

The AQUARIST AND PONDKEEPER

Founded in 1924 as "The Amateur Aquarist"



THE BUTTS, HALF ACRE, BRENTFORD,
MIDDLESEX

Telephone: EALing 4703

PUBLISHED MONTHLY
SUBSCRIPTION RATES

The *Aquarist* will be sent post free for one year to any address for £1 2s. 0d. Half-yearly 11s. 0d. Canada, U.S.A. \$3.00 yearly; \$1.75 half-yearly.

QUERIES

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

Correspondence with intending contributors is welcomed.

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

The Editor accepts no responsibility for views expressed by contributors.

Contents

	Page
Editorial	89
Pencil Fish	90
Axolotls in British Columbia	91
Vallisneria is a Must	94
A Terrapin Pond	95
Coldwater Fish-keeping Queries	96
Aquarium on the Map—Mevagissey	97
Dangers of Heat to the Pond	98
Aquarist's Notebook	99
Bull Frogs	101
Tropical Aquarium Queries	103
Microscopy for the Aquarist—43	104
The Dragonfly	105
Our Readers Write	107
Friends and Foes	109
News from Aquarists' Societies	110

VOL. XXIII No. 5

1958

Editorial

VISITING country houses and mansions of historic interest in Britain has come to be a favourite holiday or week-end pastime of a large number of people. Without doubt many aquarists are included among such visitors, and features of special interest to them will be the ponds and water gardens to be found in the usually spacious grounds of these buildings. From our own somewhat regrettably limited survey of old country gardens it appears that the ponds are most often of much more recent date than the buildings close by them, unless some of the very old fish ponds or stews kept for the entirely practical purpose of providing fish for the table have been preserved. It is possible, of course, that the ornamental ponds built in such places in the last hundred years or so did in fact replace or extend earlier ones (the guide-books are usually disappointingly silent on this matter), and if so it would seem that the old ponds were less durable than the dwelling houses of their owners. On the other hand, the availability of the goldfish in this country, which was probably not a common fish here until the nineteenth century, might well have influenced the introduction of ponds to gardens, since it is, of course, only fishes as conspicuous as these that bring a pond to life; our native species are most difficult to see from above the water. If this explanation is anywhere near the truth, an interesting chain of thought can be started on a summer's afternoon spent in the quiet and peaceful surroundings of an English manor garden's ponds, which might owe their existence to the importation of a Chinese fish.

NEXT month (25th-26th September) in London the Institute of Biology is arranging a Symposium on the Effects of Pollution on Living Material, in which biologists will discuss the results of contamination of water, land and air by industrial and all other kinds of wastes, including radioactive substances. Further details of the Symposium and a programme can be obtained from the Secretary, Institute of Biology, 41 Queen's Gate, London, S.W.7.

Pencil Fish

(*Poecilobrycon auratus*)



ORDER: Ostariophysi, from Greek *ostarion*—little bone, and *physa*—a bladder.

FAMILY: Characidae, from Greek *charax*—a sea fish.

SPECIES: *Poecilobrycon*, from Greek *poikilias*—a kind of spotted fish, and Latin *auratus*—ornamented with gold.

IN general body outline and appearance, this little gem from Guiana and the Amazon might well be mistaken for a *Nannostomus*. The presence of a small adipose fin, however, serves to identify it as a different species. None of the *Nannostomus* group carries this distinctive feature.

Nor can it be confused with *Poecilobrycon eques*, although it has been sold as such, for it swims in the characteristic "pencil-fish position"—at an angle of up to 45 degrees from the horizontal, whereas *P. eques* maintains the more usual horizontal position, swimming only at an angle when feeding at the surface, or changing its swimming level.

It would be interesting to know what causes the pencils to swim at the angle they do. Without knowing definitely, I would hazard a guess that the swim bladder is in a different position from the normal, so that the body weight is distributed unevenly front and rear of the bladder. It would be interesting to know whether or not this is so, or if there is some other explanation. Perhaps someone who reads this will know the answer and write in about it.

From conjecture let us return to fact! Of a maximum length of almost 2 inches, *P. auratus* is beautifully streamlined, its shape being emphasised by its longitudinal division into several narrow, coloured bands of golden brown, pure brown and black, with a row of black dots. The fins are as follows: the lower half of the caudal is black, the anal brown with a red spot close to the body, others very transparent and almost colourless.

They are peaceable members of a community but, to me, they seem better on their own. Their peculiar swimming angle when seen among the more usual horizontally swimming types gives the impression that they are suffering from loss of balance, and although this attracts attention, it is not in itself attractive.

Breeding

Aquarium specimens are not prolific. Normally happy in from 70° to 72° F, they need higher temperatures (from 80° to 84° F.) to stimulate spawning. Sexes are identical except when the female fills with roe, at which time she is noticeably plumper than her mate. Live food—little and often (and small)—will further bring them into condition.

They scatter eggs singly. Scatter is perhaps not the right word; the eggs are found on the underside of broad-leaved *Cryptocoryne* or *Sagittaria*, which argues some gymnastic ability on the part of the breeders to defy the force of gravity—unless the eggs are lighter than water, of course. Not having witnessed a spawning myself, however, this again is pure conjecture, upon which I would like further information.

In from 2 to 3 days the fry hatch. The parents are supposed not to eat the eggs and to do a certain amount of guard duty until the fry emerge. For safety, remove parents after hatching is finished. It is by no means

certain that the fry will be eaten if left with their parents, but with a species of fish which is not prolific, it is wisest to ensure the survival of as many fry as possible. Otherwise how can other aquarists share your pleasure in studying these fish?

Thriving Infusoria cultures of the smaller kinds are a must if it is hoped to raise many fry. The mouths of the parents are small enough, but the mouths of the youngsters are just minute.

The best way to get small Infusoria is to use fairly fresh cultures, I mean young cultures. It seems that when microscopic creatures first make their appearance in water, it is the smaller species which are apparent. Gradually, as the culture "ripens," larger species crowd the others out—a sort of survival of the fittest. The larger species can only be nibbled at by the fry instead of being swallowed, and, I imagine, could possibly choke them if wedged in their gullets.

The older cultures, containing paramaecia and the like, can safely be used on larger fry of different species.

If dried food is used at all it must be ground to the finest powder. The decay of a certain amount of uneaten food might well start off cultures of Infusoria, but harmful bacteria and their by-products of poisonous gases may also be produced, with disastrous results.

Goldfish Litigation

GOLDFISH were the subject of an action at the Mayor's and City of London Court when Cazaley Mills & Co. Ltd., forwarding agents of 18, Devonshire Row, London, E.C., claimed £300 18s. 3d. from Ted's Products (Upton Park) Ltd., for freight and Customs. The defendants alleged negligence and counter-claimed for loss of trade and profits. The claim was in respect of two consignments of goldfish sent from Italy which the plaintiffs accepted at Dover for delivery to the defendants. In one consignment of 60 cans the fish in 14 cans were found to be dead on delivery at the defendant's premises. Of the other consignment of 80 cans all the fish were dead on delivery or died immediately afterwards.

The fish were transported in cans from Italy by rail and sea to Dover, whence they were taken by road to the defendant's premises. It was an essential condition of transport that the water in the cans should be changed every 24 hours. The defendants alleged that this had not been done. Evidence was given by Mr. Robert Affleck, President of the Goldfish Society of Great Britain, that fish should be starved before travel to reduce excreta in the water. He said that one or two dead fish in a can could affect the health of the remainder.

Giving judgment, Judge Brocke said he found that the plaintiff company had carried out their duties to the hilt. He gave judgment for the full amount claimed, £300 18s. 3d. with costs. The counter-claim was dismissed.

Axolotls in British Columbia

by RICHARD GUPPY

(Photographs by the author)

THE term axolotl will have, I believe, a familiar ring to most people, even among those not particularly interested in natural history. It is also probably well known that the word is Mexican in origin, and was applied to the aquatic larval stages of a large salamander, used as food by the natives of that country. This animal sprang into prominence after the remarkable fact came to light that the larvae could grow to full adult size and might reproduce before or after transformation to the terrestrial form.

The exact species concerned was long considered to be the tiger salamander, *Ambystoma tigrinum*. This matter, so far as I know, has not yet been satisfactorily settled. However, it is apparently only the old quarrel between splitters and lumpers, the Mexican salamanders may be taken either as races of *A. tigrinum*, or as valid species. One outcome of this argument is that the term axolotl can be fairly applied to the larva of any species of *Ambystoma* which has reached sexual maturity without transforming.

A. tigrinum as a species extends its range north of the Canadian border, but it occupies mostly the eastern and

central part of the continent, reaching the west coast only in the more southern parts of its territory. Its smaller cousin, the north-western salamander, *Ambystoma gracile*, occurs on the Pacific Coast from northern California nearly to Alaska, and this is the species whose acquaintance I have made.

Salamanders at High Altitudes

I had not been many days on Vancouver Island, at the age of 11, before I came upon these large salamander larvae. Even at that time I remembered the pictures I had seen of axolotls, and immediately named my new acquaintances "loxtis." Actually I had been set down in one of the very best spots to find these particular amphibians. On Vancouver Island they are much commoner on the west and north-east coasts than elsewhere. In the south east, where I now live, they are very scarce except at high altitudes. The centre of abundance seems to be near the northern tip of the Island. Some years ago I was able to spend 3 weeks in that region, during the month of June. I was much struck by the great number of *A. gracile* spawn masses

Land-living form of the north-western salamander (*Ambystoma gracile*). Compare this with the picture of its axolotl or aquatic form



Axolotl form of the north-western salamander (*Ambystoma gracile*). This animal is found in small ponds on the rocky ledges of mountains

which I saw; they appeared in every kind of pond and stream. I was never able, on that trip, to find anything but spawn; I could locate neither larvae nor adults.

These spawn masses are quite unique. The size and shape of a large grapefruit, they are so firm as to hold their globular form exactly when lifted from the water. At the time of my arrival in the north, these eggs were all partly developed; when I left on 20th June, none was near hatching. It appears that the incubation period is very long. For a while I thought them all spoilt, an illusion heightened by their ghastly green colour. This is in fact due to an alga which somehow gains access to the covering jelly; it has no harmful effect on the eggs. I did not manage to get any of the spawn home in hatchable condition, which is not surprising, as I have since failed to transport it for much shorter distances.

Since that time the only haunts of the north-western salamander that I have been able to visit are on the higher slopes of east-coast mountains. Usually one does not run across the big amphibians until past the 4,000 ft. level. Here, on the grim rocky ledges, they live in tiny ponds that are frozen over from October to May, and frequently covered by 20 ft. of snow. Spawn is usually plentiful in July, and a few of the big axolotls, up to 8 inches long, may be seen during any summer month. The terrestrial adults are seldom found, I have collected only two specimens, beyond those that metamorphosed whilst in my possession.

Mysteries of the Ponds

There is an aura of mystery about these mountain pools. The survival of the salamanders in so inhospitable a region is perhaps not remarkable; in fact they share their breeding quarters with a relation, the long-toed salamander, and also newts and toads. The first circumstance that strikes the observer is the apparent barrenness of the ponds—not a green thing in them, except that the shore-line grasses are flooded early in the season. The bottom of some consists of grey sticky clay, but others are lined with layer upon layer of mat-like masses of dead vegetation.

Strangest of all is the absence, at least as far as one can see, of any tadpoles. Only the grown axolotls are present, and the terrestrial adults of the other species. This is in marked contrast with ponds elsewhere, which, if they are commonly used by amphibians, will always show at the appropriate season plenty of these animals in their immature stages. As far as the toads are concerned, I strongly suspect that those which are present hardly ever breed, or else they use certain ponds which I have not discovered. But the spawn of both species of salamanders, and the Pacific newts, has always been noticeable on my early-season visits to the mountains. A few weeks later there is nothing to be seen. The eggs have apparently come to nothing.

A careful examination of the pond reveals plenty of small life, consisting mainly of bright-red copepods and tiny bivalve molluscs. Caddis worms are present, and while adult water beetles are abundant, the larvae of the latter are as conspicuous by their absence as is the case with the amphibian tadpoles. This goes also for dragonflies, which swarm above the ponds, but seem to produce no offspring.

The only conclusion I can draw is that in the absence of any covering vegetation the few large axolotls soon eat nearly all the insect larvae, and their own young together with those of the other amphibians. The caddis worms, protected by their tough cases, are largely ignored, and finally the axolotls must depend on the little clams and crustaceans, which are too plentiful to be exterminable. At first thought it might be supposed that the salamanders would commit racial suicide, besides destroying the other species with which they consort. I believe that the explanation lies in the virtual absence of any other predator. Near sea level garter snakes (*Thamnophis*) are excessively

abundant, and must make great inroads on the amphibian population at all stages of growth. There are also many racoons which prowl the shore line searching for any edible morsel. Neither of these predators occurs much above 2,000 ft. On the high crags where *A. gracile* lives there are not even many birds. A few small passerines, ptarmigan and an occasional hawk seems to be about all. There are no diving birds on the ponds, and I have never once seen a heron or kingfisher. In fact, once an amphibian has become too large to be easily swallowed by an older pond mate, it is just about in the clear, and will most likely be able to make many attempts to reproduce itself.

Experiences with the Spawn

It is impossible to tell what proportion of the spawn is deposited by axolotls or by the terrestrial salamanders. I will draw on Stebbins' *Amphibians of Western North America*. He states: "scarcity of adults in the Museum of Comparative Zoology suggests that, at least in California, metamorphosed individuals are rare, or their habits are such that they are seldom encountered." He also gives definite records of egg laying while in the larval stage. For my own part, I have kept a number of these salamanders alive for varying periods, without having been able to observe anything of their breeding habits. An account of my experiences with each one would be long and tiresome.

After one unsuccessful attempt, I was able in 1954 to bring home a batch of spawn, from which about a dozen tadpoles hatched. The following spring I turned these loose in a small outdoor pond. Since they were able to feed themselves, they did not get much attention, and by the time I noticed that they were transforming, and making their escape over land, most of them were gone. They were then just 2 years old, and less than half grown. Of five that I found still in the pond, four metamorphosed almost immediately after, and the last one a year later. I still have all of these; they are nearly 4 years old, and as large as the average adult of the species, but they have not spawned. Of course, it is possible that all are males.

Out of a total of seven full-sized axolotls brought from the mountains, only two transformed. They were kept for varying periods up to 2 years. None grew any larger during the time I had them, and none spawned. One I still have, the others went one way or another. The temptation to allow them considerable freedom, in the hope of persuading them to breed, accounted for several losses. They will find some avenue of escape, or are picked up by snakes. One that so disappeared was obviously gravid.

The young larvae of the north-western salamander are similar to those of other tailed amphibia. They are chubbier than the adults, with the usual wide tail fin, and conspicuous external gills. They have reached the point where the earliest transformation is possible, the gills are much smaller in proportion, and they have changed in other ways, but it is a mistake to suppose that they are now just adults with gills. The photos show well the great difference in body contour and shape of the head. From now on, until something tips the balance and causes them to metamorphose, they will show no change other than increased size. As with all amphibians, the adult coloration is assumed suddenly along with the other attributes of a terrestrial life. But this species presents such a nondescript, uninspiring hue, that little can be said except that all stages are brown or greyish.

There are some exceptions; occasionally an adult will appear covered with small yellow spots of irregular shape. These specimens were once considered a different species, under the name of British Columbia salamander *Ambystoma decortication*. Stebbins considers that the B.C. salamander is a poorly defined race of *A. gracile*. From my own observation I should guess that they are merely freaks. One of these spotted individuals posed for the photograph.



Adult form of the long-toed salamander (*Ambystoma macrodactylum*), a species that invariably transforms long before maturity is reached

The other picture shows the long-toed salamander, *Ambystoma macrodactylum*, a smaller ambystomid which invariably transforms long before maturity, and at sea level will breed successfully in ponds which are dry before August. It is common on the east coast of Victoria Island, and extends into the mountain haunts of *A. gracile*, but apparently does not mix with the latter on the west or north coasts. It is far more conspicuously coloured than its larger cousin, being black with an irregular band of bright yellow along the back.

Squeaking Salamander

A. gracile has one habit which seems to have been overlooked by herpetologists. It squeaks. Not often will this sound be heard, since it is uttered only under special circumstances. Handling or forcibly restraining the salamanders will never induce them to put on the act. But if one knows of the spot where one of these animals lies concealed, then it is easy to get it to squeak; one has only to prod gently at the ground near by.

Just what are the circumstances which cause certain amphibian species to breed as larvae, whereas at other times they transform first? A common fallacy is that the drying up of their ponds forces them to assume the terrestrial form. This is definitely not the case. From my observations of the long-toed salamander I have concluded that there is a possibility of influencing this early-transforming species by keeping the tadpoles short of water for a considerable period. Nevertheless, many young of *A. macrodactylum* do lose their lives each year when they are stranded by receding water. I have never seen *A. gracile* spawn in any pond that was liable to dry up. Writing of the tiger salamander, Stebbins passes on the report of a fellow observer (Rahn), who found an estimated 1,200 axolotls dead in a dried-up pond.

It is certain that over much of the range of these two large ambystomids in the western U.S.A., conditions are very difficult for terrestrial amphibians. Owing to the long dry summers, they are forced much of the time to live in the burrows of mammals. It is evident that this circumstance would have a tendency to favour delayed metamorphosis. In eastern North America, where summer rains are adequate, it is said that *A. tigrinum* always transforms. But *A. gracile*, in extending its territory northward, has reached a climate equally favourable to terrestrial life, but has retained in great measure the axolotl form. The un-failing metamorphosis of eastern tiger salamanders is attributed to the presence of iodine in the waters there, which activates the thyroid, and encourages transformation. This iodine business cannot be regarded as a controlling factor, since, if detrimental, it would soon be overcome by

natural selection. It must be just a trivial circumstance which operates when everything else is in a fine balance. We must remember that even if life is easy for the terrestrial salamanders, they have probably no distinct advantage beyond the dubious one of dispersal. There are conditions, such as scarcity of permanent water, and keen competition with fishes, which have in the past caused the evolution of amphibians as a class. But such conditions often do not persist, and there may be nothing to force the animals in the direction of an early metamorphosis.

I have already dwelt on the difficulty of studying the salamanders in their mountain fastnesses. Do the axolotls I find represent the total survival of tadpoles, or have a number transformed earlier and hidden themselves ashore? I have only this evidence, that all of the few I reared from the egg transformed before they were fully grown, most at about half adult size. Of the axolotls brought down, less than a third metamorphosed within the year or two that I had them under observation. This may merely mean that there is a certain point in their development which, if it is passed without transformation occurring, makes the change progressively less probable later. But I incline to the theory that either the water in my ponds or the diet they find there encourages metamorphosis.

Cacti in the Fish House

WHEN watering cactus plants in pots make sure that enough water is given at a time to ensure that the whole of the soil in the pot is damped. If sufficient space was left at the top of the pot when the plant was potted up, this can be filled with water and allowed to soak in. If the plant soil has become very dry another amount of water can be added. Once the plant has been well watered no more must be given until the pot has dried out again. After a hot day cacti can benefit from a good spraying. Practically all cactus plants rejoice in sunshine and so they should always be where the maximum amount can be obtained. Do not forget that the plant likes plenty of fresh air and so open windows of the fish house on all suitable occasions.

A fairly common cactus plant is the *Echinopsis*. This gets its scientific name from resembling a hedgehog. The plants are round or pear-shaped with deep ridges running from top to bottom of the plant. As they age so they become more columnar. Many bunches of spines are to be found up the edges of the ridges. The flowers are large and have a long tube. Many of these plants flower better if the off-sets are removed before they grow too large.

Vallisneria is a Must

by J. G. WALMSLEY

A SHORT while ago, without any knowledge of the game at all, I decided to enter the ranks of the tropical fish-keepers, being prompted to do so at first, I will admit, by the decorative possibilities of a small tank on my sideboard rather than by any desire to make a contribution to the science of ichthyology. Accordingly, my activities would, I decided, be devoted entirely to setting up and maintaining as a credit to their owner a 2 ft. tank full of brightly coloured tropical fishes.

Now, whilst I may not be particularly clever, I am not a complete idiot, and I realised that this would not be merely a matter of filling some tank with any old water, sand and plants, bugging in fishes and feeding them once in a while. In order to enlighten myself on the procedure therefore I went to my local library and took out the first book on tropical fishes that I saw. This book, after congratulating me upon my decision, advised me to fill the 24 in. by 12 in. by 12 in. tank I had bought the same day (in the hope of seeing it set up by the morrow) and leave it for a fortnight, changing the water every few days to rid the tank of impurities, test for leaks and so on. Despite my impatience, I did so, but before this fortnight was up I had finished this book and, my interest having been awakened, exchanged it for another.

This second book said I should leave my tank for a minimum of 3 weeks. After patiently waiting out this extra week, I took out yet another book which said that 4 or 5 days, or a week at most, would have been sufficient. Anyway, I supposed it was best to have erred on the side of generosity and, apart from this, having had time to read three books on the subject of fish-keeping I had suddenly found out that all the experts did not seem to be in complete agreement with each other on a number of subjects. I therefore wondered if the advice of a single book could be relied upon: I later wondered if any book could be relied upon!

For instance, I had bought my tank from my local dealer without giving the matter of choice, apart from size, a single thought. But having come across this statement in one of my books I began to wonder if I had been wise: "A frame of copper, brass or other metal dangerous to fish, should be avoided no matter how attractive it may appear to the eye . . . we do not approve of galvanisation for zinc is dangerous to fish."¹ A hasty reference to another book, by W. T. Innes reassured me, however, for he calmly advocated brass for aquariums up to 40 gallons. And again, another book² said: "Several types of materials are used for aquaria up to 50 gallons capacity; angle iron, galvanised iron, aluminium, stainless steel, brass and copper," and appeared content that they should be so used, whilst expressing a preference for iron, galvanised or otherwise, aluminium and stainless steel. It seemed that I need not worry after all about the material of which my tank was made therefore, although the anti-brass faction disquieted me.

The next subject I tackled was lighting. I had read a good deal of the evils of too much light, too little light, too strong a light for too short a time, too weak a light for too long a time and so on, to say nothing of the quality of the light, so I very naturally wished to get it right. My first authority on this subject³ said: "Artificial lighting adds greatly to the beauty of the tank and also assists the growth of most of the plants . . . The most usual and at

the same time the most charming way is by strip lighting . . . they radiate a certain amount of heat also, thus two purposes are served." Excellent! But on the other hand . . . "It is possible to obtain reflectors which make use of fluorescent lighting. These latter have the advantage that they give off less heat (italics mine) than ordinary incandescent bulbs." This from a different book,⁴ which also goes on to say: "From the point of view of the inhabitants of the tank, there is absolutely no difference in the quality of light given by either type of bulb. You may hear some nonsense about fluorescent lighting being bad for fishes—this is nonsense and nothing more." The author went on to prove this latter statement. But there was yet a third author who proved equally well, to my unenlightened self, the following statement: "Fluorescent lighting, which is the subject of much controversy, is, in my experience, practically useless . . ." and he recommends a 50 watt lamp for 9 hours a day.

Having tossed a coin and thus decided in favour of tungsten lighting, I sought confirmation of his recommendation. The next authority to be consulted gave this formula: "Length of tank \times 32/wattage = time in hours,"⁵ which gives 15 hours for a 50 watt bulb—half as long again. My next writer⁶ on the subject pointed out that the time for which a 50 watt bulb should be left on depended upon whether the tank was situated in a dark or a light room, and suggested from 4 to 10 hours daily, according to circumstances—leaving me to decide the circumstances. I still don't know whether my living room is a 4 hours room, a 6 hours room or a 10 hours room! How dark is dark, anyway?

Another author⁷ told me to multiply the length of my aquarium in inches by 3 $\frac{1}{2}$, which, he said, would give me the wattage of the lamp I should burn for 10 hours a day. It turned out to be 80 watts, no less. In the end, because it was the figure which appeared most times, I installed a 50 watt bulb but without having much idea of how long to leave it on.

Having thus "resolved" the question of lighting, I turned to heating. My authors presented me with the following formulae and recommendations:

- (a) Amount of water in gallons \times 5 = wattage.⁸
- (b)
$$\frac{\text{Required temperature} - \text{room temperature}}{10} \times \text{tank capacity in gallons} \times 2\frac{1}{2} = \text{wattage.}^9$$
- (c) "Two watts for raising each gallon five degrees above surrounding temperature."¹⁰
- (d) "75 to 80 watts for a tank in a normal situation indoors."¹¹

The first gave 66 watts, the second, based on a minimum winter temperature of 40° F and a required tank temperature of 70° F, gave 94 watts and the third, on the same basis, 150 watts. I couldn't have had a wider choice. I finally took an average and bought a 100 watts heater and a thermostat. One or two authors did not approve of thermostats, preferring "natural fluctuations," which seems reasonable enough, but I had read of one or two diseases caused by drops in temperature, and anyway, the fluctuations of the English climate are far from natural. I had also read of one or two diseases, part of the cure for which included prolonged high temperature and a thermostat seemed the best way to obtain this condition. Me being

so lucky, I was sure I would need it eventually (and I did).

Most of my books had a take-it-or-leave-it attitude to aeration, so I left it.

Then came compost. "... Plants ... need a medium-sized gravel ... in which to grow ... Ordinary builder's sand ... is not suitable."¹¹

"Suitable sand for aquarium use is the coarse variety from builders' yards ..."

"A layer of loam, with its four edges and surface covered with sand, is to be recommended."¹²

"Loam, earth, etc., are not necessary ... loam can breed harmful bacteria unless sterilised, and if this is done then the loam is of little use to the plants."¹³

I solved the compost problem by going to the nearest dealer and asking for the stuff that he used.

After compost came plants. Here, at last, I found all of the authorities in glorious unanimity. I must, I simply must, they all said, have lashings of *Vallisneria*. I was so pleased. But their agreement on how many plants per square foot to have was not quite so close, however. Their advice ranged from "at least 12" to "a maximum of 16" and "18 initially." I compromised on 15 and a ten-bob parcel just filled the bill.

That only left the fishes. I did not want very large specimens and I thought that an average length of 2 in. would be very nice. I was grieved to find that the first publication I consulted about this said that I should not have more than six fishes of this length in my tank. I was comforted and relieved, however, when the next author, our friend Mr. Innes, confidently said I could keep 36. I cautiously began with ten; no need to name names, you've seen them all before in every beginner's tank.

So now there it is on my sideboard. It was 3 months after I bought the tank that those fishes went in, not 3 weeks, and during those 3 months I read enough books on the subject to make me a leading authority, if every book hadn't contradicted the previous one.

As it is, I am left in a deep, deep fog and it is a wonder to me that my fishes are all still alive. It is also a wonder to me that all prospective newcomers to the hobby are not immediately deterred by the mass of conflicting initial information available in the fish-keeping literature, which is certainly plentiful enough.

Perhaps, however, it is because of this, rather than in spite of it, that new enthusiasts continue to be recruited—for those infuriating books have left me with but one ambition—to find out for myself! And as soon as I have the room to expand, I shall do just that ... at least I shall have one firm fact with which to begin. *Vallisneria* is a must.

REFERENCES GIVEN

1. *Freshwater Tropical Aquarium Fishes* by G. F. Hervey and J. Hems.
2. *Handbook of Tropical Aquarium Fishes* by Axelrod and Schultz.
3. *Tropical Aquarium Plants and Fishes* by A. L. Wells.
4. *The Tropical Fish Book* by R. Todd.
5. *Tropical Fish in the Home* by D. Gohm.
6. *A Home Aquarium on a Small Income* by A. F. Brunner.
7. *The Right Way to Keep Pet Fish* by Reginald Dutta.
8. *Aquariums* by A. Innes.
9. *Exotic Aquarium Fishes* by W. T. Innes.
10. *Exotic Fishkeeping: Aquarium Management and Fish Farming* by T. H. Marshall.
11. *Tropical Fish, their Care and Management* by R. E. Hudson.

A Terrapin Pond

SOME pond-keepers are very interested in specimens for their ponds other than fishes and a favourite with some people is the terrapin or pond tortoise. These are very interesting inhabitants for a small pond but they do not take kindly to our winters and so should be taken under cover in a living-room temperature for the winter. It must be remembered that the terrapin can eat small fishes and may also take bites from larger ones. They can be

kept in a pond with either a vertical side or one with a small overhang. This will prevent the terrapin from wandering from the water. An island of a kind should be constructed so that the creature can climb from the water if it desires to do so. Terrapins can be fed on raw meat and garden worms, and small pieces of raw fish will be taken as well. If a heater could be installed in the pond to prevent actual freezing up, it would be possible to keep terrapins out of doors all the winter.

PLYMOUTH'S NEW TANKS

PLYMOUTH'S Aquarium on the Hoe will be closed all next winter when, thanks to a grant of £12,000 from the Nuffield Foundation, the tanks will be rebuilt on modern lines and the viewing conditions improved. The tanks and their occupants are primarily there to help the research work of the scientists of the Marine Biological Association of the United Kingdom, of whose laboratory the Aquarium is a part. But since soon after the laboratory opened in 1888 the public has been admitted to the Aquarium and now it has 80,000 visitors every year. The present tanks are the original ones, and they are coming to the end of their days. They were damaged when a bomb dropped close to the building during the war and were not repaired until after hostilities had ceased. In recent years they have shown increasing signs of wearing out. The new tanks will incorporate many improvements from the point of view of the health of the occupants, ease and economy of maintenance and display purposes. There will be about half as many tanks again as at present. They will line three sides of the Aquarium, instead of two. The lighting will be greatly improved and the viewing hall will have a new ceiling and floor.

One of the new features has already been introduced—an improved circulation system which has given the Aquarium some of the cleanest water of any in the country.—*World's Fair*.



Photo: Laurence E. Perkins
A young specimen of the European terrapin or pond tortoise. This species should be selected in preference to the small green terrapins offered for sale, which rarely live long in captivity here

COLDWATER FISH-KEEPING QUERIES answered by A. BOARDER

Please can you tell me which varieties of goldfish are suitable for a large pond with water running in and out continuously? The pond is about 30 ft. long and 15 ft. wide, and up to 3 ft. deep in most parts. I have some common goldfish but would like some of the more coloured kinds which would breed. Do you think there will be enough natural food in the water and would ducks harm the fish?

The pond sounds "just the job" for the purpose of breeding and keeping goldfish. The fact that freshwater can run into it will be a great advantage. It will aerate the water, which is most important in warm weather, and the movement will tend to prevent the pond from freezing over in the winter. Some shubunkins will give you plenty of colour in the pond and should breed all right there. You should have thought of these fish before you placed ordinary goldfish in the pond. You see, the shubunkins or in fact any other variety of goldfish would breed with the common goldfish and the youngsters would be a mixed lot of little value. It must also be borne in mind that it is not easy to breed any type of fancy goldfish in an outdoor pond. Only a few of the progeny would be of sufficient quality to be of much value and the others would only remain in the pond to spoil the further spawnings. With large ponds such as yours the difficulty would be to catch the fish for sorting at any time. Unless a pond can be netted or emptied easily it is most difficult to catch the occupants. Ducks would eat some of the fish and so you must think well over this project before introducing any to the pond.

I am building a tank, 24 in. by 12 in. by 12 in., and would like to use asbestos sheeting for the back and base; would this be all right for the fish?

I think that it would be safer if you use glass instead of the asbestos sheeting. This can be too alkaline for the fish. The usual type of sheeting is made with shredded asbestos and cement to bind it. The cement could give off free lime in the water which could be dangerous to the fish. Repeated scrubbing and soaking might make it safe but glass is much to be preferred.

I have two coldwater tanks of fish in an unheated garage. Can you suggest an economical method of keeping the water above freezing point? Would a 25 watt bulb placed slightly in the water do the trick?

The 25 watt bulb should be able to keep the water from freezing, especially if you protect the tank with some form of lagging. Do not let the lamp go too far into the water, but you will have to watch that condensation does not lower the water away from it. A low-wattage aquarium heater could be used with greater safety and less trouble.

I am about to set up a new tank, 36 in. by 15 in. by 12 in., and would like your advice on lighting it. It will only receive the direct rays of the sun for a short period. I wondered if a fluorescent lamp 2 ft. long will be enough for the tank. I have heard and read so many conflicting opinions on the subject of fluorescent lighting that I would like to hear your verdict.

As you say, there are various ideas on the subject and I must admit that I have never tried fluorescent lighting myself. However, I remember that this method was used at the London Aquarium, Waterloo Bridge, and the water plants would not grow with it. It had to be changed to ordinary electric lighting before the plants would grow. Of course, in that instance there was no natural lighting at all, whereas you have at least a little. If you already have the lamp you can give it a trial and change over if necessary.

I have a pond 8 ft. by 6 ft. by 18 in. deep made of concrete. I am having trouble with the water as it is very alkaline. I also have a slight leak in the pond. What can I do to improve matters?

Empty the pond and scrub it out well. Then clean out the crack and remove any loose pieces of concrete. If the

crack is large it can be filled with a 1:1 mixture of fresh cement and fine sharp sand. Force this well into the crack and do not refill the pond for 2 days. The water will be alkaline if there is too much free lime coming from the concrete. This can be removed by scrubbing and washing out once or twice. If the crack is small it can be filled with one of the new types of plastic cement such as Seelastik. This is very sticky and for filling a crack you can either damp a finger with paraffin or use a strip of grease-proof paper to force the substance in. If well forced in, it will do the trick and last quite a long time. As it remains pliable it can expand slightly with the concrete if the water freezes in winter.

I have moved into a fresh house with a large pond in the garden. It is a natural one with clay bottom and is fed by a spring. The water keeps pure and some fish I have introduced are doing quite well. However, the pond is almost full of a water plant and I would like to know the name of it. Is it any use as an oxygenator, and shall I do all I can to eradicate it? I would like to introduce some water lilies next spring and wonder if they will help to keep down the growth of the weed. In a pond of this size, 15 yards by 20 yards, sloping to a depth of 5 to 6 ft., will falling leaves do any harm, as it is difficult to keep them out?

The sample of water plant is known as *Aponogeton distachyum*, or water hawthorn. It is quite an attractive plant which flowers well. As most of the leaves grow on the surface of the water it cannot be considered a good oxygenator. It will be rather difficult to clear from the pond as the roots are of a tuberous kind and would be hard to drag out. You can remove a lot by using a form of grapnel hook on a long line. If you plant water lilies they should grow well despite the water hawthorn. Their leaves will soon cover a large part of the pond and will have the tendency to choke out some of the unwanted plant. It must be realised, however, that the water hawthorn has become well established and has a good root run on the bottom. This plant seems to thrive in almost any depth of water. You will have some difficulty in getting your water lilies established as most of them do not like to be planted too deeply for a start. If you could lower the depth of the water for a time, once the lilies are planted, it will give them a better chance to get established. You may be able to procure some large clumps of lily and these would be better to use than very small plants. A pond the size of yours with a natural bottom is not likely to be upset very easily by falling leaves. If possible clear out what you can reach. Sometimes the wind will blow them to one side, when they can be raked or netted out.

Can you please tell me the nearest place to Bradford, Yorkshire, where coldwater catfish can be found naturally? My catfish is getting too big for his tank and I would like to set it free amongst his own kind. Failing this would the company of roach, gudgeon, etc., in a local canal be suitable?

Coldwater catfish are not found naturally in this country but there is no reason why your fish would not thrive in your local canal. I remember that many years ago, I believe about 50, Lord Rothschild introduced some catfish into one of the reservoirs near Tring, Herts. Although I do not know of records of any of these fish having been caught on rod and line, one or two were found dead and these had grown to a very large size. These reservoirs are used for feeding the canal nearby and I believe that one or two small catfish have been caught there. It is therefore correct to assume that the catfish will be all right in your local canal. If, however, the canal is rented by an angling society it would be as well if you ask the advice of the society before freeing the fish in their waters. When these catfish grow to full size they can eat smaller fishes and could be as dangerous as pike in angling waters.

(Please turn to page 108)

Aquarium on the Map—Mevagissey

by L. R. BRIGHTWELL

ONE of the hallmarks of a prosperous town or village is the capacity to laugh at itself (*cide* Aberdeen's joke factory), and Mevagissey still approves the guide books repeating the libellous story of how a dead monkey washed ashore many years ago was mistaken for a continental spy and publicly hanged.

A more recent tale recounted how Mevagissey lifeboat put to sea to rescue a supposed mariner marooned on the lonely Gull Rock off Porthscatho, only to discover on arrival that the mariner was a large cormorant drying its wings! But this yarn at least can never be again justified, for the lifeboat now operates from Fowey and the Mevagissey lifeboat house has been transformed. Hence another joke-factory effort. "When the words Builder and Fish Merchant are put together what do they spell? . . . Marine Aquarium! And the hamlet's sub-title is "Ever-fishy."

Mevagissey's Aquarium is placed at the western end of an always busy little harbour, the year round alive with fishing craft of many kinds.

The Aquarium connoisseur will at once like Mevagissey's contribution to the Aquatic Zoo Movement, not only for its general excellence, but for its modesty and honesty. The vestibule notice board does not repeat the customary flamboyant flourish about the vast size of the collection, unrivalled and rare tropicals, etc. Nor are there any other marks of incompetence and failure, parrots, monkeys and other abortions. Instead, the notice simply says, "Everything in this Aquarium has been caught locally."

Too many Aquariums will not realise that the vast riches of our seas can stand up to the demands of the most hard-to-please casual gazers if properly displayed. A recent fauna list of the West Country's marine resources shows well over 2,000 species, which includes about 200 species of fishes, 60 tunicates, 50 echinoderms, 250 hydroids, anemones, etc., 1,000 crustaceans and about 500 molluscs, to mention only the more sizeable creatures. Much work was done in this area by the famous Jonathan Couch between 1789 and 1870. His *Cornish Fauna* and *British Fishes* are classics.

The one-time lifeboat station is some 35 yards long by 17 yards wide, and the average tank is some 12 feet long by 3 feet wide and as many deep. A waist-high open floor pool stretches across the entire width of the Aquarium's more seaward extremity. Though lighted throughout by electricity the tanks are brilliant, thanks to the purity of the water, the vivid Cornish blue stone of the well-built rock-work backgrounds and the sparkling tank floors of local blue stone and granite chips, the normal constituents of every inshore beach between the Devon border and Land's End.

Though an always busy fishing port, and the seat of an important fish cannery, Mevagissey keeps its harbour most commendably clean. Penalties for careless distribution of ships' oil are severe. The tanks are filled at each high tide and the only snag seems to be an occasional run of north-east winds which are liable to bring in waste from the world-famous China-clay works of St. Austell, some 12 miles away. When this occurs a clean sweep is made forthwith, every tank being emptied, well flushed and refilled. An engine of a few horse power only ensures continual circulation and excellent aeration. This steady inflow of fresh sea water ensures the appearance of many weeds, sponges, worms and zoophytes besides a great quantity of



"Fowey—six months' return, please!"

plankton, which is impossible in filtered water; there may even be seen a wonderful influx of opossum shrimps, so valued in the Channel Islands where it is netted on a big scale and salted as use for ground bait.

The setting of this Aquarium could hardly be more maritime. Gulls always line the roof and keep a sharp eye on visitors, who may shed a few sandwich or pastry crumbs. They swarm over the harbour at low tide clearing every scrap of refuse. At high water there is not only a galaxy of bobbing craft, but just beyond the harbour mouth the sea surface may be dotted with what look like miniature islands, but they are basking sharks, anything from 10 to 30 feet long.

No tropic waters, fresh or salt, could easily beat some of the splendour to be had by trawl or trammel net on the Aquarium's doorstep. Such starfishes as the big rose-pink cannibal star *Ladia*, the gold and crimson 12-rayed sun star, or the weird fawn and deep-rose bird's-foot star light up any tank. A year or two ago the rare red-banded fish *Cepola tubescens* was brought in and later sent to Plymouth Laboratory. The cuckoo wrasse makes a wonderful show, the male being vivid cobalt and orange, the female orange with black-and-white spots. Another recent rarity was a white lobster with black patches, an even greater curiosity than the occasional red lobster, said to have caused several London Zoo visitors to have hastily withdrawn and signed the pledge. The crawfish (*Palinurus*), our largest crustacean, is always present. It can be heard "grunting" through the thick plate-glass windows.

A considerably larger Aquarium than that at Mevagissey is established under the same management at historic Fowey, and this is the winter quarters of many of Mevagissey's exhibits. Though they have regularly made this trip for some years now, it far from retards growth, and many fishes such as bass, conger and ray promise to strain the capacity of their ample quarters. The conger, always the

(Continued overpage)

Dangers of Heat to the Pond

DURING this month the water in a garden pond can become very warm, and if there is any suggestion of pollution it can become unsafe for the fishes. As is generally known, the warmer the water the less oxygen will it hold and when there is a quantity of decaying vegetation in the pond the water can become filled with bad gases which upset the fishes and may kill them.

There is no doubt that some fishes can stand rather foul conditions better than others. It will be found that those fishes which naturally frequent running rivers will be in trouble before some kinds which inhabit ponds or fairly still waters. Of the fishes which are most often kept in garden ponds the golden orfe is one of the first to be affected by foul water. Even a thunderstorm in the night can upset the balance in the pond and cause the death of these quick-swimming fish. Trout are also very prone to become oxygen starved when the water becomes too warm or foul. Minnows and gudgeon can also be affected.

Sensitivity of Fishes to Oxygen Lack

It will also be found that, as a rule, the larger the fishes the sooner are they in trouble. This is because they require more oxygen than smaller fishes. Such fishes as green tench, rudd and carp are more used to a stagnant water and can put up with a rather less-oxygenated water than the previously mentioned fishes. For all that it is no use thinking that the condition of the water can be neglected even for these fairly hardy species. A lot will depend on the size of the pond and the number of fishes in it. When the water does become foul in any way the fishes will soon indicate to you that something is wrong. If you are on hand to apply the remedy all may be well, but if nothing can be done then some fishes may die. As soon as the water becomes unsafe, that is, either lacking oxygen or having too much foul gas, the fishes will come to the surface of the water and mouth about there. Even if disturbed they will swim down for only a short period, to reappear and carry on with the mouthing.

If fishes are seen in this state it is imperative that some fresh water is run into the pond as soon as possible. If some of the stale water can be run off first it will be an advantage, but if not let the fresh water run in until the pond has flooded over. It is remarkable how soon the fishes will respond to the fresh water. Fishes which were on their sides almost dead can recover in a few minutes and then be feeding and swimming around as if nothing had been wrong within a quarter of an hour. If it is possible to make a small fountain or waterfall then the need for any change of water may be prevented. It is surprising how well even a small trickle of water into a pond can help to keep the water safe for fishes. A small electric pump can be installed so that it makes a small fountain or is used to raise water to a nearby rockery from where the water falls gradually over rocks or through small pools back to the pond. Such pumps should be hidden from view in a water-tight box where they can be reached if required.

Depth and Oxygenation

It will be noticed that the deeper the water in a pond the less oxygen is found in the lower layer of the water. A very shallow pond allows a large area of water to be in contact with the air so that foul gases can be given off and oxygen taken in. In a small but shallow pond a number of fishes would live when rather overcrowded, and as they swam about with their dorsal fins out of the water their actions would help to reoxygenate the water. In very deep water that at the bottom of the pond would be too far from the air to receive any direct benefit. The unfortunate part



Photo:

Laurence E. Perkins

about the shallow pond, however, is that it would warm up very quickly in the summer and cool too fast in the cold weather. A pond about 2 feet deep seems quite deep enough for general use.

The depth of the water in many ponds can be lessened by adding too much bottom compost. The pond is then very difficult to clean out and each year there is an accumulation of mud and mulm which again lessens the depth of water. The introduction of compost at the bottom of a fairly small pond can also have other effects not very pleasant. If some of the water plants of vigorous growth get well rooted in this base compost their growth becomes so rampant that they get quite out of hand and choke out other more tender subjects. To try and reduce the size of these plants is then a major operation. Their roots will have become so firmly embedded in the compost that it will be possible to thin the plants out only by emptying the pond and, with gum boots on, getting among the roots with a sharp spade.

Aquarium on the Map— Mevagissey

(continued from the preceding page)

subject of most extravagant anglers' yarns, proves a most amenable fish in confinement, sliding through the keeper's hands without the least hint of hostility. Octopus also has wintered successfully at Fowey.

These Aquariums are both fine examples of what can be done with the materials nearest to hand and more than justify the assertion of the proprietors that if an Aquarium can't get on without parrots and monkeys it does not justify the title of Aquarium at all.

AQUARIST'S Notebook



by

RAYMOND YATES

THE cichlids are the tough boys of the piscine hobby in more ways than one. Their pugnacious ways are well known. They are also blessed with strong constitutions which enable them to stand up to rough handling from their owners or other fishes, and are highly resistant to disease. By and large they present few feeding problems, grow quickly and live longer than most other varieties of tropicals kept in aquaria. The exceptions to the foregoing are angels, pompadour fish and perhaps the dwarf cichlid *Apistogramma ramirezi*. Both angels and pompadours have much in common, both being of unusual shape, retiring, shy, timid and temperamental. Angels are now so common and low-priced that their loss is no longer looked upon as a major disaster, although the reverse is the case with pompadour fish. Both these fishes have one common failing, which is not shown by any other cichlid, this being a casual, half-hearted attitude to feeding on occasion.

This faddiness can be the despair of the hobbyist because, for no reason at all, healthy fish will suddenly go on hunger strike and completely refuse all foods offered. Books are little help because they invariably tell the reader to offer specially tasty or choice tit-bits to the fish in question, as if this solved the problem. Angels or pompadours on hunger strike just go right off all food, usually retire to the back of the tank and either hide away or sulk in a top corner near the surface. When very large specimens do this it may prove a passing whim and they can, and often do, recover their appetite within a few days. I have had large angels who have gone several weeks and then come back on the feed, little the worse for their self-imposed fast. With small specimens hunger strikes are usually fatal. The fish is small to begin with and has little reserve to fall back on. The result is that within 10 days of the cessation of eating a marked decline is observed in the fish, which is noticeably thin and emaciated; the point of no return has been passed. The eyes stand out unpleasantly and the rounded contour of the body becomes decidedly angular. The fish generally dies within a fortnight or 3 weeks, often failing to maintain its equilibrium during the last day or two of its life. The colour is usually intense black during the final phases and this is particularly the case with pompadours. However, with these normal coloration returns before the death of the fish, whereas angels often die when their colouring appears at its best.

It is difficult to know what to do with hunger strikers. Mostly they do this as individuals, often after long periods of hearty eating, and they do not regain their appetites merely by keeping them with other fishes which are hearty eaters (like barbs), or by changing the water, or by removal to another tank or even by changing the temperature. Whatever the cause of their disinclination, it is not a habit picked up by other angels or pompadours sharing the same tank. Pompadour fish are even more faddy than angels and, before buying, make sure that they are eating, and eating well, and just what food they are taking. When purchasing it is also wise to buy in the spring, when numerous natural foods will be available for some months, rather than buy in late autumn or early winter when the fish will have to be reared or brought on with a much more restricted choice of possible foods. Angels and pompadours are too elegant and disdain rushing after food or having to put themselves out in any way. They would rather starve than join in a "free for all," and so come off second best. To some extent this indicates that they do better when kept with no other species. Has any reader

any worthwhile information to offer on hunger strikes, particularly as regards pompadours?

Goldfish can take it. We all know that. What man has done with the goldfish is only rivalled with his results with the dog in the animal world and the dahlia in the plant world. With the warm-water fish the paradise seems to be the one most able to stand up to "the slings and arrows" of tank life. They certainly seem to be able to withstand most diseases and to have powers of recovery far beyond those of most tropicals. They can put up with wide variations in temperature and very foul water indeed. They are always ready for food and seem unconcerned about split finnage, gashes, internal parasites, worms eating out of their heads, eye fungus and what have you. Some time ago I had one which developed a large raw patch near the vent and this became covered with fungus until it was fully an inch deep. I netted the fish and removed the growth with tweezers. A second fungus growth appeared and this also was removed in like manner. No further trouble occurred thereafter. Eyes glaze over for days or as long as a couple of weeks; generally to do nothing is the best policy. Paradise fish recover without outside help. Holes in the head are quite common and these can even increase but in time all will clear up. The fish never seem inconvenienced. Worms sometimes grow out of the sides or head of the fish; again, leave well alone. Paradise die only of old age. A lot of those offered for sale are poor quality and weak in colour. If colour is not there to begin with it won't come later.

There are some very experienced women aquarists and a few have distinguished themselves as breeders, dealers and writers on the hobby. Few clubs are without their feminine side and the ladies certainly come into their own at social evenings or at providing those welcome refreshments on club nights. However, relatively few seem to take office in the running of clubs, which is surprising because many are cut out for the job of secretary. Nor do we find many ladies in the capacity of chairman—a pity in some ways because they would be invaluable at annual general meetings; after all who would want to argue with a woman? In the ranks of the judges there are few members of the fair sex. Is this because they fear they would not be fair and want to change their minds too frequently?

The fact remains that in our many clubs in Britain the ladies seem quite content to take a back seat. The reverse is the case in the United States. Club membership is more restricted there than in Britain and there are only about one hundred clubs in the whole of the Union. Most of these are in the big centres of population like California and New York and about 18 of the 49 states boast no club for the hobby. Those that are in existence are generally good and 42 of them issue their own magazine or news letter, a far higher percentage than in Britain. Most surprising of all is the fact that 70 of the club secretaries are women. This cannot be any accident and perhaps one of our transatlantic readers in the know can explain how it comes about that women have a virtual monopoly of the job over there.

In Britain the term "Aquarium Society" or "Aquarists' Club" is almost universally used and the same applies in

the States. However, one or two unusual names appear, such as, for instance, Neptune Teen Age Club, Junior Beta Club, Kansas Exotic Fish Enthusiasts, Fireside Society, Fanciers of Tropical Fish, Midland Tropicuarists and Tropical Fish Fanciers Guild.

The very mention of duckweed to most aquarists is like a red rag to a bull. I have never been able to understand why this is so. Given favourable conditions duckweed increases rapidly and very quickly covers the surface area of a tank. Of course, it shades some of the light from the aquatic plants beneath it but this is no obstacle. Either give more light or remove some of the duckweed periodically. If it does not get enough light it turns white and becomes a decaying mess, but this will not happen if the owner is at all experienced. Duckweed is a fine food for many fishes (*Metynnis* especially) and it prevents the growth of algae in your tanks. This is done in two ways, first by shielding the tank from excess of light and secondly by its luxuriant growth. Algae declines in any tank which has very good plant growth. However, blue-green alga can spread at the surface if introduced and this should be looked for and removed.

A fairly new importation is *Rasbora hengali*. This tiny fish suffers from its diminutive size, like *Rasbora maculata*. It is pretty enough with its grey and gold coverings but it is happy only in a tank on its own. It tends to remain still in the water for long periods and then makes sudden darts at food or out of the way of other fishes. If kept with much larger fishes it will hide in the plants and miss all the tit-bits. Lacking the colour of *R. maculata* this fish is too small to prove of lasting appeal. It is beyond the reach of hobbyists with only one tank for obvious reasons, and for those with more its size often proves a problem.

The bleeding-heart tetra takes my fancy very much. It is very hardy and ever on the move although not so cheeky as, for example, the tiger barb. Given the right light the red spot on the side looks really wonderful. It is also a fish which holds its fins erect and seems to be ever on the alert. This does not mean it will eat anything. On the contrary I find them faddy eaters because when they don't feel in the mood they will refuse to look at chopped worms, *Tubifex* and the like. They are not fin nippers and neither worry nor are worried by other fishes.

Many hobbyists tend to let their plants grow on until they get out of hand. This is often the case with *Cabomba*, water fern and *Hygrophila*. This is all very well but it can make the fishes in the tank very miserable. It all depends on what you have. Some fishes enjoy a tangled forest, many don't; obviously these are the fast swimmers or quick darters. Barbs and *Aphyosemion* varieties just hate these conditions. If you have such a tank it is sheer cruelty to keep *Panchax* types, who require an open surface area where rapid movement is possible. *Panchax* kept alone with one other big bullying fish seem to lose their nerve and forsake the surface for the lower reaches. This means that the big fellow (cichlid, paradise or such like) gets all the food and the *Panchax* tends to become thin and waste away. Because they are such voracious feeders and so pike-like it should not be assumed that they are fearless fish—on the contrary I find them very wary and out to avoid trouble at all costs.

At table shows square bottles are used as distortion of the fishes is less. A certain dealer discovered that he had fewer losses when sending fishes in square cans as compared with round ones and he put this down to the fact that the water was less easily set in motion with four corners to contend with than in a circular track. Fishes would look better at table shows if a little gravel was used in jars;

no fish is happy with a background the colour of its underside—it is only too aware of its prominence.

I like all *Corydoras* species and have no favourites, although I like *Corydoras aeneus* least of all. Having kept all of them at one time or another I was struck recently by the different speeds of growth. One would imagine that this would be uniform for all, all things being equal. Thinking back, I have not found it so. I have found leopard catfish (*Cr. julii*) rather slow in growth and *C. melanistius* not much better. *C. paleatus* is much better but *C. myersi*, to my mind, is far the speediest at putting on weight. On the other hand, *C. arcuatus* seems to grow very large indeed. These last two seem the best at "coming on." By and large *C. julii* seem the least hardy, although this does not mean that they don't stand up well to tank conditions; they do, but not quite so well as other *Corydoras*.

FINNY BUSINESS

by
LD



"Bye dear, have a nice time
—mind you don't get canned!"

Bull Frogs—by ROBERT BUSTARD

(Photographs by the author)

THERE are three species of these truly gigantic frogs which are available from time to time in this country. They are the Indian bull frog (*Rana tigrana*), the American bull frog (*Rana catesbeiana*) and the African bull frog (*Rana adspersa*). The adult measurement of all these frogs is 6 to 7 inches from snout to vent. Therefore they require somewhat spacious surroundings. These are specimens for the indoor vivarium. Let us first consider the various species available, before discussing housing in detail.

The American bull frog (*R. catesbeiana*) is the hardest of the three species mentioned above. It has a wide range in the United States and occurs in Southern Canada. It can be hibernated during the winter if desired. This course cannot be recommended for the other two species, and in any case should only be carried out if the specimens are fat and in good condition. The American bull frog is largely aquatic and never travels far from water. In size it reaches 7 inches, the male having a pair of internal vocal sacs. The tympanum or ear membrane is very large in *R. catesbeiana*. Coloration is olive brown, with darker markings and spots above; below, it is yellowish white with occasional brown markings. These are more abundant on the throat.

The American bull frog is a wonderful jumper and this trait is shared by its Indian relative. It is by far the easiest

species to obtain in this country and on account of its hardiness is very popular.

Indian Bull Frog

The Indian bull frog (*R. tigrana*) is in many ways similar to its American relation. It differs from it in having external vocal sacs present in the male. Its general shape is similar and it has a somewhat pointed snout, resembling a giant edible frog (*Rana esculenta*) in outline. It reaches a length of at least 6 inches, and is common in parts of Eastern Asia, although is not so easy to obtain in this country as *R. catesbeiana*. In coloration it is olive brown with darker markings above and white below.

I have found that the Indian bull frog tends to be nervous initially, although it will soon settle down if suitably housed. If it is kept in an aquarium I advise that the back and sides should be painted over or covered with dark paper to induce a feeling of security. *R. tigrana* is largely aquatic and when out of the water will bury itself in the mud until only its head is noticeable. The dorsal coloration blends in so well with its environment that it is very difficult to see even when not almost totally submerged in the mud. I recommend a temperature of 65 to 70° F. for this species. Heating may not be required during the summer but should be supplied during the winter. Indian bull frogs should not be hibernated.

African Bull Frog

Finally, the African bull frog (*R. adspersa*), which is definitely my favourite species. It belongs to the box-headed group of frogs and has a huge mouth which is broad



African bull frog (*Rana adspersa*). This is a young specimen seen on the prowl for food, which consists of large earthworms or strips of raw beef, and mice are also accepted



American bull frog (*Rana catesbeiana*), a hardy species and a popular one with vivarium keepers

and not at all pointed like those of the other bull frogs. This species likewise reaches 7 inches in length and may be nearly as broad as it is long if well fed. The hind limbs are small and largely hidden in the folds of fat. The coloration is green above, which is very variable in shade. There are ridges of raised skin running down the back and sides, which may have creamy-coloured markings on them. The sides give way to yellowish and below the frog is whitish. Small specimens are usually particularly attractive. A temperature of about 70° F. is ideal for this species and should be maintained throughout the year. My African bull frogs usually spend a day or two in or near the pool after feeding and then burrow down in the mud for several days. They are less aquatic than the two species mentioned above, and being so fat and possessing small hind limbs cannot swim nearly so expertly as the other two species.

Appetites

These large frogs all have equally large appetites and are capable, when adult, of devouring a fully grown mouse. Specimens soon learn to take these freshly killed when dangled in front of them, and they are swallowed in several gulps. I frequently feed my specimens on strips of raw meat and find they soon learn to take these even if they are not moved around in front of them; this applies particularly to *R. adipesa*. They will also feed on gentles and bluebottles, although about a hundred will be required to constitute a meal! Large earthworms are also relished by all three species.

The vivarium should certainly not be less than 24 in. by 12 in. by 12 in. and should be 36 in. by 20 in. by 20 in. if possible. I have kept adult pairs of *R. tigrana* and *R. catesbeiana* in a vivarium of the latter size. The smaller size would suffice for *R. adipesa*, which is less active. The vivarium must contain a large pool, or alternately an aquarium can be used and a wall of stones built across the middle of the tank. One half is filled with water and the

other half with pieces of stone, mud and finally moss. Many collectors prefer to keep the water localised in a large pie dish and this arrangement is much easier for cleaning out. This is the system I always use. In the aquarium the water soon fouls and the whole tank must be dismantled for effective cleaning. It is also easier to regulate the dampness of the soil by the dish method and those who dislike seeing a dish in their vivarium can soon disguise it or make a similar pool out of concrete. If this is treated to neutralise the alkalinity of the cement it will be perfectly safe for use. It should be made so as to allow enough room for all the bull frogs to submerge at the same time.

I have always been interested in bull frogs and found them easy and interesting creatures to keep, requiring little attention and thriving for many years in the vivarium.

Twenty-five Years Ago

A GIANT lumpfish has been captured some 10 miles off Brighton and safely conveyed to the Aquarium. The latest arrival is a remarkably fine specimen, and the biggest ever exhibited alive. It is a female fish, and about four times the size of the male lumpfish which arrived at the Aquarium a few weeks ago, and with whom the "lady" is now "keeping company." It is interesting to observe that, of the two, it is the "gentleman" who seeks the limelight, and having found a comfortable "seat" at the front of the tank window, he cannot fail to attract the attention of every visitor to the institution. His "lady friend," however, is extremely modest, and offers proof of a retiring disposition by keeping to one of the sheltered sides of the tank, where, to the astonishment of visitors, she hangs head downward, like some titanic fly seen in a nightmare, a large sucker disc enabling her to maintain this uncomfortable-looking position with ease.—From "The Aquarist," August, 1933.

OUR EXPERTS' ANSWERS TO TROPICAL AQUARIUM QUERIES

My aquarium is situated close to a sunny window and the water is quickly becoming green. I do not wish to paint or cover the back to inhibit the growth of mossy algae. What is the best way to deal with this problem of green water?

Your best plan would be to grow plenty of deep-rooting, shade-providing plants such as *Vallisneria* along the back and ends of the aquarium, and cover the surface of the water with a floating plant such as *Salvinia*, or dwarf bladderwort (*Utricularia prehenalis*).

The sand along the front of my aquarium has become blue-black, and bubbles of gas keep arising from it. Please can you tell me what is wrong?

Black sand is usually caused by too much food lying uneaten on the bottom, or unhealthy plant life in which the roots and stems have rotted away in the compost and given rise to local pollution. Remove the discoloured sand by scooping it up in a tablespoon. If the sand is spread on newspaper and left to dry out in the open air it will soon revert to its normal colour and become purified. After rinsing it under running water, it may be returned to the aquarium.

I have converted a garden shed into a fish house, and now I am faced with the problem of heating it economically. I have been told that paraffin stoves are quite suitable, but I do not like the idea of filling them every day and keeping the wicks clean; and also there is the danger of fire and fumes. What is your opinion, please?

The more expensive type of paraffin stove is easy to keep clean and will burn for 2 or 3 days on one filling of oil. As for fire and fumes, there is little or no danger of trouble from these, for the modern paraffin heater is extremely well constructed. On the other hand, have you thought about buying a small coke-burning stove? These stoves give off a good heat and are economical in fuel consumption. We advise you to get into touch with one of the manufacturers of heating stoves for greenhouses, informing the firm of the size of your fish house and your temperature requirements.

Will you please tell me the best position for an aquarium heater to ensure equal distribution of heat?

The best position for a tubular heater is about the centre of the aquarium, close to the sand and in a horizontal position. Never place the heater in a vertical position in a corner of the aquarium. A heater placed in such a position will heat just that corner of the aquarium, and the surrounding area will always remain cool or cold.

Is it true that feeding *Tubifex* worms to fishes causes them to waste away?

We have not met this piece of "wisdom" before and we do not think it is true. Fishes fed on *Tubifex* worms usually put on weight and soon look in tip-top condition. But there is a danger of introducing disease with *Tubifex* worms, for they are usually collected in dirty places.

Please will you tell me the average life span of the guppy?

The guppy has a life span of about 2 years. The female almost always lives a few months longer than the male, but during these last few months of life she usually presents a very emaciated appearance.

Can you tell me the sort of conditions most likely to lead to a spawning of neon tetras?

Use a 24 in. by 12 in. by 12 in. aquarium half-filled with filtered water of slightly acid reaction, a temperature ranging between 72° and 75° F., and not too bright a light. All plant life should carefully be picked for snails and then sterilised in potassium permanganate or alum solution to prevent the introduction of disease or pests into the

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.

aquarium. The fish, of course, should be brought into condition by being fed on a much-liked live food.

I have just started tropical fishkeeping and would like your advice. I bought a green swordtail a few days ago, and this fish—a fine male—keeps chasing and bullying the other fishes in the aquarium. A pair of dwarf gouramis that I have had for about a month seem too frightened to emerge from the plant life to take food. What should I do to stop the swordtail from bullying the other fishes?

Your best plan would be to ask your dealer if he would be willing to exchange another more peaceful fish for your swordtail. Large swordtails often develop into nasty bullies, and can cause quite a lot of trouble in a community tank.

Please will you give me some information about the fish known as the scissors-tail (*Rasbora trilineata*)?

The scissors-tail (*Rasbora trilineata*) is native to the Malay Peninsula and the Dutch East Indies. Aquarium fish average about 3 inches in length, but in the wild a length of 6 inches is attained. The fish prefers clear, acid water well stocked with fine-foliaged plant life. A temperature ranging between 72° and 78° F. suits it very well. It will eat the usual dried foods, but does better on live and meaty foods.

I have soaked two large handfuls of peat in a jug of water. The water is clear but brownish in colour. Will this water be all right to empty into my aquarium to help to improve conditions for my plants and fishes?

Peat water is beneficial in the aquarium. But first strain it through an old nylon stocking to remove any fine particles suspended in the water.

Would it be safe to introduce a Leer's gourami into my community tank?

The gourami you mentioned is quite well-behaved in its smaller sizes, but when it attains middle to full size it often becomes something of a bully.

Is it a good thing to install a filtration system in one's aquarium?

Filtration of the water is a very good thing. The water remains pure and clear, the fishes always look brighter and happier, and the aquarist is relieved of the task of spending an hour or two every other week in siphoning the bottom or going over it with a dip-tube.

I have recently introduced a *Plecostomus plecostomus* catfish into my community aquarium. It does not appear to be eating any of the food I feed to my other fishes, and I am becoming quite concerned about its welfare. Does this catfish need special food to keep it alive?

Plecostomus plecostomus needs a great deal of algae and similar soft green food in its diet. It will also eat *Tubifex* worms with relish, but most of its feeding is done after dark; so make sure that some food is introduced into the aquarium last thing at night so that the catfish is not starved of nourishment.

My two angel fish seem to have lost a lot of their dark colour. Is there anything wrong with them?

The dark markings on angel fish come and go according
(Continued overpage)

Microscopy for the Aquarist—43 by C. E. C. COLE

THE object of washing tissue or creatures after fixation is to get rid of excess of soluble fixative, which might spoil our work at a later stage in slide-making if left in the tissue. Thorough washing is essential for good work, and must be performed in the correct liquid, which may vary in constitution or in strength according to the fixative used.

Carrying on from last month, let us consider the correct procedure when using formalin, acetic acid and Bouin's fluid.

Alcohol is used in various strength by those people able to obtain it, but I think we should rule this out straight-away, as we are unlikely to be among those few. Instead we could use methylated spirit—not the coloured kind obtainable from the local oilshop, but pure. For this we need a permit from the Inland Revenue Department. I have never bothered to obtain one, because there is on the market an alcohol substitute, a dehydrating liquid miscible with distilled water in any desired proportion, which does the job admirably. I use the same proportions as are recommended for pure alcohol.

Washing Tissue

For washing tissue fixed in either acetic acid or Bouin's fluid 50 or 70 per cent. strength is correct. For formalin the minimum strength is 70 up to 90 per cent. If we intend to stain our objects we wash to the strength of liquid used in dissolving the stain. I will enlarge upon this later.

It is useful and instructive to perform all operations in shallow staining pots or similar transparent and small containers, as this enables us to observe the various processes and keep a check upon their progress without difficulty—merely by placing the container upon the microscope stage and focusing in the usual manner.

Although in what should be a completely transparent medium, the action of the liquid upon the tissue is usually visible as a turmoil in its vicinity, which lessens as one liquid gradually replaces the other until an equilibrium is finally established. When all action has ceased the solution can be discarded and the next step in processing the material undertaken.

Staining

Theoretically, the next process is that of staining. The object of staining is to make the different parts or contents of the material more easily visible. This it usually does because not all constituents of cells absorb stain at the same rate. The best-known example is that of cell nuclei, which stain first, leaving the cytoplasm much paler. Within the nuclei, chromosomes will mop up the stain more rapidly than the other contents of the nuclei, so that they are much more conspicuous than before.

Quite often two or even three stains are used, to obtain an even more detailed picture of the contents of a tissue. To an advanced microscopist the different colours he sees, provided that he knows what stains have been used, tell quite a story.

For our present purposes, however, it must be said that many of our subjects require little, if any, staining, unless they are almost completely hyaline, which means that their refractive indices approximate that of glass and as a result they are almost impossible to see.

Most—nay—all chitinous parts of insects, crustaceans, etc., are quite plainly visible, and in fact the problem in such cases is to increase transparency so as to see more detail, not less.

Notwithstanding, if there are attached to them any

transparent objects, these will escape notice altogether unless we resort to staining.

I had a case myself some time ago when examining a freshwater shrimp and experimenting with stains upon it. It had been kept in Bouin's fluid, and so was an overall pale yellow. I dehydrated it up to a 50 per cent. solution, and then popped it into a little borax carmine. After about 2 minutes I removed it, placed it upon the stage, and focused it with a 2 in. objective. I was surprised to see minute red dots upon its body and legs, whereas its bulk was still untouched by the carmine.

Advantage of Staining

I swivelled round to a higher power, and found that the dots now took a definite shape—they were infusorians of the bell-animalcule type, which had formed small colonies upon the legs and body of the shrimp, and still remained attached.

Similarly, cilia and hair is made more visible upon a creature when a stain is used, although we know also that different lighting can be used for this object without recourse to staining.

The most useful stains to us as aquarists are the following. Later, I shall give you details of application of all those mentioned.

1. Borax carmine. If you are interested in algae: 2. magdala red, 3. phloxine B, and 4. aniline blue W.S. 5. Aceto-carmine. 6. Iodine. 7. Acetic methylene blue. 8. Methyl green. 9. Crystal violet. 10. Nile blue sulphate.

Tropical Aquarium Queries Answered

(continued from the preceding page)

to the mood of the fish or the environment they are in. The fish show the darkest markings when they are placed in a thickly planted tank, well illuminated, and when they have plenty of live food in their diet.

Are *Nanostomus anomalus* easy to breed?

N. anomalus is not an easy fish to breed. Its chief requirements are clear, acid water, and a wealth of fine-foliated plant life on which to deposit the eggs, though sometimes it prefers to deposit its eggs on the glass side of the aquarium or on rockwork. At a temperature of 80°F the eggs hatch in about 3 days. The fry have very small mouths, and they must be given the smallest of live food.

The eyes of some of my fishes are bulging out as though they are filled with gas or air. Can you tell me what is wrong with them?

The symptoms you describe are those of pop-eye disease, or exophthalmia. As a rule, this disease is brought on by a sudden change in the temperature of the water, or sudden change of the water from old soft water to hard water fresh from a tap. Even an excess of artificial aeration may bring about this pop-eyed condition. To treat: raise the temperature of the water 5 degrees above normal, then add up to five drops of ordinary household ammonia to every 4 gallons of water to be treated, *or pro rata*. If the fishes appear to become distressed after a short while, add fresh water at the same temperature. After an immersion of about 4 hours, gradually reduce the ammonia content by draining away some of the water and adding fresh until the aquarium is back to normal.

THE DRAGONFLY

by LAURENCE E. PERKINS

(Photographs by the author)

OF all our native insects the dragonfly is one of the most fascinating and beautiful. Its lustrous, gauzy wings, rapid flight and elusiveness are certain of claiming our attention and, when we are lucky enough to study it closely while it is at rest, there are more characteristics to arouse our wonder and interest.

A completely harmless creature, the dragonfly is often thought to carry a sting or to be, for some other reason, an insect best avoided. The appendages sometimes present at the tail end are not weapons of any description but part of the equipment utilised in the process of reproduction. The head has a somewhat menacing appearance in the larger species but although the jaws are quite large and powerful they are only suited to the job of masticating and devouring small flying insects. The mode of flight is extremely fast and erratic, so that one may fear a sudden collision when confronted with an oncoming dragonfly but, such are its powers of sight and manoeuvrability, that this possibility is very remote.

To delve a little more deeply into its life history is both absorbing and rewarding, for the various stages of its development from the egg are unique among the insect host which is legion.

The majority of insect forms pass through four distinct phases, commencing with the egg. From this hatches out the larva or grub which turns into the pupa or chrysalis. During this third stage the final structural alterations occur to be followed by the emergence of the imago or adult insect. The dragonfly dispenses with the pupal form,

merely undergoing several changes of skin whilst a "nymph" in the larval state. These skin casts are carried out to facilitate growth and development and periodic observations of the nymph will show the gradual appearance of the wing shape beneath the external skin.

Throughout the nymphal or larval stage the creature is totally aquatic, swimming rapidly under water and feeding on live prey. It breathes through a system of tubes which, utilising the water's oxygen, supply all the parts of its body. This complicated breathing structure serves a dual purpose, for the nymph achieves a darting style of locomotion by emitting, in jets, water consumed for its dissolved oxygen.

To facilitate the capture of its prey, the dragonfly nymph has a singular appendage called the mask. Attached under its "chin," this device, which resembles a tiny shovel with two controlled hooks at the scoop end, is drawn up tight and flush with the head when not in use, but when a likely prey passes within reach, it shoots out and, clasping the helpless victim with the hooks, draws it back to the jaws where it is soon voraciously consumed. Thus equipped, the nymph has little need to chase its prey, and although it is well able to travel at fast speeds it spends a great deal of its time lurking in the mud or among the weeds awaiting the approach of a potential meal.

The dragonfly in nymphal guise is rather difficult to reconcile with the fairy-like fly darts and hovers over the hedgerows. A drab brown in colour, devoid of wings and having an ugly head and two rather fearsome-looking spikes at the rear end, this queer creature of the muddy water-



At the left the newly formed dragonfly is seen emerging from its larval "skin" above the water surface. In the centre picture, after emergence the young dragonfly has assumed a head-upward position and the hanging wings are beginning to expand. The dragonfly clings to its larval case until its wings have fully expanded (right) and it is ready for flight

holes is as much removed in appearance from its adult form as is a carwig from a butterfly.

For about a year the dragonfly endures an underwater sojourn and then, at the bidding of an instinct unknown to man, it leaves the water and climbs up the nearest reed-stem to a position well clear of the water surface. Resting here, it rapidly dries off and splits its skin along the back. Simultaneously, the young adult dragonfly emerges and, crawling free, climbs further up the stem to complete the drying process and to allow the wings to develop fully.

To witness the subsequent operations is one of the most wonderful experiences of nature's countless miracles, and is an event not to be missed should the opportunity present itself. Immediately after emergence from its unattractive nymphal case the creature's coloration is a very pale version of the final hues. Its wings are still folded and its body is stunted. Then, as it breathes pure air for the first time, the blood begins to be pumped forcibly, the body commences to expand and the wings to unfold and hang downwards. With further pumping fluid is carried into the nerves of the wings and they, too, expand until their full stretch has been attained. At this juncture the wings are flimsy and translucent but as the fluid in the veins coagulates they assume their brittle and fully transparent appearance.

The wings are then erected to the normal position of rest—flat and at right angles to the body. While the wings have been developing, the delightful colours of the body

have been approaching their full brilliance and the forelegs busy with cleaning the head and huge compound eyes.

With the transformation completed the dragonfly makes ready for its initial essay at flight and the wings reveal its desire to be off by beginning to tremble and vibrate. Suddenly, and without further ado, there is a loud sound like the rubbing together of dry leaves and the young fly is away, over the tree-tops and out of sight.

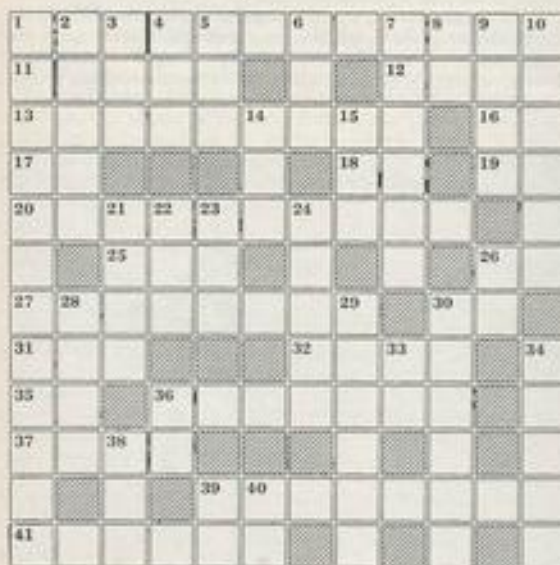
From now on it will pursue an almost totally aerial existence, hunting and devouring its prey upon the wing and enjoying equally well butterflies, gnats, moths and any other form of winged life of a size it can manage easily.

All dragonflies execute their mating in the air, returning to a suitable water-hole or pond for the actual egg-laying. The two sexes, flying in tandem, usually part over the water. The female then, skimming over the surface, either drops her eggs or, depending upon the species, settles on a semi-submerged plant stem and, making an incision with her ovipositor, lays her eggs within the stalk.

Although little is known of the actual span of life of the dragonfly as an aerial creature, it is considerably shorter than that time which it spends as an underwater nymph. When the insect has reached the age of maturity it is only necessary for reproduction to be carried out for nature to have achieved her purpose, and there being no further reason for prolongation of life after this event, the dragonfly dies before the autumn has turned to winter.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

- Pistia stratiotes*, floating plant (5, 7)
- Vehicle in A.A. conveys this fish (5)
- Coral loses its head (4)
- Palliseria* generally (4, 5)
- This is almost in the rut for sporting fish (2)
- Pearl sounds hesitant in dropping friend (2)
- For the heavier woman (1, 1)
- If in a terrace must be at one end (1, 1)
- Aquatic, or Copenhagen (10)
- Before most of the mere (3)
- Thank you for half a tank (2)
- Golden club, handsome aquatic plant (8)
- Artistic distinction of tail of 11 Across (1, 1)
- Did he lend his last penny? (3)
- Molten rock (4)
- Haircut seen in ponds? (1, 1)
- Living or growing in water (7)
- Perhaps the loveliest of water-side plants (4)
- See 41 Across (8)
- and 39. Crystalwort (6)

CLUES DOWN

- Stratiotes aloides* (5, 7)
- Artist follows accountant in the tank (5)
- Pat on the back for water supplier (3)
- Poetically previous (3)
- Kind of sand worms to bring the garfish back (3)
- Here is the time. You need the dope for genes (3)
- Dead heat might call for this to bring back out (4, 2)
- City of the Chaldees (2)
- Felines to others, *Corydoras* to us (4)
- Now *aperia* (6)
- Orc changed to fabulous bird (3)
- Heavenly body of sole (3)
- Shining light of many a tropical tank (4)
- Water container run inside out (3)
- Necessary for angler and aquarist, not grossly (3)
- Fleshy conical body suspended from palate (5)
- "Week-end soldiers" (1, 1)
- Bring up from fry, breeders! (4)
- The cavity in which young are formed (6)
- Relating to lineage in genetics (6)
- Short for *Hottotia palustris*? (2)
- Break (5)
- As it is (2)
- Limited in an American way to less than an inch (3)
- Hi this for good reproduction (2)
- Take note of the lamprey (2)

PICK YOUR ANSWER

- "It's no fish ye're buying, it's men's lives," is a quotation from Sir Walter Scott's: (a) *The Antiquary*; (b) *Ivanhoe*; (c) *Old Mortality*; (d) *Woodstock*.
- Golden killifish is the popular name of: (a) *Apllocheilichthys lineatus*; (b) *Cubanichthys cubensis*; (c) *Pseudorasbora chrysoptera*; (d) *Rivulus ocellatus*.
- Girardinus metallicus* is native of: (a) Cuba; (b) Haiti; (c) Jamaica; (d) Trinidad.

- In nature *Rasbora daniconius* reaches a length of about: (a) 6 in.; (b) 8 in.; (c) 10 in.; (d) 12 in.
- Gambusia aquatica* was named by: (a) Aublet; (b) De Candolle; (c) Linnaeus; (d) Sibthorp.
- The optimum temperature for *Nitella* is: (a) 60° F.; (b) 64° F.; (c) 68° F.; (d) 72° F.

(Solutions on page 111)

G. F. H.

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

Transport and Trade

AN article in the June issue of *The Aquarist* which has just come to hand prompts this letter. In fact several things have been on my mind to write to you about, and now the article "Aquarist's Notebook" on the I.C.I. reference to polythene has appeared in your journal I shall direct my words to you.

First of all, the reference to the fish that were shipped in polythene originated here in Montreal. It had to do with the shipment of some beaver fish (*Amia*) to Paris for some sort of exposition by our Provincial Fishery Department. It is so like a group of that type to jump to conclusions about their method of packaging the fish, whereas under their very noses, thousands of fishes arrive weekly from Florida packed in polythene bags. I drew the attention of several people to this fact, but it was publicised in the local press much as the I.C.I. people had it, and I suppose they got it from the Canadian counterpart of their firm, Canadian Industries Ltd. Actually, the method of packing was to place the individual fish in a long, sausage-shaped bag of polythene, very little water if any was present, and the bag was puffed up with pure oxygen and the top tied. The individual fish were about 20 to 24 in. long. As I recall it, they were refrigerated during the flight to reduce their rate of metabolism.

Secondly, what is the matter with the British wholesalers in the matter of trade with Canada? Recently, to assist a busy local retail/wholesale firm, I undertook to write for him, on his letterhead, to a few of the leading suppliers in Europe and the British Isles. So far, the ones whose addresses were obtained from *D.A.T.Z.* have, with very few exceptions, replied to this man, some in the English language. *No replies have come from the firms in Britain.* This notwithstanding the fact that the present Government of Canada, much more than previous Governments, is in favour of trade with Britain, and is in fact, as you probably have read, critical of the imbalance of trade as it presently exists with the U.S.A.

Of course, I suppose that firms like Aquarium Hamburg have very low prices that are hard to beat, and in fact they are making shipments to Montreal quite regularly, as they do to the U.S.A. *Deutsch Lufthansa* have a local office here, and do all possible to expedite shipments. On the other hand, *B.O.A.C.* have a local office, too, but I'll bet they don't handle any fish shipments from Britain to

Montreal. There is no doubt about it, these other people are after the business and are getting a good share of it. Of course, the wholesaler referred to above has no trouble getting American fishes. He merely picks up the 'phone and calls Florida, they tell him what is current and choice (mostly livebearers, of course) and they are here in 48 hours. A New York jobber of fishes and supplies that I know even 'phones the Montreal retail stores almost weekly, looking for business.

L. W. HAYTER,
Quebec, Canada.

Badges on View, Please!

I SHALL be visiting the Hendon Congress of Fishkeepers Film Show in September, and it will be my first chance to meet any other fishkeepers, for there are none in my neighbourhood. I shall wear my Aquarist Badge, which I was pleased to receive from you, and ask all other aquarists in London for that week-end to wear their badges, so that an opportunity will be provided to meet.

MARGARET CORVELL,
Stranraer, Scotland.

Public Aquariums

ON several occasions recently I have read with interest references made in the aquatic press with regard to the standard of this country's public aquariums.

One aquarium which I have found to be consistently of a high standard is that found in Bristol Zoo. In a small space is a compact display of healthy fishes in clean tanks and presented well. By contrast, I was appalled at the rapid decline in the standard of the tropical-freshwater exhibits in Torquay Aquarium. Hardly a fish on view was completely free from faults of some kind when I visited Torquay early in June this year. Tails and other fins of a great number of fishes were torn or rotting, where finnage was present at all. By contrast the marine section was really quite good and deserving of praise.

So often attention to minor wrongs would greatly raise the standard of our public aquariums. Quite recently at London Zoo an otherwise pleasant tank of neons was completely spoiled by the ungainly movement of two of the shoal afflicted by bladder trouble.

M. GRIMS,
Oxford.

Coldwater Fish-keeping Queries

(continued from page 96)

I am going to make a pond in my garden with a galvanised tank. Will you please tell me of something which will not harm the fish that I can paint it with inside to waterproof it?

I have about a dozen coldwater cisterns in use and some of them have been in constant use for nearly 20 years. The holes were blocked up with wooden pegs or bits of rag and then the inside was painted over with a thick solution of cement and sand, one part of each. It is amazing how well cement will stick to anything galvanised. Well wash out the tank once the cement has set, to remove the free lime, or it will be dangerous to fish. As a matter of interest, about 14 years ago the coldwater cistern in my loft developed a leak. I went to try to repair it, and when the sediment was removed from the bottom I found a hole I could put my fist in. I stuffed a large piece of rag in the hole, floated this over with a good layer of cement and sand and the tank still holds water.

Where can specimens of the bitterling be found in the natural state? What is the scientific name for the painter's mussel? Can you tell me any books which mention the bitterling in detail?

The bitterling (*Rhodeus amarus*) is a freshwater fish occurring in Europe but not found naturally in the British Isles. The scientific name for the painter's mussel is *Unio pictorum*, and the shells were often used by the Dutch painters as receptacles for their colours. For a very good description of the bitterling's spawning habits see the article in *The Aquarist* (July, 1954) by Dr. J. J. Duyven de Wit.

I have made an outdoor pond and treated the cement with a waterproofing cement. It still loses water and I have been told that margarine smeared round the top of the pond (where I seem to be losing the water) will do the trick. What do you think of the idea?

This is a new idea and one I would not use myself. A small leak could probably be stopped by pressing margarine into the crack but in warm weather this would melt and run over the top of the water. Fish could nibble it and field mice and rats would be attracted to the pond to gnaw off the margarine. If a pond is correctly made it should not lose water. Even half an inch of concrete made with fresh cement and sharp sand to a strength of 3 parts of sand to 1 part of cement will hold water without any further treatment. It is when stale cement or dirty sand is used, perhaps with lumps of earth or soft sand in it, that concrete will allow water to percolate through it. A bitumastic water-proofing agent can be applied where the leak is suspected if the surface to be treated is thoroughly dried first.

I would like to put a scavenger fish into my pond but do not think it would be hardy enough to stand the winter out of doors. What is your advice?

The green tench (*Tinca tinca*) is an excellent fish for the outdoor pond as it is a good scavenger and perfectly hardy. My pond, which contains fantail goldfish, has not been without one or two for 20 years and I have had no trouble from them. In 1947 the tench bred, and having parted with the old fish which had grown very large, I kept three youngsters which I still have. There are two males and one female and they bred when only 2 years old. They are now very large and very handsome fish. Although they are mostly bottom feeders they do come to the top to bask in the sun during warm weather. They eat any large worms which fall into the pond, clear up any decaying

vegetation or uneaten goldfish food. These tench are a source of endless amusement to visitors, as I fish for them with a fly rod with float, shot but no hook. A worm is tied on to the line and it is never long before I get a bite! The tench can be played for some time but will not allow their heads to be brought out of the water; they either get the worm or leave go. Immediately after they will go for a fresh worm and never show the least sign of being scared by the fight.

I have an outdoor pond holding approximately 200 gallons of water. Last spring I restocked it with 50 goldfish, 2½ to 3 in. long, making 68 fish in all. After 6 weeks they began to die off until I had 25, when they developed white-spot disease. I took precautions and had no further losses. Six weeks ago I was given seven carp varying from 3 to 8 in. in length and to-day four of my previous fish and one of the carp are dying.

It appears to me that you have badly overcrowded your pond. Whatever was the reason for putting 68 fish in such a small pond? With only 200 gallons the pond is only 4 ft. by 4 ft. if it is 2 ft. deep, and in fact is only about 17 times as big as the standard tank, 24 in. by 12 in. by 12 in. A dozen fish as large as yours would be ample for your pond. I have only 12 breeding fantails and three tench in my main pond, which would take several ponds the size of yours! When you try to keep too many fish in a small pond some of them are sure to die off until the limit is reached. You say that your fish developed white-spot disease in the pond. This is rather unusual and I wonder if it was this disease or ordinary fungus. Your pond should be thoroughly cleaned out and when refilled start with only a few fish. You are more likely to succeed with a few fish and you certainly will not have the trouble you have so far experienced.

I have a 9-months-old veiltail which has developed small blood-red spots, each about the size of a pin head, on its gills, throat and head. From some of these white-worm-like creatures have appeared, about the thickness of a needle. The fish does not seem too distressed by this and does not dash about as if it were attacked by flukes. What is the trouble, and cure?

The trouble appears to be caused by a form of parasitic worm too large for a fluke, which could be seen only with a magnifying glass and do not as a rule make a red spot. The creatures should be examined under a microscope to determine what they might be. It is possible that the red spots are a form of cyst or tumour from which a white substance erupts when the skin is broken, like the core of a boil. Examination under a strong glass would show whether the actual white object was a worm of any kind or just inanimate matter. Give the fish a bath or two in a Dettol solution, a half teaspoonful to a quart of water and remove it after half a minute or sooner if it turns over. Repeat the treatment after a week. If it is found that the object actually moves it may be an anchor worm (*Lernaea*). In this case the worms would drop off the fish if touched with some strong solution of potassium permanganate applied with a brush or piece of cotton wool.

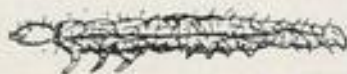
I have made a new section to my pond and have treated it with potassium permanganate. When can I put fish into it and what shall I feed them on?

When a pond is newly made with cement there is always a certain amount of free lime on the surface of the concrete. This can be dangerous to fishes if it is in sufficient strength. A great deal will depend on the volume of water in contact with the fresh concrete. For instance, a very shallow pond would mean that the water would probably hold a dangerous quantity of lime which, if spread out in contact with much more water, in a deeper pond would be harmless. As a rule if a new pond is filled with water, left for a few days and scrubbed out well when emptied there should be little free lime left, and a second treatment like the first should make the pond quite safe.

FRIENDS & FOES

No. 69

Aquatic Moths



Larva (top) and adult of the brown china-mark moth Nymphula nymphaeta

Lepidoptera

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

ORDER: Lepidoptera, from Greek *lepidotos*—scaly, and *pteron*—wing.

CLASS: Hexapoda, from Greek *hex*—six, and *podos*—foot.

EXAMINING the stems and leaves of such aquatic plants as water lilies, potamogeton, arrow-head, etc., during the late spring and summer months, one may frequently find small pieces of leaf sticking closely to the other leaves. Removing them carefully, one discovers a creature inside which wriggles desperately to escape. Caterpillar in form, it has three pairs of true legs on the thorax, and five pairs of false legs (like small pimples) on the abdomen. It seldom exceeds half an inch in length.

If the cocoon of leaf is not disturbed but placed in a jar of water, the caterpillar, once it is sure that it is safe, will keep poking its head out from one end or the other to feed.

Like terrestrial caterpillars, these little creatures are vegetarian and always hungry. They constitute quite a menace, when present in quantity, to the aquatic plants which are at once their hosts and prey.

Sometimes, like caddis flies, the caterpillars make a protective covering from two or more pieces of leaf, fashioned rather like a sleeping bag, which the creature can carry around with it to pastures new.

At first smooth skinned, "hair" grows all over the body as the caterpillar grows. Pupation takes place within an air-filled case, sometimes above, sometimes beneath water level, and in June and July the adults emerge and fly around in the vicinity of water. They are white with dark marbling upon the wings. After mating, eggs are laid upon the underside of lily leaves, from which hatch a new generation of caterpillars, which spend the winter months hibernating in the mud at the bottom of the pond.

C. E. C. Cole

Aquarist's Calendar

11th-16th August: **Exeter A. and P.S.** Exhibition at Royal Memorial Museum, Queen Street, Exeter.

14th-16th August: **Walthamstow A.S.** annual show, Hawthorne Road Halls, Hawthorne Road, Walthamstow, London, E.17.

21st-23rd August: **Rugby and District Aquarists' Society** annual show at Percival Guildhouse, Rugby.

23rd August: **Romford Aquarists' Society** seventh annual open show, Wykeham Hall, Market Place, Romford.

27th-30th August: **Midland A. and P.S.** annual open show at Bingley Hall, Birmingham.

4th-6th September: **Three Counties Show** at the Drill Hall, Penrith Road, Basingstoke.

5th-6th September: **Bethnal Green A.S.** annual show at the Main Hall, 229, Bethnal Green Road, London, E.2.

6th-7th September: **Accrington and District A.S.** annual show at Town Hall, Accrington.

6th-7th September: **Oldham and District Aquarium Society's** seventh annual show at the Osram Social and Athletic Club, Shaw.

6th-14th September: **Southend A.S.** annual open show at the new Exhibition Hall, Southend Pier.

11th-13th September: **Bath Aquarist Society** annual show.

13th September: **Blackpool and Fylde Aquatic Society** annual open show at the Waterloo Road Methodist Mission, South Shore, Blackpool.

13th-14th September: **Willesden A.S.** annual show at Roundwood Park, London, N.W.6.

16th-20th September: **Leeds and District A.S.** annual open show at Trinity Church Hall, Trinity Street, Boar Lane, Leeds.

20th September: **East London A. and P.A.** annual show at London Co-operative Society Hall, 201, Ilford Lane, Ilford, Essex.

27th-28th September: **Federation of Guppy Breeders' Societies** annual show at Queen Mary's School, Basingstoke.

31st October and 1st November: **Bristol Aquarist Society** annual open show at Bishopston Parish Hall, Bristol.

8th-9th November: **British Aquarists' Festival** at Belle Vue, Manchester.

12th-15th November: **Scottish Aquarium Society** annual open show at the McLellan Galleries, Glasgow.

Tests for Appetite

If you think that the fishes in your pond are not finding enough food you can always try out their appetites by throwing a piece of stale brown bread on the water. If the fishes are hungry they will soon be up at the surface after it. If a broken garden worm is thrown in it may be possible to watch to see how soon the fishes go after it. If they are ready for food it is probable that the food will be taken before it reaches the bottom. Most fishes are attracted to falling food and as they swim to it other fish see them moving more quickly than usual and follow them in the anticipation of food themselves.



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.

THE secretary of the West London Guppy Breeders Society is now Mr. N. W. Webb, 90, Wellesley Road, Chiswick, London, W.4. New members are welcomed, and meetings are held on the last Monday of the month, full particulars being obtainable from the secretary.

INCREASED membership is reported by the Middlesbrough and District Aquarist Society. Interest has been stimulated by various inter-club visits, the last one being from Whitby A.S. Two Shows recently held—one for Breeders Class and one for Champion Class, received encouraging entries. The secretary is Mr. J. K. Powell, 7, Coniston Avenue, Redcar and new members would be welcomed.

INCLUDED in the recent activities of Tottenham and District Aquatic Society was a Brains Trust, which was thoroughly enjoyed by the members.

MEMBERS of the Aylesbury Aqualife Association have recently had a lecture on "Fish Structure," by Dr. R. M. Easterbrook, and a talk-demonstration by Mr. E. Stanley on "Cacti—Potting and Grafting."

AT the annual general meeting of Ilford and District Aquarists' and Pondkeepers' Society, the following officers were elected: President, Mr. A. L. Jarvis; vice-presidents, Messrs. E. Atkins, R. Charter, F. W. Mullings, J. P. Nott; chairman, Mr. A. L. Stebbing; vice-chairman, Mr. Charter; hon. secretary, Mr. V. Price; hon. treasurer, Mr. D. Hunter; librarian, Mr. K. F. Ellis; press and social secretary, Mr. L. S. Smith.

A DAPHNIA net, etc., was found recently at "The Goat." The owner is requested to contact the secretary of the Study A. & P.K.C. CROYdon 8981.

A FINE exhibition of tropical and coldwater fish was staged by the Deal and District Aquatic Society recently, the occasion being the annual young stock show of the Deal and District Livestock Fanciers' Club. Judging was done by Mrs. W. M. Meadows. Mr. R. Bone won the furnished aquaria prize. Mrs. M. E. Baker was second—a really splendid effort by one of the Society's lady members; and Mr. R. Dykes was third.

The juvenile section was a credit to the young competitors and resulted in Master Townsend winning the furnished aquaria, and Master V. Edgington the best fish.

Other prizewinners were:
Best single fish: 1, F. C. Baker (beacon); 2, Mr. Hayward (Leeri gourami); 3, J. R. Bone (thick lip gourami). Best pair: 1, J. R. Bone (Barbus filamentosa); 2, J. R. Bone (Moenkhausia oligolepis); 3, Mr. Hayward (red swordtails). Plant Section: 1, J. R. Bone; 2, E. Hooper.

THE Oldham and District Aquarium Society are holding their 7th Annual Show in the Osram Social and Athletic Club at Shaw on Saturday the 6th and 7th September. Schedule and entry forms may be obtained from Mr. A. Sloan, 93, Kew Road, Failsworth, Manchester.

DISBANDED some time the aquarists' society in Keighley has been reformed, the new organisation being known as the Keighley and District Aquarists' Society. The officials

are: President, Mr. B. Warwick; vice-president, Mr. M. Jennison; secretary, Mr. C. Dobson; treasurer, Mr. T. Atkins.

THE judges for the Romford Aquarists' Society Open Show, to be held on the 23rd August, will be Tropical, Mr. Creed; Coldwater, Mr. O'Neill.

THE Dunstable and District Aquarists' Society held their sixth and largest show and exhibition recently, the entries being judged by Messrs. Robinson and Glyn.

The best fish in the show was a *Corydoras pinnatus* which was entered by Mr. L. Joyner of Luton. A full list of other winners is as follows:—

Junior Section.—Furnished aquaria: 1, R. Bates; 2, M. Everett; 3, Miss M. Hurst. Junior Livebearers: 1, Miss M. Hurst; 2, Miss D. Holcroft; 3, Miss M. Hurst. Junior Egg-layers: 1, R. Bates; 2, R. Bates; 3, M. Everett. Senior Section.—Senior cold water: furnished aquaria: 1, Mrs. E. Franklin; 2, Mrs. E. Franklin. Senior furnished tropical aquaria: 1, R. Hurst; 2, M. Dixon; 3, R. Hurst. Breeders' class: 1, D. Bloomfield; 2, M. Dixon; 3, M. Dixon. Goldwater Fish: 1, Mrs. E. Franklin; 2, D. Bloomfield; 3, M. Everett. Livebearers: 1, D. Bloomfield; 2, M. Dixon; 3, M. Dixon. Barbs: 1, M. Dixon; 2, R. Hurst; 3, D. Bloomfield. Labyrinth: 1, L. Joyner; 2, J. Atkinson; 3, L. Joyner. A.O.V. Egg-layers: 1, L. Joyner; 2, R. Hurst; 3, R. Geary. Plants: 1, M. Dixon; 2, D. Bloomfield; 3, M. Dixon. The society meets on the first

and third Tuesday of each month at Chew's Hall, High Street South, Dunstable, at 7.30 p.m., where all interested in the hobby are welcome.

THE next A.S.L.A.S. Table Show will take place on Saturday, 13th September, at the Adult School Hall, Benhill Ave., Sutton, Surrey. Classes are Catfish, Barbs, Breeders and Plants. There will be entertainment while the fish are judged, possibly a film together with other items.

The results of the previous table show were as follows:—Class 8: 1 (69 points), W. A. Hawkins (Clapham), combtail; 2 (68 points), H. G. Rundle (Kingston), Leeri; 3 (67 points), S. N. Cornock (Carford), combtail. Class 9: 1 (70 points), E. Angus (Carford), bleeding heart zebra; 2 (67 points), H. G. Rundle (Kingston), scissortail; 3 (66 points), C. R. Parslow (Surrey Aq.). Class 10: 1 (68 points), H. G. Rundle (Kingston), black shark; 2 (67 points), Mrs. Barber (Kingston), brown acaia; 3 (66 points), C. R. Parslow (Surrey Aq.), zebra. Society positions: Kingston, 9 points; Carford, 4 points; Clapham, 3 points; Surrey Aq., 2 points.

NEW SOUTH LONDON COLDWATER CLUB

MANY interested aquarists attended the inaugural meeting sponsored by both A.S.L.A.S. and G.S.G.B. The officers elected were:—Chairman, Mr. O'Neill; hon. secretary, Mr. W. F. Walters, 41, Manor Drive, Hinchley Wood, Surrey; treasurer, Mr. J. Barnshaw Armstrong. Speakers were Capt. L. C. Betts and Mr. R. J. Affleck. At the next meeting the members were addressed by Mr. R. E. Ison, B.Sc., on pigments and reflecting tissue in the three groups. Coloured diagrams were used to show the distribution of chromatophores and reflecting tissue and the way in which a few pigments produce a number of different colours. A second lecture on Japanese goldfish and their influence on British standards was given by Mr. R. J. Affleck and illustrated with colour slides.

The name of the new club is the Goldfish Society of Great Britain (South London Section). It will affiliate with A.S.L.A.S. and the annual subscription is £1 with 10s. entrance fee to cover cost of badge, standards, booklet, and other publications.

THIS year the Willesden Aquarists Annual Show will take place on the 13th-14th September at Roundwood Park, Willesden, N.W.6. Schedules may be obtained from the Entertainment Manager, Town Hall, Dyne Road, N.W.6.

THE next meeting of the Goldfish Society of Great Britain will be on Saturday the 13th September at the Feathers Hotel, St. James, at 2.45 p.m. The talks will be by A. Leuschner, B.Sc., on "Fish Behaviour" and "Sorting Fish," by R. J. Affleck. The Table Show is Breeders Class (1957), two fish per entry.

INTER-CLUB shows and competitions were discussed during the ordinary business meeting of the Blackpool and Fylde Aquatic Society.

Letters had been received from Blackburn and Accrington societies giving details of forthcoming shows and intended visits to Blackpool. Table show results: 1, Mr. B. Done; 2, Mr. G. Gower; 3, Mr. L. A. Childs.

Principal speaker of the evening was Mr. R. E. Legge, curator of the Tower Zoo and Aquarium, who entertained members with an illustrated talk about his experiences in the waters around the Isle of Man whilst collecting specimens for the aquarium.

Mr. Legge depicted the many hazards, comic and otherwise, which were the accepted lot of collectors in general (and Mr. Legge in particular).

THE Skipton and District Aquarist Society held their annual trip recently when 37 members and friends visited New Brighton via Liverpool and the Mersey Tunnel. An enjoyable day was spent. At the monthly meeting



The Aquarist's Badge

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

To obtain your badge send a postal order for 2s. together with the Aquarist's Badge Token cut from page viii, to Aquarist's Badge, *The Aquarist*, The Burns, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

and table show, the show was for Carp and Minnows, judged by Mr. F. Cherry. Winners: 1, Mr. Duckett (Labe); 2, Mrs. Mooney (Rasbora argentea); 3, Mr. Jenkinson (betritatum); 4, Mr. Duckett (barbs semi-fasciatus).

AT the June meeting of the **Carassius Club** the article in the June issue of the *Aquarist*—Aeration in Aquaria—was commented upon and the outstanding points, general conclusions and additional data will be typed and sent to all members for reference.

Good reports are being received by members on the seasons' breeding activities, mainly in twin-tails, globe-eyes and orfe.

SUNSHINE and fine weather favoured members and friends of **Derwent Aquarist Club** when they visited Chester. The main object of the trip was the Aquarium in the Zoological Gardens. The June meeting of the Club was addressed by Mr. G. Hobson, a member who specialises in coldwater fish native to the country, green and golden tench in particular.

A SUCCESSFUL year is being enjoyed by **Kingston and District Aquarist Society**. In the second part of the Aala Table Show, Mr. Rundle obtained two prizes (1st, A.O.V. Trop. and 2nd, Characins and Rasboas), and Mrs. Barber obtained 2nd in the A.O.V. Trop. class. As a result Kingston is now second with one more section of the show to be held in September. Recently Streamham were beaten in the first leg of an Inter-Club Table Show.

AT the **Bristol Aquarists' Society** meeting, Mr. S. J. Davis gave a talk on Furnished Aquaria, with points for exhibition tanks. There was also a Tropical Table Show, which was judged by Mr. H. C. B. Thomas. The results were as follows:—Cichlids: 1, G. Stone; 2, R. King; 3, G. Stone. Characins: 1, 2, 3 and 4, G. Stone. Labyrinth: 1, G. Stone; 2, R. King. Guppies: 1, R. Bryant; 2, R. Bryant; 3, R. James; 4, R. James. A.O.V. Igglayers: 1, R. Bryant; 2, R. King; 3, G. Stone; 4, M. Bellis. A.O.V. Livebearers: 1, R. James; 2, R. James; 3, G. Stone; 4, R. James. These compete for the S. J. Davis Trophy for highest points at table shows which include coldwater fish.

AT the **Walsall Aquarium and Pool Society's** show the trophies were presented by the mayor, Councillor Frank Harrison, to Mr. T. W. Lowe, of Wednesbury, whose Siamese fighting fish was the best in the show, and to Mr. N. C. Pinches, who had the highest points aggregate.

Other winners were: Mr. W. Pickering, of Blaxwick (Danio fish); Mrs. E. Lamburn, of Wednesbury (Characin); Mr. N. C. Pinches (Cichlid and Labyrinth); Mr. B. W. L. Coombs, of Wednesbury (Barb); A. J. Cooper, of Pelsall (Tropical egg layer); K. S. Holloway, of Walsall (novice Characin and Tropical egg layer).

FEDERATION OF SCOTTISH AQUARIST SOCIETIES

The first Newsletter has now been issued and indications are that the Federation has got off the mark well. The next meeting is at the club rooms of the Edinburgh Aquarist Society at the Working Men's Club, Infirmary Street, Edinburgh, 1, and in addition to Federation matters there is a Table Show for Guppies, Platy, Barbs and Fighters. The hon. secretary of the Federation is Mr. A. Cross, 49, Ferry Road, Monkfish, Angus.

THE **Carford A.S.** held their first inter-club show recently, and the Societies taking part were:—Bethnal Green, Kingston, Surrey, Study and Catford. The contest was won by Catford with 36 points, Surrey 25 points, Kingston 23 points, Bethnal Green 13 points, and Study 3 points.

Mr. and Mrs. Meadows, who judged the entries, had a difficult task owing to the high quality of the fish entered. The best fish in the show award went to Mr. V. Stevens (Kingston) for a beautiful black moor. The results were as follows:—Livebearers: 1, W. Ryan (Catford)

2, 3 and 4, R. Mealand (Surrey). Barbs: 1 and 2, W. Ryan (Catford); 3, A. Scott (Bethnal Green); 4, D. Irons (Kingston). Characins: 1, H. Wood (Kingston); 2, W. Ryan (Catford); 3, H. Wightman (Catford); 4, S. Iles (Catford). Catfish: 1, Mr. Henry (Kingston); 2, N. Hill (Study); 3, Mrs. P. Penton (Bethnal Green); 4, Mrs. P. Scott (Bethnal Green). Cichlids: 1, E. Aldridge (Catford); 2, S. Cornock (Catford); 3, H. Penton (Bethnal Green); 4, R. Luff (Surrey). A.V. Labyrinth: 1, R. Luff (Surrey); 2 and 3, J. Cobden (Catford); 4, S. Cornock (Catford). Danios, Rasboas and W.C.M.M.: 1, F. Walters (Surrey); 2, A. Scott (Bethnal Green); 3, Mrs. P. Penton (Bethnal Green); 4, A. Scott (Bethnal Green). A.O.V. Tropical: 1, H. Barlow (Catford); 2, V. Stevens (Kingston); 3, J. Cobden (Catford); 4, Towell (Kingston). Fancy Goldfish: 1, V. Stevens (Kingston); 2, K. Fawcett (Kingston); 3, Barber (Kingston); 4, K. Fawcett (Kingston). A.O.V. Coldwater: 1 and 2, W. Walters (Surrey); 3, G. Parslow (Surrey); 4, W. Walters (Surrey).

It is hoped that next year Carford A.S. will be able to put on its first Open Show and are looking forward to support from as many Clubs as possible.

BRITISH AQUARISTS' FESTIVAL

The 1958 B.A.F. will be held at Belle Vue, Manchester, on the 8th and 9th November. The Competition is to be an Open Inter-Society Show incorporating Individual competition by members of entrant Societies. About 20 classes will cover all types of Fish, Furnished Aquaria and Aquascapes and in addition to the trophies there are Cash Prizes.

MEMBERS of the **Yeovil and District A.S.** visited Mr. B. Rundle's aquarium and gardens (Bagshot) recently and were most impressed by the fine fish on view, and the layout of the pond, which met with everyone's approval as a cold-water fish-keeper's dream. From Bagshot the club went to the Highland Water Gardens, Rickmansworth, where members spent an enjoyable afternoon.

On 12th July the Society held its Annual Table Show, which was the fourth annual show.

HAVE YOU READ

FISH FOODS AND FEEDING

by Feroze N. Ghadially

Written by the well-known "Aquarist" contributor and profusely illustrated, the purpose of this book is to present in as simple a way as possible some facts about feeding fishes.

Summary of Contents

General Principles
Feeding Problems Encountered by the Fish Breeder
Foods of Animal Origin
Vegetable Foods
Dried, Bottled and Frozen Foods
Miscellaneous

Obtainable from:

THE AQUARIST

THE BUTTS,
HALF ACRE, BRENTFORD, MIDD.

Price 4s. 11d. post free

and this proved to be the most successful, the entries being the highest ever—just under 100.

The winner of the Thomas Stoll Cup for the highest number of points in the whole show was won by Mr. R. Stone and the Stainer Shield, for the best fish in the Tropical Section, was won by Mr. N. Stainer with green lace Guppies.

The winner of the Roger Shield for the best cold-water fish went to Mr. G. Aston with a common Goldfish. Other awards were: The Assurance Cup for best Goldfish, Mr. G. Aston; The Edith Aston Cup for best Catfish, Mr. M. Enticott; The Margaret Duff Cup for best Igglayers (Breeders), Mr. N. Stainer (Cherry Barbs.); The Margaret Duff Cup for best Livebearers (Breeders) Mr. N. Stainer (Green Lace Guppies); The Bryant Cup for best Livebearer, Mr. N. Stainer (Green Lace Guppies); The Pinder Cup for best Barb, Mr. S. Stidson (Chequers); The Hook Cup for best Characins, Mr. R. Stone (Glowlights).

The judge was Mr. V. E. Jones, of the Bristol Zoological Society, assisted by the Bristol Tropical Study Group. Forthcoming attractions: The public exhibition at the Yeovil Agricultural Show on Thursday, 11th September by the Yeovil Aquarist Society. Both Tropical and Cold-water sections over 50 different kinds of fish on show.

CHANGE OF ADDRESS

Brockley and District Breeders Society: H. J. Vosper, 7, Foxberry Road, Brockley, London, S.E.24.

NOW IN STOCK

Award Labels for Tanks at Shows

five on a page (1st, 2nd, 3rd, 4th and Special), 50 pp. to a book, 2s. 9d. per book (post free)

Tank Class and Number Labels

100 for 1s. 9d. (post free)

Obtainable from

The Aquarist,
The Butts, Half Acre,
Brentford, Middlesex.

Crossword Solution

W	A	T	E	R	L	E	T	T	C	E
A	C	A	R	A	R	O	R	A	L	
T	A	P	E	G	R	A	S	S	T	O
E	R				O	O	S	S	D	
R	A	N	U	N	C	U	L	U	S	E
S		E	R	E	V	P	I	T	A	
O	R	O	N	T	I	U	M	R	A	
L	E	N			L	A	V	A	S	
D	A	A	Q	U	A	T	I	C	M	
I	R	I	S		R	I	A			
E	N	F	L	U	I	T	A	N	S	
R	I	C	C	I	A	X	L	H		

PICK YOUR ANSWER (Solutions)

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

ASK YOUR
DEALER FOR



Brosiam

THE WORLD'S MOST IMITATED FISH FOOD

Especially for the Tropical Fish Enthusiast!
JUST OVER SIX MONTHS AGO WE INTRODUCED

"THE ENCYCLOPEDIA OF TROPICAL FISHES"

By H. R. AXELROD & W. VORDERWINKLER Price 60/- (62/- post free)

Thousands of copies of this book are now in use all over the world, more are being purchased (and treasured) every day

NOW for the Coldwater Enthusiast we offer a
fitting companion book

"GOLDFISH IN YOUR HOME"

price 22/6 (23/6 post free)

This book has 144 pages packed with information on the care, maintenance and breeding of all the popular goldfish types available today, including the more recent introductions. Numerous black and white, and full colour plates. Ask to see a copy at your local stockists now. Remember Goldfish and Fancy Goldfish are on the way back!
For the true enthusiast this completely new book is a must!

T. F. H. Publications (London) Ltd., 34, Nutley Lane, Reigate, Surrey