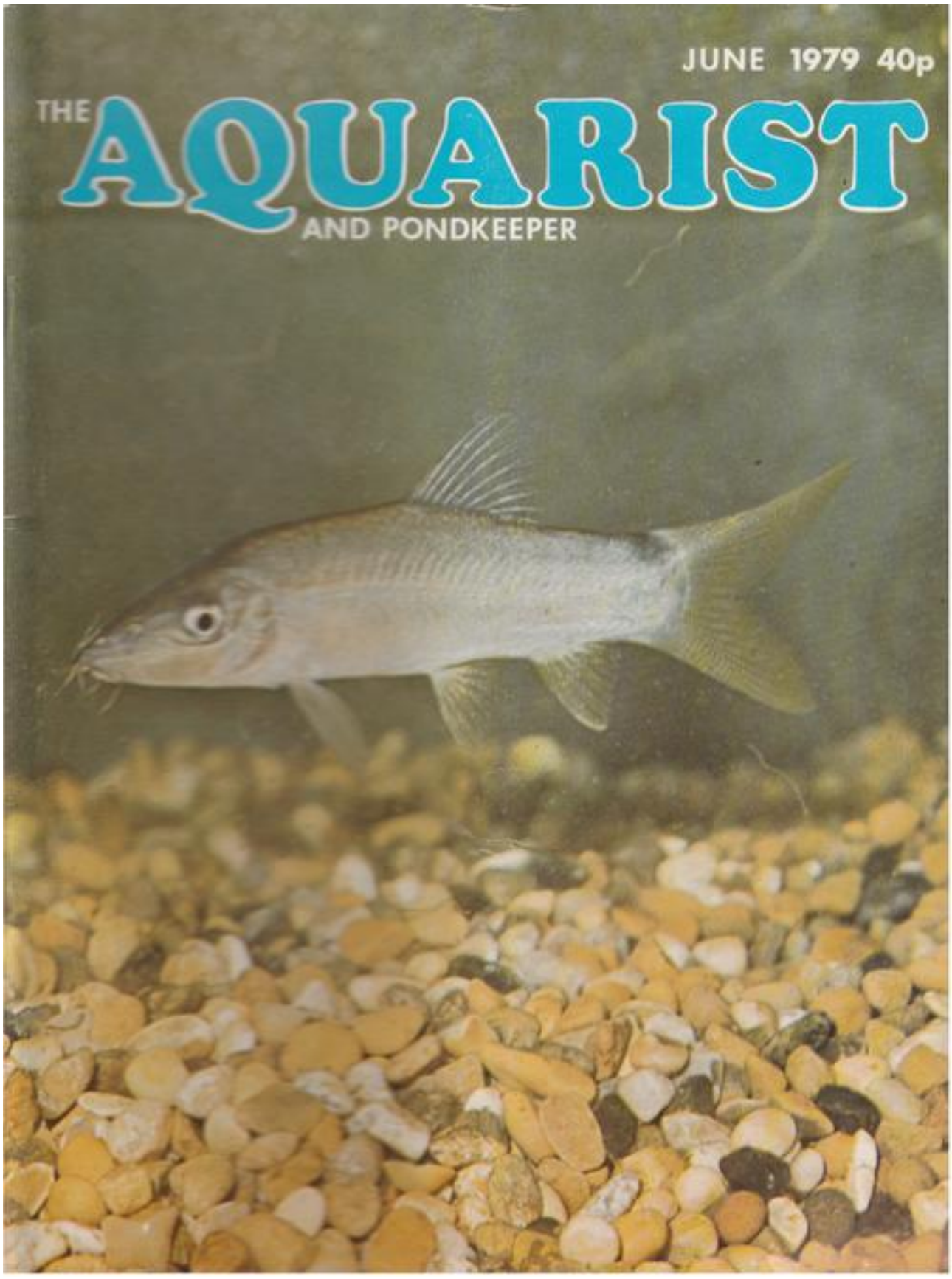
JUNE 1979 40p

# THE AQUARIST AND PONDKEEPER



THE AQUARIST AND PONDKEEPER

The Aquatic Magazine with the Largest Circulation in Great Britain

*Published Monthly 40p*

# Contents



The Editor accepts no responsibility for views expressed by contributors.

Printed by Buckley Press Ltd.
The Butts, Half Acre,
Brentford, Middlesex.
Telephone: 01-568 8441

Subscription Rates:
The Aquarist will be sent by post for one year to any address for £6·50. Airmail quoted on request.

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

Founded 1924
as "The Amateur Aquarist"
Vol. XLIV No. 3, 1979

Editor: Laurence E. Perkins
Advertisement Manager:
J. E. Young

It is regretted that our cover plate for May issue, showing a waterside primula, was wrongly captioned *Botia modesta*.

# OUR EXPERTS' ANSWERS TO YOUR QUERIES

**READERS' SERVICE**
**All queries MUST be accompanied by a stamped addressed envelope.**

**Letters should be addressed to Readers' Service, The Aquarist & Pondkeeper, The Butts, Brentford, Middlesex, TW8 8BN.**

## TROPICAL QUERIES

by Jack Hems

**Is it possible to breed the black-banded sunfish in the ordinary home aquarium?**

It has been done, but telling the sexes apart is no easy matter. However, prior to spawning the female assumes a more vivid coloration and her sides become distended. The male, if ready, fans a depression in the sand to receive the eggs. Thenceforward the breeding procedure is much like that of some cichlids. The eggs are deposited in the depression or removed to another freshly fanned depression. There they are usually permitted to stay (unless there is yet another move) until incubation is complete. Sometimes the fish wait until the fry are free of the eggs before they are moved to another depression. The male protects the eggs and fry until the latter are some few weeks' old. An essential requirement at this time is an ample supply of minute live food for the young. Brine shrimps, micro worms, gnat larvae are indicated.

*Colisa labiosa*

**Is the thick-lipped gourami** (*Colisa labiosa*) **suitable for a community tank stocked with smaller tetras, barbs and livebearers?**

*C. labiosa* seldom, if ever, causes any trouble in a tank if there are plenty of plants, a strong top light, and a plentiful supply of easily swallowed live or dried food. It much prefers to play about in the plants and leave the other fishes to get on with their own business. A temperature in the upper seventies (°F) is advised.

**Can you tell me a way to sterilize plants before introducing them into the aquarium?**

Leave the plants to soak for about 10 minutes in water to which a crystal or two of permanganate of potash has been stirred about to colour it pink. Before rinsing the plants in clean water (tepid), search the leaves and stems for snails and their jelly-like capsules. Remove them. Snails are more nuisance than they are worth.

*Rasbora cephalotaenia*

**Is there such a fish as a porthole rasbora?**

The porthole rasbora is know to science as *Rasbora cephalotaenia*. It is native to Malaya and Indonesia and attains a length of about 5 in. It is peaceable, eats anything and is characterised by a number of porthole-like markings along the sides.

**Is the platinum tetra long-lived, easy to feed, hardy, active, and a good mixer in a community tank?**

*Gephyrocharax atracaudatus*, to give this species its proper name, has a life span of upwards of four or five years, is always on the go—mostly in the middle of the water—and accepts any small live, flesh or dried food. It does not molest other fishes.

**What is a blue chin?**

The blue chin is a catfish from the Amazon Basin. Well-grown fish are characterised by a blue-black body and major fins speckled and streaked with white. The scientific name of this fish is *Xenocara dolichoptera*. It attains a length of about 4 in. and spawns under large stones. After spawning is completed, the parent fish mount guard over the eggs and fry.

**What is the life-span of the freshwater angel fish (Pterophyllum)?**

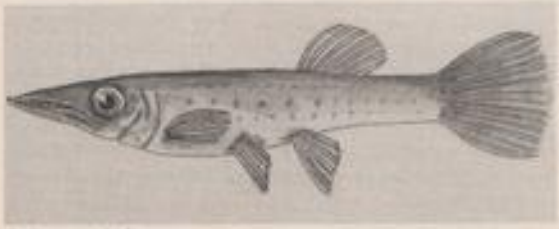
It is not uncommon for the ordinary black-and-silver angel fish to live for more than seven years in the aquarium. According to Mellen and Lanier's *1001 Questions answered about your Aquarium* (New York, 1935), "a scalare in Germany has lived 18 years in captivity".

**Can earthworms dug out over the next few months be stored for use during the late autumn and winter?**

An old kitchen sink with tall sides, or a half-cask (wood or plastic), with all drainage holes well crocked to prevent waterlogging, is the basic requirement. Bury the container to soil level and then fill it with rotted or rotting leaves, vegetable scraps, and ash from bonfires. Throw all the worms you can spare from your digging in the garden into the container and every so often introduce a small quantity of boiled potato to the mixture. Keep the surface of this sort of compost heap covered with soil and cover the soil with sacking or a piece of old lino to protect it from excessive rainfall. Earthworms should prosper in such an environment.

**Can the bitterling be kept in a heated community tank?**

Bitterling have the power to adapt to a temperature in the lower to middle seventies (°F) provided the change from cooler water is brought about gradually. Bitterling are inoffensive little fish and should not be placed with any species likely to bully them.



*Belonesox belizanus*

**Please give me some information about the pike minnow?**

The pike minnow or dwarf pike is a voracious livebearer native to the Atlantic slopes of Central America, from southern Mexico to Honduras. It is known to science as *Belonesox belizanus* and between the two World Wars was easy to find in the well-stocked dealer's shop. Now, however, the fish is hard to come by. Understandably this is explained by the fact that *B. belizanus* is too large and too voracious for a community tank. The male reaches about 4 in., the female to about twice this size. The species needs a constant supply of live food such as guppies, platies, earthworms, and sizable aquatic larvae. Some pike minnows will accept strips of raw red meat. Baby pike minnows are nearly an inch at birth and are soon devoured by their parents unless the submerged plants in the tank are sufficient to provide ample cover.

**Will the introduction of some bladderwort into my aquarium endanger the lives of my fish?**

The common bladderwort (*Utricularia vulgaris*) could capture tiny fry, but the pygmy bladderworts are only capable of trapping really microscopic creatures such as infusorians and similar minute forms of life.

*Aequidens rivulatus*

**Is *Aequidens rivulatus* suitable for a community tank? Also, what foods and temperature suits this cichlid best?**

*A. rivulatus* grows to about 9 in. and is native to Peru. Apart from its large size, it is a species well-known for its pugnacity and overbearing habits. Knowledgeable aquarists call it the green terror. It eats any food that is fleshy, alive or dead, and is quite comfortable at a temperature in the low to upper seventies (°F).

**I should appreciate some information on *Acanthophthalmus shelfordi*.**

Commonly called the banded or Shelford's loach, this species is worm-like in outline and variable in coloration. It comes from Borneo and though indulging in short or extended periods of quiescence in drifts of bottom debris or behind stones, it has the habit of making sudden dashes about the aquarium as if trying to escape the attention of some invisible menace. It eats anything small such as whiteworms, shredded raw red meat, well-washed tubiflex, bloodworms, and the usual appetising dried foods.

# COLDWATER QUERIES by Arthur Boarder

**I have a few goldfish in a tank and they seem to be healthy and feeding well but they keep rubbing themselves against plants and rocks and appear to be very irritated. Why is this please?**

When fishes show these symptoms it is either that the water is not to their liking and perhaps has an excess of minerals in it or there are pests on them. You should change all the water for fresh and see that this does not come through copper pipes or from a copper tank. If pests are present they may be flukes. (*Gyrodactylus*) or fish lice. The former are difficult to see as they are a form of flat worm which are almost transparent. They can however be seen with a medium strength microscope. They move about on a fish with a looper caterpillar-like movement. If these pests are present the fish would soon show other signs, such as blood streaks on the body and then the fish would go off its food, mouth at the surface and become very wasted, and death would soon follow.

If the pests are fish lice, (*Argulus*), then small blood spots would appear where the louse was feeding. These are small creatures about a quarter of an inch across which are difficult to see, especially when they attach themselves to the joint of a fin. Both of these pests can be killed by the Dettol treatment. This affected fish should be immersed in a solution of a half teaspoon of Dettol to a gallon of water. The fish must only be in the solution for about 16 minutes and must be watched all the time. If the fish should turn over, remove it to fresh water immediately where it will soon recover. This treatment has been very successful but it may have to be repeated in the case of an infestation by lice.

**I have kept and bred tropical fishes and now wish to try my hand at breeding fancy goldfish. I have two tanks, 39 × 12 × 15 inches and two 24 × 12 × 12. If I would not be able to breed fish in these tanks what is the smallest pond I could use. It would have to be a raised one?**

It is quite possible to breed fancy goldfish in tanks. You could have two pairs as they could give you all the fry with which you could cope. Plant up all the tanks so that water plants could get well established. Have one pair in a well planted tank and feed well with flake food and garden worms. When requiring them to spawn, remove about a third of the water and replace with fresh. When spawning has taken place remove the parent fish and allow the eggs to hatch where laid. You could, of course, remove plants with eggs to another tank for hatching but the former method is the better one. You can use plastic washing-up bowls as hatching tanks quite successfully as they are shallow and have a wide surface area.

The smallest outdoor pond for breeding fishes would be about 6 × 4 × 1½ feet. As it would be raised it could freeze up badly in winter unless some form of heating was used.

**Please could you tell me what is wrong with my goldfish in an outdoor pond; they have small white spots on them, mostly on the fins and tail but some on their bodies? They appear to be quite healthy otherwise.**

The trouble seems to be that the fish are infested with parasites of the White Spot disease, (*Ichthyophthirius multifiliis*). This is caused by a small parasite which attaches itself to a fish and becomes embedded in the skin or tissue. The fish then forms a kind of cyst against the irritation. There is little which can be done to kill the parasites whilst they are on the fish. When they mature they drop to the bottom and encyst. After a time fresh small parasites emerge and seek a host when the process is repeated. There is nothing which can be put in the water powerful enough to kill the parasites whilst embedded in the skin of a fish, as anything strong enough would kill the fish. It is only when the parasites leave the fish that they can be destroyed. Obviously, if the parasites can be killed as soon as they leave the cysts on the bottom they can be destroyed before they can find a host.

The best method is to place the infested fish in a clean tank and then move the fish to a fresh clean tank each day. By this means any cysts which fall from the fish will be washed away before they can hatch out. It is difficult to treat fishes in a pond and, in fact, I think it would be impossible. This trouble is usually encountered with tropical fishes and it is strange how the pests got into your pond. Any new fishes in the pond could have been infested when introduced or it is possible to find cysts attached to fresh water plants which could have been added.

**I have a garden pond, 6 × 4 feet × 15 inches and would like advice on plants, filtration, aeration and stocking?**

The pond is very shallow and you may have trouble in the winter. However as you live in Northern Ireland, it is possible that you may be in an area where there are few severe frosts. In any case the pond should be cleaned out every early November so that there is nothing left which could decay and cause pollution and an excess of foul gases which could be trapped under the ice. You will be able to get

answers to all your questions, and much more, from my book "Coldwater Fishkeeping". As the pond is small you should not have more than eight two-inch body length of fish. No filtration nor aeration will be necessary if you do not overfeed nor over-stock with fish.

**Can you tell me anything about a fish I have called a Weather Fish? Are there any other coldwater fishes I could have in my pond besides goldfish?**

The Weather Fish, (*Misgurnus fossilis fossilis*), is reputed to become very disturbed when a thunderstorm is approaching but I do not know any certain evidence that this is so. This fish needs no aeration in the tank as it can exist in very muddy or poorly oxygenated water. It has the power of taking air at the surface if necessary. It likes a lot of mulm or fine sand on the bottom and feeds mainly by sucking up mulm and extracting anything edible from it before ejecting it. The fish is very peaceful and has an intesting courtship when the male lies beside the female and appears to embrace her. As many as over a hundred thousand eggs can be laid among plant roots etc., on the bottom. It feeds mainly on small live creatures and soft vegetation.

Providing you have plenty of swimming space in your pond you could add: Golden Orfe; Tench, both green and golden; Rudd, silver and golden and if the pond is large and fairly deep you could add Koi and Higoi.

**I have a garden pond, 10 × 6 × 2 feet in which I have some fair sized goldfish and good class shubunkins. Can I breed the shubunkins without the chance of them being crossed with the goldfish?**

It is possible to breed good shubunkins under your conditions but highly unlikely. The trouble is that shubunkins like all other fancy goldfish are of the same species; *Garassius auratus*. Therefore all types can breed together and so you could have male goldfish fertilising the eggs of female shubunkins. Once spawning starts in a pond, most of the male fishes will join in the chase and so their sperms can fertilise any eggs with which they come in contact. However, there are methods you can adopt to get over this problem. When the fish are spawning you can pick out a good pair of shubunkins, the chaser will be male, and transfer them to a fairly spacious container which is well stocked with fine-leaved water plants It is surprising how soon they will settle down and start spawning again. Leave the fish in the container until afternoon and then return them to the pond. It is usually quite easy to catch spawning fishes as in their excitement they lose much of their fears.

It is also possible to hand spawn the fish you wish to breed. This is best done when the fish have actually commenced spawning as it is easier to pick out a true pair. Get a container ready with clean water and a few plants to take the eggs. I do not advise hand spawning unless the fish are actually chasing and ready. At other times I think that a fish could be injured if it were pressed too much when not ready. Take the female fish in one hand, belly upper most and stroke it gently with thumb and finger from the head part down towards the vent. The eggs should run out easily when the fish is held just under the water. Then repeat the process with the male fish. By this means you can make sure that the eggs obtained will be true shubunkins and not be crossed with goldfish sperms.

**I have a pond, 12 × 6 × 3½ feet with fair sized goldfish, comets and Koi. My trouble is that they eat all the water plants as quickly as I put them in. They eat oxygenating plants, water lilies, even marginals. I saw a large goldfish force itself nearly out of the water to reach a bunch of water forget-me-nots. What can I do, I feed them well?**

It certainly appears that your fishes are very fond of vegetation. I have never had this trouble with fantails and Tench either in pond or tanks. The food you are giving should be enough for them unless you are not giving enough considering the sizes of your fishes. The Koi are fairly ravenous when healthy and so you had better increase the amounts of food you give when the water temperature is suitable. Then you must give plenty of soft vegetation such as boiled green stuff of all kinds, green peas and carrots. You can also try them with boiled wheat. Simmer this until the skins burst and the white inside protrudes. It will be a good idea to provide a fair sized feeding ring tied near one side so that you can see if any food is left uneaten.

**I have a tank, 27 × 12 × 15 inches with four fantails and a 3 inch Koi. The fantails appear to have bedraggled fins, stay at the top of the water and are not eating. What is wrong and can I add six or seven Koi, shubunkins and fantails to the tank?**

There is something radically wrong with your conditions in the tank. You may have been giving more food than could be cleared up by the fishes and so have polluted the water. If the Koi is of three inch body length and the fantails are much smaller it may be that a certain amount of bullying could have taken place. I consider that it is bad policy to have a large fish with smaller ones in a tank. I do not advise you to add any fish at all to the tank until you get conditions better. Your tank will hold about 13½ inches of body length of fish and no more. Handsome though Koi undoubtedly are, I do not advise you to keep them in a tank. They are much better in a good sized pond where they have a chance to grow well.

# MARINE QUERIES

by Graham F. Cox

**READERS' SERVICE**
**All queries MUST be accompanied by a stamped addressed envelope.**

**Letters should be addressed to Readers' Service, The Aquarist & Pondkeeper, The Butts, Brentford, Middlesex, TW8 8BN.**

**I have recently set up a 30 in. × 15 in. × 12 in. marine tank after 4 years of freshwater tropicals and have the following queries:**

**(1) My small Hawaiian Lionfish (Pterois sphex) periodically sheds what appears to be his skin. Is this natural or is there something wrong with the water? The fish is otherwise very healthy and eating well.**

**(2) I have a large white sea anemone (Stoichactis sp.) which has dark objects within the outer edges of its oral disc and a few in its tentacles. What are they and will they harm the anemone? The anemone is otherwise healthy and feeding on lance fish.**

**Finally, I would be very grateful for any information you may have on the black Ribbon Eel. This interesting fish is not mentioned in any of the books I have read.**

(1) *Excessive mucous production in coralfishes.* This is almost always indicative of metal poisoning, i.e. an abnormally high concentration of metallic catious in the seawater. Could you by any chance be using an unpainted aluminium hood and without the additional safeguard of cover glasses?

(2) *Anemones.* These granular often highly-coloured particles with the tentacles and oral disc of anemones are normally clumps of symbiotic zoothanthellae algae and are quite normal. Indeed were they not there you would have to feed your anemone much more heavily than at present.

(3) *Black Ribbon Eel.* I can tell you very little about this fish and its even more attractive metallic blue and yellow cousin from the Philippines except that they are hardy, non-aggressive fishes. However, being related to the dwarf moray eels I would *NOT* suggest that you tempt piscean nature by housing him with anything small enough to fit into his mouth.

**In the early part of next year I hope to convert from freshwater tropical fish to marines. To date I have read 4 books on the subject of keeping marines but I still have a few queries that I hope you will be able to answer for me.**

**My first query is regarding filtration and aeration. My tank is 36 in. × 12 in. × 15 in., and I intend to use two 17 in. × 11 in. under gravel filter plates plus an internal box filter. I also wish to use one of the new "Coral" diffusers and although this will serve its obvious purpose, I want it mainly for decorative purposes.**

**A friend of mine who keeps marines has recommended the "ORION" twin outlet air pump. I plan to use this to operate the filters and diffuser. My first query therefore is do you think my proposal of using 'T' junctions will operate the filter systems adequately or do you think I should buy (if available) an airpump that has four outlets?**

**Secondly, at the moment I have a beautiful piece of bogwood in my freshwater tank. Do you think I would be able to use this in my planned marine aquarium, or do you think it would have an adverse effect on the water chemistry? Of the books I have read, only one (vaguely) mentions the use of wood for decor in the marine aquarium.**

**Thirdly, my tank's total capacity would appear to be around the 23½ gallon mark. I have decided**

**to assume that about 7½ gallons will be lost through rockwork displacement etc. This will leave me with approximately 16 gallons of actual seawater. I estimate therefore that after say 3 months, I could keep about 8 in. of fish in my aquarium. Do you think I have under or over estimated on this matter? Please advise the "inches" of fish you would think to be appropriate.**

**Finally, I have my eyes on fishes such as the blue damsel, yellow wrasse and the Copperband butterfly. I also would dearly love to own a Common Clownfish. However, I *do not* intend to keep any invertebrates and I have read that the clownfish is only happy with those of the same species and that they are in fact "obligate symbionts" in that they cannot survive for any length of time without the anemone. However, I have also read that this is not always so. What is your advice on this matter please, as I do not wish to keep a fish that is not happy in its surroundings.**

**As a matter of interest, I have found quite a lot of contradictory statements in the literature I have so far read (especially on specific gravity).**

(1) *Orion.* I would use the "ORION" solely to operate the U/G filters, and purchase a separate high-pressure/medium volume pump (e.g. Zoobeko/Rena/WISA) to operate via a TEE the internal box-filter and microdiffuser. Use a G-clamp on the line to the box-filter to divert approximately 90% of this pump's output.

(2) *Bogwood* releases too much acid into the marine aquarium. However, you could render it suitable by painting thoroughly with *clear* polyester or expoxide resin.

(3) *Stocking ratios.* Bitterly expensive experience has taught that, whereas 1 in. of fish length to each 2 gallons is a *maximum* stocking density which can be successfully aspired to by a full-time, highly-experienced professional marine aquarist in a well-matured and well-managed aquarium, the average hobbyist is well advised to keep to 1 in. of fish to each 4 gallons for the first 6-12 months experience and then very slowly increase this to 1 in. to each 3 gallons.

(4) *Your choice of fish.* The fishes you have mentioned sound good. However I would warn that you must make absolutely certain that the Blue Damsel you choose is *Pomacentrus caeruleus* (the Electric-blue Damsel) from the Philippines and *NOT* one of the ultra-aggressive, similar-looking species from Ceylon.

(5) *Clownfishes. All* clownfishes would prefer to live in close association with an anemone given a choice in the matter. Indeed, at least two species *A. perideraion* (Pink Skunk Clownfish) and *A. akallopsis* (Orange Skunk Clownfish) will pine away and die within 2-3 weeks if denied access to an anemone.

On the other hand, some clownfishes which we have bred in the laboratory (*A. percula*) are now over 15 months old and have never seen an anemone in their lives. Two other clownfishes which can achieve a substantial independence from anemones are the Tomato—or Fireclownfish and the Maroon Clownfish. I would stress however that clownfishes which are denied access to anemones *NEVER* have the same colour intensity, vitality, appetite and willingness to spawn as clownfishes kept with an anemone.

(6) *Specific gravity.* Since you seem to be specialising in coralfishes from Filipino water, you should adjust your S G. to read 1·019-1·021 at 76° F-78° F.

---

# KOI QUERIES

by Hilda Allen

**I am now convinced that filtration is beneficial to Koi and am grateful for your advice after I became converted. However, your recommendations may vary from time to time and I wonder if you can advise on the number of Koi I may keep in my pond.**

I was pleased to receive your letter with its constructive criticism and perhaps I can explain some of the problems involved.

In most cases I am expected to be specific in relation to a certain pond and set of circumstances. It would take a whole book to consider every aspect and I can only hope that readers will be able to arrive at some general conclusions on the gentle art of keeping Koi.

The need for filtration and the results obtained certainly vary from pond to pond and may be successful or otherwise, the variables are endless. Even so, I do not advocate a higher rate of flow through the filter of more than 10 gallons per square foot area per hour and through a large filter would be happy with less.

On the subject of the number of Koi you may keep, I have deliberately not given the details of your pond because I would like to take this opportunity of indicating this in relation to the surface area as a simple guide.

| Length of Koi in inches | Surface area of pond in square feet | | | | | |
|---|---|---|---|---|---|---|
| | 80 | 100 | 150 | 200 | 300 | 400 |
| up to 6 | 18 | 24 | 36 | 50 | 88 | 145 |
| 8 | 12 | 16 | 25 | 36 | 63 | 105 |
| 10 | 9 | 12 | 19 | 28 | 48 | 80 |
| 12 | 7 | 9 | 15 | 22 | 38 | 62 |
| 15 | 5 | 7 | 11 | 16 | 28 | 45 |
| 18 | — | 5 | 8 | 12 | 20 | 32 |
| 21 | — | — | 5 | 8 | 13 | 22 |
| 24 | — | — | — | 5 | 9 | 14 |

Assuming an average depth of 2½ feet, the volume of water in a pond will not be less than about 15 times the area in square feet. Thus, a pond 200 sq feet would hold about 3,000 gallons. Dependent on the extent of filtration, aeration, partial water changes, and attention to general hygiene the number of Koi may be increased, particularly in larger, deeper ponds.

Allowance for growth must be made and the factor for bulk is greater than that applied to length. Therefore, if stocking with very small Koi it is advisable to plan the number of fish at no more than that given for the 12 inches length until gaining experience.

**Some of my fishkeeping friends refer to the pH of water but I am a little nervous of asking what this means. Can you explain this phenomena and how it could affect my Koi.**

The abbreviation pH stand for potential Hydrogen and the pH value is a number used to denote degrees of acidity or alkalinity in a solution as may vary by the concentration of hydrogen ions. The neutral value of 7 can be associated with mains supply water as this is usually neither acid nor alkaline. Any value less than 7 indicates an acid condition and values above 7 indicate an alkaline condition.

Test kits, complete with instructions, are available to measure the pH value of water. Some Koi keepers have tried to maintain a steady pH value in their ponds by adding various chemicals, but as the pH is constantly changing throughout the day, or may not even be the same in different parts of the pond, I think it is a forlorn hope to try to maintain a steady pH in large volumes of water.

Pond fish prefer an alkaline water and fortunately this occurs naturally in a well managed and filtered pond so that there is little need to worry unduly about pH.

If tests are made, you may find a pH value of between 7·2 and 7·4 which is ideal. Rapid changes in pH, the same as applies to other conditions, can affect the behaviour of Koi. Apart from dirt and pollution in rain water, it can also be quite acid and a torrential downpour after a dry spell in summer can be unsettling for a day or two until both Koi and pH readjust. I am not in favour of using water collected from roofs, the hazards to fish are too great in these days of industrialisation to out-weigh any benefits.

**Is it possible to have a Koi-pond that is also well planted, opinions seem to vary on this subject. Are plants a good idea or do hungry Koi eat them?**

Much will depend upon what you hope to achieve and I will explain the pros and cons of having plants in Koi-ponds. Water plants are very beautiful without doubt and provide useful shade in summer besides being a protection for smaller Koi; it is quite usual for Koi-keepers to start with plants. On the other hand, water lilies especially can obscure small Koi from view and by hiding, do not easily become tame.

Oxygenating plants perform a useful function most of the time but can be a positive menace in producing carbon dioxide during the hours of darkness. Many

people still fail to realise the dangers of over-planting resulting in oxygen deficiency at nights, especially during the summer months. Or the consequences of sealing both fish and plants under ice in the winter, aeration of water by other means is much more satisfactory. Plants have to be set in some growing medium, usually in a container, which may in itself be hazardous. Healthy Koi will certainly try to sift through any soil in search of food, usually to the detriment of the plant and the cleanliness of the pond. Koi graze on algae but I am not convinced they eat plants. They can certainly damage plants by their activities and the powerful suction action of large Koi mouths is quite capable of wreaking destruction upon growing leaves and flowers. I like Koi and I like plants, especially water lilies; small Koi appreciate their shelter but large Koi do make a pond untidy with the litter of broken stalks, leaves, buds or even roots. I now grow water lilies in barrels or tubs around the garden, and the Koi have a bare pond. There is no reason why you should not start off with both Koi and plants, you will have the pleasure of seeing what happens.

**Can you please supply me with the names and addresses of reliable Koi-dealers in my area as I have no experience of buying Koi?**

Before you consider buying any Koi you should know what you are looking for. Choice of variety is a personal matter and may range from the metallic ohgons to coloured, patterned fish in practically every colour of the rainbow. Health is most important and any Koi that are thin, to give the impression of a large head with a pinched-in body are not recommended. Scales should always lay flat and the skin should have no dull patches, indicating loss of natural mucous. Eyes should appear bright and not dull or sunken. Fish with any wounds, swellings, spots or raised scales should be avoided. Koi are active fish but it is not always easy to judge the effect of life in a confined space, but if the fins are kept close to the body, or if the fish stays by itself in a corner or has difficulty in maintaining an even balance, then sickness can be suspected. It is wise to look for external parasites. such as white spot, fish lice or anchor worms. Fish appearing to have difficulties in opening or closing their mouths or when the gills are not working properly may have flukes.

The introduction of any disease or parasite into a pond can create enormous problems and the rule of quarantine should be strictly observed. Koi can be upset by being moved or by changes in water conditions, etc., so that if isolated, if only for a few weeks, this should give at least some guide to general health. Buying Koi is not always easy and notice should be taken also of the premises. Dealers having dead or dying Koi on show are to be avoided as others are much more anxious to provide a good service.

---

# *BOOK REVIEW*

Wildwoods Book of Ponds and Aquariums. Wildwoods Water Gardens Ltd. Theobalds Park Road, Enfield, Middlesex, EN2 9BW. 60p (75p Post Paid).

The *Wildwoods Book of Ponds and Aquariums* is good value for the price. It is divided into two sections. Up front ponds made of glass fibre, semi-rigid plastic and long-life waterproof sheeting are adequately dealt with, including their installation, planting, stocking with fish and proper care the year round. The rear half deals with the heated freshwater and marine aquarium. Regrettably the *Wildwoods Book of Ponds and Aquariums* is limited to no more than 48 pages, including illustrations. The pages, however, measure about 12 in. by 8 in. This large page size has permitted a goodly spread of illustrations among the well-written text. (The absence of misprints and spelling mistakes is added attraction.) Colour as well as black and white has been used to great effect. The reproductions of colour photographs of ornamental pond fish (16), marginal plants (8) and water lilies (8) are faithful and pleating. Full marks, too, for the six colour plates of various fishes, coldwater and tropical, bogside, shallow water and floating plants. They should prove invaluable to those who are not too familiar with a wide variety of fishes or water plants and need an accurate visual guide to identification.

Price lists for *Garden Ponds, Accessories, Plants and Fish, Aquariums, Accessories and Plants* and Information Leaflets entitled *All about Fungus Infection* and *All about Green Water* are available. All that is needed to obtain them free is a stamped self-addressed envelope.

Jack Hems

# Commentary

## by Roy Pinks

A COLLEAGUE of mine has just moved house from London for reasons of business, and has settled not far from where I live. He came to see me recently with a particularly upsetting tale of woe which once again underlined how important it is to get advice before undertaking major changes in fishkeeping arrangements. The circumstances were that he had a magnificent pond in his old location which contained, amongst others, a greatly loved and prized specimen Golden Orfe, some of whose young were much in evidence at the time of the move. There were numerous Goldfish, too, and some Tench. The Orfe, some 13 in. in length, was of a size which suggested that the new pond should be bigger than the old one, and of worthy contours to accommodate such a fine fish.

He duly worked very hard and constructed a pool with a liner, incorporating features which he considered were good practice, and which were indeed sound enough. He had enough time for initial preparation and took infinite care in transporting the fish when the time came for them to transfer to their new home. He was seasoned enough to take a few at a time and, of course, the Orfe went sole. I was, incidentally, greatly intrigued as to how he had managed to breed Golden Orfe in a garden pool, as this is a rare achievement even in these days of refined technology, and he attributed much of his success to feeding his fish on cat food. The type in question is that which is marketed in biscuit like form, and this in itself seemed unusual as I have not met this recommendation elsewhere, though amongst the cognoscenti this is no doubt an accepted ploy. The results spoke for themselves, and I am almost tempted to buy a tin of this product, much as the thought basically appals me!

The new pool is always under strain in its first season as the various elements wrestle with one another for supremacy, and in most cases the outcome is highly predictable—green water and other manifestations of algal increase and excess. Such was the way of this pool, and almost inevitably its proud owner reached out for the bottle of algicide and applied the contents to the teeming waters. The first sign of trouble was that a number of fish suddenly began to take spasmodic and frantic jerks, rather than the normal smooth planings which characterize trouble-free motion. Many of them finished on their sides, gasping and aimless. At this stage the pundits will tell you to net them and apply Lotion X, but they omit to tell you how to net fish in a large and quite deep pond. It was thus impossible to do much in the beginning of this tragedy, as the fish generally dived for the bottom when chased, and they remained there, some for good. The next thing was the death of the prize Orfe, which was found on the pool surround: it had evidently jumped out in its agony and expired. Most of the other fish by then were floating up, some dead, others in great distress, and their owner transferred all he could catch into external containers of fresh water. He then emptied the pond, scrubbed it out, washed the water plants and replaced them, and then ran it another quota of water. The surviving fish, including some of the young Orfe, were then replaced. None behaved normally, and most had clamped dorsals and difficulty in breathing. He now faces complete replacement of his once fine collection.

Our post mortem discussion began with his rueful admission that the bottle of algicide did state, in small print, that if fish were present the dose should be at a lower rate, and he agreed that he should have been more careful. He was, however, puzzled by the behaviour of the fish and by the slimy appearance of his surviving water plants. I explained that what he had described was typical of gill failure, and that this had almost certainly been brought about by an acute oxygen deficiency arising from the collapse of not only the algae but also many of the oxygenating plants in the pool. He took the point that green water, far from being harmful to fish, is usually extremely beneficial, if a trifle unsightly. The damage to the gills, especially in the oxygen loving species like Orfe and Rudd, is usually irreversible, although in some instances revival can be achieved by vigorous oxygenation. But this treatment must be applied early in the disintegration process, and it doesn't always work.

He is now beginning all over again. I hope to enable him to restock with plants, because my pool has overgrown itself in the past year and I have plenty of surplus. But it will take him many years to achieve breeding Golden Orfe again, but we will wish him success. Fishkeepers are very determined as a species, and the more terrible the mistakes, the more dedicated they tend to become in attempts to

prevent their recurrence. But I do wish that manufacturers of things like algicides took more care in stipulating the correct dosage. It just isn't good enough to say that if there are fish present, reduce the dose. It should be stated by what proportions it should be reduced for particular fish types. Better still, the stuff should not be sold at all.

The somewhat unusual type of food mentioned above prompts me to consider for a moment just what modern fish foods actually achieve. If we are to believe the advertisements, and there is no reason to doubt them, they provide a full range of the essential foodstuffs calculated to keep fish in good condition and possibly to induce them to breed. But I have been quite unable, after practical experience of most of them, to agree that the type produced for marines is markedly better for marines than, say, the staple food, which is usually cheaper. Equally, I have found that marine food fed to freshwater fish has very similar results to the freshwater version, and, all in all, there is considerable flexibility as between one type and another, both in terms of appeal to the fish and in general performance. This is all very useful to the fishkeeper who keeps all sorts of fish, because if he runs out of one sort of food he can always offer the contents of some other packet with reasonable confidence that, if anything, the change of diet will be beneficial rather than otherwise. So, some of the more extravagant claims about the benefits of this or that food will be seen for what they are.

Without detracting in any way from the conscientious way in which the chemists have produced such acceptable dried foods as they have, I still wonder how our present day fish would look if they were still fed on the range of products which existed, say, 40 years ago. The ant "egg" and the biscuit-like fragments which we used to pour into our tanks produced some astonishingly good results, and I wonder whether any readers have recently experimented with "iron rations" for any of their charges. There is no special reason today why one should subject domestic fish to starvation diets just to save a few pennies, but it would be interesting to observe the physiological effects of a regime based on products which are now openly scorned.

I well remember a number of pet goldfish in my youth, which never received anything but ant "eggs," and which thrived mightily. They were given a swim in the long stone kitchen sink every Sunday morning whilst their tank was being cleaned out, and as the water straight from the tap was near freezing point for most of the winter, equalization of temperature was something which seemed not to matter, as there was never any suggestion of disease or bodily malfunction. Did the ant "egg" have, in fact, more food value than is now claimed? I note that this food is still readily available, and presumably many aquarists still use it. Dried *daphnia*, on the other hand, is fairly generally applauded as an acceptable item of diet, but on the face of things it is not very impressive.

Obviously, a diet comprising about equal parts of live food and dried food is going to be more acceptable to fish and more productive in terms of results than one which is unchanged over a long period, or so it would seem. But I have run two tanks during the past year on an unchanged diet of Phillips flake food: one was marine, and the other freshwater, both tropical. The results were decidedly better in the marine tank than in the other. As this was not a controlled experiment the less successful freshwater tank could be explained away by factors unrelated to diet, but what was interesting was the highly satisfactory development of the chromis and the damsel in the marine tank, which not only looked a picture of health from the outset to the present day, but which put on size proportionate to the expectation of the two species.

# The Sacred Lotus

by Philip Swindells

THE SACRED lotus or nelumbium is one of the most fascinating aquatics the hobbyist can grow. Several species and varieties are cultivated, all with handsome glaucous plate-like foliage held high above the water on centrally placed petioles. The upper surfaces of the leaves are coated with a thin waxy substance so that when a drop of water falls on to them it runs about like quick-silver. The waterlily-like blossoms are borne on long slender peduncles which extend to just above the foliage and are followed by curious seed heads which resemble the roses of small watering cans.

Cultivation is not difficult if cool greenhouse protection can be provided. The whitish banana-like rootstocks are started into growth during March and early April, being planted in round tubs in a heavy loam compost enriched with a handful of coarse bone meal. Plant horizontally, about an inch beneath the soil and then add two or three inches of water. As the young foliage emerges, gradually raise the level of the water until it is about nine inches deep. Routine summer care is confined to watching for aphids and supporting any foliage that becomes top heavy. As autumn approaches, the water is slowly drained off so that the foliage dies down. The roots can then be lifted and washed ready for overwintering in boxes of damp sand kept in a frost proof shed.

Propagation is usually effected by breaking off the tubers at the points where they narrow, ensuring that each portion has a terminal shoot, and then planting in the normal manner. In addition, the species can be teproduced from seed sown singly in pots of heavy loam and placed in a tank of water which is kept at a temperature of 75-80°F. Following germination of the seedlings the juvenile leaves will float on the surface of the water, but as the plants become stronger they are thrust above it in typical fashion. Once large enough to handle comfortably they can be potted in the same heavy loam, but with a sprinkling of coarse bonemeal added. After two years or so they will have reached maturity and can then be expected to run into flower.

Two species of nelumbium are commonly grown, the American lotus or water chinkapin, *Nelumbium luteum*, and the Hindu lotus, *N. speciosum* (*N. nucifera*). Both have similar characteristics and require the same growing conditions, although the North American *N. leteum* is somewhat hardier. This latter is a handsome plant with immense leaves two feet across carried on stems up to three feet high. Its blossoms are pale sulphur yellow attaining a diameter of eight inches when fully open, almost twice the size of those of its variety *Flavescens*. This, although smaller, is exceedingly attractive and sports a conspicuous red spot at the base of each petal and in the centre of every leaf.

*Nelumbium speciosum* is a much taller species, which in its natural form may attain a height of six feet. With blossoms like huge rose-pink chalices a foot or more across and large plate-like leaves it is a plant that few hobbyists can accommodate satisfactorily. However, there are a number of diminutive hybrids that seldom exceed a foot in height and are complete miniature replicas of the species. The pygmaea group embrace the best known kinds and include the pure white *N. pygmaea alba*, fully double *N. pygmaea alba plena* and the tiny rose-pink *N. pygmaea rosea*. A recent introduction from Japan is even finer and once it becomes more readily available in this country should prove quite popular. Called *N.* '*Momo Botan*', it thrusts up typical lotus foliage from a small well behaved rootstock and produces fully double tulip-shsped blossoms of deep rose-pink. All the shorter varieties can be grown successfully in a small tub and stood outside during the summer, or else planted in a conventional circular planting basket and placed in the garden pool for the warmer weather.

Susceptibility to frost has always been a big drawback with nelumbiums, and the main reason why they have not achieved the popularity they undoubtedly deserve. However, in recent years major developments have taken place and at least one attractive cultivar can now be tentatively suggested for outdoor culture. This is *N.* '*Mrs. Perry D. Slocum*', a hybrid between *N. luteum* and *N. speciosum*, which it is said since its introduction in 1965, has proved hardy, if grown in a foot of water, throughout most of the United

States and Canada. Obviously if it can survive such hardships, it should prove perfectly hardy here. Sadly it is rather tall, reaching up to five feet, but with imposing blossoms of deep rose-pink passing through apricot to soft creamy-yellow with each succeeding day.

Finally, I must just mention some of the taller growing varieties of *N. speciosum*, for although often difficult to accommodate, they do deserve attention. The magnolia lotus, *N. speciosum var. album*, with expansive blossoms of cool icy-white, *N.* '*Osiris*' sporting huge globular rose-pink blooms like silky brandy glasses and the rare and beautiful *N.* '*Madame Paufique*' proudly displaying creamy-white goblets flushed with carmine. For those who consider fragrance the prime virtue, few aquatic plants can surpass the deep crimson flowered *N. pekinensis rubra*.

*Nelumbium nucifera* Harold Langford, ARPS.

# *Only a few more weeks to–*

# *'The Aquarist' Fishkeeping Exhibition*

The countdown has entered its final phase and, by now, fishes from all over the country will be coming into peak condition for display at THE AQUARIST FISHKEEPING EXHIBITION at Alexandra Palace.

An attempt has been made to accommodate everyone's favourite fishes—you'd be surprised how many of those there are—and in consequence there are no less than *thirty-three* opportunities for *you* to win a First Place with your fish. It doesn't matter if you're not an Aquarist Society member, if you think you've got a winner in your tank bring it along and perhaps surprise the Establishment! Although the thought of competing may be a little daunting for the "first-timer," there will be plenty of people to help make your competitive debut as painless as possible; the entry form is pretty straightforward, but if you can't quite understand it fill in as much as you can anyway and send it off by the *1st July*. By the time that you arrive at the Show to bench your fish we'll have sorted it into its correct Class!

Classes we're particularly looking forward to seeing (well, we've got favourites too!) are the more uncommon LIVEBEARERS (and their families) in Classes T and XT; the ANGEL OF ANGELS competition (Class Da); and the wide range of COLDWATER FISHES, such as the Common, and Fancy Goldfish, Sunbasses, some of our native fishes and, of course, those marvellously coloured Koi.

Now that we've antagonised the rest of the exhibitors bringing other species, we hasten to add that the aforementioned Classes are in no way more important than any others as far as the hobbyist is concerned, but it was felt that the visiting non-fishkeeper might find in these Classes attractions that represented many of the different aspects of the hobby. Having had their appetites whetted by these Classes, who knows what they'll make of the multitude of other fishes on display? Barbs and Characins, Loaches and Labyrinths, Cichlids and Killies, Catfishes and Rasboras, Livebearers and Danios will all be clamouring for attention, and we hope that a fair proportion of visitors will learn about fishkeeping as a result of *your* keenness to fill the shopwindow of the hobby with the best turnout of fishes that London has seen for a long time. Can you try to embarrass the Show's Organisers with *too many* entries? We hope you can! If you can't manage a fish or two, why not try a Reptile or an Amphibian—there's a Special Invitation Class for them too.

***DON'T FORGET!!*** Tickets may be bought in advance of the Show *by post*, at very advantageous DISCOUNTS for 20 or more. Send off today, (details elsewhere in this magazine) and avoid the queues on the day.

***DON'T FORGET!!*** Fish entries to the FBAS Show Secretary, Laurie Brazier, (66 Ormesby Way, Kenton, Middlesex) by the 1st July 1979.

***DON'T FORGET!!*** We'll be waiting to see *you* at the Show, whatever your fish fancy, on the 13th-15th July at Alexandra Palace, you'll be sorry if you miss it!

Dick Mills, Chairman, FBAS Show Committee

***STOP PRESS***

At the time of going to press, we are pleased to announce that the Trophies will be presented at the Show by BBC TV's Weatherman, Mr. Michael Fish so why not come along to meet a real Mr. Fish in addition to our more normal acquaintances?

# The real fish diseases

*by Dr. D. M. Ford of the Aquarian Laboratories*

FARMING OF ANIMALS has necessitated research into the husbandry of many species, particularly the treatment of disease. The farming of fish is an ancient art, but since it was only introduced into the technologically advanced countries in recent years, scientific research into fish diseases has only just begun. In the past, with ample wild stocks of edible fish, there was no incentive to research fish diseases and parasites other than for identification, morphology, ecology and such academic studies. The position of ornamental fish was even worse than edible fish. No scientifically-based study of aquarium or pondfish was undertaken at all, and as the hobby grew over the last 50 years or so, aquarists had to rely on their own very practical identification and treatment of pet fish diseases. It is a monument to the ordinary aquarist's dedication and ingenuity that so many exotic fish can now be kept under what would be very intensive farming conditions, without massive fatalities. Also for the very effective range of chemotherapeutic agents available to treat the many parasitic infestations that plague all species of fish. Even the proprietary medicines and remedies are only copies of the home-made formulae developed by hobby aquarists over the years.

The situation is now changing. Research units under the control of Veterinarians and Biologists are springing up all over the world as wild fish stocks run out and farming of fish becomes essential. There are 12 Veterinary Investigation Units in England and Wales where the facilities and expertise are available to identify fish diseases. Northern Ireland has one such unit and Scotland boasts the world's only Unit of Aquatic Pathobiology at the University of Stirling. At Stirling, qualified vets can take a post graduate course in fish pathology.

The U.S.A. runs many fish disease courses for both amateur and professional ichthylogists. Even the U.S.A. Armed Forces Institute of Pathology has a syllabus on the Pathology of Fish Diseases. The Eastern bloc countries have a long tradition of the study of parasitology and diseases in fishes reflected by the large number of research papers, books, symposia and conferences, especially in the U.S.S.R. Papers on fish diseases are being catalogued in computer reference banks at a rate of around 2,000 annually.

The "spin-off" for the aquarist is obvious and all hobbyists can look forward to new and better treatments for their diseased pet fish in the near future. Meanwhile, what about the mountain of information available in the literature? At the end of this article is a bibliography on the subject of fish diseases. Most of the papers listed in the books' reference section are available at the British Lending Library, Boston, Spa, Wetherby, W. Yorks. LS23 7BQ (to whom enquiries should be made about their services).

Reading these books and papers will soon show that the "popular" aquarium books list diseases in a very different, and often far too simplistic, manner. The following are typical examples of the imprecise (but not necessarily inaccurate) nomenclature of the popular ideas on fish diseases.

**Symptoms**

A symptom (often misspelt sympton) is actually a manifestation of disease as felt and described by the patient, as opposed to a sign which is a manifestation of disease apparent to the observer. Hence no animal can show symptoms, simply because they cannot speak. A fish can only show signs of a disease—although in American-English the terms are synonymous.

**Dropsy**

This condition is not really a disease but a sign (symptom) of a specific disease problem. The well known signs of Dropsy are a swelling of the body with consequent raising of the scales (the correct name for this condition is Ascites). It may be due to bacterial activity in the body cavity and the bacterium *Aeromonas hydrophila* (formerly *punctata*) has been associated with the disease. More often, however, incision of the swelling shows the body to be simply full of water. A freshwater fish (unlike marine fish) is continuously "drowning" in its aqueous surroundings because of the osmotic effect. Osmosis is the passing of water through a membrane in order to equalise the concentration of dissolved compounds each side of that membrane. The fish is the membrane

and the body fluids are the dissolved compounds, hence water is continuously being absorbed. The fish maintains its body fluid concentration by excreting this water continuously via the gills and kidneys. Any pathological condition that interferes with this process leads to a watery build-up and hence Dropsy. This includes kidney diseases, of course, but also growths, benign and malignant, and post mortem examinations have often shown heart failure to be a major cause because any reduction in the blood circulatory system inevitably leads to reduced efficiency of water excretion.

**Popeye**

Exophthalmos is the correct name for this sign of disease. However, in many cases histological examination of the eye during post mortem study shows no sign of a specific eye condition at all. Often it is simply another dropsical condition—water build-up causing the eye to swell because of some other disease problem as described above. However, the eye itself may be infected and Almeida *et al* (1968) isolated seven different micro-organisms from fish with diseased eyes.

**Mouth Fungus**

This all too common complaint became known as a Fungus because it resembles the cotton wool growths of Fungus (Saprolegniasis) seen on the fins and body of pet fish. Microscopic examination, however, will reveal no threads of a mould parasite, but the single slender rods of a bacteria *Flexibacter columnaris*. This is a gliding bacterium of the Order Cytophagales. At one time the bacteria was classified as a member of the Myxobacterales called *Chondrococcus columnaris*. Myxobacteriales are also gliding or slime bacteria and are unusual in that they only cause disease problems in fish and do not affect higher vertebrates.

**Fungus**

The parasitic fungus disease (Dermatomycosis) is very common in both aquarium and pond fish. It is usually considered, and treated, as a primary disease condition. The spores of the fungi involved, such as *Saprolegnia thureti* and *Achlya prolifera* are present in all mature waters and cannot be eradicated. Hence a fungal infestation must always be a secondary disease, or fish would be permanently affected by the moulds. The primary problem may be physical damage, of course, as well as disease or infestation.

**Ichthyophthonus**

Many aquarists may have heard or read of this disease but never actually seen it. This is because the causitive agent is the organism *Ichthyophonus hoferi* or related species. They are only clearly visible under the microscope, although cysts can just be seen with a hand lens. The cysts and the amoeba-like

Exophthalmos or Popeye may be a specific eye condition but often is an indication of disease elsewhere in the fish's body.
*Courtesy Aquarian Laboratories.*

This is a microphotograph of a goldfish's gills showing a family of flukes, Gyrodactylus species, the next generation of parasites can be seen inside the bodies of the parents.
*Courtesy Unit of Aquatic Pathobiology, University of Stirling.*

A goldfish with Carp Erythrodermatitis or Body Rot—a typical condition, where chemical treatment will not be effective and so antibiotic therapy is required.
*Courtesy Unit of Aquatic Pathobiology, University of Stirling.*

stages of the parasites are usually to be found in internal organs, where they do enormous damage. Unfortunately there is no cure for this disease, and the fish die as some vital organ ceases to function. Isolating and treating the parasite with chemotherapeutic agents is effective in destroying the cysts and ameboid stage. Phenoxythol is one such chemical, available in various proprietary remedies. However, dosing the water or the fish's food with the chemical has no effect on the *Ichthyophonus* cysts because it is surrounded by necrotic (dead) tissue as well as being buried deep within the fish's body, so the chemical cannot reach the parasite even if absorbed.

**Fish T.B.**

A "wasting-away" disease in fish is usually tuberculosis. This is not the human disease but a specific group of tubercle bacterium that are pathogenic to fish. These are the *Mycobacterium* spp and Van Duijn (1973) lists six species isolated from various affected fish. Just one of these species, *Mycobacterium marinum* that affects marine fish, is also pathogenic to humans causing ulcerous skin conditions. (Remember this next time you start a siphon by sucking the tube). Again there appears to be no effective cure although antibiotic treatment has had some limited successes.

**Flukes**

Most aquarists can recognise body flukes by the "flicking" actions of the infested and irritated fish. The usual dip methods or in-tank treatments are used to irradicate these parasites in fresh water aquaria (usually *Gyrodactylus* a livebearing animal). This treatment is usually effective. However, microscopic examinations of infested fish almost invariably show gill flukes are present as well. The gill fluke may be the *Gyrodactylus* species but is more often the *Dactylogyrus* of confusingly similar name. This parasite however is an egglayer, and the eggs are unaffected by chemical treatments. Hence, some three or four days after clearing the body flukes the gill flukes re-emerge. A survey by the Unit of Aquatic Pathobiology at Stirling, placed gill fluke disease as the most common problem in aquarium fish, after the White Spot and Fungus infections, (T.B. was next).

**Treatment**

It should be obvious from the above information that the common pet fish diseases are much more complicated than the hobbyist books would indicate. For the same reason the popular remedies and treatments are often ineffective, giving rise to the belief that "a sick fish is a dead fish."

As indicated in the introduction, new remedies are being developed. Until these are available it is recommended that the following treatments are tried.

For the bacterial diseases, e.g. Mouth Fungus, Fin Rot, Body Rot, and inflammed lesions associated with ordinary Fungus, as well as Dropsy and Popeye that will not respond to the usual proprietary chemotherapeutic agents, an antibiotic is recommended. The ideal treatment would be to culture the bacteria involved in the disease, on a blood-agar plate with a multodisc *in situ* (these are paper discs impregnated with a range of antibiotics—it is obvious within a few hours which chemical prevents the bacteria growing). Such sophisticated equipment is not available to the hobbyist although he may be able to consult a veterinarian, especially if a veterinary hospital or investigation centre is near. Without this information, it is recommended that a general purpose antibiotic is used.

It is illegal in the U.K. to sell antibiotics without prescription and so no commercial product for dealing with fish diseases can contain such compounds. The antibiotic of choice is Oxytetracycline because it is a broad spectrum antibiotic and will act through the aquarium water. The two drawbacks are that it colours the water and its breakdown products are toxic. Oxytetracycline is obtainable on prescription from Pfizer Limited as Terramycin (soluble powder). The prescription (or compound itself) should be obtained from your local veterinary surgeon (see telephone directory yellow pages).

Terramycin contains 55g Oxytetracycline hydrochloride per Kg. and dosage has been found to be optimal at 13 mg/l Oxytetracycline hydrochloride. One level teaspoon of Pfizers' Terramycin contains 200 mg. of Oxytetracycline hydrochloride, so the average tank, 24 in. × 12 in. × 12 in., holding 50 litres, needs $\frac{13 \times 50}{200} = 3\frac{1}{4}$ teaspoons.

For other size tanks or containers (it is best to isolate a sick fish for treatment) use about ¼ teaspoon for every 10 litres (one gallon equals 4·546 litres). Predissolve the Terramycin by vigorously shaking with some of the tank water and pour into the tank. The water will redden. Keep the fish in the solution for up to a week and closely observe the effect. If the fish is distressed, do partial water changes. If the water blackens, this is evidence of the toxic by-products being produced; also do partial water changes until clear and then repeat the original dose.

Do not use Terramycin where an undergravel filter is in use, especially in a marine aquarium. The separate medicine tank can be bare (perhaps with a plastic plant to give the fish some cover) and treatment should be completed before any filtration problems (or nitrite problems in marine tanks) occur.

**Gill Flukes**

The chemical of choice for irradication of gill flukes (and body flukes) is a solution of Formaldehyde. This is an unstable compound and so proprietary

remedies based on the chemical are not available. The chemical can be purchased from most chemists, however, as a solution of strength 30% to 40% called Formalin. Some Methanol (methyl alcohol) is usually included as a preservative and this is very poisonous to fish, of course, but at the dose levels quoted below, it will not prove toxic. Formaldehyde tends to polymerise (combine with itself to precipitate in a form called paraformaldehyde). Unfortunately this chemical is also poisonous to fish, so the Formalin must be fresh stock, free of any precipitate. This should be explained to the Chemist when collecting the solution. A 25 ml. sample will cost about 30p. Discard any solution left over from the treatment.

The dose rate is two drops per gallon added to the main aquarium if fresh water, or a medicine tank if salt water. This is because the Formalin will kill nitrifying bacteria in a salt water tank's undergravel or power filter. No carbon should be present because it absorbs the chemical. The fish should be closely observed and if obviously distressed carry out a 50% water change. This is because sensitivity to the chemical varies with species, their size and age, but, on average, two drops per gallon is tolerated.

Three days later carry out a 50% water change and then dose again at two drops per gallon. This second treatment is to kill the parasites hatching from *Dactylogyrus* eggs (which will have survived the first treatment). Two days later the normal partial water changes can be resumed, or the fish replaced from its medicine tank.

**Warnings**

When adding any chemicals to the aquarium, local concentrations must be avoided since these will harm the fish. Keep the bulk water stirred by good aeration and/or filtration. Draw off some of the water, add a small part of the premeasured chemical and slowly dribble it back into the aquarium. Repeat until the full dose has been given. Observe the fish's reactions throughout so additions can be stopped if panic reaction is seen.

Tests have shown Discus to be very susceptible to Terramycin and the recommended dose levels will kill them in a few hours, therefore use a half dose with this species. Regrettably, this antibiotic, and similar antimicrobials, are ineffective with hole-in-the-head disease of Discus.

If a diseased fish dies the body should be burnt, or placed in a dustbin for collection for incineration. Never flush it down the toilet or throw it into a river or pond since the pathogens may then be spread into the water ways.

Finally, it must be stressed yet again that good husbandry, particularly good water quality, is the best way of keeping fish healthy. Dosing the fish and water with chemicals will not compensate for bad husbandry.

**References**

Almeida *et al* (1968) Tropical Fish Micro-organisms, J. Fish. Res. of Canada, Vol. 25 No. 1 1968 pages 197 to 201.
Van Duijn (1973) see bibliography No. 1.

---

## BIBLIOGRAPHY OF BOOKS ON ORNAMENTAL FISH DISEASES

PRICES are quoted where known but can only be approximate. The order is in preference for ornamental fish disease information and does not reflect scientific quality.

1. Diseases of Fishes by C. Van Duijn Jnr. 3rd Edition, Iliffe Books, London (1973) ISBN 0-592-00072-9 (372 pp. Hardcover) £6.
2. Textbook of Fish Diseases by Erwin Amlacher translated by D. A. Conroy and R. L. Herman, TFH Publications (1970) ISBN 0-87666-037-5 (302 pp. paperback).
3. Parasites of Freshwater Fishes by Dr. G. L. Hoffman and Dr. F. P. Myer, TFH Publications (1974) (224 pp. paperback).
4. Fish Pathology, by Reichenback-Klinke, translated (from German) by C. Ahrens, TFH Publications (1973) (512 pp. paperback).
5. Diseases of Fishes, Book 1: Crustacea as Enemies of Fishes by Z. Kabata. Edited by Dr. S. F. Sniezko and Dr. H. R. Axelrod, TFH Publications (1970) (171 pp. paperback).
6. Diseases of Fishes, Book 2A: Bacterial Diseases of Fishes by G. L. Bullock *et al* and Book 2B: Identification of Fish Pathogenic Bacteria by G. L. Bullock. Edited by Dr. S. F. Snieszko and Dr. H. R. Axelrod, TFH Publications (1971) (196 pp. hardback).
7. Diseases of Fishes, Book 3: The Prevention and Treatment of Diseases of Warmwater Fish under Subtropical Conditions, with Special Emphasis on Intensive Fish Farming by S. Sarig, Edited by Dr. S. F. Snieszko and Dr. H. R. Axelrod, TFH Publications (1971) (127 pp. paperback).
8. Diseases of Fishes, Book 4: Fish Immunology by D. P. Anderson, Edited by Dr. S. F. Sniezko and Dr. H. R. Axelrod, TFH Publications (1974) ISBN 0-87666-036-7 (239 pp. paperback).
9. Diseases of Fishes, Book 5: Environmental Stress and Fish Diseases by G. A. Wedemeyer *et al*, Edited by Dr. S. F. Sniezko and Dr. H. R. Axelrod, TFH Publications (1976) ISBN 0-87666-463-X (192 pp. paperback).
10. Fish Pathology, Edited by R. J. Roberts, Baillière-Tindall, London (1978) ISBN 0-7020-0674-2 (318 pp. hardback) £21.
11. The Pathology of Fishes, Edited by W. E. Ribelin and G. Migaki. The University of Wisconsin Press (1975) ISBN 0-299-06520-0 (1004 pp. hardback) £24·50.
12. Parasitology of Fishes, Edited by V. A. Dogiel *et al* translated (from Russian) by Z. Kabata, TFH Publications (1970) (384 pp. hardback).
13. The only periodical dealing with fish diseases is: Journal of Fish Diseases, Edited by R. J. Roberts, Blackwell Scientific Publications ISBN-0140-7775, Published quarterly (annual subscription £22). The journal is mainly concerned with edible fishes.

# Coldwater jottings

by Frank W. Orme

As I WRITE these words I cannot help wondering whether by the time they appear in print the weather will have improved. Readers will need no reminding of the past winter. Even in April the temperatures are low, the sun is a rare sight, and cold rain and sleet showers common. It was noticeable that the plants in and around the pond were showing little sign of renewed growth, in fact, the whole aspect appeared very drear. It seems hard to believe that only a few years ago, the 1974/5 winter had been the warmest for a hundred years.

Frogs were about a month later in spawning than is usual, the first mass was frozen solid only a few hours after being laid, which subsequently proved to have been fatal to the eggs. However, later spawnings seemed to be heavier than usual; possibly Nature's safeguard to ensure that, in the event of further adverse conditions, the survival rate would be maintained. I was surprised to notice some males firmly embracing females which were quite obviously dead. It is well known that during the breeding season the very strong instinct of the male will cause him to seize slow-swimming fish, but I had not realised that they would continue to grasp a dead female.

**Reluctance to spawn**

From conversations with fellow goldfish breeders it seems that many fish were reluctant to spawn, unless the water temperature was raised artificially, and this is understandable. In my own fish-house the water temperature has seldom reached sufficiently high to encourage the fish to be interested in breeding. Under normal circumstances the protected environment of the fish-house tanks has allowed the water to warm up naturally and by mid-March the fish have spawned. Despite the late start to the season, by the time June arrives the fish should have obliged and fry should be occupying their respective tanks. By ensuring an adequate supply of food, practising strict culling, and allowing plenty of growing space it is quite possible that the young will grow sufficiently well to make up for the lost weeks and their late start.

By applying artificial heat it is possible to warm the water, and so encourage the fish to give an early spawning. There is no reason why this method should not be used, providing it is remembered that the breeding pair cannot be returned to colder water immediately. Their water temperature must be equalised, by gradually adjusting their warm water to that of the cooler tank in which they are to be placed.

**Aquarist Society Shows**

Last year I had the pleasure of visiting a number of shows in different parts of the country. Two are worthy of mentioning; Loughborough & District A.S. and the Salisbury & District A.S. both have a majority membership of tropical fishkeepers, and their open shows cater predominantly for the various species of tropical fish. During 1978 their schedules included a number of additional classes for the fancy goldfish exhibitor. Fortunately these improved schedules were given good support by those who exhibit coldwater fish, so much so that the organising committees have decided to expand the coldwater section still further for this year. Hopefully the classes will again be well supported, for it is not too often that coldwater fishkeepers find tropical fish societies that go out of their way to cater for the coldwater hobby. Where a society does try to offer a schedule which includes a sensible number of coldwater classes they should receive the full support of the coldwater hobbyist. Only the number of entries in each class will prove the right kind of encouragement, and warrant the continued improvment of the coldwater classes.

**Coldwater Classes**

Details of venue and date of this year's shows, both societies staging theirs during this month, will be found elsewhere in this issue, suffice it to say that both have arranged ten classes for the coldwater fish

enthusiasts. Of course, of prime interest are the specialist coldwater open shows. These are organised by The British Koi-Keepers' Society, The Yorkshire Koi Society, Bristol Aquarists' Society, The Goldfish Society of Great Britain, and the Northern Goldfish and Pondkeepers' Society. All are held in high esteem and attract exhibitors and visitors from all parts of the United Kingdom.

The B.K.K.S. and Y.K.S. cater for those who are interested in Koi, and visitors may well be surprised at the large size of some of the fishes on display. The other three societies are devoted, in the main, to the various varieties of fancy goldfish—both adults and current season's young. Many of the country's foremost breeders and exhibitors enter their fishes in these shows, thus visitors are provided with an ideal opportunity to view numbers of top quality fishes, talk to experienced hobbyists and generally enjoy a pleasant, and perhaps educational, day.

During September Bristol A.S. will be staging their Jubilee Year Open Coldwater Show. Knowing the hardwork which this society puts into their annual shows I am quite certain that even more effort will be put into this year's celebration event. I have little doubt that it will prove well worth a visit—as it always is—and will offer much of interest, not least being the high quality of the exhibits.

**Tableaux**

I am often puzzled by the conditions imposed upon exhibitors at some shows, especially those that often go under the name of 'Festivals' and set out to represent the fish keeping hobby as a whole. Tableaux seem nowadays to be a necessary feature, yet I fail to understand what relevance they have to practical fish keeping. That a great deal of skill is required to design and construct many of these exhibits cannot be denied—but do they make the successful management of fish easier, or teach the novice any new skills?

The argument is often made that visitors to a fish show would soon get bored if they had only ranks of tanks, containing fish, and trade stands to look at. Surely this can hardly be true, for why else do people attend these events if they do not wish to see lots of various fishes? If it is the intention of the organisers to educate whilst entertaining I feel that the public would derive greater benefit if the shows were based upon more sensible and realistic classes. It is, in my view, essential that space be devoted to the display of fishes in individual tanks. Fish should be the backbone of the show. Other classes could be devoted to 'tableaux vivant' in which the fish is displayed in a planted aquarium, this 'furnished aquarium' representing a section of a natural underwater scene. Other classes could include cultivated aquarium plants, photography, and do-it-yourself equipment, together with the usual trade stands. However, I shall probably be told that a show of this nature would not be supported by exhibitors, is old fashioned, and would not attract the general public—it might also cause the organisers a little more work.

If one wishes to attract all sections of the hobby the increasing number of koi keepers should be kept in mind. If the size of some koi is thought about it soon becomes obvious that some will be too large to display in an aquarium. This being so the sensible approach is to allow the fish to be exhibited in portable vats—allowing them to be viewed from above—whilst smaller specimens are shown in exhibition tanks. The method of judging koi is also somewhat different to the methods used to judge tropical and goldfish; a competent koi judge should be engaged to assess the quality of the fishes. To insist that all fish are displayed in tanks will effectively prevent many of the best koi being shown, and debar koi keepers from exhibiting. Imagine the size of tank which would be needed to accommodate a 24 inches long fish in comfort for any length of time!

I have been told of another festival which has rules requiring that each competitive stand shall contain six tanks, one of which must be a furnished tropical aquarium. If strictly applied this rule would also bar the specialist coldwater societies. Few members of the Koi and Fancy Goldfish Societies also keep tropical fish, therefore it would be necessary to obtain the necessary tropical fish and plants in order to comply with the show rules. I doubt if many would consider the cost worthwhile.

**Newsletters**

Each month I receive newsletters from various coldwater societies; those produced by the two major koi societies are very professional productions both in style and content, all provide most interesting reading. The March issue of the B.K.K.S. Magazine, for instance, carried a report of the 11th All Japan Nishikigoi Exhibition. This competitive show was organised by the Zen-Nipon Nishikigoi Shinkokai (All Japan Association for the Advancement of Nishikigoi), and was supported by the Ministry of Agriculture and Forestry, the Tokyo Metropolitan Government and the Niigata Prefectural Government. From start to finish the event lasted for seven days; attracted 3,750 fish and 20,000 visitors. There were 220 classes divided by variety, size, and sex. The Grand Champion, which the judges chose by secret ballot, was a Taisho-Sanke female with an overall length of around 30 inches.

Exhibitors were charged a fee of £26·00 for every fish entered, regardless of size, and the entrance fee for visitors was £2·60.

Whilst British shows would benefit from Local Authority support, and organisers would welcome their sponsorship, I doubt that many exhibitors would be prepared to pay such high entrance fees for their fish—in fact most would just not be able to

afford the costs. Even so, although our shows may be modest by Japanese standards they can still prove very successful. In a letter from Mr. Fred Ayres, chairman of the Yorkshire Koi Society, this very point is made. Last year the Y.K.S. staged their National Open Show at Harewood House and attracted over 10,000 visitors to the event. Although the cost of purchasing 200 fifty-gallon tanks and more than a mile of air hose had to be deducted from the income the final result still left them with a substantial profit. The society anticipates an even greater net profit from this years show.

**Holidays**

It continues to surprise me when I hear a fish keeper say that holidays must be forgone—because they must stay at home to care for their pets. And there are many who believe that it would be fatal to leave the fishes to take care of themselves for a week or two. Let me assure any reader who holds this view that their fears are groundless. To allow your hobby to deprive you of taking a vacation away from home is unecessary. The fishes will come to no harm—indeed they may even benefit from a respite from over-zealous ministration, you may well be surprised at the clarity of the water and how fit the fishes appear when you return. Each year I depart with my wife, after locking up the fish house, to spend a fortnight in pastures new during which I seldom think of the fishes. I cannot recall having ever lost a fish as a result of this annual 'neglect.'

Provided a few simple precautions are taken a week or so before leaving for your holiday all will be well and it will not be necessary to enlist the help of any other person. Too often the well intentioned help of a second person can lead to tragedy—gross pollution of the aquarium and the death of the inhabitants, due to overfeeding. It just is not worthwhile risking a possible disaster and putting a friendship in jeopardy.

Prepare the fish by feeding slightly more than usual for a few days prior to your departure from home, to allow them to build up a reserve of body fats. Keep the front glass clean, but allow algae to grow on the sides and back panels; the fishes will browse upon the green algae during your absence. Finally, the night before you leave, siphon over the bottom to remove any mulm or sediment. Lower the water level by approximately fifty-percent and then gently refill with fresh water. The aquarium and fishes will then be ready to safely survive your holiday absence. However, if it would make you feel happier, a last feed of live *Daphnia* may be given on the day that you leave to start your holiday—but this is not really necessary.

Attend to these very minor tasks and spend a care-free vacation in the knowledge you have put neither fish or friendship at risk. Do as I do—feed 'em, clean 'em, lock 'em up, go away and forget 'em! It pays, and allowing for the unforeseen, all will be well upon your return and your homecoming will be a happy one—and, you never can tell but perhaps the fishes will also have enjoyed their holiday and lack of supervision!

# The Mollies (3)

## The Crown Prince of the Mollies

### by Barry Durham

"Were it not for the superior elegance of velifera, we would rank *Mollienisia latipinna* as king; as it is, we may dub him the prince of the livebearers, and the crown prince at that." So wrote C. L. Hubbs in an article in "The Aquarium" (Vol. 1, No. 10) in 1933, and who could fail to agree with those sentiments for the Sailfin Molly is indeed a magnificent fish. The trouble is that it is so often confused with *Poecilia velifera* that these days many aquarists have considerable trouble telling which is which.

True, they are alike in many ways but there are enough differences to be able to tell them apart with reasonable ease. Latipinna is smaller for one thing and not quite as deep in the body. The coloration is similar but the throat is silvery as opposed to brassy on good velifera fish, but the main difference is in the size and number of rays in the dorsal fin. Latipinna's is more flowing, coming to a rather pointed latter end and is not as tall as velifera's. It also carries only 13 to 16 rays as opposed to 18 to 19.

Like the Mexicana molly, the Sailfin, too, comes from a wide geographical range extending from Mexico through Texas and the Gulf Coast States of the U.S.A.: Florida, North and South Carolina to Virginia, but having such a distinguishing feature as its dorsal, its races have not been so easily confused as the short-finned molly. It does change according to locality, however, both in body size and colour and in the magnificence of the dorsal, but most of those imported do have a dorsal of reasonable size and are of a pretty standard coloration.

The body is elongated and laterally compressed and is basically a dark olive green with pale yellow overtones. The throat is silvery and the scales on the sides each have a dark dot which make up between seven and nine broken lines. The sides also bear six or seven very dark transverse bars which start above the belly and are spaced as far as the caudal peduncle. The dorsal fin reaches a height of about 1¼ inches (3 cms) and is coloured with blue-black vertical stripes with small black dots between the rays. These dots form about half a dozen wavy lines on the lower half of the fin before becoming more numerous towards the edge which is bordered with bright orange-red. The tail is slightly triangular and is dark yellow with greenish blue at the top and bottom, these hues becoming more prominent when the fish is excited. It is edged in black and spotted with black, especially in the upper two thirds. The dorsal fin starts just behind the head and when folded flat lays across the caudal fin; it is erected most often when there are two or three pairs in the tank as he is then either courting a female or indulging in mock combat with one of the other males. And such a tank should be quite large—at least three feet long—if more than one pair are to be kept.

The female of the species is quite drab in comparison being coloured basically olive with one or two highlights on the sides. Her dorsal is very much smaller than the males' and just carries a few rows of black dots. There is also a small amount of black spotting in the top half of the tail. In the wild both albino and black forms occur naturally.

Keeping and breeding the fish is not too difficult although they are not really the community fish many dealers would have us believe. As mentioned previously, they need a spacious tank and if a two foot one were the only one available, only one pair of fish should be kept and all hopes of breeding and raising the young to any sort of size forgotten.

Two or three pairs could be kept in a three foot tank, but once they had bred, a further three foot tank would be needed for raising the youngsters as many will not develop the large dorsal fin if kept in too small a space. There should be some vegetation but the tank should not be over-planted and good lighting is necessary if only to promote a good growth of algae for the fish to feed on. At least one teaspoonful of cooking salt should be added to each gallon of water and possibly a little more. Good aeration is called for (especially as the water is salty) and weekly water changes. Temperature should be in the mid-seventies Fahrenheit.

If you do intend to breed the fish, then the best way is to have plenty of floating plants over part of the tank if you don't have a separate breeding tank. On no account should you use a breeding trap because the female is prone to producing dead young if a trap is used. In extreme cases the mother will also die as the confined space induces a kind of shock.

Gestation lasts eight to ten weeks and a good sized female (3½ to 4 inches) will produce up to eighty youngsters about half an inch long. Smaller females have correspondingly smaller broods.

They like green stuff and live food and grow reasonably quickly, but really require as much space as possible. The male's dorsal fin can take up to two years to fully develop and if the youngsters are kept crowded it may not develop at all.

As well as the main blue-green form already de-

scribed there are four other "colours" and a lyretail form available:

ALBINO—This is a golden coloured fish with red eyes. It lacks all black pigment but the scales have bluish dots and the dorsal has a faint orange border. The blue-black lines and dots in it are replaced by blue ones. The female is usually plain gold. They tend to be more delicate than the usual form and are prone to chilling.

CHOCOLATE ALBINO—A recent development from the golden albino. It looks very like a black in lots of ways except that the body is a soft chocolaty brown as are the fins. The eye is red and there is sometimes a red border to the dorsal fin. There are also speckled specimens of this form showing blotches of brown on a gold background.

BLACK—Initially a naturally occurring "sport" which has now been established as a strain. It has a sooty black body and fins apart from the outside edge of the dorsal fin which is edged in orange or red. The female is also black all over but has no coloured edge to the dorsal.

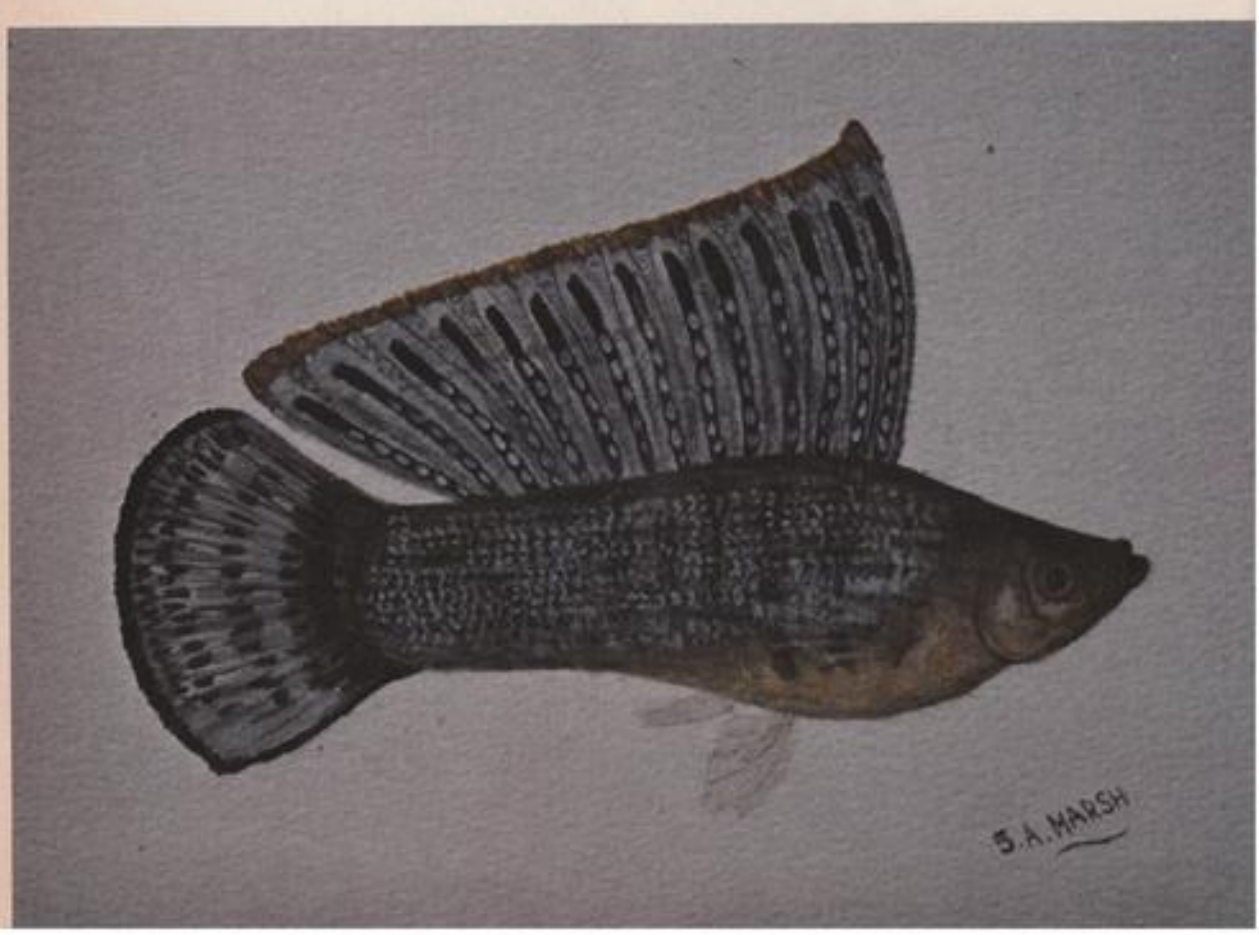
SPECKLED—This is probably as the result of a cross between the black and the blue-green and is also known as the marbled molly. The basic blue-green

colour of both sexes is covered with an irregular pattern of black.

LYRETAIL—Seen to date in black, blue-green and speckled forms the upper and lower lobes of the tail extend outwards in a curve to form the lyre. The other fins are elongated as well making a good specimen a truly magnificent fish. With this form it is very difficult to determine whether in fact it is a latipinna or a velifera as the form has velifera ancestry and in most specimens the ray count of the dorsal is indeterminate.

---

NEXT—The King from Yucatan.



# WHAT IS YOUR OPINION?

by B. Whiteside, B.A., A.C.P.

*Photographs by the Author*

SNOW STILL lies on the hills as I begin this month's feature with a letter from Mr. M. J. Docherty, who resides at 36 Daytona Drive, Northop Hall, Mold, Clwyd. He states: "I have a 30 in. × 12 in. × 15 in. community tank and amongst various fish it contains are three *Corydoras*. Two are *Corydoras punctatus* and the third is a *C. aeneus*. None of them is very active during the day; and for some reason a few of the young platies in the tank seem to delight in pecking at a particular *C. punctatus*—especially at its eyes and adipose fin. They do not touch the other *C. punctatus* or the *C. aeneus*. I am quite at a loss as to why they should do this and hope that someone can enlighten me.

"Finally, I do not know if anyone is interested but I have some young platies which are cross-breeds between a black platy male and a yellow comet female. The young have black bodies and varying degrees of yellow on their heads. Also, I have some young, pure-bred, marbled mollies open for offers. I do not have enough room for all these young fish so I wish to find a good home for them."

Yesterday, when I typed the above letter, was the last day of March. Today is the first day of April and, at the moment, a thin layer of snow covers my garden. The sun feels warm enough to melt it quickly. No doubt it will go—and return again. The second of this month's letters reached me from Post Office Stores, Tittleshall, Kings Lynn, Norfolk. Mr. Ken Smith has the following to say: " . . . In response to your request for ideas on fresh equipment, surely an improved sucker for heaters, etc., must take pride of place. My older ones with steel clips remain stuck but the clips rust. The newer plastic clips don't rust—but neither do they stay stuck for very long so the heaters end up on the bottom and the thermometers disappear into the plant collection intended to hide all other equipment—but definitely not the thermometer.

"Secondly, what about a plastic tank divider which could be slid in, in a hurry when, as often happens, a pair of fish decide to breed in the community tank just when all the other tanks are full? The bottom would slide into the gravel; but the problem seems to be the top. Perhaps a pair of magnets, similar to the type used for the algae-cleaner magnets, would do the trick; not, I beg, non-stick suckers! I have just started a community tank for catfish only and would be grateful for any advice from other readers who have tried this." (Some time ago I gave up the small, circular thermometers because they spent a lot of time on the gravel of my tanks and changing their rubber rings, at intervals, annoyed me. I replaced those thermometers with vertical thermometers containing spit and fixed to the tank glass with a sucker. Most of these thermometers, despite frequent changes of suckers of many kinds, now reside useless on the gravel. My heaters/thermostats, with one exception, lie or waft about in my tanks; outlet and input tubes from power filters waft about depending upon whether or not the filters are switched on. Some time ago Interpet sent me a pair of heater/stat clips fitted with large suckers. The pair are still in place. If your firm manufacturers suckers, of various types, that stick for more than a few weeks or months, please let me know. Disintegration or hardening appears to be the main problem affecting many of those I have used. My car contained an ash tray stuck on with a sucker. It fell off and I had to replace the sucker with one I'd bought from an aquarium shop. The sucker still remains in place on the windscreen—although I removed the ash tray twenty-four days ago when I stopped smoking. I'm still managing to resist the craving to smoke—but the desire is as strong as it was during the first week. Sucking sweets has caused me to put on weight. No doubt slimming will be next on the list. These should all be good for my soul!)

"Dear Editor," writes Mr. Michael Kitduff, "I wish to enquire about breeding guppies. Once the male and female have been left in a tank together how do you know when they have bred successfully and when to move the female to a breeding trap? Also, could you send me some of your Java moss? I enclose a stamp and a plastic bag." Mr. Kitduff lives at 104 Two Bridges Road, Newhey, Rochdale, Lancs. (No doubt readers are aware that our Editor is Mr. Laurence E. Perkins. In Mr. Kitduff's query the words "bred successfully" are rather vague. One can be sure that a male guppy has fertilised a female guppy only when the female becomes pregnant.

Personally speaking, I am not too keen on the use of breeding traps. In some designs the newly-born fry would need to have read the instructions as to where they should go to take shelter. A pregnant female guppy could be placed in a small aquarium containing a layer of floating plants—such as water sprite/Indian fern. When the babies are born they can seek shelter amongst the fronds of the ferns; and at this stage the mother fish can be removed because live-bearing fishes do not look after their young. I shall try to send you a sample of Java moss during the summer—if I have any. Requests should be accompanied by a s.a.e. and a plastic bag. If I have to pay for the envelope out of my own pocket it discourages me from taking the trouble to send readers samples of the plant!)

While in London recently I had the pleasure of meeting Dick Mills, a man of many parts—including editor of the F.B.A.S. Bulletin, Chairman of the F.B.A.S. Show Committee, and author of the book **Know the Game—AQUARIA,** which, at 60p provides an excellent introduction for those new to our hobby. Dick kindly treated me to lunch—during which we had plenty of time to discuss fishes and plants—and then introduced me to some of his friends. I had a fascinating day and feel sure I now know what people mean when they say that time flies. As dusk approached—very much earlier than it does in my part of the world—Dick set off to give a lecture to an aquarium society; and I headed towards the West End to form my own opinions about 'Annie' and her orphan friends at the Victoria Palace. Many thanks, Dick, for a highly-entertaining day.

Latest in the list of F.B.A.S. publications is National Booklet No. 12: *Dictionary of Common & Scientific Names of Marine Fishes.* This publication should be of interest to those who keep marines—and its fifty-six pages are good value at only 75p.

Mr. A. K. Morton's home is at St. Nicholas, 5 Norwich Road, Cromer, Norfolk; telephone number Cromer 2118. He writes: ". . . I saw the sale/exchange item in the March edition. I also have one: 1 pair of dwarf gouramies—£1·00; 1 Indian glassfish—25p; and 1 pair of three spot gouramies—£1·50; or I would swop all for a pair of lyretail sailfin mollies or lyretail marbled mollies. If interested, please write. I enjoy your column very much and have, found it very interesting." (Interested readers should contact Mr. Morton direct—at his home. B.W.).

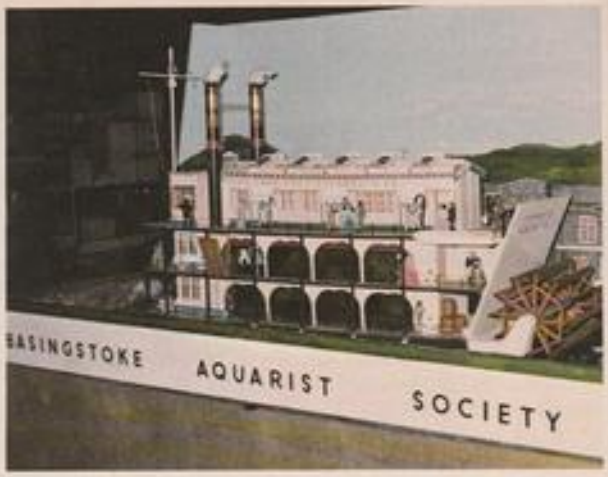
No. 20 Seaview Road, Brightlingsea, Colchester, Essex, heads the letter I received from Master David Tillett. He wrote: "Please could you tell me where my nearest aquarist society is based; and also, please could I have some of your Java moss? I cannot obtain any around here. I will enclose a plastic bag and a s.a.e. for your reply. Finally, I would like to establish a pen relationship with someone who is interested in breeding livebearers and is between 14 and 18 years of age. I am 16 years old." (Unfortunately I am not in contact with aquarium societies in your area, David. Perhaps a society member who lives near David would drop him a line telling him about any club in the area. Those interested in exchanging letters with David should write directly to him. I will forward a sample of Java moss when time permits—possibly during the summer holidays. C.S.E. examinations are upon me—and these will be quickly followed by 'O' and 'A' level examinations. I hope I'll be able to remain a non-smoker! Readers are reminded that queries requiring a personal reply should be addressed to Messrs. Boarder or Hems, together with a s.a.e. Unfortunately I just do not have time to write replies. B.W.).

Mr. R. Riley, who lives at 32 The Meadows, West Rainton, Nr. Houghton Le Spring, Tyne and Wear, is a member of both the B.M.A.A. and the B.K.A. (Do you find, as I do, that such abbreviations frequently leave you feeling ignorant and foolish because their exact meaning eludes you? I assume that the above are the British Marine Aquarists' Association, and the British Killifish Association. No doubt, if I am wrong, many readers will correct me.) Mr. Riley writes: "As I have been a regular reader of *The Aquarist & Pondkeeper* for some 20 years now I thought it was about time that I contributed something to *W.Y.O.*; and on reading this (April) month's issue and your request for people's views on keeping cold water marines I feel I may be able to give some opinions. My first start on marines was with tropical marines, four years ago; and after a while, as I live only a few miles from the coast, I began to wonder why I should go to all the expense of buying tropical fish when I had the ideal opportunity to go out and get my own fish.

"I set up a cold water marine tank exactly the same as for tropicals; but instead of using artificial sea water I went down to the nearest beach, which happened to have a natural break-water, where I was able to obtain natural sea water without the bother of having to mix up the artificial water. Several times I was nearly drowned by in-coming tides; and my shoes had salt stains for months afterwards. I now have a tide table!

"All gravel used was from the beach—as were rocks, including some that had seaweed attached. The tank that I set up was an all-glass, 36 in. × 18 in. × 12 in. aquarium fitted with a normal U/G filter as used in my tropical tanks. Whilst obtaining the sea water I also obtained some periwinkles and some barnacles, and a very small edible crab that I did not know I had caught until several days later. I managed to keep the crab for well over a year. I lost him, when giving up the hobby for a while, when I returned the crab and the rest of the occupants to the sea area from where they had come. During this time

*Continued on page 58*




**SCOTTISH AQUARISTS' FESTIVAL PRIZEWINNERS**

*Top Right*
Basingstoke A.S. won first prize in the Tableaux section with their magnificent 'Show Boat'

*Top Left*
A pupil of St. Serfs School, Edinburgh accepting the award for Schools Aquatic Art from Mr. Robert Halpern

*Bottom Left*
The Aquarist Rose Bowl for the Highest Pointed Tableau being accepted by a representative of Livingstone A.S.

# The Scottish Aquarists' Festival

THIS, THE SEVENTH Scottish Aquarists' Festival which has been the best to date, thanks to both the general public and aquarists who came in force on both days. All were very pleased with the excellent display on the trade stands, with their large variation of foods, equipment and fish for sale, all at competitive prices. Everything was available for either beginning or expanding in the hobby.

The interest of new converts can only be maintained if reliable information is available right from the start. We enjoyed the usual excellent support from societies with their tableaux entries from as far south as Basingstoke and to as far north as Aberdeen. As usual we had the well-known faces of John Young with the *Aquarist and Pondkeeper magazine* stand, George Cooke complete with camera and the judges who always do a very good job.

This year we had Robert Halpern, the noted hypnotist to present the trophies, not that any of the winners required to be hypnotised on to the stage to receive their trophies! Basingstoke and District A.S. (River Boat) won the Tetra Min trophy for Best Tableau plus the N.E.L. trophy for Best Furnished Aquarium. The Lanarkshire trophy for Best Breeders' Livebearers with a team of *P. intermedia*. The Aberdeen trophy for Best A.O.S. Egglayer with a *Badis badis* and The Aquarian trophy with a *Labeo bicolor* which also won the Bobby Wood trophy for Best Fish in Show.

Aberdeen A.S. came second with a 50p piece, the Geo. Henderson trophy for Best Livebearer with a *M. sphenops*, and other tickets. Well done for their first visit to S.A.F.

Third came Livingstone A.S. with their Punch and Judy Show together with *The Aquarist* trophy for the Highest Pointed Tableau; the Friendship trophy for the Best Danio and Tropical Minnow with a *B. Frankei*; the Rift Valley trophy with a *L. Trewavasae* and the M. M. trophy for Best Pair Egglayers, a pair of *P. Harrisoni*.

Fourth Tableau award went to my own club Lanarkshire A.S. with a very damp 13 amp plug! No trophies but a few cards, including my own, *not* second in a class of 2! (I know the judges).

The F.N.A.S. trophy for Best Furnished Aquarium was won by Renfrewshire A.S. and the Edinburgh Pondkeepers trophy for Best Coldwater entry went to Ayrshire A.S. with a *Lepomis gibbosus*. They also collected the Aquarama trophy for Best Pair Livebearers with a pair of *E. eiseni*. Alloa A.S. won three trophies, the Woodcock trophy for Best Characin with a *N. palmeri*, the Stan Taylor trophy for Best Barb with a *B. arulius* and the Bob Ferguson trophy for Best Rasbora with a *R. heteromorphia*. Dunfermline A.S. claimed the Muirhouse trophy for the Best Gourami with a *C. chuna*, also the Hutchings trophy for Best Pair of Guppies.

The Edinburgh A.Q. and Pondkeepers won the Alloa trophy for Best Breeders' Egglayers with a team of *Cory aeneus* plus the new Duncan Fotheringham trophy for Aquarium Plants, with a Spatterdock. Belle Vue trophy for the Best Siamese Fighter went to Tinto A.S. and the Fotheringham trophy for Best Cichlids was won by Muirhouse A.S. with a *P. kribensis*. The Catfish Association of Great Britain coming north for the first time took home the Mark Aitken trophy for Best Catfish A with a *Cory blochi*. Clyde A.S. won the Hartlepool trophy for Best Loach with a *Acanthophthalmus Sp.*, the F.G.A. (Scottish Branch)—the Earl of Motherwell trophy for Best Guppy, the B.K.A.—the B.K.A. trophy for Best Egglaying Toothcarp with a *Aph. australe* and the Scottish A.S.—the Ayrshire Jubilee trophy for Catfish B, with a *L. Siamensis*. The Bell Thompson trophy for Schools Aquatic Art was won by St. Serfs School, Edinburgh.

Many thanks for a very good show.

STEVE NAISMITH.

# From a Naturalist's Notebook

by Eric Hardy

Powys County Council erected a notice this spring, together with a picture of a toad, warning motorists to beware of spawning toads crossing the highway at Llandrindod Wells, an annual hazard. The British Herpetological Society, keen to locate and define the remaining haunts of such common species, along with declining crested newt and smooth snake as well as the more publicised rarities, still seems to make only limited contact with regional field-workers and societies outside the county trusts.

I sometimes find with dismay an academic aloofness to fish-keeping aquarist societies whose members, in fact, often possess a more intimate field-experience of current freshwater life in Britain. This is only too plainly revealed when official distribution-maps are published. The same applies to fishes. Consider the burbot, a relict freshwater relative of cods surviving from the slow, low-oxygen rivers of the fens and mosslands, west as well as east. It was one of the species to which the legal protection of the Conservation of Wild Creatures Act was to be extended, though after reaching the Lords, this bill seems to have died with the government. It was also intended to add the large, green-eyed Norfolk dragonfly *Aeshna isoseles*, which favours my annual haunts around Hickling Broad and the Catfield Fennside dykes of Barton Broad, where water-soldier grows. It has transparent wings, unlike the common brown *A. grandis*.

Another on the list was the glutinous pond-snail *Myxas* (*Limnaea*) *glutinosa* which inhabits the hard water of Lake Bala, though sometimes occupying soft water haunts. In young specimens the mantle covers the thin, amber-coloured shell and the adults are not wholly contained in the shell. It inhabits the pondweed beds of Windermere Lake, but apparently not in Malham Tarn.

**Fish-farms**

The increasing development of fish-farms in this country was shown in March when the Minister of "Ag. & Fish" visited Berkshire Trout Farm at Dun Mill House, said to be the second oldest in the Thames Water Catchment, being started in 1907, and Avon Springs Hatchery at Pewsey in Wiltshire, which had been transformed in the past year from a watercress-bed. The government was making a review of fish-farming, together with financing research on disease (at Weymouth laboratories), fish-genetics and glandular secretions such as hormone-stimulation and fertility for breeding. The success of fish-farming seems to depend primarily upon control of fish-disease.

World Wildlife Fund is financing a biologist to study the distribution and status of ragworms and lugworms around our coasts. It recently made a grant towards the purchase of a meadow with two floating bogs at Rhose Glyn-yr-Henlyg, in Dyfed.

**Insects**

Such a lengthy list of adult and larval insects eat water-plants that one might be mistaken for assuming every insect visitor is up to something harmful. Not so. Neither alder-fly nor willow-fly of the angling world is a pest, though they rest on these trees. At night many useful, predatory ground-beetles fall into steep-sided garden ponds. Insect-hunting soldier-beetles often sit in water-lily flowers, while predatory marsh and raft spiders (which are not insects) will be found on marginal zone emergent plants. Numerous small flies and wild bees may be fertilising flowers *Nymphaeae* water-lily flowers alternate between "female" condition when they start with stamens all standing erect and tiny beetle visitors sliding down their slippery sides to drown in a sugary liquid below, bringing any pollen from visits elsewhere. Later the plant functions as "male" when the liquid trap dries up and the stamens form a cone, keeping insects from the female stigma and offering their pollen as the attraction. White *Nymphaeae* water-lily suffers more from insect pests than does yellow *Nuphar lutea* whose flowers and leaves rise further above the water, particularly from July-August leaf-mining caterpillars of tiny, defoliating brown and white-mottled China mark moth, which flies to lay eggs from June to August.

Alder tree's own beetle pest, *Galrikella alni*, is abundant from May to August as are a midge-forming leaf-gall *Dasyneura alni*, the hymenopterous *Hemichroa alni* and 3 kinds of leaf-gall mite making pimples, blisters or swollen pouches, up to 400 on a leaf. Caterpillars of the alder-kitten, dagger, miller, lobster, prominent and alder moths (the latter pupate in the pith and are there July-September) may be found. Also those of tiny *Eucosma*, *Lithocolletis*, *Argyresthia*

and other micromoths and the caterpillar-like grubs of the alder-sawfly. Also add apple-capsid bug and you sum up the alder's pests. Occasional caterpillars of holly blue, green hairstreak and brimstone butterflies cause no defoliation and are not really pests.

Greatest of all waterside insect-hosts are the legions of *Salix*—willows, sallows and osiers, wild and cultivated, which lean over the bank. Numerous tiny leaf-caterpillars of over 30 different micro-moths on them include: *Hydriomena, Cerura, Argyresthia, Batrachedra, Depressaris's* leaf-cases, *Coleophora, Lithocoletis* (making red leaf-blisters), *Gracillaria* leaf-miners, *Eucosma, Argyroploce, Gelechia, Cacoecia, Peronea, Compsolechia,* etc. Also at least 16 different leaf-mining Tortrices moths are augmented by over 40 larger moth species, including sallow-moth, sallow-kitten, several quakers, small angle-shades, herald, sharks, chestnut, red sword-grass, sprawlers, several prominents, puss, kittens, buff-tip, alder-moth, poplar grey, dingy shears, broom, dark barred, twin spot carpet, scalloped oak, chevron, peppered, white satin, eyed hawk, lesser broad-bordered yellow underwing, huge trunk-tunnelling goat-moth larvae, vapurers, small, web-spinning willowermine moth and white wave.

If those are not sufficient to keep a willow-grower's entomological friends busy, *Salix* plants also attract over a score of beetles, including the musk-beetle, grubs of *Lagris hirta, Polydrosus cervinus* and *C. oblongus*, various *Galerucella, Dorytomus* and *Orchestes*, and *Phratoria vitellinae.* Cuckoo-spit bug destroys terminal buds, causing shoots to branch, as do 3 willow-aphids. From July to May apple-capsid bug may infest willows. Some 20 gall-midges, over two dozen gall-wasps, 6 gall-sawflies including leaf-miners, and a gall-mite causing "witches brooms" may be added to the list.

Their stems are also gored by the longhorned timberman beetle, *Spaerda populnea.* The brown willow-bettle, *Galerucella lineola* is very destructive to the finer rods of *Salix triandra.* A flea-beetle, *Chalcoides*, also attacks willows and *Phyllodecta* beetles are very destructive to osiers. Willows are winter hosts of green willow-carrot aphis whose eggs hatch as the buds open in spring.

*Potania capreae* (= *proxima*) is a sawfly named originally from its association with goat-willow, as was the gall-mite *Eriophyea salicis* (= *E. tetanothorax*) and the gall-midges *Rhabdophaga* (= *Cecidomyia*) *salicia* and *Itemonyia capreae*, hatching in May. The galls are on young or old twigs, flower-buds or leaves, resulting in poor leafage, swellings, even the rupture of bark which hangs in shreds, twigs failing to grow or becoming angled, the galls often being enlargements of the pith. They are controlled with gamma-HHC, diazinon or parathion, always away from any fish. Lime-sulphur is sprayed on gall-mites in spring. Most have little effect on the health or growth of the willow. Several sucking capsid bugs including their own *Salicarius roseus* and *Corniortoaes salicellus* also attack willows.

Dogwood (*Cornus*) another waterside shrub has its own root-aphid, *Anoecia corni*, cured only by a root-drench (first removing any fish), and one of the midge-galls common on willow, and a leaf-folding *Tortrix* moth, *corylana.*

# Aquarian Launch New Tablet Food

Flaked foods are an ideal way of providing ornamental fish with their nutrients because each flake will float for top feeders, slowly sink for middle feeders, and lie discreetly on the gravel for bottom feeders. However, flakes do have limitations—they are too small for the larger fish, and too delicate for biting fish.

With these problems in mind, Dr. David Ford of the Aquarian Studies Centre has developed an Aquarian Tablet Food which will be launched to the Pet Trade at Harrogate.

To bring the same high food value and high acceptance to the tablet food, that is expected from all Aquarian food products, the bulk of the ingredients include the ten different Aquarian graded flakes. the formulae was chosen to give a balanced diet to the typical species of fish kept in the Aquarium.

The ten formulae are blended and compressed in a special way that allows the tablet to be fixed to the inside front glass where it slowly disintigrates, releasing the small flakes. This bring the community fish forward to sample the food so they can be clearly viewed whilst feeding.

Large fish can be fed the tablet, whole or broken, according to the size of the fish's mouth. It is common to find large fish fed on chunks of scrap food, and the use of Aquarian tablets ensures that essential nutriets, missing from such a scrap diet are supplied.

The table will also trigger a feeding response in anemone and so are a useful addition to their diet. Catfish and similar bottom-feeding fish will benefit from the tabletted food as the tablets can be dropped to the bottom of the Aquarium for the fish to browse at their will

One of the most useful features of the Aquarian Tablet Food is the high degree of adhesion to the glass. Simply dip the tablet into the water for a few seconds to wet the surface, and then press firmly against the front glass.

# BUOYANCY

*by Chris Storey and Jane Richards*

WHEN AN ANIMAL lives in water it not only has to propel itself along but it also needs to keep itself from sinking. The obvious solution is to continually swim upwards but this is wasteful of energy so many animals have evolved more efficient methods of achieving bouyancy.

The swim-bladder, a gas filled sac which is found in teleost (bony) fish, is just one solution to this problem. To obtain neutral bouyancy, i.e. not sinking or rising in water, the swim-bladder needs to be 5% of the body volume in sea-water, or 7% of the body volume in fresh-water. When this is achieved a fish can remain motionless. If the fish should swim down, the volume of its swim-bladder will decrease due to the increased pressure of the water and the fish will become heavier than water. In this situation the fish is negatively bouyant and will tend to sink. To regain neutral bouyancy the fish has to secrete more gas into the swim-bladder until it is again 5% (or 7%) of the body volume of the fish.

The gases found in a fish's swim-bladder are oxygen, nitrogen, carbon dioxide, and some argon. These are the same as those found in the atmosphere but they occur in different proportions. There are various exceptions to this, however, for example the whitefish, *Coregonus albus*, has a swim-bladder filled with almost pure nitrogen.

If a fish, that is neutrally bouyant, swims upwards the pressure on its swim-bladder decreases and so its swim-bladder expands. This makes the fish positively bouyant and so the fish will rise. To return its swim-bladder volume to 5% (or 7%) of the body volume gas has to be removed from the swim-bladder.

The whole process of maintaining neutral bouyancy is kept under strict control because disastrous consequences arise if it gets out of hand. When a fish rises from 30m to the surface its swim-bladder will increase in volume thirty fold. Normally the fish can compensate by removing gas but if the ascent is made too quickly, as when the fish is caught by a fisherman in deep water, there is no time to compensate. This is the reason why fish often arrive at the surface with ruptured swim-bladders.

Another animal that uses a gas filled float is the Portuguese man-of-war, *Physalia pelagica*. Although this looks like a single jellyfish it is, in fact, a colony of many individuals including both polyps and medusae. The colony, whose tentacles are sometimes 10m. long, hangs below the float (see fig. 1). The float itself can be anything up to 30 cm. long and is filled with gas produced by the members of the colony. These colonial jellyfish stay at the surface and the float is blown along by the wind. Other jellyfish, which are near relatives of the Portuguese man-of-war, can regulate the volume of gas in their floats as a fish does, and so they can migrate vertically. Some use this ability to sink into calmer water when a storm rages at the ocean's surface.


Fig. 1.
Portugese man-of-war

Although the fish with its swimbladder and the jellyfish with its gas float have solved the problem of bouyancy, there is a drawback with them both in that they are softwalled. This means that as the animal changes its depth, the volume of the gas float or swimbladder is also changed. A rigid walled gas float overcomes this problem, for its volume is constant and therefore its bouyancy effect is constant. Such a system is used by *Sepia*, the cuttlefish. The cuttlebone, well known to bird fanciers, acts as the

float, see diagram 2. It is a strong, rigid structure made of layers of calcium carbonate reinforced with chitin. The layers are held about 0·5 mm. apart by pillars, see diagram 3. The cuttlebone itself comprises about 9% of the body volume of the animal and it is filled with nitrogen gas under a pressure of 0·8 atmospheres. When the cuttlefish is in deep water, the cuttlebone has to withstand great pressures. It has been found by experimentation that the cuttlebone can survive, due to its sheer strength, the external pressures of up to 25 atmospheres but that above this amount the cuttlebone implodes. This limits the depth to which a cuttlefish can descend, as at 240 m. the water pressure is at 25 atmospheres. Therefore the cuttlefish cannot go below this depth otherwise the cuttlebone would implode. The *Nautilus*, a relative of the cuttlefish, has a similar system but its shell, which acts as the float, is coiled. Again the depth to which it can descend is limited but the shell is of a much greater strength than the cuttlebone so the *Nautilus* can go deeper. The shell can withstand 75 atmospheres before it implodes.

Elasmobranchs are the fish with a cartilaginous skeleton such as sharks, dogfish and rays and they do not possess a swim-bladder or any other type of gas float. Instead they have other ways of maintaining themselves at a given depth. For a start a cartilaginous skeleton gives some reduction in weight, but the greatest factor is oil in the liver. The liver of a shark can be as much as 20% of its body weight and the liver itself can be 75% oil. Most fats and oils have a specific gravity of 0·90 to 0·92 and as the specific gravity of sea-water is 1·026, then oil floats on water (fresh-water has a specific gravity of 1·000). The oil in a shark's liver, called squalene, has a specific gravity of 0·86. This difference i.e. between 0·86 and 0·90, gives squalene 50% more bouyancy than normal fats and oils for a given volume. In fact, even with all this oil in the liver most sharks are still negatively bouyant, although some like the basking shark are lighter than water. Sharks that are heavier than water have to actively swim upwards to keep at a given depth and they obtain their lift by the angle at which they keep their fins and because they have a heterocercal tail.

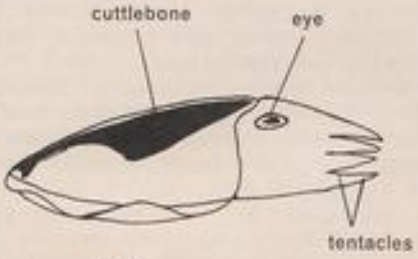



Fig. 2.

A cuttlefish


Fig. 3

Section of cuttlebone

The specific gravity of different solutions plays an important part in the way several other animals achieve bouyancy. The more concentrated is a solution of salt water then the higher is its specific gravity and this is why freshwater (S.G. 1) floats on salt water (S.G. 1·026). Therefore if an animal can reduce the concentration of its body fluids to a concentration less than that of the sea around, it will float. But this method tends to cause more problems than it solves and its use is limited to the planktonic eggs of teleost fish.

Most marine animals are surrounded by a membrane (skin) that allows some molecules to pass in and out but not others, and such a membrane is called semi-permeable. If a semi-permeable membrane has a concentrated salt solution on one side and a weak salt solution on the other, then water will move across from the weak to the concentrated side to try to equalise the two solutions, (see diagram 4). This process is called osmosis. Of course, the two solutions could become equal if the salt itself could move, but the membrane stops its passage and so it is the water which has to move. Now if this idea is applied to an animal various problems present themselves. The weak solution of the animal's body fluids are on one side of the membrane and the concentrated solution of the sea is on the other and so water will pass out of animal and into the sea. All the animal can do to replace this lost water is drink seawater, and then actively excrete the extra salt taken in. To avoid

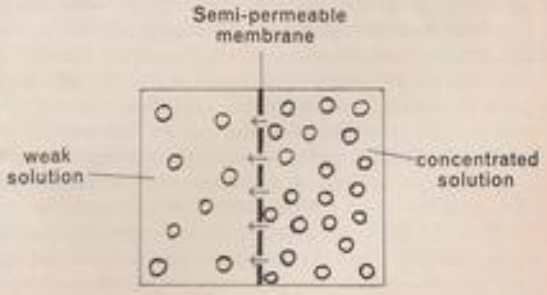



Fig. 4.

← direction of water movement

such problems most marine animals maintain their body fluids at the same concentration as that of the sea. Such animals are known as osmoconformers and they gain bouyancy by altering the components of their body fluids rather than changing the concentration. As stated earlier, sea water has a specific gravity of 1·026, but a pure solution of sodium chloride has a specific gravity of only 1·020. This difference is due to the presence of magnesium, calcium and sulphate ions in the sea water, so if an animal could reduce the amounts of these in its own body fluids then it would increase its bouyancy. In fact many plankonic plants do this and so does *Noctiluca*, an organism that causes luminescence at the sea's surface. Jellyfish also use this method and gain bouyancy by removing sulphate ions from the gelatinous mesophil layer. They are aided as well by the pulsation of their bells. This produces a jet of water squirted downwards and helps to stop them from sinking. Related to the jellyfish, although in a separate phylum, are the ctenophores more commonly known as sea gooseberries or comb jellies. They are basically spherical in shape with two long tentacles and eight ciliated bands on the body called combs. Like the jellyfish they improve their bouyancy by getting rid of heavy ions, especially the suphate ions.

Cranchid squids, which are small deep sea creatures, carry on this ion replacement to extremes. They not only remove the heavier ions such as calcium, magnesium and sulphate but most of the others as well. These have been replaced by the lighter ammonium chloride. An almost pure solution of ammonium chloride is found in the enormous bouyancy chamber of the animal. This chamber, which is the coelome, takes up two-thirds of the volume of the squid, but as the concentration of the fluid in the chamber is the same as that of the sea then they have no osmotic problems. The specific gravity of this solution is 1·010 so clearly they are bouyant in sea water. However there are two disadvantages to this method. One is that the pH of the chamber has to be kept at 5 which is very acidic for a body fluid. The other is that the squid is encumbered by a float that is twice the size of the rest of the animal.

---

## What is your opinion ? *continued from page 51*

the crab had grown, and cast off its shell several times. It had grown from ¼ in. to 1¼ in.

"I did not use any kind of light and, of course, the seaweed died. My main aim had been to see how cheap keeping a cold water marine tank could be. The fish that were kept were the common shannie, and gobies. These, and the crab, became completely tame and knew at what time I would feed them. Also kept were several small tubeworms which had been attached to the rocks. They were fed with a well-known liquid food and they seemed to thrive on it because none of them died. The barnacles did not live very long: about three months if I remember correctly (I do not have my fish diary with me or I would look it up for verification). Some of the periwinkles only died when they escaped out of the tank via the air line opening and could not get back. Several were returned to the sea—from where they had come. I found keeping native marines to be highly rewarding and I encourage anyone about to keep marines to have a go; after all, everything you keep will be free. Well, Mr. B.W., I could go on for reams—but I am afraid I must bring this to a halt now. Maybe next time I will tell you about my experiences with tropical marines. Incidentally, once you have kept marines you will never want to keep freshwater fish again. That I can promise you—unless it's killies. So, pluck up your courage and have a go; after all, you must live near the coast in N. Ireland." (I do live on the coast, Mr. Riley, but I do not think I would like to keep native marines in an indoor aquarium. If time permits, and the sun ever shines again, I shall take my camera to the shore and attempt to photograph some of the plants and animals that inhabit the rock pools in the area. I have not got any photographs of sea shore plants or animals although I do have a fairly large selection of biologically accurate drawings that I made of sea shore life when I was a student. As a matter of interest, does anyone have a marine pond—either indoor or outdoor? B.W.)

I'm afraid that time has defeated me again. If I have not yet used your letter, do not give up hope. I receive many letters every month and am unable to include more than a few; however, I usually receive fewer letters during the summer holiday months and I am then able to include some of the letters unused when originally written.

For a future feature please send me your opinions on any of the following: (a) strength, quality and duration of lighting required for good plant growth in a tank of a given size; (b) breeding angels; (c) fertility in golden/blond guppies; (d) killer fish that you have kept, i.e. those that have killed numbers of other fishes; (e) cultivating *Cryptocoryne* species; (f) cultivating lace plants; (g) breeding livebearers with fancy fins. I hope you will send me a few lines. Please do.

# SPAWNING AND RAISING

# *Corydoras paleatus*

by Bob Purdy

THE GENUS *Corydoras*, which belongs to the family Callichthyidae (mailed catfishes), contains a large number of similar but attractive species. *Corydoras aeneus*, the Bronze Catfish, is the most commonly kept species but many other species, including *C. paleatus* (the Peppered Cat), *C. julii* (the Leopard Cat), and *C. reticulatus* (the Spotted Cat), are usually found on offer in dealers' tanks. The genus *Corydoras* is restricted to Tropical and semi Tropical South America, most of the species being found in and around the Amazon Basin. Mailed catfish usually inhabit slowly flowing, shallow waters with a muddy substrate and an acid composition; temperatures will range from around 65°F up to 85°F. They search the muddy base in small shoals seeking out the tiny worms and crustacea which make up the basis of their diet. Most of the species in this genus appear to be carnivorous and are not seen to graze on algal growths or to eat water plants.

*Corydoras paleatus*, the species under discussion, hales from South Eastern Brazil and is said to attain a length of seven to eight centimetres. Sexing is fairly easy as the female is much stouter than the male and providing she has been well fed (and not recently spawned) the difference is immediately obvious when viewing both specimens from directly above (see diagram 1). The general body shape of the Peppered Cat is quite normal for the genus *Corydoras* but the dorsal fin is much larger and held more erect than in most species. The Peppered Cat can be kept alone or in groups, it seldom quarrels even amongst its own kind and it will eat all of the commercial foods normally used by aquarists. Like most of the other species that belong to this genus, *Corydoras paleatus* is quite long lived for its size, the average life span being in the region of five years or so.

**Spawning**

The price of *Corydoras* catfish in dealers tanks range from fifty pence up to a pound or so and this for very small and immature specimens. Larger specimens will often fetch up to two or three pounds depending on size and scarcity of the particular species. From these facts it seems fairly obvious that *Corydoras* species can be quite difficult to breed in captivity and this often proves to be the case. Once, however, a pair of Peppered Catfish spawn, it is quite easy to induce them to continue to spawn at intermittent intervals for a period of two to four months.

The first experience I had of spawning *Corydoras paleatus* happened when a pair that had been placed in a breeding tank (to keep the base clean) unexpectedly covered the whole of one side of the glass with about one hundred eggs. The water temperature was at 80°F. at the time of the spawning, the chemical composition of the water being very soft and slightly acid (eighteen ppm hardness and a pH of 6·5). As the catfish had been placed in the tank for hygienic reasons it was pure chance that they happened to be a pair. The spawning pair were two catfish out of four that had been purchased some eight weeks earlier; four days after the first spawning the other two catfish also proved to be a viable pair and spawned in a different tank but in similar conditions. Spawnings were obtained, at intervals, from both pairs for approximately four months. At the end of this period both of the pairs refused to spawn for a further three to four months and then started the cycle all over again. Various experiments were carried out with both pairs during the second period of spawning and these produced some interesting and unexpected results.

1. Although the water conditions were constant in all the tanks that were tried, the catfish refused to

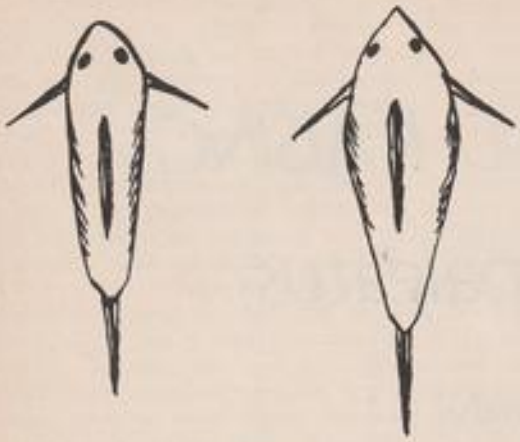


Diagram 1

Male and female *Corydoras paleatus* viewed from above. The female is on the right


Diagram 2

Newly hatched fry of *C. paleatus*. (Greatly enlarged)

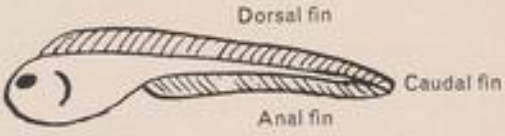



Diagram 3

Four day old, free swimming fry of *C. paleatus* (Greatly enlarged)

Note how the dorsal, caudal and anal fins are all joined giving an overall tadpole like appearance

spawn in certain of these tanks. Possible reasons for this behaviour could be a variation of light conditions or a variation in the depth of the water.

2. When the tank contained no plants the female would stick the eggs to the box filter or to one of the sides of the tank. When floating plants were introduced to the tank the female would make many journeys to the surface of the water and would deposit all the eggs on to the leaves of the floating plants (Indian Fern). When the tank was planted with submersed plants the females ignored these and continued to utilize the box filter or one of the sides of the tank.

3. It seemed to make no difference if pea gravel was used as a base or if the base of the tank was left clear. In both cases the catfish spawned but in the former they tended to wear away their barbels so the pea gravel was excluded after this was observed.

4. Although both pairs of Peppered cats belonged to the same species, when the males were exchanged both pairs refused to spawn. The females would roe up with eggs but when they laid the eggs the males would ignore them.

5. If an extra catfish of the same species was added to the tank, spawning would cease until he or she was removed. Many books, when discussing the spawning of *Corydoras* species, advocate the use of a ratio of three to one males to females. This would appear to be nonsense when looked at in conjunction with the above observation.

6. Although back crosses of sons to mother and daughters to father were tried on a number of different occasions none of them proved to be fruitful. The young females failed to lay eggs despite heavy and prolonged feedings of live foods and the young males failed to fertilize the eggs that their mothers produced. One exception was nine fertilized eggs out of a spawning of about sixty produced by a son to mother back cross, these eggs proved quite viable and duly hatched out.

7. When *tubifex* worms were fed on a regular basis, spawning was relatively consistent and occurred about once every fourteen days. Each spawning that was observed during this period lasted about six to eight hours and produced, on average, between one hundred and three hundred eggs. These facts are again quite contrary to other reported spawnings which speak about prolonged periods of egg laying lasting up to seven days and producing a total of two to three hundred eggs. Only on one occasion was a prolonged spawning of a similar nature observed. On another occasion eight separate spawnings were observed in fourteen days, the egg production of each spawning was at least sixty in number this giving a minimum total of four hundred and eighty eggs in just two weeks. When *tubifex* worms were withheld for a prolonged period the incidence of spawnings was lowered and a large number of fungused eggs (about 20%) were obtained from each spawning. The reintroduction of *tubifex* worms brought back normal spawnings at higher level incidences which took about three weeks to settle back to the expected level.

8. Temperature seems to have no obvious effects on spawning. As expected, a lowered temperature produced a lowered incidence of spawning but the actual spawning was of the same quality as any spawning produced at a higher temperature. A temperature of 85 F. produced no visible effects whatsoever, spawnings continuing as usual without even the expected rise in the number of incidences. Although the author has recorded this species living quite happily in a temperature of 55f, no spawnings were observed below 70 F., this hardly being surprising as tropical fishes must have a lower limit below which spawning will cease. These observed facts are again at odds with other sources which often claim that lowered temperatures of 65 F to 69 F are required in order to induce a spawning.

9. Changes of water were never seen to induce a spawning, in fact quite the contrary was observed and an expected spawning was often delayed by anything from five to ten days after changing only a quarter of the total water volume. Once again this totally contradicts the majority of written accounts some of which even go as far as to suggest imitating rain storms and tropical downpours.

**Hatching the Eggs and Raising the Fry**

Providing the breeding pair had been well fed all the eggs from a spawning would be viable and free from fungus. When laid and fertilized, the eggs of the Peppered cat were milky in colour and quite opaque, they varied in size from 0·7 to 1·0mm. It was often noticed that when *tubifex worms* were omitted from the diet of the adults as many as 20% of the eggs would become fungused and fail to hatch. In order to prevent the fungused eggs from infecting the viable eggs, each egg was kept separate from its neighbours and the whole spawning was incubated in a shallow tray and inspected frequently. On inspection any infected egg was immediately removed and noted; no chemicals were ever used to try to combat the fungus. Handling *Corydoras* eggs is easily done with an eye dropper as the eggs have a fairly hard shell and can be subjected to quite rough treatment. Considerable pressure is needed to crush a fertilized egg between the thumb and finger and this has proved a good test to indicate the early presence of infection.

Initially, the eggs were left to hatch in the tank where the spawning had taken place. The Peppered cats were removed soon after spawning as both pairs developed the unusual habit of eating their own eggs. Once the eggs had hatched the fry would lay on the bottom of the tank and subsist on the yolk sac that was still attached (see diagram 2). When the yolk sac had been assimilated the fry would begin to search for food and would devour any live or dried foods of suitable size. Unfortunately, despite the fact that the fry were eating quite well, all would die soon after losing the yolk sac. Because of this problem it became impossible to raise young Peppered cats past this stage until the reason for the deaths became more apparent.

Through a series of lucky accidents it became obvious that young *Corydoras paleatus* recently rid of their yolk sacs, preferred shallow water to deep water. The next spawning was removed from the breeding tank and hatched in a shallow tray in about one inch of water. All the eggs hatched and the young fry raised to maturity without one fatality occurring. Once it was observed that the depth of water in the tank was indeed the lethal factor the reason for it became obvious.

In addition to their normal gills, all *Corydoras* species have a specialised breathing organ connected to the alimentary canal. Air is taken into the mouth and forced down the gullet into the breathing organ; this is done during the occasional mad, seemingly pointless dashes that *Corydoras* catfishes often make up to the water surface. It would appear that this organ develops in fry soon after the yolk sac is exhausted and that young *Corydoras* catfish that are kept in deep water (anything from ten inches upward) experience great difficulties when trying to fill this organ with air. Put more simply, the distance to the surface is so great that they die of exhaustion by having to go back and fore all the time. Although it is imperative to keep newly hatched *Corydoras* catfish in only one or two inches of water no mention of this is made in any of the leading literature associated with the hobby.

Another observation which has also gone unmentioned in previous reports is the remarkable resemblance that young *Corydoras* catfish bear to small tadpoles (see diagram 3). At this stage (about three to four days old) the only really suitable foods are micre worms and micro eels, newly hatched brine shrimps being totally unsuitable because of the aversion the *Corydoras* catfish have for salt. From about ten to fourteen days, young Peppered cats will take small *tubifex* worms and as these are an ideal food, producing quick and healthy growth, it is worth the extra effort needed to obtain them.

An easy way to separate small *tubifex* worms from larger ones is as follows. After thoroughly cleaning the worms place them into a large bucket and half fill with fresh water. Agitate the worms until each worm has become separate then allow the larger worms to settle (these will sink first) before netting off the smaller worms that are still floating. This should be repeated a number of times until most of the smaller worms have been separated from the mass. This extra effort is well worth expending as the growth of the young catfish is speeded up and they are soon big enough to be fed their *tubifex* worms "straight."

Providing the water depth is slowly raised over a period of four weeks from the date of hatching, the young *Corydoras* catfish will tolerate one foot of water

with no ill effects at the end of this period. At this time they are of a saleable size (approximately a half to three quarters of an inch in length) but experience has taught that for the first two months at least, *Corydoras paleatus* are very susceptible to changes in water conditions. The fry can be lost by simply transfering them from one tank to another but, providing they are left in the same tank for the first two months they can then be moved without any serious losses.

**Conclusions**

Providing a willing pair of adult fish is available, *Corydoras paleatus* is a fairly easy species to spawn. The knack seems to be in acquiring a spawning pair initially and going on from there. Providing the fry are hatched and raised in shallow water there is no reason why the whole spawning should not be raised to maturity. Once this hurdle had been overcome, raising large numbers of Peppered cats was quite feasible and far from difficult even with the limited resources available to the author. It is strange that the need for shallow water has been so totally ignored in previous breeding reports; perhaps it is because far fewer people raise *Corydoras* species in this country than we are generally asked to believe. Nevertheless, it is hoped that this article will be of assistance to the would-be *Corydoras* breeder because although all the above remarks and observations concern only *C. paleatus*, they can generally be taken for all the members in the genus, *Corydoras*.

# CROSSWORD PUZZLE

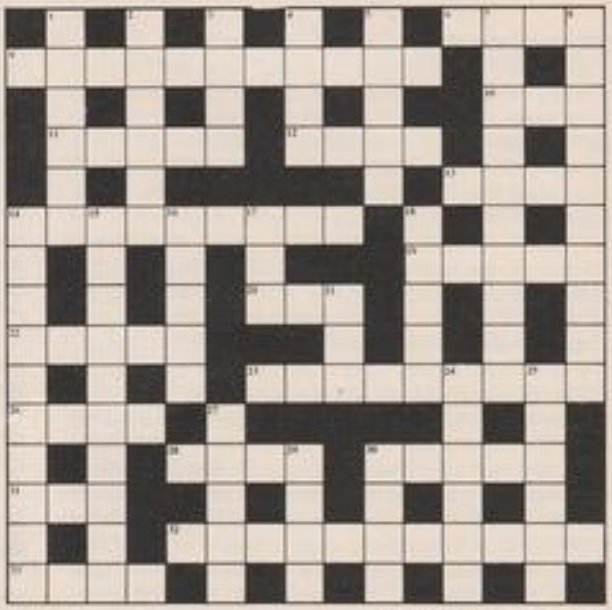
*by Dylan Pugh*

**ACROSS**

6 Malc gets turned into a shellfish? (4)
9 Is this large cichlid a well known fighter? (4, 7)
10 Where we may dig up *Tubifex*? (3)
11 Where anglers pit their skills—against each other? (5)
12 Part arranged to protect eggs and fry? (4)
13, 33 Distinguishing feature of *Chelmon rostratus*? (4, 4)
14 Doubled up to give the striped headstander. (9)
19 We might suffer from these after moving tanks! (5)
20 In which the dogfish lays it's eggs? (3)
22 African river, from which a country takes it's name, where many cichlids live. (5)
23 What a diaphragm did, and what it supplied! (6, 3)
26 Breathing part of a fish. (4)
28 Micro, Grindal, Earth? They are all good food. (4)
30 A colourful white spot remedy might leave this! (5)
31 What every aquarium should have. (3)
32 Could it, perhaps, give us a forecast? (11)
33 See 13

**DOWN**

1 Popular game fish? (6)
2 Pair of fish we might need in icy weather? (6)
3 A net is made of this. (4)
4 Ocellus? (4)
5 What most tank frames are made of. (5)
7 Genus of water plants. (10)
8 Island from which the Lace plant comes? (10)
14 Genus to which the Lace plant belongs. (10)
15 *Capoeta* ....., the Checkered Barb. (10)
16 Member of *Hyphessobrycon*? (5)
17 One of these is sometimes used for Killies to spawn in (3)
18 This should be well insulated near water! (5)



**Solution on page 65**

21 As one, we hear, blocks an Egyptian river. (3)
24 The smallest cichlids? (6)
25 *Hyphessobrycon* ....., the Neon Tetra. (6)
27 What a fillet should be! (5)
29 A breeder wants this for his best specimen. (4)
30 This might help a Climbing Perch? (4)

# News from AQUARISTS' SOCIETIES

Monthly reports from Secretaries of aquarists societies for inclusion on this page should reach the Editor by 3rd of the month preceding the month of publication.

THE **Reading and District** Open Show, 1st April, attracted over 600 entries in the 32 classes. Best fish in show was awarded to Mr. R. Prior (Newbury) for his *Rasbora maxmeieri* (Class F). The FBA's Championships Trophy (N-ot) was also won by a Newbury member, Mr. C. Howe. Other results were:

Sp: 1, P. Rushbrooke; 2, W. West; 3, T. Gardiner; 4, S. P. Swann. Ag: 1, T. Waller; 2, M. Bird; 3, Master A. Waller; 4, Mrs. G. M. Rushbrooke. Ba: 1, F. May; 2, R. F. Adams; 3, T. Fraser; 4, A. Campion. B: 1, D. Eidlestone; 2, A. Campion; 3, A. Chaplin; 4, R. F. Adams. Ca: 1, A. I. Feast; 2, M. Wright; 3, Mrs. V. A. Feast; 4, J. Shults. Cb: 1 and 3, C. Richards; 2, D. Goss; 4, N. Fox. C: 1, M. Bird; 2, R. F. Adams; 3, R. Cooke; 4, G. Arnold. Db: 1, P. Baker; 2, D. T. F. Kerr; 3, Master J. Gifford; 4, G. Arnold. De: 1, S. P. Swann; 2 and 3, D. Eidlestein; 4, W. Knight. D: 1, D. Eidlestone; 2, L. R. Gale; 3, G. Arnold; 4, P. Lawrence. Ea: 1, R. Price; 2, T. Jennings; 3 and 4, A. G. Wing. E: 1, R. F. Adams; 2 and 3, D. T. F. Kerr; 4, G. Webb. F: 1, R. Price; 2 and 4, G. Siti; 3, L. F. Lovegrove. G: 1, P. M. Lambert; 2, W. West; 3 and 4, C. Richards. H: 1, W. A. Knight; 2, A. I. Feast; 3, P. Rushbrooke; 4, J. Egan. J: 1 and 4, B. Witteridge; 2, D. Goss; 3, M. Fox. K: 1 and 4, D. Goss; 2, C. Richards; 3, B. Witteridge. L: 1, 2 and 4, C. Richards; 3, N. Jackson. M: 1, Mr. Cooper; 2, J. Humphries; 3, T. Hutt; 4, I. Lecky. N-bm: 1, C. Richards; 2, D. Goss; 3, R. Townsend; 4, R. T. Stallwood. N-ot: 1, C. Howe; 2 and 3, Mr. Dibble; 4, R. Townsend. O: 1, J. Arnold; 2, D. Goss; 3, R. Townsend; 4, R. T. Stallwood. P: 1, J. Arnold; 2, D. M. Lambert; 3 and 4, S. Furssedonia. Q: 1, C. Richards; 2, R. Prior; 3, I. J. Sellwood; 4, J. and T. and F. Mayle. R: 1, J. and T. and F. Mayle; 2, 3 and 4, J. Elgan. S: 1, J. and T. and F. Mayle; 2, I. Lecky; 3, Mr. Cooper; 4, C. Robinson. T: 1, Mr. Dibble; 2, C. Howe; 3, C. Richards. X-bm: 1, T. Duffy; 2, J. and T. and F. Mayle; 3, D. Blundel; 4, D. Eidlestein. X-ot: 1 and 2, T. and J. and F. Mayle; 3, Mr. Dibble; 4, A. Campion. U: 1, R. F. Adams; 2, D. T. F. Kerr; 3, Mr. R. Stallwood; 4 M. Dodds. V: 1 and 4, S. Furressdonn; 2 and 3, Mrs. J. Sawyer. W: 1 and 3, R. Breet and W. F. Woodward; 2, M. and B. Coe; 4, F. May.

* * *

AT the March meeting of the **Thorpe and District A.S.** members were entertained by a quiz by Aquatic dry goods wholesaler Chris Skelton, from Chelmsford. The close fought quiz was finally won by the Ladies' team. At the April meeting Mr. Wally Card, president of the Suffolk Aquarist and Pondkeepers Association, gave an illustrated lecture on various fish kept by members of the association over the past few years. The evening finished with an auction of over 60 lots of fish, plant and equipment.

Table show results: Barbs: 1, T. Driver; 2 and 3, T. Cork. Swordtails: 1, Mr. and Mrs. Crooks; 2, K. Appleton; 3, P. Sparkes. Juniors: 1, 2 and 3, J. Norton. Gouramis: 1, G. Balls; 2, J. Woods; 3, Mr. and Mrs. Crooks. Fighters: 1 and 2, K. Appleton. Juniors: 1, J. Norton; 2, D. Hurn; 3, S. Dale.

At the quarterly meeting of the East Anglian Federation of Aquarist Societies competing against eight other societies members of Thorpe and District A.S. won 37 of the 86 award cards and the best in show was won by club secretary, Neville Newby.

* * *

AT the A.G.M. of the **Saracens Aquarium Club** held on the 5th March, the following committee were elected: chairman, B. Barford, 33 Longfield Road, Harpenden, Herts.; vice-chairman, M. Mason, 72 Hill Rise, Sundon Park, Luton, Beds.; secretary, A. Grimes, 25 Abercorn Road, Luton, Beds.; treasurer, J. Eaton, Saracens Public House, Redbourne, Herts.; show secretary, G. Lester, 1 Station Road, Finchley, London N.3; public relations officer and assistant secretary, M. Emmson, 48 Downedge, Redbourne, Herts.

* * *

**Southend Leigh and District A.S.** club meetings and table show results for the past three months:

2nd Jan.—Talk on Equipment. Table Show: Bz, P. Boore; Ezy, P. Cole; Oy, G. Saville. Jan. 16th—Talk on Fish Foods, D. Cheswright. T/S: B. R. Neale; By, M. Phillips; Q-X, R. Neale; Q-Xy, I. Archer. Feb. 6th—Auction Night. T/S: First leg of challenge. 20th Feb. —Talk on Showing Fishes, D. Hickman. T/S: C. R. Davis; Cy, S. Boore; Ms-Os, R. Davis; My, P. Cole. March 6th—Talk/Slides on Southend's Parks, Mr. Holliday. T/S: Es, J. Wimbush; Ray, P. Cole. 20th March —Beginner's Night. T/S: L: J. Wimbush; Ly: G. Saville; R, R. Davis; Ry: P. Cole.

The open show was being held on 28th April at St. Clements Church Hall, Leigh-on-Sea, Essex.

* * *

THERE were 556 entries at the **Morley Aquarist** 2nd open show on 8th April. Winner of Best in Show: Mr. D. Harris (Mexborough Society). Section winners: Best Livebearer, Mr. S. Hall (Swillington); Best Barb, A. Marples (Sherwood); Best Characin, R. Lake (South Humberside); Best in Section D, D. Sugden (Bradford); Best Killifish, R. Brown (Morley); Best Anabantid, Mrs. M. Gray (Ind.); Best Cichlid, M. Price (Castleford); Best Catfish and Loach, Mr. and Mrs. Riley (Leeds P.O.); Best A.O.V., D. Harris (Mexbro'); Best Breeders, D. Jones (Dearne); Best Pairs, Busfield (Barnsley); Best Coldwater, K. Chapman (Mexbro').

Guppies: 1, Mr. and Mrs. Goacher (Goole); 2, E. and L. Walley (Barnsley); 3, A. Cook (Hallcroft). Swordtails: 1 and 2, S. Hall (Swillington); 3, M. Ozanne (David Brown). Platies: 1, M. Price (Castleford); 2, W. Riley (Immingham); 3, Mr. and Mrs. Chadwick (Castleford). Mollies: 1, M. Price (Castleford); 2, Miss J. Gray (Ind.); 3, W. England (Barnsley). A.O.V. Livebearers: 1 and 2, T. and P. Busfield (Barnsley); 3, R. and S. Cherryholme (Barnsley). Small Barbs: 1, Mr. and Mrs. Hopkinson (Darfield); 2, M. Price (Castleford); 3, Mr. and Mrs. Waller (Chesterfield). Large Barbs: 1, A. Marples (Sherwood); 2, Jackson Bros. (Sherwood); 3, Mr. and Mrs. Kemp (Sheaf Valley). Small Characins: 1, Mr. and Mrs. Lake (South Humberside); 2, M. Price (Castleford); 3, Mr. and Mrs. Richardson (Scarborough). Large Characins: 1 and 2, H. J. Plastow (Immingham); 3, S. Sutton (Barnsley). Rasboras, Danios and Minnows: 1, Mr. and Mrs. Lake (S. Humberside); 2, B. Wigley (Mexbro'); 3, Mr. and Mrs. Hopkinson (Darfield). Sharks and Flying Fox: 1, D. Sugden (Bradford); 2, Mr. and Mrs. Hopkinson (Darfield); 3, Mr. and Mrs. Jarman (Darfield). Killifish: 1, R. Brown (Morley); 2, J. Britten (Morley); 3, B. Bank (BBC, Thorne). Fighters: 1 and 3, Mrs. M. Gray (Ind.); 2, Mrs. Anderson (Ind.). Small Anabantids: 1, T. Harrison (Swillington); 2, A. Cook (Hallcroft); 3, Mrs. M. Gray (Ind.). Large Anabantids: 1, H. J. Plastow (Immingham); 2, Mr. and Mrs. Copley (Doncaster); 3, Mrs. I. Avis (Immingham). Small Cichlids: 1, Miss S. Price (Castleford); 2, M. Price (Castleford); 3, Mrs. M. Gray (Ind.). Large Cichlids: 1, M. A. Hollingworth (Sherwood); 2, S. Sutton (Barnsley); 3, J. Marsland (Barnsley). Angel Fish: 1, D. Harris (Mexbro'); 2, T. Marsland (Barnsley); 3, G. Watson (York and Dist.). Malawi Cichlids: 1, M. Price (Castleford); 2, M. A. Hollingworth (Sherwood); 3, Mr. and Mrs. Bollon (York and Dist.). Corydoras and Brochis: 1, M. Price (Castleford); 2, Mr. and Mrs. Copley (Doncaster); 3, D. and C. Kirk (Castleford). A.O.V. Catfish: 1, K. Fisher (Sherwood); 2 and 3, Mr. and Mrs. Honner (Doncaster). Loaches and Botia: 1, Mr. and Mrs. J. Riley (Leeds P.O.); 2, T. Holdsworth (Sth. Leeds); 3, E. and A. M. Rice (Barnsley). A.O.V. Tropical: 1, D. Harris (Mexbro'); 2, H. J. Plastow (Immingham); 3, Mr. and Mrs. Dorrell (Zenith). Breeders—Livebearers (1-10): 1, S. and K. Hatton (Barnsley); 2, B. Bank (BBC Thorne); 3, Mr. and Mrs. Hill (Barnsley). Breeders—Livebearers (11-20): 1, Mr. and Mrs. Hill (Barnsley); 2, B. Bank (BBC Thorne); 3, T. and P. Busfield (Barnsley). Breeders—Egg Layers (1-10): 1, Mr. Gover (Ind.); 2, G. Clark (BBC Thorne); 3, D. Smith (Morley). Breeders—Egg Layers (11-20): 1, D. Jones (Dearne); 2, Mr. and Mrs. Copley (Doncaster); 3, B. Bank (BBC Thorne). Pairs —Live Bearers: 1 and 3, T. and P. Busfield (Barnsley); 2, Mr. and Mrs. Goacher (Goole). Pairs—Egg Layers: 1, Mr. and Mrs. Copley (Doncaster); 2, Mr. and Mrs. Richardson (Scarbro'); 3, Mr. and Mrs. Tindall (York). Common Goldfish: 1, K. Chapman (Mexbro'); 2, Mr. and Mrs. Waller (Chesterfield). Fancy Goldfish: 1 and 3, D. Jones (Dearne); 2, Mr. and Mrs. Waller (Chesterfield). A.O.V. Coldwater: 1, Mr. J. and H. Snowden (York and Dist.); 2, Mr. and Mrs. Wright (Barnsley); 3, Mr. and Mrs. Tindall (York and Dist.). Novice: 1, Mrs. Gawder (Ind.); 2, Jackson Bros. (Sherwood); 3, Mr. S. Hancock (Hallcroft). Junior: 1, D. and C. Kirk (Castleford); 2, Miss P. Canning (York and Dist.); 3, Master S. Smith (Morley).

* * *

AN old club, **Lower Gornal Select,** has been reinstated. Meetings at The Bulls Head, Lower Gornal, West Midland, on the 2nd and 4th Monday of every month at 8.00 p.m., new members welcome.

* * *

OFFICERS OF THE **Worksop Aquarist and Zoological Society** are: Chairman, Mr. Eric Wainwright, 'Carie,' Church Street, South Leverton, Retford, Notts; secretary, Alan Alberry, 2 Dambrook Drive, Clowne, Chesterfield, Derbys; show secretary, Bill Shepherson, 2 Popular Street, New Ollerton, Newark. The W.A.Z.S. will hold bring and buys on 16th September and also the 6th of November at the St. Johns Ambulance Hall, Newcastle Avenue, Worksop.

* * *

MARTIN HARVEY and Arthur Jarvis's lighthearted treatment of the subject 'General Fishkeeping', delighted the audience at **Evesham Fishkeepers' Society's** April meeting.

Mr. Harvey was kind enough to judge the table show. Results: Corydoras: 1 and Trophy winner, D. R. Goll; 2, Mrs. L. Wright; 3, Mrs. E. Thornton. A.O.V. Catfish: 1, Mrs. E. Thornton; 2, S. Biddle; 3, D. R. Goll.

The Society meets on the first Wednesday of every month at 8.00 p.m. at the Hampton Scout Hut, Pershore Road, Evesham, Worcs. Visitors and new members welcomed. Secretary Mr. Michael Barnett, 14 Meadow Road, South Littleton, Nr. Evesham, Worcs. (Tel: Evesham 830034).

* * *

THE **Hoylake A.S.** meets on the 2nd and 4th Tuesdays of the month at the Coach & Horses, Moreton Wirral, and guests are always welcome. On 13th March they showed the F.B.A.S. Aquatalk "Northern Sights." It is worth noting that this slide/tape lecture deals with the social side of the hobby and does not show any fish, but deals with the British Aquarists Festival at Belle Vue and gives good coverage of the tableaux.

27th March was the date of the A.G.M. The society recorded its appreciation of the services of their late vice-chairman, Tom Jones, a regular contributor to Barry Whitesides W.Y.O. Last years show secretary, D. Laking was elected to the vacant position of vice-chairman and other changes are noted elsewhere in this section. There followed an informal discussion on the future programme material for the society.

* * *

THE **Goldfish Society of Great Britain,** held its A.G.M. on 17th March. The Officers for 1979-80 are: president, W. Wilson; chairman, R. Dodkins; treasurer, J. E. Parker; show secretary: A. Lesurf; secretary, A. C. Law, 115 Commonwealth Road, Caterham, Surrey.

Would-be members should write to the secretary for information, or come along to one of the meetings, at the Conway Hall, Red Lion Square, Holborn, London, on any of the following dates: 21st July; 17th Nov., as guest of P.R.O. L. F. Clements.

* * *

**Wolverhampton A.S.** meets on the 1st and 3rd Wednesday of each month at the Oxley Community Centre, Marsh Lane, Wolverhampton at 8 p.m. New visitors are always welcome and more information can be obtained from L. Crook (tel: Wolverhampton 53383).

* * *

THAT the risk of introducing parasites among plants from the wild could be reduced by a bath in Sterazin, came up during a discussion on spawning media for Goldfish by **Bristol A.S.** Too rigid a medium could also cause fin damage.

This was also the occasion of Miss Hilda Morgan's 87th birthday and this active member was given a Golden Tench as a birthday present.

The table show, judged by Ron King and Graham Bell, resulted as follows: Goldfish: 1 and 2, W. G. Ham; 3, M. Calway; 4, C. Hayes. Fantails: 1, 2 and 4, H. C. B. Thomas; 3, S. Ford. Veiltails: 1 and 2, S. Howells; 3 and 4, R. Pinnock.

* * *

RESULTS of the final leg of the Three Corner Competition between Mount Pleasant A.S., Priory A.S. and NOVOS T.F.C., which was held at the Mount Pleasant Social Club, Gateshead on 27th March: A.O.V. Livebearers: 1, J. English (N); 2 and 3, A. Learoyd (N). Rift Valley Cichlids: 1, Mr. and Mrs. Caddle (N). Barbs, Large: 1, P. Best (P). A.V. Coldwater: 1, G. Hunt (N); 2 and 3, D. Hume (M). Small Barbs: 1 and 3, Mr. and Mrs. Risbridger (N); 2, A. Bloomfield (M). Plants: 1 and 2, G. Thompson (M). Corydoras and Brichis: 1 and 2, Mr. and Mrs. Risbridger (N); 3, G. Hunt (N). Danio and WCMM: 1, A. Bloomfield (M); 2, Mr. and Mrs. Risbridger (N); 3, Mr. and Mrs. Caddle (N). Rasbora: 1, Mr. and Mrs. Caddle (N); 2, Mr. and Mrs. Risbridger (N); 3, Robinson (N). Guppy Female: 1, G. Thompson (M). A.V. Labyrinth: 1, A. Botcherby (M). Breeding Pair Livebearers: 1, J. English (N); 2, G. Thompson (M). Large Cichlids: 1 and 2, J. W. Johnstone (P). A.O.S. Egglayer: 1, Mr. and Mrs. Hall (N); 2, D. Eastern (M). Labeo: 1, G. Hunt (N); 2, D. Hume (M); 3, M. Campbell (M). E.L.T.C.: 1, Mr. and Mrs. Hall (N); 2, G. Thompson (M). Loach: 1, M. Campbell (M); 2, J. English (N); 3, Mr. and Mrs. Hall (N). Molly: 1, G. Hunt (N); 2 and 3, A. Campbell (M). Tropical Catfish: 1, D. Hume (M); 2, Mr. and Mrs. Hall (N); 3, P. Best (P). Breeders Egglayers: 1, D. Hume (M); 2, J. W. Johnstone (P); 3, G. Thompson (M). Breeders Livebearers: 1, Mr. and Mrs. Risbridger (N); 2, J. W. Johnstone (P). Betta Splendens: 1, D. Hume (M); 2, K. Ring (M). Breeding Pair Egglayers: 1, G. Thompson (M); 2, J. W. Johnstone (P); 3, D. Hume (M). Characins, Large: 1, Mr. and Mrs. Hall (N); D. Hume (M). Characins, Small: 1 and 2, Mr. and Mrs. Hall (N); 3, D. Hume (M). Cichlids, Small: 1, 2 and 3, D. Hume (M). Best Fish in Show: Corydoras (83 points), Mr. and Mrs. Risbridger. Points total for show: 1, NOVOS 64; 2, M.P.A.S., 54; 3, Priory, 16.

Total for all three legs: 1, Novos, 183; 2, M.P.A.S., 128; 3, Priory, 90.

* * *

AT the 12th April meeting of the **Mid-Sussex A.S.** at the Fox and Hounds, Haywards Heath, the chairman welcomed members of Brighton and Southern A.S., to the first leg of the annual 'Over the Downs' competition. Life membership was offered to, and accepted by Mr. and Mrs. N. Short, in appreciation of all that they have done for the club. Mr. N. Short gave the talk for the evening on 'Coldwater Fish'.

Mr. J. Stillwell judged the fish and awarded cards as follows: Loaches: 1 and 3, R. Hard (Brighton); 2, C. Slade (Mid-Sussex); 4, B. Slade (Mid-Sussex). Labyrinths: 1, P. Levine (Mid-Sussex); 2 and 3, L. Pinney (Mid-Sussex); 4, T. Ramshaw (Brighton). Barbs: 1, E. and T. Tester (Mid-Sussex); 2 and 3, B. Sayers (Brighton); 4, B. Slade (Mid-Sussex). Rasboras: 1, C. Raggio (Brighton); 2 and 3, P. Levine (Mid-Sussex); 4, B. Sayers (Brighton). Characins: 1, E. and T. Tester (Mid-Sussex); 2, B. Slade (Mid-Sussex); 3, T. Ramshaw (Brighton); 4, B. Sayers (Brighton). Guppies—Female: 1 and 3, E. and T. Tester (Mid-Sussex); 2, I. Birch (Mid-Sussex); 4, S. Smith (Brighton).

Result of the first leg was: Mid-Sussex, 39 points; Brighton, 21.

Further details from the Secretary, Mr. J. Birch, 11a Sandrocks Way, Haywards Heath (Phone: H. Heath 50585).

**Croydon A.S.** held their annual general, meeting on 3rd April. All members were present. Change of committee as follows: chairman, J. Hooper; secretary, L. Dorrick; P.R.O. and ass. secretary, N. Winford; show secretary, K. Dryden; treasurer, T. Skeets; committee men, D. Day.

* * *

THE Annual Inter Society Table show and quiz of the **Northwich & District A.S.** was held on 18th April at "The Winnington & Castle" Old Friends, club, off Queensgate, Castle, Northwich. List of classes: Guppies, Swordtails, Dwarf Cichlids, Rasboras, Danios and Minnows, Catfish (Corydoras and Brochis), Characins, Fighters, Pairs Egglayers, Pairs Livebearers.

Results: 1, Warrington A.S. (Inter Society Trophy Winner); 2, Macclesfield A.S.; 3, Northwich and D.A.S.; 4, Wrexham A.S. Best fish in show Plaque Winner (S. Tomlinson Macclesfield A.S.); the fish were judged by Mrs. Jackie Selby (Wythenshawe A.S.) and Mr. G. Harvey (Southport A.S.).

The results of the quiz: 1, Wrexham A.S.; 2, Macclesfield A.S.; 3, Northwich A.S.; 4, Warrington A.S. The quiz was devised and presented by Les Bradley.

* * *

**Darwen A.S. and Blackburn A.S.** have now officially amalgamated, but the new Society is still to be known as **Darwen Aquarist Society.** The club meetings will be held in the same meeting place of Darwen A.S.,—"The Crown Hotel," Redearth Road, Darwen, every third Monday evening. All meeting dates are those of the former Darwen A.S. and the plans for the year remain the same.

The new Society now have two F.N.A.S. "B" Class Judges: P. Yates, 21 Rosegate, Darwen, (Tel. 57931, office hours) and B. Walsh, 9 Marsh Terrace, Darwen, (Tel. 75988).

* * *

THE committee of the **Ichiban Ranchu Society** now consists of the following new committee members, since their A.G.M. on 7th April: show secretary, Mr. Gary Lewis; lay member, Mrs. Sue Lewis; lay member, Mr. Frank Hilton. Any details required of Open shows, etc., can be obtained from Mr. Gary Lewis, 91 Bourne Avenue, Hayes, Middlesex. (Phone: 01-573 1770).

* * *

## CHANGE OF OFFICERS

Due to the recent departure of Mr. J. Widd, Mr. Peter T. Lawton, 61 Highlands, Royton, Oldham OL2 5HL (Tel: 620 9922) has taken over as Secretary of the **Osram A.S.** Mr. Eddie McKown, 16 Avon Road, Shaw, Oldham (Tel: Shaw 43955) has taken over as show secretary from Mr. P. Hewitt.

* * *

## SECRETARY CHANGES

**Evesham Fishkeepers' Society,** Mr. Michael Barnett, 14 Meadow Road, South Littleton, Nr. Evesham, Worcs (Phone Evesham 830034).

**Hoylake A.S.:** G. Robinson, 24 Heathmoor Road, Moreton, Wirral, Merseyside L46 7UN. Show secretary, Mr. K. Hand, 8 Myrtle Grove, Wallasey (Tel: 051-677 8297).

* * *

## CALENDAR

**3rd June:** Accrington A.S. open show at Antley Methodist Church. Benching 12-2 p.m. More details, s.a.e. to show secretary, S. Lyne, 12 Thwaites Road, Oswaldthistle, Nr. Accrington.

**3rd June:** Scunthorpe Museum Society Aquarist Group 9th open show at Charter Hall, Corporation Road, Scunthorpe. Schedules available from Mr. D. Caldow, 5 St. Martins Road, Scawby, Brigg, South Humberside DN20 9HG.

**3rd June:** Redcar A.S. open show at Coatham Bowl, Redcar.

**3rd June:** Loughborough & District A.S. open show at Burleigh Community College, Thorpe Hill, Loughborough. Schedules from I. S. Purdy, show secretary, 10 Cleveland Road, Loughborough, Leics. LE11 2SP.

**3rd June:** Mid-Sussex A.S. invitation interclub show at Sydney West Hall, Leylands Road, Burgess Hill. Further details from T. Tester, 19 Cyprus Road, Burgess Hill, West Sussex RH15 8AX (Tel: 43202).

**3rd June:** Sudbury A.S. open show at the Wasps Rugby Ground, Repton Avenue, Wembley, Middx. Schedules from L. J. Brazier, 66 Ormesby Way, Kenton, Middx. (Tel: 01-204 5374).

**3rd June:** Arbroath A.S. open show at the Community Centre, Marketgate, Arbroath. Schedules etc., from John Steven 95 Brechin Road, Arbroath.

**9th June:** Dow Corning A.S. 2nd open show at the Memorial Hall, Barry. Schedules from Secretary, S. A. Jenkins, 43 Norwood Crescent, Coldbrook, Barry, Glam.

**10th June:** St Helens A.S. open show.

**10th June:** Northwich and District A.S. open show at Hartford High School, Greenbank Lane, off Chester Road, Hartford, Northwich. Judging to F.N.A.S. methods and standards. Further details from Show Secretary, D. Valentine, 43 Hartford Road, Davenham, Northwich, Cheshire (Tel: Northwich 6624).

**10th June:** South Park A. (Study) S. SPASS open show at the Community Centre, St. George's Road, Wimbledon, S.W.19. Will all holding cups please return these by Thursday, 15th May, to the Show Secretary, Mr. L. Clapp, 16 Overhill Way, Beckenham, Kent. (Tel: 01-657 4404, daytime).

**16th June:** F.G.A. North West Lancs./Manchester Section annual show at the Seton Challen Temple, Savoy Street (off Pitt Street), Preston. Benching 12.2 p.m. Further details from Mr. B. Morris 4 Irwell Street, Burnley, Lancs.

**17th June:** Loyne Aquarists open show, St. Paul's Parish Hall, Scotforth, Lancaster Details from Mrs. H. Batchelor, 76 Greaves Road, Lancaster (Tel: 66633).

**17th June:** Salisbury and D.A.S. annual open show at the Activity Centre, Wilton Road, Salisbury. 50 classes including 6 Cichlid classes and 10 Coldwater classes. Judging to F.B.A.S. standards. Further details and schedules from Mr. R. F. Adams, 26 Empire Road, Salisbury. S.a.e. please.

**17th June:** South Park Aquatic (Study) Society 2nd open show at Wimbledon Community Centre, St. George's Road, S.W.19.

**24th June:** Killingworth open show in the Communicore Building. Schedule from Mrs. Susan Metcalf, 71 Windburgh Drive, Cramlington.

**24th June:** The British Koi-Keepers Society 1st national Koi auction at the Botanical Gardens, Edgbaston, Birmingham. Viewing from 10 a.m. Sale begins at 2 p.m. Further details from Mr. R. Hodgson (021-454 6283).

**24th June:** Warrington A.S. 11th annual open show at the Parr Hall, Palmyra Square, South Warrington. Further details from I. Hopkins, 6 Westford Road, Lower Walton, Warrington, Cheshire.

**24th June:** The British Koi Keepers Society 1st national Koi auction at the Botanical Gardens, Egbaston, Birmingham. Details from Mr. R. Hodgson, 5 Westbourne Road, Egbaston, Birmingham (Tel: 021-454 6283).

**24th June:** Alfreton & District A.S. open show at Alfreton Hall. Schedules from Mr. P. W. Bonsor, 10 George Street, Riddings, Derbys, DE5 4AU.

**1st July:** Kings Lynn A.S. open show at the Corn Exchange, Tuesday Market Place, Kings Lynn.

**1st July:** Chard and District A.S. 5th annual open show at Furnham School, Chard, Somerset. Details from A. Griffin, 24 Thornton Road, Yeovil, Somerset (Tel: Yeovil 23231). Show schedules end of April.

**1st July:** Sherwood A.S. open show and auction, St. Margarets Hall, Holbeck, nr. Worksop. Further details from M. Hollingworth, 9 Vespar Court, Forest Town, Mansfield, Notts.

**1st July:** Midland Koi Association 4th national open show at the Baginton Village Hall, Baginton, Coventry Pre-entry forms from the secretary, Mr. M. K. A. Causer, 8 Swinburne Road, Mill Hill East, Hinkley, Leics. (Tel: Hinkley 30145).

**7th July:** Nailsea and District A.S. open show at Community Centre, Clevedon. Schedules from P. Fitchett, 2 Woodland Road, Nailsea, Bristol, Avon (Tel: Nailsea 3096).

**8th July:** Lytham A.S. Annual Open Show at Lytham Baths, Dicconson Terrace, Lytham, Lancs. Schedules from Show Secretary, Mr Peter Ham, 1 Wyndene Grove, Freckleton, Preston, Lancs. (Tel: Freckleton 633182).

**8th July:** Scunthorpe & District A.S. open show at the Park Community Centre, Ferry Road, Scunthorpe, South Humberside. Also being and buy sale. Benching 12.00-2.00 p.m.

**8th July:** Novos 1st open show at Heston School, Newton Road, Byker, Newcastle (new date).

**13th, 14th, 15th July:** The Aquarist Fishkeeping Exhibition, Alexandra Palace, London. Schedules from L. Brazier, FBAS Show Secretary, 66 Ormesby Way, Kenton, Middlesex.

**14th-15th July:** Romford and Becontree A.S. open show (Dagenham Town Show), Central Park, Dagenham. Schedules (May) from Garry Steptowe, 35 Coniston Way, Elm Park, Hornchurch, Essex (Tel: Hornchurch 44057).

**15th July:** Scarborough A.D.A.S. open show at Gladstone Road Junior School, Wooler Street, Scarborough. Schedules (March) from J. F. Richardson, 5 Keld Garth, Pickering, N. Yorks. YO18 8DG. Tel: 73964.

**15th July:** Sandgrounders A.S. open show at Meols Cap School, Meals Cap Road, Southport. 30 major trophies. Schedules later from Mr. B. Baldwin, 10 Olive Grove, Southport.

**21st July:** Goldfish Society of Great Britain general meeting at Conway Hall, Red Lion Square, Holborn, London.

**22nd July:** Gosport & District A.S. open show.

**29th July:** South Humberside A.S. open show at the Memorial Hall, Cleethorpes.

**29th July:** Dorchester Tropical Fish Society open show at Hardy's School, South Court Avenue, Dorchester.

**29th July:** Runcorn A.S. open show at St. Edwards Church Hall, Ivy Street, Runcorn, Cheshire.

**3rd-4th August:** Hull A.S. show in connection with the Agricultural Show at the East Park, Holderness Road, Hull.

**3rd, 4th, 5th August:** Three-Rivers Aquarian Fish Keeping Exhibition in the Crowtree Leisure Centre, Crowtree Road, Sunderland. Further details from the show manager, Mr. G. Liddle, 19 Pamleston Ave., Newcastle-upon-Tyne.

**4th August:** Northern Goldfish and Pondkeepers Society hold their 3rd Coldwater fish show at the Sports Centre, Silverwell Street, Bolton, Lancashire. Schedules from Mr. B. Rothwell, 4 Whalley Road, Hale, Cheshire. (061-980 8801).

**5th August:** Oldham and District A.S. annual open show, Wernith Park, Oldham. Tropical, marine and coldwater sections. Schedules from P. Harris, 21 Richardson Road, Eccles, Nr. Manchester (Tel: 061-707-1395).

**5th August:** Blackpool and Fylde Aquarium Society annual open show at St. Kentigerns Hall, Newton Drive. Address of the Show Secretary is Mrs. D. Moseley, Flat 80, Forshaw Avenue, Grange Park, Blackpool (tel: Blackpool 36456).

**6th-11th August:** Portsmouth A.S. annual exhibition at the Wesley Central Hall, Fratton Road, Portsmouth. Tropical and coldwater fish, local marine life, local and North American fish, reptiles, amphibians, furnished aquaria and sea shells.

**8th-11th August:** Irish Federation of Aquarists Societies show in the Wellington Hall, Central Belfast.

**12th August:** Hastings and St. Leonards Aquarium Society open show at the Youth Centre, Station Road, Bexhill-on-Sea.

**12th August:** Grimsby and Cleethorpes A.S. open show at the Memorial Hall, Cleethorpes. Benching 12.2 p.m.

**19th August:** South East London A.S. 4th open show at 141 Greenwich High Road, S.E.10. Contact Mr. S. Jeffrey, 207, Sibthorpe Road, London S.E.12.

**25th, 26th, 27th August:** Leamington and District A.S. exhibition, including an open aquarium contest, at the Royal Pump Rooms Annexe, Leamington Spa. Further details from show secretary, M. Burridge, Flat 1, 36 Warwick New Road, Leamington Spa, Warwickshire.

**26th August:** Long Eaton A.S. open show at Gregorys Rose Gardens, Toton. Details from R. West, 137 Longmoor Road, Long Eaton, Notts.

**27th August:** Petersfield and District A.S. 2nd open show at the Town Hall, Heath Road, Petersfield, Hants. Schedules from Show Secretary, G. Stacey, 6 Highfield Road, Petersfield, Hants.

**27th-28th August:** Gt. Yarmouth and District A.S. Exhibition 79 at Hopton Village Hall (on A12 between Gt. Yarmouth and Lowestoft. Tropical and coldwater fish plus society tableau.

**2nd September:** Bethnal Green A.S. open show.

**2nd September:** Castleford A.S. open show at The Civic Centre, Ferrybridge Road, Castleford. Schedules from Secretary B. Stansill, 4 Milnes Grove, Airedale, Castleford WF10 3EZ (Phone: 559615).

**7th September:** Scunthorpe & District A.S. mini show at the Brown Cow Hotel, High Street, Ashby, Nr. Scunthorpe. Benching 7.30-8.00 p.m. Also bring and buy sale.

**8th September:** Bristol A.S. jubilee open coldwater show at St. Ambrose Church Hall, Stretford Road, Whitehall, Bristol 5. Schedules from Mr. W. G. Ham, 18 Imperial Road, Bristol BS14 9ED (Tel: 0272-776924).

**8th September:** Bethnal Green A.S. open show at Bethnal Green Institute, 229 Bethnal Green Road, London E.2. (Re-arranged date).

**8th September:** Kingston & District A.S. open show at Raynes Park Methodist Church Hall, S.W.20. Details from E. Lough (01-390 4138).

**9th September:** David Brown A.S. open show at David Brown Tractors Sports and Social Club, Meltham Hall, Huddersfield Road, Meltham. Details from Mr. Les Hardy, 19 Fairlea Cottages, Taylor Hill, Huddersfield (Tel: Huddersfield 663401).

**9th September:** Evesham Fishkeepers Society 2nd open show at Evesham High School, Four Pools Road, Evesham, Worcs. Schedules later from E. M. Thornton, 41 Crooks Lane, Studley, Warks (Phone: Studley 7125).

**9th September:** Longridge and District A.S. open show at the Civic Hall, Willows Park Lane, Longridge, Nr. Preston, Lanc.

**9th September:** Huddersfield Tropical Fish Society open show at Slaithwaite Civic Hall. Show secretary, Mr. D. Hill, 59 Celandine Avenue, Salendine Nook, Huddersfield (Tel: Hudds. 659977).

**9th September:** Koi 79. The British Koi-Keepers Society fourth national open Koi show, Tatton Park, Knutsford, Cheshire. Membership details from Mr. M. Waumsley, 165 Woodside Road, Amersham, Bucks. HP6 NR.

**9th September:** Novo's Tropical Fish Club open show at Heaton School, Newton Road, Byker, N.C. Further details from Mr. P. Caddle, 47 South Street, Deckham, Gateshead, NB8 2BD.

**9th September:** Middlesbrough A.S. open show.

**9th September:** Bridgewater A.S. annual open show at St. George's Community Centre, Kenyon Way, Little Hulton, Manchester. Details from Show Secretary, M. Burgoyne, 15 Pansy Road, Farnworth, Bolton, Lancs.

**9th September:** Wellingborough and District A.S. show at the Victoria School, Mill Road, Wellingborough. Show Secretary Mick Coe, 20 Salisbury Street, Kettering.

**9th September:** Zenith A.S. (Scunthorpe) open show at Charter Hall, Scunthorpe. Judging to Y.A.A.S. standards and rules. Benching 12.2 p.m. Schedules from T. Robinson, 87 Shipton Road, Scunthorpe DN16 3HJ (Tel: Scun. 58540).

**12th September:** Aveborough and District A.S. mini show and auction, at Greenacre Hall, Rawdon.

**15th September:** Hounslow and District A.S. open show at Hounslow Youth Centre, Cecil Road, Hounslow, Middlesex. Schedules and run on from Show Secretary, Mr. T. Bolingbroke, 2 Holmwood Close, Addlestone, Surrey. (Weybridge 54976).

**16th September:** Leamington and District A.S. open show at Trinity Hall, Trinity Street, Leamington Spa. Schedules from M. Burridge, Flat 1, 36 Warwick New Road, Leamington Spa, Warwickshire.

**16th September:** Midland Aquarist League open show and inter-society show, Coventry. Schedules from F. Underwood, 10 Hyde Road, Kenilworth CV8 2PD. (Tel: 59280).

**16th September:** Wythenshawe & District A.S. open show.

**23rd September:** Chesterfield & District A.S. open show at Clay Cross Social Centre. Schedules mid-May. Details from Mr. L. Waller, 79 West Street, Eckington, nr. Sheffield (Tel: Eckington 2531 or Chesterfield 36546.

---

## SOLUTION

ACROSS:

6 clam; 9 Jack Dempsey; 10 mud; 11 Match; 12 trap; 13 & 33 Long nose; 14 *Anostomus*; 19 aches; 20 pod; 22 Niger; 23 pumped air; 26 gill; 28 worm; 30 stain; 31 top; 32 Weatherfish.

DOWN:

1 salmon; 2 skates; 3 mesh; 4 spot; 5 metal; 7 *Limnophila*; 8 Madagascar; 14 *Aponogeton*; 15 *oligolepis*; 16 tetra; 17 mop; 18 cable; 21 dam; 24 dwarfs; 25 *innesi*; 27 boned; 29 mate; 30 step.