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and Pondkeeper

MARCH 1963

MONTHLY
Vol. XXVII No. 12

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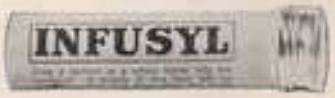

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AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"

VOL. XXVII No. 12 1963

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

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

QUERIES

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

Correspondence with intending contributors is welcomed.

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

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Contents

Fluoride and Your Aquarium

SINCE the finding that children living in areas with water supplies containing mineral fluoride in small amounts suffered less tooth decay than children in other areas, recommendations have been made to standardise the content of fluoride in domestic water. Accordingly water boards in some parts of Britain are now proposing to add sodium fluoride to water to raise the concentration to the one that gives protection to teeth, namely about 1 part of fluoride per million parts of water. This has provoked much discussion in letter columns of local newspapers up and down the country, and many readers of *The Aquarist* have asked us whether fluoridation will affect their pond and aquarium stocks.

Most natural waters in which fishes occur already contain fluoride. The amount depends on the extent to which the water has dissolved fluoride from rocks and soil it has passed through. That is, the geological nature of the area yielding the water determines how much fluoride is present. In Britain the range of variations in fluoride content of different waters is from the barely detectable up to about 6 parts per million. There is nothing to show that fishes are adversely affected by water having amounts of fluoride in this range. Even if you live in a fluoride-deficient area so that fluoride is now specially added to the water supplies, your water will still have less of this mineral than many of the untreated waters from which your fishes might have been obtained.

Some people object to having their drinking water "doctored", and they are often irrational in their use of anecdotes to advance their objections. In one American town, when it was announced that fluoridation was to begin, complaints about taste, and deaths of pets including goldfish, all ascribed to fluoride, were received from an alarmist minority weeks before the water supply was in fact altered in any way!

After the Big "Freeze-up"

by A. BOARDER

DURING this winter I have recorded lower temperatures during the cold spell than I have over the past 42 years. Up to this winter the lowest I had found was 6°F, or '26 degrees of frost' (—14°C). During the night of 22nd to 23rd January, 1963 my thermometer showed 0°F ('32 degrees of frost'; —18°C). Admittedly this was only a foot from ground level, but I had placed the thermometer near the pond to test what the fishes had to stand.

Throughout the cold spell my pond was frozen to a depth of at least a foot and my outside tanks have been frozen almost solid. I have kept a hole in the ice on the pond with difficulty but have had to give up trying to get through the ice on the tanks. These tanks (12 of them) are disused cold-water cisterns that have been floated over with cement on the inside. They have been in use for about 25 years and have never been frozen over so thickly before. They house some young fantails, but whether any have survived I do not know at the time of writing as I am unable to see through the ice.

Possible After-Effects

In my pond are three large green tench, which I bred in 1947. They appear to have come to no harm under the ice. I have also 15 fantail goldfish of various ages, which form my breeding stock. All of these survived the severe weather with no apparent ill-effects. One of them, a large female, had been off balance long before the cold spell but is still alive and seems no worse than she was before. This fish had become very swollen with spawn and this tends to constrict the swim bladder in some of the fantails, especially when they are over 12 years old. I had quite expected to find that this particular fish had succumbed to the severe cold, but it had not done so.

Of course, as I write this it is too early to tell whether there will be any harmful after-effects to the fishes, for I am quite aware that often attacks by fungus and fin rot occur as an aftermath. However, if one keeps a sharp lookout in the pond any fish so affected can be treated and cured if taken in time. One of the first places to be attacked by fungus is the tail or caudal fin. The affected fish will often leave the others and remain in the upper regions of the water and rarely go low down. The fungus on the tail may be painted with iodine whilst the fish is held out of water in a net, and this may arrest the disease. If not the salt bath should prove sufficient to bring about a cure.

Hardy Strain

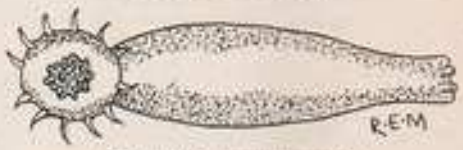
As fantails are a fancy goldfish with a large double tail it might be expected that they are liable to contract fungus disease there. However, I have been breeding this strain of fantails for the past 26 years to try to get a hardy strain that could live out-doors through our winters. I also wanted a strain that would change colour early, at least in a year, and at the same time be of exhibition standard. I think that by selective breeding over the years I have achieved my objects. I certainly do not breed all show specimens, and much of the interest in breeding some good ones would be lost if this were so, but I still get a good proportion of excellent fish. I have not introduced any fresh fish into my pond during this time but have discarded any that did not come up to my high standard. Also I have never believed in endeavouring to cure a sick fish for the purpose of including it in my breeding strain. In Nature such weaklings would be eaten by predators, so that only the strongest survive to perpetuate the species.

Cracked Ponds

It may be that we shall not experience another winter as bad as this last one for many years, but this one has taught me that it is a wise plan to clean out any reasonably small pond before the coldest weather sets in. Many pond-keepers may have been disappointed to find that their ponds have cracked despite them having sloping sides. The old notion that in a pond with sloping sides the ice would slide up and not cause a crack sounds all right in theory but in practice is not true. The ice sticks firmly to the side and does not budge up a fraction of an inch.

DISEASES OF FISHES

Gill Flukes



Gill fluke (Dactylogyrus) magnified

GILL flukes (*Dactylogyrus*) are closely related to skin flukes and can be diagnosed by the following symptoms. Various parts of the gill sheets (i.e. the internal section of the gill) will be covered by a grey film consisting of slime and dead epithelial cells. The internal parts of the gill may swell and bulge from the gill covering and show as a pale woolly protuberance. The gills will gape and look very pale in colour and there will be a marked increase in the fish's breathing frequency.

Treatment must be commenced immediately by placing the fish in a tank containing a solution of methylene blue. The solution is prepared by dissolving 1 gram of methylene blue in 100 millilitres of distilled water; 1-2 millilitres of this solution is added for each Imperial gallon of water in the tank. It is not necessary to repeat the treatment as the solution will stay active long enough to kill all the flukes present. Your local chemist will supply the methylene blue and help you (if asked nicely) in making up any prescription.

R. E. Macdonald

Water Life in Close-up

by

L. JACKMAN

Photographs by the author

SOME readers will no doubt have seen the B.B.C. Television series by Peter Scott called "Look". During the past year Ron Pegg and myself have been making a film about life beneath the waters of a lake, and this was televised in "Look" on 30th January.

Our technique is to present many of the small aquatic creatures in large close-up views on film, for in this way we believe they tend to hold interest more than, say, a shoal of fish seen as a whole. Our first consideration in making this film was to find a suitable lake, and eventually we selected Slapton Ley in Devon. Here is a lake unspoiled and preserved as a nature reserve by the Field Studies Council.

The story told by the film is a simple one, and involves two boys who go fishing for perch and rudd. In this way we were able to cut from surface to underwater quite naturally simply by showing, for instance, a float hitting the water and then the next shot showing the bait sinking under water.

Whilst much exciting work can always be done in the field, a studio is essential to get the detailed material in close-up. Our studio is equipped with two large tanks 6 feet in length by 4 feet wide by 3 feet deep. There are two smaller tanks, each 3 feet long, and numerous others used for keeping livestock and plants etc.

A system of plastic pipes links all these tanks together and numerous stopcocks are arranged so that any or all of the tanks can be isolated. The tanks are also connected to a reservoir. Thus at any time we can have seawater or freshwater circulating. The seawater is pumped through a pipe to the studio laid under the road from Paignton Harbour.

Another pump takes water from the reservoir and one pump is used to circulate water. The tanks have two outflows, the first leading back to the reservoir and the other leading to waste.

An ex-Government vacuum pump provides more than enough air, and two time-switches connected to its motor give regulated periods of air supply throughout the 24 hours.

Lighting is always a problem with filming, and in the end we settled for a rig holding 4,500 watts of tungsten light, three 500 watt photoflood lamps and two beam-focusing spot lights of 500 watts each. And that amount of electricity soon warms the water! Therefore we have to switch on the 300 gallons per hour Mono pump, which pumps through a glass wool filter to keep the supply clean.

One of the major jobs of work involved in filming under these conditions is the setting up of rocks and plants to make duplicates of the natural habitat. We have adopted a system of allowing one tank to 'mature' and settle after planting whilst we film in another. Having set up the tank, the next thing to do is to prepare for filming, and this is where frustration and excitement sit by your shoulder.

One of our major sequences came by chance. It showed a dragonfly larva attacking, seizing and eating a small rudd. This happened without warning, when luckily we had the camera mounted and ready for use. We were able to cover the entire sequence and even managed to get some big close-ups of the jaws at work. It's only when you are

Some of the pumps used to circulate water between the aquaria used for filming

face to face with such creatures and can see nothing but their gnashing jaws through the viewfinder that you realise how savage they are.

Water insects and their larvae are the most deadly predators for small fishes and crustaceans. On another occasion we watched a dragonfly larva perched on a stone shoot out its mask time after time to catch *Daphnia*. It never moved its body, and in 3 minutes its prehensile jaws seized 20 of the water fleas in the unconfined space of a large tank.

Dytiscus larvae will attack anything on sight. One attacked a *Caddis* larva and literally shook it as a dog will shake a bone. It probed with grim intent and finally grasped the hiding larva and dragged it from its case.

Most of the close-up work was filmed in the studio with extension tubes of various sizes for the lens. Depth of focus troubles? Of course, but that's just one of those things.

The job has many frustrations. For instance, we needed several shots of perch swimming from right to left in front of a group of reeds. For an hour with camera set up we watched those fish swim from left to right behind the reeds. No sooner had we decided to call it off and pack up than they did what we had waited for so long—but this time the camera was not ready, of course. But just occasionally luck helps us, as when the dragonfly adult started ovi-positing right in front of the lens.

However, filming the under-water scene is attractive because it affords us the opportunity of watching for long periods the fascinating creatures that live there.

The air pipe seen in the aquarium does not appear in the shots obtained on film

BOOK REVIEW

Exotic Tropical Fishes by H. R. Axelrod, C. W. Emmens, D. Scudthorpe, W. Vorderwinkler, R. Socolof and N. Pronek. T. F. H. Publications (London) Ltd. £7 10s.

I HAVE seen published four or five books purporting to be the last word in tropical fish literature, each supposedly giving an exhaustive survey of all the tropical fishes on the market, and full and authoritative information on everything from breeding to diagnosing disease. I thought therefore that this latest looseleaf book would have to be something special indeed for its publication to be justified. I looked at it from two angles: to see whether it added anything original and whether it fulfilled the purpose for which it was intended, namely to provide a textbook on tropical fishes that would never be out-dated.

The section on raising Tropical Fishes Commercially was a joy to read, as was also the first section, Aquarium Management (a part that often is as dry as dust to the experienced aquarist). The book is surprisingly free of Americanisms, and I could detect no ambiguities in the text. Exceptionally well illustrated, it could easily stand as a complete book.

The sections on Exotic Aquarium Plants and Exotic Tropical Fishes are well-treated, but I was not taken by the method used for indexing the fishes. They are placed in alphabetical order, according to their scientific names, which in itself may prove difficult for the beginner. If he does not know the guppy as *Lebistes reticulatus* he will have to look through the section until he finds his fish. This problem could easily be solved by provision of an appendix giving common names of fishes, and some indication of the families to which they belong. That would save having to hunt through the book to find an alternative cyprinoid to the goldfish.

To my mind, the work lives up to its boast that it would never be out-dated. Its looseleaf pages are easy to fix into the special folder, and it does not need a degree in engineering to fix in extra pages. It can also open flat. It has, of course, minor faults, but unlike those in most books, they can be easily righted in this one. Even if you have those other "four or five books" on your shelves, you could do worse than buy *Exotic Tropical Fishes*.

J. McM. URE

The Reptiles and Amphibians of Southern Africa by Dr. Walter Rose. 1962. Maskew Miller, Capetown. 494 pages, 294 photographs.

THIS excellent book can be recommended to readers whether or not they possess the original edition. The new greatly enlarged edition (the first edition was of 378 pages) incorporates many new photographs.

Dr. Walter Rose has spent a lifetime watching and keeping the reptiles and amphibians of Southern Africa and he relates his experiences wittily yet instructively. His skill and sympathy have resulted in a valuable collection of photographs and a fascinating text, of great value to the reader. It tells us the habits and habitat (and therefore the vivarium requirements) of all the reptiles and amphibians kept by the author and also the experiences he has had with his collection over the last 50 years. Dr. Rose has discovered several new species and much about the life history and habits of other species.

This is a superb book, which every vivarium enthusiast should possess. When the first edition appeared I wrote that it was the best single book on herpetology that I possessed, and I am still of this opinion—12 years later.

H.R.B.

European Green Tree Frogs

by ROBERT BUSTARD, B.Sc.

Photographs by the author

A single grass stem can support the weight of a green tree frog

DURING the last 15 years I have received hundreds of exciting and unusual reptiles and amphibians from many parts of the world, but few have given the equal of, and none has exceeded, the pleasure I felt at seeing my first green tree frogs (*Hyla arborea*) at close quarters. The brilliant green coloration, the daintiness of the tiny animal, its quick movements and its fearless jumps in all directions, endeared it to me. I have had green tree frogs as long as I have been interested in reptiles and amphibians, or rather since I was old enough to keep a small collection. Indeed I am told I showed great interest in lizards before my third birthday.

We are very fortunate to have this delightful little frog so readily and cheaply available (they cost 1s. 6d. to 2s. each). It is a human failing that we tend to overlook or spurn that which is easily obtained, and pursue rarities, not for their own sake, but because they are rarities. The little green tree frog is one common species that is certainly worth while keeping, and this advice is directed at the beginner and the more ambitious collector and also at aquarists possessing a fish house.

The green tree frog is a native of Western and Central Europe, where it lives in bushes, often in gardens, except in the breeding season when the adults go to the water to mate and lay their eggs. It is mainly active at night, but specimens are not averse to basking in sunlight.

Size seldom exceeds 2 inches and coloration is usually a beautiful shade of grass green. I say "usually" as these frogs, in common with many other species, have considerable ability to change colour. The result is that the frog is well camouflaged and the coloration may be yellowish or brown instead of green. This colour change takes place slowly, unlike that of chameleons, which can alter their colour in a matter of seconds. There is a black lateral band edged in white (in the typical form) which passes back from the eye to the groin and serves to separate the dorsal green colour from the ventral white.

Adhesive Toe Pads

The most important adaptation, however, is still to be mentioned: the power to cling to leaves, branches or even a vertical sheet of glass. This is possible because of adhesive pads on the fingers and toes, and these give this little frog its extreme freedom of movement and ability to live off the ground. Arboreal species show various specialisations, and in tailed forms the tail may be prehensile and/or used as a balancing organ. In the slow-moving chameleons the opposable digits allow a definite grasping action and the lamellae on the feet of *Anolis* (see *The Aquarist*, July 1962) allow them the same freedom of movement as *Hyla*. One has only to watch tree frogs, especially at feeding times, to see just how perfect is their co-ordination and how important the adhesive discs are in allowing them to cling to some foliage at the end of a leap.

In captivity tree frogs are best housed in a fairly roomy vivarium if they are to be seen at their best. Height is important with all arboreal species, and a suggested size for their vivarium is 15 in. by 15 in. by 24 in. high. If a still larger home is available so much the better. Tree frogs like humid conditions, although they can bask in sunshine for long periods. The floor of the vivarium should have 2 inches of garden soil covered by moss. Moisture-loving plants such as lichens and ferns can be added and in the absence of a tall-growing plant, tree branches, preferably leafed and in a jar of water, should be added. The moss at the base of the cage is kept moist to ensure that the humidity is maintained. Naturally the vivarium lid must

Adhesive toe pads permit the green tree frog to cling to a vertical glass pane

be secure with such superb climbers. During the breeding season, in the early spring, a water dish should be provided and collectors in this country who have allowed their frogs roomy conditions have often been rewarded by pairing and egg-laying in captivity.

Male frogs in breeding condition give loud high-pitched croaks, during the course of which they inflate their throat pouches enormously. Even when this organ is deflated it is still often clearly recognisable as being functional at that time. The tadpoles require the usual treatment and leave the water at about 3 months. A most interesting account of the breeding of this frog and the rearing of the tadpoles was given in the *British Journal of Herpetology* (vol. 2, no. 3, page 56, 1957) by R. Bushnell under the title "Some notes on the breeding of amphibia, 1952".

Food provides the main problem for people with a small collection as tree frogs feed almost exclusively on winged insects; bluebottles are ideal, and catching them can be a tiresome business if the size of the collection does not make breeding or purchasing supplies worthwhile. The acrobatic behaviour when some flies are introduced has to be seen to be believed. I have often watched them capture bluebottles in mid-air and they jump after food with no thought of where they will land. Their small size and light weight is a great help to them, as can be seen in the accompanying photograph of one of my specimens resting on a single blade of grass.

Tree frogs are, of course, ideal inhabitants for an outdoor reptiliary, provided that it is enclosed so that they cannot escape. They also do well at liberty in the average greenhouse or fish house, although escape may provide a problem. My greenhouse, which is used to grow tomatoes and cucumbers and bring on bedding-out and house plants, appears most suitable for them. There is always shade below the plant trays and usually a fair degree of humidity, and the only window is in the roof. To date I do not know of any escapes. Normally, enough food enters the greenhouse and then cannot find the way out.

I hope that this article will interest many people in these frogs. They are very hardy, hibernate during the winter and are ideal for beginners.

Water Plants that

by C. D. SCULTHORPE

Photographs by the author

IN 1960 the author contributed articles to volumes XXIV and XXV of *The Aquarist*: various aspects of the natural habits and aquarium cultivation of some temperate and tropical water plants were described and illustrated. The purpose of this present series of notes is to bring the older accounts up to date, illustrating species of recent introduction and focussing attention on certain unusual features of both well-known and uncommon plants in which aquarists might care to interest themselves.

The number of species available to the aquarist is larger to-day than ever before, but the lay literature has not correspondingly increased, and so the aquarist interested in water plants is still faced with the considerable problem of attempting to discover what a given plant, revealed to him only as a scientific name in a price list, actually is and how it grows before deciding whether to obtain it. The publication of Roe's excellent little survey, *A Manual of Aquarium Plants*, has somewhat reduced the difficulties but even so the notes in this series may be of further, more detailed use to interested aquarists.

In these notes, the emphasis is on the illustrations, which are photographs of actual specimens, and one cautionary point must be remembered. Whilst a photograph possesses the advantage of depicting a single real specimen, as compared with an idealised drawing, it suffers the disadvantage of showing that specimen in just one state of growth. Hence numerous photographs are required to illustrate the full growth of a species and this demands considerable space. Wherever possible in the succeeding notes several illustra-

Fig. 1

Survive the Winter

tions are used; where this luxury has not been possible, the state of growth of the particular species is noted.

Perennating Organs

Of particular interest to the aquarist at this time of the year are those native plants which survive the winter not in the full vegetative state but as modified buds, often known as turions. Numerous species perennate in this way: the frog-bit (*Hydrocharis morsus-ranae*), the whorled milfoil (*Myriophyllum verticillatum*), the water soldier (*Stratiotes aloides*), the bladderwort (*Utricularia vulgaris*) and the arrowheads (*Sagittaria* spp.) are probably the most common.

Under natural conditions the perennating organs are formed during the autumn months and fall to the substratum as the parent plant decays. Using the food reserves of starch and oils, with which they are abundantly supplied, these buds grow vigorously in the spring, as the water becomes warmer and the light more intense, and each gives rise to a new plant. Under experimental conditions the plants may be induced to form such 'winter buds' by starving them of essential soluble nutrients at any time of the year.

Perennating organs of these species may be collected from natural freshwater habitats or purchased from aquatic nurseries, such as those of L. Haig and Co. Ltd., Newdigate, Surrey. Of the species mentioned, *Myriophyllum verticillatum* and species of *Sagittaria* are fairly frequent in slow-moving waters, especially in lowland districts. Both *Stratiotes aloides* and *Hydrocharis morsus-ranae* are rare in or absent from many northern and western areas, except in some localities to which they have been introduced by man. Whichever source is used by the aquarist, the perennating organs may be placed in small established coldwater aquaria and their development followed. Natural material should, of course, be washed and thoroughly examined to eliminate any possible parasites of fish. These specimens may also be kept in tropical aquaria with water at a temperature of up to 70-75°F (21-24°C); their development will then be more rapid, but their subsequent vegetative growth tends to be etiolated and survival is not assured.

The early stages of development are sustained by the nutrients which the organs themselves contain and the aquarist need supply no artificial composts. Cultivation of the maturing plants must be more elaborate and is noted below for each species.

Fig. 3

Frog-bit (*Hydrocharis morsus-ranae*)

Turions. 5-10 mm. long, more or less oblong, enclosed by two scale leaves, formed at the ends of stolons in autumn, dark green (see Fig. 1). The turions stay upright in the water, the centre of gravity being in the basal, stalked end.

Development. Scale leaves open, rudimentary leaves with long stalks and tiny blades appear; turions rise to water surface; successive leaves have increasingly larger blades which gradually attain the mature floating shape. Fig. 2 is a side view of young floating plants at this stage, displaying the decaying scale leaves, the first rudimentary leaves and later floating leaves.

Cultivation. Mature floating plants thrive in pools out-of-doors (Fig. 3), producing white three-petalled flowers and abundant stolons and roots from the nodes. In cold-water aquaria they will sometimes persist, but usually only if the water is appreciably calcareous.

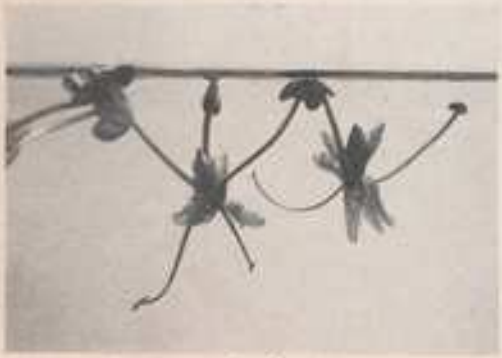


Fig. 2

Fig. 4

Whorled milfoil (*Myriophyllum verticillatum*)

Turions. 0.5-5 cm. long, club-shaped, with densely arranged leaves, rich deep green.

Development. Leaves open from below upwards, stem begins to grow. Fig. 4 shows an aerial view of turions at this stage. Abundant adventitious roots formed from nodes, anchoring the plant in substratum; youngest leaves have sparse thick segments, usually four leaves in a whorl; mature leaves have 25-35 hair-like segments, usually five leaves in a whorl. Fig. 5 shows developing plants and characteristic 'sleep movement', plant at left with leaves in the 'night' position, plant at right with leaves spread out in 'day' position. Fig. 6 shows later stage with mature, finely-divided leaves towards top of stems.

Cultivation. The maturing plants are easily maintained in aquaria provided that the temperature does not exceed about 65°F (18°C); they may be rooted in gravel or sand, but for luxuriant growth should be planted in a compost to which some clay soil has been added. In garden pools with a muddy substratum, growth is often rampant and the aerial flower spikes appear in July and August.

Water soldier (*Stratiotes aloides*)

Offsets. 2-5 cm. long; small spiny leaves in a dense cluster at the end of a short stolon arising close to the crown of the parent plant when it has become submerged in early autumn; offsets often remain attached to parent until following year.

Development. Two or three stout adventitious roots appear at the base of the offset (the first of these is visible in the side view of an offset in Fig. 7) and grow to 9-12 in. long; leaves spread open and successively longer leaves are produced until mature size is attained. By this time the young plant has usually broken free of the parent and risen to the water surface. The structure and peculiar habits of the mature plant were fully described in 'Strange Habits and Floral Mechanisms of Familiar Aquarium Plants' (*The Aquarist*, July 1960).

Cultivation. Though young plants will survive for several months in an aquarium the water soldier *is* really a pool species; it does not appreciate high water temperatures and needs calcareous salts in the water. These may be supplied by having clay in the bottom mud. Under good

Fig. 5

conditions of sunlight the plants will produce aerial white flowers in early summer; native specimens are usually females.

Bladderwort (*Utricularia vulgaris*)

Turions. 0.5-1.5 cm. diameter, more or less globular with densely packed, coarsely divided leaves; dark brownish green.

Development. Buds uncoil, the rootless stem elongates and new floating leaves are produced below the water surface, with progressively longer and finer segments; the later-formed leaves of the developing turion bear the typical small bladders. Fig. 8 shows two turions starting to develop and a young growing plant.

Cultivation. The common native bladderwort usually thrives in an established coldwater aquarium or in a garden pool, especially if the water is peaty. Out-of-doors, in

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

optimum conditions during July and August, aerial stalks bearing bright yellow flowers may be produced. Temperatures above about 65° F. (18° C.) are not usually tolerated in aquaria.

Arrowheads (*Sagittaria* spp.)

Turions. The native *S. sagittifolia* and the ornamental *S. japonica* both produce stolons in autumn which bear terminal turions resembling small corms or bulbs in general appearance. Those of *S. sagittifolia* are about 3 cm. long, ovoid in shape, and bright blue with yellowish orange spots. Those of *S. japonica* are slightly larger and orange brown.

Development. The turions should be lightly rooted in gravel or sand. Fig. 9: dormant turion of *S. japonica* showing covering scales and apical leaf sheath. Fig. 10: same turion 2 weeks later, showing developing shoot and the first two adventitious roots appearing from the future crown of the plant. Fig. 11: after a further 10 days, abundant roots have formed, and the first true leaf has appeared. Fig. 12: 5 days later, the first linear lanceolate floating leaf has formed, and the root system has developed laterals along the main roots. Fig. 13: two turions of *S. sagittifolia*; the typical linear submerged leaves have begun to develop and the adventitious root system is growing vigorously.

Cultivation. For further growth, the turions should be transplanted to 3 or 4 in. diameter pots containing a compost of 2 parts of good garden soil, 2 parts of sand and 1 part of peat, covered with aquarium gravel. These may be retained in large uncovered coldwater aquaria or preferably transferred to the garden pool, where subsequent growth of the plants will be more vigorous. *S. sagittifolia* produces its linear submerged leaves for some time, and then cordate floating and sagittate aerial leaves develop, whereas *S. japonica* quickly reaches the mature stage of sagittate aerial leaves.

Pondweed and Hornwort

Development of the turions of other native aquatic plants provides equal interest and demands just as simple apparatus as that for the species described above. Many fairly common species of pondweed, for example *Potamogeton lucens*, *P. pusillus*, *P. crispus* and *P. pectinatus*, perennate by means of turions; an even more familiar aquarium plant, hornwort (*Ceratophyllum demersum*) forms dense buds on the shoot system which have a similar purpose. Depicted in Fig. 14, these buds are composed of food-laden, sparsely branched leaves in a tight cluster. As a result of the fragility of the stems of the plant these winter buds usually break away from the decaying parent plant, remain on the substratum throughout the winter months and recommence growth in the early spring.

Fig. 13

Fig. 14

A JUDGE'S THOUGHTS ON JUDGING FISH

Assessment of Body

by FRANCIS BARRATT

LAST month I dealt with the first factor of pointing—size. Next comes body, for which we must allocate up to 20 points. The first thing we look at is the outline of the body viewed from the side, picturing in the mind an ideal outline and comparing the fish before us with this picture.

First look at the curve of the upper outline from nose to dorsal fin. In most species this should be a smooth continuous convex curve with no sign of a tipped-up snout. Amongst species that are widely bred by aquarists this hollow above the eyes is a common fault and should be treated as serious if it is more than slight. We must look for this fault particularly in tiger barbs, angel fish and gouramies etc. Improper selection of breeding stock, coupled with in-breeding, have played havoc with the body shapes of these species, and to award a prize to fish with this fault is to encourage continuation of deformity.

We have to be careful, however, not to penalise fish in which this snouty appearance is an inherent part of the fish's correct shape. An extreme example is the glass headstander (*Charax gibbosus*), but some common species have this characteristic to a lesser extent. In the ruby barb (*Puntius nigrofasciatus*) it is fairly pronounced; in the harlequin (*Rasbora heteromorpha*) it should be very slight.

Some fishes also show the fault of a bump instead of a hollow at this point. Only experience and long study of photographs and show guides, as well as of live fishes, will tell us which is ideal.

The first ray of the dorsal fin usually occurs at the highest part of the upper curve of the body and in some species the line drops sharply from this point to the tail, whereas in others the curve should be continuous and even. We have to learn in which cases this may properly occur.

Next we take the ventral curve as one sweep from nose to tail. The first fault we look for here is "bull chest". In most cases the ideal shape will be a clean convex curve, and any hollow under the chin is a fault. One of the exceptions here is again the ruby barb, but it must only be slight. Again this is a serious fault if it is present to a marked degree, for it seems to be a dominant hereditary characteristic. Continue the lower curve to the anal fin, where, as with the dorsal, this is often a point at which the curve breaks into an angle. Some of the large barbs and carps show this fault, and it gives the fish a flattened appearance underneath in some cases.

Now we compare the upper and lower outlines against each other. Should they be equal? Are they equal? If it is a female we expect a little more depth, but is it too much? Perhaps a little too full of roe (or of young in a livebearer). Look for a bulging side that will indicate a too recent, too heavy meal, or a hollow that may mean neglect, or incipient disease. Some specimens may have a perfect outline but some rather peculiar hollows in the side that do not always show so much. If it is in a tank look closely at the reflection on the sides of the fish to estimate if the body is straight. If in a jar, to remove the top and view from above is a simple way to see if there is deformity of the spine, but a slight curvature can easily be overlooked

Photo: W. J. Howes

Harlequin fish (Rasbora heteromorpha)

in a tank. At nearly every open show, I have seen a deformed fish exhibited, and I once saw a deformed specimen take the award for best in the show.

Try to get a "head-on" look to make sure the fish is plump enough, that both sides are even, and also to look at the mouth. It is surprising how many twisted lips there are, especially amongst swordtails.

One of our troubles may be to get a sideways look at a fish, which expects to be fed and is nose to the glass, so we judge its "head-on" appearance first and step back to see if it will turn sideways. Or it may be that a lovely big fish, with all the appearance of a winner, will only show one side. Fishes shown in round jars look long and thin and with most peculiar shapes if they are nearly as long as the jar is wide. We should be extremely careful how we make allowance for the distortion of the glass; the fish might really be like that! The onus is on the exhibitor to produce the fish before the judge in its best form. It is not for the judge to make allowance for travelling, or coldness, or a badly shaped or too small jar.

Allocation of Points

When we have thoroughly examined the body from tip to tail, we must make an assessment of points value, and we must be as accurate as possible in this as in all the other points decisions, because one point may cover the first three places.

There is no mathematical formula to help us here, as there was when dealing with size. We must remember to use all the 20 points, not just half of them. It is argued that if a fish has a body it follows that it must get some points, but

what we are assessing is the show value, and anything that can be honestly said to be bad has no show value, therefore no points.

A little formula that proves helpful here is to take into consideration all the faults and virtues of body shape and convert them into a graded 'opinion', such as: 'excellent', if there is no fault or blemish in line or contour, 'very good' if there is only a vague fault of contour, and so on down, through 'good', 'fair', 'poor', 'very poor' and 'bad'.

A Table of fair pointing for these grades would be as shown:

	Points
Excellent	20
Very good	19, 18
Good	17, 16, 15
Fair	14, 13, 12, 11
Poor	10, 9, 8, 7, 6
Very poor	5, 4, 3, 2, 1
Bad	No points

At the top of the Table there is only one possible mark. If the body is really 'excellent' it gets 20 points. 'Very good' covers 2 points, 'good' 3 points, and so on. We must not be afraid to go below 10 points for a body that is poor, and we will find very often that an exhibit that was highly pointed for size is lower down the scale for body, as many faults of shape appear as size develops.

Note that scars, cysts etc. should be ignored here, even though they may affect the body shape. These are properly taken into account under Condition, and this will be dealt with later.

WATER—the Cradle of Life

by P. F. CAPON

WHEN soap is added to water and an insoluble precipitate or scum is formed, the water is said to be hard. Water containing soluble salts of calcium (lime) or magnesium, or the salts of any of the metals other than sodium and potassium, has this property. Normally calcium and magnesium salts are the most common cause of water hardness. Soap is a substance called sodium stearate and is soluble in water; when it comes into contact with the calcium and magnesium salts in the hard water it forms calcium stearate, the scum, and a soluble sodium salt derived from the calcium salt.

Hardness of Water

There are two types of water hardness: temporary hardness and permanent hardness. Temporary hardness can be removed by boiling; it consists of the bicarbonates of calcium and magnesium, which decompose on boiling to give calcium carbonate (chalk) and magnesium carbonate. The "fur" in kettles is due to these carbonates. The calcium carbonate is hardly soluble in water but magnesium carbonate is slightly soluble in water, so that all the hardness due to the magnesium carbonate is not removed. The bicarbonates of calcium and magnesium are formed when water containing dissolved carbon dioxide flows through or over limestones or magnesian limestones, and boiling is simply a reversal of this process.

Permanent hardness is caused by the salts of calcium and magnesium other than the bicarbonates and cannot be removed by boiling. Methods other than boiling can be used to remove hardness. Lime treatment has been used by the authorities at Chelmsford, Southend, Caterham, Southampton, Canterbury and some other places. Lime in the form of quick-lime is added to the water; the lime removes the excess carbon dioxide from the calcium bicarbonate and double the quantity of calcium carbonate is precipitated. This method removes only the temporary hardness and if too much lime is added it causes hardness itself. It should be possible to use this method for aquarium water but great care would have to be taken to ensure that no excess of lime was left as this is more harmful to the fishes than the natural hardness. Washing soda will also soften water but this is most unsuitable for use in aquaria.

There are on the market water softeners of the Permutit type which are ideal for many domestic purposes but not for aquaria. The soft water that they dispense contains often quite high concentrations of sodium salts, hardly a natural water for fishes. A number of people have reported breeding successes with these softeners but they probably had only a slightly hard water in the first instance, so that the sodium salts concentration in the processed water was quite low; the sodium salts in water from softeners are roughly proportional to the quantity of calcium and magnesium salts in the supply water. A substance often used to soften water is a substance called sodium hexametaphosphate, but this should not be used in aquaria; it will cause the water to appear soft but will actually cause an increase in the total dissolved solids of the water and quite probably injure the fishes. Sodium hexametaphosphate is a constituent of many of the powder types of detergents.

One of the simplest methods of softening water is by diluting it with distilled water. Never use the distilled water sold by garages for topping up batteries as often this has had acids added to it. A solid-free water can be obtained by using an ion-exchange type of softener, which removes all the solids; these are usually obtainable from scientific supply houses.

Too many aquarists worry overmuch about the hardness. Fishes are in general very adaptable and, provided that the hardness is not excessive, they will not be harmed. After all, they survive in the wild where the hardness varies from

one extreme to the other with the varying amounts of rainfall. To my mind the total dissolved solids in the water are just as important as the hardness. The total dissolved solids includes both the hardness and many products of the fishes' metabolism, the latter often being poisons. The hardness may be determined by a method called titration, either a soap solution (a rather inaccurate method) or a substance called ethylenediamine tetra-acetic acid being used. For the aquarist's purposes the use of the soap solution is probably the easier method; after all he needs to know only the approximate hardness.

Of course, repeated topping up of an already hard water with more hard water will eventually increase the hardness to an extreme and is said to be a cause of fish dropsy.

Reaction of Water

Another property that aquarists worry too much about is the pH of the water. I recently carried out a series of tests on the pH in one of my tanks with an electric meter. The pH varied all over the place in a 7 days period from 6.5 to 7.1, and even varied from hour to hour. How can a fish be said to breed at a specific pH when the pH is very rarely steady? The fact that there are fish in the water will mean that the pH will vary, as the excreta of the fish will decompose and the decomposition products alter the pH.

I did hear of one aquarist lowering the pH to 4.5 in an attempt to breed cardinal tetras; he simply dumped the fish into this highly acid water from a community tank with a pH of about 7.0. He wondered why they lay gasping on the floor of the tank! The amazing thing is that the fish recovered after a while and even swam around in a more or less normal manner. The shock that these fish received must have been terrific; it just goes to show how tough our fish are; water at pH 4.5 will eat into iron! The pH is far from the complete answer to breeding the "problem" fishes; correct temperature range, a reasonable dissolved solids content, good feeding and, surely most important of all, not just any two fish but a pair, are necessary.

For our purposes it is sufficient to know that pH 7.0 is neutral, a pH above 7.0 is alkaline, one below 7.0 is acid. The pH is best measured with an electric meter where accuracy is required, but for the aquarist's purposes the books of test papers or the comparator sets are quite suitable. One method that can be used to lower the pH of your aquarium water, if this is absolutely necessary, is by the use of phosphoric acid; this also lowers the hardness as well. One part of dilute phosphoric acid B.P. is mixed with nine parts of distilled water (your chemist will do this for you) and this mixture is added to the tank drop by drop until the desired pH is achieved; the fishes are best removed during the treatment. If the water is very hard particles of calcium phosphate will be seen in the water and a film of the phosphate may even form on the surface. The tank should be left to stand for about 12 hours and then the film either skimmed off or simply stirred in and allowed to settle to the bottom. The calcium phosphate settling in the gravel results in a better growth of the plants. Not all fishes appreciate this treatment of their water, notably white cloud mountain minnows and many barbs and others used to an alkaline water.

Toxic Metals

There are only five metals likely to be used in or near aquaria that are toxic: copper, zinc, lead, chromium and silver. Iron has been stated to be dangerous to snails but in my tanks where the top angle iron is almost completely rusted away the snails are just as prolific as ever and show no signs of any effects at all. Copper and zinc are the most important as far as toxicity is concerned for of the metals they are the most likely to come into contact with the water. Thousands of "tiddlers" must be lost every year by small boys who proudly bring home their catches and pour them into a galvanised bath, only to find them dead next morning. How many potential aquarists must be lost because of these initial disasters! Perhaps with the advent of plastic bowls more "tiddlers" will survive and the ranks of aquarists be swollen as a result.

Some aquarists use galvanised tanks, as they do not rust as readily as ordinary angle iron ones, but these can be dangerous. Many fishes are able to survive in galvanised tanks as the zinc of the galvanising goes into solution far more readily in acid water than alkaline water. In some cases a film of insoluble oxide or carbonate forms on the surface of the metal and so prevents the zinc going into solution. Fishes such as roach are said to be killed by as little as one part per million of the metal in a few hours. The safest way of avoiding zinc poisoning is to keep all galvanised iron and perforated zinc away from your tanks; there is no need to use perforated zinc for breeding traps nowadays; plastics perform this function admirably.

Copper and its alloy with zinc, brass, are also highly dangerous to fishes; many are killed by as little as one part per million of copper. One point to remember is that many houses are now fitted with copper water pipes and these could be a source of trouble. However, if the taps are allowed to run for several minutes the concentration of copper will usually fall to a negligible proportion, for it is only when water is in contact with the metal that a dangerous concentration can build up; luckily the Company's mains are not made of copper. Hot-water systems should always be regarded with suspicion, as the hot-water tank is usually made of copper and hot water dissolves copper far more readily than cold. Do not worry about your tanks and pipes being eaten through and water leaking through the ceiling in the middle of the night, for when I talk of the metal dissolving the amount that does dissolve is so small that it will take hundreds of years for a leak to appear from this cause.

Copper and zinc kill fishes by coagulating the mucus covering of their bodies, especially around the gills, and death is by suffocation due to the precipitated and toughened mucus clogging the gills and preventing water with its life-giving oxygen flowing over the gill membranes.

Lead is a poison only when in solution and will dissolve to an appreciable extent only in a soft acid water. From time to time there are human fatalities where lead pipes are used to supply a soft acid water for domestic purposes. To the best of my knowledge no deaths due to lead poisoning have been reported in the aquarium press, but possibly some of the unexplained deaths in soft water districts could be due to this metal having gone into solution. When a piece of lead is immersed in water it is soon covered by a dulling film of oxide, which prevents further attack of the metal. In a water of sufficient acidity the dull surface film on the metal is readily dissolved and the metal presents a bright surface, showing that the metal is going into solution. Chromium is only occasionally used for aquarium frames and, like the other metals, hard alkaline water inhibits its solution; no cases of chromium poisoning have been reported but this does not mean that they do not occur from time to time.

Silver is also a poison but to a lesser extent than copper or zinc. There is on the market a filter medium that incorporates granules coated with silver; the manufacturers claim freedom from disease when this product is used. A very small quantity of silver goes into solution, it is too small and not of sufficient toxicity to harm adult fishes; it will kill off some micro-organisms in the water and in addition kills fish sperms, resulting in whole spawnings of infertile eggs.

Aluminium appears to be perfectly safe; after all it has

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Steps in Pond Construction

FIRST choose a site and design to suit your own garden. Draw a plan and stick to it, remembering that with the exception of lilies and nuphars and similar plants, sub-aquatics cannot be grown in deep water. So when designing it is better to include shallow ledges round the outside edge.

Remove excavated soil out of the way. It hampers the work and spoils perspective.

Make sure that all materials are at hand before you start.

Be systematic and thorough. Concrete the sides first, using shuttering boards to keep the material in place. The best proportion for mixing is 3 parts of sand to 1 of cement. With a stick poke the mixture about, and also tap the shuttering occasionally to make sure it will settle down well.

By the next day the cement will be sufficiently hard to start work on the floor or base. Now is the time to construct a 'soak-away'. Dig down to a depth of 4 or 5 feet. A piece of drainpipe is then stood on end, and underneath and around it is rammed rubble and loose stones so that it now projects 6 inches above the soil. A suitable plug with a ring or hook in the centre can easily be fixed.

The concrete floor of the pond should be about 4 inches thick, but before laying it the soil at the base of the previously cemented sides should be scooped away to the depth of 3 inches; this will allow the cement to run under and so make a good joint.

All corners should be rounded; this adds strength.

At the end of each day when concreting, all uncompleted work should be covered with wet sacks and well hosed, particularly before proceeding with the next layer.

The last piece of work is the surrounding rockery or crazy paving, which should be cemented to the edge.

The pond is now ready to receive the water, and the first filling should be allowed to remain for a week before it is released. Then fill the pond again and leave it for as long as patience will permit before emptying it once more.

The water lily will be planted in a basket, and so a layer of gravel is all that the deep part requires. The shelf may now be filled. First a layer of loam 2 inches thick, and then a layer of gravel to the level of the ledge.

Keep the pond full of water. This eradicates lime from the cement and reduces the risk of cracks; a hard frost is almost certain to cause fissures in an empty pond.

The secret of a balanced pool is ample plant life; but you must avoid the common mistake of overstocking. As a general guide allow one plant for every 2 square feet of water.

With a suitable number of plants in healthy growth the water should remain clear and pure all the year round.

The fish stock should not exceed one fish to every 10 gallons of water. This leaves ample margin for the growth of fish.

J. L. Brooks

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

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

Although my angel fish have spawned twice within the last 10 weeks, most of the newly hatched fry died after a few days. Can you suggest any reasons for the heavy casualties?

If the bottom of the tank is littered with uneaten food and other debris, pollution of the water (which kills fry very quickly) soon sets in. Therefore you must always guard against feeding the parent fish too heavily just before or after egg-laying has taken place. Moreover, make sure that harmful material is not introduced into the aquarium along with Infusoria or other microscopic live food intended for the fry. Two more things to guard against are a fluctuating temperature and over-bright light. Neither is conducive to successful hatching or subsequent development. Further, it might be worth your while to ascertain the degree of acidity or alkalinity and quantity of salts dissolved in the water; for, although angel fish have bred successfully in hard alkaline water, in the main they and their fry flourish best in soft, acid conditions.

Last spring I transferred some adult zebra fish to a spare tank kept in an unused attic room. While the fish remained in the tank heat was supplied, but after a month or so the fish were taken downstairs again, and the heater removed. You can imagine my surprise when I looked into this tank a few days ago and saw a number of emaciated-looking zebra fish fry swimming in the almost evaporated cold water. How did the fry manage to survive several months without food or artificial heat?

It is amazing how the fry of some species of "tropicals" can endure low temperatures and lack of human attention if they are left to fend for themselves in a well-planted tank. In the first place, you must remember that the zebra fish (*Brachydanio rerio*) has a temperature range extending from the middle sixties to the nineties (°F), so that although a lot of the fry would succumb in the late spring and early summer temperatures, the fittest would stay alive to grow apace with the arrival of warmer days. In an old and neglected aquarium there is always some food present for the fry to feed on, and though they would not grow fat on such a scanty diet, they would at least stay alive while the room remained reasonably warm.

What conditions are needed to spawn glowlight tetras?

Glowlights are not among the easiest fishes to spawn, and, having spawned them, their fry are not among the easiest to raise to maturity. Yet there are some hobbyists who can breed them successfully. The conditions most likely to ensure success are old, soft, acid water, a scrupulously clean tank, a temperature in the region of 74°F (24°C) and a diffuse light.

Will it harm my tank of tropical fishes to keep the top light switched on for about 14 hours every day?

Your fishes will not suffer any harm from 14 hours electric illumination daily. After all, they will still have 10 hours of darkness in which to rest and recoup their expenditure of light-time energy. But your plants may become covered with algae unless you cut down the strength of light for a few hours every day. To achieve the

most satisfactory artificial lighting, you will have to do some experimenting with lamps of a lower wattage.

Can the Malayan angel fish be kept without difficulty in the ordinary home aquarium?

Monodactylus argenteus, to give the species its scientific name, stays shy for the first few days after being placed in a new tank, but when it has grown accustomed to its changed surroundings it soon forgets its fears and swims boldly to and fro on the look out for food. It will eat almost anything and, given adequate swimming space in well-aerated water, it will grow at a phenomenal rate. Specimens under 2 in. long are well behaved, but larger fish often chase and bully one another and make a mess of the plant life in a tank by eating it and pulling it to pieces.

I wish to stock a 4ft. tank with about six different cichlids. Will you kindly supply me with the names of some of the more docile species?

Among the least quarrelsome cichlids are *Cichlasoma severum* (in its smaller sizes), *C. festivum*, *C. cutteri*, *Aequidens maroni*, *A. latifrons* and *A. curviceps*. Of these, *C. festivum*, *C. cutteri* and *A. maroni* are the shyest and least likely to cause any trouble. However, several large stones placed at each end of the tank and in the middle will do a lot towards impeding any outbreaks of chasing and bullying.

What is the best way of accelerating the growth and development of finnage and colours in male guppies?

A dark, clean compost, a strong light over a healthy growth of plants, sediment-free water and copious feedings of small live food will help promote rapid coloration. To hasten growth in fins and body, give the fish adequate swimming space in well-oxygenated water.

I am a beginner in fish keeping and wonder whether it is advisable for me to top up my aquarium with water drawn straight from the tap?

Provided that your mains water is not hard, a pint or two warmed and added to the aquarium every now and then does no harm. But in hard water areas, boil all tap water before use. Boiling helps to precipitate the dissolved salts in the water and thus reduces the solid content.

Is it true that a pale pink solution of potassium permanganate of potash added to aquarium water will cause swimming algae and dust-fine sediment in the water to gravitate to the bottom, where it may be removed with a dip-tube?

Yes, but make sure that the crystals of permanganate are completely dissolved before you empty the solution into the aquarium. If any of the fishes gasp at the surface soon after the chemical has started working (the water will then turn very cloudy) supply artificial aeration at once, or remove them to clean water.

I have just added some tiger barbs (*Barbus tetrazona*) to my community tank, but they keep together in a top corner with their heads down. Have they been stricken with some disease?

Barbus tetrazona often stay in a corner until they recover from their initial shyness after a change of tanks. Do not disturb them, or worry about their head-down posture. When not swimming to and fro, tiger barbs often adopt a head-down position.

I have just purchased an eel-like fish which the dealer told me was a member of the *Clarias* genus. I cannot find any fish listed under the heading *Clarias* in my books. Can you give me some information about it?

Clarias catfishes are native to Africa. They are smooth-bodied, eel-shaped fishes with a cluster of forward-pointing processes or "whiskers" on the wide slit of a mouth and tiny, beady eyes set wide apart on the head. The dorsal and anal fins extend almost the length of the body and are ribbon-like. The species we have seen and kept have been mostly grey to black with silvery underparts. They are nocturnal feeders and eat anything alive, dead or dried. They will soon outgrow a small tank and, at a length over 6 in., are capable of swallowing the usual run of guppy-sized tropicals. In the space of a year or so *C. angolensis*, the species most often imported, may exceed 12 in. in length. During the daytime, these interesting catfish tend to hide away behind or under stones or bury themselves up to their gill-openings in the sand.

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

Please tell me what thickness of glass I should use to glaze a frame measuring 48 in. by 15 in. by 15 in.

Use ¼ in. plate for the sides and ends, and ⅛ in. wired-glass for the bottom.

I am thinking of constructing an aquarium 36 in. by 15 in. by 15 in. and wish to know the quantity of aquarium cement required for 1 in. by 1 in. angle iron. Is there any advantage in using glazing compounds as advertised over ordinary putty?

You will need from 3½ to 4 lb. of glazing compound for your tank. As for the kind you use this is an individual taste. Thousands of tanks have been glazed with ordinary linseed oil putty and it has been found satisfactory, but many modern aquarists use the new types of compound.

I have a garden pond which has been established for 4 months. It is 9 ft. by 6 ft. and varies in depth from 18 to 30 in. The pond contains about 40 fishes of various sizes, and aerating plants and water lilies. My trouble is that the water is not clear. I have been told that it may take some months before the water does clear. Is this correct and is there anything I can do to accelerate its clearance?

As the pond is in an open part of the garden and gets all the possible sunshine then it is natural for the water to become green through the presence of algae. It is probable that the water will clear by itself. You appear to have too many fishes in such a small pond. There seems to be a general idea about that it is possible to introduce some magic substance which would kill all the green algae overnight but not harm the water plants or fishes. As the algae are just another form of plant life it is just not possible to do this; what would kill algae would kill the other plants as well. Once the other plants become well established the algae will be choked out.

I find the coldwater catfish an interesting and useful fish to keep. I have six in a 2 foot tank. Could you please give me details of feeding, its mixing ability with other fishes and how to breed it?

I do not think that you are likely to be successful at breeding catfish in your tank. In the first place these fish grow to a huge size, over 30 lb. in weight, and are fairly large before they breed. As for food they eat almost anything. I was inclined to say that they make good pets, "very fond of children", but perhaps that would be a bit too much. However, I have seen a small catfish, not more than 4 in. long overall, with a fully grown stickleback stuck down its throat, and a friend of mine was cleaning out his pond when one of his catfish got the toe of his wellington boot into its huge mouth. No, this fish is not a good mixer unless you want to keep down the numbers of fishes in a pond.

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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

Tank Divider

IN *The Aquarist* for January a coldwater fishkeeper asked for a source of grooved rubber for use in dividing his tank with glass. I have kept coldwater fishes for a number of years and tropical fishes for 12 months, with good results. With a tank 24 in. by 12 in. by 12 in. my problem was to provide a compartment for young fry to grow up in away from the adult fishes.

I made a tank divider by purchasing a piece of picture glass about the size of the aquarium's end panels and some net-curtain plastic (sold for curtain fixing in place of wire). I slit one side of the plastic and fitted this down the side edges of the glass and along its top edge and then wedged this across the tank. Several people have copied this idea with success, including my local pet shop.

(Mrs.) J. Ross,
Rhyl, Flintshire.

Ultraviolet Light

CAN we have readers' views and experiences on the effects of various types of lighting on fishes and plants? One reads allusions to the bad effects, sterility etc., alleged to be produced by use of ultraviolet light on fishes and plants. How can this be? Surely ultraviolet light can only stimulate growth and virility? I would like to hear of readers' experiences with fluorescent and other forms of lighting where the ultraviolet spectrum predominates.

P. W. Kavanagh,
Luton, Beds.

Clean and Hardy

HAVING decided that one of my 18 in. by 12 in. by 10 in. tanks, housing adult lyretails, needed cleaning I began siphoning the water into a small 10 in. by 8 in. by 8 in. tank and then proceeded to net and transfer the fish.

I emptied the larger tank to a depth of ½ in. and inspected the inside with a 60 watt lamp; I was satisfied that it contained nothing but the water. I then emptied the water down an outside drain and left the tank outside for 10 minutes or so whilst I made preparations to bring it indoors to clean it.

Once I had brought the tank indoors I began to clean it with a soap pad and a bucket of hot tap water. I eventually emptied the bucket of water into the tank and the result was ½ in. of soapy water in the bottom of the tank. Just then I noticed what I thought was a piece of old plant stuck to the corner of the tank about half way up. I gave it a rub with the soap pad and "it" jumped into the soapy water—it was an adult male lyretail! I immediately rushed into my fish house and, armed with a bucket (filled with water taken out of the 18 in. tank) and a net, I succeeded—after a few quick sweeps with the net—to catch the lyretail and put it into the bucket. I then transferred it to the small tank in which I had put the other lyretails.

You can imagine my surprise and delight when I went into the fish house the following morning and saw my lyretail enjoying the best of health and spawning one of the females.

Although this lyretail may not be the biggest fish in the fish house it is, without a doubt, the cleanest.

A. Tatlock,
Bolton, Lancs.

Phenoxetol

I WAS interested to read in *The Aquarist* (January) Mr. R. E. Macdonald's article recommending phenoxetol as a cure for fungus in fishes. Unfortunately this chemical is not usually kept in stock by dispensing chemists, although an aquarist is likely to require the treatment in a hurry.

Phenoxetol is available to aquarists under the name Liquitox, in convenient capsule form to ensure correct dosage. Many amazing cures have been reported with Liquitox.

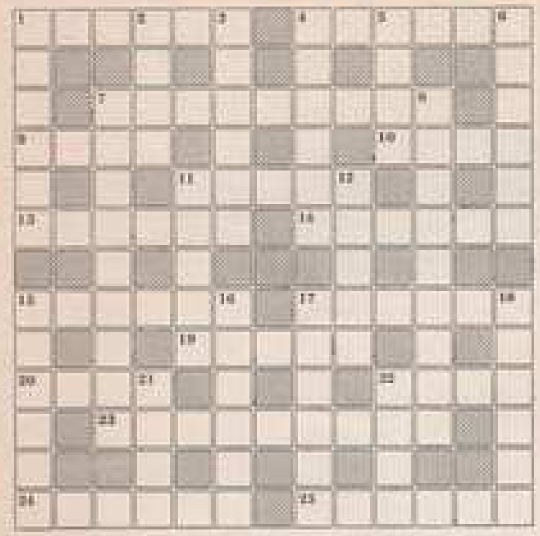
Dr. J. N. Carrington, M.P.S.
The Liquafry Co. Ltd.

Centigrade and Fahrenheit

BREAD can be obtained in sliced and unsliced form. If Mr. Boarder (*The Aquarist*, December 1962) purchases a sliced Fahrenheit loaf he is perfectly happy because there are 180 ready cut tasty slices, but if he buys a new-fangled centigrade loaf he must cut it into 100 slices by definition. But wait a moment! What about this wonderful decimal knife, which will permit him to slice each degree into ten sub-units; and if he so wishes and has a thermometer sensitive enough, into a further ten units, giving 10,000 units between freezing and boiling points?

A. C. Wright,
Wirral, Cheshire.

The AQUARIST Crossword



Compiled by L. BRADLEY

CLUES ACROSS

1. An aid to aquarium cleanliness (6)
4. Metal catfish? (6)
7. *Aequidens latifrons* (4, 5)
9. Poke with a quiet stick (4)
10. Fat from the kidneys of oxen (4)
11. They wait for the mistakes by the batsman? (5)
13. Machine (6)
14. Pertaining to vinegar (6)
15. English county (6)
17. A supper surrounding the rogue in the covered walk (6)
19. Pursues (5)
20. Can he be bowled underarm? (4)
22. A colour variety (4)
23. *Hyphessobrycon innesi* (4, 5)
24. Colour variety of the wagtail platy (6)
25. The games are left [illegible] (6)

CLUES DOWN

1. *Hyphessobrycon callistus* (6)
2. Grease (4)
3. Sharp as a —— (6)
4. Harpoons (6)
5. Used to propel a boat (4)
6. Co-star (anag.) (6)
7. Surrounds the ornamental pond (3, 6)
8. Diggers abound here (9)
11. Slink around the snake (5)
12. Left after the battle? (5)
15. Disease of fish (6)
16. *Planorbis planorbis* (6)
17. Heavenly fish? (6)
18. Gone into (6)
21. Genuine (4)
22. The three performers produce a riot (4)

Solution on page 238

Water—the Cradle of Life

continued from page 232

been used for many years in the construction of aquarium covers. A dulling film of oxide forms over the surface of the metal and protects it from corrosion. Many other metals do dissolve in water but they are usually present in such small quantities as to be harmless, and often the amount is so small as to be detected only with difficulty by accurate methods of chemical analysis.

Black Gravel

Whilst considering metals mention might be made of the blackening of aquarium gravel. This effect is due to a reaction between small quantities of iron in the gravel and the hydrogen sulphide produced by the anaerobic bacteria. This blackening is a sign that all is not well; there is pollution and an oxygen deficiency, especially in the lower levels of the tank. The cause can usually be traced to a dead fish or overfeeding or similar carrion.

Water authorities usually add chlorine or chloramine to their water to kill off bacteria and other organisms that are objectionable or harmful in domestic supplies. Usually it is present in only small quantities and is readily given off to the air or absorbed by organic matter in the aquarium. When it is present in excess it can be removed by standing the water over-night, boiling or adding a crystal of sodium thiosulphate (hypo) to about 10 to 12 gallons of water. Fluoridation of water has been tried by adding sodium fluoride to investigate its properties in protecting teeth from decay; in Andover, Kilmarnock and Watford it has been added for some time but has not had any ill-effects on our fishes.

To be concluded

Coldwater Fish-keeping Queries

continued from page 234

I cannot keep water snails for long in my tank and would like to know the reason. I buy snails which last only a week. I think my fish, green tench (6-8 inches long) attack them. I also have some red ramshorn snails in a separate tank and feed them on fish foods but they hardly seem to grow; what is the reason for this?

You will not be able to keep snails for long in your tank as they are the natural food of tench. They can crush small ones and will suck the bodies from the shells of larger ones. I wonder if the reason why your other snails do not grow is they are tropical snails raised in warm water and you are trying to keep them in cold water? If so they are not likely to thrive with this treatment.

I have been out of the hobby for 8 years and now wish to start by getting some stocks of fancy goldfish to breed from. I have seen some shocking examples of imported fish offered for sale at high prices and feel justified in trying to breed some good class fish for sale. Where can I get some good specimens to make a start with?

I get many requests like yours but it is very difficult for me to answer you as I would like to be able to do. In the first place there are only a few breeders to-day who are concentrating on breeding first-class fish. I see only a few whilst judging fish shows. If I recommended anyone and then satisfaction was not obtained I would be blamed. The only safe way is to attend as many shows as you can, find the types of fish you require and get in touch with their owners. In this way you can obtain fish that have been 'bred right' over a period of years. You may have to pay a good price for good fish as they do not come out like peas in a pod. An exhibition fancy goldfish may only appear once in a hundred fry.

News from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 15th of the month preceding the month of publication.

OFFICERS for 1963 for the **Aireborough & District A.S.** were recently elected as follows: President: Mr. Thompson; Secretary: Mr. A. S. Holmes; Treasurer: Mr. G. Norfolk; Show Sec.: Mr. H. Myers; Publicity Officer: Mr. J. K. B. Yeadon; Committee: Mr. K. Emms, Mr. Roberts.

Attendance at the last meeting was adversely affected by the shocking weather conditions but for members who braved the elements a very interesting and informative lecture was given by Mr. B. Winterburn of Bradford Aquarist Society on "Aquarium Electrics". A vote of thanks to Mr. Winterburn was proposed by Mr. K. Emms and seconded by Mr. Thompson.

The table show was for livebearers with results as follows: 1 and 2: K. Emms; 3: J. K. B. Yeadon. A.O.V. class: 1 and 2: K. Emms; 3: A. S. Holmes. Meetings are held on the first Thursday in every month at 7.45 p.m. at St. Andrews Church Institute, Chapel Lane, Yeadon. New members are always welcome.

* * *

AT the recent Annual General Meeting of the **Portsmouth A.S.** the following officers and committee members were elected: President: Mr. Winsor; Chairman: Mr. J. Stilwell; Secretary: Mr. D. Hancock; Treasurer: Mrs. J. Stillwell; Committee: Miss W. Ryder, Miss J. Stillwell, Miss E. Hancock, Mr. L. Searle, Mr. A. Chandler, Mr. M. Mason, Mr. J. Howard, Mr. C. J. D. Smith.

* * *

THE **Goole & District A.S.** Annual Dinner was well attended and included the well known aquarist Mr. V. Michaels and his wife. A social evening and presentation of awards took place after the dinner. This year's awards, the points trophy and the Table Show plaque were both won by Mr. J. N. Banks the Secretary. At the Annual General Meeting the officers elected were as follows: Chairman: Mr. R. Hunt; Vice-Chairman: Mr. F. Taylor; Secretary: Mr. J. N. Banks, 186 Dunhill Road, Goole; Show Secretary: Mrs. M. Mackrill, 108, Estgate, Goole; Treasurer: Mr. F. Mackrill.

Mr. V. Michaels consented to be President of the Society. The results of the Table Show of 4th February which was for Catfish was: 1, F. Marshall (Aeneus); 2, R. Bean (Glass Catfish); 3, D. Thompson (Melanistus).

* * *

AT their recent Annual General Meeting members of the **Southampton and District A.S.** honoured founder member Mr. R. V. Fish by making him their President. Mr. Fish has been an active member throughout the 15 years of the Club's existence. Only last year he won the Pond Competition.

Other officers elected were: Chairman: Mr. Freeman; Vice-Chairman: Mr. Fish; Hon. Secretary: Mrs. M. Gilbert; Show Secretary: Mr. Ball, 7, Northbourne Close, Butts Ash, Hythe, near Southampton; Treasurer: Mr. Sprinks; Committee: Mr. and Mrs. Bailey, Mr. Reed, and Mr. Hamilton.

* * *

A SOCIAL and presentation was held recently by **Worksop Aquarist & Zoological Society.** Trophies were presented by the President, Mr. V. Gabnoyl and principal winners were: Mitchell Cup and plaque for most points in 1962, Mr. G. Sibson. Home Aquaria Cup: Mr. L. Tye. Junior plaque, most points 1962: Master C. Wilson.

At the Annual General Meeting the following officers were elected: President: Mr. V. Gabnoyl; Vice-President: Mr. J. Dernie; Chairman: Mr. F. Porter; Vice-Chairman: Mr. D. Jones; Hon. Treasurer: Mr. F. Harrison; Hon. Show Secretary: Mrs. J. Sibson; Hon. Secretary: Mr. B. Washington, 72, Portland Ave., Creswell, near Worksop, Notts.; Committee: Mrs. Dernie, Mrs. Harrison, Mr. Sibson, Mr. Tye.

* * *

NEW SOCIETY

A NEW aquarist's society has been formed recently in Newport and is known as the **Newport A.S.** The officials elected are: Chairman: Mr. Ralph Harris; Secretary: T. G. Wall; Treasurer: Mr. M. Roach and two members Mr. B. Kelly and Mr. A. Gardner.

All interested aquarists in the district would be welcome and meetings are held on the first and third Thursdays of each month, at 71 Bridge Street, Newport.

* * *

THE senior "Aquarist of the Year" trophy of the **Leith A.S.** was jointly won by C. Barr and G. Wilson and the junior by J. Milne. The "best fish of the year" was a Panchax playfairi owned by L. Wilson.

The club has had several interesting lectures one of the best being on Artificial Rockwork Manufacture by Angus Jeffrey from Kirkcaldy.

The monthly table show results were: Egg Layers: 1, B. McLafferty; 2, C. Barr; 3, T. Blackness. Livebearers: 1, D. Paterson; 2, B. McLafferty; 3, J. Evans. Guppies: 1, C. Barr; 2, A. Halliday. Junior: G. Melville; 2, E. Stuart; 3, D. Shade.

The trophy for the "Best Fish of the Show" was given to the junior G. Melville for his Red Swordtail.

* * *

THE new **Nelson A.S.** was informed last May and has now 36 members, with applications from new members each meeting. The Society is holding the first Annual Open Show in the Civic Theatre, Stanley Street, Nelson, off Manchester Road, on Sunday 28th April.

All societies are cordially invited and the syllabus is available from show secretary Mrs. H. Crick, 8, George Street, Nelson. (Amendment to syllabus already sent to societies.) Class 6 should read "Catfish & Loaches".

* * *

MEETINGS of the **Tipton & District A.S.** are held at the "Leopard Inn", Market Place, Great Bridge, Tipton, Staffs. The secretary is Mr. W. Davison, 2, Shaw Road, Tipton, and new members would be welcomed.

* * *

GOOD progress is reported by the **Hull A.S.** and the membership continues to increase. In the early stages difficulties were encountered but the Goole A.S. was extremely helpful and this enabled the club to get into its stride. Meetings are held in the Central Library, Hull on the first and third Tuesdays of each month. Plenty of activity and competition awaits the new member as the club has quite an amount of outside interest in the way of shows and competitions. New members would be welcomed.

* * *

NEWS from **Peterlee A.S.** includes information of recent activities. The last meeting was held at Edenhill Community Centre on Thursday, 7th February, at 7.30 p.m. Details of the 2nd Annual Open Show were discussed. Date of Show: 4th, 5th and 6th July. Show Committee elected were Messrs. Robinson, Jones, Porter and Harrison.

A talk illustrated by colour slides on "An Introduction to Marine Tropical Fishkeeping" was given by Mr. J. Hunt of the Grotto Aquarium, South Shields, and was very well received.

Results of a competition for the best Dwarf Cichlid were 1, Mr. N. Jones (rainbow cichlid); 2, Mr. E. Motherill (rainbow cichlid—cerberus).

In spite of the atrocious weather conditions, the attendance was very good. The secretary is Mr. J. Hewitson, c/o Edenhill Community Centre, Peterlee, Co. Durham.

* * *

THE following officials were elected at the annual general meeting of the **Merseyside A.S.** Chairman: Mr. C. W. Elliott; Vice-Chairman: Mr. E. H. Mace; Secretary: Mr. C. F. Sawyer, 198, Roundley Road, Chatham, Kent. Treasurer: Mr. G. G. W. Richards; Show Secretary: Mr. W. G. Keene. New members would be welcome and particulars can be obtained from the secretary. Meetings are held monthly at Henderson House, New Road, Chatham on the second Wednesday of each month at 7.30 p.m.

* * *

RECENT news from the **Blackpool and Fylde A.S.** includes the result of the February Show for Livebearers and these were as follows: Junior: 1, N. O'Hare; 2, J. Jackson; 3, C. Robinson. Open Section for Livebearers: 1, Mr. T. G. Williams; 2, Mr. J. Watkinson; 3, Mr. J. Baker. Mr. R. W. Crook, Chairman, presided over the last meeting and during the evening a talk was given by the club secretary, Mr. E. Crowther on simple electricity. The profits of the Open Table Show to be held on the 26th May will be donated to the Mayor's Freedom from Hunger Appeal. The Society's Annual Open Show will be held on the 29th September at 67, Station Road, South Shore, Blackpool.

* * *

PARTICULARS are to hand of the first open table show of the **Don Valley A.S.** This will be held on the 21st April at the Pavilion, Bentley, near Doncaster. Details from Mr. D. Cross, Secretary, 65, West Lane, Sharlston, near Wakefield.

* * *

THE **Willesden and District Aquarists Club** held their annual general meeting recently. The retiring Chairman, Mr. E. Landau spoke of the increased activities during 1962 and recalled the many visiting clubs who had been entertained with exciting contests and the return visits paid to such clubs as Chelsea, Hounslow, Uxbridge, etc. Membership had increased considerably and it was good to see the enthusiasm that had supported the retiring Committee efforts and Mr. Landau thanked his committee for its hard work.

The following committee were then elected: Chairman: Mr. Eaton; Vice-Chairman: Mr. E. Hobley; Secretary: Mr. W. Hobbs; Treasurer: Mrs. A. Wingrove; Show Secretary: Mr. R. Porter; Assistant Secretary: Mr. Sullivan. The new committee has already met and a new interesting programme is being arranged for the coming year. Anyone interested in joining will be welcomed. Please contact Mr. W. Hobbs, 48, Dunmercroft Avenue, Kingsbury, London, N.W.9.

* * *

AT the annual general meeting of **The Federation of Guppy Breeder's Societies** the following officers were elected: President: R. Forster-Jones, B.Sc.; Hon. Treasurer: A. Lindley; Hon. Provincial Secretary: L. B. Parkin; Hon. Gen. Secretary: G. M. Davis, 120, Broadway, Walsall. Any recognised aquarist society may affiliate to the F.G.B.S. on payment of affiliation fee of £1 1s. 6d.—this will entitle any accepted society to two copies per issue of the Federation Journal and Newsletters.

* * *

NEWS from the **Dundee A.S.** includes the leading positions in the Scott Trophy Competition which are: Peter N. Greening 24 pts.; Fergus McNaughton 14 pts.; Jas. McGeoghie 12 pts.; William Cockburn 8 pts.; Andrew Irvine, Wilson Lowdon 7 pts.; Albert Harris 6 pts. In the Tayside Trophy Competition for the Member of the Year the leading positions are held by: Albert Harris 155 pts.; Wallace S. Russell 135 pts.; Charles D. Smith 130 pts.; Andrew Irvine 120 pts.

THE **Chelsea A.S.** will be holding their Open Table Show this year on Saturday 11th May. Show Schedules are available from Mr. D. G. Arnold, 1, Royal Mews, Hampton Court, East Molesey, Surrey. Closing date for entries is Monday 29th April.

* * *

QUITE a few new members were enrolled at the last meeting of the **Leeds & District A.S.** A most entertaining and interesting talk was given by Mr. P. Reynolds on guppies which were on the table along with catfish and loach. The results were as follows: Guppies 1 and 3, Mr. R. Moss; 2 Mr. J. Smith. Catfish and Loach: 1, 2, and 3 Mr. D. Lees. The annual show date this year is the 19th-21st September.

* * *

A SATISFACTORY financial balance in hand, after the busiest year in its history so far, was reported at the annual meeting of the **Regent A.S., Derby.** The chairman (Mr. P. Hanks), who was unanimously re-elected, referred to the Open Table Show the Society was holding at the Railway Institute, Derby, on Sunday, 21st April, and it was reported that inquiries had already come in from Bristol in the West, Hull in the East, and other parts of the country. Officers appointed, in addition to the chairman, were: Vice-chairman, Mr. Frank Bass; Secretary, Mr. E. Ivers; Treasurer, Mr. J. Darbyshire. Committee, Messrs. J. Burrell, M. H. Wright, D. Fall, G. Hobson, T. Jessam, D. Maddocks, M. Salt and S. Tattum. The new Secretary's address is 21, Beverley Street, Willaston, Derby.

* * *

THE recent monthly meeting of the **Prestwich and Bury A.S.** took the form of a general discussion. It was pleasing to note the continued attendance of the juvenile members and the interest displayed by them in the proceedings. There was a Table Show for A.V. Barbs and Characins and the fact that second and third places were filled by Master Yarwood and Master Markland respectively would indicate that this section of the society is now well and truly established. First place went to Mr. Campbell with a Cherry Barb.

AT the meeting of the Yorkshire Section of the **Fancy Guppy Association** on Sunday 10th February, the speaker was Mr. Frank Whitham on "Judging" and each member judged the fish in the table show. The pointing was then explained and small prizes awarded to the members present to that of the judge. The table show winners were: Guppies: 1, Mr. Schofield; A.O.V.: 1 and 2 Mr. P. Rushworth.

* * *

THE officials of the **Kingston & District A.S.** for 1963 are as follows: Chairman: Mr. Dave Ellis; Secretary: Charles Joyce, 74, Effingham Road, Long Ditton, Surbiton, Surrey. Elmbrook 5779; Treasurer: Maurice Reeves; Show Secretary: Harry Towell.

The Kingston and District A.S. Inter-Club Open Table Show will take place on Saturday, 28th September.

* * *

THE **Leyne Aquarists** met recently for its first "working" meeting. Mr. E. Smart of Windermere talked about the problems of Foods and Feeding. A number of specimens of live food were examined and ways of breeding them explained. Mr. Smart gave hints and tips on how to keep fish warm during the extremely cold weather and what to do in the event of power failures. A lot of answers were given to the flood of questions this talk brought forth.

Membership is increasing and new members can be assured of a warm welcome. The secretary is Mr. L. H. Marchal, 15, Fairhope Avenue, Lancaster.

* * *

THE annual general meeting of the **Cambridge and District A.S.** was held recently. A number of new members have joined in the past year, and in addition to the monthly meetings the Society has had three outings and a well attended and enjoyable dinner. At the meeting it was agreed to try to hold three shows during 1963. Suggestions were also made for future meetings. Mr. B. K. Elkerton was elected Chairman and Mr. T. W. Ingrove was re-elected Secretary. Mr. N. Radford was re-elected Treasurer.

THE **Bradford and District A.S.** will have talks in March from Mr. Roy Taylor and his subject will be "Social Organisation of Fishes" and on the 20th March, Mr. E. Little will speak on "Fish Foods and Feeding." Future announcements will contain particulars of a new table show for members to be held later in the year. The Open Table Show is to be held on the 19th May and the judges are Mr. H. Lodge and Mr. R. Pengelley, both of the F.N.A.S.

* * *

THE **Nottingham and District A.S.** recently had a film display and talk from Dr. F. N. Gladdaly. Four films were shown and Dr. Gladdaly gave a short introductory talk before each one. The result of the table show for livebearers (except Guppies) was 1, Mr. G. Bullpitt; and 3, Mr. G. Wood. The vacant post of secretary has been filled by Mr. D. J. Harris, 6, Jasper Close, Radcliffe-on-Trent, Notts.

Crossword Solution

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

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