bitterling carp and various sunfish.

I am able to obtain plenty of Tubificus worms from a pond near me, but I have difficulty in extracting them from the muck. Is there a good way of doing this?

Get a fine tea strainer and scoop up a quantity of muck and worms. Then wash round and round in the water,

taking care that you do not wash any worms over the top. The muck will be washed through the strainer and the worms will form together in a tight ball.

Can you inform me of any simple way of breeding goldfish, moors and veiltails?

Sorry, I cannot. If there was a simple way of breeding these fishes in this country there would be no need to import the many thousands each year from overseas. Get my book, now reprinted, entitled "Coldwater Fishkeeping." This will at least tell you all you need to know on how to breed them, but do not expect it to be easy. To breed common goldfish is not difficult but to breed a good number of decent moors or veiltails is not at all easy, as plenty of budding breeders could gladly tell you. A great deal of experience and know-how, as well as patience is required, and after having read my book you can ask any further questions which you may find unanswered.

I would like to know at what size and age Fantails and Sho-bunkles breed?

These fishes can breed at a year old when they have a body length of not more than an inch-and-a-half. To be able to do so they must have been reared well and be in first-class condition. Many breeders like their fishes to be at least two years old before they use them for breeding. The age alone is not as important as the way they have been reared. With plenty of space and the right types of food many fishes can breed at from 10 to 12 months of age.

I have been given 14 minnows which were caught in a local reservoir. They all appear very healthy but some of them have a number of tiny white dots on their heads. Is this a disease like white spot and how can it be cured?

It is probable that the minnows with the small white dots on their heads are male fish. This is a sign of the sex and there is no need to worry over these marks.

I have a goldfish which I think is ill. For the past few weeks it has been lying on the bottom of the tank and swims to the surface only about every half hour and appears to take in air and let out bubbles. What is wrong with it?

The fish acts as if it has an attack of swim bladder trouble. This may have been caused by a chill or the fish may be a female with swollen eggs inside. These eggs can sometimes constrict the swim bladder in some types of fishes. You should put the fish in shallow water, just covering the dorsal fin when extended. Add a teaspoonful of block or sea salt to each gallon of water and leave for a week. If no improvement is observed the fish should be destroyed.

Where can I get rocks suitable for putting into my coldwater tank?

You should be able to get the right type of rocks from a nurseryman. The type sold for rockeries, such as weathered Westmorland rock, is very suitable, but soak it well and scrub it thoroughly before use.

I have bought some Daphnia for my fish and would be interested to know what their eggs are like, where they lay their eggs, how long they take to hatch and how many can live in a tank with 6 in. by 6 in. surface area. Where can I catch Daphnia?

Daphnia inhabit castle ponds or stagnant waters where it is rather foul. They live on the small forms of life such as Infusoria. Adult *Daphnia* produce their young alive and the young can be seen inside them as blackish dots. They lay eggs in the late autumn, and these lie on the pond bottom and do not hatch until the following spring. It would be impossible to keep many *Daphnia* alive in a small tank such as the one stated. They need as much oxygen as fishes and are just as difficult to keep in a small tank.

Fish breeding in the pond

By A. BOARDER

ONCE the pondkeeper has obtained a well balanced condition in his pond it is very probable that he will like to be able to breed a few fishes. There is always a particular thrill to be obtained in succeeding in getting even a few youngsters. In many well run ponds the fishes may breed without any special care having been taken by the owner. Such ponds are usually the ones with a very good growth of healthy water plants and a water which has a good oxygen content. Most goldfish types will breed in a pond if they are in good condition, but if there is little plant life it is quite probable that many of the eggs (or the fry, if any hatch) will be eaten by the fishes.

To expect the fishes to breed one must have the two sexes but there are other considerations. The ages of the parents does not appear to be very important as it is possible for fishes a year old to breed. This, of course, is if they have been bred fairly early the previous year and have had a good upbringing. The difference between youngsters which have been neglected and those which have had ideal conditions can be very great. To expect year-old fishes to breed they must be about three inches long over all. Varieties of goldfish can breed when they are at least fifteen years old, again of course if they are in very good condition.

All fishes need a certain amount of food to be able to grow well but they need that little extra to ensure that the females develop plenty of eggs and the males are well stocked with milt. Many types of fishes store up nourishment in the late autumn and so late feeding is important if the fishes are to be expected to breed the following season. The correct feeding of the fishes in the spring also is important as once they start to feed after the winter's rest it is necessary to make sure that they are fed as often as they are seen to be on the feed. Goldfish are usually feeding when they can be seen moving about well and sucking at the sides of the pond for soft algae etc. A test with a little food can soon indicate whether the fishes are on the feed or not. A small piece of dried bread thrown on the water should bring the fishes up to the surface if they are hungry and then a little more food can be given. There is little doubt among aquarists that the best form of food for bringing goldfish into condition is live food and the garden worm is the favourite in most cases. These can be broken if on the large size and few fishes will ignore this very safe food. I state safe as there is little danger of introducing any pests into the pond by using garden worms. Other forms of live



foods can be used but great care must be taken when using any type from a native pond or river. I learnt my lesson many years ago when, as the result of using *Daphnia* from a cattle pond, I introduced a bad crop of gill-flukes into my fry. Since then I have not used any more *Daphnia*, *Tubifex*, but rely on garden worms and white worms which I breed myself. By refraining from using any live fish which come from water I do know that I am not likely to introduce any of the many pests which can come with such creatures. The possible pests are: flukes (*Gyrodactylus* and *Dactylogyrus*); leeches; anchor worms (*Ternstroemia*); lice (*Argulus*); larvae of fresh water mussels; larvae of gnats; water beetles; larvae of dragon flies and also water boatmen.

It is possible to examine the catch to make certain that some of these pests are not put into the pond, but sometimes they can be so small that they are not to be seen without magnifying glass and some of the eggs are also difficult to see. There is also great danger if water plants from such



Gill fluke (*Dactylogyrus*). Note the haptor (a) and head organ (b) in comparison with those of the skin fluke (*Gyrodactylus*).

stones are used in the pond as these can house many pests. It is possible to use some of the cat and dog foods which are made from meats and fish. This food is dehydrated and so is safe to use. It can be fed dry to the fishes or soaked for a time before feeding.

Providing the fishes are in good condition they can breed if the water is right. It will not often be found that goldfish types will breed in water which is in any way foul. Most require a well oxygenated water to bring them into the condition to spawn and fishes can hold their eggs right through the season without spawning if the water condition is not right for them. The water should look clear and have no unpleasant smell. The time when the fishes can be expected to spawn depends a lot on the temperature of the water. Whilst I have had spawning at from 50°F. to 75°F. I think that the best one is about the lower sixties. The time can also vary in different parts of the country. Generally there should be an earlier spawning in the south. In April or May is about the best time to expect the fishes to breed but they can do so almost any time up to late

should be run off and fresh water added. This fresh water often triggers off the spawning of the fishes, especially if it can be added early in the morning, if not, late the night before. If a fountain plays on the water this can have a good effect on the fishes too.

Some would-be breeders get impatient and catch their fishes and try to hand spawn them. This is a very dangerous proceeding when carried out by amateurs. Once the fishes are actively chasing and spawning it is easy to hand strip them but if they are not ready and pressure is applied to the females it is possible to do harm to them and they could even be killed. One must wait for the right conditions to arrive, and this can be certain types of weather. One often finds that the fishes will spawn at the beginning of a long fine spell of weather.

If a particular variety of goldfish is in the pond and fry are required from them, it is useless to have any other type of goldfish in the pond as they can inter-breed. If various kinds are kept together for most of the year and it is necessary to obtain youngsters from a certain pair of fishes, then all one has to do is to wait until chasing starts and then catch the wanted pair for them to spawn in a separate container. Make sure that this container is large enough to accommodate the fishes well and that it contains plenty of water plants suitable for the reception of the eggs.

To make sure that all the eggs are not eaten by the parent fishes if they spawn in the pond it is necessary to provide nests of water plants at one shallow part of the pond. The fishes prefer to spawn on plants at or very near the surface. I make up a bunch of plants, usually hornwort, and suspend the bunch at the side of my pond in the shallows. Once the fishes have spawned well and plenty of eggs can be seen, the bunch can be removed for hatching in a separate tank and a fresh bunch introduced. Spawning usually starts in the early morning and can go on until the middle of the day. I have rarely had goldfish spawn late in the day, but my green tench have continued spawning all through the day and night.

My next article will deal with the hatching of the eggs and the rearing of the fry.



(a) FISH LOUSE (ARGULUS) (b) ANCHOR WORM (LEISHMANIA)
(c) TENCH LOUSE (ARGULUS) (d) FISH LOUSE (ARGULUS)

September, even occasionally in October. An early spawning is best as this enables the breeder to get the fry to a fair size before the water turns too cold for their development.

If the fishes have not spawned by June and conditions appear to be right for them there are one or two things which can be tried to encourage the fishes to make a start. If the water does not look clear enough then a large amount

Continued from page 97.

AROUND THE AQUARIUMS

In 1960 he was appointed to be in charge of the Surgical Unit at the Animal Health Trust's Small Animals Centre at Kennet, near Newmarket, where he is employed at the present time.

Mr. Hime is married with one daughter and it is expected that he will take up his appointment with the Society in September of this year.

Nannacara anomala

by M. R. Fitzgerald

FOR anyone who loves the character and individuality of cichlids and hasn't the space for the bigger ones, *Nannacara anomala* is the fish. Growing to no more than 2½ ins., it is safe with most small specimens. However, a male may spar occasionally with males of his own and other species, but this is rarely serious: only large, well colored fish are bothered, and they can usually look after themselves.

Their colour varies so much with mood and environment that it is almost impossible to describe. It can change in seconds from grey-cream chequerboard to a rich chocolate brown. The fish has a fairly typical cichlid body shape, the female being somewhat plumper than the male. When young, they are difficult to sex but one point which is rarely mentioned but is usually reliable is this. From just above the root of the pectorals to the leading edge of the anal fin the female has a dark bar which is only very faint in the male. When they are older, of course, the male's superb dorsal and anal fins with their long trailing points, make him a glorious sight.

There can be few spectacles more magnificent than a pair of *Nannacara* showing off to each other with fins spread to splitting point, each adorned with its most beautiful colours. This display is often a preliminary to mating. When they are at a fever pitch of excitement, they waggle their bodies violently, and then come together in a "kiss". They then break apart and proceed to spawn upon an upright rock.

The parents are not particular about water and temperature, but best results seem to be obtained with moderately hard water at 80°F. Having laid the eggs in neat rows, the female usually drives off the male (who is best removed) and then commences to fan them carefully for 4-5 days; i.e. until the fry are wriggling. Now she picks them off the rock and deposits them in a dip in the gravel, resuming her guard duty. After a while the fry will rise up in a cloud and swim about in search of food. The best food now is undoubtedly brine shrimp which they devour ravenously. Later on they can have chopped white worms and small *Daphnia*. If the female is left in now she will marshal the youngsters into a tight mass and sail out, like a battleship and with eyes aglaze, to ward off any danger. This is a heart-warming sight, but all the same I should advocate her removal. She will only compete for food and also, there is always the risk of her eating the babies.

In 3-4 weeks, the fry will be ½ ins. long and even at this size some scrap with the others. They mature early and can be bred at about 8 months—it is best not to defer this too long since, like most dwarf cichlids, they are not very long lived.

Fish diseases (27) Neon Tetra disease

by R. E. Macdonald

ALTHOUGH neon tetra disease is peculiar to certain species of the genus *Hyphessobrycon*, the immense popularity of the neon tetra calls for the inclusion of this infection in any work on fish diseases.



Illustration showing where disease manifests first

The infection manifests itself as white spots (similar in appearance to those caused by *Ichthyophthirius*), that show quite clearly on the blue-green luminous colour band that extends horizontally along the body of the fish. Other symptoms are emaciation, decaying fins, complete loss of colour and in some cases, sterilisation of the female caused by the destruction of the ovaries. Death generally occurs within two weeks after the appearance of symptoms.

The disease is caused by sporozoans of the genus *Platyphora*. It is a highly contagious killer and for infected fish there is no cure.

Infection is transmitted to other fishes through espulsion of the *Platyphora* spores with the excreta into the surrounding water. Once infected, a fish will always remain a carrier until it dies and consequently the infection of other neons becomes purely a matter of time. It is possible for this disease to be rampant during the early stages of infection without the fishes showing any apparent symptoms.

As soon as the disease is diagnosed it is advisable to destroy the entire neon population of the infected tank and to disinfect the tank with a 1 per cent. solution of chlorine. Even accessories etc., should be subjected to this treatment; in fact, treat every thing in contact with the set-up. This drastic action is completely necessary to prevent re-infection.

Insect individualists *Notonecta*

by F. Wilmot

NOBODY seeing the Water Boatman (*Notonecta*) propelling itself with powerful strokes through the water could possibly doubt the appropriateness of its name. And this in spite of the fact that it lives beneath the surface—not on it.

The elongated hind legs are wonderfully constructed so as to give maximum efficiency, for not only are they flattened like the blades of oars but they also have fringes of hairs to increase their surface area. These hairs *Notonecta* can make lie close when making the backward movement of the legs. In addition, the body of this little insect is keeled down the middle to improve its balance.

One cannot help wondering whether those humans who dwell by the water in ancient times learnt something about the construction of boats and oars by watching *Notonecta*.

The water boatman rows (or swims, according to how it appears to the onlooker) upside down, and rises to the surface to take in air through the tip of its hind-end. As it rises its long back legs are held outstretched in a way that suggests a boatman resting on his oars. The legs come into contact with the underside of the surface-film in such a manner that they do not break through, and this of course causes the body also to stay just below the film.

At the same time as it takes in air at its hind-end, *Notonecta* traps a supply of air between its body and its wings, and also carries down beneath the surface with it a film of



air resting against the keeled part of its body. It can readily be seen what strength and skill the water boatman must have to be able to drive its body well down beneath the surface, using for this purpose only a single pair of limbs.

In addition to its other accomplishments, *Notonecta* is a strong flier, and it has been recorded that it has escaped from a large area of badly frozen ponds when all non-flying aquatic insects have perished.

Hemigrammus *caudovittatus*

by H. R. Bradley

THIS popular name for this fish, Buenos Aires Tetra, gives an indication of the part of the world in which it is to be found. The general body-colour is silver with bright red fins, except the pectorals which are colourless. The caudal fin is red with a black line running through it to the centre of the body. This is one of the larger characins and attains a length of 4 inches when fully grown, the male being slightly smaller with more intense colours than the female.

Having been given a few of these young fish by a friend, I decided I would like to try and breed them. The fish needed to be brought into first class condition, and this I did by feeding them heavily on a diet of white worms, *tubifex* and various dried foods. It soon became easy to establish which were male and which were female, the females being much larger in the stomach than the males. At this stage I separated the fish for over a month, at the end of which time the females were bulging with eggs, and the males in another tank were very lively and had intensely bright colours.

The next step was to set up the tank. I used a 24 x 12 x 12 inches, into which, after thoroughly cleaning it, I put a 2 inch thick layer of colourless marbles, and on this a 2 inch thick layer of *Najas*. The tank was then filled with new water to a depth of 6 inches and heated to a temperature of 80°F.

After two days the tank had settled down sufficiently to enable me to introduce the best looking pair of fish late one evening. When I observed them the following day they were sulking in the *Najas* and showing little interest in their surroundings or in each other. To try to remedy this, I syphoned in about ½ gallon of cold fresh water. On observing the fish the following morning I was pleased to note that they were showing a great deal more interest and the male was chasing the female round the tank. Although I looked very closely I could not see any eggs falling. Nevertheless, when I looked about two hours later the female appeared tired and was no longer plump. I then removed both fish.

I observed the tank every day, and was rewarded on the third day when the first fry appeared. They were extremely small and I made the first feedings from infusoria (made from crushed lettuce leaves).

The method of feeding I employed was one 1 fl. oz. jar of infusoria-water morning and evening for the first week. This was continued through the second week, and every alternate day I also fed brine shrimp. As by the third week the fry seemed to be growing well, I commenced feeding dried foods. My troubles seemed to be over.

The fish are now three months old, an inch or so long, and are schooling together in the tank—a very pleasing and rewarding sight.

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

Gas Embolism

R. E. MACDONALD in his article "Gas Embolism" (*The Aquarist*, June) appears to have absolutely no knowledge of the basic principles of the chemistry of water.

His worst and most glaring mistake is his statement that pH 10 is dangerously acid water. With this pH it is indeed dangerous to fish, but the fact is that it is concentrated alkali.

The acidity of water is measured on a scale that extends from 0 to 13; the meaning of the figures need not concern us here except to state that waters with a pH of 7 are neutral whilst those with a pH below 7 are acid, whilst those with a pH above 7 are alkaline.

Mr. MacDonald is also erroneous in his contention that aquatic plants are able to extract carbon dioxide (or carbonic acid in his nomenclature) from bicarbonates and carbonates.

Certain bicarbonates are present in many natural waters and upon use in an aquarium these materials readily decompose to give carbonates and carbon dioxide. The carbon dioxide can be assimilated by the plants during photosynthesis, and the carbonates can often be seen as an incrustation in the aquarium particularly on the heater.

Mr. MacDonald contends that plants are then able to utilise this carbonate and remove more carbon dioxide from it—this is impossible for all the plants that I have ever heard of.

In practice the commonest carbonate that makes up this white incrustation is calcium carbonate which is better known as the mineral chalk. To remove any carbon dioxide from calcium carbonate it is necessary to heat it to between 800 and 1,000 degrees centigrade which I am sure the plants in Mr. MacDonald's tank are hardly likely to survive!

May I suggest that Mr. MacDonald consult my articles in the February, March and April 1963 issues of *The Aquarist* before attempting to write on chemical aspects of our hobby, as he apparently has no knowledge of the subject whatsoever.

P. F. CARON,
Publicity Officer,
Southend, Leigh and District
Aquarist Society

Runts For Sale

LIVING in the country has its problems when it comes to buying tropical fish and Sussex is no exception. We have locally only three shops which sell fish. Two of these

have only four tanks and keep very few fish in stock. The third has about one dozen tanks and keeps a good stock of livebearers, danios, and the more common fish, and occasionally has the less common species. So when looking for good specimens we have to travel quite a distance.

In the last year we have visited several shops and hatcheries, and have become more disheartened each time as there seem to be more and more runts and deformed fish for sale than ever before. We have seen for sale fish with broken lines, humped backs, crooked backbones, pop eye, fin rot, and even bloated with scales raised obviously suffering from dropy.

I do quite a lot of breeding and always cull out vigorously to ensure that I do not sell deformed fish.

At times I feel like giving up the hobby when I walk into a shop and see the rubbish sold to the unsuspecting customer.

My husband had to go to the Midlands recently so thought it would be a good opportunity to buy some good quality fish from a large establishment who advertise their fish as first class. He arrived at the establishment after going several miles out of his way to find once again zebrafish and cherry barbs with broken lines, harlequins so thin that he hardly recognised them, guppies with bodies of fry size and tails of adults, selling at £1 per pair (obviously runts), and spraying characins 3 inches long with a body depth of a quarter of an inch, only to mention a few examples.

It seems that the only way to buy really good fish is to buy from club members who breed fish as a part of their hobby.

The problem still remains that if the aquarist is unable to obtain good fish to restock with from time to time then what will happen?

The aquarist has to have fish as near perfect as possible otherwise he cannot take part in open shows and club events, or pursue his hobby to the full. He will not breed poor specimens, and unless something can be done to stop the sale and importation of such fish then most of the pleasure will have gone from our hobby.

Mrs. JOYCE H. PARTRIDGE,
Crowley, Sussex.

On Guard, Mr. Whittington

IT is with pleasure and concern that I write about the opinions that are being aired concerning classes for cold-water fish. Well, Mr. Whittington. You state you are being fobbed off with one or two classes, and so you are.

And who is to blame? Well, it is you and your coldwater friends. Yes, Mr. Whittington. There is nobody else to blame, and the reason? e.g. Burnley Show, 1959. Classes: 14. Prizes value 30s. each class; number of entries, 16 at 2s. each. Loss on coldwater entries: £19 8s. That is one example, in 1959. Now take 1966. I have been to three shows in the last two months and the total coldwater entries were 14. It is no use us giving you five or six classes when the entries consist of 1 moor and 3 common goldfish of about 2 inches each in length.

Not only do you not warrant any more classes at the open shows but what about the B.A.F.? This is the finest show in England and yet there are classes there that have only three and even two entries. So, Mr. Whittington, until there are some reasonable entries you will have to be satisfied with what you have.

LESLIE LEWIS, F.N.S.,
Sec., Burnley A.S.,
28 Simpson Street,
Burnley.

Aquarist Club in Africa

MANY copies of your magazine are distributed in this country and it may be of interest to these readers to note the following:

The Peninsula Aquarist Club meets on the first Tuesday of each month at the Scout Hall, 56, Camp Ground Road, Rondebosch, C.P. South Africa, at 5 p.m. Visitors are very welcome. For further particulars please contact Secretary, P.O. Box 183 Rondebosch C.P. South Africa.

A. M. RICHESBY (MISS),
Honorary Secretary.

Thermos Jar Trouble

SOME months ago you published a short article describing the use of the larger wide-mouth thermos jars for transportation of tropical fish. I have used one for this purpose for many years but soon discovered, at the cost of several casualties, that the cork being acted as a piston in the neck of the jar.

Thus when inserting the stopper there was a momentary but large increase in pressure inside the vessel. Possibly with even more disastrous results was the sudden decompression produced by removal of the bung. Fish became badly shocked and a large proportion were thought to have suffered actual rupture of their swim bladders.

This trouble can be eliminated if a hole is bored through the cork. If this hole is fitted with a looped glass tube then leakage of water during travel can be reduced.

DR. J. H. L. GRIFFIN,
Cullington, Devon.

Granite Chippings

REPLYING to a request from S. A. Gillingham in the June issue: His granite chippings will undoubtedly serve his purpose best, BUT, he should contact a builder— one presently erecting say, a Factory—School—of other industrial building, where a large proportion of the floors are laid with Grano Flooring. This is granite chippings of a very fine consistency akin to the usual aquarium gravel. Thank you for an excellent magazine I look forward to this every month.

E. G. CLAYTON,
Sharnbrook, Bedfordshire.

Inaccurate Article

THE reference is the article by R. E. Macdonald (Aquarist June 1966) titled "Gas Embolism."

My first point concerns the formula given for carbonic acid, that is, CO_2 . This is incorrect and should be H_2CO_3 . This acid is formed when carbon dioxide (CO_2) is dissolved in water and is a weak acid. Secondly, although plants can use CO_2 from the calcium bicarbonate which, of course, is in solution, they cannot use CO_2 in calcium carbonate which is insoluble. With regard to this point it is conceivable that the total removal of CO_2 from the bicarbonate, that is, $Ca(HCO_3)_2 \rightarrow Ca(OH)_2 + 2CO_2$, could be true but it is doubtful. The calcium hydroxide $Ca(OH)_2$ is slightly soluble and would give an alkaline reaction. Here I would like to suggest an alternative route for obtaining a dangerous alkaline level. In the absence of calcium bicarbonate which means the plants have no source of CO_2 from biological decalcification, the waste products of fishes for example urea and allantoin in solution can provide carbon dioxide with the evolution of ammonia NH_3 . When in solution ammonia forms ammonium hydroxide, $NH_3 + H_2O \rightarrow NH_4OH$ and although very unstable it will again give an alkaline reaction. This supposition seems reasonable as it has been observed that relatively soft water can produce dangerous ammonium compounds.

E. R. WARD,
Chesdle, Cheshire.



They have a window on the sea

by GRAEME WICKS

WALK from the bright Australian sunlight down 30 steps of a narrow companionway . . . and you are face to face with fish of strange shapes and gorgeous colours in the wild seas of Queensland's Great Barrier Reef. The Great Barrier Reef which extends down 1,250 miles of the Queensland coast is the biggest coral rampart in the world.

Visitors to the Underwater Coral Observatory on Green Island, off the shore from Cairns, well into the Australian tropics, can stay dry and comfortable but see the living corals and their myriad strange creatures of the deep as if they were in an aquarium—but it is the viewer who is confined. The fish are free and come and go as they please in their own watery world.

Green Island's underwater observatory gives the visitor a fish's eye view of the fish's own element.

The viewer sees not a tame fish pond but the Great Barrier Reef itself, where the beauty of a garden combines with the dangers and horrors of a jungle.

He sees the sea as if he were a sea-thing himself. During the southern winter, the height of the Great Barrier Reef tourist season, more than 2,000 visitors a week go through the observatory.

Though Green Island is only 17 miles and 1½ hours by tourist ferry from Cairns, it is a true Barrier Reef coral island. That is, it was actually built up from the sea floor by the reef-building corals. It is a national park. The thriving bird-and-fish-life is undisturbed by the thousands of tourists and day-trippers who visit the island each year. Corals grow on its sheltered shores and may be reached by wading at low tide.

Green Island is the most popular on the reef because of its natural attractions, ready accessibility, good accommodation and such features as the daily screenings of underwater films at the Great Barrier Reef Theatre, the concentration of reef creatures at Marineland (claimed as one of the only two aquariums in the world where live corals are kept), and the underwater observatory.

Opened in 1954 the observatory is said to be the first of its kind. It is set on the sea floor 16 ft. below surface and is reached by a wide footbridge from the Green Island jetty



Photo by Australian News and Information Bureau

This school of trevally is among the permanent "residents" of the reef next to the observatory.

more than 100 yards from the shore.

The open sea observatory was the brain child of two Australian hunters and big game fishermen, Vince Winsoff and Lloyd Grigg. They shared a great interest in underwater photography but were convinced that even the best pictures could not convey the feeling of being underwater. They considered that in order to gain a proper sense of the underwater atmosphere the viewer had to be at the bottom of the sea. The answer was an observation chamber which would allow people to get down with the fish without danger and without the special skills of a diver—even without the need to get wet.

To withstand the crushing pressures of the sea, the constant surging of waves and the occasional lash of a cyclone, the observation chamber had to be strongly made and firmly secured. The two men built the chamber in Cairns of ½ in. steel plate, reinforced with 10 in. steel girders and fitted with concrete ballast inside and encased with 5 in. of ferroconcrete on the outside. Magnesium anodes were fitted to protect the chamber from the sea's corrosive power. The 22 viewing windows were made of ¼ in. plate glass. The chamber weighs 80 tons with superstructure and ballast but for added security both superstructure and chamber are bolted to steel pins driven 8 ft. into the solid coral bed while chains at each end are fastened to anchor pins. Finally—only as a last resort and naturally when there are no visitors inside—the chamber can be flooded with 50 tons of water should the raging sea of a cyclone threaten to loosen it from its bed.

When completed in Cairns, the chamber was fitted with air ballast tanks and towed to its present site. It was sunk and secured with as little disturbance to the coral bed as possible because the guiding thought was always that this should not be a man-made show. Except for some specially-placed giant clam shells the viewer sees only what Nature provides. The fish are not even fed to keep them near. The observatory management says that 24 different types of corals and 52 different types of fish live within the field of vision of the windows. On a short visit



On the edge of the coral lagoon, the underwater observatory.

Continued on page 105

Aquaria and zoo guide

CHESHIRE

North of England Zoological Society, Zoological Gardens, Upton-by-Chester, Cheshire. Admission charge—to Gardens: Adults, 4s.; children under 14, 2s.; to Aquarium, 6s. Open daily throughout the year from 9 a.m. to dusk. Party terms (parties of 25 and over): Adults, 2s. 6d.; children under 14, 1s. 3d. Aquarium admission 6s. No reductions for parties. Description: Mainly tropical freshwater fish. 178 species of fish. Collection of fish, 2,400. Recent acquisitions include grass danio (*Daphnysoma-zebrastrata zebrifasciata*) and some other unusual catfish from South America. It is hoped shortly to develop a marine section in this Aquarium, but this is only in the experimental stage at the present time.

DERBYSHIRE

Pan's Garden—Zoological and Botanical Gardens (including an Aquarium), Ashover, Chesterfield, Derbyshire. Admission charge—Adults, 2s. 6d.; children, 1s. 3d. Open 11 a.m. to dusk every day of the year. Description: The aquarium section of the Zoo comprises 12 tanks and a floor pool, and includes coldwater, tropical and marine sections. We endeavour to exhibit rarities, such as neonfish, sword legs, panchas, paradise fish, dragon fish, scorpion etc., rather than the more common species.

DEVON

Exmouth Aquarium, Sea Front, Exmouth, Devon. Admission charge—Adults, 1s. 6s.; children, 6d. Open 10 a.m. to dusk every day, May to September (week-end during winter). Party terms on application. Description: 30 tanks ranging from 24 by 12 by 12 ins. to 17 by 7 by 10 ft., housing our giant turtle measuring 5 ft. long by 3 ft. Seahorses, local fish, also tropical and coldwater exhibits. Seawater is pumped up from the sea through a 700-ft. long pipe. Aquarium's sleep following.

Paignton Zoological and Botanical Gardens, Paignton, Devon. Admission to Zoo, 5s.; Aquarium, 6s. Open daily at 10 a.m. Party terms: Halfpenny return for parties over 30 (see Zoo). Description: Tropical plant house, reptile house and aquarium. 37 fish tanks showing 379 fish of 43 species, 7 terrapin tanks and 25 reptile cages (74 reptiles of 62 species). Expected soon: Estuaries cross-bio, soft-shelled turtles, and mangrove snake. Most important exhibits: Manx rat, 20 ft. resuscitated python, electric eel.

Paignton Seashore Aquarium, Paignton Harbour, Paignton, Devon. Admission charge—Adults, 1s. 6d.; children, 6d. Open every day including Sundays, 10 a.m. to 10 p.m. Party terms: Organized parties 6d. per head. Description: Each aquarium tank illustrated by models and information to explain facts of the living creatures. Large number of educational exhibits explaining local seashore life. All specimens are from immediate local waters. Filming studio on premises where television (B.B.C. "Look" series) films are made about marine life.

Teignmouth Aquarium, The Den, Teignmouth, Devon. Admission charge—Adults, 1s.; children, 6d. Open every day including Sundays, 10 a.m. to 10 p.m. Party terms: Organized parties 6d. per head. Description: Each aquarium tank contains local seashore life. A large number of educational exhibits explain local marine life with small display among others.

EDINBURGH

The Carnegie Aquarium, The Royal Zoological Society of Scotland, Scottish National Zoological Park, Murrayfield, Edinburgh, 12. Admission charge—Adults, 6s.; children, 3s. Open every day of the year. Hours: 11 a.m. to 4.45 p.m. Winter 11 a.m. to 3 p.m. Party terms: none, except for Edinburgh Corporation Schools. Description: Consists of three large halls. Tank devoted to marine exhibits including green and black-billed terns, sugar eels, lobsters and crabs etc., and many sea fish. Freshwater specimens include electric eels, lung fish, giant salamander, glass eel etc. Large variety of brilliantly coloured fish, both coldwater and tropical.

ISLE OF MAN

Marine Biological Station (University of Liverpool), Port Erin, Isle of Man. Admission charge—Adults, 1s.; children under 14, 6d. Open Monday to Saturday, 10 a.m. to 5 p.m. all year. Party terms: Organized educational parties admitted free if prior notice given. Description: Marine, 6 large and 10 smaller tanks. Good display of local fish and invertebrates. Palace nesting.

LANCASHIRE

The Tower Aquarium, Tower Main Buildings, Blackpool. Admission charge—Adults, 5s.; children, 1s. 6d. This includes general admission which includes Tower Ballroom, Zoo, Aviaries and Ocean Room Cabaret. Open 9 a.m. to 10.30 p.m. Sunday to Saturday. Description: Aquarium founded in 1914. Consists of a central block of twelve large tanks with 38 smaller tanks on the outer walls. The total collection is 340 species of fish and 24 species of invertebrates. Latest addition, Chinese grass carp (*Campylorhynchus sinensis*), Clarias (Chinese eel). Aquarium specialty: British marine fish.

Marine Land, Stone Jetty, Mosses, Lancashire. Admission charge—Adults, 2s.; children, 2s. Open daily from 10 a.m. Party terms: Parties of 20 or more, 2s. and 1s. 6d. Description: Europe's first Oceanarium; also wide selections of marine and freshwater tropical, local fish and coldwater fish, seals, sea lions, penguins, alligators, turtles and dolphins. Sea circus daily at 11.15 a.m., 2.15 p.m. and 4.15 p.m. with performing shrimp, sea lions and dolphins. Newly arrived: "Clippers," star dolphins performs from New York's World Fair.

Belle Vue Zoo Park Aquarium and Reptilium, Manchester, 12. Admission charge—Adults, 1s.; children, 6d. Open daily 10 a.m. to 6.30 p.m. General admission to Park, 3s.; children, 1s. 6d. Party rates (25 or more): Adults, 2s.; children, 1s. 3d. Admission to Aquarium and Reptilium: Adults, 1s.; children, 6d. Description: Three halls of tanks ranging from 25 to 1,500 gallons exhibit familiar favourites of the tropical freshwater world, fishes of the coral seas and specimens from our own coastal waters, rivers and lakes. Continuing through the Reptilium, a wide range of snakes, lizards, terrapins, monitors and the new world famous breeding alligators may be viewed.

LONDON

The Aquarium of the Zoological Society of London, The London Zoo, Regent's Park, London, N.W.1. Admission charge—Adults, 2s.; children, 1s. Open throughout the year (except Christmas Day) from 10 a.m. to 4 p.m. before closing time of main Zoo at dusk or 7 p.m., whichever is earlier. From Good Friday to September, last admission to Aquarium is 7.15 p.m., closing time 7.45 p.m. Description: Marine and Freshwater: 100 tanks ranging in length from 12 inches to 30 feet. Marine Hall with fish and invertebrates from tropical and temperate waters. Tropical Hall with many primitive freshwater fish and an aquarium near 5 ft. long. Terrariums Freshwater Hall with representative collection of European and other fish; also aquatic arachnids.

SURREY

Chessington Zoo Ltd., Leatherhead Road, Chessington, Surrey. Admission charge—6d., adults and children. Open week-ends in March. Hours to 31st October, 10.30 a.m. to 3.30 p.m. early season, 6.30 p.m. full season. Party terms: 3d. each adult and children for parties of 30 or more. Description: Chessington's Aquarium, although small, has a varied collection of coldwater and tropical fish (500 in 70 species) kept in 28 tanks varying in size 24 by 12 by 25 ins. to 66 by 12 by 24 ins. Amphibians and reptiles are also on display as at the moment there is no separate Reptile House.

SUSSEX

Brighton Aquarium, Marine Parade and Madeira Drive, Brighton, Sussex. Admission charge—Adults, 2s.; children, 1s. Open every day of the year 9 a.m. to dusk; Christmas Day 9 a.m. to 1 p.m. Party terms: Adults, 1s.; children, 6d. Description: 12 freshwater tanks, two large capacity, containing carp, eels and loaches; 10 marine tanks, specimens added as available; 12 tropical tanks. Large fish and plants are recent arrivals. Other large tanks contain harbour seals and turtles. A sea-lion pool (great attraction to visitors).

WORCESTERSHIRE

The Dudley Zoological Society Ltd. (The Aquarium), 2, The Broadway, Dudley, Worcestershire. No admission charge to Aquarium. Open Monday to Sunday, 10 a.m. to 6 p.m. (during summer months) 10 a.m. to 4 p.m. (winter months). Party terms: 25-100, Adults or children of mixed; Adults, 3s.; children, 1s. 6d. 101-250, Adults, 2s. 9d.; children, 1s. 3d. 251-500, Adults, 2s. 3d.; children, 1s. 3d. 501 and over: Adults, 2s.; children, 6d. Description: Built in the Castle Crypt, the Aquarium contains 39 tropical tanks (one marine) and 16 coldwater. Several amphibians, as well as invertebrates, are also displayed. Heating is achieved by both gas boiler and electric (oil-burner) heaters. Interesting specimens include an electric eel, an African langfish, and a 2 1/2 ft. black "shark."

Malapterurus electricus

by L. B. KATTERNS



THE unusual, peculiar or grotesque, always have a certain amount of appeal to most people and aquarists are no exception to this, in fact this facet of human nature is often more pronounced in their case. No matter what the main interest happens to be, in most cases there will be one specimen at least that does not conform to the overall pattern, and if the aquarist happens to have a fish house or fish room there is often one tank set aside for something that is just that little bit different. The search for oddities may be governed by several things such as unusual shape, colour or habits, and the choice of available fish is very great at the moment.

The Electric Catfish offers much in filling unusual requirements but must be ruled out at once if the quest is for something that may be added to the community tank. It will not tolerate other fish for long, and these remarks do not apply only to smaller fish. Two or more may be kept together if necessary but this fish seems to get along very well on its own and although the books give small live fish as the food, I have found that they will take and thrive on earthworms and dressed crab.

The shape of the Electric Catfish is similar to that of the common coldwater catfish but does not taper towards the tail; in other words the fish is almost sausage shaped. Coloration is somewhat unusual, the whole body being a pinkish grey or white covered with a number of tiny black spots. These vary with each specimen both in number and size. At the base of the tail there are two wide vertical black bars and the area between these is almost white. There is also a large black crescent shaped mark in the tail which is transparent as are all the other fins. Some fish appear to have several very light marks on the body and when present these give the fish a rather prehistoric look. Electric Catfish are very clumsy in their movements and rest in all manner of unnatural positions. One in particular seems to predominate. The fish lays on one side with the body arched, a position we all associate with that of a dead fish.

These fish are very short sighted but make good use of the barbels, which are long, to partially overcome this.

Temperatures around the 75°F mark are ideal and water conditions do not appear to be of such importance as with some other fish and if it be shallow they will survive

in really foul water. I do not suggest that it is not necessary to keep their tank clean but merely mention this to show that in my own experience they are not difficult fish to keep. The breeding of *Malapterurus* is a little in doubt and I have not heard of them having been bred in captivity. Those offered by the trade are imported from Tropical Africa and are usually about 3-5 ins. long. They can grow to about 28 ins. in nature but although they grow very quickly in the aquarium, it is only rarely they exceed 12 ins. The amount of electrical current these fish can generate is very small and is used mainly in assisting it to catch its prey.

Heteranthera zosterifolia

by B. FRY

THIS water plant is indigenous to Bolivia and Brazil and in the natural state grows rampantly in marshes and around the edges of lakes. It seems rather a mystery that it is not nearly so common at the present time as it was before the outbreak of the Second World War, for it has the twin virtues of beauty and usefulness.

The pale pea-green leaves, which attain about 2 in. in length and about $\frac{1}{4}$ in. in width, grow in pairs up a branching stem. It is never long before this plant forms a tangled mass at the surface. Oxygen is released from it in quantity.

Roots are produced freely from the lower parts of an upright stem or along most of a stem or stems growing horizontally in very shallow water, and reach downwards towards the compost. It follows then that propagation is easily effected by layering and severing rooted stems, or from cuttings.

If given plenty of sunlight—in any case a bright light is necessary if the plant is to do well—pale blue flowers, smaller but not unlike those of *subrieta*, pop up among the partly submerged foliage about the middle of the summer.

A bunch of *H. zosterifolia* anchored carpet-fashion to the bottom of an aquarium with some lead bands offers a first-class spawning ground for egg-scattering fishes. Needless to say, as a sanctuary plant for livebearer fry, *H. zosterifolia* takes some beating.

Continued from page 102

They have a window on the sea

one does not try to count the varieties—there is too much to see.

Only a few feet from the windows are two of the reef's most spectacular creatures—the tiny coral polyp and the giant clam shell.

The enormous underwater mountain of coral, running 1,250 miles parallel with the Queensland coast, is the work of the little coral "flower-animal." Green Island itself is an example of the polyp's work.

The giant clam is the biggest mollusc in the world, measuring 4 ft. across and weighing up to a quarter of a ton. Both polyp and clam feed on the same things—the microscopic plankton that thrive in the clear, warm, sunlit waters. The clam's huge siphoning mechanism is clearly seen.

Above and between the corals and clam shells can be seen showers of small fish as brilliant as fireworks display in slow motion. There are iridescent demersals drifting like blue sparks near branching coral where they can dart for protection at the slightest danger. Then the view

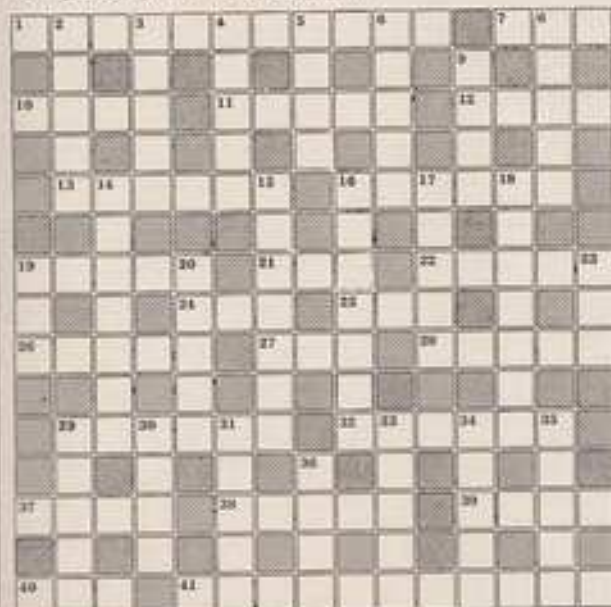
might be obscured by a school of golden striped perch glinting in the water-filtered sunlight. Drifting between the intricate coral and under ledges are butterfly fish with trailing fins and rainbow colours. Parrot fish, in luminous peacock blues and greens rasp the coral for food like flocks of grazing sheep. Anemone fish with bright clown colours nestle among giant anemone tentacles that paralyse any other fish. Sometimes near the surface a scintillating school of sardine-like fish will hurry by. Mackerel, trevally and barracouta will sometimes invade the garden sending a visible shock of fear through all the fish.

To the fish this is like any other piece of the Great Barrier Reef—and it is, except that it is also the most looked-at piece of reef.

As corals, sponges and seaweeds grow over the outside of the observatory, it begins to look like a rock with porches. It is a familiar part of the underwater scene, and the swarming fish ignore the faces which press daily against the glass and know nothing of the world-wide interest they attract simply by living naturally in the sea.

The AQUARIST Crossword

Compiled by M. W. SAUNDERS



CLUES ACROSS

1. That story about the one that got away? (7, 4).
2. That wise old bird (3).
3. A very gripping personality of the deep (4).
4. Mixed ocker sold by Fabian's dealer (5).
5. This type of food is dead right for your tub (4).
6. Examined by the Taid set maybe? (6).
7. Go up (8).
8. Note the fur on the mat (5).
9. Useful for Aquarists during those blackouts (3).
10. Crept cautiously (3).
11. The officer begins to go (3).
12. Used to be (3).
13. A quantitative relation at Rio (5).
14. Provides cover for your fishpond during winter months (3).
15. The fashion of the moment (5).
16. This and 27 give spirit (8).
17. Under strain—so the steership has run inside (6).
18. A type of grass on top of the head? (4).
19. Stung by a crocodile (5).
20. An condition which might lead to Finest (4).
21. The finish of Ned—just about (3).
22. Common name for some Barba strops (6, 5).

CLUES DOWN

1. A town (5).
2. Dwellings (5).
3. If you lose it you might become very afraid (5).
4. Type of plant found in Madagascar Garden fields? (4).
5. Descriptive of Birds and Fish (5).
6. Made like the sea at a party? (5).
7. Sounds like the water dweller will run away (4).
8. Doing a stretch? (2).
9. Not the cat's choice of sea food, presumably? (7).
10. Swears about the letter but replies (7).
11. Cost of Arma found at sea? (3).
12. Types of Barba (7).
13. Mode of Transport the R.A.C. turned about (3).
14. The Hen takes root to work (5).
15. Father's up and down but just the same (3).
16. When the Wasp confuses the direction he might lay his egg? (3).
17. Lead for rowing (4).
18. Descriptive of a fisherman's haul (5).
19. The Territorial Army finds the pig's home delicious (5).
20. From your next glass you'll get more (5).
21. Waste ungrudgingly (3).
22. Necessary for spawning purposes (4).

Solution on page 108

News from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 12th of the month preceding the month of publication.

DURING June the Gosport and District A.S. was given a slide show and talk by Mr. Hyder of Portsmouth, the interest of which was heightened by the inclusion of many of the colourful formal stamps depicting the fish that are kept. Results of the June table show were: 1. Mr. Stevens (female red snappers); 2. Master Purman (yellowtail snappers); 3. Mr. Clough (male and female); 4. Master Clough (male blue fighter).

Of the twelve clubs that participated at the inter-club show at Portsmouth on Whit Sunday, Gosport came twelfth but an improvement will be made next time.

THE annual table show of the Yeovil and District A.S. attracted a record number of 126 slides including 14 home aquaria. The fish were judged by Mr. B. Mollay and Mr. W. Combes of Poole and the home aquaria by Mr. D. Silver. Award winners were as follows: Goldfish: 1. W. Reeves; 2 and 3. M. Blandart, female shubunkins: 1, 2 and 3. S. Langdon, London shubunkins: 1, V. Collins. A.O.V. fancy goldfish: 1 and 2, V. Collins; 3, W. Reeves. A.O.V. pond or river: 1 and 3, W. Reeves; 2, V. Collins. Breeders' goldfish: 1, 2 and 3, S. Langdon. Labridae: 1, N. Wright; 2, J. Hubbard; 3, D. Phinn. Barb: 1 and 3, T. Sharp; 2, G. Gillard. Characins: 1 and 2, T. Perry; 3, N. Wright. Cichlids: 1 and 2, D. Phinn; 3, G. Gillard. A.O.V. striped cichlids: 1, D. Chaffer; 2, G. Gillard; 3, J. Hubbard. Catfish: 1, D. Chaffer; 2, D. Phinn; 3, T. Perry. Mollies: 1 and 2, G. Bushell; 3, A. Nicholls. Main species: 1, 2 and 3, G. Gillard. Funnis species: 1, T. Sharp; 2, G. Gillard. Swaths and plates: 1 and 2, J. Hubbard; 3, Mrs. C. Bushell. Breeder's egg-layers: 1, T. Perry; 2, G. Gillard; 3, D. Phinn. Breeder's livebearers: 1, G. Gillard; 2, C. Bushell; 3, D. Chaffer. Home aquaria: 1, M. Entwistle; 2 and 3, D. Phinn. Superb Shield for the best outdoor entry: W. Reeves. Best in Show Challenge Cup for most points in the outdoor section: S. Langdon. Status Shield for the best tropical entry: T. Perry. Reserve Cup for the best freshwater: C. Bushell and J. Hubbard tie. Small Cup for most points in the show: G. Gillard.

THE Basildon and District A.S. recently held the annual leg of the inter-club table show meetings between Southend, Leigh and District A.S. and Thurrock Aquarist Club. Mr. Cress (F.R.A.S.) gave a talk on fish-keeping and the judges were Mr. Scowen (F.R.A.S.) and Mr. Goodall (F.G.A.).

The table show results were as follows: Guppies (males): 1, Mr. D. Stockwell (Basildon); 77 pts.; 2, Mr. J. Higginson (Basildon); 75 pts.; 3, Mr. Dunn (Southend); 75 pts.; 4, Mr. J. Higginson (Basildon); 74 pts. Guppies (females): 1, Mr. J. Higginson (Basildon); 78 pts.; 2, Mr. D. Smith (Basildon); 70 pts.; 3, Mr. K. Logan (Basildon); 69 pts. A.O.V.: 1, Mr. B. Logan (Basildon); 89 pts.; 2, Mr. Dunn (Southend); 88 pts.; 3, Mr. D. Smith (Basildon); 85 pts.; 4, Mr. Nicoll (Thurrock); 84 pts. Danos, fishoras and neonoras: 1, Mr. B. Logan (Basildon); 89 pts.; 2, Mr. Nicoll (Thurrock); 87 pts.; 3, Mr. D. Chatteridge (Southend); 86 pts.; 4, Mr. B. Logan (Basildon); 85 pts. Labridae: 1, Mr. Nicoll (Thurrock); 85 pts.; 2, Mr. Mould (Thurrock); 85 pts.; 3, Mr. Barber (Thurrock); 83 pts.; 4, Mr. Capon (Southend); 82 pts.

The Society welcomes new members. Meetings are held fortnightly on Monday evenings at 8 p.m. at the Landon Community Centre, Aston Road, Landon, or contact Secretary for further information at the above address.

THE main item of the July meeting of the Newport A.S. was a surving-up by Mr. Colin Salmon, a former chairman of the Society, on the first "big" of the furnished aquaria competition held three weeks earlier.

Winners were announced in Ladies Section: Mrs. M. Burgess. Aquarists under 2 ft.: Mr. J. T. Burgeon. Aquarists over 2 ft.: Mr. H. J. Wall. A secondary item was a lecture given by Society member Mr. Joe Phillips on "Tropical Aquarism Carps," illustrated with the use of an episcopes (magic lantern).

Schedules for the fourth annual open show of the Society to be held on Saturday, 17th September, are now available from the show secretary, Mr. M. J. Perry, 45 Western Drive, Galsida, Cardiff (tel. 6677). Judges for the event are Messrs. Kim Farrant, R. Dennis Johns, Doug. Songhurst and Richard Wagg (South Wales Tropical Fish Study Group).

A SOCIAL night was held recently by Latham A.S. at which members of Accrington and Blackpool Aquarist Clubs were present. There were 85 people to witness the home side win a challenge match against the other two clubs, Blackpool being soundly with Harrington third. The event secretary of the Federation of Northern Aquarist Societies, Mr. J. Sloan, presented the trophies.

AT a recent meeting of the Stone (Staffs.) A.S. the programme consisted of a colour slide show entitled "Common and Uncommon Tropical Plants." A total of 30 slides was shown. A short running commentary was provided by Mr. G. Leadley and Mr. C. Balfour who gave the benefit of their personal experience with the plants shown to an appreciative audience.

ON the 9th June, High Wycombe and District A.S. held their annual general meeting when all officers for the past year were re-elected with the exception of the secretary who retired earlier in the year. The temporary secretary was elected to the post for the coming year.

The chairman reported a quiet year but was pleased to add that there had been several very good social evenings with other local clubs and a resolution was passed to have more table shows and social evenings with other clubs during the coming year. If any club would like to join in a table show the Society would be very pleased to hear from them. Meetings are at present held on the second and fourth Wednesday of each month.

The officers elected are: Chairman, Mr. R. Reynolds; treasurer and vice-chairman, Mr. P. A. Robinson; librarian, Mr. E. Chaffield; 18 North Drive, High Wycombe; secretary and show secretary, Mrs. V. Pike; 18 Ashley Drive, Dyma Green, Foss, Bucks.; equipment officer, Mr. K. Bevin; committee members: Mr. E. Reynolds, Mr. A. P. Wilkinson, Mr. E. Chaffield, Mr. C. Bevin, Mr. C. Pike, Mrs. P. Reynolds, Mrs. V. Pike, Mr. F. Wain.

AT the Blackpool and Fylde A.S. first meeting in June an auction took place, the money raised being for club funds.

The table show results for this meeting were as follows: Singleton Trophy: 1, J. Smith (black gourami); 2, J. Hayes (three-spot gourami); 3, B. Atkinson (three-spot gourami); Robinson Trophy: 1, J. Smith (black gourami); 2, B. Atkinson (three-spot gourami); 3, J. Hayes (three-spot gourami).

The second meeting in June was very entertaining with a fish drive being the main attraction. The game was played in the same way as a bottle drive with some very strange fish being drawn. The table show for breeders class was won by J. Smith (black gourami); 2, J. Hayes (black gourami); 3, C. A. Jones (crabs). The Blackpool and Fylde A.S. open show is to be held on the 25th September at the Hartwood Solarium, South Promenade, Blackpool.

THE new headquarters of the Gorron and Openghaw A.S. for every first and third Tuesday in the month, will be at larger and better premises in the Railway Hotel, Chappin Street, Gorron, Manchester, 18. New members will be made most welcome to take part in the Club's many forthcoming activities which include their second annual open show at the Conservative Club, Gorron Lane, Manchester, 18, on the 14th August. There will be 60 open classes including pairs sections for all the popular classes and a marine section for the first time in the north plus the Manchester section of the Fancy Group Association. Many valuable prizes are to be won in all classes.

Any one requiring further information about this worthwhile society should contact the club secretary, Mr. Len McCarty, at 36 Railway Street, Gorron, Manchester, 18.

THE Catford Open Show was well supported by 18 clubs and members of individual aquarists. Over 400 fish were on view and the judges, Messrs. Mealand, Brown and Bisco, remarked on the high standard, a fact borne out by the medal awarded to many F.R.A.S. Gold Stars and Silver Stars on the prize certificate.

The major trophy, the F.R.A.S. Championship Plaque, was won by Mr. T. K. Payne of Penkridge, Staffs., with a Cynochirus Wharfedale, a member of B.R.A. The Best Fish in the Show award was won by a Catford Club member, Mr. T. Asquith, with a Veiltail molly. The best outdoor fish award went to another Catford member, Mr. W. B. Doo.

The general list of prizewinners was as follows: Plares: 1, Mr. Glyn (Huddersley); 2, Mr. R. J. Thomas (Halesworth); 3, Mr. Debra (Newport); Guppies: 1, Mr. R. Bagg (White City); 2, Mr. Southborne (Harrow); 3, Mr. A. Jamieson (Walling); Swordtails: 1, Mr. J. Cobden (Catford); 2, Mr. J. Wilson (Lea); 3, Mr. C. Greenhalgh (Morden); Mollies: 1, Mr. T. Asquith (Waltham); 2, Mr. J. Cobden (Catford); 3, Mr. R. J. Thomas (Halesworth); A.O.V. livebearers: 1 and 2, Mr. R. Cooper (Totterdell); 3, Mr. C. Greenhalgh (Morden); Labridae: 1 and 2, Mr. B. M. Barber (Harrow); 3, Mr. B. Stewart (Bodley Heath); Characins: 1, Mr. R. J. Thomas (Halesworth); 2, Mr. A. Harding (Darlington); 3, Mr. R. Bagg (White City); Dwarf cichlids: 1, Mr. D. J. Woodward (Harrow); 2, Mr. Cooper (Totterdell); 3, Mr. N. E. Lucas (Ashford); A.O.V. cichlids: 1 and 2, Mr. Challenge (Bare Barn); 3, Mr. D. J. Woodward (Harrow); Barb: 1 and 2, Mr. T. Gilman (Bethel Green); 3, Mr. S. G. Mooney (Marwell Hill); Danos, fishoras, minnows: 1, Mr. R. Bagg (White City); 2, Mr. S. G. Mooney (Marwell Hill); 3, Mr. J. Wilson (Lea); Egg-laying fish: 1 and 2, Mr. T. K. Payne (Penkridge, Staffs.); 3, Mr. M. Packwood (Milton); Corydoras cat: 1, Mrs. F. Bost (Chelms); 2, Mr. S. Anon (Lewisham); Mrs. G. Mooney (Marwell Hill); A.O.V. cat: 1, Mr. Jackson (Walling); 2, Mr. R. Glyn (Huddersley); 3, Mr. J. Cobden (Catford); A.O.V. egg-layers: 1, Mr. S. G. Mooney (Marwell Hill); 2, Mrs. F. Bost (Chelms); 3, Mrs. F. Bost (Chelms); Breeder's livebearers: 1, Mr. R. Cooper (Totterdell); 2, Mr. C. Fullerton (Brixton); 3, Mr. S. G. Mooney (Marwell Hill); Breeder's egg-layers: 1, Mr. J. Cobden (Catford);

2, P. Bullock; 3, H. Ellis, Luben; 1, S. Tickle; 2, R. Grice; 3, P. Bullock. January: 1, J. Cobb; 2, P. Lee; 3, G. Smith and J. Smith; 1 and 3, K. Parker; 2, J. Robinson. Cichlids: 1 and 3, J. Robinson; 2, P. Mullis. Rainbow and Guppies: 1, B. Parker; 2, J. Robinson; 3, P. Bullock. Barb: 1, P. Bullock; 2, J. Robinson; 3, S. Tickle. Labryrinth: 1 (equal), P. Mullis and R. Moorcroft; 3, P. Bullock. Livebearers: 1, R. Moorcroft; 2, W. Parker; 3, J. Robinson. A.O.V.: 1, J. Robinson; 2, H. Jones; 3, H. Moorcroft.

REPORTS presented at the **Ilford and District Aquarist and Pondkeepers' Society** annual meeting showed a successful year and an increase in membership.

Officers elected were: President, V. Price; vice-presidents, L. Jarvis, I. Nott; chairman, A. Stobbing; vice-chairman, J. Sanders; secretary, R. Ruth; assistant secretary, P. Price; treasurer, M. Brill; assistant treasurer, L. Smith; show secretary, H. Berger; press and social secretary, L. Smith; librarian, K. Ellis. Committee: Mrs. R. Ruth, J. Hansen, R. Sampson. Auditors: B. Dixon and P. Hartley. Winners at the June table show: Tropical tetras, guppies: M. Brill; J. Hartman, T. Robinson, J. Hansen. Tropical cutfish: J. Hansen, M. Brill, M. Brill, J. Hansen. Cobras: H. Berger, W. Cook, H. Berger.

Three pairs of fish were won in competition by Mr. R. Sampson and Mr. J. Sanders. Anyone interested in bookkeeping will be welcome at future meetings. Details from Mr. R. Ruth, 13 Dunbar Road, Dagenham.

RECENT activities of the **Bradford and District A.S.** have included talks by Mr. L. Greenall of Tadcaster on "Tudor Carp" and Mr. Smith of Bradford talks on "Worms." The next social evening will be to Chester Zoo on Sunday, 4th September. An honour conferred on one of the members has been the elevation of Mr. D. Carr to the position of President of the Association of Yorkshire Aquarist Societies.

THE **Brighton and Southern A.S.** held their third Open Show recently and the complete list of prize winners is as follows:

A.V. platy: 1, G. B. Bass (Rugate & Rodhill); 2, J. Smith (Brighton); 3, T. W. Leach (Rugate & Rodhill); 4, M. J. Sellwell (Perranmouth). A.V. swordtail: 1 and 2, G. Greenhall (Kingston); 3, M. Harley (Brighton); 4, G. Aylard (Kingston). A.V. mollie: 1, G. Aylard (Kingston); 2, A. G. Hart (Clapham); 3, J. Stewart (London Transport); 4, T. D. Smith (Willesden). A.V. male guppy: 1, E. D. Smith (Willesden); 2, J. Pulliam (Brighton); 3, G. Aylard (Kingston); 4, C. Swinburne. A.V. female guppy: 1, G. B. Bass (Rugate & Rodhill); 2, G. Aylard (Kingston); 3, R. Sigs (Kingston); 4, C. Ward (Brighton). A.O.V. livebearer: 1, 2 and 4, B. Cooper (Kingston); 3, J. E. Harris (Mitcham). A.V. characin: 1, R. Sigs (Kingston); 2, Mrs. J. E. Partridge (Crawley); 3, J. Pulliam (Brighton); 4, J. Smith (Brighton). A.V. barb: 1, J. Pulliam (Brighton); 2, N. Short (Mid-Sussex); 3, J. Hatley (Mid-Sussex); 4, A. G. Hart (Clapham). Danio, carpio, minnow: 1, C. Swinburne; 2, C. Waller (Mid-Sussex); 3 and 4, P. Saunders (Clapham). Barb: 1, R. Sigs (Kingston); 2, Mrs. E. Coleman (Clapham); 3, R. Keppel (Basingstoke); 4, G. Greenhall (Kingston). A.V. fisher: 1 and 3, T. E. Howe (Mitcham); 2, G. Weller (Midsussex). A.O.V. labryrinth: 1, A. W. Zarnasche (High Wycombe); 2, G. Aylard (Kingston); 3, Miss J. Stewart; 4, H. Arncliffe (Perranmouth). A.V. tooth carp: 1, 2 and 3, H. Arncliffe (Perranmouth); 4, D. Ellis (Kingston). Dwarf cichlids: 1, G. Feltenmark (Clapham); 2, J. A. Channon (Independent A.S.); 3, R. Cooper (Kingston); 4, C. Ward (Brighton). A.O.V. cichlid: 1, P. Collins (Rugate & Rodhill); 2, G. Greenhall (Kingston); 3, C. Ward (Brighton); 4, T. D. Smith (Willesden). Corydoras cutfish: 1, T. P. Gaggie (Crawley); 2, P.

Saunders (Clapham); 3, J. Stomp (Rugate & Rodhill); 4, H. Arncliffe (Perranmouth). A.O.V. tropical cat: 1, A. W. Zarnasche (High Wycombe); 2 and 4, D. W. Ellis (Kingston); 3, B. Stratton (Brighton). A.O.V. striped snapper: 1, J. E. Howe (Mitcham); 2, J. Kay (Brighton); 3, M. Harley (Brighton); 4, R. Browning (Brighton). Tropical brooders (livebearers): 1, G. Feltenmark (Clapham); 2, R. Cooper (Kingston); 3, N. Short (Mid-Sussex); 4, R. E. Partridge (Crawley). Tropical brooders (guppies): 1 and 2, Mrs. J. E. Partridge (Crawley); 3, B. Jackson (Crawley); 4, A. G. Hart (Clapham). Common goldfish: 1, B. Whittington (Rugate & Rodhill); 2, W. Leach (Rugate & Rodhill); 3, J. Watson (Midsussex); 4, T. W. Leach (Rugate & Rodhill). A.V. shubunkin: 1 and 2, R. Whittington (Rugate & Rodhill); 3, Miss D. Morris (Rugate & Rodhill); 4, W. Leach (Rugate & Rodhill). A.O.V. fancy goldfish: 1, Mrs. J. Sellwell (Perranmouth); 2 and 3, Miss D. Morris (Rugate & Rodhill); 4, T. P. Gaggie (Crawley). A.V. river and pond: 1, Mrs. J. Sellwell (Perranmouth); 2, A. Dixon (Wimbledon); 3, V. B. Hunt (Perranmouth); 4, D. W. Ellis (Kingston). The Brighton Trophy for the Best Fish in the Show was awarded to Mr. R. Whittington, Rugate & Rodhill Club, for his Bristol shubunkin.

AT the annual general meeting of the **Midland Aquarist League**, the new secretary elected was Mr. Dulver and Mr. J. Grant was re-elected chairman. It was also hoped that Tamworth Society who had resigned earlier in the month would rejoin the League as soon as conditions permitted. The season's note was worked out as follows: September—Rugate; Goldwater, A.O.V. tropical, brooders livebearers; October—Aberystwyth: Anabantids, cichlids, guppies; March—Northampton: Cathid and loach; Barb, danio, kille, white cloud, livebearers; April—Leamington: Barb, characin, guppies; May—Coventry: Guppies, A.O.V. livebearers, livebearers.

THE first open show of **Cardiff A.S.** produced a record number of entries for Wales, the total being 108, the largest classes being Barb and A.O.V. labryrinth, each having more than 80 entries. The awards were presented by the President, The Rt. Hon. James Callaghan, M.P. (the Chancellor of the Exchequer). Results: Fighting fish: 1, P. Bartlett; 2, A. Ibberton; 3, R. Bennett; 4, M. Davis. A.O.V. labryrinth: 1 and 4, T. Fitzgerald; 2, C. Francis; 3, W. Senghaere. Hamas and syphons: 1, J. Sanders; 2, W. Ward; 3, F. Brown; 4, P. Bartlett. A.O.V. characin: 1, M. Davis; 2, D. Galligan; 3, M. Davis; 4, C. W. Gorwill. Barb: 1, F. Brown; 2, M. Davis; 3, C. W. Gorwill; 4, Mr. Humphries. Dwarf cichlids: 1, E. S. Baker; 2, A. Ibberton; 3, C. W. Gorwill; 4, C. Pemberton. A.O.V. cichlid: 1, M. Davis; 2, C. W. Gorwill; 3, N. D. Smith; 4, T. Gallow. Danio, carpio and w.z.z.m.: 1, B. Clarke; 2, I. Short; 3 and 4, P. Bartlett. Cathid: 1, G. Chinn; 2 and 4, P. Harris; 3, J. Brown. Kribia: 1 and 2, F. Brown; 3, W. Ward; 4, D. Hayes. Male guppies: 1, 2, 3 and 4, R. S. Wigg. Female guppies: 1, J. Wheeler; 2, S. N. Sorey; 3, P. Bartlett; 4, D. Galligan. Platin: 1, J. Wheeler; 2, R. D. Jones; 3, M. Davis; 4, P. Bartlett. Molini: 1, T. D. Smith; 2, M. Davis; 3, P. Bartlett; 4, J. Pearson. Swordtails: 1 and 3, P. Brown; 2, W. D. Senghaere; 4, A. Ibberton. A.O.V. tropical: 1, 2 and 3, M. Davis; 4, D. Hayes. Brooders livebearers: 1, R. S. Wigg; 2, R. Brown; 3, J. Wheeler; 4, A. Ibberton. Brooders livebearers: 1, M. Davis; 2, T. D. Smith; 3, A. Davies; 4, C. W. Gorwill. Common goldfish: 1 and 4, C. Gans; 2 and 3, H. Jago. Shubunkins: 1, R. Berry; 2, 3 and 4, H. Jago. Fancy goldfish: 1 and 3, V. Capaldi; 2, P. Berry; 3 and 4, B. Light. Farnished aquaria: 1, G. V. Lloyd; 2, P. Bartlett; 3, S. Nelson; 4, B. Light. Special awards: Best goldwater, R. Berry; Best brooders exhibit, R. S. Wigg; Farnished aquaria, G. V. Lloyd; Best fish in show, M. Davis (a cat).

AQUARISTS' CALENDAR

8-12th August: Perranmouth A.S. Open Show. Schedules are available from W. T. Ryder, 493, Commercial Road, Mile End, Perranmouth.

21st August: Milton Tropical Fish Society First Open Show at the Milton Community Centre, Clough Lane, Milton, Hants. Schedules are available from Mr. H. Wainwright, 95, Hambroes Drive, Milton, Hants.

24-27th August: Midland Open Aquarist Show, Ringly Hall, Broad Street, Birmingham, 1. Details available from Mr. J. Edwards, 34, Veronia Close, Selly Oak, Birmingham 29.

27th August: Hounslow A.S. Open Show, Chateaux School, Heath Road, Hounslow.

3rd September: High Wycombe and District A.S. The Rye, High Wycombe. Schedules available from Mrs. V. Price, 16, Ashby Drive, Tylor Green, Penn, Bucks.

2-4th September: Northampton and District Annual Open Show at the Drill Hall, Drury Road, Northampton. Full details are available from M. W. J. Christie, Hon. Show Secretary, 40, Moor Lane, Dunny, Notts.

4th September: Federation of Scottish A.S. September Convention, The Good Templar Hall, Gray Street, Brimley Ferry.

4th September: Middlesbrough & District Aquarist Society Open Show at Berwick Hills Community Centre, Middlesbrough.

17th September: Newport A.S. Fourth Annual Open Show, Shaftesbury Street, Methodist Church Hall, Newport. Details from Hon. Show Secretary, Mr. M. J. Pery, 45, Western Drive, Goshall, Cardiff.

24th September: Cambridge and District A.S. Second Annual Show, Trinity Hall, Cockburn Street, Mill Road, Cambridge.

24th September: Kingston & District Aquarist Society Annual Open Show. Secretary, Miss P. Greenhall, 39, Garth Close, Morden, Surrey.

12th October: Hart London Aquarist and Pondkeepers Association Annual Show, Ripple Road School, Barking Essex. Schedules from Mrs. P. Harris, Show Secretary, 88, Leigh Road, East Ham, London, E.6.

16th October: Stone A.S. Second Open Show, Walton Community Centre, Stone, Staffs. Schedules from Mr. R. J. Harvey, 61, St. Vincent Road, Stone, Staffs.

29th-31st October: British Aquarist Festival, Belle Vue Gardens, Manchester. Full details available later.

Crossword Solution

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continued on page xvi

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