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AND PONDKEEPER

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Contents

	Page
Editorial	257
Behaviour and Reproduction of various Newt Species	258
Friends and Foes	260
Dwarf Cichlid	261
The Garden Pond in March	262
Aquarist's Notebook	263
From the Black Sand	265
Spring in the Water Garden	266
Microscopy for the Aquarist	268
More Notes from an Amateur	270
Fighting Fish, Temperature and Drugs	271
Holiday Rations for the Aquarium	273
A Novice's Lesson Learned	273
News from Aquarists' Societies	275

VOL. XXII No. 12 1958

Editorial

WHAT is the main purpose of a public aquarium? Is it to meet educationally the demand of public curiosity about aquatic life, or to form an unusual sideshow by which extra visitors can be attracted to the place where it exists, or to act as a centre of scientific research into biological matters? All of these reasons for establishing public aquariums have been advanced in news reports received by us, from widely separated parts of the world, in recent months.

In Barbados, for example, discussions have been held to determine how funds can be raised to build a marine aquarium "first and foremost as a means of attracting dollar-spending tourists from North America" (*Barbados Advocate*). In South Africa the threat of a new aquarium to be opened at Durban this year has caused plans to be considered for improvements to the East London Aquarium so that it may continue, as a City-Council official has said, "to claim prominence in this field of public interest" (*East London Dispatch*). Over 8,000 people visited this Aquarium in the last two weeks of December, 1957, so that the interest is no fancied thing.

An Aquarium that first was formed as part of a Marine Biological Station near Portobello, New Zealand, has also captured increasing attention from the public since access to it was made easier by a road built a year ago. Here the Aquarium is part of a centre for scientific research, and it is in the same type of partnership that an aquarium is soon to be built in Ireland. This new Marine Biological Station (Ireland's first) will be at Dun Laoghaire, and its aquarium is also planned to attract tourists.

Perhaps no other venture can at one and the same time be of educational value to the community, increase the fund of scientific knowledge and also set out unashamedly to attract the shillings of holiday-makers to itself and its town. In addition, such a centre can, from study of problems of fisheries, materially help the economy of a country. When will the coasts of Britain show some modern examples of useful aquariums?

Behaviour and Reproduction of Various Newt Species

by DUNCAN SCULTHORPE

IN spite of their evil reputation in days of old, newts make charming pets and excellent subjects for scientific experiments. They can be kept quite easily in the ordinary aquarium. My observations, made 12 months ago, were carried out on three species of newts kept in an aquarium 15 in. by 10 in. by 10 in., there being six newts altogether in this small tank. The tank, in a greenhouse, received sunlight for nearly 12 hours, and the plants grew rapidly throughout the spring and summer.

The bottom of the tank was covered with sterilised peat to a depth of ¼ in., above which gravel was spread to a total depth of 2 in. at the back of the tank and 1 in. at the front. River-washed stones were used, and a plant pot acted as a cave. The newts, throughout the period of observation (2 months), never showed any tendency to climb up the sides and escape. Sturdy plants are needed for newts because of the animals' clambering habits and egg-laying tactics. The following species were used: *Vallisneria, Elodea densa, Ranunculus, Lysimachia, Hottonia, Ceratophyllum* and *Myriophyllum*. All but *Vallisneria* were planted as cuttings, in bunches.

Table 1. **Sizes of the newts**

Species	Sex	Total length (in.)	Tail length (in.)
Alpine newt (*Triturus alpinus*) ..	Male	3¼	1⅜
	Female	3½	1½
Smooth newt (*Triturus vulgaris*)	Male	3½	1½
	Female	3¾	1⅝
Palmate newt (*Triturus helveticus*)	Male	2½	1⅛
	Female	2¾	1¼

In colouring, the females of smooth and palmate newts are hardly separable, being a brownish-green dorsally, although the former's belly is usually more orange-red. Of the males of the two species, the smooth newt is unmistakable, with its high, undulating crest passing from between the eyes back to the tip of the tail. The male palmate newt has a fine, black filament extending from the end of its tail. The Alpine newts are very bright creatures: the male is brilliant blue dorsally, with a low black-and-white crest, and its belly is orange. Its tail has black, blue and yellow tints. The female is a delightful olive colour with black-and-mauve specklings; its belly is orange. Sizes of the specimens used are given in Table 1.

First Reproductive Activity

On the morning of 11th April, 2 days after the newts had been introduced, I was extremely surprised to find ten newt eggs laid in their ovoid mucous envelopes in the folds of *Elodea densa* leaves. Just one egg had been laid quite bare on the ribbon leaf of *Vallisneria*. In the early evening the male Alpine newt became alert and springy in its movements, following the female of the species and barring her progress by jumping in front and displaying itself. The display ended with the male arching its back and curling its tail towards the female. This process was always interrupted by the very inquisitive female smooth newt!

Two days later, the male palmate newt was seen in the afternoon vigorously displaying itself before the female palmate in a similar way, but its tail was set vibrating at great speed in a position parallel to its body. The following day, the male smooth newt became very active, at first displaying before the female palmate and then in front of the female smooth newt. This mistake occurred many times, and was probably due to the similarity in the colour of the females. Some experiment still needs to be done to see whether the male eventually perceives his mistake merely by sight, or by odour from the skin glands, of the respective females. I think we can dispense with the idea that something in the female's attitude tells the male that he is not wanted. Observation shows that there is very little, if any, difference between the attitudes of the females to the males' courting displays. If it is the wrong male, and frequently even if it is the right one, the female starts to walk away and seems to pay no further attention to the male.

Photo: Laurence E. Perkins

Female smooth newt (Triturus vulgaris)

While reading the various books on these animals, I came to the conclusion that the courtship of newts had caused more imaginative thinking than correct observation. To take just one example, some writers talk about the "dull hypnotic stare" of the female as she is confronted by the display of the male. Since the animals have scarcely movable eyes, they seem to be staring the whole time. They stare just the same at an inanimate object put about an inch in front of their heads. The writer's phrase, in this case, does lead the reader to believe that the female's reception of the male's display involves something different from the

Photo: Laurence E. Perkins

Palmate newts (Triturus helveticus). The tail of the male on the left shows the elongated filament characteristic of the species

animal's normal behaviour and facial appearance. It is always easy to see what your imagination would like you to see !

Egg-laying Observed

On 15th April the female Alpine newt was seen laying eggs for the first time. Standing on her hind legs, she smelled the finely dissected leaves of *Hottonia* (I can only assume that it was smelling and not just ascertaining the size of the leaves). Having found a suitable place, she climbed the plant and manoeuvred herself so that her cloaca was in contact with the leaves, after which she used her hind legs to fold or grasp the leaves into a "cup" round the cloaca. Keeping her tail out of the way, she then seemed to arch herself slightly while pointing her head upwards, remaining in this position for the process of depositing the egg. Each egg is laid separately, the process taking about 1½ to 2½ minutes from the time when the leaves are cupped under the cloaca.

Table 2. **Plants selected for egg-laying**
Percentages of eggs carried

Newt	*Hottonia*	*Elodea*	*Lysimachia*	*Ranunculus*	*Cerato-phyllum*
Alpine	43	1.5	34	0.5	21
Smooth	5	40	38	9	8
Palmate	—	55	20	25	—

In the early evening, the male Alpine newt searched for and assiduously followed the female Alpine, pressing his snout to her lips, flanks and cloaca. Then he would scramble ahead and display his colours with spasms of tail undulating. At the end of one such spasm, the male dropped from his cloaca an elongated, spiral, white object—the spermatophore—after which he moved slowly away, with his tail waving slightly. Although the female had witnessed this, she moved over the spermatophore and away, and did not take it up into her cloaca.

The spermatophore gradually changed shape, becoming spherical, and was removed to a microscope slide, where it was teased with needles in a drop of water. The mass of thousands of spermatozoa was seen under the low-power objective, and under the high power each spermatozoon could be examined. After a total of 25 minutes the tails of the spermatozoa had ceased to move, and their short, active life was over. Later that evening the male Alpine newt resumed his ardent displays before the female.

Activities and Egg-laying Habits

The details of the courtship displays are the same for all three species I observed. There was slight variation in the process of tail vibrating, both between the species and at

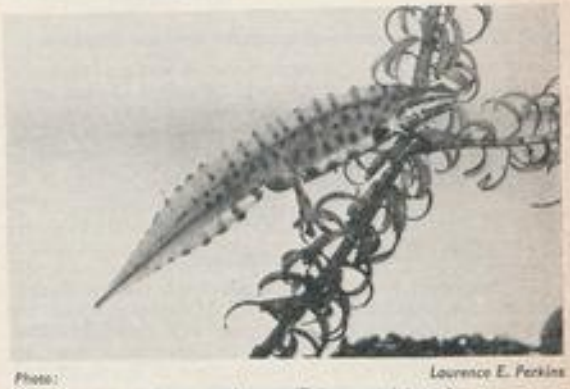


Photo: Laurence E. Perkins

Male crested newt (Triturus cristatus)

different times in the same animal. This tail movement may not be a necessary part of a display, although it usually accompanies it; it may indicate only the way that the male newt works off his sexual energy. I hasten to say, however, that in the great crested newt (*T. cristatus*) the tail vibrations attain great ferocity, and the male stands in such a position that at intervals its tail hits the female's flanks. Here the phenomenon may have another significance. Many times the displays were witnessed and the spermatophores were dropped, but only once did I see the latter picked up into the female's cloaca. I concluded therefore that only one, or two, spermatophores are needed to fertilise all the eggs of one female for one season. The other displays merely dissipated the males' excess of energy.

Table 3. **Period of egg-laying**

Newt	Total eggs	Started	Finished	Interval (days)
Alpine ..	138	11th April	15th May	34
Smooth ..	122	19th April	28th May	39
Palmate ..	53	24th April	12th May	18

The eggs of the three species discussed here may be distinguished quite readily. The mucous envelope of the alpine newt's egg is clearly oval but the contained egg is spherical and has a darkish brown "animal pole"; its envelope is 6-7 mm. in length. The smooth newt's egg shows an animal pole that is buff coloured and its envelope is 5.5 mm. (average figure) in length. In the palmate newt's egg there is no differentiation of colour at the animal pole; the average length of the egg envelope is 3.5 mm.

Table 4. **Period of courtship by males**

Newt	First display	Last display
Alpine	11th April	5th May
Smooth	14th April	25th April
Palmate	13th April	14th May

From the egg-laying of all three females, certain common features were observed. The process took approximately the same time for each egg although the total number laid varied considerably each day. Judging by the respective numbers of eggs laid on them, broad-leaved plants were preferred to fine-leaved ones. Where the latter were used, preference was shown for the apices of the stems, where the leaves were most dense. Only one egg was laid on a bare ribbon leaf. These conclusions were reached from a total of 313 eggs. The last common feature is that as soon as an egg was laid and the female was satisfied, her first movement was to swim very rapidly to the surface—for a bubble of air !

In Tables 2-5 the findings are summarised.

Table 5. **Influence of temperature on displays**

Newt	Temperature of water at times of displays (12 displays of each newt were tested)	
	Maximum	Minimum
Alpine	54° F.	47° F.
Smooth	58° F.	55° F.
Palmate	60° F.	53° F.

Feeding behaviour

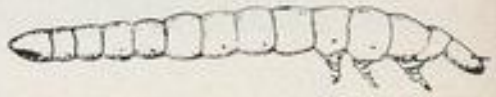
All the newts were fed on a mixed diet of live foods: earthworms, *Tubifex* worms and frog tadpoles. Feeding was usually twice a day—morning and evening. The animals' behaviour towards food was interesting. Moving food is snapped at when it passes close to the head, but stationary objects are rarely touched. When worms are suspended by a string in the water, they usually remain unnoticed until a newt passes, by chance, within about 3 inches. At this range the newts either saw the worms, or their struggles set up water currents which "gave their presence away." The wild tugging and biting which ensues, once the worm has been snapped, indicates what poor teeth the newts possess.

After about a month the female newts no longer tugged aimlessly at the worms; they each bent their body round the string and, holding on to it with the limbs of one side, they tugged with the mouth, thus tearing the worm, instead of biting it. Moving tadpoles were quickly snapped up, but stationary ones often remained unharmed.

For such observations as these I have described, the newts should be obtained in late March. By the end of June breeding will be finished and the only maintenance the aquarium needs during the 3 months is a periodical siphoning-off of the accumulated mulm. The water certainly need not be changed; it needs only topping-up.

FRIENDS & FOES No. 65

Water Beetles *(continued)*



Magnified view of the larva of Dryops

Parnidae

LAST month we discussed the Helmidae family of beetles. This month we look at the Parnidae family, which consists of seven known species of the genus *Dryops* (*Parnus*), and one somewhat rare member of the genus *Helicus*. Slightly larger than the Helmidae, the adults still do not exceed one-sixth of an inch in length, and have distinctive hairy bodies and short, peculiar antennae. Vegetarians, the adults emerge from the water by night, and fly around to feed and breed.

Eggs are laid above water level on nearby plants. If these overhang the water, the larvae drop straight in as they hatch, but otherwise wriggle their way into the water from the bank.

The larvae have no retractile tufts of gill filaments like the Helmidae, but instead possess a valve-like opening in the last abdominal segment. They are even more worm-like than the Helmidae, and very slow to move, remaining for long periods in more or less the same position.

The Parnidae are stream dwellers and like the same localities as the Helmidae. There is little doubt that many fall victims to fishes, particularly when there is a dearth of other live foods. Any aquarist who catches them can try feeding them to his larger fishes. Unless aquaria are close-covered—particularly those that are not vigorously aerated—it would be unsafe to assume that the beetles have been eaten merely because they no longer appear in the tank. Remember their habit of nocturnal flight.

C. E. C. Cole

Dwarf Cichlid

(Nannacara anomala)

Male Nannacara anomala

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

FAMILY: Cichlidae, from Greek *kichle*—a kind of sea fish.

SPECIES: *Nannacara*, from Greek *nanos*—dwarf, and Greek *akares*—short, and Greek *anomalos*—irregular (? shape).

BEAUTIFUL ! Drab ! Interesting ! Not worth keeping ! Well worth attention ! And so on and so forth ! No wonder the tyro cannot make up his mind whether or not to purchase one or two *Nannacara* when he hears so many differing opinions concerning them.

My advice is to go ahead and make the purchase and decide through experience whether they are worth having. I have never kept fish which can change so much in intensity of colour in a few hours. A few degrees rise in heat can bring them out in a very pronounced pattern of squares and rectangles of chocolate filled in with pale brown. Sometimes only one of a pair will change, and then when we have given up hope of the other it, too, will develop the pattern even while we are looking at it. In a few minutes both will fade out and become comparatively drab. Perhaps a quarter of an hour or less afterwards both are once more displaying the chequered chocolate pattern.

The same behaviour occurs in a community tank, in which they will live peaceably with the other occupants, going about their own business and minding no other fish's. Their growth usually ceases at about 2½ inches, so that they do not look out of place among many of our smaller fishes.

Hardy Specimens

A normal temperature of about 75° F. suits them very well, but they are sufficiently hardy to survive should heater failure or some other cause allow the temperature to fall to the lower fifties. The pair I had a couple of years ago also were subjected, through a thermostat jamming, to an overnight rise to over 100° F.

When I went in to give them the usual morning feed steam was curling up from the surface of the water and most of the other fishes were belly upwards, but the *Nannacara* were on their sides, gasping for breath.

Desperate situations call for desperate remedies! A jug of cold water straight from the tap went into the aquarium —the temperature came down with a run, and within minutes the *Nannacara* were bustling about apparently none the worse for their gruelling experience.

A small aquarium, about 12 in. by 9 in. by 9 in., is adequate for a single pair of fish if it is hoped to breed from them. Among the decorations in the tank should be a small flowerpot on its side, and a flat rock or two (one or two smooth stones from the garden are admirable) and sand sufficient in depth to allow shallow depressions to be fanned or scooped in it. Plenty of live food should be provided and the temperature raised a degree or two above 75° F.

Eggs will be laid in the usual cichlid manner, but the female will take over afterwards. The male can be removed or left, according to individual taste. I have seen it claimed that his presence in the aquarium after egg-laying is complete makes the female "edgy," and likely to neglect the eggs while trying to see what her spouse is up to.

Even if this is so, catching the male for removal is no easy matter, for he can move like lightning if frightened, and dive into the most awkward places to get at.

Female's Care of Eggs

The female fans the eggs continuously, and it is during this period that she is often most noticeably patterned. Hatching of the eggs takes place in from 2 to 3 days, depending upon the water temperature. In this connection it can be taken for granted that the higher the temperature the sooner the eggs will hatch (which applies to all fish eggs, not only those of *Nannacara*). Some aquarists believe that the shorter the incubation period the better—others disagree—but no one is sufficiently intrepid to give precise ideal times for any incubations.

Once the eggs hatch the female redoubles her vigilance and care. She changes the position of her nursery several times a day, and endeavours to keep her youngsters together even after they are free swimming. This taxes her to the utmost, but it is a beautiful sight to see her cruising round the aquarium surrounded by a flock of tiny offspring. Within 10 days to a fortnight she will be ready once more for breeding.

The young should be fed for a day or two on Infusoria, which should be followed up by the smallest of live foods—*Cyclops* nauplii, sifted *Daphnia*, micro worms and the like. Sorting of the young can start as soon as they are large enough to examine for defects. Only the best should be kept, to produce good future breeding stock for your own or others' aquaria.

End of Volume XXII

READERS who wish to have their copies of *The Aquarist* bound to enable them to be used for future reference are reminded that this service is available at The Sir Robert Jones Memorial Workshops. Twelve issues will be bound in cloth (any colour) with gilt lettering on the spine for 13s. 6d. (postage extra), or 24 issues can similarly be bound as one volume for 21s. plus postage. The Workshops employ crippled and disabled men who would not otherwise find regular employment, and the standard of work is first class. All forms of printing can be undertaken for aquarists' societies, and enquiries should be addressed to The Manager, The Sir Robert Jones Memorial Workshops, 70-74, Upper Parliament Street, Liverpool, 8.

The Garden Pond in March

by ASTILBES

DURING this month the garden pond will give added interest as various amphibians come to it for breeding. Most ponds will receive their visitors, and even in London districts it is possible for frogs, toads and newts to come regularly to the pond each year. It is always interesting to watch for the first arrivals and to note the methods of breeding. Many pondkeepers are afraid to leave these amphibians in their ponds in case any of the fishes may be injured. On very rare occasions a male frog will clasp a fish, but it is only the rather slow-moving fancy goldfish with short bodies that are likely to be attacked.

It is often very surprising how the creatures get to a garden. I have known them visit a certain pond each year and yet the garden is one of many all enclosed by high brick walls, as may be found in so many London districts. It is, of course, probable that some of them have been introduced by a pondkeeper as spawn or tadpoles and have developed to mature specimens without being able to leave the particular area. Once frogs, toads or newts are reared in a pond it is very likely that they will come back there to breed when old enough.

The frogs and newts usually arrive before the toads, but early March is the time when the ponds are occupied by these interesting animals. It is rarely possible to keep them in the pond once the breeding is over, as they mostly spend their time in damp places in the gardens or under stones during the day-time. Most are nocturnal in their feeding habits although they will all take live foods if offered at any time of the day if they are hungry.

Apart from the very unlikely possibility of a frog clasping a fish, the presence of the visitors can be of rather mixed advantages. Apart from the interest in watching the development of the tadpoles there does not seem to be any advantage in encouraging toads to visit the pond. Their tadpoles are not eaten by the fishes and so there is no food value from them. Frogs are very different, as their tadpoles are relished by most fishes, and even when they are first swimming they make tasty morsels. If tadpoles are required for conditioning fancy goldfish for spawning, it is better to remove the spawn to a place safe from fishes so that the tadpoles can grow to a good size before being fed to the fishes.

Newts are rather more troublesome in the pond as they will eat under water and make short work of any garden worms which may have been put into the pond for the fishes. They are also capable of eating small fishes and so the specialist breeder will be rather loath to leave newts in the breeding pond.

Many garden ponds are so made that it is almost impossible for the amphibians to leave them when they have finished breeding. Any smooth-sided concrete pond proves a very difficult obstacle to frogs and toads, and even newts may have difficulty in getting out. Where flag or other stones overlap the edge of the pond it is practically impossible for the animals to leave the water. In such circumstances it is possible for them to die, as they may be unable to obtain sufficient food in the water. It is therefore advisable to provide some means of access to dry land for the amphibians. A small strip of netting laid so that a good portion is below the water level and reaching out of the pond will enable them to leave by it.

It is fairly easy to remove the amphibians from the pond with a net. All have to come to the surface to breathe at fairly frequent intervals, when they can be caught. Newts can be caught by dropping a worm tied to a piece of string into the pond. No hook is required and the newts can be pulled out still holding the worm quite firmly. If removing these creatures from the pond it is well to take them a good distance away or they will find their way back again.

Photo: W. J. Howes

Common frog with her freshly laid mass of spawn in shallow water

Fishes in the garden pond may be fed if they show an inclination to take food. Small pieces of garden worms are very tempting to most kinds of fishes and after the long winter's rest a little live food will help them on the road to health for the coming breeding season. It is surprising to find that some varieties of fancy goldfish will still take live foods even when the temperature of the water is down to 41°F. There is no need to feed heavily so early in the year as it is better to increase the amounts given gradually so that the fishes can more easily digest the food.

Trout Circus

THE owners of a sawmill in the little Alpine hamlet of Engelhartszell, Austria, claim to have succeeded in taming and training the trout of the fast waters that turn the turbines of the mill. Tourists have been entertained by the "trout circus," the turns in which include a jump by a dozen trout over a stick held above the water surface and congregation of the trout around a hand held in the water so that they can be stroked and fed with worms. It is reported that the fish will perform only for the two mill owners, which is said to be an observation, made by scientists, that has occasioned some surprise, since it seems to indicate that the fish can distinguish between human individuals.

AQUARIST'S Notebook——

by

RAYMOND YATES

WE can all make mistakes. What a sickening feeling it is when the realisation dawns. Some time ago I was due to judge a show, and, having judged a previous show for this particular society, I carelessly failed to note the change of venue. Accordingly, one fine morning I duly arrived in the town and made my way to the imagined location only to receive a tremendous shock when I turned a corner and found the whole building had been demolished. This was awkward indeed . . . I had left the club's invitation at home and had no idea where the show was being held. I was due in 5 minutes. Police couldn't help so I tried one or two of those nondescript non-aquarist pet shops which one can't miss nowadays. Nothing doing. "What are aquarists?" . . . "Never heard of them," and so on. Not a poster anywhere to help . . . how few clubs ever advertise in shop windows. Finally, in desperation I went to the local market and asked at a pseudo pet stall there, but once again drew a blank. Fortunately, a customer had an idea, and, clutching any straw, I tried this address. Lucky me . . . the right place and only half an hour late.

A Midland dealer relates how one evening he took some lengths of timber into the cellar and suddenly heard a low, rumbling sound. Thinking the timber had slipped, he investigated but discovered it was not the timber but water which was pouring through the ceiling into the cellar. Which tank had burst—the 36 in., the 48 in., the whole lot? . . . what sickening thoughts must have passed through his mind at that moment! However, in the event it proved to be the bottom of a 24 in. tank which had given way. Plants, gravel, fishes, rockery and water were all over the place. It turned out that 6 years earlier a replacement had to be made in a hurry on a Sunday and 24 oz. window glass was all that was available. It had lasted till then. This shows that everything comes to he that waits, an instance when it is better never than late, unlike my episode. Tanks with thin glass are a perpetual risk; the chance is always there, but familiarity breeds contempt and one fine day the tank gives up the unequal contest and a shocking mess results.

Aquaria upstairs are always something of a risk. I have had one or two friends who have had the bottoms of tanks fall out with dire consequences. However, bottoms will not fall out if the whole tank is supported on a flat firm base such as the top of a tallboy or similar furniture. It is wisest to put a deep rubber mat under the tank, which beds in to the rubber. Water will damage the tops of wooden furniture and it plays havoc with the veneers used to-day. Cracked sides and bottoms can be used in situations where no real damage can be done if the worst comes to the worst. I have seen many tanks with enormous cracks last for years and I have one in the garden now with a hopelessly cracked bottom which survives hail, rain, gale and frost. I don't know how it does it but it does.

Few aquarists have ever seen a 25 gallon tank exposed to the continued action of frost, mainly because the opportunity isn't offered but also because our mild winters are unsuitable. About 35 years ago I had a large outdoor tank built up on high brick supports and this survived much colder winters than we now endure. On cold nights a heavy cloth would be thrown all over the tank and surface ice broken up in the morning. However, several times severe frosts got to work and the ice would form up to 2 in. thick at the surface and then travel down the tank sides until a form of grotto was formed, with the ice roughly 2 in. thick all round and pierced with what appeared to be thousands of white air-needles. The fishes (orfe, goldfish, carp, rudd, etc.) meanwhile would calmly continue normal winter life and I used to pierce the surface ice regularly. The bottom of this tank was very thick slate. I well remember 40 years ago how we used to go skating locally every winter on ponds frozen well over 12 in. thick. Nowadays, with a tank outside you can laugh at the weather because you know that what goes for a frosty spell will do no more than coat the surface with a thin ice layer of no consequence.

* * *

Writing in *All Pets* (U.S.A.) Diane Schofield tells of a spawning of the hitherto problem fish, the black shark (*Labeo bicolor*). The breeder concerned is Mr. James Ellis of North Hollywood, California, who purchased seven small specimens 18 months ago. These were well fed on a wide variety of foods and grew to approximately 7 in. in length. One Sunday last August he noticed considerable activity in their 35 gallons tank.

Two of the fish assumed a side-by-side position, spawning in a similar way to head-and-tail lights. The adhesive eggs were about the same size as those of angel fish and fell to the bottom. The other five specimens were greatly excited and followed the spawning pair all over the tank, but ignored the eggs. The tank contained Amazon sword plants and *Cryptocoryne* at a temperature of 80° F. and a pH of 7.8, filtration and aeration being in use. The breeding pair were identical, although the female seemed a little full. Colours intensified with the spawning, the black being real jet-black and the tail a fiery red. The breeding lasted for 2 hours but at the end of 7 hours all the eggs had become covered with fungus. Although no young were obtained it is a move in the right direction and perhaps it will not be long before complete success with these unusual fish is reached.

* * *

Have you ever thought what a noiseless hobby fish keeping is? Apart from a noisy pump (and there are some noisy ones) no sound disturbs the peace and quiet of those homes where aquarists live. Perhaps occasionally the neighbours hear subdued whispering as the hobbyist shows off his pets to a friend, the swish of a net, the sound of a scraper or a siphon or the creak of a fish-house door, but that is all. No wonder fish people make such nice neighbours. Think of the other hobbyists: the motorist and motor cyclist, the dog fancier, the cat lover, the bird fiend, the pianist or trumpet player or woodworker, the T.V. or record fan. Aquarists never annoy the people in their street, who see little of them except an occasional glimpse as they enter their homes, furtively hiding something under their coats. Perhaps we are lucky here though, luckier than we realise.

A new law is in the offing in Los Angeles which will prohibit the granting of new permits to members of the public for keeping larger "dangerous" animals such as lions, pumas and gorillas in the residential city limits. Neighbouring suburbs have already passed ordinances forbidding the keeping of pet lions, tigers, wild cats, snakes and monkeys. It seems big city residents are no longer startled to see lions on a leash or panthers and 5 feet pythons speeding by in cars. It is a very common thing in Spain when taking over the lease of a house to find a clause forbidding the keeping of monkeys (and many other

animals). Of course, aquarists are not always quiet; when they are at their local aquarium club they really let themselves go, but fortunately then they annoy only other aquarists so no harm is done.

* * *

The Duke of Edinburgh is reported to have referred to himself as "a very considerable expert on fish in general" when he presented the Prunier Trophy to Skipper James Muir in London recently. The Duke said: "I have tried to catch fish in every way, from the bent pin and the worm up to using expensive tackle. I have been out in a drifter and I have watched a whale-catcher at work. I have seen fish caught, landed, filleted, kippered, frozen, smoked, salted, packed, potted and canned." He had also been to a research laboratory. It would be interesting to know how the Duke has fared catching cunning fish like black mollies or pal fish in well-planted aquaria, of which there are several at the Palace. It would also be nice to know if he has ever done any breeding of tropicals.

* * *

Heard at a fish show: "Harry, I don't like it. Looks very suspicious to me. My prize fish has disappeared from its show tank and the show secretary says it must have jumped out of its tank although they can't find it anywhere. Half an hour ago fish was off the menu at the show restaurant, now its on. Seems fishy to me."

* * *

How long fishes live in public aquaria or in private tanks has often been conjectured. Of course, with one's own fishes the result is always the same; the very rare fishes last a few hours or at most days, the common varieties live for ever and survive boiling, freezing, cracked tanks, jumping out and so on. It is a fact that the fishes we can keep are the ones we don't want, and even when we give them away they go on for ever like the famous brook. I remember a large *Barbus filamentosus* I had for some years and then gave away about 3 years ago. The other week I saw it again, still doing the "Johnny Walker" act. If you have a pair the attractive male will be the one to die on you, fate seems so unkind to hobbyists. Another annoying aspect is the "Peter Pan" fishes which not only live for ever, more or less, but never even grow up. Can anything be more exasperating than fishes which never put on weight? The Steinhart Aquarium in San Francisco recently gave some details of fish longevity there: Australian lungfish, 18½ years; archer, 7 years; angels, 5 years; mouth-breeders, 3 years; giant octopus, 15 months; African lungfish, 4 years; *Astronotus*, 7 years.

* * *

Fishes on stamps are becoming more and more popular. Latest are Empire stamps from Turks and Caicos Islands whose 1957 set of ten retail at 5s. mint. These long stamps include 1s. blue and green (mackerel), 4d. red and grey (snapper), 3d. blue and violet (albacore), 2d. brown and green (red grouper), 1½d. orange (bonfish), 2½d. red and green (spiny lobster), 5d. brown and blue (permit) and 6d. blue and red (conch). What a long way we have come since the days of the Newfoundland cod and the Japanese trout.

* * *

Transatlantic sources report that if all the codfish eggs laid in the Atlantic developed into codfish it would be packed solid with fish. However, it would still be quite a long walk to New York. We are told that about 10 pounds of food is required to build up 1 pound weight of the animal eating it. At the commercial price of white worm this could be quite an item! The North West Territories Aquarium Society (Canada) is up against the difficulty that outdoor pools tend to fill up with snow in summer. This causes untold hardship to the fishes and necessitates netting them out and clearing the pool every few days. Snow snakes are also a problem . . . how does one keep them out? With our weather what it is surely some reader can offer suggestions from personal experience in this island. Nearer home a Hampshire reader tells how all efforts to breed lyretails met with failure until at last he filled his tank with water from the ditch at the bottom of the garden. This was very dirty, full of pieces of wood and vegetable refuse and an old boot. A pint of sea water was added, plus gravel, peat and moss. From that moment breeding lyretails was simplicity itself. However, they can be spawned without going to this trouble.

* * *

Readers, and in particular those who have attended previous British Aquarists' Festivals, will have wondered what damage followed the recent disastrous fire at Belle Vue, Manchester. They will be pleased to learn that both the fine public Aquarium in the gardens and the well-known exhibition hall were far from the scene of the fire and quite undamaged. However, the 4½ acres of devastation, comprising the firework stand, ballrooms, bars and restaurants, is a terrible reminder of scenes we grew accustomed to in "the blitz." The lake which surrounded the firework island was drained, and this proved to have an enormous collection of rubbish on the bottom, not the least of which were large quantities of beer bottles. This lake provided wonderful *Daphnia*, so it looks as if water fleas can hold their own with the most unsteady club member!

The Aquarium has roughly 70 varieties of tropical fishes on show (practically none of which is very common), and it is interesting to note that 25 of these different varieties come from Africa. These include spotted perch (*Ctenopoma acutirostris*) which is like a 5 in. leaf fish and is most attractively coloured in chocolate and cream. Other fine specimens include *Nannochromis nudiceps*, three very large *Symphysodon discus*, *Exodon paradoxus*, jewels, *Phenacogrammus interruptus*, large clown loach, piranha, giant gourami, *Leporinus striatus* (8 in.), archer, sailfins, *Distichodus* and moonlight gourami. These last have ventral feelers one and a half times their own length. Their colour is unattractive, being rather like that of the silver tetra or the bleak in some lights. Nineteen large cardinal tetras have a tank to themselves. The lion fish had lost its tail, the only tank-mate being a large trigger fish. This is a fascinating collection which is kept in first-class condition.

* * *

Japan is not noted for its contributions to the hobby except for the goldfish and the medaka or rice fish. However, the carp is much respected and is the emblem of perseverance that overcomes every obstacle. Certain carp of long ago are reputed to have traversed the length of the Yellow River and crossed the terrible rapids of Lung-men, the Dragon's Gate. These fish then became dragons themselves. On the fifth days of the fifth month the boys' festival is celebrated by flying enormous carps made of paper or cloth from very high poles. These flutter proudly in the wind and signify the courage male children need to display throughout life.

The Japanese catfish has much folklore woven around it; in fact it is said that the islands of Japan lie on the back of an enormous catfish and that the frequent earthquakes there are due to the movements of its body from time to time! The origin of Chinese characters (from which Japanese ones are taken) is supposed to be due to a study of the lines on the shell of the tortoise; those connected with long life and good wishes at a wedding include "A thousand years for the stork and ten thousand for the tortoise." Long ago in *The Aquarist* I cast doubt on the oft-repeated story that the white-cloud-mountain minnow got its scientific name because it was discovered by a boy called Tan. I don't suppose we shall ever know his name, but he was certainly a boy scout. The Chinese word for a scout is "jun tan" and the verb to scout is "dzoh jun tan." Hence *Tanichthys* really means "scout's fish."

From the Black Sand

by D. JONES

SOME parts of the shore at Morecambe are exposed only for short periods a few days each month. As I ventured forth on to the exposed part some time ago I soon became conscious of the cold east wind, and it was raining a little. As the wind would push the tide out further than usual I continued on my way.

When about a mile out I came upon a circle of colour, bright orange, an inch in diameter. It was shining from a patch of wet black sand where one would have thought nothing could exist, and I was so surprised that I forgot the discomfort of the wind and rain. Looking closer I found it to be a *Sagartia* sea anemone. I was further surprised to find that the disc had a most elaborate pattern. The mouth was surrounded by 24 white spots and it had approximately 196 tentacles. There were six in the first circle, six in the second, then 12, etc., the inner ones having a mark resembling a letter B at their bases, and all having white transverse bars at intervals along their length.

Beauty in the Blackness

I was left wondering why nature had gone to such lengths to compile such beauty for this uninviting environment. I touched the tentacles lightly at first, as if it was some small organism. They curled towards the mouth, then opened out again, the outer ones resting on the sea bed. I now touched them again, using a little more force. They all instantly turned towards the mouth. A grey column now appeared, then even this vanished, and I was left gazing into a small hole in the sand. I removed the surface sand and 4 inches down I found the sea anemone attached to an old mussel shell, with the beautiful disc hidden from view. It seemed a lifeless thing as I looked upon it now.

Many years have passed since that day and I have observed these anemones numerous times both on the shore and in my aquarium. I never seemed to find the young, and so I placed six specimens in a goldfish bowl along with some *Ulva* sea weed to produce oxygen. I kept the bowl in the light, then patiently I observed their behaviour for 11 months. I was rewarded on 3rd May, 1957. One night the water had a milky appearance. Microscopic examination revealed hundreds of sperm actively searching for eggs. It was not until the next morning that I found these eggs appearing in such numbers as to make a brown coat on the bottom of the bowl; this happened again on 29th June, 1957. I regret that I was unable to observe the development of these eggs.

Defence and Offence

The anemone possesses thread cells with which it both captures food and defends itself. The ones for capturing food are situated in the tentacles and very small organisms touching them are pierced with many threads and death soon follows. If a great disturbance occurs, such as when the anemones are collected from their attachments on the shore, they eject both through the mouth and some holes in the column some thread-like structures. These are called the acontia and are capable of independent movement. They are, in fact, armoured units loaded with thousands of thread cells, and any organism becoming entangled with them soon beats a hasty retreat.

When kept in an aquarium the anemones sometimes become restless and move round the tank, pushing the sand away and leaving their path clearly marked. They also like

darkness, for if a light is switched on at night they are usually found to be open and greatly expanded.

The base is firmly adherent and any curling of the edges or loosening of its grip is a sign of sickness. I know of only one enemy apart from man. This is a sea slug, *Aeolidia papillosa*, and it is completely immune from the thread cells of *Sagartia*. Their only defence from this sea slug is to be buried far enough down in the sand.

High Summer Display

I have found hundreds of *Sagartia* at times, but it is difficult to tell what variations there are in their numbers from month to month or year to year. Only in June, July and August do they appear to remain open when the tide is out. In other months one is compelled to look for a small hole in the sand. To make things more difficult, the top portion of the column of these anemones has developed small suckers, of which they make admirable use, gathering pieces of shell and larger grains of sand. These are displayed level with the sea bed and it is almost impossible to detect the anemone's presence.

The result of my observations over the years under these difficult conditions shows that some *Sagartia* are always present on the shore and at times become extremely abundant. The colour mutations of this variety are amazing. I have found colours from light fawn to orange with the pattern either faint or strong. Add to this the high shore form of *Sagartia* var. *ornata* and you can see that Morecambe is not without its beauty within the bay.

There it is then. Our sea anemone has the beauty of a flower and a sting of death. Though it is low on the scale of life I never cease to marvel when I see that ring of colour shining from the black sand.

Cacti in the Fish House

CACTI of the genus *Rebutia* are very free-flowering and as they do not grow very large they are ideal subjects for the fish house. They can be raised from seed and will flower in 2 years. If they receive plenty of sunshine they should flower every year without fail. Do not water these plants in the winter, and never give a great deal of water at any time. If the flowers are pollinated, seed pods will form later on. The pods are ripe when the skin takes on a papery appearance.

Spring in the Wa

Primula rosea naturalised by the pondside

NOT nearly enough use is made in our water gardens of the lovely native kingcup, *Caltha palustris*, which is one of the showiest of all spring-flowering plants for the garden pond, streamside or lake. For the garden pool it is an excellent companion for a clump of *Iris laevigata*. *Caltha* should be planted just above water level, and the iris will grow at the pondside in up to 6 in. and flowers after the kingcup is over, in June. Behind them both, if there is room, try either the lovely Japanese iris, *I. Kaempferi*, or some *Astilbes*, to flower in July.

To give of its best *Caltha palustris* needs a rich soil, when it will reach a height of 2½-3 ft., and flower like the plant illustrated. For the stream or lakeside it needs planting in bold drifts to give the best effect, and again the irises can be used to follow on.

For those with smaller ponds, *Caltha palustris nana plena*, the dwarf double form, is the plant to use, as it remains quite dwarf; it is a little darker in colour. It is even freer flowering than the single, literally covering itself with its fat golden buttons. It is also an equally good plant for the larger pool, as it flowers before *C. palustris* and so lengthens the spring show. To go with the double form, *Primula rosea grandiflora* and *P. denticulata* make the fine colour contrasts. Given a permanently damp site, *P. rosea* will naturalise itself too, on the banks of a stream or pool, where the wild English lent lily, *Narcissus pseudo-narcissus*, should also be planted with a free hand.

There are three dwarf daffodils which do well in moist situations: the one mentioned, then *Narcissus cyclamineus* (which blooms in March) and the lemon-

Aponogeton distachius photographed from above the water surface

r Garden

by T. C. CLARE
(Photographs by the author)

hooped petticoat *N. bulbocodium citrinus*, which flowers at the same time as the lent lily. As these three all flower early their leaves are already dying down by the time the grass needs cutting in early June, which makes them especially suitable for naturalising.

At the end of April the candelabra primulus, *P. pulverulenta*, deep magenta, and its pink form *P.p. Bartley*, *P. japonica* in various shades of red, pink and a good white, and *P. helodoxa*, yellow, commence flowering, and go on until early June. They will also naturalise themselves in the gardens of those who are lucky enough to have permanent moisture.

For the pond itself, nothing could be finer than an established group of *Aponogeton distachius*, the Cape water hawthorn, so named after its hawthorn-like scent. It is one of the very few plants with black anthers, and is snow white, with handsome strap-shaped leaves. *Aponogeton* is one of the best of all plants, in my opinion, as it starts flowering in April and goes on until the first frosts kill it in late September. This does not mean that it is not hardy. Only the leaves and flowers are affected. It will grow in anything from 6 in. to 4 ft. of water, and flowers equally well in sun or shade. It has, though, one disadvantage.

It is not suitable for planting in ponds with natural bottoms, unless they can be weeded, as it seeds freely and practically every seed germinates. This means that in a few years the pond is smothered with the plant. It flowers in 12 months from seed. In a formal pool three good plants liberally treated in a half-tub or similar container of about 18 in. diameter will provide a wonderful show.

Caltha palustris nana plena flowering on a bank above water level

Caltha palustris in flower with Iris laevigata beyond it and Iris Kaempferi in the foreground

Microscopy for the Aquarist—39 *by* C. E. C. COLE

WE finished last month with (I hope) a presentable and highly satisfactory home-made slide of a complete water beetle.

It is an excellent idea to start collecting beetles with a view to making a number of slides of different species. Although many look alike to the casual observer, upon close examination after due preparation (as outlined in previous articles) many quite noticeable differences, and an equal number of less obvious ones, are apparent.

After slides of whole beetles have been made, I suggest that the same parts from different species be mounted side by side for purposes of comparison. The different elytra are excellent subjects, although these will need long and steady pressure to stop them arching as they would in nature. There are little spring clips which can be purchased quite cheaply, made to hold cover glasses in position until mountants are dry. The patterns on the elytra are well worth close examination, and differ widely.

Other parts which make excellent slides are the legs, the heads, the sex organs (aedeagus and parameres) and the skins of the abdomens displaying spiracles.

Agabus

Rantus

Hygrobia

Patterns of the elytra, seen under the microscope, of three species of water beetles

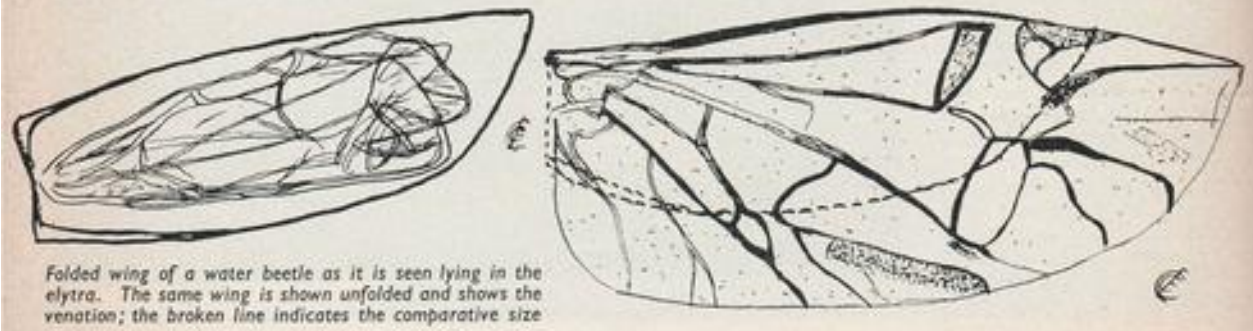
Fore leg of a male dytiscid water beetle (Agabus)

First leg of male squeak beetle (Hygrobia)

Most confusing to the uninitiated is differentiation of the sexes, particularly if they have read that the males have large suckers on their front legs with which they grip the females. When I first started to take interest in these creatures, that was the first thing I looked for—and wondered why there was such a dearth of males. I even dissected one or two and thought the male sex organ was the female ovipositor.

The truth is, of course, that the males of a great many species do not—I repeat, *not*—have large suckers on the first pair of legs. They may have merely a few sucker bristles, or tiny, projecting, cup-like, hair-fringed pads.

When slides of whole beetles are purchased the first pairs of legs are frequently obscured by the outstretched elytra,



Folded wing of a water beetle as it is seen lying in the elytra. The same wing is shown unfolded and shows the venation; the broken line indicates the comparative size

and most difficult to examine without knowing exactly what you are looking for. That is why I suggest making separate mounts of them.

Easier to examine are the male sex organs. These are found in a pocket of thin skin in the last abdominal segment, and consist of a chitinous thorn-like structure (the aedeagus) and a pair of hairy, soft, elongated organs, very pale brown in colour (the parameres). The bristles on these latter are often trumpet shaped—obviously to assist stimulation of the female or the maintenance of a firm adhesion. Purchased slides almost always have them well displayed.

Sex organs (aedeagus and parameres) of male water beetle (Agabus)

Claws, too, form means of identifying species, and vary greatly in length, thickness, shape, etc.

When you have examined the external features of many suitably prepared specimens, it is possible that you will wish to examine the internal organs of beetles.

If so, it is obviously silly to put the beetles into potassium hydroxide solution, for this will dissolve the very parts it is wished to preserve. Instead, just drop the freshly killed beetle into water, then cover and leave for a day or two. The first effects of decomposition will loosen connective tissues between head and thorax, intestines and abdominal walls, etc.

When you lift the cover of the container, you will realise why it was necessary. Pour away the stinking water, holding back the insect to prevent it sliding into and down the sink, replace the water with fresh, swirl it round and again pour it away. Do this several times.

Sex organs (aedeagus and parameres) of male water beetle (Rantus)

Sex organs (aedeagus and parameres) of male water beetle (Ilybius)

Now hold the insect down by pressure of a matchstick in the middle of its back, and take the head in a pair of forceps.

Give it a gentle tug, and it will probably part from the thorax, drawing out the whole alimentary tract with it.

The tract may be preserved in a solution of 2 per cent. formalin, or in acetic acid, until we are ready to further process it. I will give more detail concerning this next month.

Egyptian Club Aquarium

Built into the wall between two rooms, so that it can be viewed from either, this aquarium is 7½ ft. long and 3½ ft. deep. It has been installed in the Egyptian Fishing and Shooting Club, Alexandria, by Nageeb Louca of the Aquarist Association Alexandria. A collection of popular small tropical fishes is housed within the aquarium, which forms a most decorative addition to the contemporary furnishings of the Club

More Notes from an Amateur

by JOHN W. LANGTON, M.B.E., B.Sc., M.I.Mech.E.

SOME months ago I contributed a small opus to this useful journal on keeping tropical fishes, from the point of view of a very amateur tropical fish keeper. This provoked some pleasant responses from various odd quarters, justifying to the writer his attempts to point out the big stones in the rough path towards successful fish keeping. In short, a successful start, without any thought of putting pen to paper again on this subject.

However, because of two recent contacts with other amateurs (to be referred to in more detail later) and from other experiences listening to various chit chat, it seemed necessary to write again on some essential points in fish keeping. It is granted incidentally that these should be very obvious, and are mentioned in any fish book the writer has ever read, but very certainly the points are not appreciated. On reflection, possibly some people do not buy a book or two on their hobby before embarking on same. How unwise !

The first stimulation to write came from seeing a first-time (really first-time) amateur or even embryo amateur go from a dealer's shop with new tank and various contents for it, including plants and fishes, all of which he hoped to put together in the subsequent hours. The second case was that of a fish-keeper friend of some year's experience, who removed his fishes temporarily, rearranged his tank contents, including uplifting and replanting plants, and then reinserted his fishes immediately thereafter. He, of course, had to remove most of them (dead) a day or two later.

Tank Balance

In my view there is a common lack of appreciation of what might be called tank balance. Basically, each tropical-fish tank is a form of chemical vat, and all the contents, water, fishes, rocks, plants, gravel and what have you, have some effect, large or small, on what is happening in the tank. Therefore no change should be made in any of these contents without serious consideration of the likely effect of the change, once a successful set-up has been established. Also, nothing should be added or subtracted with similar serious thought.

The next important point that I would stress is that many of the chemical actions which take place, do so slowly, so that the effect of any change may not be detected for some time. It follows from this that when establishing a new tank, some time should elapse between fitting up the tank entire, and the adding of the fishes, and I would say that 2 weeks is not too long. A good deal depends on the tank surround and principally the amount of light the tank receives. If in doubt, make the interval longer. With an established tank, after any alteration of plants, causing check in their development, it should similarly be left to settle down.

It seems much too obvious to mention the all-important question of light to the tank, but it might as well be stressed just in case. The correct quantity of light required by the tank, etc., is a constant, or nearly so. So if the quantity of daylight is changed, then other changes, such as the use of artificial light, or consequently the blacking out of some light, must be made.

Additional Comments

Having put pen to paper once again, it might be as well to express an additional comment or two. The first is on

(*Please turn to page 272*)

Black swordtails in a well-established aquarium

Photo: W. J. Howes

Fighting Fish, Temperature and Drugs

by Dr. MYRON GORDON *(Geneticist, New York Zoological Society)*

ECKHARD H. HESS, psychologist, working in his Laboratory at the University of Chicago in 1953, found that *Betta* are at their peak of activity psychologically when the water temperature is around 80°F. Keeping the temperature constant at various levels, he tested the fighting responses of a fish when it was confronted by each one of three different attack-provoking stimuli.

These visual stimuli were created by painting three different poses of a male fighting fish. One male fish was drawn on cardboard simply in black and white. The second was like the first except the fish's gill membranes were shown fully extended and painted bright red as if it were in a fighting position. The third was like the second, except the entire body and extended gill membranes of the fish were painted red.

Hess first ran a series of experiments with the temperature constantly at 77°F. He placed a vigorous male fighter in a Plexiglass aquarium 5 in. by 5 in. by 7 in. long and waited for a day so that the fish would accustom itself to its new environment. Then he placed the cardboard showing the painted fish pattern no. 1 close to one of the sides of the aquarium. He set his stop watch going and recorded the length of time, in numbers of seconds within a 2 minute period, that the *Betta* kept its red gill membranes everted. The fighting fish will evert its gills when its fighting spirit is aroused. After an interval of a day the fish was tested again. In all, each of the five different *Betta* were experimented with twice for their reactions for each of the three poses. The results Hess obtained were as shown in the table.

Responses of each of five fighting fish at 77°F.

		Time of responses (seconds/ trial lasting 2 min.)				
Fish no.		1	2	3	4	5
Fish pattern						
1	First trial ..	2	0	0	2	5
	Second trial ..	2	0	0	0	5
2	First trial ..	7	10	12	3	9
	Second trial ..	17	8	13	7	11
3	First trial ..	29	23	24	21	15
	Second trial ..	33	33	18	24	16

Hess allowed the five fighting fish to rest a week before repeating the entire series of experiments at some other temperature. Some of the temperatures were lower, others were higher: 50°, 68°, 77°, 86° and 95°F.

In response to the simple black-and-white image no. 1 Hess found that *Betta* reacted just a little more at the higher temperature. But in response to the second pose, which showed the red gill membranes everted, Hess reported that the *Betta* reacted quite differently at different temperatures. For example, at 86° and 95°F. their responses lasted between 20 and 25 seconds during a 2 minute period; at 68° and 77°F. the responses persisted for between 10 and 15 seconds; at 59°F. the responses were hardly more than zero during the same 2 minute period. The third pictured pose, which was mostly red, evoked an even greater range of gill-dropping responses. For example, at 95°F. their gills were extended for about 36 seconds during a 2 minute period; at 86°F. the fish deverted their gill membranes for about 33 seconds; at 77°F. they extended them for 24 seconds; at 68°F., 18 seconds; and at 59°F., only for 2 or 3 seconds.

Hess drew two conclusions from these experiments: 1, that temperature had a profound effect on the behaviour of the fighting fish; 2, that the visual stimulus was equally important in eliciting a response.

It is surprising that these facts indicating the great variability of the *Betta* in response to temperature are not better known and utilised by those who are testing the new psychotic drugs on the fighting fish's behaviour. The trend of assumptions seems to be that the fighting fish's behaviour is stereotyped. If fighting fish did not vary in their ability to react, fighting contests between them would not have been possible. And yet, the Malayans continue breeding *Betta* for their fighting skill.

Until experimenters utilise genetically known and uniform strains of fighting fish and state accurately all conditions of their tests, the results of their work will be inconclusive. At the same time, it is remarkable that three independent workers have reached some common conclusions about the effects of psychotic drugs on *Betta*.

In the experiments of Dr. E. J. Walaszek and Dr. L. G. Abood were used sexually mature and eager-to-fight *Betta* which they placed, for purposes of observation, in opaque plastic aquaria which were divided into two chambers and separated by watertight transparent Lucite panels. After the experimental fighting fish had been subjected to the effects of a drug, which was placed in one chamber, they removed the sliding panel and watched the fish's response.

They found that fish which were exposed to the antihistaminic drugs refused to fight. The fish would remain quiet until they were exposed to an undrugged fighting fish; then, they tried to escape with such violence that they almost jumped out of the tank. Their response to a female fighting fish was negative; they made no move to attract her attention. When they placed together two male fighting fish that had been treated with the antihistaminics, the fish avoided one another; neither fish showed any sign of initiating the preliminary normal fighting stance.

The action of the antihistaminics lasted a very long time and even after a week in fresh water the fish exhibited a similar and characteristic response. The drugged fish also showed a peculiar colour response; they became pale when confronted with a normal, challenging male that had assumed the fighting pose. When the drugged fish were later isolated by the experimenters, they noticed that the fish's colour would return. Their behaviour under the influence of antihistaminic drugs was altogether different from the behaviour of fish treated with a tranquillising drug,* which retreated rather slowly from an undrugged attacking fish.

Barbiturates, the doctors reported, produced a definite sedative effect. After 2 hours in sodium phenobarbital, the fish rested on the bottom, but when goaded, they showed the fighting response. With thiopental, the fish were actually narcotised; they could be readily aroused and would orient themselves temporarily toward the control fish as if to fight but then they would relapse into a depressed state.

Fish under the influence of sodium salicylate behaved normally but some became slightly "hyperexcitable."

**Drugs which are used to alleviate emotional distress and anxiety in humans are known as tranquillisers. Reserpine is one tranquilliser used in these experiments.*

Morphine, in concentrations up to 40 micrograms/millilitre, had a somewhat similar effect, and, if anything, increased their aggressiveness. After varying periods of time the fish recovered from the effects of all the drugs used; there were no mortalities.

The psychiatrists concluded that *Betta splendens* responds differently to a diverse number of pharmacological agents but that the tranquillising agents do seem to induce a characteristic response. All such agents definitely suppressed the quality of pugnaciousness without necessarily impairing the fish's sensitivity and motor activity. The researchers feel that their methods and test animals may be used in the partial evaluation of the transquillisers, as well as related neurotropic agents, and that the fighting fish s definitely one of the best experimental animals for such tests.

The use of the guppy as a living tool in testing new drugs is championed by Dr. Doris L. Keller and Dr. Wayne W. Umbreit of the Merck Institute for Therapeutic Research at Rahway, New Jersey. When they placed guppies in a solution containing 4 milligrams of lysergic acid (LSD)/millilitre at approximately neutral pH and between 77° and 82°F. for an hour and then transferred the fish to aquarium water, the fish responded by rapidly swimming towards the glass of the container; then the fish continued to swim against the wall apparently unaware of the futility in their effort to move beyond the enclosure. (LSD given to humans can be the cause of behaviour resembling some mental illness.)

The guppy's responses to drugs responsible for hallucinations in man, such as mescaline or yohimbine, were quite different from that to LSD. But their behaviour in the eyes of these investigators was so complicated that they have defied analysis, so far.

Doctors Keller and Umbreit claimed they can permanently change the behaviour of guppies by the use of LSD if they pretreat the fish with indole or tryptamine at concentrations of 10^{-6}M and then give them the usual dose of LSD for 1 hour. When the fish were transferred to aquarium water the abnormal effects induced by LSD lasted for months. At periods the fish would return to normal behaviour. In spite of their abnormal vibrations and rapid swimming under the influence of the drug, the fish managed to court females. The investigators discovered that the abnormal "permanent" effects of LSD could be counteracted by treating the drugged fish with reserpine (20 milligrams/millilitre for 3 days); then the fish's behaviour returned to normal and remained normal subsequently.

Wholesale shippers of fish may find it desirable to add limited doses of tranquillising drugs to the water to slow down some of the more active fishes during transit. Perhaps pugnacious and predatory species like piranhas could be induced to behave like kissing gouramies under the influence of the sedative, and the possibility exists that, under the influence of a suitable drug, male fighting fish may be shipped in large numbers—in the same container.

(This article was first published in Tropical Fish Hobbyist, U.S.A.)

More Notes from an Amateur

(continued from page 270)

the subject of tank routine. The writer is inclined to carry out all the work associated with a tank-feeding, cleaning, etc.—at regular times. There is no proof that this is a good thing, but my experience with various live things has left me with a sense that it is advisable. Against this hunch an argument could be posed that in the natural life of fishes, there must be marked variations in feeding times, etc., but the best of conditions in an aquarium are still far, very far, from natural conditions. With a definite routine, the fishes regularly assemble before regular meal times, and in fact one sign that a fish is not well is that he does not appear with the rest. The opinions of other amateurs on this point would be appreciated.

A second comment is on the subject of tank design; why is there no alternative to the angle-framed aquarium? Why not designs in natural rock? Is it because there would be an increase in frame to water cubic capacity, and if so, why should this necessarily be regarded as bad? Could not tanks be designed to seem a more natural habitat for fishes than the angle-iron frame? The standard argument for the latter is well known, but one might as well say a frame has no influence on a picture.

A third comment is on the subject of filters. After several years, the writer is coming to wonder if filtration is worth the trouble, with once-a-week tank cleaning Aeration is useful, but how useful or desirable needs to be tested. I am experimenting on both these matters, but would be glad to hear from other amateurs (or even professionals) on the subject. I expect the common answer is that it all depends. However, very certainly the changes made will be gradual !

"Congratulations! You're the father of Siamese twins"

HOLIDAY RATIONS FOR THE AQUARIUM

FOR aquarists who worry about what to do with their pets when they go on holiday, Mr. Arthur Button, of Corby (Northants), has the ideal solution—an automatic fish-feeder.

Mr. Button, who works in the instrument section of a local steelworks, thought of the idea shortly before going on holiday, and experimented with one or two gadgets before coming up with a successful one.

Shaped like a windmill, with a back and having a detachable front, the feeder is broken into eight segments which can be filled with the amount of food required for the number of fishes to be fed.

The wheel is attached by a spindle to a government surplus instrument clock which turns one complete revolution each week, and spills out each day's "ration" of food through a small hole at one end of the segments.

"I finished the gadget just before I had to leave for my holiday and had no time to test it," Mr. Button told us, "but when I came back all my fishes were swimming about quite happily. It worked perfectly."

A Novice's Lesson Learned

by H. E. SCOTT

PERHAPS my experience during the past year as a novice to tropical-fish breeding may be of some help to others who, with little or no experience, suddenly find themselves with white-spot disease in their tanks.

My first tank was 24 in. by 12 in. by 12 in., and it was not long before I bought another one of the same size. Later I had a stand made to hold these together with a further tank, this time 36 in. by 15 in. by 15 in. In these, I expect like all other beginners, I kept a few guppies, platys and mollies. Later, I bought my first pair of fighters, and I was soon wrapped up in these colourful and delightful fish. There and then I decided that I must have a go at breeding them.

At the first attempt, I thought I had been more than successful on hatching and rearing over 40 of these enchanting fish. Not only that, but by some chance mating I was fortunate in having bred reds, blues, greens and whites, and to make matters better all the males developed into fine handsome specimens. By this time I was also rearing some 50 or so thick-lipped gourami fry, and so I decided to have a go at something else. With this in mind I set off one Saturday morning, with my wife, who by now had been bitten by the fish-keepers' bug, for a nearby city where we thought that a greater variety would be found than in our town where the demand was not so great.

In this we were correct, and settled for two each of pearl gourami, red swords, green swords, nigger and tiger barbs. With these we hurried home and on arrival split them up, putting some in the large tank and the others in one of the smaller tanks. It was noticed by both of us that the barbs were keeping well hidden behind the plants, but nothing was thought about this until on the Thursday we were horrified to find that these were suffering from white-spot disease.

My first reaction was to clean out all together; on second thoughts I decided that I would kill all the fishes, sterilise all the tanks and equipment and have a second attempt. But after a good night's sleep, and a further tousle with the problem, I decided that there was only one

sensible way to tackle this disease, and that was to cure it.

After consultation with my fish-keeper neighbour and with books loaned to me, I decided to experiment.

In the large tank I used quinine hydrochloride, strength (as directed) 3 grains gallon, and to the satisfaction of my wife and myself this was 100 per cent. effective. In the smaller tank I used one of the cures offered for sale by the dealer; this did not cure, though I carried out the instructions to the letter. So, after giving the fishes a rest for about a week, I gave them a second dose, but this time with the quinine hydrochloride, which once again proved successful. I did lose some fishes and some plants, but I was of the opinion that this was due to the smaller tank having had two treatments.

It is now 3 months since the white-spot disease was first seen, and I can vouch for it that my fishes are now healthy and fit, and once again I look forward to starting some breeding operations. It is said that one has to pay to learn. Well, I have paid, but one thing I will say, it never will happen again for this is what I learned. When purchasing any new fishes see that these are put in a quarantine tank for at least a week. And secondly, never to get into a flat spin when and if white-spot disease ever occurs again, for it can be cured quite easily and effectively.

If, by my little experience, some other poor unfortunate tackles this in like manner, and he too gets as good results, then at least my few words have been well and truly worthwhile. And for me, I shall always have the knowledge that for me this was a moral victory, for I was near to being an ex-fish-keeper. Having tackled my problem in the proper manner, I can look forward to future activities in the fish world with a happy and contented mind.

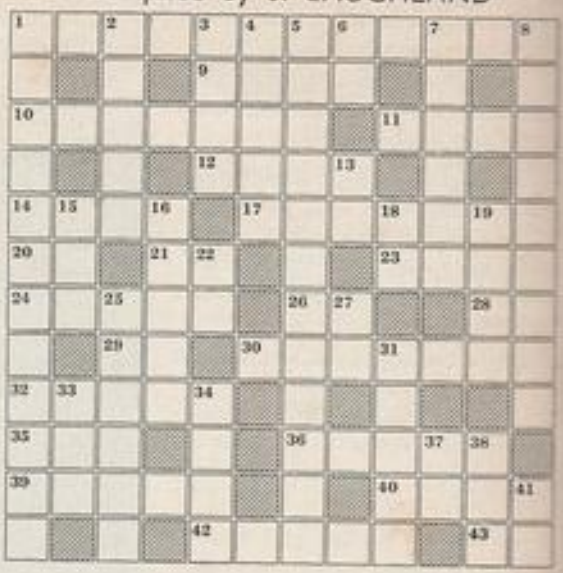
Twenty-Five Years Ago

ACTING upon the suggestion of a reader *The Aquarist* approached the authorities of the Royal Botanic Gardens, Kew, with a view to having installed in the *Victoria regia* tank a number of angel fishes (*Pterophyllum scalare*), and we are glad to be able to announce that the Director has agreed to the proposal. As both the royal water lily and the fishes hail from the Amazon, one is a fitting complement to the other, and as the conditions are therefore equally suitable, the fishes should multiply and greatly enhance interest in the tank.

The "tank" is virtually an elevated pond 1,800 sq. ft. in size, so visitors will be able to view the fishes as though under almost natural conditions. This is likely to prove more interesting than spectacular, perhaps, as though *scalare* reaches 8 in. in length and is much taller than long; with huge dorsal and anal fins making the fish somewhat crescent shaped, the body is so compressed that the fish is almost imperceivable to an observer looking directly downwards—as, also from front or rear. The fish could, in fact, take cover behind a blade of eel grass !—*From "The Aquarist," March* 1933.

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. They spin their nests below water and carry air down to it ! (5, 7)
9. "Food for men in Scotland and for horses in England" (Dr. Johnson)—and for micro worms (4)
10. To pedal for the larval frog (7)
11. Your pond will freeze 32° F. over this (4)
12. To the Sappers for dead grass (4)
14. Tiny stream, too small to hold a brill (4)
17. Presage, perhaps that wine will finish ? (6)
20. Defender of the Faith (1, 1)
21. It is out of print (1, 1)
23. Even freshwater fishes depend for nourishment upon the change of tide (4)
24. Honour makes a bloodsucker of the American general (5)
26. Could mean a male fish (2)
28. On account of (1, 1)
29. Left hand (1, 1)
30. Of the order of toothed carps (7)
32. Seen on large expanses of water, and on the head (5)
35. Even without the end she upset things early on (3)
36. A type of this infests fishes (5)
39. Type of *Danio* (5)
40. Male of quality (4)
42. Pups of an insect (5)
43. Is this half as extinct as the dodo ? (2)

CLUES DOWN

1. General term covering all flowering aquatic plants (5, 7)
2. Affected by the sea (5)
3. Part of plant which is embedded and sucks nourishment from the soil (4)
4. Where Shropshire aquarists make a slop (5)
5 and 7. Angel fish (12, 6)
6. Upper reaches of Isis ? Or lower ! (2)
8. Popular livebearer, green or red (9)
13. Royal cypher (1, 1)
15. Orfe (3)
16. Unusual spelling of loach (5)
18. Amateur soldier's decoration when 10 Across loses a pole (1, 1)
19. Bright light or bright fish (4)
22. Measure of water's acidity (1, 1)
25. Upset levers for slippery ones (6)
27. Probably with nickel or chromium (1, 1)
31. Reverse of smooth (5)
33. Roman hail in 32 Across (3)
34. In the near future (3)
37. Compass direction (1, 1)
38. Like the caudal fin (3)
41. —— and this is, almost, too (2)

PICK YOUR ANSWER

1. "As sound as a . . ." The missing word in the proverb is: (*a*) bream; (*b*) dace; (*c*) roach; (*d*) rudd.
2. *Mesonauta insignis* is an earlier name of: (*a*) *Cichlasoma facetum*; (*b*) *C. festivum*; (*c*) *C. nigrofasciatum*; (*d*) *C. severum*.
3. Lemon tetra is the popular name of: (*a*) *Hyphessobrycon bifasciatus*; (*b*) *H. heterorhabdus*; (*c*) *H. pulchripinnis*; (*d*) *H. serpae*.
4. *Limia melanogaster* is a native of: (*a*) Cuba; (*b*) Haiti; (*c*) Jamaica; (*d*) Trinidad.
5. The veiltail goldfish is known to the Japanese as: (*a*) the hiroshima; (*b*) the honshu; (*c*) the kyoto; (*d*) the nagasaki.
6. Which of the following has a yellow flower ? (*a*) *Cardamine lyrata*; (*b*) *Hesperanthera sanctifolia*; (*c*) *Hydrocharis morsus-ranae*; (*d*) *Lobelia dortmanna*.

G. F. H.

(Solutions on page 276)

News from AQUARISTS' SOCIETIES

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

ALL future meetings of the **North Birmingham Pond and Aquarium Society** will be held at Greenholme Road School, Kingstanding, Birmingham, on the last Wednesday of each month at 8 p.m. The new chairman is Mr. S. Ray.

* * *

AT a time when a number of Societies are finding the going difficult a happy note is struck by **Bradford and District Aquarists' Society** who have managed to maintain membership at a fairly high level and in addition have also improved their financial position. The stock of equipment has also been increased and a successful Show organised. At the annual meeting Mr. G. Taylor was re-elected president and Mrs. E. Horrocks re-elected vice-president. The secretary is Mr. Kenneth Barrett, 68, Moorland Road, Pudsey, Yorkshire, and new members can be assured of a real welcome.

* * *

NEW headquarters of the **Tottenham and District Aquatic Society** are at Northumberland Arms, Northumberland Park, Tottenham, London, N.17. The officers are: President, Mr. H. Brant; chairman, Mr. L. Clements; secretary, Mr. J. Hall.

* * *

AN increased membership in 1957 was reported by the **Aylesbury Aqualife Association** at the annual meeting. A varied programme has been arranged for the current year with both outdoor and indoor events. The secretary is Mr. C. L. Stephens, 79, Abbey Road, Aylesbury.

* * *

OFFICERS elected at the **Dunstable and District Aquarists' Society** were as follow: Vice-chairman, Mr. B. Flatman; Show secretary, Mr. M. Dixon, who was also elected as holder of the Franklin Shield. Michael Everett was appointed the new Junior Leader. The secretary is Mr. J. Long, 12, Chester Avenue, Luton.

* * *

THE **Royal Leamington Spa Aquarists' Society** are proposing to hold an open show at Kenilworth Agricultural Show this year, and any society wishing to enter should contact the secretary, Mr. A. Hall, 26, St. Laurence Avenue, Warwick, for further details.

* * *

A SLIGHT re-organisation of the committee of the **Coventry Pool and Aquarium Society** was made at the annual general meeting, and the following officers were elected: President, Mr. P. O. Smith; chairman, Mr. G. Glover; vice-chairman, Mr. H. S. Greaves; treasurer, Miss N. Barnatt; secretary, Mr. F. Prescott; committee, Messrs. Randall, Ellis, Simkins and Scott.

* * *

MEMBERS of the **Middleton and District Aquarist Society** were given an illustrated talk by Mr. Partington at the last meeting. The speaker gave a talk on the setting up and maintenance of aquaria, and on the control of fish diseases. He also spoke on British ponds and various types of plant life. Among the visitors were members from the Salford and Rochdale Aquarist Societies.

* * *

AN extremely keen and active society is the **Taunton and District Aquarist Society** who in January presented their third public exhibition in nine months. Excellent support was rendered by **Exeter Aquarium Society** who despite the distance and difficulties involved sent along four furnished tanks. The help of the Plymouth Laboratory of the Marine Biological Association was also forthcoming with suitable specimens for marine tanks, and Mrs. H. G. S. Cox is to be congratulated for the way she carried out the duties of show secretary.

* * *

RECENT events in the programme of the **Kingston and District Aquarist Society** have been a lecture by Mr. Bob Reid on "Fancy Goldfish" and also a visit and talk on "Marine Aquaria" by Mr. H. J. Vosper. An annual feature "Judging by Members" when an ASLAS judge will help members with this aspect of fishkeeping is also on the agenda. The first table show is on 20th March when Mr. Peter Hewitt will judge. Meetings are on the first and third Thursdays in the month and new members are welcome.

* * *

AT the table show of **Willesden and District Aquarists' Club** the winners were as follow: Mollies: 1, E. Landau; Platys: 1, Mr. J. Prince; Swordtails: 1, Mr. R. Porter; Guppies (male): 1, Mr. B. Cooper; Guppies (female): 1, Mr. E. Landau.

* * *

MEMBERS of the **Llantwit Aquarist Society** heard their secretary, Mr. R. S. Wigg, give an interesting lecture on Judging and Pointing at the last meeting. Coldwater and tropical fish enthusiasts who wish to join a society in this area can be assured of a welcome from Mr. R. S. Wigg, secretary, 17, Ham Lane South, Llantwit Major.

* * *

MR. CREED gave an interesting talk at the last meeting of the **Hounslow and District Aquarist Society** on his method of breeding tropical fishes.

A table show for fish in the "Barbs" class was held. The judge was Mr. Billington whose job was not easy among so large an entry. Results: Mr. Rowland (chequer barb) 1, Mr. Rowland (cummingi barb) 2, Mr. Boult (cherry barb) 3.

* * *

THERE was a change of chairman at the Annual General Meeting of the **Bexhill and District Aquarist Society**—Mr. G. B. Chissell succeeding Mrs. Chissell. Mr. N. Dengate was elected vice-chairman, Mr. J. Holder secretary and Mr. A. McCormich treasurer.

A successful year was reported, the club being in a very strong financial position and with a keen membership. As the only club left along the Sussex Coast an invitation is extended to any unattached aquarists in the area to join. Meetings are held at the Merrythought Cafe, Western Road, Bexhill, on the first Thursday of each month at 7.30 p.m. and a warm welcome is assured.

A letter to Mr. Holder at 19, Selwyn Road, Eastbourne, will be answered by return with full particulars.

* * *

ON 16th January, Mr. A. Boarder gave a talk to the members of **Hendon Aquarists' Society** on judging fantail goldfish. A double row of show tanks containing 22 of Mr. Boarder's 1956-bred fantails were numbered and members were invited to judge the fish; three prizes were offered to members who came the nearest to Mr. Boarder's placings. No-one gave a correct forecast but three members found three of the first four from the 22 fishes. The evening proved very interesting and it is thought that similar contests with different species of fishes will prove informative.

* * *

A VERY successful year was reported at the annual general meeting of the **Taunton and District Aquarists' Society** by the secretary, with a considerable increase of membership. New officers elected: Chairman, Mr. E. Eggleston; secretary, Mr. R. Saunders; treasurer, Mr. C. Scutt; show secretary, Mrs. Cox. The Aggregate cup awarded for most points obtained during the year was won by Mr. R. Saunders.

At an exhibition held recently a cup was presented by Mr. G. A. Murdock (a member of the Society) for the best fish of the Show. This was won by Mr. E. Eggleston for his fine specimen of tiger barb.

* * *

"HOW I Started Breeding Tropical Fish" was the title of a talk to members of **Derwent Aquarist Club** at the monthly meeting at the Club's new meeting place, the Y.M.C.A., St. Peter's Churchyard, Derby. The speaker, Mr. Fred Reader, is now one of the most successful breeders of Siamese fighting fish in the Derby area.

* * *

AT the last meeting of the **Corby and District Aquarists' Society** a film was shown about Missionary life in South America. Later a "Bring and Buy" was held.

* * *

THE annual show of the **Bethnal Green Aquatic Society** will be held on the 5th and 6th September at the main hall, 229, Bethnal Green Road. The main attractions this year are: the F.B.A.S. Major Trophy for a class of Sexed Pairs of Barbs; the Perry Cup All-England Mollie Championship (replica after 12 months); the Bonner Cup, best barb in show to be won outright. Show schedules will be available from March.

* * *

THE second annual general meeting of **Poole Aquarists' Association** was held recently. A new committee was elected as follows: Chairman, Mr. C. R. Macdonald; secretary, Mr. H. J. Pearson; treasurer, Mr. S. A. Goode;

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 xii**, to Aquarist's Badge, *The Aquarist*, The Butts, Half Acre, Brentford, Middlesex, and please specify which type of fitting you require.

show secretary, Mr. D. Andrews; committee Members, Mr. R. Matley, Mr. N. Walker, Mr. G. Morris, Mr. H. Aiken.

* * *

A NEW society has been formed by Mr. H. N. Allies (aquarium curator at Paignton Zoo) and will be known as the **Paignton Aquarists' Society.**

The first inaugural meeting was held on 24th January, when 18 members were enrolled.

Mr. N. H. Dixon, F.C.A., F.Z.S., honoured the society by accepting the presidency.

Mr. O. H. Jackson was elected chairman, Mr. H. N. Allies, hon. secretary, and Mr. G. Pullin, hon. treasurer. Meetings held second and fourth Tuesday in month at the headquarters, Paignton Zoo Restaurant at 7.30 p.m.

* * *

THE following members were elected at the annual general meeting of the **Riverside Aquarium Society** (Hammersmith): Chairman, Mr. Barnes; vice-chairman and Treasurer, Miss Watson; show secretary, Mr. E. Daynes; secretary, Mr. T. Thewless, "White Building," Barley Mow Passage, Chiswick, W.4.

At a recent meeting Mr. Flintham gave a talk on Judging and Judging Standards. Future events include a Table Show for Catfish and Loaches.

* * *

AT the annual meeting of the **Portsmouth Aquarists' Society** the following officials were elected: President, Mr. T. Bennett; chairman, Mr. D. Nicholls; secretary, Mr. C. Smith; treasurer, Mr. B. Nunn.

Until the first Monday in May the meetings will be held the first and third Wednesday of each month and after 21st May the first and third Monday of each month. The venue is the Senior Modern Boys School, Doyle Avenue, Hilsea, Portsmouth. New members will be welcome.

* * *

THE Association of **South London Aquarist Societies** will be holding the first of a series of three Inter-Club Table Shows on the 15th March; the others will be held in June and September. The shows will be held at the Sutton Adult School, Benhill Avenue, Sutton.

This first will consist of seven Live-bearer classes and four Coldwater classes, and while judging is taking place there will be a lecture by a guest speaker, Mr. R. Affleck of the Goldfish Society of Great Britain.

* * *

MEMBERS of the **Brockley and District Breeders' Circle (Aquaria Society)** recently visited the St. William of York R.C. Youth Club in Forest Hill. The speaker was secretary H. J. Vosper, who described the items used in setting-up a tank of tropical fish. Mr. D. Ceppen illustrated the process during the course of the talk—having brought a tank, gravel, plants, fish, etc., from his home several miles away.

Other members provided a further 25 fish —from the guppy to more unusual specimens such as an Indian climbing perch. Coldwater fish were also on view, together with many different types of equipment and foods.

The mixed audience was appreciative and several more than keen, asking questions, taking notes, etc. It was tentatively fixed that a follow-up visit be made later this year, when some sea-water creatures would be exhibited.

Eight tanks, of various sizes, are maintained by members in hospitals and schools and other tanks are being prepared for installation. This works out at nearly one tank per two members —a high proportion to keep in condition, yet there is no lack of volunteers.

These two aspects of the group's activities are in support of one of their main aims—to strengthen and spread the fishkeeping hobby. Although they wish to remain a small group themselves, they hope that other groups in the area will gain through their efforts.

* * *

THE **Carassius Club** held their monthly meeting at the Carnegie Library, Portsmouth. There was a full attendance for the main debate on the moor variety of goldfish, its scale group, etc. Nacreous and matt groups held nearly equal support, bearing in mind the description and reasons in favour of the accepted three groups. Genetics and fish sexing also brought about a very lively discussion.

* * *

AT the annual meeting of the **Rugby and District Aquarists' Society** new officers elected were: Chairman, Mr. L. E. Burton; secretary, Mr. E. F. Bennett; treasurer, Mrs. P. Herbert. The Bedford Cup for coldwater fish was won by Mr. L. E. Burton, and this was presented by the donor, Mr. J. Bedford. The Herbert Cup for tropical fish was presented by Mrs. Herbert to Mr. E. F. Bennett, and the runner-up, Mr. W. H. Smith, was presented with a plaque. Meetings will continue to be held in the Percival Guildhouse on the 2nd and 4th Thursday in each month, when visitors are welcome, and help and advice for beginners always available.

* * *

OFFICERS elected at the annual meeting of **Worksop Aquarists' and Zoological Society** were: Chairman, Mr. W. Kirk; secretary, Mr. A. M. Deakin; assistant secretary, Mr. F. Foster. It was decided that meetings will be held on Wednesday nights every three weeks. A table show was held and Mr. W. Kirk won the first and second prizes; Mr. C. Foster and Mr. A. Fotheringham the third. The Worksop Society will be recognised by inclusion in a directory of natural history societies to be published by the Council of the British Association for the Advancement of Science.

* * *

THE next meeting of the **Goldfish Society of Great Britain** will take place on Saturday, 15th March, at the George Hotel, Hammersmith Broadway, at 2.45 p.m. Talks include "Colour Patterns" by R. E. Ison, B.Sc., and "Shapes in Singletails" by R. J. Affleck, M.Sc., F.Z.S. The table show will be for Adult Singletails.

* * *

THIS year sees the coming of age of the **Nottingham and District Aquarists' Society** and members are already discussing various ways of marking this event. Recent talks have been by Mr. C. D. Roe of Shirley Aquatics, and Mr. W. Mandeville. The items for March include the Annual General Meeting which will be held on the 25th March.

* * *

RECENT activities of the **Medway Aquarists' Society** have included a talk on pond construction by Mr. Cox and the annual competition for fighters. The cup in this contest has been won by Mr. W. Knott with a cornflower blue male.

* * *

MEMBERS of Whitleigh Townswomen's Guild heard a talk on setting up an aquarium, given by Mr. T. Ackland, a member of the **Plymouth and District Aquarists and Pondkeepers' Society,** at their meeting at Woodfield School.

They decided to send a contribution towards an aquarium and fish to be provided for the children at Maristow House.

* * *

THE **London Transport (C.R.S.) Aquarists' Society** meets every three weeks at 301, Camberwell New Road. This year they are having ten table shows as well as an annual show, and are also having a series of lectures. New members would be very welcome and further details may be obtained from the secretary, Mr. R. Yexley, 11, Arundle Road, W. Croydon, Surrey.

* * *

FROM **Rolls Royce (Glasgow) Aquarium Club** comes news of recent lectures by Dr. A. Young of the Glasgow University and Scottish Aquarium Society on the "Bubble Nest Builders" and also Mr. D. O. Carr of the Greenock Society who spoke on "Tropical Fish Breeding." Forthcoming events include a film show on the 26th March. The secretary is Mr. David W. Begg, Rolls Royce, Limited, Hillington, Glasgow, S.W.2.

* * *

INCLUDED in the forthcoming activities of the **Smethwick and District Aquarist Society** are visits by the Walsall Aquarist Society and the Midland Aquarium and Pool Society for a quiz and debate. On the 26th March there is a show and talk on coldwater fishes and pond construction. The secretary is Mr. A. E. Allsopp, 800, Stratford Road, Sparkhill, Birmingham 11.

* * *

AT the February meeting of the **Sunderland and District Aquarists' Club** the programme consisted of a table show for Livebearers, and a film strip on aquatic plants was shown with a tape recorded commentary made by Mr. A. Brunton. This novel way of presentation was appreciated by all the members. A new enterprise is the issuing of a club bulletin.

* * *

WHEN members of the **Southport Aquarist Society** held their recent meeting Mr. W. Bailey of Liverpool, a noted aquarist, was the visiting speaker. One question raised concerned the difficulties of keeping Angel fish, and Mr. Bailey expressed the opinion that "where a number of these fishes are kept in an aquarium, an acid effect is created in the water making it almost impossible to grow plants satisfactorily." In the discussion on the growing of aquatic plants and the necessity of artificial light at this time of the year Mr. Bailey said that "Normally the growth of plants is practically nil, but in a few weeks time there will be a more vigorous growth. The best plants are usually to be found in tanks inhabited by Livebearers." The vice-chairman, Mr. Stanley Radam, thanked Mr. Bailey foe providing such an interesting and enjoyable evening for members.

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies:— Bridlington and District Aquarists' Society (Mr. W. R. Holroyd, 1, Elma Villas, Bridlington, E. Yorks) Coventry Pool and Aquarium Society (Mr. F. Prescott, 3, Kings Grove, Coventry). East London Aquarists' and Pondkeepers Association (Mr. F. A. Petto, 52, Humberstone Road, Plaistow, London, E.13). Grimsby and Cleethorpes Aquarists' Society (Mr. S. Nelson, 72, Hope Street, Grimsby). Kingston and District Aquarist Society (Mr. C. J. Henty, 120, Craddocks Avenue, Ashstead, Surrey). North Birmingham Pond and Aquarium Society (L. W. Male, 880, Kingstanding Road, Kingstanding, Birmingham 22C). North Hants Aquarists' and Pondkeepers' Club (Mr. A. E. Walters, 71, Jubilee Road, Aldershot, Hants). Royal Leamington Spa Aquarists' Society (Mr. A. Hall, 26, St. Laurence Avenue, Warwick). Taunton and District Aquarists' Society (Mr. R. Saunders, 5, Victory Road, Priorswood, Taunton, Somerset). Sheffield and District Aquarists' Society (Mr. R. P. Middleton 37, Tavistock Road, Sheffield, 7). Walthamstow and District Aquarium Society (Mr. W. J. Chenneau, 44, Capworth Street, Leyton, London, E.10).

Crossword Solution

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

PICK YOUR ANSWER (Solutions)

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