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AQUARIST

AND FONDKEEPER

The Magazine for Fishkeepers



GOBIES (colour feature)
Spotlight on the **GIANT GOURAMI**
FISHBREEDING Planning the Menu



COVER STORY *Photo: A. van den Nieuwenhuizen*

Amphiprion ocellaris, the Common Anemone-fish or Common Clownfish, belongs to the family Pomacentridae, the Damselishes, members of which are found in all tropical seas, but primarily the Indo-Pacific. Damselish classification is notoriously difficult because many species are variable both as juveniles and adults, as individuals within populations, as populations within different localities, and because of the existence of species complexes (groups of apparently closely-related species). As a result, names are periodically revised as new information comes to hand, e.g. *A. ocellaris*, was formerly known as *A. percula*. Although Clownfish are well-known for their association with anemones, some species, including *A. ocellaris*, can exist quite happily without one. Indeed, they may even refuse or ignore potential hosts introduced into their territory. The fact that they may not be automatically immune to the stings, but may have to acquire this gradually, may well have something to do with this behaviour. Amphiprion species are Protandrous Hermaphrodites (i.e.) the largest fish in any group is invariably a female, the next one down being a functional male, and the remainder, immature. If the female disappears, the male changes sex to a female while the largest of the immature specimens becomes a functional male.

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Your questions answered...

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Every query receives a personal answer and, in addition, we will publish a selection of the most interesting questions and responses each month. Please indicate clearly on the top left hand corner of your envelope which department you wish your query to go to. All letters must be accompanied by a S.A.E. and addressed to:

Your Questions Answered, The Aquarist & Pondkeeper,
The Butts, Brentford, Middlesex TW8 8BN.

TROPICAL



Dr. C. Andrews

Tropical



mouth fungus . . .

I have read that mouth fungus may be treated with *Asareomycin*. Can you provide some information on how it is used?

To begin with *Asareomycin* (chlorotetracycline) is an antibiotic and must be used carefully. It is only available in the U.K. on veterinary prescription, so you will need to make contact with a local vet (see 'Yellow Pages').

When it has been used in the past, *Asareomycin* has been added to the water of a treatment tank to achieve a final concentration of 60mg per gallon. The fish are left in this for four days, after which a cure should be effected and most of the water changed. The fish should then be maintained in isolation for a further week before release back into the community tank.

For further information consult your local vet and 'Diseases of Fishes' by C van Duijn (Charles C Thomas).

hardwater plants . . .

I have recently set up a 27½ × 18 × 18 inch tropical aquarium, with lighting and U/G filtration. The water in my region has a pH between 7.5-8.0 and is quite hard. What fish and plants would you recommend?

Plants such as Amazon swords, *Hygrophila*, *Vallisneria* and *Elodea*



Hygrophila polysperma

usually tolerate hard, alkaline conditions quite well. With regard to fish, I would tend to go for various livebearers and shoaling barbids initially, although many of the tetras will also live in quite hard water.

gro-lux . . .

I have set up a 36 × 12 × 15 inch tropical community tank. Can you tell me if it is safe for the fish and plants to have just Gro-lux lighting?

I would suggest that if you want really vigorous plant growth that you install one 20 or 30 watt Gro-lux tube along with one 30 watt 'white light' fluorescent tube. Assuming that your tank does not receive too much natural sunlight, these should be left on for 8-10 hours per day. If you install just Gro-lux, I would suggest that you will need at least two 30 watt tubes.

By the way, remember that fluorescent tubes lose strength with time, and should be renewed about once a year.

C.A.

Coldwater



white clouds . . .

I have a small pond in the garden and I would like to stock it with White Cloud Mountain Minnows as I understand that they can stand cool water. I would like to breed them in the summer. Is this possible?



I see no reason why the species *Tanichthys albonubes* would not breed in an outdoor pond in summer. However, I do not think that they would live there in the winter, especially one like the last. Their natural temperature is from 16-18°C in winter to 20-22°C in summer. They spawn in dense water plants and the eggs hatch in a couple of days at a temperature of the middle 20°C. You would not have to have any other fishes in the pond as eggs could be eaten, and in any case the parent fishes will eat the eggs unless they have been laid in dense water plants.

I do not recommend these fishes for a pond as although they may look attractive when viewed from the side in a glass tank, when seen from above in a pond, their dark backs would render them almost impossible to see, especially if the water was a little murky.

A.B.

COLDWATER

Arthur Boarder

PLANTS

Vivian De Thabrew

KOI

Hilda Allen

MARINE

Richard Sankey

DISCUS

Eberhard Schulze

Koi**handle with care . . .**

I have just lost a Koi out of four I bought a short time ago and one of the others is on his own with folded fins and will not feed. I paid £75 each for the fish and the dealer told me I was lucky to have first pick as they only arrived from Japan the previous day. Can you tell me why the Koi died or what I can do for the others?

I am very sorry to hear of your expensive loss but I cannot tell you with any certainty why it died or what to do for the best for the remainder. I presume your pond is aerated and suitable for Koi? This story is all too familiar to me and it is regrettable that any dealer should know or care so little about Koi that 'fresh from Japan' is offered as an inducement to buy. The truth is that most Koi suffer stress to some extent during the long journey from Japan and upon arrival here they need the most careful handling.

Water is all important, and time must be taken in the gradual change-over from the foul water they have travelled in to relatively clean water at the same temperature. Sudden shocks must always be avoided. This period of adjustment should be followed by rest, and later possibly by treatment for the eradication of parasites.

Beginners should note these facts to avoid disappointment. Observing the Koi on sale, looking for any signs of difficulty in breathing or swimming, listlessness, sunken eyes etc, etc, are up to the buyer. We need to understand the problems caused by moving fish long distances, handling, changes in temperature and water, and then mysterious losses seem less mysterious. Some Koi may be sold as "quarantined" or "over-wintered in this country," even so they should be isolated for several weeks against the risk of introducing exotic diseases into healthy stock.

I would suggest that your remaining Koi be allowed to rest, small amounts of food can be offered to test their reaction, and a course of medication can follow if necessary.

sold short . . .

My pond used to be 10 ft. x 6 ft. x 2 ft. but is now 8 ft. x 4 ft. x 1½ ft. due to the fact that the shop assistant did not give me sufficient liner. The pond now has sloping sides and a smaller swimming area. Last year I bought two Hi-go! carp but one died, would it be all right for me to buy a koi to keep it company? I have eight other fish beside the Hi-go! and I take them indoors for the winter.

I am sorry to learn of your misfortune but you really should have taken the new liner back to the shop if the size was their fault rather than make your pond smaller. There is no need

to buy a koi, the Hi-go! will be quite all right with the goldfish, etc., and you already have nine fish in what is quite a small pond.



Hi-go!

Apart from the dangers of introducing new stock, I hope you will be content with not buying any more fish now your pond only holds about 300 gallons of water.

Fish do grow, and I trust that as a schoolboy you will accept my advice because over-stocking is never a good idea. Keeping a few healthy fish will give you much more pleasure than trying to keep more in limited space. Best wishes for your future fish-keeping.

H.A.

Plants**sooty plants . . .**

I have a 30 in. x 18 in. x 12 in. coldwater fish tank which has 12 fish and two bottom filters with charcoal and wool. The plants I have are: Elodea, Fountain, Amazon Sword, Water Rose and Fittonia. I have 1½ in. of gravel. The water is crystal-clear except below the gravel in the front of the glass.

The plants do not seem to grow very well and some die. But my query is that the plants have all gone like black soot. I have tried algae min. but it did not make any difference. I have had some fish die, which I think is through eating the plants that are sooty. I feed the fish a small pinch of food every day except Sunday. I clean the filters twice a week and go over the stones with a vacuum pump once a week.

1½ inches is certainly not enough gravel; your planting medium should be at least 2½-3 inches, in order to allow for good root development. This is the main reason for your lack of success with plants.

Your 'black soot' must be a type of algae deleterious to plants and the general condition of your tank, created by unsuitable lighting and water conditions. You do not say what form of lighting you have. For your tank I would recommend moderate light, e.g. a 30 watt warm white on for 8-10 hours per day. Your water condition will certainly be improved by giving your plants a nutritious planting medium, e.g. a ¼ in. layer of washed aquarium peat covered by at least 2 in. of 'pea' gravel or gravel and coarse sand. If you provide these conditions in your tank it will be a healthier environment for both plants and fish.

The 'Fountain Plant' (*Ophiopogon japonicus*) and *Fittonia* ('Snake-skin Plant') are not true aquatics and therefore will not thrive in submerged conditions.



Ophiopogon japonicus is not a true aquatic plant

lighting . . .

My 40 in. × 12 in. × 15 in. aquarium is lit by two gro-lux tubes of 30 watts each. I aim to illuminate the tank for approximately 6 to 7 hours per day. I find if I exceed this duration, algae then becomes a bit of a problem. I would be most grateful for your recommendation as to the duration of lighting. The aquarium is not directly situated in sunlight or beside a window.

I generally recommend a minimum period of 8 hours artificial illumination per day. If you still find algae troublesome, you could add a little salt to your water (about 1 tsp. per gallon), or try one of the proprietary brands of algae-killer from your dealer. **V.T.**

Marine



beginning with marines . . .

I am thinking about setting up a 60 in. × 15 in. × 18 in. marine aquarium and would be grateful if you could answer a few questions for me.

1 What filtration would you recommend for a tank as described. (I thought of just using under-gravel filtration with six uplifts). If this is not enough I do have a Hagen 'Aqua-clear 1200'—but I'm not sure whether this would be suitable for a salt water aquarium.

2 How often should I change the water and also how often should I check the pH, the hardness, the nitrate and the nitrite content?

3 Could you please tell me how many inches of fish this tank would hold when set up. I am thinking of putting in it: 2 Common Clownfish, 2 Black Clownfish, and 1 Bannerfish would it be possible to put in some shrimps, (if so, could you suggest some 'colourful,' relatively easy ones to keep. I would also like to

put in 2 Tomato Clownfish but would this be too many? Also would the fish described suit a beginner in marines, and will they be 'happy' together?

4 What lighting would you recommend for this size tank and how long should it be on for? Also would you suggest two heaters or one, and what strength of wattage?

5 Can you tell me the value of pH, water hardness, nitrite and nitrate, for the fish described?

6 Which 'gravel' should I put in the tank and how much?

7 Are there any good books on this subject? I would be most grateful if you could answer these questions.

I hope that the following answers to your various queries will be of assistance to you.

(1) The size of the aquarium that you have chosen for your first marine aquarium would be ideal. Frankly the most common fault that new marine hobbyists make, is to choose a small aquarium and these can be very unstable. As regards your first question, what kind of filtration would I recommend. There are so many different schools of thought for filtration these days, it is very difficult to give you one specific overall system. A lot depends on the kind of animals you intend to keep. Although it is not always the case, the more you spend the better the filtration system you end up with. It is, however, wise to make sure that you have a little more filtration than is required, rather than a little less. A trip to a couple of local dealers will I am sure be the most advisable thing for you and whichever shopkeeper you feel offers the healthiest and best kept fishes, I would suggest you attempt to assimilate whatever he is doing.

(2) The modern school of thought for water changes is that they should be done very often, but with very small amounts. Personally I would change approximately 6 gallons of water per week in your aquarium. During the first couple of months of your aquarium installation, I would do daily checks for pH and nitrite. Once your aquarium is fully matured and settled, I would suggest weekly tests of pH and nitrate.

(3) I do not believe there is any hard and fast rule for the number of fishes per aquarium. Different species of fish respond to space available in the aquarium in different ways. Again, sound advice from an experienced retailer would be best, as he should know the kind of fishes that you have gradually built up over a period of time, and hopefully would advise you on what species not to mix, and when you are at capacity in the aquarium. However, I always advise the new hobbyist not to go into a mixed fish and invertebrate aquarium, and I would suggest you do one or other until you have had at least 12 months experience in the hobby. Sadly this is where too many new hobbyists go wrong.



Beginners should not mix invertebrates, such as Sea Squirts, with fish

(4) I would suggest the use of 3 x 4 ft. fluorescent lights, preferably north light or colour matching tubes. Two heater/thermostats would be far better than just one, and with this sort of equipment, it is also best to seek advice from your local dealer.

(5) Assuming that you are going to maintain a fish only aquarium I suggest the specific gravity be at 1.020, a temperature of 74°F, and that nitrite should be nil, and nitrate should not be allowed to exceed 10ppm at a pH of 8.3.

(6) In my opinion there are only two ideal undergravel media for the marine aquarium. If you have no mechanical filtration (power filter) then I would suggest the use of pure algal oolitic sand as it is not only a superb biological filter but also a reasonably efficient mechanical filter. However, if you are going to have some form of external mechanical filtration,

then the material I would suggest would be coral gravel, as this is an excellent biological medium, but due to its larger grain size does not trap the dirt. The advantage is that in the long term the substrate will need considerably less maintenance.

(7) In my opinion one particular book outshines all others written to date and that is the Marine Aquarium Handbook by Martin Moe. **R.S.**

Discus



discus tips . . .

I am thinking of setting up a Discus tank. The size of the tank is 48 in. x 15 in. x 12 in. and will be filtered by an Eheim internal power filter with a throughput of 60 galls per hour. The bed will consist of a 1 inch layer of aquarium peat and a 2 inch layer of gravel on top. Decorations will include large pieces of bogwood, Vallisneria and Amazon Sword plants. Lighting will be a 30 watt Grow-lux tube. The fish I am planning on keeping are four Blue Discus, two Brown Discus and 3 Clown Loaches. But my major problem is the water. My tap water is hard pH 7.0-7.2. My questions are: Will the addition of Bogwood and aquarium peat lower the pH and make the water softer; will the filter be sufficient for the size of the tank; what is the best food for them? I will be keeping the water at a temperature of 29°C.

Your aquarium is certainly big enough for the number of Discus fish and Clown Loaches you intend to keep except perhaps you could do with a bit more height. But you would want only to have this additional height of the aquarium when your Discus fish are approx 7 to 8 months or so to give them enough room to develop into really large specimens.

Bogwood and aquarium peat will certainly lower the pH of the water but I would never put peat underneath the gravel bed. I know it has been advocated by other contributors of the magazine but from my fishkeeping experience it never really works well.

As aquarium water often goes acidic through pollution what would happen if a certain pH was reached but the peat continues to release humic acids into the water? I can envisage the time when you would have no choice but to strip the aquarium completely to remove the peat. If it was loose peat, rather than peat blocks, it would also, with time, find its way above the gravel either thru' hoovering or planting and would make a terrible mess. If peat is going to be used in an aquarium under the gravel bed it should only be used as blocks and if the Carbonate content of the water is very high. If you need aquarium peat to lower the pH value of the water either use it in a filter or in a stocking where it can easily be removed and renewed.

Although outside power filters are much more efficient your internal filter should cope with the amount of water your aquarium holds.



Daphnia may introduce parasites

A healthy Discus fish will almost eat anything: I suggest that you stay away from live *Tubifex* worms and perhaps even *Daphnia* as they can, and often do, bring diseases into the aquarium. The main diet should be Beef Heart, F/D *Tubifex* worms, Tetra Cichlid Flake, Frozen Bloodworms, Frozen *Tubifex* or any other of the smaller varieties of the Gamma range. **E.S.**



by
Roy Pinks

It would be very interesting, some time, to have the statistics on what are the main causes of failure of aquarium keeping in the home. Very high on the list would probably be the collapse of plant life, and this is usually followed by steady deterioration of the rest of the collection. Another interesting statistic would be what motivates the buyer of an aquarium in the first place. The answer here at the top of the ladder would be an interesting and decorative feature for the home. Just as soon as the look of the thing falls short of the standard of décor in the rest of the home, something drastic happens, and all too often this results in the premature termination of the project.

It often strikes me whether we are too hidebound in the way in which we advise aquarists to set up their tanks. On the whole we suggest that they present what I can only describe as the Porthole Effect: that is, a container brimful with water, portraying an idyllic underwater scene. The technique is well known and well documented, the most difficult aspect of the undertaking being the establishment of healthy plant growth. The alternative to this, far less often

recommended, is the Aquascape, in which land and water are merged into a single picture, with the waterline perhaps halfway up the front glass.

Aquascaping

The art of aquascaping probably goes back to Victorian days when folk did fascinating things with plants and other living things housed in glazed wooden cases. Looking down on the contents as well as straight at them provided additional satisfactions and perspectives, and since nothing was irretrievably fixed, there was plenty of scope for alteration and the exercise of individual ingenuity, especially in the case of plant arrangement and cultivation. At many of our fish-keeping exhibitions there are special classes for aquascaping, and I have heard countless admirers expressing the wish that they could emulate some of the very attractive effects on display.

But much as I am attracted by a breakaway from the conventional I must put in a strong word of caution to would-be aquascapers. If you look at the composition of the terrestrial part of the picture you will find that many of the components like mosses and ground-hugging plants are completely out of context with the fish.

English ferns from banks in country lanes nestle alongside dwarf heaths and mosses, whilst neons and glow-lights cavort in the pool below. Of course, for the purpose of the few days of the exhibition this simply doesn't matter, but even so, do take note of the countless sprayings of the foliage which the exhibitors have to undertake in order to prevent it from wilting. Such dedication in the environment of the home would be very much of a non-starter. Since such a lot has been done in recent years to encourage the serious study of plant culture in aquaria of the conventional form, I wonder how much of a future this alternative form of art may actually have. Possibly the most difficult problem to overcome is the outlook of aquarium owners themselves. Even today many of them honestly believe that the neatly-bunched ten inch long pieces of plant they see in dealers' tanks are somehow born like this and remain like this indefinitely, requiring little or no effort on their part to obtain proper cultivation. The real truth is that many of these are not true aquatic plants anyway and should never be sold as such, whilst

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Water Crowfoot has finely divided submerged leaves and 'clover-like' emerged ones



Coldwater Jottings by Frank W. Orme

I SUPPOSE it may be said that the coldwater fish breeder's year can be divided into four seasons. During the spring we are busy conditioning and spawning our fish; new tanks and ponds are constructed and, perhaps, new stock is acquired. The late spring and summer months are devoted to raising and selecting the best of the young fish, whilst much time is spent visiting natural pools to obtain supplies of *Daphnia* for the growing youngsters. With the arrival of autumn it is time to make the final selection of those young which are to be kept for future showing and breeding, ponds to be given their pre-winter clean-out, and the condition of the fish checked. The fish will require that extra attention and food which will allow them to build the necessary reserves of fat that will help to ensure that they will survive the winter months of semi-dormancy. Winter is the period of inactivity—so far as fish-keeping is concerned—and is spent overhauling equipment and dreaming of the coming season of breeding. With great optimism we plan which male to cross with which female and dream of the outstanding progeny that will be produced; next year, we are certain, is the year that we shall find the perfect specimen amongst the young fish. Fortunately our optimism

is never realised, and so we continue to dream, plan and endeavour. Without our dreams of achieving an almost impossible objective, and our efforts to do so, much of our enjoyment would disappear.

It is a fact, and understandable, that many fishkeepers tend to neglect their adult fish during the excitement of breeding, hatching and rearing activities. This neglect occurs at the very time when the adults need that little extra care and feeding. Now is the time to make up for any such neglect, by increasing the rate and quality of their food. Little and often; live and dried foods; variety of foods offered; these are the essentials in coaxing the fish to eat and so put on that extra bit of weight and condition before the temperatures begin to fall too low. If we are to avoid deaths during the winter and have early spawnings next year, then it is very important that the fish be encouraged to build a sufficient reserve of flesh and stamina, to tide them over this difficult cold period.

So much for the adult stock, but what about the babies? Those who have taken up fish breeding for the first time may have kept too many, they may well feel disgusted with the size and quality of the young. Lots of small fish, but very few decent types,

which do not appear to grow very fast. It is a fact that the fancy goldfish does not produce many quality young, and that the rubbish outnumbers the decent specimens—even from the best of adults. Furthermore, the best specimens are generally not so sturdy and vigorous as the throw-backs and runts. Only by constant and critical culling can the best types be selected and given the space, conditions and food which is so necessary to their growth and development. The young should be carefully studied for colour, body-shape and finnage. Pick out no fewer than six up to a maximum of eighteen of the best specimens. After a few days reduce the number still further, by choosing only the absolute best types, and dispose of the others. The selected few can then be allowed as much swimming space as possible in uncrowded conditions. Feed with good nourishing foods as often as possible, removing all uneaten non-live foods as soon as the fish lose their interest in feeding for that particular time. Given the proper care the chosen young should make quite good growth over the next couple of months.

Similar attention should be paid to any young which have been reared outdoors in a pond. Even in the more spacious environment of a pond it will be found that the better shaped and coloured specimens do not grow so fast as the poorer types. Select a number of the more desirable young, and sell or otherwise dispose of those which remain. The selected few can



This has been a good year for pond plants such as Water Hawthorn

Coldwater Jottings

then be brought indoors and treated as suggested for their tank-raised brethren. Next year they can be replaced in the pond and, in this way, the quality of the pond fish will be preserved. If the pond raised young are not subjected to culling the better specimens will, with time, gradually vanish. It will be found that, due to the inferior fish being allowed to breed, each season will produce an ever larger proportion of poor quality young and decent quality young will cease to be produced by the adults. As I have mentioned on previous occasions, it should be the aim of every fish breeder to improve, or at least

maintain, the quality of the stock. It is far better to succeed with a few good specimens rather than to be partially successful by raising a horde of 'also-rans', and there are many beginners who would welcome a few healthy fish, even if they are not first-class specimens. However, when giving fish do make sure that they are worthy of donation; it benefits neither the recipient nor the hobby to give away runts or other unworthy rubbish, such poor quality fish are far better disposed of in a permanent, but humane, manner.

Despite the poor start to the year, and the prolonged months of rain and low temperatures, the pondside plants have given a truly magnificent display. In particular the Water Hawthorne (*Aponogeton distachyum*) and Yellow Iris (*Iris pseudacorus*) were remarkable for the number and size of the flowers. Water lilies bloomed prolifically whilst, below the water surface, the plantlife

has spread into large masses of vegetation. Others have also remarked that their own ponds have given a similar bountiful display. On my travels I noted that natural waters enjoyed a similar lush growth of plants. The only problem is that this prolific growth has resulted in my pond becoming almost choked by the plants and in a couple of months time will have to be drastically thinned in order to preserve its appearance. Against this there has been the benefit of crystal-clear water throughout the depth of the pond, and a lack of the more obnoxious types of algae. There has also been a noticeable increase in the population of the frogs which inhabit the pond, ranging from adults down to young 1½ inch specimens. So, all-in-all, it has been a very good season for life in and around the pond—and I have benefited from the pleasure of sitting near the water and enjoying it all.

COMMENTARY

Continued from page 24

others are likely to romp away and prove an embarrassment. What hope, therefore, for the proposition I have made that we double the difficulty by asking them to look after both water and land based plants in the same container?

I just live in hope. Somehow I think that there are more would-be takers who are a bit happier about above-ground plants than about pure aquatics, and if only we can build up their confidence they will in time treat with both kinds with a large measure of success. The first step might be to define those plants which would thrive near water and under artificial light. But it is quite useless to intro-

duce dwarf subjects from the garden, partly because the temperature would be too high for them, and partly because the overhead lighting would draw them up into spindly anaemic-looking masses with little or no attraction and a high potential for early decay.

If enough interest is shown in the possibilities I will develop the theme in some future notes. There are many succulents and hot house species which would not only survive but would make a positive and colourful contribution to the home. At the same time the possibilities of extending underwater plants should not be overlooked. Many of them have a submerged form of a totally different nature from that which may grow above the water (termed the *emerse* form): many aquarists are totally ignorant that some of their favourite plants have these two disparate forms, and a visit to one of the specialist plant nurseries where the plants are grown under near-

natural conditions can be a real eye-opener to anyone who wishes to be a bit more adventurous. Such enterprise is not in the least risky as the lessons learnt are neither difficult nor expensive to apply, and above all they stimulate interest and keep you on the move.

NEXT MONTH

MULTIPLYING AND DIVISION. Our colour feature deals with reproduction among Sea Anemones.

THE WHITE CLOUD MINNOW. Ruda Zukal turns our SPOTLIGHT on to this ever popular aquarium fish.

MYCOTIC DISEASES. Dr. Goldstein describes some fungus diseases of fish.

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of the Aquarium

Killifishes

KILLIFISHES, or Egg-laying Toothcarps, belong to the Family Cyprinodontidae (not to be confused with the Cyprinidae, the largest of all the Families, with about 1,600 species, to which the Carps and Minnows belong). There are considerably fewer species of Cyprinodontidae (around 300) belonging to about 50 genera. These figures are only approximate because there is considerable confusion over the correct naming of certain genera, species and subspecies.

Killifishes have long, and deservedly, been strong favourites among aquarists. One of the main reasons must, undoubtedly, be the resplendent colours that many males possess. Another must surely be the fascinating lifestyle of some species which go from egg to death in no more than a year.

These annual fishes have evolved their remarkable way of life in response to the pressures exerted by natural selection over long periods of time. This pressure is created by the seasonal drying up of the pools and ditches in which such species are found in nature. Clearly, survival is impossible under such conditions, unless . . . Annual Killifishes overcome the problem by laying eggs which can survive periods of drought buried in mud. When the rains return, hatching of some (but not necessarily all) of the eggs occurs within hours. Others will hatch only if a second drought and re-soaking occurs, thus adding a vital second weapon to the species' armoury of survival mechanisms in an unpredictable (rainwise) environment. Not all Killifish have eggs which undergo such a diapause, though. This is hardly surprising when it is considered that the Cyprinodontidae are found

in virtually every major landmass other than Australasia. Even Europe has its own Killifishes—*Aphanius iberus* and *Valencia hispanica*—both found in Spain.

Equally, consideration of this in conjunction with the "transient" habitats in which some species are found, plus the effects of human intervention, has resulted in about 30 species warranting a mention in the Red Data Book (a volume dealing with species which are endangered in one way or another). Fortunately, some of these, such as *Cynolebias constanciae* and *Simpsonichthys boitoni*, are successfully being kept and bred in aquaria by specialist bodies such as the British Killifish Association.



Simpsonichthys (Cynolebias) boitoni
(Photo courtesy of M. Addicott, B.K.A.)

Livebearers



Poecilia nigrofasciata, an ovoviviparous species

FISH are often classified as egg-layers or livebearers. The most popular "definitions" of these categories are:

- (a) Egg-layers, as the name suggests, produce eggs;
- (b) Livebearers produce live young.

To a certain extent, these descriptions are misleading, particularly when the reference to "live young" is considered in relation to egg-layers. In general terms, therefore, egg-layers are

best regarded as those species that adopt external fertilization of eggs and livebearers as those that use internal fertilization. With few exceptions (see the entry for Egg-layers in this series), this distinction is accurate.

Livebearers may be further subdivided into two groups:

- (a) *Ovoviviparous species*—in these the males have an intromittent copulatory organ (usually the anal fin, which may be modified into a gonopodium) and development of embryos is internal with nourishment almost exclusively being derived from the egg yolk. There is no marked weight increase in the embryos during gestation; in fact, some new-born fry can weigh marginally less than a fertilized egg. In ovoviviparous species, the degree of synchronization of reproductive behaviour (i.e. co-operation between male and female) is roughly inversely proportional to the length of the males' copulatory organ. For example, in the Guppy, *Poecilia reticulata*, there is more elaborate courtship behaviour

than in, say, *Gambusia affinis* where males have a much larger gonopodium. (b) *Viviparous species*—in these the males may have a gonopodium or some other fin adaptation, not necessarily intromittent (e.g. anal fin notch in Goodeid males (see Goodeid entry in this series). Embryonic development, as in ovoviviparous species, is internal but, this time, nourishment is derived from egg yolk and maternal secretions of one type or other. There is, therefore, a marked weight increase in the embryos during gestation. Superfoetation may occur (i.e. a number of small broods at varying stages of development may be carried by a single female at any one time, as in *Heterandria formosa*, a species of Mosquito Fish.

In both types of livebearers, the males of some species produce sperm in packets (spermatophores) which remain viable within females for many months. Successive broods may, therefore, be produced after a single mating in such species.

Koi

Of the 275 or so genera which, together, constitute the Family Cyprinidae, none have been more significant in shaping the coldwater hobby than *Carassius* and *Cyprinus*.

The Goldfish (*Carassius auratus*) with all its numerous varieties, and the Crucian Carp (*C. carassius*) are the most significant species of the former, while the Common Carp and its derivatives, the Leather, Mirror and King Carps, and Koi, all belong to the single, most significant species of the latter, *Cyprinus carpio*.

Therefore, despite their strikingly different coloration, all Koi belong to the same species as the more subtle-colored, but nevertheless attractive, "barbed" carps. This needs to be borne in mind since, failure to do so, will undoubtedly lead to interbreeding with potentially disappointing effects on the resulting stocks.

On the other hand, careful management and selection can lead to prize-winning specimens having combinations of features from a number of varieties,

such as scale-less patches (as in Leather Carp) and large-scaled areas (as in Mirror Carp).

The word Koi, itself, means Carp in Japanese. It is, therefore, incorrect to refer to these fish as Koi Carp; the



Koi—a man-made variety of *Cyprinus carpio*

second word is simply superfluous. In addition, although many people refer to all domesticated forms as Koi, it is more correct to use the term Nishiki Goi when referring to the Fancy varieties.

Carp of one type or other have been kept in captivity for centuries. However, interest in these fish was, for a long time restricted to their culinary qualities. The Koi that are enjoyed nowadays as "hobby fish" are probably descended from stocks kept in some of the mountain regions of Japan less than a century ago by farmers in their rice paddies.

Today's fish have, therefore, come a long way in quite a short time (in evolutionary terms). Intensive, selective breeding has produced a bewildering array of colours and patterns with the very best prize-winning specimens being valued at many thousands of pounds. However, and fortunately for the average hobbyist, a huge industry has grown to keep pace with the ever-increasing demand for Koi and attractively marked specimens can, today, be obtained at very reasonable prices.

Loaches

LOACHES belong to three Families, two of which are common within the aquarium hobby. These are: (a) the Suckerbelly Loaches, Gyrinocheilidae, having the single genus *Gyrinocheilus* which includes the ever-popular Sucking Loach *G. aysonieri*; (b) the "True" Loaches, the Cobitidae, with about 21 genera and nearly 150 species, including all the common Loaches such as the Clown Loach, *Botia macracantha* and the various Kuhli (Coolie) Loaches, *Acanthopthalmus* spp.

A third Family, the Hillstream Loaches, Homalopteridae, are hardly ever (if at all) seen in aquaria even though there are 28 genera with nearly 90 species. These all occupy torrential streams in India and the Far East.

The Sucking Loach has been featured elsewhere in this series (see Algae Eaters) and will, therefore, not be considered further.

The Cobitidae are widely distributed in parts of Africa, in Asia and in Europe, with the highest number of species in Asia.

All have at least three pairs of barbels while some may have an adipose fin (small second dorsal fin) and an erectable spine close to the eye. These characteristics are considered sufficiently significant to warrant subdivision of the Cobitidae into three Subfamilies.

Subfamily Botiinae—this consists of just two genera, *Botia* and *Leptobotia*. Both are distinguished from other loaches by their two-pronged erectable spine located under the eye and rather pointed face with a sloping "forehead". Many of the popular aquarium loaches such as the Clown Loach mentioned earlier, belong to this Subfamily which contains over ten species.

Subfamily Cobitinae—this contains many of the other popular loaches characterised by their long, slender bodies (worm-like in genera such as *Acanthopthalmus*) and high number

of barbels (e.g. ten in *Misgurnus* spp., the Weather Loaches. Eye spines are also typical of the Cobitinae (a translation of *Acanthopthalmus*, in fact, means "Thorn-eye"). The Horse-faced Loach (*Acanthopsis cheirorhynchus*) also belongs to the Cobitinae which contains 15 genera with about 25 species.

Subfamily Noemacheilinae—this consists of about four genera with about 110 species. Perhaps the best known are some members of the genus *Noemacheilus* such as *N. barbatulus*, the Stone Loach, and *N. nanyang*, the Arrow Loach. The Noemacheilinae lack the orbital spine of the other Subfamilies.



Acanthopthalmus semicinctus, one of the "Thorn-eyed Loaches"



The pair, male below

A BARB

with a colourful dorsal fin

Puntius ticto stoliczkai

by R. Zukal

At first sight it is evident that this barb is very similar to a fish known to many aquarists—*Puntius conchomius*—and, as one would expect from its appearance, is a related species. The obvious differences consist of the lines in the shape of their bodies and the splendid coloration of the dorsal fin of the males of *Puntius ticto stoliczkai*.

As in all species of the genus *Puntius*, the mouth of this barb is without barbels. The back of the fish is olive to moss-green and the underside is white. The large silvery scales have a dark border and have a sheen ranging from bluish to yellowish when they are caught by the light.

Behind the gills and in line with the eyes there is a dark mark reminiscent of a drop of liquid, which is edged with gold at the rear. A similar spot decorates the root of the tail. The pectoral fins are colourless, the caudal fin is yellowish at the peduncle. The ventral and anal fins are often reddish, the iris is goldish and coloured blood-red at the top.

The sexes can be distinguished even in young fish, as the male's dorsal fin is already coloured red and there is a crescent-shaped, dark fleck in the middle of the fin, or a small number of dark spots. In addition, the red of the male's dorsal fin is edged with

black at the top. Older females are fuller in the abdomen and, apart from the markings on the sides of the body, uniform in colour.

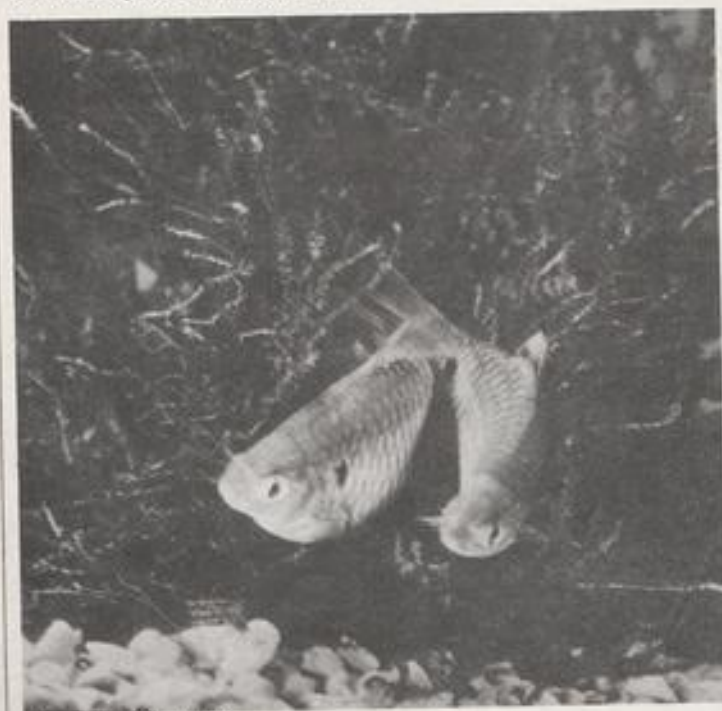
Like all *Puntius* species, this barb is ideal for any aquarist, but will only feel at home in a larger-sized tank. It attains a size of 6 cm and it is found in Burma, from where it was first imported to Europe in 1925. Although a relatively undemanding fish to keep and much more attractively coloured than *P. conchomius*, it is not found in hobbyists' aquaria as often as its "cousin". A water temperature of 18-20°C is suitable for keeping this species. The tank should be well-planted and, ideally, well-illuminated. Normal tap-water (not hard) which has been allowed to stand is suitable. The substrate should consist of coarse sand, as these barbs have a ready appetite and search the bottom of the tank for food. They are easy to accommodate as far as diet is concerned, accepting all kinds of food, whether live, dried or flake food. In addition to the kinds of food of that nature a certain amount of vegetable matter should also be included in their diet. They are sociable and can be kept together with other species of barbs. One should avoid keeping them with

other, smaller species, however. They are prone to ill-health in old water which has a high nitrogen content, so it is advisable to adhere to weekly, partial water changes. A good filtration system is also desirable.

Breeding is quite easy and the same as in other species of barbs. A tank of a capacity of 20-30 litres can be used as the spawning tank. It can be with or without a substrate of sand. There should be some fine-leaved plants, which can be anchored by stones if the tank does not contain sand. Tap-water which has been left to stand for two days is suitable (in our part of the world pH is 7, hardness is 14° DH). The temperature should be 24-26°C. The female is introduced a day later than the male so that the male has more of an opportunity to get used to his surroundings. In addition, I find it an advantage to separate the male and the female for a few days prior to the intended spawning, as courtship behaviour soon follows once they are reunited. After violent activity before actual spawning,



Female, followed by male, seeks a spawning site



Spawning taking place

the fish press against each other in the plants (Java moss), the male sweeps his tail over the back of the female and the fish release their sexual products simultaneously. Spawning is repeated several times over a period of two to three hours. This species does not spawn as freely as *P. cochinensis* and one can count oneself as highly successful in obtaining 300-600 eggs. Usually, a large number of the eggs remain unfertilised. After a few hours these turn white and they should be separated from the fertilised eggs by sucking them into a glass tube. After spawning has been completed the parents should be removed, otherwise they will feed on the eggs. The brood hatches after 24-36 hours and on the sixth day, when they are already free-swimming, the young must be given the finest food. Like the adult fish, they are omnivorous. After four to six weeks the spawning tank becomes too small for the young and they must be transferred to a larger tank. This is a good opportunity to sort them according to size.

It would be a pity if these fish were to disappear from our aquaria and it is for this reason that I would like to draw the attention of hobbyists to them.

Tomorrow's AQUARIST



FISH BIOLOGY COURSES

READERS of this column will, no doubt, remember our item in the June issue of A & P concerning a course in Fish Biology being run for aquarists at the City of London Polytechnic. The course, which has now ended, was well received by those who attended it. Particular interest was shown in the sessions dealing with fish diseases and their treatment, the use of the microscope and in the fish dissections.

On the last evening, three members of the course team, Drs. Powell, Sweeting and Roberts, formed a panel and tackled a flood of previously-prepared questions from the participants. The resulting discussion went particularly well and was much enjoyed by all. After this, the group reluctantly disbanded having learned a great deal about fish biology in the preceding ten weekly evening sessions.

For their part, the members of the course team also felt that they had learned a tremendous amount about the world of the hobbyist and his/her fish.

The high level of two-way flow of expertise and information experienced was exactly what was aimed for at the beginning. So much was gained from this that it will continue to form part of the basic philosophy of future courses, the next of which will start in October.

Again, there will be no entry qualifications of any kind required for this

Total concentration



Husband and wife "team" working in the laboratory

course although there will be a registration fee of £25 to cover administration costs, tuition, equipment, use of the Polytechnic's library facilities, etc.

In response to the group's perceived need for more detailed information on fish disease, a one-day laboratory-based course has now been planned by Dr. Anne Powell and her colleagues. By the time we go to press, the session will have already taken place (15 August) and we hope to carry a report

in a future issue of A & P.

For full details of the above courses, please contact:

**DR. ANNE POWELL,
BIOLOGY DEPARTMENT,
CITY OF LONDON POLYTECHNIC,
CALCUTTA HOUSE,
OLD CASTLE STREET,
ALDGATE, LONDON, E1.**

or **THE SHORT COURSE UNIT
at the Polytechnic, Tel. 01-283
1030, Ext. 324.**

BEGINNERS' SESSIONS RUN BY SOCIETIES

WE HAVE come across a number of Aquatic Societies which run activities specifically for newcomers to fish-keeping. These range from complete evenings set aside for beginners' lectures, demonstrations and open-forum discussions to introductions to the "art" of showing fish and table shows for juniors and other newcomers to the hobby.

Clearly, there is a great deal being done around the country to stimulate interest in fishkeeping. We think that there may be much to be gained by giving publicity to such activities and would, therefore, welcome details of anything that your Society does in this field. Please address all correspondence to the Consultant Editor. We look forward to hearing from you.

GOBIES

Pick a group of fishes that has this set of characteristics, and you'll be describing a popular family that has its own, brand new specialty society. Characteristics: Many species, size from an inch to two feet, available all over the world, easily adapted to aquarium conditions, males and females often distinguishable, substratum spawners, easily bred, easily fed on a variety of foods, tolerant of wide range of temperatures, can be maintained in any size aquaria from two gallons up, fry challenging to raise but not impossible, opportunities to trade through the mails with other aficionados, cheap when purchased from shops but few species in shops, many possibilities for new fish among imports, possibilities to collect natives, need for a society newsletter, need for a book, need for a category in shows.

If ever there was a group that offered challenges and diverse species reminiscent of the early days of the American Killifish Association, the American Cichlid Association, the North American Native Fishes Association, and any local club, it is the family Gobiidae, containing gobies and sleepers.

Gobies occur from drift habitats of the open ocean to the depths of the continental shelf, from coral reefs to estuaries, and up into freshwater zones. They occur in waters of the United States, England, Europe, South America, Africa, Australia, New Zealand, Japan and China. They occur at islands from the frigid polar regions to the equator. They occur in your local pet shop and down the road on the coast. In short, the 700 species worldwide occur just about everywhere you look for them, and more would be known if more people would just look.

Aquarists have different interests and capabilities in their fish rooms. Some people do it all, while others are strictly freshwater, and others strictly marine. Gobies supply everybody with fun fish, so let's take a look at them from the

by
Dr. Robert Bob Goldstein

perspective of aquarists, rather than biologists and begin with the freshwater forms known in the hobby.

Ask an aquarist if he's ever kept any gobies, and he'll immediately think of bumblebees. The several species of *Brachyobius* (*xanthanona*, *nana*, *aggregatus*, *doriae*) are popular with American aquarists and some have been spawned on occasion. Dr. Sally Boggs is one of these successful aquarists, and her spawning reports have been circulating in local club bulletins for several years. The problem with raising the fry is their small size, requirement for *infusoria* and/or green water, and the small sizes of the spawns. Unfortunately, success with *Brachyobius* does not portend success raising the fry of other goby species, which might be much smaller and more difficult to feed. Other popular gobies in years past have been *Mogurnda mogurnda*, the purple gudgeon of Australia and the mudskippers of the genus *Periophthalmus*. Most of the aforementioned gobies are native to coastal regions of Asia and Australia, running the environmental gamut from high salinity to almost pure freshwater. That tolerance is a characteristic of several gobies, and almost all of those fish, represented by the gudgeon, known as sleeper gobies.

If *Mogurnda* is an all-but-forgotten sleeper, along with the American *Dormitator* (*maculatus* on the Atlantic and *latifrons* on the Pacific side), then some new sleepers are being imported that will not be so quickly forgotten. At least one, and possibly several, species of *Hypseleotris* are beginning to appear in the hobby, more or less resembling *H. compressus* of Australia. Readers are referred to John S. Lake's *Australian Freshwater Fishes*, published by the Thomas Nelson Company of

West Melbourne, Australia, for photographs and habitat information on several of the Down Under continent's offerings. This fish has recently been spawned by Dr. Sally Boggs, of whom we shall have more to say later on. Males, of this imported unknown *Hypseleotris* species become blackish on occasion, indicating either prenuptial coloration or aggression, but there can be no doubt that these fish are very suitable for aquaria and will remain popular in the hobby if the supply continues. Another rather attractive import is a brownish goby that is sometimes called "rainbow", but that name has been applied to at least three different (and clearly unrelated) gobies in the past two years alone. Apparently, importers are filling orders for "rainbow goby" with whatever is on hand, and the incoming fish species continue to vary. Finally, a few years ago some aquarists were getting specimens of *Stigmatogobius sadanondio*, a silvery fat sleeper in which the male has a blue spot in the dorsal fin. This *Stigmatogobius* has been spawned on several occasions, but so far the fry have proven too difficult to raise. That will certainly change.

There are other sleepers and true gobies that appear in the hobby from time to time, and their spawning habits (so far as known) fall into two categories. One small group (unpopular) spawns by scattering eggs in a small area of vegetation off the bottom. The majority of gobies and sleepers spawn on a hard substrate, the eggs either on a vertical wall or on the roof of a cave. Ideal spawning set-ups for these freshwater to brackish species consists of a five to ten gallon low aquarium with considerable rockwork on the bottom and an assortment of caves. The caves can be constructed of sea shells, PVC plastic pipe, standing perforated bricks, or flat rocks. Filtration should be undergravel or air-driven box-type, but not power, as these fish prefer very slight current. Bright lights are acceptable if there is a good deal of cave-work and other rocky places available. Very few of the species will fade or hide under any but the most barren and brightly lit conditions. A small amount of salt added to the water is helpful. One gram of sea salt per

litre is sufficient, but doubling that amount is beneficial for most species.

For those unable to raise goby fry on infusoria or green water in small aquaria, there is an alternative method that has worked for me with darters and for others with brackish water gobies. It only works in the summertime, when you can establish aquaria out-of-doors. Set up a large, flat surfaced area such as a child's wading pool and leave it in full sun, together with clean (boiled or dried) rocks and some leaf litter. Do not use wet rocks from a local stream, as they may contain insect larvae that will prey on larval fishes. Add a handful of garden soil. In a matter of weeks the water will turn soupy green, and the leaf litter will contribute to a good growth of natural infusorians. After your fish have spawned in their indoor aquaria, watch the eggs for signs of development. If the eggs are eaten or spoil right away, try altering the salinity in the aquarium. Once the eggs are ready to hatch, place the substratum in a gallon jar of tank water (or larger container), upside down, with a gentle bubble spray from an aerator to circulate the water around the eggs and remove metabolic gases. At this time, modify the salinity in the outside pool to approximately that of the spawning aquarium, if it hasn't been previously adjusted. Keep the eggs in the dark. Upon hatching, release the entire contents of the hatching container into the outside pool, going through the traditional steps of temperature equalisation and gentle and partial mixing of the two waters. After the fry have been released into the pool, forget them! The worst thing you can now do is feed the pool with too many nutrients, which will result in fouling the entire container. After three days, begin daily light feedings of newly hatched brine shrimp, and gradually increase the feedings at the rate of 100% per week for four weeks. After this time, you should begin to see nicely developing young fish, and can use your judgment regarding further feeding. If the water is still green after this time, you can find the fish by first removing the rocks and swirling a net. Usually, however, the water will have gone



Very common in the low salinity flood control canals of Florida, a frillfin goby can be recognised by the free upper pectoral ray, not joined to the membrane of the fin. From above, the fish has a barred appearance, much like a riffle-inhabiting darter. *Bathygobius soporator* was caught in a minnow trap



Coryphopterus punctipictophorus is a tropical goby usually found in the Caribbean, but also extending to the deep subtropical reefs off the coast of North Carolina. This North Carolina specimen photographed by Fritz Rhode



A convenient set-up for brackish water gobies is provided by a number of bricks for caves, and tankmates of a brackish killifish (which can spawn in the yarn mops)



Rainbow goby guarding its eggs in a PVC pipe. The eggs will develop, but the fry will not be viable. Photo by Dr Sally Boggs



There are several sleeper gobies in Florida waters, extending northward as far as North Carolina. This one is *Gobiomorus dormitor* the bigmouth sleeper



through its phytoplankton bloom and become yellowish and somewhat clear.

Marine gobies offer an entirely new area for those interested in breeding, and one of the few aspects for the marine hobby that can be conducted in small (five gallon) tanks with little or no investment in equipment, and not much more in livestock. Many gobies are among the least expensive of marine fishes, often selling at about the same price as a male *Betta*. They should be provided with caves, bright light, and undergravel filtration. While some gobies come from coral reefs, many other marine gobies occur in shallow, mud-bottom backwaters where mangroves or sea grasses dominate the seascape. Others occur among coral rubble, and any aquarist who has ever collected marine gobies will be struck with their lack of specialisation to water requirements, foods, temperature or habitats, and their ready adaptability to living in old bottles and cans in practically putrid water.

GOBIES

On the mid-Atlantic coast of the United States, not far from my home, there are vast stretches of shallow marine sounds located landward of the barrier islands. These sounds have varying salinities, tend to be overgrown with sea grasses, and the bottoms are littered with small clumps of oysters. The muck is very soft, and a man will sink in it up to his thighs only about twenty feet from the shoreline at low tide. The water is perhaps one to eight inches deep, and no fish are apparent except for the roving schools of *Fundulus*, native killifish that live everywhere and are much favoured by fishermen as live bait.

Within the oyster patches are clumps of dead shells with the living oysters, worms, crabs, amphipods and snails. And gobies. I collect many delightful and cryptic fishes by wading into the shallows in boots (to protect my feet from being cut by the sharp shells) and lifting and rolling clumps of oysters onto a flat net that is 1 foot square with $\frac{1}{2}$ inch mesh. Using gloves, as these clumps can cut one's hands very badly, I wash the oysters back and forth to clear away the mud and chase fishes out of the empty shells. Then I put back the clump where I found it, and lift my net. Inside there may be a variety of fishes, but gobies are usually dominant.

It is important to determine the salinity in the field, despite the appearance of the region. For, although some areas look like they have a very low salinity, in fact many are almost full strength sea water. This has consequences for travelling back by automobile. If the salinity is high, then agitation or aeration *en route* will keep the fish alive no matter how foul-appearing the water. If the salinity is low (but not almost freshwater), then it is advisable to find some high salinity water for the trip back. The high salinity water will retard bacterial decomposition.

Both local and exotic marine gobies may be set up in small aquaria, the only difference in treatment being the

numbers of fish per aquarium (more if they're free) and the temperature. To induce spawning, feed heavily and look up the spawning season of your goby. In most instances, gobies will be summer spawners and should be on a 14 hour photoperiod. For winter spawners, use a ten hour photoperiod or slightly less. If you cannot determine their spawning season, experiment with replicate aquaria on different light regimes. Do not vary a single aquarium, as you don't know how long it takes to bring a fish into condition using light stimulation. You'll probably just neutralize your fish if you are not consistent for a protracted period.

For those with marine aquaria and the good habit of changing water periodically, save the old water in an outdoor pool in the summer, and store it in plastic barrels during the winter. Outdoor pools in summer can be utilized for growing your fry, or can be used to grow adult brine shrimp from egg cases. For those just getting into the marine hobby, with only small aquaria, ask your local pet store for their discarded marine water. Run it through a diatomaceous power filter prior to placing it in service in your outdoor pool, just to be safe, or chlorinate it for 24 hours.

For those interested in learning more about gobies, I recommend the odd, traditional textbooks (e.g. Sterba). Seek out these other volumes at the public library: Boblke and Chaplin's *Fishes of the Bahamas*, J. L. B. Smith's *Sea Fishes of Southern Africa*, Scott, Glover and Southcott's *Fishes of South Australia*, Lake's *Australian Freshwater Fishes*, and the Smithsonian Institution-TFH Reprint Fund's *Philippine Bureau of Scientific Monographic Publications on Fishes, Number 23, Gobies*. Most important are good picture books for exotic marine gobies, and publications of local and national museums and agencies for native fishes.

Dr. Sally Boggs is starting a Goby Society in the USA, and welcomes members and participation from aquarists around the world. You can write to her at 441 Maple Avenue, Pittsburgh, Pennsylvania 15218, USA. If you would like to trade native gobies through the mails, you can write to me at 4818 North Hills Drive,

Raleigh, North Carolina 27612, USA. Sally would appreciate copies of aquarium society spawning reports on gobies, as well as reprints of technical literature not widely circulated.

In recent years, Aqualife Research Corporation, located in the Florida Keys, has been producing tank raised neon gobies for the American marine market. The adult fish are spawned in five gallon aquariums, and the fry raised on *Brachionus plicatilis* rotifers, the rotifers in turn fed on various marine phytoplankton. Neon gobies are fed on this fine live food for four weeks before they can be weaned onto brine shrimp, because of their extended larval period prior to metamorphosis, which is longer than in clownfish. Aqualife has spawned and raised several other gobies, but is not producing them commercially simply because of the lack of a market. Thus, the technology is here, and the species to be provided will depend on market forces and political realities. Aqualife, incidentally, raises many of its fish in outdoor vats, eschewing any need for sterile culture techniques but instead relying on many systems operating simultaneously.

Gobies, in general, have a planktonic stage that is short in some species (bumblebee gobies), but protracted in others. Most losses occur during this stage right up to metamorphosis, and the importance of heavy feeding and good water quality, while often conflicting in practice, is the key to bringing the young through into the juvenile stage, from which they are quite easily raised.

Some aquarists have difficulty getting the fish to spawn. That is generally not a problem in a dedicated aquarium, viz., one occupied solely by the gobies. It is more difficult to achieve success in community aquaria, for the danger of other species eating the eggs usually causes the parent fish to seek hiding places cryptic even by aquarium standards. Thus, you may have a pair of fish spawning frequently, and never know it.

Gobies can provide an entirely new area for breeding and raising success, and tie marine and freshwater aquarists into a single association. Let's hope so.

Meet the Societies



NORTH WARWICKSHIRE AQUATIC SOCIETY



The N.W.A.S. logo



A pair of spawning Angels

AS WE have said in the past, Aquatic Societies form a never-ending source of interesting stories. In the case of the North Warwickshire Aquatic Society, their most unusual "claim to fame" is that they have been founded twice!

Originally, the Society had been founded in 1959. In keeping with that well-known tradition of out-of-the-ordinary birthplaces, N.W.A.S. was established in a garage by a dozen or so enthusiasts under the Chairmanship of Mr. George Griffiths. Over the next few years, the membership rose to over 100 and enjoyed considerable success. Sadly, and for a variety of reasons, interest had waned to such an extent by 1978, that the surviving faithful regretfully came to the decision to disband the Society. However, you can't keep a good Society down for long and, following the continued contact between some of the old members (largely at Erdington Aquatics, a shop owned by Mr. Albert Skinner, a previous Chairman, now the President), it was decided to hold a "feasibility meeting" in September 1981. This led to the re-birth of N.W.A.S. in January 1982, since when interest has once more mushroomed. There are now more than 50 members who meet on the fourth Thursday of every month at the United Reformed Church, Pype Hayes, Chester Road, Erdington, Birmingham.

Meetings start at 8.00 p.m. and can include lectures and slide shows by members and visiting experts on a wide range of topics from buying tanks and equipment to cultivating plants, combating diseases, feeding, breeding, etc. In fact, N.W.A.S. tackles any subject that will help the Society fulfil its stated aim of "fostering the study and culture of aquaria and its kindred interests".

On alternate months, there are table shows while, at each monthly meeting, there are competitions for the U.16's as well as a raffle for all members. Trips are also discussed at these get-togethers. The Society's Newsletter, "Talking Fish", is published monthly and sent free to members. A warm welcome is extended to all visitors and new members.

Subscription Rates: Adult membership, £5.00; Family membership, £6.00; U.16 membership, £2.50.

Apply to: Miss F. M. Plant (Secretary), 56 Allendale Road, Walmley, Sutton Coldfield, West Midlands.

BRISTOL AQUARISTS' SOCIETY



The B.A.S. logo



A Bristol Shubunkin

B.A.S. is one of the oldest, if not the oldest, Aquarists' Society in UK. It was formed on 25 February 1929, by a small nucleus of enthusiasts who unanimously agreed to start a Society, completely separate from the existing British Aquarists' Association.

From the start, the new Society had a strong coldwater bias and its first Open Show for coldwater fish was held in 1931. By this time, considerable interest had already developed in the Shubunkin. This grew steadily over the next few years and resulted, in 1934, in the formulation of the first Bristol Shubunkin Standard. This, plus the continued development and improvement of the Bristol Shubunkin over the years, rates among the most significant contributions in the history of the coldwater hobby. It focussed attention on one type of hardy, colourful fish and set a target to be achieved that has provided a stimulus to exhibitors, breeders and fishkeepers ever since.

B.A.S. has, of course, developed its own very high standards over the years and has published them in a widely acclaimed booklet. Needless to say, these standards are used at the B.A.S. Annual Show (this year's is scheduled for 10th September).

These Shows attract enthusiasts from all parts of the country and usually stage between 300-400 exhibits. This year, the Nationwide Trophy (established from earnings accrued as a result of collaboration with the Goldfish Society of Great Britain in the making of a B.B.C. film) will be awarded to the best Lionhead.

In addition to running one of the most prestigious Shows in the country, B.A.S. also runs monthly meetings on all aspects of the hobby, organises regular Table Shows (at which tropical fish are also exhibited), publishes a monthly Newsletter and supports other major Coldwater Shows (e.g.) those of the Goldfish Society of Great Britain, Northern Goldfish & Pondkeepers' Society and South Park Aquatic Study Society.

B.A.S. meetings are held on the second Tuesday of every month at 7.30 p.m. at St. Ambrose Church Hall, Stretford Road, Whitehall, Bristol.

Subscription Rates: Adults, £5.00; Junior & Senior Citizens, £2.50.

Apply to: Mr. V. Cole (Secretary), 10 Hardwick Close, Bristol. Tel. No. (0272) 711 286.

Press Release



Two new remedies from Aquarian

1. Tanksafe

Fish inevitably experience a considerable degree of environmental stress when introduced into a newly set up aquarium. The problems that such situations can create are so common that they are often collectively referred to as the New-tank Syndrome.

Tanksafe is a specially developed dried bacterial/enzyme culture that aids in overcoming these problems in freshwater aquaria. It does so by converting toxic ammonia, nitrites and chlorine into harmless by-products. As a result, it stabilizes the aquarium environment until the normal biological cycle is established.

Tanksafe is designed for use, not only in new tanks, but also when introducing new fish into an established set-up, when an imbalance has been created by excessive feeding and whenever major water changes are carried out. Tanksafe is harmless to all types of aquarium fish and plants.

Each packet contains twelve tablets individually sealed in foil which enhances the shelf-life of the bacterial/enzyme culture by keeping it moisture-free. Each quick-dissolving tablet will treat 20 gallons and precise instructions are provided on the packet for the treatment of a variety of tank sizes, making the administration of the correct dose both safe and easy to follow.

2. Coppersafe

Coppersafe is a highly efficient treatment that is 60 times less toxic than other copper-based remedies. It is a unique form of copper and copper

alloys for the control of Ich (White Spot), *Trichodina* (a ciliate Protozoan which causes over-production of body slime), *Gyrodactylus* (Flukes) *Lernaea* (Anchor Worm) and other freshwater parasites. In marine aquaria, it is effective against Saltwater Ich (*Cryptocaryon*), Velvet (*Amyloodinium* and *Oodinium*), Gill Flukes and other parasites.

Coppersafe is extremely stable, remaining active for over one month under normal aquarium conditions. Because of the hypersensitivity that some invertebrates such as anemones and snails exhibit to all forms of copper, it is always advisable to remove these from the aquarium during treatment. However, temperature, filtration and aeration should be maintained at their normal levels during this period.

Coppersafe comes in 80ml bottles and is administered at the rate of one inner capful per 23 litres (5 gal.) of aquarium water. Because of its long-lasting qualities, monthly administrations need only be at a dosage rate of one inner capful per 88 litres (20 gals). Coppersafe is also ideal as a precautionary measure whenever water changes are carried out.

For further details concerning Tanksafe and Coppersafe, contact the Aquarium Laboratories, Pellon Lane, Halifax, West Yorks, HX1 5QP. Tel: (0422) 50221.

New Fluval power filter from Hagen

ROLF C. HAGEN (UK) LTD, have added a new and larger filter to their Fluval range. It is the Fluval 302 which has a turnover rate of 840 litres (222 gal.) per hour. The corresponding rates for the other models are: 378 l/hr (100 gal.) for the Fluval 102 and 420 l/hr (111 gal.) for the Fluval 202.

Although the new 302 can easily meet the filtration requirements of even large aquaria (e.g.) 72in. x 18 in. x 18 in, it can also easily be



adjusted for small tanks. This is made possible by special hose valves which allow for precise control of both the intake and the exhaust (return) flow. The 302 has two intake and two exhaust hoses, each individually controlled. These can be turned off without causing unnecessary pressure build-up inside the impeller chamber. A second advantage of this arrangement is that all the hoses can be left in place while the filter is removed for cleaning. It also makes it possible to direct the exhaust flow via a spray-bar (for surface agitation) and a sub-surface flow simultaneously. Added flexibility is provided by the inclusion of an exhaust diffuser among the accessories. This allows for added aeration within the aquarium while still providing a concentrated current of water.

Other distinctive features about the Fluval 302 are its self-priming qualities, silent operation, its ease of cleaning (the various filter media are contained in cartridges), its clear impeller cover (for easy visual inspection), the flexible elbows which make it possible to arrange the hoses in many different configurations without kinking or reduction of the flow rate, and its hermetically sealed motor unit which requires no motor maintenance.

Each Fluval 302 comes complete with a full range of accessories and a colour instruction brochure. Recommended Retail Price is £59.95. For further details, contact Rolf C. Hagen (UK) Ltd, 275 Kirkstall Rd., Leeds LS4 2BZ, West Yorks. Tel: (0532) 796 566.

Xotic Pets Limited

XOTIC PETS commenced trading just over twelve months ago in a purpose-built warehouse at Alfreton in Derbyshire. The premises occupy five and a half thousand square feet, with two floors, and are conveniently situated just over one mile from the M1, Exit 28.

The emphasis is very much on marines and these are maintained in what is believed to be the worlds only 'fast self-service' system using small purpose-built acrylic containers, each with their own overhead supply of filtered water and their own vent pipe for returned water back to the centralised filtration system. Every effort has been maintained to provide the best possible water quality, and this is achieved by using biological sand filters, foam sponge filters, cartridge filters, U.V. sterilizations and commercial protein skimmers. Four complete systems are in operation, two for marine fish and two for invertebrates. The Company claims that this system of housing and displaying marine fish offers very considerable advantages over the traditional method of community aquariums. The fish are not stressed in any way and are not subjected to bullying, which is a common factor in community aquariums.

Furthermore, there is no netting involved and each species is individually housed in its own small aquarium with a through-flow of filtered water of up to 5,000 gallons running continuously 24 hours a day. Trade customers are invited to serve themselves and self selection with trolleys is provided. This is proving immensely popular with Traders who can inspect their purchases very much more carefully and a further advantage is that each species is individually priced and there are, therefore, no misleading price differentials. Time and labour costs have also been reduced dramatically and not only are there benefits for the purchaser in saving time, but also a minimal number of staff are required to stock and maintain what is probably

the largest saltwater holding capacity in the U.K.

Regular imports arrive weekly from all over the world and the Company have without doubt what must surely be the largest selection of on sale marines to the Trade in this Country. On the first floor there is a showroom offering dried goods from all leading manufacturers/distributors—these are attractively displayed and priced with generous cash and carry discounts.

Owing to popular demand, Xotic Pets now offer a very competitive Console Service for tropicals, marines, coldwater, aquatic plants and reptiles, for those customers wishing to handle their own direct imports. Many regular customers prefer to buy their fish in this way and when collecting from the warehouse normally purchase other species from the Company's own stock and of course, dried goods.

As well as marines, reptiles are also a speciality and a large bank of vivariums is used for stocking and maintaining a huge variety of reptiles. Xotic Pets feel that there is a steady and increasing market for reptiles and are always pleased to advise Traders on any aspects of this hobby so that a new dimension can be added to their existing sales.

The entire operation is owned by John and Jane Tarbatt and managed by Jon Coote. The Company reports a steady growth in business and claims to be able to offer a 'complete' service to all sectors of the Aquatic Trade. All business is strictly wholesale only.

A new look for hw Marine products

HW MARINE Products are now distributed by Interpet Ltd of Dorking. Interpet has established a reputation as manufacturers and distributors of aquarium products, but one obvious area omitted until now has been that of marine products. This new distributorship, which has been taken over from Peterams Ltd, helps to fill this gap.

The major product is hw Marinemix plus Bio-Elements. This very popular synthetic marine salt contains Bio-

Catalysts, which are organic substances not normally present in the aquarium, but which have a great effect on the regulation of growth, vitality and breeding, and of general metabolism.

hw Bio-Elements and Trace Elements are also available separately.

Another important product in the hw range is the water steriliser. This is provided in 3 sizes of 8 Watts, 15 Watts and 30 Watts for aquariums up to 700 litres.

Multipurpose heating tray and Fermenter

EMITTING a low temperature heat over a wide area, Thorne Electric's heating tray is sold as a fermenter in home yogurt and wine making, as a foot and aquarium heater and as a warmer in photo copy and other photographic equipment.

The heat is provided by Thermaflex's Flexel element which is insulated within a Melinex sheath and connected to an exit cable. It is encapsulated on both sides with a resinated Durestos felt and laid to cover almost the entire surface of a laminated veneer board. The element is taped into position and a second veneer laminated board is placed on top. The unit is then moulded under pressure at 140°C to form a rock solid tray, which is almost indestructible.

The element, which consists of a PTFE coated glass cloth material with copper strip conductors, is supplied as a 10/50 watts element. When the heating trays are used as a fermenter, it raises the liquids to a temperature of 72°F, which is an ideal temperature for good fermentation. It provides heat at the bottom of the container to warm the yeast. At the same time heat is circulated as the warmed liquid rises up and the cold drops down.

This is claimed to give a much better fermentation than the alternative of an immersion heater, where the temperature at the heat source can be too hot. Moreover, in contrast to the 10/50 watt Flexel element, a 50 watt immersion heater would be required to ferment the liquid in a one gallon container.



SPOTLIGHT

THE GIANT GOURAMI

by Jack Hems

ORIGINALLY a native of the Great Sunda Islands, the giant gourami or, technically speaking, *Osphronemus goramy* is, at the present day, widespread over the Far East and beyond. That it has become established in many countries far removed from its ancestral abode can be attributed to its hardiness, and its ability to live under different water conditions (provided they are clean enough to support higher aquatic life) and serve as a nourishing fish food for man. Indeed, '... one of the best flavoured in the East Indian Archipelago.' So A.C.L.G. Günther in *An Introduction to the Study of Fishes* (Adam & Charles Black, Edinburgh, 1880). Another point in its favour as a species ideally suited to extensive cultivation as a food fish is its steady growth (given the right treatment) and potential size (in outdoor ponds it attains a length of about 2 ft. and a weight of some 20 lb. In the home aquarium, however, it grows to about half this size and build).

Temperature is of small account; for it can endure a range of from the middle sixties (°F) to the middle eighties (°F) with no ill effect. And yet another advantage. It will eat almost anything taken by truly omnivorous fish and has a great partiality for green food. In commercial raising ponds in tropical countries the fish is kept well supplied with soft greenstuff obtained from local market gardens

(unwanted greens or trimmings), or the wayside. The foliage of certain species of wild yam (*Colocasia*) is taken avidly. This green-food is rich in vegetable protein, yet it cannot be too strongly stressed that a protein-rich diet is insufficient in itself for maximum growth (for the table) unless cereal mashes and suitable mixed refuse from native households is added daily.

O. goramy is an air-breathing and nest-building member of the family *Anabantidae*. It has been known to science for more than a hundred and twenty years, and to aquarium keepers since the 1890s. (See early editions of the Rev. G. C. Bateman's *Freshwater Aquaria*). It has a compressed body almost elongated oval (deeper from back to belly in its advanced years), thick and protuberant lips, large scales and, in its fully adult form, a puffy-looking enlargement of the head. The species has a lifespan in the aquarium, and in the wild, in excess of seven years.

The upper parts of young fish are reddish brown overlaid with a greenish to grey or bronzy green sheen. The throat and underparts are silvery to satiny white. Seven to ten dark vertical bars are present on the sides (these markings tend to melt into the background colour as the fish ages and grows darker

in colour). There is a black spot in the lower base of the tail; in some young fish a dark spot is often seen near the base of the pelvic fins. In old fish irregular dark markings are present on the head. The pelvic fins are drawn out to thread-like appendages or antennae. They can move independently of each other and are waved, at times, in all directions. The caudal fin is blunt and not rounded or bifurcated as in so many other species of the *Anabantidae*. The dorsal and anal fins are long-based, spiny anteriorly and soft posteriorly. The dorsal and anal fins of the female are rounded at their extremities whereas those of the male are longer and terminate in points. The pectoral fins are translucent grey with a hint or more of blue. The eye is pear shaped, the apex pointing towards the mouth. The pupil is oily black.

In its smaller sizes, say about to 3 in. the giant gourami is quite suited to a community tank housing fishes of near enough its own size. Above the 3 in. mark it is advisable to house a single specimen or a pair on their own. *O. goramy* can, and does, bully smaller or timid fishes to their peril.

A tank about 36 in. x 15 in. x 12 in. is large enough for a pair or a single specimen for a year or two. After this period of time more spacious accommodation will become necessary. As has been



mentioned above, the fish is not particular about food. All the same, it calls for plenty of nourishment, provided by a varied diet, if it is to keep in good health and shape. Flake foods and such things as small or chopped earthworms, gnat larvae, live *Daphnia*, cooked turnip

tops, cooked spinach, bruised and torn leaves of lettuce, fronds of Indian fern (*Ceratopteris*), and so on should be included in the diet. As the fish browses on soft leaved plants such as the aquatic grasses, it is not good sense to introduce them into the aquarium. Better the water plants that grow free-floating such as a warmwater-cultivated hornwort (*Ceratophyllum*), which has no roots and has a rate of growth that will keep it slightly ahead of the nibblings of the fish. Duckweed, too, is

another plant to place in the aquarium.

Although the giant gourami appears to be a prolific breeder in tropical freshwaters, breeding in a restricted space (and by this I mean a tank not of enormous proportions) is a different story, and one I cannot bring to mind in all my fifty or so years in the hobby. Put in other words, as far as I can ascertain, the species has never bred in the home aquarium. Perhaps some reader can help in this respect?

BOOK REVIEW

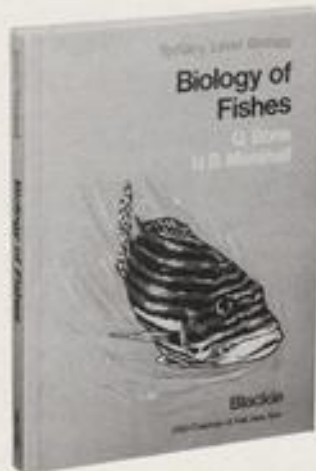
Biology of Fishes by Q. Bone and N. B. Marshall. Published by Blackie (1982). Price £11.92. ISBN: 0 216 91017 X.

In the Preface the authors state that, at around 20,000 known species, fish constitute the most abundant class of vertebrates (back-boned organisms).

Despite this, and despite the huge following that fishkeeping enjoys both here and abroad, fishes still remain the least known of all the vertebrates. Since new species are constantly being discovered and described, it is reasonable to assume that the "real" total number of both extinct and extant (living) species is well in excess of the above-quoted figure.

Clearly, it is impossible for a single volume to cover such a vast field comprehensively. This book does not claim to do so. Instead, it (quite correctly) states its terms of reference and then proceeds to cover the "most useful and interesting" topics with the professionalism that one has come to expect from its eminent authors.

It must be stressed that *Biology of Fishes* is not a "this-is-species X-and-here's-how-you-keep-and-breed-it" type of book. It is primarily written for those with more than a casual knowledge of fish and, as such, is



neither aimed at, nor suitable for the beginner.

Nevertheless, the style adopted by the authors makes it a very readable, thorough and informative book. It deals with both basic and complex concepts in a concise, uncluttered fashion, illustrating relevant points by means of accurate line drawings. Some of these are a bit too small but this does not really detract from their value. Although not every topic is covered in great depth, this is not surprising in a book measuring just 8 in. x 5½ in. and having 236 pages of text. The authors are well aware of this limitation and compensate for it to a considerable extent by including, in addition, 13 pages of

references, some of which are as recent as 1982 (the same year the book was published). Both the authors and the publishers must be congratulated for their desire to be as up-to-date as this.

The references themselves are grouped according to chapter and are clearly signalled in the text, allowing the reader to pick and choose which, if any, to follow up.

Topics covered include classification, swimming, feeding, vision, respiration, reproduction and the nervous system.

I can recommend *Biology of Fishes* to anyone interested enough, and willing enough, to make an effort to come to grips with the relevant biological terminology (there are some good, inexpensive dictionaries about —(s)he will be well rewarded.

J.D.

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THE CONSTRUCTION OF AN ECONOMIC FISH HOUSE

By Dr Peter A. Lewis, PhD
Part 5

TO DATE we have dealt with construction of a fish house either in brick or wood starting with an open site that entailed laying a foundation and building walls. In this article I have detailed the fabrication of a fish house using an existing room or outbuilding. This project involves considerably less work than the previous two but nevertheless is still worth considerable forethought and planning.

Our first decision that must be made is which room or area is to be converted to house fish. Personally I have always been reluctant to use an upstairs room bearing in mind the volume of water that is involved in keeping several tanks of fish and being aware of the fact that no matter how careful we are an accident can happen that results in water spillage. Spillage in an upstairs room rapidly finds its way downstairs and can add insult to injury by also causing damage to plaster walls and carpet in the room below the fish room.

Ideally the conversion of a part of the garage or an area in the cellar is an optimum location since normally the floor is concrete and spillages are less likely to cause any damage. Alternatively an outbuilding such as a wash house or stable may be available for conversion calling for only a small expenditure of capital to bring the building up to our fish house standards of insulation.

Taking the cellar location first and assuming that either all or part of the area chosen is below ground level we have two primary questions to resolve. The first is what to do about removing



Cellar fish house containing over 100 tanks and belonging to Charlie and Ginny Eckstein of the Long Island Aquarium Society, New York, U.S.A. The view shows the central bay of all glass tanks. Note the use of fluorescent lighting down the aisles rather than above each individual tank. If additional lighting is required then a lead light is clipped above the tank as necessary. Also note the fan on the floor which is used to ensure efficient circulation of the heat through the space heated structure.

water from the location below ground level and the second is how to prevent moisture from being drawn through the walls into the fish room.

Dealing with the second point first,

since it is the easiest to solve, the readiest solution is to either paint the entire walls with a rubber based water proof paint as is used for the inside of swimming pools and garden pools or to line the walls with a 3-4 mil polythene vapour barrier as illustrated in Figure 1. Addition of the polythene barrier is probably easiest and cheapest but care must be taken in hanging the polythene to ensure adequate overlap between lengths is allowed.

Removing water from below ground level involves a little more inventiveness. Obviously if your cellar has been fitted with a drain either to a sewer system or to a leach pit then your problems are minimised and it is sufficient to run a drain hose from the fish house area to the drain. My cellar did not afford such a luxury so I had to resort to a pumping system as illustrated schematically in Figure 2.

My system first involved the installation of PVC guttering across the front lower support of my tank shelving such that the water siphoned into the gutter during cleaning operations drained into a five gallon plastic 'hold tank.' From the bottom of this hold tank was run a length of $\frac{1}{2}$ in. copper pipe connected to the tank using a threaded pipe adaptor sealed into the tank with the aid of silicone sealant. This pipe was then attached to the inlet side of a $\frac{1}{2}$ horse power (429 watts approx) self priming pump using $\frac{1}{2}$ in. plastic pipe and screw tightened pipe clips. The outlet side of the pump was attached to a length of $\frac{1}{2}$ in. copper pipe that ran up the cellar wall and out through the wall at a point just above ground level to a surface water drain at the corner of the house.

Note that the elbow going into the hold tank from which the waste water is pumped stops about one inch from the bottom of the tank. This arrangement allows gravel that is inadvertently siphoned out of the tank to settle in the hold tank from which it can be easily recovered. Additionally this arrangement prevents gravel from getting pulled into the rotor of the pump which might result in damage to the rotor. The use of a holding reservoir provides a buffer in the system and ensures that the pump is working

efficiently and without air bubbles during most of the tank cleaning operation.

To operate the system merely start draining the dirty water into the hold tank via the PVC gutter, observe the water level in the hold tank and turn on the pump when the tank is almost full. Continue the cleaning operation until all the tanks are done, allow the pump to pump out all the water from the hold tank and then turn off the pump. Water in the rising pipe to the outside drain will drain back into the hold tank thus preventing any residual water in the outside piping from freezing during cold weather.

When purchasing a pump, a size from $\frac{1}{2}$ to 1 h.p. is adequate with either a $\frac{1}{2}$ in. or $\frac{3}{4}$ in. pipe size for the inlet and outlet connections. A critical point is that the pump should be self priming otherwise the system becomes unnecessarily complicated.

Turning our thoughts back to the fish house conversion we have a cellar room with polythene lined walls—what else is needed?

Even though we are below ground level it is still important to add insulation. My own cellar conversion involved constructing a shell around the cellar walls as shown in Figure 1. As illustrated a layer of polythene was hung across the wall followed by a 3 in. layer of glass fibre insulation (R=11). Across this insulation was added a second layer of polythene to form a sandwich of glass fibre between two plastic vapour barriers. Next I built an inner wall of 9 in. \times 18 in. concrete blocks that were 3 ins. thick to give a complete new inner skin to my fish house that would not only be water-proof but also energy efficient.

Turning now to the ceiling as illustrated in Figure 3. I again added insulation above a false ceiling of 2 ft. \times 4 ft. acoustic tiles. In outdoor projects I had used 6 in. thick insulation for the ceiling but with this cellar project I chose to use 3 in. thick insulation since heat lost would only be minimal and would be into the house room above anyway.

This same scheme of constructing an insulated inner layer in an existing structure can be followed for other



locations such as an outhouse, stable, washroom, garage, etc. The main points to remember are that a vapour barrier must be used on the WARM side of the insulation, that water draining facilities will be needed and that an electrical supply and water supply are mandatory.

If only a part of an existing structure is to be used then an insulated partition wall will be necessary as detailed in Figure 4a. Basically this wall consists of an insulated sandwich between plaster board or wall board using 4 in. \times 2 in. timber as the framing material. Each frame section is constructed as an eight foot length and of a height about $\frac{1}{4}$ to $\frac{1}{2}$ of an inch shorter than the height of the existing structure. The frame is then lifted into position and wedges hammered underneath the sole plate to firmly locate the frame between the floor and the ceiling. The frame is then made secure by nailing or screwing the frame to the existing floor and ceiling structure. Finally the frame is then filled in as detailed in Figure 4b, using 3 in. thick glass fibre insulation purchased in 15 in. wide rolls.

If a door is required into the modified fish room area then the frame can be tailored to fit the door prior to wedging it into an upright position. Ideally the door should be either 3 ft.

The work area of the cellar fish house shown in photographs 6 and 7. Note the sink facilities and the all important extraction fan located in the cellar wall and vented to the outside. Working in this fish house during the Summer months would be impossible without this extraction fan since temperatures often reach as high as 100°F with humidity to match

or 3 ft. 3 in. wide to allow for easy movement of tanks and equipment into the fish room.

Generally a water supply to cellar located tanks is no real problem since often the cold water supply to the house runs into the cellar. When furnishing my cellar fish house I experimented by only providing a cold water supply to the area. Thus each weekend I would remove 10-15% of dirty water from each tank and then top the tanks up with cold water only. This was done gradually whilst I was working in the fish house and at no time would I remove more than 15% of the water. Although my procedures would probably have offended some purists who insist on adding water to the tank at the same temperature as that withdrawn, I can only say that what I did worked but it must be borne in mind that the fish I was keeping were of the more hardy varieties of cichlids, botias, armoured catfish, characins and loaches. At no time would I suggest this practice with tanks of

Discus and the less hardy species of tetras, barbs and rasboras for example.

Another experiment I tried successfully with my super-insulated cellar fish room was to install heater/thermostat combination in each of my twenty tanks. By and large this system appeared to work judging by the minimal rise in my electricity bill once my fish room became a reality. A drawback to this heating method was the initial outlay for twenty units and the additional wiring necessary.

Overall the cost of preparing a fish house from an existing area or room is considerably cheaper than any construction starting with a clear site. Basically all that is necessary is to upgrade the insulation and to install an electrical circuit and water supply and removal system. Over the years my costs have varied from £100 when upgrading a portion of my garage to £150 when converting a basement room. Remember at all times that the use of recovered lumber for framework

and shelving and salvaged doors is critical in minimising costs.

Common to all fish houses, however constructed, is the need for an electrical circuit, for a supply of air to each tank and for shelving for the tanks. In the next article I shall detail these aspects of the project with special regard to the management of those factors such as water changing and feeding on a routine basis.



FIGURE 1. Section of wall construction to provide insulation.

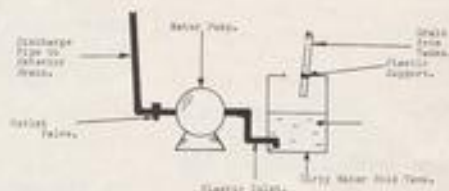


FIGURE 2. Detail of tank discharge device.

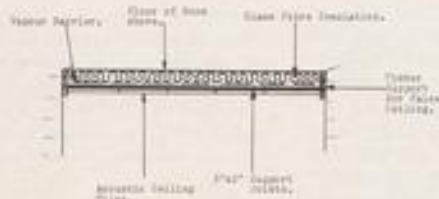


FIGURE 3. Floor section to allow insulation.

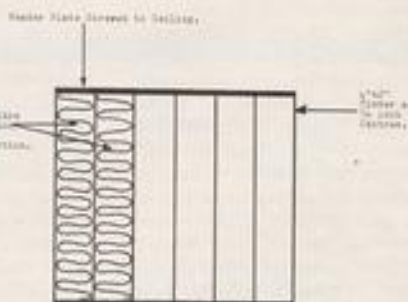


FIGURE 4a. Detail of the insulation system.

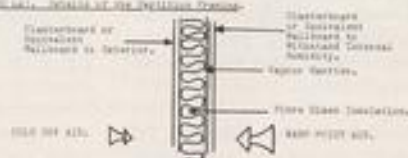


FIGURE 4b. Section through the glass fibre detail.

BREEDING

Planning the menu

by
Roy Pinks

IN THE FIRST of this series I emphasised the need to guarantee your food supplies before getting involved with the more obvious elements of the programme. It is necessary not only to provide the proper sort of food for your breeding stock, but also to cater for the hoped-for offspring, from the time at which they begin to take food external to that which is naturally supplied in the egg sac, to the time during which they are approaching adulthood. In Britain you also have to think about the right season for breeding: obviously, cold-water fish are best during the spring and summer months, though tropical fish will breed right through the year. In the latter case, however, it must be remembered that although warm water species are not fussy as to season, live food supplies are very difficult to maintain during even an average local winter. Thus it may not be a bad idea to concentrate on the live-bearing species during the bleaker months, because it is quite easy to rear most of these using food straight from the packet or tube.

Conditioning the Stock Fish

If you are to get the most willing breeders and the finest fry you need to keep the stock fish on their own,

with the sexes separated, for several weeks before breeding. The time at which it is best to put them together depends rather on the appearance of the female, which should be bulging with eggs after proper conditioning. In this period, the length of which will vary greatly as between the species chosen, and depending on the age of the actual fish, every effort must be made to provide a varied diet, but with a preponderance of live food. The size and nature of this will again depend on the size of the subject fish, but it is worth making the point that both large cichlids and neons condition marvellously on earthworm—it is the way in which you serve it that makes all the difference. The conditioning tanks need not be very carefully prepared, apart from provision of the right sort of water, a thin layer of compost on the floor, and a clump of plants in which the fish can hide if they are nervy, but it is important to avoid any hint of pollution. The more food, within reason, offered during this period, the better, hence the need for extra care about hygiene, as we usually overplay our hand in this part of the process. If you can only manage two feeds a day, I suggest a good flake food in the morning, which enables you to spend more time on a live food régime each evening. Although attempts have been made to evaluate the benefit of individual live foods, nothing very conclusive has emerged sufficient to topple the notion that the greater the variety the better. At all costs, though, refrain from feeding live food collected from ponds unless you are confident about identifying the predatory creatures which are usually netted together with the harmless ones. These range

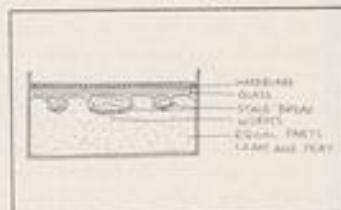
from the inch long early forms of dragonflies to the quarter inch anemone-like Hydra, the former of which may kill your stock fish, and the latter forming greedy customers for all the fry you can produce.

Live food for Stock Fish

The following food, suitably rendered as to size, will be accepted by most species of stock fish, and may be offered to growing youngsters when they demonstrate that they can cope with it. Always provide food particles smaller than you think are needed, as many fish will choke and die on oversized mouthfuls.

(a) **Earthworms.** Probably the most valuable of all live food, they are at their best when about 2 in. long. Not to be confused with the banded, reddish and evil-smelling worms found in manure and compost heaps—the ones we are after are whitish-pink with a bluish tinge, and they are usually found in flower and vegetable beds. The soil must be damp, to attract them, so in hot spells water a patch of garden well and cover it with a wet sack: the worms will then usually be only an inch or so below the surface and can be dug up readily with a trowel.

(b) **Whiteworm (*Euchytraea*).** These are thin creatures, like pieces of white



Cross section of a working culture of whiteworm or grindal worm

cotton, commonly reaching $\frac{1}{2}$ in. in length. Occurring naturally in leaf mould, they are easily cultivated at home. Obtain a starter culture from a fellow aquarist—commercial packs are also available—and stir this into a bowl or box containing a mixture of equal parts damp fine loam and peat. On top of this scatter a slice of stale bread which has been soaked in water and then squeeze hard in the palm of your hand. Place a piece of glass on top of this to conserve the moisture and cover with a piece of hardboard or lino, slightly smaller than the top of the container, to exclude light. Put the container in a cool place and replace the bread every few days as it is eaten by the steadily multiplying worms, taking care to remove any pieces which mildew. Within a week or so a huge increase in numbers will be evident, and these should be removed and fed to your fish. Avoid the alarming and damaging build-ups which can occur (often during hot spells) by hiving off the surpluses into new cultures. A breeding programme will call for a number of these, which you can "milk" as

necessary. If you do encounter overloads (when this happens the worms escape from the container in large numbers and the compost begins to look wet and solid), you can throw the unwanted worms on to the garden—they do no harm—but you must also inspect the compost, and if it is sour and evil smelling it must be replaced.

(c) *Tubifex* worms. These are pinkish-red worms, also cotton-thin, and usually about 3 in. long, which live in mud, often in excreta-ridden estuaries, where they anchor their lower ends and wave the rest of their bodies to and fro. They thrive on filth, hence their probity in the breeding arena is suspect. They are obtainable from most dealers, except during weather extremes, and come in tightly compacted masses, containing thousands of the creatures. They must be thoroughly cleaned before being offered to fish. Place them in a container and subject them to a gentle jet from the coldwater tap, so that the mass is well broken up. The detritus will disperse. Repeat several times, then let the mass reassemble and place it

under a dripping tap or in moving water. These have to be caught or bought as they are difficult and uneconomical to attempt to breed at home.

(d) *Grindal* worms. These are a small edition of *Enchytrae* (about half size) and call for similar cultural treatment. They are much less subject to overloading and tend to breed less readily.

The above may be regarded as the most reliable stock live foods for stock fish, and it may be noted that nearly always chopped or shredded worm is more attractive than the whole item—perhaps because fish have an advanced sense of smell. There are other occasional treats like the small crustacean, *daphnia*, often accompanied by cyclops, available at absurd prices from local dealers. Their value as food is not high and yet fish go mad over them. It is up to you whether the fleeting pleasure is worth the high cost, but certainly this is not an essential to any breeding programme.

My next article will cover the essential range of foods for fry and growing fish.



Pygmy Catfish

The pygmy catfish (*Aquarist & Pondkeeper*, April, 1983). I wish to correct a wrong impression given by the authors of this article.

The species *Corydoras pygmaeus* Knaack 1966 and *Corydoras hastatus* Eigenmann & Eigenmann 1888 are distinct species with different distributions in South America.

Corydoras pygmaeus has a black

stripe which runs along the lateral line whilst *Corydoras hastatus* has a dark spot at the caudal peduncle (base of body/tail fin).

If confusion existed on these catfishes—it related to commercial literature which mixed the names. *Corydoras hastatus* is extremely rare in aquarium imports, the last group were imported from Paraguay/Argentina—*Corydoras pygmaeus* in contrast is often seen in great quantities among Peruvian fish imports.

D. D. Sands, Preston, Lancs.

Power Breaker

With reference to the "Coldwater Jottings" by Frank Orme in your July issue, the 'Power Breaker' Earth Leakage Circuitbreaker can be obtained direct from the manufacturers B. & R.

Electrical Products Ltd, Temple Fields, Harlow, Essex CM20 2YD.

J. E. Morris, Ross-on-Wye.

Ashford Aquatics

May I through the pages of *Aquarist*, thank "Ashford Aquatics", of Harton Road, Stanwell, Middlesex for keeping and despatching my fish, with so much care, to Preston, Lancashire, this month; they had them for 5 weeks whilst I moved house from Denham, Buckinghamshire to Lytham, Lancashire. If any of your readers, are under the same dilemma of moving, need advice, I can recommend these people. I cannot speak too highly of their helpfulness, and may I say through your paper, many many thanks to them.

E. J. Rogers, Lytham, Lancashire.

A KOI SHOW IN JAPAN

by
Hilda Allen

HAVING been sent the news report of the 15th annual All Japan Nishikigoi Exhibition, it should be of interest to many readers to know the extent of the present-day Japanese dedication to this fancy variety of coloured carp, now generally recognised here simply as Koi.

Nishikigoi is said to be the "National Fish" and the king of ornamental fish in Japan that has also become popular in many other countries.

It is to be noted that Koi-keeping only became really widespread in Japan from 1968 when the first of these national exhibitions was held in Tokyo, and at about the same time Koi were being actively considered as a highly desirable pond-fish in this country.

These exhibitions are promoted by the All Japan Association for the Advancement of Nishikigoi and supported by the Ministry of Agriculture, Forestry and Fisheries, The Tokyo Metropolitan Government, and the Niigata Prefectural Government for the showing of Koi by keepers, breeders, and distributors worldwide in international competition with a view to progress in methods of breeding, improving quality, creation of new varieties and so on.

This year's exhibition was held in the impressive Tokyo Ryutsu Centre Building from the 18th to 24th January. The initial two days were taken up with the construction of facilities (ponds and stands etc.), the fish arriving on the third day and judged the following day.

A total of 3,557 Koi including 54 from overseas were entered in 252 classes according to size and variety. In the case of larger adult Koi over 55 centimetres (22 inches)

in length, there were separate classes for sex because of the different body-shape in male and female fish. Innovations this year were to have Doitsu, meaning German to indicate mirror and leather carp, and to have Jumbo as size groups for later adult fish of 70 to 80 cm (28 to 32 inches) and over, divided into males and females as extra classes.

The Koi were divided into 15 size groups ranging from under 15 cm (6 inches) for young fish to 80 cm (32 inches) or more, and each size group sub-divided according to variety. The first prize winners were judged against each other of the same size class to arrive at the Kokugyo Prizes (National Prize) fish.

The resultant 22 National Prize fish were then grouped into seven stages of growth from which 7 Group Champions were selected. A male fish of Kawari-mono type in the Jumbo group 15 over 80 cm (32 inches) won the Jumbo Prize.

From these 7 Group Champions the Grand Champion was selected and this year's Grand Champion was a Japanese female Koi of Kohaku variety in the Jumbo group 14, 75 to 80 cm (30 to 32 inches) in length.

As may be expected, the greatest number of Koi entered were in the 15 to 70 cm (6 to 28 inches) groups but there were 384 Koi of Jumbo size over 70 cm including 3 Koi over 80 cm (over 32 inches). The most popular entries were in the varieties of Kohaku (white with red pattern), Taisho-Sanke (white with red and black patterns), and Showa-Sanke (black with red and white patterns).

The exhibition was open to the public for the last two days and ended with the festive occasion of the prize-giving ceremony. Like most things in Japan, exhibitions are relatively expensive and apart from the public admission charge equal to almost £3, the fees for the entry of Koi ranged from about £28 for each young fish, £33 for each mature to middle-age fish, and £42 for each adult and Jumbo size fish.



The Tokyo Ryutsu Centre



Female Jumbo Group Champion and
'Grand Champion'



Male Jumbo Group Champion

THE FIRST of this month's letters was written by Mr. Thomas Stewart, of School Bungalow, Castlefields Infants School, Field Top Road, Rastrick, Brighouse, West Yorks. He wrote: "I have been an aquarist now for 16 years and during that time have taken a great interest in your column.

"I started my involvement with the hobby, two weeks after starting work, with a 24 in. stainless steel framed tank, and in it I crammed the usual starter's fish. At that time I was working in a local pet store at weekends in return for a pick of the fish that came in; also I received a great deal of help and hints and within a few months knew a great deal about most aspects of the hobby. It is amazing to see that quite a lot of the equipment available then is still on the market now.

"I was very sorry to see that British Rail have made it very hard to transport fish by rail now because one of the things I enjoyed most was to look through the magazine to see lists of fish available to the hobbyist by rail from retailers in England as I was in Dundee, in Scotland, at that time and there was only one totally aquarist shop in Dundee then. Subsequently I moved down to where we are now with my wife and six children and only now do I have the space available for the long-awaited fish house which I am in the process of building. When completed it will hold six 36 in. tanks, 20 x 24 in. tanks and 20 x 18 in. tanks. The fish house will be heated by thermostatically-controlled radiators from our central heating system as the fish house adjoins our kitchen.

"I tried marine tanks 15 years ago when they were first introduced into Dundee. It was a very expensive mistake because at that time there were not enough people in Dundee keeping marines for me to fall back on for advice. I'm glad that this has now been reversed and that marines are not a great deal more trouble than freshwater fishes.

"I seem to have landed lucky now as I'm not more than a 20 minute bus ride from Hemmingways and Keith Barraclough's premises; and there is also a little shop in Brighouse that has



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

'Photographs by the Author'

been open now for three to four years and if it is anything to go by then the hobby still seems to be popular—even during the present unemployment situation. . . . I will just wish you good luck with your column and hope that it will be going strong 16 years from now."



One of Gary Hodge's bala or silver sharks—*Balantiocheilus melanopterus*

My three latest Woolworth's bulb figures are 192, 107 and 78 days. It's interesting to note that one bulb lasted more than twice as long as another.

It is disturbing at the moment in Northern Ireland to hear about many thousands of fish in various rivers being killed by waste from farmers' silage production getting into rivers. Apparently, during the fermentation process, in the silo, an acidic waste is produced. This is normally sprayed on land far from rivers; but unexpected heavy rain can wash it into bodies of natural water where, I understand, it

can reduce the oxygen content to a extent where fish simply suffocate. One hopes that farmers take as much care as possible with their waste products. It's sad to think that carelessness could result in the unnecessary deaths of many fish.

Recently I complained about a paucity of letters from young ladies. The following letter, written by Miss Helen Wilcox, of 224 Broadway North, Walsall, West Midlands, goes a little way towards righting the imbalance between male and female contributors to *W.Y.O.* She says: "I am writing concerning Mr. Bradbury's letter in the June issue, and in particular his problems with feeding *Tubifex* worms. A very easy solution is to sink a flowerpot saucer, preferably of the earthenware kind, into the gravel until its lip is just protruding, and fill this with gravel. It is then a simple matter to place a ball of *Tubifex* worms into this. They do still burrow down, but obviously cannot go very far, and will remain there readily accessible to the fish. If any do die the saucer with gravel can be lifted out, washed and replaced, thus avoiding any pollution.

"This method is also of benefit in the general feeding of bottom-dwelling fish, and especially *Corydoras*, because tablets and pinches of flake food can be dropped directly above this saucer also, and then any particles which remain uneaten can be simply removed by cleaning out the saucer and its gravel when necessary."

Additional views on live foods reached me from Mr. Malcolm Keene, who lives at 77 Ashley Avenue, Folkestone, Kent. He wrote: "I have been a reader of your column for some while. In the May issue you asked for readers' views on live foods. As I am a firm believer in live foods under the right circumstances I thought I'd write to you. My wife and I regularly use quite a variety of live food. Bloodworms and *Tubifex* are the only ones we buy. I cultivate white worms and micro worms; collect *Daphnia* in summer; and freshwater shrimps all year. These shrimps are common in the streams at the back

of Folkestone. I grade them into large and small with a sieve; and during the summer months, when they are abundant, I freeze them. These shrimps are avidly eaten by all our fish, especially my discus—which have just started to spawn regularly—and Rift Valley cichlids. The discus also have white worms and bloodworms regularly; I think white worms in moderation are a good conditioning food. The only snag with live food that I have come across is the occasional touch of fungus on the fins of some R.V. cichlids when they are fed *Tubifex* regularly; so I now give them *Tubifex* as an occasional treat and the problem does not arise.

"We also use earthworms which are probably the best of all, and which even people living in cities must be able to collect. Their only drawback is that they tend to cloud the water—although I have read that they can be cleansed in milk. I have never tried this personally. Aside from any nutritional value that any of these live foods might have, I think the fact that the fish have actively to chase and search for moving food stimulates their interest and helps to keep them in condition. This conditioning value seems to apply especially to fish that you are trying to breed.

"I have only mentioned the foods that we regularly use as they are those that I have found easiest to collect or culture, and they also give the best results and value for money."

Mrs. Jane Meredith's address is 18 Cranleigh Road, Portchester, Fareham, Hants. She writes: "In the April issue you asked for details of our experiences with the breeding of gouramies. As far as I am concerned I should like to know how to stop breeding them. I have been keeping fish for only 10 months and have been breeding literally thousands of dwarf gouramies during that time. I wanted only one community tank originally, but now I have 10—and am in the process of building a fish house as I still do not have enough space in which to raise the young to saleable size. When I first purchased my pair of dwarfs I noticed after a few

days that the male had coloured up beautifully and was in the corner furthest from the filter and above the heater. He was pulling wool from the filter box and pulling my plants to pieces. For the next few days he worked like a Trojan, oblivious to everything except his work. During this time he built several nests; but when they were completed the black mollies went nosing as usual and broke them all up, so the poor old soul had to start all over again. I felt so sorry for him that I went out and bought him a new tank and heater. I planted it with as much as I could rob from the other tank and filled up with water only 6 in. deep to put the pair in; but by that time I think he had run out of puff as he couldn't manage to blow bubbles very well at all. I helped him out a bit by placing some stretched-out filter wool on top of the plants that were floating up to the surface (*sic*). He seemed very pleased with that and after a few hours of scrutinising it from every possible direction he decided that it was just the job, found his third wind and, in the morning, there was a beautiful little nest of bubbles, filter wool and bits of vegetation.

"That evening I was presented with hundreds of tiny eggs and a very proud dad. The female ate a lot of eggs before I managed to get her out; and the male ate a lot more just after they hatched; but I have it all down to a fine art now with no losses at all—

except for the few when the labyrinths are developing. I have also found that the male will look after the fry continuously now and I don't have to remove him at all as he is a very loving and protective dad. I have even put him in a tank when the fry were one month old and he has looked after them and refused to eat anything until they have all had their fill. However, I am deviating from the rearing.

"I usually remove the male after two or three days as he insists on blowing the free-swimming fry back into the nest and they, by this time, don't want to play. I feed them for three days on *infusoria* and then on brine shrimps, with occasional egg-layers' fry powder; but I have found something very interesting through my experiments. If the fry are fed only on brine shrimps for four to six weeks there is no cannibalism amongst them and nearly all are reared; whereas if fed on the powder the bigger ones always eat the small fry, and by the end of six weeks I am left with only 100 instead of 300 to 400. Also there is a greater variation of size from then on, with some males developing their red stripes before others. I now breed them in tanks with plants in pots, and rocks for the female to hide behind, and no gravel, so that when I remove the parents I also remove the plants and furnishing, so keeping the tanks a lot cleaner. I have to change

Continued on page 57

A pair of Gary Hodge's platies



CAN fish hear? Yes, of course, but not to discriminate between Chopin and Mozart. Music attracts many to shoal sufficiently for Japanese experiments in Kyushu's Saki Bay to turn it to profitable fishing. Sea-bream responded to piano melodies, a rather low sound in the 200 to 300 hertz range, played at between 50 and 60 decibels. Squid in contrast responded to sounds of 600 to 700 hertz at 15 to 30 decibels. But a single tone or sound could do equally well.

Fish kept in one place by nets were reputed not to grow so big as those herded by music, because of their less contented restrictions. Three radio towers emitted the chosen sound for 30 minutes twice a day. Fifteen minutes after each performance food was released automatically into the shoals.

Schools of other fish make sounds which can be picked up on a hydrophone, though their hearing is almost confined to a simple inner ear. A catfish responds to a frequency so high as 13,000 a second, a minnow to 660 at 200 ft, and all fish are sensitive to vibrations through the water. Pond-trout and carp attracted at feeding-time by a hand-bell may see the action of ringing the bell and respond to that. The fish's ear is an organ of balance as well as hearing; the hearing part lacks the intricate structure of higher animals. Much of this hearing is little more than detecting vibrations in the water, aided in many fish by a tube-like connection with the swim-bladder or by a series of small bones which intensifies the impulses from the vibrations. The lateral line also detects low frequency vibrations of about 6 a second.

The marine catfish, has its inner ear adapted for hearing low frequencies



by Eric Hardy

with a much larger upper chamber with sensitive skin than its relatives and a large ear-bone or otolith. It can detect only sounds from 50 to 1,000 Hz and is best at 100 to 200 Hz. Its relative detect sounds over 3,000 Hz and are best at 500 to 1,000 Hz. It uses echolocation. This group of fishes has bony ossicles between swim-bladder and ear, making them more sensitive to sound over a wider frequency than fishes without such connections. A squirrel-fish with its swim-bladder connected to the ear also hears a wider range of low amplitude sounds than relatives without that connection, more for instance than the goldfish which hears over 3,000 Hz. But American work has shown that fish without a coupling between swim-bladder and ear don't always detect a wider range of sounds than fishes without such connections.

Snails

Aquarists have a mixed attitude

to snails. Some fish eat these, like goldfishes' fondness for spindly shaped *Physa* bladder-pondsnails and trout's liking of the common pond snail *Lymnaea (Radix) peregra* and the large, golden yellow, live-bearer snail *Vitrina* used as a tank-scavenger introduced early this century into Sale's Pond, Chorlton, near Manchester. Lungfish and famous *Gambusia* have an appetite for snails in their tanks and guppies eat some *Cercariae*. But some snails host parasitic trematode worms, one via the common *Lymnaea* causing blindness in trout.

Whatever your problems with them in pond or tank, most chemical molluscicides used to control them are toxic to fish, even when harmless to plants, mammals and birds, effects vary with the hardness or softness of water and the temperature.

One of the most up-to-date and informative new books on the biology as well as control of these creatures is the English edition of Dora Godan's authoritative *Pest Slugs and Snails*, 441 pages with 7 plates of colour-photos, plus identification keys and non-chemical as well as chemical controls, published by Springer-Verlag of Heidelberg at 84.50 US dollars



Livebearing Snail, *Palvolina vivipara*

WHAT IS YOUR OPINION?

Continued from page 54

the water every day and sift out any young to remove and replace them. I have found a very serious and foul-smelling nitrite content—but it does not seem to worry the fry because they have their labyrinth; however, the smell is awful and the fish do not develop as quickly if water is not added every day. Keep up the good work!"

This month's photographs, in sequence, show a *Balantiocheilus melanopterus* (bala shark or silver shark); a pair of platies; a firemouth—*Cichlasoma meeki*; and a common goldfish. Please drop me a few lines if you have kept/bred any of these species. My thanks to Gary Hodge and Stephen McCrindle for allowing me to photograph their fish.

I'm a Channel 4 fan—and was interested to watch a programme in the series *AKind of Living* which dealt with, amongst other subjects, a small trout farm in Devon, and a lady who raised carp for eating in her garden pond, together with attractive koi for



One of Stephen McCrindle's firemouths—*Cichlasoma meeki*



Common goldfish in Stephen McCrindle's aquarium

their aesthetic appeal. It appeared to be a blatant case of discrimination against the poor old plain carp!

Please send me a letter about growing

aquatic plants or breeding live foods for next time. I hope you get an Indian summer. Goodbye until October.

(about £56). The freshwater snail *Biomphalaria pfeifferi* which thrives among spreading *Salvinia* plants in the West Indies, leaves the water if the temperature is 18° C and crawls up the side of the tank, but not when it is between 25 and 27 deg., when its increase is much faster. But 27 deg then checks egg-production.

If you have snail-trouble you will find pond-snails more likely to build up resistance to frequent use of chemicals than land snails. It's not always feasible to remove all the plants they feed upon or shelter in, for non-chemical control but excessive growth can be reduced. Copper sulphate is unsafe for trout about 7 ppm, and the fish is affected more in hard water than soft. Water can be made more acid by dragging a bag of

peat through it. The predatory British brown snail *Zonitoides nitida* has been used in Europe to destroy the fluke-carrying *Limnaea (Galba) truncatula*. *Pomacea* species eat the egg-masses of freshwater snails and newly-hatched young snails. Yellow amber-snail *Succinea putris* and *Physa* are cannibals.

Large North African water-bugs like *Limnodynastes* used in tanks might attack fish. The book lists many parasites and virus and bacterial diseases, but few amateurs can use these for control. One good precaution is to quarantine or treat all pond-plants before introduction, even leaving them overnight in a weak salt-solution which makes any snails drop out. Carbaryl, used for land-snails, is poisonous to fish and *Tubifex* worms.

DISCOVER THE FISH

by Pisces—

The first is in LINE but not in ROD
The second is in PLAICE but not in COD

The third is in RIVER but not in STREAM

The fourth is in TENCH and also in BREEM

The fifth is in TUBIFEX but not in WORM

The sixth is in MICROBE and also in GERM

The seventh is in TABLET but not in PILL

The eighth is in PEPPER but not in MILL

The ninth is in PLEASURE but not in JOY

The tenth is in CARP but not in KOI

WUPPERSIAIT

Book Review



The Practical Encyclopedia of Freshwater Tropical Aquarium Fish by Dick Mills and Dr. Gwynne Ververs. Published by Salamander Books Ltd., 27 Old Gloucester Street, London WC1N 3AF at £8.95.

This large and lavishly illustrated book (280 colour photographs) is very modestly priced by current standards. With a wordage of 100,000 it is much more than a picture book.

The authors have split the coverage between them, Mr. Mills supplying the nuts and bolts of aquarium keeping in the first section and Dr. Ververs describing the proclivities and requirements of a wide range of different fishes in Part 2, the Species Guide. Arranged in family groupings in order of evolutionary development, two hundred tropical species are presented in alphabetical order of scientific names.

In Part One Dick Mills covers all that the beginner needs to know in

a masterly style of concise assembly of the stages leading from the acquisition of an aquarium, through the joys and troubles (ailments and treatment) to eventual breeding with a final chapter on Society membership and showing. Colour artwork and photographs illustrate all aspects covered.

The Species Guide comprises the major part of the book and with the highest quality of colour photographs supplies the customary description of the fish, habitat, aquarium and breeding requirements. In addition to a general index there is an index of plants and an index of fishes. Measuring 11½ in. x 8½ in. the large format allows for the use of numerous photographs of reasonable to full page size

with an attractive layout. Each species is illustrated and is accompanied by a silhouette of a tiger barb and an outline of the species under review to the same scale affording an impression of the size to which the described species will attain. Each double page carries a life size drawing of a tiger barb for reference in this connection.

Colourful glossy books on fish and aquaria are legion but often unrewarding for the seeker of accurate information. The authors of this book, however, can be relied upon for this essential ingredient with a bonus back-up afforded by the colourful brilliance of the illustrations.

L. E. Perkins.



Popular Marine Fish for your Aquarium by Martyn Haywood. Published by W. Foulsham & Co. Ltd., Yeovil Road, Slough, Berks in paperback at £3.50.

Here is a practical, concise and clearly written guide to marine aquarium fish and their maintenance. Illustrated with drawings in colour, it supplies all the basic information on marine set-ups and on a wide range of popular fish. In his introduction the author indicates that while anyone who has kept freshwater tropical fish may feel confident of taking the step towards keeping marine fish, there is no reason why one should not begin the hobby without having kept other sorts of fish, and the book aims to assist even such complete novices.

Covering the whole gamut of preparation from choosing the aquarium,

conditioning the water—with a chapter on water chemistry—filtration and aeration, heating and lighting, and other equipment, to buying fish, diseases, invertebrates, and plants, there are some useful tables suggesting fish communities for a range of tank sizes and this is followed by an introduction to fish families.

The main bulk of the book comprises an identification guide where every fish covered is illustrated and accompanied by details of its scientific and common names, origin, size, whether suitable for a community, food, SG, invertebrate compatibility, and a potted resumé of its behaviour under tank conditions. Each portrait has a symbol denoting at which level the subject habitually swims.

Marine aquaria keeping is a science on its own and embodies many pitfalls for the unwary beginner who fails in meticulous attention to detail, but with guidance such as is offered in this book the painstaking enthusiast should be able to cope with the teething troubles and join the ever growing band of happy marine buffs.

L. E. Perkins.

WATERLILIES

By Phillip Swindells.

Published at £8.95 by Groom Helm Ltd., Provident House, 6-20, Burrell Row, Beckenham, Kent BR3 1AT.

"The first serious horticultural study of the genus *Nymphaea* and its allies for 75 years." So says the publisher's note on the dust jacket. Describing all known species, varieties, forms and cultivars of the genus, it also embraces those of *Nelumbo*, *Euryale* and *Victoria*.

For those interested in water lily cultivation there are comprehensive instructions for propagation from seeds, eyes and tubers as well as for hybridisation.

It may come as a surprise to many to learn that the antiquity of the

waterlily family can be traced back to Jurassic times in the case of *Nymphaea* and that plant remains of *Nymphaea* and *Niphar* are known to exist in beds of the Tertiary age. Evidence from fossils suggest that many are in the same form that existed 160 million years ago.

The author has had considerable experience of waterlily culture and rejects some of the commonly recommended aids to cultivation such as the use of rotted cow manure as a constituent of waterlily compost. Instead he advises the use of "good clean garden soil from land not recently dressed with fertiliser."

Hybridisation in this field has intrigued horticulturalists for many years and little success has been achieved with hardy species since the death of Latour-Marliac. As the author points out, the production of a blue hardy form, as are found among tropical species, has so far eluded us and this area of cultivation is still wide open to the enthusiast with time, capital and dedication.

To assist those wishing to embark upon a breeding programme there is an account of pollination and seed collection. For most of us though, it is the wide variety of hardy cultivars available for immediate introduction to our garden pools that provide the most interest and which we wish to encourage to bloom profusely and colour our waterscape.

Most pond owners can trot out a short list of waterlily varieties such as Escarboucle, Sunrise, Gladstoniana etc and may have seen extensive lists of many others in water-gardening books but have difficulty in obtaining them. One of the useful appendices to the book lists nurseries specialising in waterlilies and this should help us get out of the rut and widen the variety of colour shades upon our ponds.

With chapters on hardy species, hardy hybrids, tropical day blooming species and night blooming species

and hybrids, culture of hardy and tropical waterlilies, pests and diseases, this book provides all that the serious water gardener needs to know about the Queen of the aquatic plants. Illustrations comprise colour and black and white photographs and drawings.

L. E. Perkins.

Freshwater Fishes of Britain and Europe by Alwyn Wheeler. Published by Kingfisher Books of 20-22, Great Titchfield Street, W1P TAD in the Kingfisher Guide Series at £1.95.

Beautifully illustrated with colour photographs and excellent colour drawings, this pocket sized book is very modestly priced and invaluable to the lover of European native freshwater fishes.

The introduction covers habitats, anatomy, senses, movement, feeding, breeding, migration, survival and protection by Man. Each species is described giving scale and fin-ray counts along with distribution and natural history. Maps are also included showing distribution areas.

This wide series of guides includes coverage of Butterflies, Trees, Birds, Aquarium Fishes, Wild Flowers, Mammals, and others and can form a useful reference library for the all-round naturalist.

L. E. Perkins.

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NEWS...



SOUTH WEST



LEW EMERY spoke to Bristol A.S. on the "Rewards and Disappointment of Fish-keeping." Among his rewards were letters by shown from very young schoolchildren to whose class he had given some fish. Replying to questions he said that he found Infusoria, worm shredders and tinned cat meat and plenty of space a successful recipe for growing fry. Table Show results: Lionheads (11): 1, 2, 3 and 4, Vic Capaldi; Loaches (3): 1 and 2, Miss H. Morgan; 3, P. Polley; Catfish (8): 1, 2 and 4, Miss H. Morgan; 3, P. Polley.

North Avon A.S. For some time we have been looking for a suitable new location for the Society. We were looking for premises that would accommodate us for both our monthly meetings and our annual show, and a location that would attract more members. In January, an opportunity arose that appeared to fill the bill, the membership agreed to give it a go for a two month trial, and during this time it became apparent that it was an opportunity not to be missed. Consequently, whilst we still meet on the third Monday in the month, we now meet at Hanham Folk Centre, High Street, Hanham, Bristol. It is interesting to note, that in the six months we have been at Hanham, our membership has increased by 50%. At our July meeting, Mr Stan Lloyd, of Bristol Aquarist Society, presented a programme about Coldwater fish on Video. In August, Mr. Andy Cowley, will be giving a talk on Water Chemistry. We would like to extend an invitation to anyone interested in the hobby, to attend our meetings, and we would be obliged if you would make mention of our new location, etc. in your magazine.

RESULTS of the Bristol Tropical Fish Club open show held on 6th August were as follows: Class B: J. Egan (P. Talbot). Ca: T. Laughlan (Haringey). Da: D. Cox (Yeovil). Db: C. Curtis (Swindon). Dd: J. Egan (P. Talbot). Ea: C. Curtis (Swindon). Eb: N. Lushchan (Swindon). Ec: K. Fellows (Swindon). G: J. Egan (P. Talbot). H: H. G. R. Johnson (Ind.). J: T. Laughlan (Haringey). K: J. Egan (P. Talbot). L: F. Cripps (Newbury). M: P. Cooke (Bristol Trop.). N: P. Cooke (Bristol Trop.). O: T. Laughlan (Haringey). P: D. Cox (Yeovil). Q: C. Curtis (Swindon). R: J. Egan (P. Talbot). S: K. Fellows (Swindon). T: Mrs. S. Walters (Nailsea & DAS). X-bee: P. Cooke (Bristol Trop.). X-ot: F. Cooke (Bristol Trop.). U: T. Laughlan (Haringey). V: G. Arnold (North Avon). W: R. Cooke (Bristol Trop.).

RESULTS of Tonham Aquarists' table show held on 21st July at Victoria Hall, Ash, were as follows: Guppy: 1 and 2, J. Otley (Poecilia Reticulata). Pla: 1, M. Bird (Xiphophorus Maculatus); 2, J. Otley (Xiphophorus Maculatus). A.O.W.: 1, M. Bird (Rasbora Tetramorpha); 2, G. Norton (Pinnacledella Pictus); 3, N. Hardy (Corydoras Hastatus); 4, J. Otley (Pinnacledella Pictus). Judge was Mr. C. Tonna.

THE Tonham Aquarists 2nd annual open show was held at Victoria Hall, Ash, on 25th June.

Results: Class F.A.: 1 and 2, M. Bird;

From Aquarists' Societies

3, A. Burgess. 1a: 1 and 2, C. Tonna; 3, A. Fuller. 1b: C. Tonna; 2, R. Burvil; 3, E. Davies. 2a: 1 and 3, S. Norris; 2, J. Handley. 2b: 1, R. Burvil; 2, D. Ford; 3, S. Norris. 2c: 1, 2 and 3, E. Davies. 3a: 1, P. Armstrong; 2, M. Bird; 3, M. Martin. 3b: 1, R. Cooke; 2, M. Bird; 3, D. Ford. 3c: 1, J. S. Vadden; 2, A. Fuller; 3, J. Handley. 3d: 1, R. Cooke. 4b: 1, J. Bath; 2 and 3, J. Robinson. 4c: 1, W. Grove; 2, C. Tonna; 3, A. Otley. 5: 1, D. Ford; 2, J. Robinson. 6a: 1, J. Handley; 2, S. Norris; 3, R. Cooke. 6b: 1, S. Knott. 7: 1, R. Cooke; 2, P. Armstrong; 3, R. Cooke. 8: 1, M. Bird; 2, F. Cooke; 3, R. Cooke. 9: 1, S. Norris; 2 and 3, R. Burvil. 10: 1, J. Otley; 2, C. Tonna; 3, P. Handley. 11a: 1, R. Cooke; 2, A. Fuller; 3, P. Handley. 11b: 1, M. Bird; 2, E. Davies; 3, C. Tonna. 12a: 1, P. Armstrong; 2, J. Tonna; 3, P. Hooper. 12b: 1, C. Tonna; 2, D. Ford; 3, P. Hooper. 13: 1, R. Burvil; 2, P. Armstrong; 3, J. S. Vadden. 15: 1, S. Norris; 2 and 3, M. Ash. 16: 1 and 2, D. and P. Lambert; 3, M. Strange. 17a: 1, A. Fuller; 2, E. Davies; 3, C. Tonna. 17b: 1 and 3, J. Bath; 2, C. Tonna. 18a: 1, D. Ford; 2, J. and S. Baines; 3, C. Tonna. 18b: 1, 2 and 3, D. and P. Lambert. 19: 1, P. Armstrong. 20: 1, L. Martin. 21: 1, D. Ford; 2, J. Tonna; 3, A. Burgess. 22: 1, J. Otley; 2, D. Ford. Best fish in show: D. and P. Lambert's *Gambusia Regan*. Highest pointed A.S.: Beeknell.

SOUTH EAST



FOLLOWING the usual club business, "Pond Life" was the theme of the 19th July S.P.A.S.S. meeting. Members brought various samples which were examined and identified which gave an interesting cross section of what lives underneath the surface. Also on display were some *Asoloch* which were showing excellent growth. South Park Aquatic Study Society specialises in coldwater fish-keeping and meets at 8 p.m. on the third Tuesday of every month at the Wimbledon Community Center, St. George's Road, London SW19. New members and visitors always welcome. Full details from: Mrs. Margarette Dudley, 163 South Park Road, Wimbledon, London SW19 8RX. (Tel: 01-540 5662).

East Kent Aquatic Study Group. Leading the field at the half-year stage in the East Kent Aquatic Study Group Table Show League is T. Webber (617 points) and in second place is D. Bridgeman (603 points), but with 79 members and 30 classes to run it is still anybody's race. This month's Table Show (July) resulted: Catfish: 1, P. Edwards; 2, J. Edwards; 3, T. Webber; 4, M. Boniface. Gouramis: 1, G. Neaves; 2, S. Webber; 3, J. Edwards; 4, M. Martin. The guest judge for the competition was Mr. Bill Hastings. Speakers for this month's meeting was Mr. Bill Francis who spoke on the subject of Reptiles and Amphibians. - Bill brought along some specimens from his own collection which included various lizards and frogs and a ten-

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.

month-old terrist which he has raised from the egg. He went on to explain how aquarists with garden ponds can help to conserve some of the endangered species of British wild life. The meeting, which was held on the second Tuesday of the month, at the Memorial Hall, Beltinge, Herne Bay, ended with a session of aquarium and pond plants.

AT the recent a.g.m. of the Folkestone and District A.S. the following committee members were elected: Chairman, Guy Woodhams; Vice-Chairman, Dick Hatten; Secretary, Malcolm Keene; Show Secretary, Tony Johnson; Assistant Show Secretary, Radford; Treasurer, Tony Everett; Librarian, Bill Pain.

The society has a growing membership who meet on the third Tuesday of each month at the "Harvey Host", Dover Road, Folkestone at 8 p.m. Programmes include talks, slide shows, table shows, auctions, etc. All fishkeepers are welcome, from beginner to expert. For further details contact M. Keene, 77 Ashley Avenue, Folkestone, Kent. Tel: 78769.

RESULTS of the East Dulwich A.S. open show held on 18th June. Class B: 1, C. Finnis (Strood); 2, E. Dixon (Beckleybath); 3, H. Smith (Sudbury); 4, D. Brooks (Croydon). Ca: 1, H. Smith (Sudbury); 2, C. Hogan (East Dulwich); 3, R. Dixon (Beckleybath); 4, P. Edwards (EKASG). Ch: 1, P. Whiddett (Tonbridge); 2, J. Rowney (Beckleybath); 3, D. Theobald (East Dulwich); 4, R. Sommers (SELAS). Co: 1, D. Theobald (East Dulwich); 2, J. Edwards (EKASG); 3, F. Whiddett (Tonbridge); 4, A. Fuller (Kingston). Dd: 1 and 3, C. Smith (East Dulwich); 2, J. Edwards (EKASG); 4, R. Sommers (SELAS). Dd: 1, J. Rowney (Beckleybath); 2 and 3, A. Fuller (Kingston); 4, D. Theobald (East Dulwich). Dc: 1, 3 and 4, M. Draper (Tonbridge); 2, C. Hogan (East Dulwich). Dd: 1, N. Brown (SELAS); 2, A. Fuller (Kingston); 3, G. Hicks (Beckleybath); 4, J. Rowney (Beckleybath). Ee: 1 and 2, Doris Winder (East Dulwich); 3, R. Cox (Croydon); 4, M. Powell (East Dulwich). Ee: 1, R. Sommers (SELAS); 2, 3 and 4, Doris Winder (East Dulwich). F: 1 and 2, C. Chawright (Southend); 3, D. Theobald (East Dulwich); 4, R. Sommers (SELAS). G: 1 and 3, Dave Winder (East Dulwich); 2 and 4, R. Sommers (SELAS). Hc: 1, Dave Winder (East Dulwich); 2, C. Finnis (Strood); 3, G. Rowney (Beckleybath); 4, H. Smith (Sudbury). Hc: 1, H. Smith (Sudbury); 2, J. Edwards (EKASG); 3, Dave Winder (East Dulwich); 4, D. Wright (Hasting). J: 1, 2 and 3, D. Theobald (East Dulwich); 4, E. Dixon (Beckleybath). K: 1, G. Rowney (Beckleybath); 2, P. Coe (Walthamstow); 3, A. Dempsey (Haringey); 4, Doris Winder (East Dulwich). Ld: 1, 3 and 4, J. Deaper (Tonbridge); 2, J. Edwards (EKASG). Ld: 1, Dave Winder (East Dulwich); 2, L. London (Tonbridge); 3, J. Edwards (EKASG); 4, A. Dempsey (Haringey). Ma: 1, G. Hicks (Beckleybath); 2, B. Light (East Dulwich); 3 and 4, R. Sommers (SELAS). Nc: 1, R. Sommers (SELAS); 2, E. Dixon (Beckleybath); 3, P. Mills (Walthamstow); 4, Doris Winder (East Dulwich). Nc-m: 1, D. Ridgwell (Southend); 2, A. Fuller (Kingston); 3, G. Hicks (Beckleybath); 4, D. Theobald (East Dulwich). No: 1, T. Laughlan (Haringey); 2, S. Benjamin (Walthamstow); 3, R. Sommers (SELAS); 4, P. Mills (Walthamstow). O: 1, H. Smith (Sudbury); 2 and 4, P. Coe (Walthamstow); 3, T. Laughlan (Haringey). P: 1, G. Freeman (Tonbridge); 2, J. Rowney (Beckleybath); 3, T. Laughlan (Haringey); 4, P. Coe (Tonbridge). Q: 1, P. Edwards (EKASG); 2 and 4, E. Dixon (Beckleybath); 3, R. Sommers (SELAS). R: 1, R. Sommers (SELAS); 2, N. Brown (SELAS); 3, R. Orr (Sudbury); 4, C.

Smith (East Dulwich); 5: 1, J. Rowley (Bexleyheath); 2, P. Cox (Walthamstow); 3, P. Edwards (EKASG); 4, S. Brinson (Walthamstow); T: 1 and 3, R. Cox (Croydon); 2, B. Light (East Dulwich); 4, C. Chewright (Southend); U: 1, T. Laughlan (Haringey); 2, P. Mills (Walthamstow); 3, J. Taylor (Haringey); 4, M. Darsley (East Dulwich); V: 1 and 4, V. Cronan (East Dulwich); 2, T. Laughlan (Haringey); 3, L. London (Tonbridge); W: 1 and 2, J. Taylor (Haringey); 3, G. Finlay (Strood); 4, C. Chewright (Southend); Xb-m: 1 and 3, D. Ridgewell (Southend); 2, C. Chewright (Southend); 4, J. Edward (EKASG); Xc-t: 1, C. Chewright (Southend); 2, B. Light (East Dulwich); 3, R. Orr (Sudbury); 4, P. Mills (Walthamstow); Z: 1, J. Taylor (Haringey); 2 and 3, P. Mills (Walthamstow); 4, K. Lambert (Walthamstow). Best exhibit in show: D. Ridgewell (Southend). Best fish in show: B. Cox (Croydon).

East Dulwich A.S. would like to thank all exhibitors and judges without whom we could not have held the show.

MIDLANDS AND WALES



Dudley & District A.S. meet on the first and third Monday every month, at the "Bulls Head", Himey Road, Lower Gornal. Results of our 1993 open show held at the Blind Institute, Sedgeley on the 10th July were as follows.

Class Ag: 1, Mr. and Mrs. P. Wilson (Stafford); 2, Mrs. D. Cruckshank (Hendon); 3, Mrs. G. Crumpton (Halesowen and Brierley Hill); 4, Mr. and Mrs. M. Griffiths (Worcester); 5, Mr. and Mrs. D. Cruckshank (Hendon); 6, Mrs. C. Crook (Wolverhampton); 7, T. Hudson (Halesowen Gen.); 8, D. Kilworth (Dudley); 9, R. Hampton (Dudley); 10, Mr. and Mrs. P. Wilson (Stafford); 11, M. Bessley (Dudley); 12, G. Crumpton (Halesowen and Brierley Hill); 13, W. Pharty (Ind.); 14, P. G. Stoodley (Leamington); 15, Mr. and Mrs. M. Griffiths (Worcester); 16, 2 and 3, J. Richards (Leicester); 4, R. Collins (Swindon); 5, D. L. K. and M. E. Hill (Gen. Mat. Cichlid Group); 6, P. Johnson (Dudley); 7, Mrs. P. Crumpton (Halesowen and Brierley Hill); 8, K. Harrison (Dudley); 9, Mr. and Mrs. L. Perks (Malvern); 10, L. F. Linton (Stafford); 11, K. Wheatley (Dudley); 12, D. J. Eynon (Willeshall); 13, G. Crumpton (Halesowen and Brierley Hill); 14, P. Grimes (Leamington); 15 and 16, T. Hudson (Halesowen Gen.); 17, 1, T. A. Cruckshank (Hendon); 2, P. G. Stoodley (Leamington); 3, A. Davies (Willeshall); 4, P. Grimes (Leamington); 5, Mr. and Mrs. H. Griffiths (Worcester); 6, J. Griffiths (Halesowen Gen.); 7, Bookhouse Family (Dudley); 8, J. Richards (Leicester); 9, F. I. T. A. Cruckshank (Hendon); 10, 2 and 4, G. Crumpton (Halesowen); 11, J. and J. Winter (Willeshall); 12, G. Crumpton (Halesowen); 13, L. F. Linton (Stafford); 14, Mrs. D. Cruckshank (Hendon); 15, P. G. Stoodley (Leamington); 16, Ha: 1, Mrs. C. Crook (Wolverhampton); 2, T. A. Cruckshank (Hendon); 3, P. G. Stoodley (Leamington); 4, Mr. and Mrs. S. K. Yallop (Malvern); 5, R. L. Collier (Swindon); 6, T. Hudson (Halesowen Gen.); 7, C. Martin (Machen Gwent); 8, T. A. Cruckshank (Hendon); 9, J. 1, Mr. and Mrs. S. K. Yallop (Malvern); 10, D. Kilworth (Dudley); 11, P. G. Stoodley (Leamington); 12, G. Crumpton (Halesowen); 13, D. Lomas (Willeshall); 14, P. G. Stoodley (Leamington); 15, P. Grimes (Leamington); 16, K. Wheatley (Dudley); 17, L. Clall Family (Wolverhampton); 18, Mr. and Mrs. L. Perks (Malvern); 19, P. G. Stoodley (Leamington); 20, Mr. and Mrs. S. K. Yallop (Malvern); 21, T. A. Cruck-

shank (Hendon); 22, G. Crumpton (Halesowen); 23, D. Kilworth (Dudley); 24, Mrs. J. Griffiths (Halesowen Gen.); 25, Mr. 1, T. A. Cruckshank (Hendon); 2, Mr. and Mrs. L. Perks (Malvern); 3, Bookhouse Family (Dudley); 4, R. Collier (Swindon); No-t: 1, Mr. and Mrs. L. Perks (Malvern); 2, D. M. P. Lambert (Surrey); 3, M. Bessley (Dudley); 4, D. and R. O'Niels (Dudley); N-hm: 1, C. Martin (Machen Gwent); 2, T. A. Cruckshank (Hendon); 3, D. and R. O'Niels (Dudley); 4, J. Richards (Leicester); O: Mr. and Mrs. Crumpton (Halesowen); 2, 3 and 4, W. Crumpton (Halesowen); P: 1 and 2, D. and R. O'Niels (Dudley); 3, A. Davies (Willeshall); 4, Bookhouse Family (Dudley); Q: 1, C. E. Curtis (Swindon); 2 and 3, S. Whitting (North Staffs.); 4, Mr. and Mrs. L. Perks (Malvern); R: 1, R. Collier (Swindon); 2, 3 and 4, S. Whitting (North Staffs.); S: 1, P. Grimes (Leamington); 2 and 4, Bookhouse Family (Dudley); 3, C. E. Curtis (Swindon); T: 1 and 3, D. M. P. Lambert (Surrey); 2, J. Richards (Leicester); 4, C. E. Curtis (Swindon); 1, Mrs. J. Griffiths (Halesowen Gen.); 2 and 3, D. and R. O'Niels (Dudley); 4, P. Grimes (Leamington); V: 1, T. Hudson (Halesowen Gen.); 2 and 3, R. S. Ansell (Ind.); 4, Mrs. J. Griffiths (Halesowen Gen.); W: 1 and 3, T. Hudson (Halesowen Gen.); 2, W. Crumpton (Halesowen Gen.); 4, C. E. Curtis (Swindon); X-c: 1, 2 and 3, D. M. P. Lambert (Surrey); 4, D. and P. O'Niels (Dudley); X-bm: 1, C. Martin (Machen Gwent); 2, Chell Family (Wolverhampton); 3, Mrs. C. Crook (Wolverhampton); 4, D. and R. O'Niels (Dudley); O-ty: 1 and 4, D. Bookhouse (Dudley); 2 and 3, N. Marshall (Ind.); B-m: 1, 3 and 4, A. and H. O'Niels (Dudley); 2, S. Crumpton (Halesowen and Brierley Hill); Z: 1 and 4, Mr. and Mrs. P. Wilson (Stafford); 2, P. G. Stoodley (Leamington); 3, Mr. and Mrs. S. K. Yallop (Malvern).

Results of Port Talbot A.S. 13th open show held on 27th June. Class B: 1, B. Witteridge (SUD); 2, J. Egan (PT); 3, J. Thompson (LM); 4, M. Griffiths (B); 1, J. Egan (PT); 2, A. Parker (CIAS); 3, B. Witteridge (SUD); 4, G. Roberts (PT); C: 1, M. Griffiths; 2, J. Egan (PT); 3, Mrs. E. Perkins (PT); 4, R. Collier (SW); Ch: 1, J. Egan (PT); 2, Miss E. Newton (LM); Cat: 1, J. Egan (PT); 2, Miss D. Lewis (LM); 3, B. Witteridge (SUD); 4, R. N. Price (CIAS); D: 1, J. Egan (PT); 2, D. Williams (PT); 3, Mrs. E. Perkins (PT); 4, J. Egan (PT); Da: 1, J. Egan (PT); 2, C. E. Curtis (SW); 3, R. Perkins (PT); Ds: 1, C. E. Curtis (SW); 2, Mrs. E. Perkins (PT); 3, D. C. Davies (AB); 4, Mrs. E. Perkins (PT); De: 1, W. Lawliffe (PT); 2, J. M. Thompson; 3, B. Witteridge (SUD); 4, M. Griffiths; R: R. Perkins (PT); 4, D. Williams (PT); Ba: 1, A. Jones (AB); 2, P. Morgan (LM); 3, C. E. Curtis (SW); 4, R. Collins (PT); F: 1, A. Parker (CIAS); 2, C. Davies; G: 1, B. Witteridge (SUD); 2, J. M. Thompson; 3, J. Egan (PT); 4, G. Melluish; H: 1, J. Egan (PT); 2, D. C. Davies (AB); 3, C. Martin (BKA); 4, C. E. Curtis (SW); J: 1, T. Laughlan (HAR); 2, B. Witteridge (SUD); 3, J. M. Thompson; 4, B. Witteridge (SUD); K: 1, P. Morgan (LM); 2, D. Williams (PT); 3, J. Egan (PT); 4, Mrs. E. Perkins (PT); L: 1, Miss D. Lewis (LM); 2, B. Witteridge (SUD); 3, A. Dempsey (HAR); 4, P. Coombs (PT); M: 1, R. Collier (SW); 2, A. Parker (CIAS); 3, G. Roberts (PT); 4, B. Witteridge (SUD); N-b-m: 1, R. Perkins (PT); 2, J. Egan (PT); 3, C. Martin (BKA); 4, G. Melluish; No-t: 1, T. Laughlan (HAR); 2, R. Collier (SW); 3, J. Scott; O: 1, R. Perkins (PT); 2, D. Williams (PT); 3, D. Williams (PT); E: J. Egan (PT) and T. Laughlan (HAR); F: 1, T. Laughlan (HAR); 2, J. Egan (PT); 3, Mrs. E. Perkins (PT); 4, T. Laughlan (HAR); Q: 1, R. Perkins (PT); 2, C. E. Curtis (SW); 3, J. Egan (PT); 4, D. Williams (PT); R: 1, Miss E. Newton (LM); 2, R. Collins (SW); 3, J. Egan (PT); 4, C. E. Curtis (SW); S: 1, D. Williams (PT); 2, T. Laughlan (HAR); 3, C. E. Curtis (SW); 4, D. Williams (PT); T: 1, B. Witteridge (SUD); 2, Miss D. Lewis (LM); 3, C. E. Curtis (SW); 4, P. Morgan (LM); V: 1, T. Laughlan (HAR); 2, 3 and 4, C. E. Curtis (SW); W: 1, C. E. Curtis (SW); 2, C. Martin (BKA); 3, C. Martin (BKA); N-hm: 1, C. Martin (BKA); 2, C. Martin (BKA); 3, Miss D. Lewis (LM); 4, Miss D. Lewis (LM); X-c: 1, C. E. Curtis (SW); 2, R. Perkins (PT); 3, Miss D.

Lewis (LM); 4, P. Morgan (LM); B-m: 1, Miss E. Newton (LM); 2, P. Roberts (PT); 3, Miss E. Newton (LM); 4, P. Roberts (PT); O-ty: 1, Miss C. Collins (PT); 2, A. Buchanan (AB); 3, G. C. Melluish; 4, P. Roberts (PT).

Abbreviations: PT—Port Talbot; AB—Aberdare; SUD—Sudbury; HAR—Haringey; LM—Llanwrthwl; BKA—British Koi Fish Assoc.; CIAS—Carrifilly S.C.T.A. A.S.; SW—Swindon.

Total entries—224. Best Fish in Show—B. Witteridge (Sudbury A.S.). "M. Parnel", Highest Individual Aggregate Points; J. Egan (Port Talbot). Highest Pointed Port Talbot Member's Fish; J. Egan. Highest Port Talbot Member's Aggregate Points; J. Egan. Highest Pointed Visiting Society; Swindon A.S. FBAS Trophy Winner; R. Perkins (Port Talbot).

Port Talbot A.S. would like to thank the judges and exhibitors who contributed to making the show such a success.

NORTH



RESULTS of the St. Helens A.S. open show held on Sunday 26th June at Ruschall Village Hall, Rainhill, Merseyside. There were 421 entries, and the Committee and members of St. Helens Aquarist Society wish to thank most sincerely all those people who helped to make it such an excellent show. Groupers: 1, A. M. Rodman (Blackpool); 2, Mr. and Mrs. Hinds (Accrington); 3, E. Winstanley (Runcorn); Plaques: 1, Mr. and Mrs. Marshall (Merseyside); 2, B. W. Carter (St. Helens); 3, P. Edwards (Ellsworth Post); Molts: 1, Mr. and Mrs. J. Daniels (Blackpool); 2, 1 and M. Brownlow (St. Helens); 3, S. Jones (St. Helens); Swordsails: 1, S. W. Hitting (North Staffs.); 2 and 3, Mr. and Mrs. Marshall (Merseyside); A.O.V. (Lovesores): 1, R. I. Payne (Merseyside); 2 and 3, 1 and E. Corbett (Merseyside); Small Anabantids: 1, D. Phillips (Merseyside); 2, R. I. Payne (Merseyside); 3, D. T. Milner (Darwen); Large Anabantids: 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, Mr. and Mrs. Lintough (Sandgrounders); 3, B. W. Carter (St. Helens); Fighters (Cambodia): 1, C. A. Daniels (Blackpool); 2, P. Hewitt (St. Helens); Fighters (Multi-Colour): 1, C. A. Daniels (Blackpool); 2, M. A. Daniels (Blackpool); 3, Mr. and Mrs. Hinds (Accrington); Small Barbs: 1, D. T. Milner (Darwen); 2, Mr. and Mrs. Marshall (Merseyside); 3, Mr. and Mrs. Slater (Sandgrounders); Large Barbs: 1, Mr. and Mrs. Baldwin (Sandgr.); 2, S. Whiting (North Staffs.); 3, M. Storey (Osley); Dwarf Cichlids: 1, Mr. and Mrs. Baldwin (Sandgr.); 2, J. T. Morris (Sandgr.); 3, J. Lynch (Merseyside); Large Cichlids: 1 and 3, L. and M. Brownlow (St. Helens); 2, Mr. and Mrs. Bibby (Sandgrounders); Rift Valley (up to 10 cm): 1, B. Wilson (St. Helens); 2 and 3, Mr. and Mrs. Baldwin (Sandgrounders); Rift Valley (over 10cm): 1, Mr. and Mrs. J. Williams (Ellsworth Post); 2, Mr. and Mrs. Barough; 3, Mr. and Mrs. Baldwin (Sandgrounders); Angels: 1, F. and S. Spencer (Pewson); 2, D. Pritchard (St. Helens); 3, E. Winstanley (Runcorn); Small Characins: 1, B. and S. Parr (Oldham); 2, Mr. and Mrs. A. Goddard (Macclesfield); 3, Mr. and Mrs. Brownlow (Sandgr.); Large Characins: 1, S. Jones (St. Helens); 2 and 3, R. I. Payne (Merseyside); Toothcarps (Topspawners): 1 and 2, J. Roberts (Accrington); Toothcarps (Bottomspawners): 1 and 2, M. Agnew (Buxton); X: E. Jones (St. Helens); Danios: 1, Mr. and Mrs. J. Daniels (Blackpool); 2, Mr. and Mrs. Baldwin; 3, Mr. and Mrs. Bibby (Sandgrounders); Baskoras: 1, D. T. Milner (Darwen); 2, B. Wilson (St. Helens); 3, R. I. Payne (Merseyside); Minnows: Mr. and Mrs. Baldwin (Sandgr.); 2, D. T. Milner (Darwen);

3, Mr. and Mrs. Evans (Blackpool). Corydoras (up to 57 mm): 1, P. Banks (St. Helena); 2, J. and K. Corbett (Merseyside); 3, B. W. Carter (St. Helena). Gerydoras (over 57 mm): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, B. W. Carter (St. Helena); 3, J. T. Morris (Sandgrounders). A.V. Synodontis: 1 and 3, J. T. Morris (Sandgrounders); 2, Mr. and Mrs. Underwood (Bridgewater). A.O.V. Catfish: 1, Mr. and Mrs. Eatoagh (Sandg.); 2 and 3, J. T. Morris (Sandgrounders). Sharks: 1, Mr. and Mrs. Eatoagh (Sandgrounders); 2 and 3, Mr. and Mrs. Baldwin (Sandgrounders). Puffers: 1, R. I. Payne (Merseyside); 2, M. Storey (Orley); 3, E. Winstanley (Runcorn). Loaches: 1, P. Harris (St. Helena); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Bibby (Sandgrounders). A.O.V. of Fish: 1, Mr. and Mrs. Pritchard (St. Helena); 2, J. Roberts (Accrington); 3, D. Armit (Buxton). Pairs (Bridgwater) under 1 in.: 1, E. Jones (St. Helena); 2, Mr. and Mrs. Hayworth (Merseyside); 3, B. and S. Parr (Oldham). Pairs (Eggleston) over 3 in.: 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, 1, and M. Brownlow (St. Helena). Pairs (Catfish): 1, B. W. Carter (St. Helena); 2 and 3, J. T. Morris (Sandgrounders). Pairs (Livebearers): 1, J. and K. Corbett (Merseyside); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, B. W. Carter (St. Helena). Breeders (Livebearers): 1-10: 1, J. and K. Corbett (Merseyside); 2, B. W. Carter (St. Helena); 3, M. Carter (St. Helena). Egglayers: 1-10: 1 and 2, D. T. Milner (Darwen); 3, B. Wilson (St. Helena). Millers (Darwen): 1-10: 1, D. T. Milner (Darwen); 2, B. Wilson (St. Helena); 3, E. Jones (St. Helena). Goldwater: 1, J. Dunn (St. Helena). Common Goldfish: 1 and 2, Mr. and Mrs. Bibby (Sandgrounders); 3, C. Wallbank (Accrington). Shubunkins: 1, K. and D. Parr (Oldham); 2, C. Wallbank (Accrington); 3, L. Mahoney (Accrington). A.V. Twinstail: 1, Mr. and Mrs. Bibby (Sandgrounders); 2, C. Wallbank (Accrington); 3, B. Johnston (Sandgrounders). A.O.V. Goldwater: 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, S. Walsh (Accrington); 3, P. Sizer (Sandgrounders). Marine A.V.: 1, B. Leyland (St. Helena); 2, A. R. Hooson (St. Helena); 3, B. Leyland (St. Helena). Ladies A.V.: 1 and 2, S. Jones (St. Helena); 3, Mrs. Baldwin (Sandgrounders). Mini Jars: 1, B. W. Carter (St. Helena); 2 and 3, D. T. Milner (Darwen). Juniors (Goldwater): 1, C. A. Daniels (Blackpool); 2, Paul Slater (Sandgrounders); 3, S. Jones (St. Helena). Juniors (Livebearers): 1, Miss J. Baldwin (Sandgrounders); 2, Miss M. Carter (St. Helena); 3, Craig Nayler (Darwen). Juniors (Eggleston): 1, N. Morris (Sandgrounders); 2, Miss M. Carter (St. Helena); 3, Miss J. Baldwin (Sandgrounders).

RESULTS of the Lytham A.S. open show held on 2nd July. Guineas: 1, A. M. Redman (B); 2, Mrs. M. Daniels (B); 3, Mr. and Mrs. Hands (A). Mollies: 1, J. Lynch (ME); 2, Mrs. M. Daniels (B); 3, Mr. and Mrs. Daniels (B). Swordtails: 1 and 2, Mr. and Mrs. Marshall (ME); 3, Mr. G. Bonney (L). Pirys: 1, Mr. and Mrs. Marshall (ME); 2, S. Walsh (A). A.O.V. Livebearer: 1, J. and K. Corbett (ME); 2, Mr. and Mrs. Whitaker (S); 3, R. I. Payne (ME). Small Characins: 1, B. and S. Parr (O); 2, Mr. and Mrs. Baldwin (S); 3, Mr. and Mrs. Eatoagh (S). Large Characins: 1 and 3, R. I. Payne (ME); 2, B. and S. Parr (O). Small Barbs: 1, D. T. Milner (D); 2, Mr. and Mrs. Marshall (ME); 3, D. J. Puck (L). Large Barbs: 1, Mr. and Mrs. Baldwin (S); 2, Mr. and Mrs. Whitaker (S); 3, Mr. and Mrs. Daniels (B). Rainbow: 1, Mr. and Mrs. Whitaker (S); 2, D. T. Milner (D); 3, R. I. Payne (ME). Danos and Minnows: 1, Mr. and Mrs. Baldwin (S); 2, Mr. and Mrs. Marshall (ME); 3, Mr. and Mrs. Evans (B). Angels: 1 and 2, H. and W. Viro (P); 3, G. A. Daniels (B). Small Cichlids: 1, Mr. and Mrs. Baldwin (S); 2, Mr. Campbell (P); 3, J. T. Morris (S). Large Cichlids: 1, R. Atkinson (L); 2, F. S. Spenser (P); 3, M. Hetherington (L). Rift Valley: 1 and 2, Mr. and Mrs. Eatoagh (S); 3, Mr. and Mrs. A. Goddard (MA). Fishers: 1, G. A. Daniels (B); 2, Mrs. M. Daniels (B); 3, A. M. Redman (Blackpool). Small Anabantids: 1 and 3, D. T. Milner (D); R. I. Payne (ME). Large Anabantid: 1, Mr. and Mrs. Baldwin (S); 2, G. Bonney (L); 3, L. A. Holden (D). Corydoras and Brochis: 1, J. Lynch (ME); 2, J. K. Corbett (ME); 3, Mr.

and Mrs. Baldwin (S). A.O.V. Catfish: 1, Mr. and Mrs. Eatoagh (S); 2 and 3, J. T. Morris (S). A.V. Loach: 1, Mr. and Mrs. Harris (L); 2, Mr. and Mrs. Bibby (S); 3, Mr. and Mrs. Baldwin (S). Sharks and Puffers: 1, R. I. Payne (ME); 2, Mr. and Mrs. Baldwin (S); 3, Mr. and Mrs. Eatoagh (S). Toothcrops: 1, R. I. Payne (ME). A.O.V. Tropical: 1, Mr. and Mrs. Mills (ME); 2, Mr. and Mrs. Ham (L); 3, Mr. and Mrs. Eatoagh (S). Breeders (Egg hard): 1 and 2, J. T. Morris (S); 3, D. T. Milner (D). Breeders (Egg easy): 1 and 3, D. T. Milner (D); 2, J. Lynch (ME). Breeders (Livebearer): 1, Mr. and Mrs. Baldwin (S); 2, J. and K. Corbett (ME); 3, Mr. and Mrs. Marshall (ME). Pairs (Egg): 1 and 2, J. T. Morris (S); 3, L. Fletcher (ME). Pairs (Livebearer): 1 and 3, J. K. Corbett (ME); 2, R. I. Payne (ME). Junior Jars: 1, L. A. Holden (D); 2, N. Morris (S); 3, Miss J. Baldwin (S). Junior (Livebearer): 1, J. Baldwin (S); 2 and 3, C. Nayler (D). Junior Goldwater: 1, G. A. Daniels (B). Mini Jar: 1, 2 and 3, D. T. Milner (D). Ladies: 1, Mr. and Mrs. Baldwin (S); 2, L. Atkinson (L). Common Goldfish and Comets: 1, Mr. and Mrs. Bibby (S); 2, C. Wallbank (A). Shubunkins: 1, R. D. Parr (O); 2, J. Lynch (ME); 3, C. Wallbank (A). Fantails and Ventrals: 1, C. Wallbank (A). Liveheads and Orandas: 1, Mr. and Mrs. Bibby (S); 2, J. Lynch (ME). A.O.V. Goldwater: 1, S. Walsh (A); 2, Mr. and Mrs. Baldwin (S); 3, C. Wallbank (A). Best in Show: 1, and K. Corbett (ME). Top Tank Results: Single Fish: 1, and K. Corbett (ME). Pairs: 1, J. T. Morris (S); Breeders: 1, J. T. Morris (S). Code for abbrev: Blackpool (B); Accrington (A); Merseyside (ME); Lytham (L); Sandgrounders (S); Oldham (O); Darwen (D); Preston (P); Macclisfield (MA); Independent (I).

THE results of the Sandgrounders A.S. 13th annual open show, held at Meols Cop High School, Meols Cop Road, Southport, on 17th July, are as follows: Guineas: 1, B. W. Carter (St. Helena); 2, Mr. and Mrs. Newport (Runcorn); 3, P. Edwards (Elliottmere Port). Swordtails: 1, J. and K. Corbett (Merseyside); 2, Mr. and Mrs. Marshall (Merseyside); 3, A. M. Redman (Blackpool). Puffers: 1, B. Edwards (Elliottmere Port); 2, J. and K. Corbett (Merseyside); 3, Mr. and Mrs. Marshall (Merseyside). Mollies: 1, Mrs. M. Daniels (Blackpool); 2, Mr. and Mrs. Paves (Sandgrounders); 3, Mr. and Mrs. Whitaker (Sandgrounders). A.O.V. Livebearers: 1, and K. Corbett (Merseyside); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Goddard (Macclisfield). Small Anabantids: 1, Mr. and Mrs. B. Baldwin (Sandgrounders); 2 and 3, D. T. Milner (Darwen). Large Anabantids: 1, M. and D. Hartley (Sandgrounders); 2, Mr. and Mrs. B. Baldwin (Sandgrounders); 3, D. Phillips (Merseyside). Siamese Fighters: 1, C. A. Daniels (Blackpool); 2, Mrs. M. Daniels (Blackpool); 3, A. M. Redman (Blackpool). Small Cichlids: 1, Mr. and Mrs. B. Baldwin (Sandgrounders); 2 and 3, Mr. Campbell (Preston). Large Cichlids: 1, M. and D. Hartley (Sandgrounders); 2, Mr. and Mrs. Bibby (Sandgrounders); 3, Mr. and Mrs. Baldwin (Sandgrounders). Rift Valley Cichlids (under 10cm): 1, D. T. Amour (Elliottmere Port). Rift Valley Cichlids (over 10cm): 1 and 3, Mr. and Mrs. Eatoagh (Sandgrounders); 2, Mr. and Mrs. Goddard (Macclisfield). Angels: 1, H. and W. Viro (Preston); 2, Mr. and Mrs. Stevenson (Oldham); 3, Mr. R. and Mrs. Stevenson (Oldham). Small Characins: 1, B. and S. Parr (Oldham); 2, E. and B. Calow (Bridgewater); 3, Mr. and Mrs. Stevenson (Oldham). Medium Characins: 1, D. T. Milner (Darwen); 2, R. I. Payne (Merseyside); 3, Mr. and Mrs. Eatoagh (Sandgrounders). Large Characins: 1, K. Buckley (Bridgewater); 2, E. and B. Calow (Bridgewater). Small Barbs: 1, D. T. Milner (Darwen); 2, Mr. and Mrs. Marshall (Merseyside); 3, Mrs. E. Winstanley (Runcorn). Large Barbs: 1, B. and S. Parr (Oldham); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Stevenson (Oldham). Rainbow: 1, Mr. and Mrs. Stevenson (Oldham); 2, J. Wilden (Sandgrounders); 3, R. I. Payne (Merseyside). Minnows: 1, Mr. and Mrs. B. Baldwin (Sandgrounders); 2, Master A. Lewis (Sandgrounders); 3, D. T. Milner (Darwen). Danios: 1, Mr. and Mrs. Daniels (Blackpool); 2, Mr. and

B. Baldwin (Sandgrounders); 3, M. Walters (Elliottmere Port). Corydoras and Brochis Catfish: 1, J. and K. Corbett (Merseyside); 2, B. W. Carter (St. Helena); 3, M. Carter (St. Helena). Suckermouth Catfish: 1, Mr. and Mrs. Eatoagh (Sandgrounders); 2, Mr. and Mrs. B. Baldwin (Sandgrounders); 3, J. T. Morris (Sandgrounders). Synodontis Catfish: 1, J. T. Morris (Sandgrounders); 2, K. Roberts (Ind.); 3, Mr. and Mrs. B. Baldwin (Sandgrounders). A.O.V. Catfish: 1, J. T. Morris (Sandgrounders); 2, D. Parkinson (St. Helena); 3, M. and D. Hartley (Sandgrounders). Loaches: 1, Mr. and Mrs. P. Ham (Lytham); 2, Miss A. Stevenson (Oldham); 3, Mr. and Mrs. Marshall (Merseyside). Sharks: 1 and 3, Mr. and Mrs. B. Baldwin (Sandgrounders); 2, Mr. and Mrs. Eatoagh (Sandgrounders). Flying Puffers: 1, R. I. Payne (Merseyside); 2, Mr. and Mrs. Stevenson (Oldham); 3, L. A. Holden (Darwen). Killifish: 1, R. Scotkin (Oldham); 2, J. Roberts (Accrington); 3, D. Parkinson (St. Helena). A.V. Female Fish: 1, Mr. and Mrs. Marshall (Merseyside); 2, B. and S. Parr (Oldham); 3, Mr. and Mrs. B. Baldwin (Sandgrounders). Pairs (Livebearers): 1 and 2, J. and K. Corbett (Merseyside); 3, A. Rigby (Blackburn). Pairs (Eggleston): 1 and 3, J. T. Morris (Sandgrounders); 2, Mr. and Mrs. B. Baldwin (Sandgrounders). Breeders (Livebearers): 1-10: 1, Mr. and Mrs. B. Baldwin (Sandgrounders); 2 and 3, Mr. and Mrs. Marshall (Merseyside). Breeders (Livebearers): 11-20: 1, J. and K. Corbett (Merseyside); 2 and 3, Mr. and Mrs. Marshall (Merseyside). Breeders (Eggleston): 1-10: 1, Mr. and Mrs. Hulse (Oldham); 2, D. T. Milner (Darwen); 3, J. Lynch (Merseyside). Breeders (Eggleston): 11-20: 1, 2 and 3, J. T. Morris (Sandgrounders). Marine A.V. Tropical: 1, M. and D. Hartley (Sandgrounders); 2, Mr. and Mrs. B. Baldwin (Sandgrounders); 3, Mr. and Mrs. Underwood (Bridgewater). Common Goldfish and Comets: 1 and 2, Mr. and Mrs. Bibby (Sandgrounders); 3, Mr. and Mrs. Colley (Oldham). Shubunkins: R. and D. Parr (Oldham); 2 and 3, C. Wallbank (Accrington). Fantails: 1, Mr. and Mrs. Bibby (Sandgrounders); 2, Mr. and Mrs. Colley (Oldham); 3, C. Wallbank (Accrington). A.O.V. Goldwater (Single Tail): 1, S. Walsh (Accrington); 2, Mr. and Mrs. B. Baldwin (Sandgrounders); 3, Mr. and Mrs. Slater (Sandgrounders). A.O.V. Goldwater (Twin Tail): 1, Mr. and Mrs. Bibby (Sandgrounders); 2, Mr. and Mrs. Colley (Oldham); 3, D. Hewitt (Oldham). Lionheads: 1, J. Lynch (Merseyside). Juniors (Livebearers): 1, M. Carter (St. Helena); 2, Miss J. Baldwin (Sandgrounders); 3, C. Nayler (Darwen). Juniors (Eggleston): 1, A. M. Redman (Blackpool); 2, Miss J. Baldwin (Sandgrounders); 3, D. Hartley (Sandgrounders). Juniors (Goldwater): 1, D. Hewitt (Oldham); 2, A. McNabb (Skirmerdale); 3, P. Sizer (Sandgrounders). Ladies Fish (any variety): 1 and 2, Mrs. Baldwin (Sandgrounders); 3, I. Jepson (Blackburn). Furnished Mini Jars (no fish): 1, B. W. Carter (St. Helena); 2 and 3, D. T. Milner (Darwen). Photographic Competition: 1, 2 and 3, A. and L. Morris. Novice (Livebearers): 1, L. Jepson (Blackburn); 2 and 3, C. Whiteside (Lytham). Novice (Eggleston): 1, C. Whiteside (Lytham); 2, Miss N. Williamson (Sandgrounders); 3, R. Scuff (Sandgrounders). Best Fish in Show: Aquarist or Pondkeeper Gold Prix, Entry into Champion of Champions contest; Top Tank Prize; Power Filter; The Iddon Trophy; A.O.V. (Livebearer); J. and K. Corbett (Merseyside). Society with Most Points (The Bernard Crabtree Trophy): Sandgrounders A.S. Society with Most Entries (The Kingsway Casino Punch Bowl): Merseyside A.S. Exhibitor with Most Points (The Fish Pad Trophy): Mr. and Mrs. B. Baldwin (Sandgrounders). Total number of entries is shown 412.

RESULTS from R.A.S.S. open show held on 22nd May, 1983. Class B: 1, J. Taylor (Carr Urie); 2, M. Barrow (Gateshead); 3, D. Clark (Hexham); 4, J. McCutcheon (Gateshead). B: 1, J. McCutcheon (Gateshead); 2, L. Burdus (Hexham); 3, D. Wilson (Radcar); 4, D. Clark (Hexham). C: 1 and 2, A. Bell (Gateshead); 3, L. Burdus (Hexham); 4, P. Barrow (Gateshead). C: 1, T. Sayer (Stanley); 2 and 3, P. Kelly (N.Aycliffe); 4, Mr. and Mrs. Zanic (Bp. Auckland). C: 1, J. Middlemass (Stanley); 2, Mrs. M. Simpson (Ind.); 3, K. Barrow (Gateshead); 4, S. Kelly

(N.Aycliffe). Dr: 1 and 2, D. Morgan (N.Aycliffe); 3, L. Burdus (Hexham); 4, M. Hall (N.Aycliffe). Db: 1, D. P. Robson (Darlington); 2, B. Reeve (Bartley); 3, J. Priestley (Stanley); 4, S. King (Redcar). Dc: 1 and 2, J. Corner (Gateshead); 3, G. Pary (Darlington); 4, Mr. and Mrs. Rodway. Dd: 1, Mr. and Mrs. Rodway (Darlington); 2, G. Errington (Stanley); 3 and 4, J. and L. Wilson (Redcar). E: 1, S. King (Redcar); 2, J. and L. Wilson; 3, E. and I. Williams (Hartlepool); 4, P. Rice (Bimbo). E: 1, J. Kavanagh (Ind.); 2, R. A. Custer (N.Aycliffe); 3, S. Tipper (Redcar); 4, N. Hall (N.Aycliffe). F: 1 and 2, P. Barrow (Gateshead); 3 and 4, Mr. and Mrs. Zahir (Bp. Auckland). G: 1, E. and S. Smith (Hartlepool); 2, B. Kavanagh (Ind.); 3, D. P. Robson (Darlington); 4, D. Morgan (N.Aycliffe). H: 1, G. Temperley (Bartley); 2, G. R. Savers (Ann-Plain); 3, R. Kirkup (Caer Urf); 4, G. A. Chapman (Darlington). I: 1 and 2, A. Richardson (Gateshead); 3, Hydon Castle Jun. Sch. (Ind.); 4, R. Brogden (Bp. Auckland). K: 1, L. Burdus (Hexham); 2, N. Bower (N.Aycliffe); 3, S. Tipper (Redcar); 4, D. Wilson. L: 1, E. and I. Williams (Hartlepool); 2, D. Burns (Novo); 3, R. Kirkup (Caer Urf); 4, J. Brady (Bimbo). M: 1, E. and S. Smith (Hartlepool); 2, A. Brown (Bp. Auckland); 3, J. Corner (Ind.); 4, D. Morgan (N.Aycliffe). M: 1, P. Barrow (Gateshead); 2, M. Hepton (Sunderland); 3, R. Kirkup (Caer Urf); 4, J. Brady (Bimbo). N: 1, W. Taylor (Novo); 2, P. Barrow (Gateshead); 3, A. Morrison (UDAS); 4, J. McCuscheon (Gateshead). N: 1, M. Conway (Bimbo); 2, D. Burns (Novo); 3, M. Hepton (Sunderland); 4, R. Horley (Bp. Auckland). O: 1, E. and I. Williams (Hartlepool); 2, R. Williamson (Caer Urf); 3, J. Priestley (Stanley); 4, Mr. and Mrs. Roe (Bp. Auckland). P: 1 and 2, R. Brogden (Caer Urf); 3, M. Hepton (Sunderland); 4, E. Hughes (Ann-Plain). Q: 1, J. Townson (Ind.); 2, J. and S. Smith (Hartlepool); 3 and 4, J. Townson (Ind.). R: 1, T. Savers (Stanley); 2, J. A. Chapman (Darlington); 3, D. Dawson (Stanley); 4, R. and A. Custer (N.Aycliffe). S: 1, S. Kelly (N.Aycliffe); 2, E. Hughes (Ann-Plain); 3, R. Lomas (Throckley); 4, M. Hepton (Sunderland). T: 1, J. A. Chapman (Darlington); 2, T. Savers (Stanley); 3, E. and S. Smith (Hartlepool); 4, Mr. and Mrs. Roe (Bp. Auckland). U: 1 and 2, Mr. and Mrs. Roe; 3, B. Jamison (Ind.); 4, J. Taylor (Caer Urf). V: 1, D. Clark (Hexham); 2, R. Scott (N. Castle Coldwater); 3, P. and M. Grimley (Ind.); 4, R. Chant (Bimbo). W: 1, G. Hunt (Novo); 2, D. Clark (Hexham); 3, P. Barrow (Gateshead); 4, D. Dawson (Stanley). X: 1, J. A. Chapman (Darlington); 2, M. Hepton (Sunderland); 3, Mr. and Mrs. Rodway (Darlington); 4, J. and L. Wilson (Redcar). Y: 1, J. Priestley (Stanley); 2 and 3, J. A. Chapman (Darlington); 4, T. Savers (Stanley). Z: 1, Mr. and Mrs. Roe (Bp. Auckland). Best Fish In Show: Mr. and Mrs. Rodway (Darlington). Tilapia Maria: Best Coldwater (single tail goldfish); Mr. and Mrs. Roe (Bp. Auckland). F.R.A.S. Championship class winner: Mr. J. Priestley (Stanley). Best Pair: Mrs. M. Conway (Bimbo). Best Brooder: Mr. J. Priestley (Stanley).

THE main attraction of the July meeting of the West Yorkshire Marine Aquarist Group was a film entitled "The Reef". The meeting was attended by some 23 members, three of whom were newcomers to the group, and subsequently are on the point of changing to mains. I nearly said progressing, but I do not wish to upset my many freshwater friends. The film was obviously about the Great Barrier Reef on the east coast of Australia and consisted of two reels. The first was above water and the second below. It showed fish and the many invertebrates that abound there. The verdict of the group was unanimous, a film very well worth seeing.

The group is again playing host to the British Marine Aquarist Association on Saturday, 22nd October at the Club and Institute, Dewsbury. A full programme has been arranged and all are welcome, members and non-members, the more the merrier. If food or accommodation is required, or any other details, please give Steve Preston a ring on Heckmondwike 403387 (S11) 0934 and I am sure he will oblige.

Next meeting will be held in September.

SCOTLAND



AFTER the summer break, Lanarkshire A.S. next meeting will be held on the 12th September, at Airdrie Community Centre, Clark Street, Airdrie, Lanarkshire at 7.30 p.m. The table show will be Swordtails, Sharks, Fawns, Pairs of Egglayers and Brooders Swordtails. Further details about the club can be obtained from the secretary, Mrs. J. Bennett, 15 Coulter Avenue, Wishaw, Lanarkshire.

Paisley & District A.S. held its annual general meeting on 28th June, when the various cups were presented. Club meetings will resume on Tuesday, 4th September at the Museum and Art Galleries, High Street, Paisley at 7.15 p.m. Everyone welcome, further details can be obtained from the Club Secretary, Mrs. E. Lindsay, 71 Wright Street, Renfrew. Phone: 041-889 5772.

Dates for the diary

A monthly information column to keep you up to date on forthcoming events.

SEPTEMBER

4th September: The Norwich Section of the **BRITISH KOI KEEPERS' SOCIETY** monthly meeting in Solihull at the home of Mr. F. E. Jarvis. For further details contact the Secretary, Mrs. O. Crosby on Norwich 412095.

4th September: **SALISBURY & DISTRICT A.S.** open show at the Activity Centre, Wilton Road, Salisbury. Schedules and further information from Mr. D. Edmonds, 33 Somerset Road, Salisbury. (Tel. 0722 26219).

4th September: **ANNFIELD AQUARIST ASSOCIATION** open show. New Venue Ludgate Cricket Ground, Near Coventry. Further information from secretary Mrs. E. Emblinton, Annfield Aquatics, Front, St. Annfield Plain, Co. Durham.

4th September: **WELLINGBOROUGH & DISTRICT A.S.** open show at Westfield School for Boys, Beckhill Road, Wellingborough, Northants. Further information from Andrew Barton, 86 Rochway, Wellingborough, Northants NN8 5YE. (Tel: Wellingborough 45562).

4th September: **CASTLEFORD A.S.** 10th open show to be held at Blackburn Hall, Rothwell, Nr. Leeds. Secretary: Mr. L. Price, 92 Westhouse Avenue, Garforth, Leeds. Tel: Leeds 941900.

10th September: **HOUSLOW & DISTRICT A.S.** open show at the Houslow Youth Centre, Kingsley Road, Houslow. Details from show secretary, T. Bolinbroke, 7 Holmwood Close, Addlestone, Surrey (telephone: Weybridge 54976).

10th September: **BRESTOL A.S.** Coldwater Fish Show at St. Ambrose Church Hall, Serreted Road, Whitwell, Bristol from 1-5.30 p.m. Details and Schedules from Show Secretary, V. Capoldi, 7A Walsingham Road, Bristol BS6 5BT. (Tel: 0272-42632).

11th September: **DUNFERMLINE & DISTRICT A.S.** annual open show at Netherlee Institute, Dunfermline. Any enquiries, Telephone Mr. Derek Long, Inverkeithing (413275).

11th September: **LEAMINGTON & DISTRICT** open show.

11th September: **HUDDERSFIELD TROPICAL FISH SOCIETY** annual open show at Southwate Civic Hall, Southwate, Huddersfield.

11th September: **READING & DISTRICT A.S.** open show at St. Peter's Church Hall, Fairfield, Buxton. Benchings 12 noon-2 pm. For info, ring 0298 77951.

11th September: **BUXTON AND DIST. A.S.** open show at St. Peter's Church Hall, Fairfield, Buxton. Benchings 12 noon-2 pm. For info, ring 0298 77951.

17th September: **KINGSTON & DISTRICT** open show at Raynes Park Methodist Church Hall, Worpole Road, Raynes Park S.W.20.

17th/18th September: **EAST KENT AQUATIC STUDY GROUP** 4th Annual Exhibition of Fishkeeping at the Village Hall, Littlebourne, Canterbury.

18th September: **NORTHAMPTON & DISTRICT A.S.** open show at the Gladstone Centre, Gladstone Road, Northampton.

18th September: **CHESTERFIELD AND DISTRICT A.S.** open show at Westfield Upper School, Mosborough, Sheffield. Schedules from A. Joyce, show Secretary, 27 Darcy Road, Eckington, Sheffield S31 9BN.

18th September: **TONBRIDGE & DISTRICT A.S.** open show to be held at Hallow Hall, Hallow, Tonbridge, Kent.

18th September: **NORTH STAFFS A.S.** open show at Thirley Hough High School, Fenkhal, Stoke-on-Trent. A of A judges. Benchings 11.30 a.m.—1.30 p.m. Details from Show Manager: John Sanders, 20 Barlborough Drive, Trenzoo, Stoke-on-Trent.

18th September: **ELLESMERE PORT AQUARIUM KEEPERS SOCIETY** first open show at T.A. Centre, Stoney Lane, Ellesmere Port, Cheshire. Benchings times 12.30 p.m. to 2.00 p.m. For further information telephone the show secretary, Mrs. Prior, 051-355 1794 or general secretary Mr. L. Bowman 051-339 6024.

18th September: **LANARKSHIRE AND MURKHOUSE A.S.** annual open show at Hamilton Town Hall Buildings, Hamilton, Lanarkshire. Further information from Mr. W. Bennett, 15 Coulter Avenue, Wishaw, Lanarkshire.

18th September: **CHELLENHAM T.F.C.** open show at St. Mark's Community Centre, Hevers Way, Cheltenham. Schedules from: M. Jenkins, 3 Marlborough Place, Princess Street, Cheltenham, Glos. Tel: 0242-25799.

23rd September: **WOLVERHAMPTON A.S.** open show. The venue will be Penderford High School, Marsh Lane, Furdooze Wolverhampton. Show Secretary Les Crook, 16 Issington Way, Wolverhampton. (Tel: Wolverhampton 5338).

25th September: **NORTHERN AREA GROUP C.A.G.B.** 3rd Catfish open show at Darwin Library Theatre, School Street, Darwin, Lancashire. 24 classes including photovisually and Catfish furnished aquaria classes. Five prize cards per class. Live lectures, Catfish auction and trade stands, etc. Further details, send a.s.c. Mr. B. Baldwin, 20 Olive Grove, Southport, Lancashire.

25th September: **THROCKLEY A.S.** are holding a grand charity auction and limited class show in the Grange Centre. Auction to take place in main hall, usual 20% of proceeds will go to charity. Book in from 11 am. Start 1.15 p.m. Further information from Mrs. D. Luky, 51 Hewley Crossway, Throckley, Newcastle NE15 9PX. Tel: 9612-45729.

30 September, 1st and 2nd October: **BRITISH KILLIFISH ASSOCIATION** International Convention and a.g.m., York University. Enquiries: Howard Atkin, BKA 537, 45 Lee Moor Lane, Stanley, Wakefield WF3 4ES.

OCTOBER

2nd October: The Norwich Section of the **BRITISH KOI KEEPERS' SOCIETY** monthly meeting in Norwich at the home of K. J. Allen. For further details contact the Secretary, Mrs. O. Crosby on Norwich 412095.

2nd October: **SUNDERLAND A.S.** 1st open show at Pennywell Community Centre, Sunderland. Schedules can be obtained from the Show Secretary, Mrs. M. Hepton, 3 Home Street, Millfield, Sunderland, Tyne and Wear SR4 6BU.