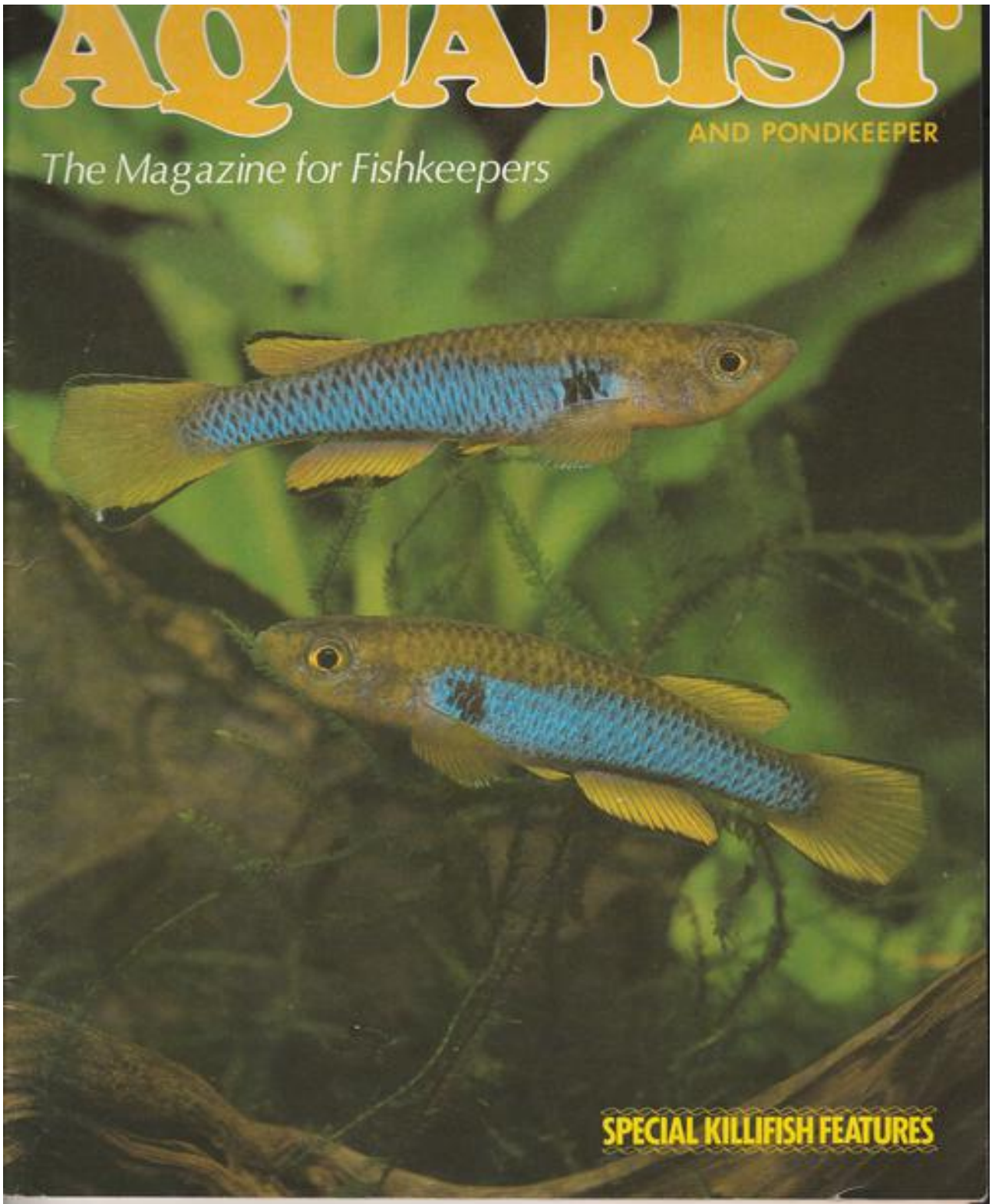
AQUARIST

AND PONDKEEPER

The Magazine for Fishkeepers



SPECIAL KILLIFISH FEATURES

COVER STORY *Photo: A. van den Nieuwenhuizen*

Killifishes have long been considered as belonging to the Family Cyprinodontidae, commonly referred to as the Egglaying Toothcarps. This viewpoint has recently been challenged and, inside, we present a summary of the main arguments in an article written by Lynne Parenti, the ichthyologist responsible for this major revision. In a forthcoming issue of The Aquarist and Pondkeeper we will be featuring—*Aphyosemion ocellatum*, the subject of this month's Cover Picture. This magnificent fish was totally unknown in the hobby until 1976, when it was first collected in the Ogaulou River System in Western Gabon. *A. ocellatum* belongs to the *A. coeleste* group and is not particularly difficult to keep. The problems really start when an attempt is made at breeding. Some pairs, for example, are avid egg eaters—others are not, but hatching may be poor. These and other factors mean that, at the moment (at least), *A. ocellatum* is rather rare. However, challenges are there to be met and we can only hope that efforts made by specialists within bodies, such as the British Killifish Association, lead sooner or later to the "cracking of the *ocellatum* code".

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AQUARIST

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Orestias luteus Valenciennes, a preserved specimen collected in 1979 from Lake Titicaca

Killifish Classification

by
Lynne R. Parenti
Research Scientist,
California Academy of Sciences

THE term killifish is often reserved for solely the oviparous or egg-laying genera of the order Cyprinodontiformes such as the well-known *Aplocheilus*, *Nothobranchius*, *Procatopus*, *Fundulus*, *Rivulus*, *Aphyosemion*, and, of course, *Cyprinodon*. Killifish is used here in its more general sense, to include the viviparous or live-bearing genera of the order as well. Part of the reason for this stems from recent investigations into the evolutionary (or phylogenetic) relationships among the genera, families and other taxonomic categories within the Cyprinodontiformes. Much of it also has to do with the particular philosophy of biological classification adopted by a systematist, a person who classifies organisms.

For decades, the egg-laying killifishes had been classified in one large, diverse family, the Cyprinodontidae (table 1). The viviparous or live-bearing cyprinodontiforms were classified in four other families: the Poeciliidae (guppies, swordtails, mollies, etc.), Goodeidae (livebearers of the Mexican Plateau), Anablepidae (four-eyed fishes), and Jenynsiidae (live-bearers from southern South America). This rather simple division of cyprinodontiform fishes into the egg-layers and four group of live-bearers served as the basis for killifish classification, yet there was something inherently *unnatural* about this grouping.

Killifish comprise one of the largest and most diverse group of the Teleostei, the bony fishes. The diversity of killifishes is certainly well-known to aquarists. One genus not well-known to aquarists, and that may be used to demonstrate this diversity, is the unique killifish of the Andes, *Orestias*. All three species pictured here are found in Lake Titicaca, the high-altitude lake of the altiplano between Peru and Bolivia. *Orestias luteus* (figure 1) is one of the wide-bodied, mollusc-crushers. Scales on the dorsal and lateral surfaces of the body are large, thick and granulated. *Orestias agassii* (figure 2) is more 'typical' of a killifish of the temperate zone, with its dark, greenish-brown dorsal and lateral surfaces, and pale-yellow ventral surface. The third (figure 3) is a new species, to be described in an upcoming revision of the genus. It is one of the more elegant-looking of the *Orestias*, and would make a fine aquarium fish.

Killifish have been the subject of much attention by ichthyologists, but little of this attention has been focused on the study of relationships of one killifish group to another. My aim in this article is to introduce some of the problems in killifish classification, and explain why sometimes ichthyologists feel it is necessary to change existing classifications, even though we obviously may be more comfortable with the old, familiar system of names.

Gordon Howes, my colleague at the British Museum (Natural History), in a recent issue (*The Aquarist*, November, 1983) presented a discussion of natural classifications in introducing problems in the classification of catfishes. His clear explanation of why a particular classification should be followed over another need not be repeated here. My discussion focuses on an application of the principles he outlined to the killifishes as a whole. In that same issue, there appeared a note on the 'killifish' family Oryziatidae (or Oryziidae), the ricefish genus *Oryzias*. In fact, *Oryzias* is not now considered to be a killifish—it is more closely related to the beloniform fishes (the halfbeaks, flying fishes, needlefishes, and sauries) than it is to any killifish genus. The cyprinodontiform and beloniform fishes along with fishes such as the silversides (for example, *Menidia*) and the rainbow-

Table 1. Traditional classification of the families of the order Cyprinodontiformes, the killifishes:

Family Cyprinodontidae.
Family Goodeidae.
Family Poeciliidae.
Family Jenynsiidae.
Family Anablepidae.

fishes (*Melanotaenia*) comprise a group called the Atherinomorpha. This is the group of fishes on which I currently concentrate my systematic research.

For the purpose of explanation, I will review two major parts of the new classification of cyprinodontiform fishes (table 2): the division between the suborders Aplocheiloidei and Cyprinodontoidei; and the relationships of the Poeciliidae (which comprises the lampeyes, the live-bearers, and *Fluviphylax*, an enigmatic, diminutive, egg-laying genus from the Amazon basin, South America).

The suborder Aplocheiloidei, the aplocheiloids for short, comprises the tropical South American, African and Southeast Asian genera that are generally called the rivulines by aquarists. The name Aplocheiloidei is based on the name of the Southeast Asian *Aplocheilus;* the rivulines on the New World *Rivulus*. Historical precedence requires that the name of a group that includes all of these fishes have *Aplocheilus* as its root. The aplocheiloids are classified in two families, the Old World Aplocheilidae, and the New World Rivulidae.

The aplocheiloids have a number of characters in common that help set them apart from all other bony fishes. Briefly, these include specialisations of the gill arches, such as the broad anterior end of the basihyal which gives aplocheiloids their broad 'tongue'; the covering of the eye is continuous with that of the head, a character generally described as an attached orbital rim; and the pelvic fin girdles are set very close to each other. Other killifishes do not have these characters; not *Fundulus* of the Cyprinodontidae in the old classification, not the Goodeidae, and so on. A systematist would say that they are uniquely derived in the aplocheiloids.

Similarly, killifishes of the suborder Cyprinodontoidei, the cyprinodontoids, have a set of characters or specialisations that set them apart from all other fishes, but most important, for our purposes here, apart from the aplocheiloids. These characters include reduction of the number of some important gill arch bones; changes in the protrusibility of the outer jaws due to a series of modifications in the shape and orientation of jaw bones, and a modification of the dorsal fin.

Perhaps the set of characteristics easiest to explain concerns the protrusibility of the outer jaws. The premaxillary bone, one of the major bones of the upper jaw, is characteristically straight in the aplocheiloids (figure 4a). This is what we identify as the primitive state of this jaw bone. In all cyprinodontoids, however, the premaxillary bone has a characteristic S-shape (figure 4b); that is, its configuration is altered such that the lateral arm of the bone has a broad anterior ramus or projection, and a broad posterior ramus or projection, as well.

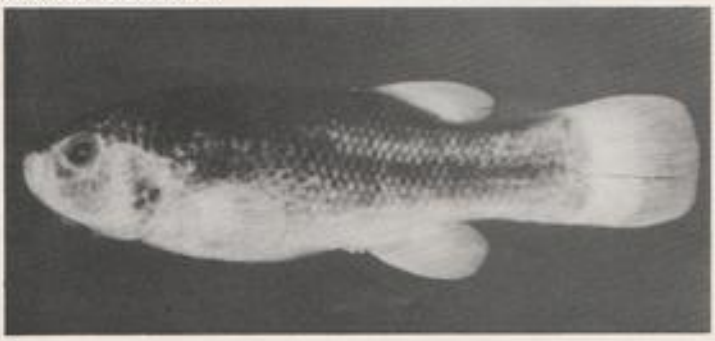
The S-shaped premaxillary bone is found in all cyprinodontoids: in the poeciliids, in *Fundulus*, in *Anableps*, and so on—all the fishes in the families listed as members of the Cyprinodontoidei in table 2. This character is one of several used to define the cyprinodontoids as a natural group. By natural, we mean that if one wished to infer something about the evolution or phylogeny of the cyprinodontoids, one could say that all cyprinodontoids share, or arose from, a common ancestor that had an S-shaped premaxillary bone. Because all of these fishes are inferred to have a common ancestor, it is desirable to classify them in a group separate from the aplocheiloids. One could object to such a conclusion, and ask why a change in classification of killifishes was based

Table 2. Classification of the order Cyprinodontiformes, following a revision (Parenti, L.R. 1981. A phylogenetic and biogeographic analysis of cyprinodontiform fishes (Teleostei, Atherinomorpha) Bulletin of the American Museum of Natural History, vol. 168, no. 4).

Suborder Aplocheiloidei
- Family Aplocheilidae
- Family Rivulidae

Suborder Cyprinodontoidei
- Section 1
  - Family Profundulidae
- Section 2
  - Division 1
    - Family Fundulidae
  - Division 2
    - Sept 1
      - Family Valenciidae
    - Sept 2
      - Superfamily Poecilioidea
        - Family Anablepidae
        - Family Poeciliidae
      - Superfamily Cyprinodontoidea
        - Family Goodeidae
        - Family Cyprinodontidae

***Orestias agassii* Valenciennes, a preserved specimen collected in 1979 from Lake Titicaca**



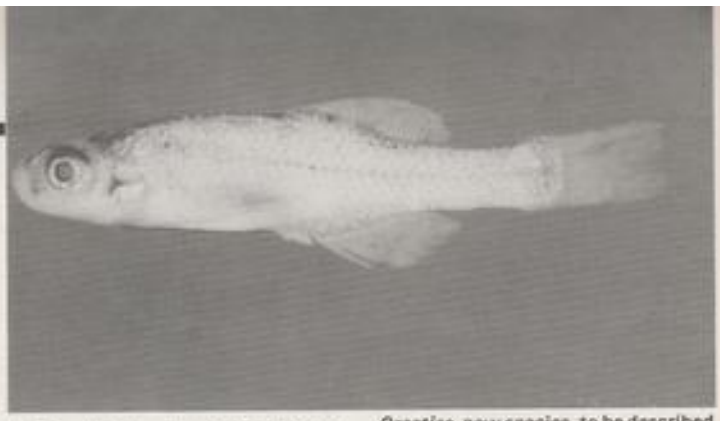
upon things such as the shape of jaw bones and the number of gill arch bones; are we not ignoring the importance of reproductive mode, hence the traditional division between the oviparous and viviparous killifishes?

On the contrary, we are not ignoring such traits, but considering them along with all others. This means that characters such as 'viviparity' must be analysed along with, for example, characters that govern extent of jaw protrusibility.

There are two possible explanations for the evolution of viviparity in cyprinodontiform fishes: viviparity evolved once (and, hence, all viviparous killifishes should be classified together in one group), or, viviparity evolved more than once, that is, independently in more than one group (and, hence, that the viviparous families do not form a group). All characters considered together indicate the latter. In the new classification (table 2), the four viviparous families of the traditional classification (table 1) are placed as follows:

The limits of the Goodeidae are expanded by the inclusion of two oviparous genera of western North America formerly believed to be closely related to *Fundulus: Empetrichthys* and *Crenichthys*. The family is considered to be the sister group, or the closest living relatives, of the Cyprinodontidae in the restricted sense. We must restrict the definition of the Cyprinodontidae if we are to remove from it groups such as the rivulids and aplocheilids. In the new classification, the family Cyprinodontidae comprises *Orestias*, the anatolian cyprinodonts (*Aphanius* and its close relatives), and

Schematic outline drawing of a lateral view of the left premaxillary bone in (a) an aplocheiloid, and (b) a cyprindontoid. Anterior is to the left



***Orestias*, new species, to be described in an upcoming publication. A preserved specimen collected in 1979 from Lake Titicaca**

the New World cyprinodontines (*Cyprinodon*, and its close relatives).

The Anablepidae and Jenynsiidae are treated as one family, the Anablepidae (again, the name is chosen for reasons of historical precedence). The Anablepidae is considered to be the sister group of the Poeciliidae, which also has a new definition, below.

The Poeciliidae of the new classification (table 2) comprises three groups: the live-bearers and *Tomeurus*, that is, poeciliids in the traditional sense; the African lampeyes (including *Procatopus*, *Aplocheilichthys*, and *Lamprichthys*), often called the procatopines or aplocheilichthyines; and *Fluviphylax*. One of the primary purposes in taking these three seemingly disparate groups and putting them together in one, the family Poeciliidae, is to tell all biologists that these fishes share some unique characters not found in other fishes, and that from these characters, one can infer that these fish all arose from a common ancestor.

What are the characters poeciliids, lampeyes and *Fluviphylax* share? Some of them concern details of anatomy that need not be gone into in great detail here. However some are well-known to aquarists. One of these is that the pectoral fins are set rather high on the side of the body, as opposed to being very lowset in, for example, the aplocheiloids which seem to paddle about with their pectorals. In fact, the aquarist Stenholt Clausen once described what he called a similarity between the movement of lampeyes and some poeciliids. The males of these two groups spread their fins and 'dance' in front of females by moving backwards and forwards. Thus, it is not just seemingly esoteric details of gill arches and jaw bones that a systematic ichthyologist uses to infer the relationships of fishes; it is behavioural characteristics as well.

The reason some systematists believe that it is critical to base classifications on patterns of inferred common ancestry is that these written classifications are what we hand over to other biologists for use in their work. In the traditional system of killifish classification, fishes in genera such as *Rivulus* and *Fundulus* were together in the family Cyprinodontidae, whereas *Anableps*, for example, was separated in its own family. If someone were to investigate genetics of the genus *Fundulus*, he or she might wish to compare data for those species with data from a close relative of the genus *Fundulus*. The new classification tells you that *Anableps* is more closely related to *Fundulus* than either one is to *Rivulus*, but the traditional classification does not tell you this. In fact the traditional classification obscures such relationships.

The aquarist may ask "Will the classification of killifishes change again?" The answer is probably yes. As we learn more and more about the anatomy, physiology, behaviour, etc. of our fishes, we must translate this information into a scheme of relationships expressed in a written classification. This is the work of a systematist. The changes are often startling and disturbing at first but, in time, one will wonder why, for example, poeciliids and lampeyes were not always considered together.

Tomorrow's AQUARIST

Catching up

WHEN Tomorrow's Aquarist was launched a year ago, we said that it would include "activities, facts, ideas, opinions, anecdotes, competitions or experiences aimed at developing the skills and knowledge of aquarists of all ages".

One of the original aims of the series was (and still is) to highlight from time to time some of the most common areas of difficulty experienced by newcomers to the hobby. However, this has proved impossible so far because of all our other numerous commitments. Therefore, before we get swept away into another set of "date-specific" items, we though that it was about time that we caught up with our runaway aim by tackling one of the problems most often experienced by new aquarists.

★★★★★★★★★★★★

THE NEW TANK SYNDROME (Part I)

Countless people have set up countless tanks over the years full of excitement and expectation only to find that they run into problems virtually straight away. Fish begin to die, some are attacked by others, while yet others start to swim with folded fins or else clamp their fins together, make exaggerated side-to-side movements but get nowhere fast. The water often becomes cloudy and smelly and black patches may develop around the gravel grains or under rocks. The list goes on. . . .

These problems are so typical of newly-set-up aquaria that they are collectively referred to as the New Tank Syndrome.

The causes are many but all can be avoided or overcome with a little patience and commonsense.

Cloudy water

This usually happens within the first few days, even if no fish have been added to the aquarium. In fact, introduction of fish should be delayed as long as possible, e.g. a week. The cloudiness is caused by a population explosion of micro-organisms and is quite harmless. As they multiply, these organisms produce waste products which soon make conditions so unsuitable for them that they die in huge numbers. As they do, the water clears marking the completion of the first step in the maturing/ageing process.

The Molly is a frequent victim of the new tank syndrome

Raw water

The most convenient and, therefore, most used source of aquarium water is tapwater. However, the treatment given to this water may make it suitable for drinking but it certainly does not render it ideal for fishkeeping. The most harmful chemical it contains is chlorine. Luckily, this gas is volatile and will disappear after a day or so, particularly if the water is aerated. Alternatively, it may be quickly neutralized by using one of the Dechlorinators available for this purpose. Tapwater Conditioners will also help this raw water to mature quickly.

If none of the above treatments is administered, then the fish are bound, to suffer, as post-mortem examinations of "raw water deaths" show. In such cases, the fish show a higher incidence of parasitic diseases and badly affected gills.

Overfeeding

This probably kills more fish than any other single factor. Although the temptation to overfeed is great, it must be resisted. Uneaten food will soon rot, clouding the water and making it smelly (quite unlike the cloudy water referred to earlier). In addition, black patches may develop on the gravel and under rocks where anaerobic bacteria (bacteria which do not require oxygen) will multiply and produce highly toxic Hydrogen Sulphide.

Although there are no hard and fast rules concerning the amount of food to give, it should *all* be cleared up within a few minutes. If there is any food left after, say 10 minutes, then the fish have definitely been overfed.

In the wild, fish eat plants and animals whose bodies contain, at least, 70% water. However, flaked or freeze-dried food can contain as little as 3% water. The obvious consequence of this is that any amount of good quality "dry" food will contain considerably more nourishment than an equivalent weight of live plant or animal food. Therefore, fish only require small feeds of flake or freeze-dried food. In fact, it is a good idea to miss a day's feeding once a week. It will do the fish no harm whatsoever and may, in fact, do them the world of good.

(To be continued)

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

anabantoid association . . .

The Chocolate Gourami is featured in the A.A.G.B. logo

I understand that there is now a society in the U.K. specialising in the study of anabantoids. Can you give me their address?

The society in question is the 'Anabantoid Association', and John Dawes and myself are President and Vice President respectively! You should write to: A. Thompson, 4 Nelson Avenue, Nelson, Cramlington, Northumberland. Do enclose a stamped addressed envelope.

fish diseases . . .

Can you give me some general information on fish disease control, and recommend some good books?

With the close confines of a pond or aquarium, outbreaks of fish diseases can have sudden, drastic effects. Every aquarist should be aware of two vital steps that can actually *prevent* such outbreaks. First, all new fish should be quarantined in a separate isolation tank for at least 14 days before being released into a set-up tank. While in the isolation tank, any symptoms of disease may be easily spotted and quickly treated. A preventative course of treatment with *Tetra General Tonic* or *Tetra Contra-Ich 80* is beneficial in many instances.

The quarantine tank need not be an elaborate affair, and may double as a treatment tank. A small to medium-sized aquarium, depending on the size of the fish to be quarantined, plus a hood or cover, an air pump and poly-foam filter and one or two plastic plants for refuge are the basic requirements. The water in a quarantine tank for tropical fish will have to be maintained at a steady 23-26°C with a reliable heater-thermostat, and the temperature checked with a thermometer. The quarantine tank must have its own set of equipment, including nets, scraper, siphon tube, etc., so that there is no risk of disease transmission to the community tank or pond. Do not forget—disease organisms can also be carried on wet hands!

After the quarantine period is over, the tank and all the equipment should be rinsed in a dilute solution of household bleach, thoroughly rinsed in clean water, and then stored dry—ready for use next time.

The second important step in disease prevention is correct pond and aquarium care. Each fish has a set of preferred environmental conditions, and trying to maintain species at the wrong temperature or in water that is too hard or too soft often leads to problems. Aquarists must familiarise themselves with the requirements of their fish. Overfeeding, overcrowding, fluctuating water temperatures and poor pond or aquarium hygiene must be avoided at all costs. Naturally, a correct, balanced diet will greatly enhance the resistance of fish to many diseases.

Remember *quarantine* and *correct conditions* and you will prevent outbreaks of many fish diseases. However, what can be done to treat outbreaks of disease, should they occur?

I think that you will find the following books useful: *Disease of Tropical Fishes* by H. R. Axelrod, 1977; *Textbook on Fish Diseases* by E. Amlacher, 1970; *Parasites of Freshwater Fishes* by G. L. Hoffman and F. P. Meyer, 1974, all T.F.H. publications. *Diseases of Fishes* by C. van Duijn (Springfield, 1973).

aggressive cichlid . . .

I have experienced some difficulty obtaining any information on *Haplochromis polystigma*. Can you help?

This species is a highly aggressive, territorial cichlid from Lake Malawi, Africa. It does best in hard, alkaline water with a temperature around 25°C. It may reach 20 cm in length and if given a good, varied diet, growth can be quite rapid. Naturally it requires quite a large aquarium with plenty of rocky hiding places. It is a typical mouthbrooder and has been bred in the aquarium. It will accept a variety of fresh foods although (with some persuasion) it should take good quality flaked foods.

"Haplochromis" polystigma **C.A.**


Arthur Boarder


Vivian De Thabrew


Hilda Allen


Graham Cox


Eberhard Schulze

Coldwater

treatment for ragged tail . . .

One of my goldfish had tail rot which I cured. Now the end of the tail is all ragged. Can I do anything about it?

With a sharp pair of scissors trim the ragged parts off but avoid damaging any of the rest of the tail. Before returning to water, smear the end with Vaseline to help prevent further infection. The tail should grow again but it may be coloured black at first. However, this should soon clear.

carp death . . .

I had a common carp for some years and it grew to 14 inches long. I recently found it dead in the pond. It had a lump where one of the pelvic fins joins the body. It had been swimming erratically recently. What was this and is it catching to other fishes?

The lump on the fish could have been a cyst or an abscess. The former is not usually fatal but an abscess may have been originated inside the fish through another disease or even an internal parasite. Had you found the trouble earlier you may have been able to treat the fish by pricking the lump and painting it with T.C.P. I should not think that it is contagious and not likely to affect the other fishes in the pond. Maggots are a good live food for fishes as an alternative to garden worms.

green water in pond . . .

The water in my garden pond is very green with Algae and even if I change all the water it becomes green again in about a week. Any suggestions for a cure?

Lack of growing water plants is the usual cause of green water. However, you might like to try a little experiment. Make a net with fine mesh nylon about 12 × 12 × 12 inches. Mount it on a small wooden frame so that it will float with the top of the net just above water level. Then place some *Daphnia* in the net and await results. The mesh should be too small to allow the *Daphnia* to escape but large enough for *infusoria* and Algae to enter. The *Daphnia* will eat the Algae and if nothing else, will provide you with fry food. After a week carefully lift the net above water level and replace it in another spot in the pond. The same type of net would be useful for housing fish fry which would be able to feed on the *infusoria* in the pond and at the same time be safe from the adult fishes.

the tanago . . .

I recently bought a fish at a pet shop and it was called a Tanago. I cannot find anything about this fish. Can you help?

I understand that the fish is like a Bitterling (*Rhodeus sericeus*). I do not know where this name originated, but I had never heard of it before. I sometimes think that dealers may think up a new name in order to con the buyer into buying something which appears to be out of the ordinary.


The Bitterling, *Rhodeus sericeus*, a close relative of the Tanago, *Tanakia tanago*

The Bitterling is a nice little fish for a tank and is well known for its strange method of breeding where the female lays her eggs inside a freshwater mussel.

A.B.

Koi

koi varieties . . .

I am often puzzled by some of the weird and wonderful names attributed to the apparently endless varieties of Koi by experts. Can you offer any comments and particularly about the so-called Taisho and Showa sanke variety of Koi?

It is not possible to give a complete answer to your query as this would occupy several issues of *The Aquarist* by itself and still leave scope for further explanation or differences of opinion.

However, I would refer you to the most recent book in English to come from Japan and reviewed in August 1982.

Manual to Nishikigoi by Takeo Kurobi includes a good selection of colour photographs and descriptions even though not necessarily up-to-date.

Earlier picture books of Koi can give misleading impressions of what the better class of fish now being produced in Japan actually look like simply because there are more breeders in the business, with different stock producing a whole range of variations of patterns, colour mixes, metallics and so on, sufficient to cause fashion and popularity to change.

To answer your specific question on the sanke (three colour) Koi which are basically white, red and black fish, albeit in a different order of predominance. The early Taisho is mainly a white fish with red and black patterns whereas the later Showa sanke is regarded as a black fish with red and white patterns.

The amounts of white, red and black do vary greatly because breeding lines take many years to establish with no assurance of what exactly may be produced as obviously the parent fish can change with time either with improvement or detriment to their progeny.

First-year koi showing a predominance of white over red and black. This may change with age

Over the years I have seen countless pictures and illustrations of Koi claimed to be of the Taisho or Showa sanke varieties and it can be difficult to decide, apart from the lack of or extent of black in the pectoral fins.

Taisho sanke should have all-white pectorals or a few black stripes in the rays, Showa sanke must have a solid area of black at the base of the pectorals next to the body. The nose of the Taisho should be white, but the Showa should have a black area according to the amount of black pattern generally evident on the body.

New variations and names appear, to suit whatever is bred in any quantity and the prefix of Showa to denote the feature of black is now applied to other Koi as a result of more recent interbreeding.

If it is any consolation, I doubt if any of us will ever be completely up-to-date with the host of new varieties constantly being produced by skilled Japanese breeders or all those strange-sounding names from far-away places.

H.A.

Marine

water change . . .

I am 15 years old. Six months ago I went into the wonderful world of marine fishkeeping.

I now have a 48 in. × 18 in. × 18 in. tank, using reverse flow filtration and a good selection of fish consisting of 1 Lionfish (Volitans), 1 Threadfin Butterfly, 1 Flame Angel, 1 common File fish, 1 Chocolate Clown, 1 Regal Tang.

When I do a water change (I do this every 2-3 weeks), I mix up my water, switch off my pump and then take the inlet end and place this into the water. I then switch on the pump, forcing the cloudy water down through the pump, up through the undergravel filter and into the tank.

My question is this. Is there any danger of killing the bacteria in the pump or in the undergravel filter, by pumping the unmatured water over them. I now use this method all the time because it does not cloud the water.

Provided that you are (i) using a correctly formulated seawater, and (ii) are aerating it and warming it for 5-10 minutes so that its final temperature is of the order of 75°F (24°C)—there should be no problems using this method.

plants, plankton and invertebrates . . .

My tank size is 60 in. × 24 in. × 18 in. and I intend, at some time, to keep living rock, coral, and invertebrates. I would like to know if it would be possible for me to grow marine plants in the tank, and also, I would like to know if my 40W 'True-lite' would be strong enough. I was also wondering if it would be possible for me to collect fresh plankton from the sea to feed to the invertebrates. If so, how should I go about collecting and carrying the plankton?

First, I would like to compliment you on having the good sense to purchase such a splendidly large tank for your first essay into the home culture of (*presumably!*) tropical marine life. Your tank has a gross capacity of 93·75 Imp. gallons (425 litres) and will make a magnificent sea aquarium. In books, articles and lectures, I have for the last 20-odd years been urging that no-one should be dumb enough to attempt a start in marine aquatics with a tank smaller than 20 Imp. gallons (90 litres) capacity. Despite all this midnight oil I still get occasional plaintive calls for help from anguished beginners. Only last week a Mrs. Ermintrude Briggs, of Cleckuddersfax in N. Yorkshire telephoned to ask me why baby Clown Triggerfishes (plural, would you believe?) keep dying in the special, novelty Water Jug Sea Aquarium which she brought back from her holiday in the sunny U.S. This astonishing piece of Space Age technology held well over two pints (Imperial) after all, and hadn't she spent over two hours painstakingly cutting my Company's new U/G filter from the 23 in. × 11 in. rectangular shape which I'd designed, down to a 4 in. diameter to fit the bottom of the jug and hadn't she also . . . etc., etc. Some two hours later (it wasn't my call, was it?), I somewhat testily suggested that she give the lot to the bin-men and take up weight lifting instead. End of telephone call and back to work.

Marine Plants. Yes, provided you steer well clear of herbivorous fishes and invertebrates. Incidentally, there are many British-made flourescent tubes (e.g. 'Northlight') which are vastly cheaper than the American tube which you mention and just as effective. However, no matter what fancy prices you pay for the tubes, one tube is nowhere near enough if you are ever to succeed with invertebrates, particularly the coelenterates and plants. For a tank 2 feet deep, you will need another three 5 ft. tubes at least. Try one 'Gro-Lux' and two 'Northlights'—you won't regret it and you'll save a lot of hard-earned cash to buy those lovely creatures!

North Atlantic System plankton. Another affirmative. Yes, provided you're contemplating the mass-murder of all your coralfishes. May I please repeat yet again in these columns that tropical marine creatures have no defensive mechanisms whatsoever against N.A.S. pathogens and parasites.

For my own part, indeed for all my parts (including those which other products cannot reach), I much prefer to use both liquid, micronised invert-food and gamma-ray irradiated sea-foods. Both are sterile, disease-free, cheaper, cleaner and more convenient.

G.C.

Discus

small discus tank: . . .

I want to set up a 24 in. × 15 in. × 15 in. tank containing a pair of Discus. I know this may be quite small for keeping Discus, but I have seen many similar sized tanks in tropical fish shops which have had more than one pair in the tank. Is my tank size alright?

I would also like some information for fixing a shelf strong enough to hold the tank to my bedroom wall which is four inches thick and made of breeze blocks.

Is there any other food I could feed my Discus apart from live food?

I realise the fish's water needs and would like to know if filtration with peat would be the correct thing to do, as my water level is neutral.

I would be very grateful if you could answer my questions.

Although I agree that some dealers will keep a great number of fish in small or even very small tanks, it does not follow that this is the correct way to look after these animals and usually common sense will tell you that it is wrong. You must also remember that often a single pair of Discus fish (if they are not a true pair) kept by themselves, will hardly ever do very well. Discus are a shoaling fish and a small school of about five or six should always be the minimum. To house five or six Discus fish you will require a tank somewhat larger than the 24 in. × 15 in. × 15 in. you would like to use. I suggest that you aim at least for a 39 inch aquarium and only then will you have some sort of chance of keeping these fish alive for any length of time. Although there is probably an ideal size aquarium for keeping Discus fish, many other criteria must be taken into consideration, e.g. filtration system, quality of water, general maintenance, quality of food as well as quality of fish. Although Discus fish may look the same they vary as much as many other products.

As far as the fixing of a shelf strong enough to hold your tank is concerned, I suggest that you ask a carpenter to advise you. Remember that a fish tank full of water is very heavy and many a bedroom carpet has been ruined by inadequate support. A 39 in. × 15 in. × 15 in. aquarium will hold approx. 130 litres of water. 130 litres = 130kg and with the weight of the aquarium the supports must be very strong.

I believe that one of the main problems many hobbyists get with their Discus fish is as a result of the feeding of live foods. Live foods such as *Tubifex*, *Daphnia* or Bloodworms should only be fed to Discus fish, or any other fish for that matter, after they have been cleansed properly and made safe. With *Tubifex* this can take about five to six days, be very messy and smelly and as a result is often not carried out. Anyone who feeds his fish such foods will get into trouble very quickly and has only himself to blame when his Discus fish start to go black, start to hide, start to refuse food and eventually die. Foods for Discus fish are no longer a problem. I believe, when Mr Roy Skipper wrote that Discus fish can be finicky with their food he was not aware that such fish were diseased—a healthy Discus fish will eat almost anything.

Discus fish can be kept in top condition with many of the Gamma varieties of frozen foods, like Bloodworm, *Tubifex*, Lobster Eggs, *Daphnia*, Gamma Shrimps, Brine Shrimps. They will also take FD Tubifex, Tetra Cichlid Flake, even bananas or spinach, but their main diet should always be Beef Heart. With the addition of some vitamins and trace elements no Discus fish will ever go short of anything and is probably kept in a better condition than his wild ancestors.

Discus are best kept in shoals

Water, or the quality of water, has been the stumbling block for most hobbyists. Discus fish are very adaptable really, just like most other tropical fish, but if any success is to be had, a water quality must be maintained. The water should not be harder than 10 dGH, a conductivity of more than 300 uS, a pH of around 6 to 6·5 and a level of pollution (nitrate, nitrite, etc.) of zero. If the water has a pH of 7 one can say that it can be filtered using a peat, but since no figures for the GH and KH were mentioned peat may have very little effect or on the other hand may acidify the water too quickly. Usually, peat is a super filter material for Discus fish and can only be recommended.

E.S.

by
Roy Pinks

THIS concludes, for the time being, my observations about the planting of newly established tropical aquaria. I make no apology for, perhaps, seeming to labour the issue of plants and their welfare: the director of a local aquatic centre recently told me that queries from his customers about failures related almost exclusively to plants, and I am sure this is reflected right across the hobby. Like him, I wish it were possible to give reliable answers, but this is not possible, and we can only attempt to offer pointers. All the very variable factors of locality account for the failure of a species in one tank alongside its complete success in an adjoining aquarium, apparently precisely similar. But, like human beings, every tank is that slight bit different from every other, and the only way in which you can achieve perfect symmetry is by the use of plastic plants, but this is an alternative I would prefer to ignore.

The pH (acidity or alkalinity) of your tank water seems not to be as important as some writers will aver, though some are certainly very misleading in the way they retail their advice. I have seen statements like "*Cabomba* needs acid water . . ." etc. But exactly how much acid is seldom stated, possibly because the practical range is quite wide and impossible to define. There are also authenticated notes by practising plantsmen that some plants said to require certain pH conditions do equally well in those on the opposite side of neutral. This is abominably puzzling for the average aquarist who may well be put off by all the verbal warfare, and who simply buys blind, with unsatisfactory results. So the first hint, perhaps, is that if you aim to have your water as near to neutral as possible, you may in practice cause least offence. This may be achieved by collecting unsullied rainwater though there are certain fairly reliable chemical ways of converting your local water. If you are a bit off neutral, to one side or the other, I doubt very much whether this matters, as plants are more adaptable than they are given credit for. However, one must be patient, accepting that some unsightly die-back will be inevitable before the specimens really come into their own.

I am inclined to the view that a suitable substrate allied with enough light for long enough should get your plants into the right condition to prosper. If anything the lighting is more important than the other factors. I am experimenting on these lines in my quarantine tank, and in a few months' time I will summarise the outcome. A very tricky situation does arise with some of the finer leaved plants like *Myriophyllum* and *Cabomba* which do need bright light, but which get so infested with algae under well-lit conditions that they fail completely. The solution here might be to kill off the latent algae by physical or chemical means before the higher plants are introduced. But I have given up with these plants because they do require so much persuasion, and even when you seem to have won they race away at the top and leave ugly leggy stems to grace the bottom, which is not really playing fair.

As a guide I have classified some of our favourite plants as under:

Barclaya—an acid lover

Not fussy about pH
Acorus S G
Aglaonema S
Amubias S
Bacopa B
Cryptocoryne B G
Echinodorus S
Hygrophila B
Lagenandra S
*Ludwigia B
*Myriophyllum B
Rotala B
Sagittaria G
*Synnema B
Vallisneria G

Alkaline lovers
Lagarosiphon B
(Elodea)
*Heteranthera B

Acid lovers
Barclaya S
*Cabomba B
*Samolus B

"S" signifies "Specimen Plant", "B" signifies "Bunch Plant" and "G" signifies "Grouped Plant", as a guide to the best effect to be gained by their

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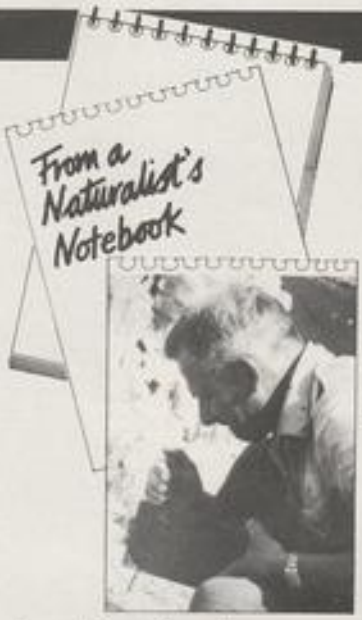


by Eric Hardy

A YOUNG dogfish hatched in the aquarium of an old schoolmate revealed four types of colour cells as against three in the adult fish. That was before the war. He suggested that in some fish, like sharks and rays, the well-known habit of colour-paling to camouflage with changed surroundings is not due to the direct control of the colour-cells by nerves, but to the activity of a hormone secreted into the blood of the anterior lobe of the pituitary gland, near the brain. This was later proved so. Colour changes in sharks and their relatives are controlled by the pituitary gland only, paling (temperature above normal) is under the sole influence of the pituitary, but darkening is the effect of its nerves and the pituitary. Lower temperatures cause freshwater fish like minnows to darken, in seconds, eels in half-an-hour, marine fish longest.

Other forms of mimicry in fishes are of a permanent nature. In the great tribe of blennies, one aggressively predatory group, the brilliantly coloured Meiacanthus blennies are the only fish to have poisonous glands in their mouths, and the venom runs snake-like down the groove in their large canine teeth which protrude like fangs. These sabre-toothed blennies bite when handled. Quite unrelated mimics though also sabre-toothed blennies, Plagiotremus resemble them and hover and leap in the same way, and share their immunity from predators. On the other hand, another sabre-tooth blenny, Aspidontus, mimics the camouflage of the cleaner-wrasse, not so much to escape predators but to approach its prey unnoticed.

Blennies are the masters of mimicry among fishes, especially in shallow, tropical seas and a few freshwaters. One of the tropical sea-hoeses mimics seaweed with trailing leaf-like appendages to spiny processes from its vertibrae, an excellent camouflage. Their colour also matches the seaweed. Like the chameleon, the sea-horse's eyes have independent action. Although not brightly coloured like bitter-tasting coral-fish with warning colours, its flesh is distasteful to predators. It also has powers of colour-change, from red and green to brown according to environment. In tanks the Biscay imported specimens have to be kept between 60 and 70°F, constantly aerated or renewed. They feed on *Daphnia* and sandhoppers.

With its knobby eyes, the tropical mud-skipper seems to mimic frogs or toads, maybe to survive out of water, where it climbs on damp mangrove roots. At Torquay aquarium it wriggled several inches up the glass side of its tank, by the suction power of water around its belly and paired fins, pressed closely against the glass. A special adaptation keeps its eyes moist to see in air. In the tropics and northwest Australia it catches insects; in the aquarium it feeds on whiteworms. The enormous eyes protruding from the top of its head, also turning in all directions like those of the chameleon, enable it to see above the surface when resting in shallow water. It is related to the gobies.

Many camouflaged fish mimic their surroundings—the angler resting on the seabed mimics the stones around, sufficient to have swallowed gull and red-throated diver as well as uncautious fish prey. Much of the hairy frogfish's development is to mimic its surroundings while it awaits its prey. Some frogfish's rag-and-tag skin mimics Sargassum weed where it lives. Do puffers which inflate their bellies with air or water when alarmed mimic sea-snakes? The strange-looking Israeli puffer which ranges across the Indo-Pacific seas looks so. So does the cuchia (Amphipnous) from Asian swamps, kept at New York aquarium. Does the porcupine-fish mimic some tropical sea-urchin among the coral reefs? Only a few fish mimic other more predatory fish for protection.

In what must be the coldest aquarium in the world, U.S. biologists at their

Dogfish

McMurdo Base in Antarctica keep dragonette-like black and white Dolleóidraco fish and garnet-like deep-water bathydracos, bull-headed long-bodied notothenïids edged with long fins, distant relatives of weever fish which replace the cottids or miller's thumbs of Arctic seas, being white-blooded. Living in dark depths, these have little opportunity for mimicry, it seems.

The Nile catfish swims upside down and adapted its camouflage by evolving a white dorsal surface and dark under surface, the reverse of most fish colouring. Reasonably harmless thornrays around our coasts survive by mimicking the electric ray without possessing its discharge. The non-poisonous sole is said to mimic the poisonous weever fish by burying all but its dorsal fin in the sandy bed, but weever fins thus exposed are distinctively black.

Perhaps the best mimicry is the Amazonian leaf-fish drifting like a dead leaf together with its lower lip projecting like a stalk. It feeds on small fish by shooting out a telescopic mouth. Do fishes with an eyespot near their tails, like Chaetodons (butterfly fish), confuse predators over which way they will swim away? The greatest change of colour is by bottom-living marine fish causing the guanin in plates of "iridocytes" giving silvery sheen by reflection to be closer or further apart by altering the water-content of their tissue, probably another neural and hormone (chemical) stimulus. Aquarists know well how fish change colour with age from transparent larvae (survival camouflage), then a few small pigments to break their outline, and finally changes as the gonads develop for breeding like red male sticklebacks.

Fighting fish are the best known examples of emotional changes in colour. Frightened perch and minnow turn paler, plaice darken and trout show a dark band down each side. Fish lose colour with illness like tuberculosis. The black patches which come and go on goldfish are melano-spores storing black pigment which can be utilised as food by reabsorbtion and stored when food is plentiful. But colour cannot be materially altered by a change of diet.

COMMENTARY

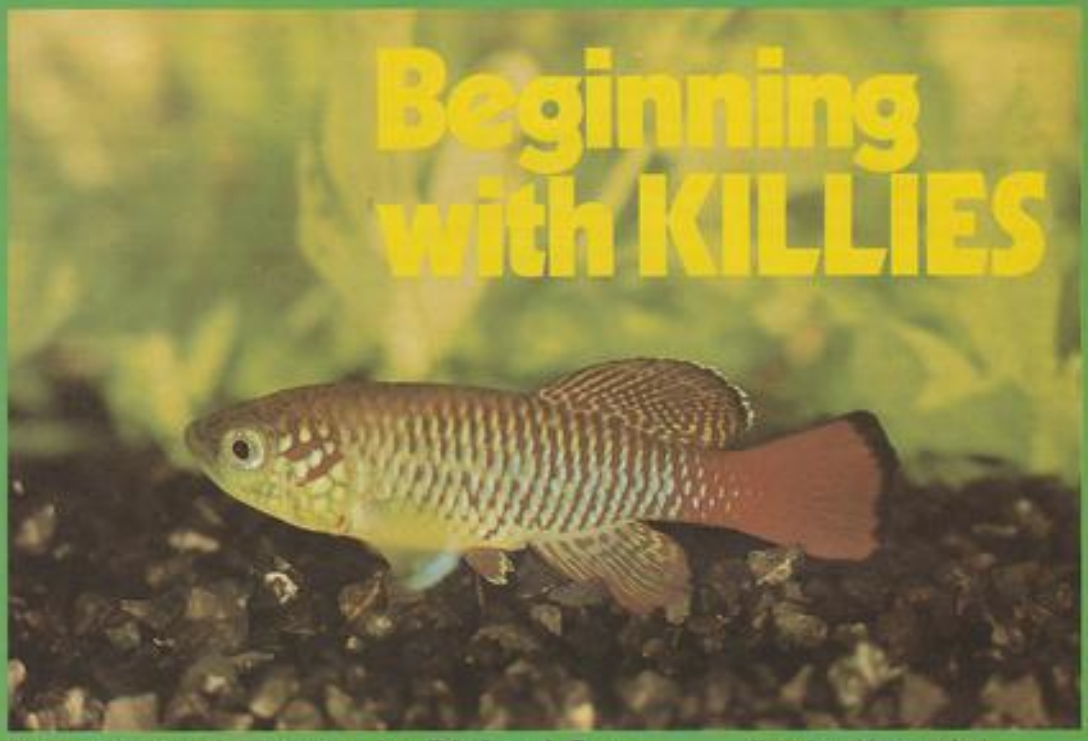
Continued from page 31

use. Those with an asterisk are most likely to come apart after a few weeks' sojourn in your tank, but the others are much less prone to disappoint. Easily the finest group of plants are the Cryptocorynes, and you can obtain types of suitable size and growth spread for literally any position in your tank. Tiny ones for the front, those which make impressive plantations in the middle ground, and those which can stand alone. Colour ranges from apple green to dark red. *Aglaonema* and *Echinodorus* species go well with them and are better able to resist attacks from hungry fish than most. Spend most of your money on these plants and you will, in the long run, be pleased with the effect. They all take some time to spread, but half the fun of aquarium keeping should be the monitoring of plant growth. The fish are not everything!

Of the Bunch species only *Bacopa* and *Hygrophila* are reliable, but both are very good and only need pinching out at the growing tip to encourage more bushy growth from below. *Sagittaria* and *Vallisneria* are pretty reliable plants for grouping, but do watch the roots. If these show any signs of rotting, reject them. In fact this criterion applies to any rooted plant, many of which are sold without proper foothold. If white roots are not present already it is unlikely that they will come after the plants have passed into your hands.

A plant which may give you something of a swelled head is Giant Vallisneria. Planted in a pot containing some loam it will probably present you with gigantic leaves over an inch wide. Some of mine are now over 5 feet long and I am almost persuaded that at last I have this plant growing difficulty under control!

Beginning with KILLIES



Nothobranchius guentheri

by Richard Cox

Members Advisory Officer
British Killifish Association

IN this short article I will try to give a simple introduction to killifish keeping and at the same time explode a few myths about killifish and their needs. Firstly let us discuss what we mean by the term killifish. It in fact embraces a group of fish of the family Cyprinodontidae which are commonly called the egg-laying toothcarps. They are found within the equatorial belts throughout the world and differ greatly from continent to continent. In simple terms they are divided into three main groups: the annuals, semi-annuals and non-annuals. The annuals live in the wild for a single season, hatching from eggs deposited in the mud of a dried up pond, growing and breeding before the pond again dries. Semi-annuals live in areas which sometimes dry out but at other times retain water through the dry season. The non-annuals live in permanent bodies of water and, in some cases, will live for anything up to five years. As an example of the great differences between the same groupings in different continents, the annual *Nothobranchius* of Africa are entirely different from the annual *Cynolebias* of South America. Such differences are to be found in the other genera throughout the world.

Now, perhaps you, like me, have always been interested in killies but have never been too sure about specialist associations due to lack of information. This situation faced me over ten years ago. I had been keeping and breeding fresh water tropicals with moderate success. I then ventured into the killie world via the organisation I belong to to this day and have never looked back. I have been continually fascinated by these beautiful and extremely hardy creatures. Truth to tell, I found that most species are infinitely easier to keep and breed than a lot of tropical species. In fact, if a species is kept alone in a well established tank, they will virtually look after themselves and reproduce at a steady rate for good measure.

Aquarium requirements

In the wild a lot of species are territorial by nature, the male defending his area against intrusion by other males. They mate with whichever females they can tempt into their territory, but of course some species shoal and will not satisfactorily reproduce unless kept in similar conditions. In the main, however, they can be kept in pairs or one male with two or three females. Accordingly, they may be kept in relatively small

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Press Release

King British Pool Formulas

AQUATIC specialists King British have developed a brand new range of five Pool Formulas to treat the most common problems in the garden pond. The new formulas for the ornamental pond and water garden are all simple and effective treatments designed to achieve more successful pool-keeping.

The five preparations in the new King British Pool Formula range are: *Safeguard.* A new water stabiliser which should be used every time new water is added to the pool, as well as when new fish are introduced. *Paracide.* An agent effective in destroying the free-swimming parasites which cause fish infections such as white spot or velvet infection. *Fungicide.* Fungus spores present in ornamental pool waters are another cause of distress problems in fish, especially after injury or at the end of the winter, when fish are particularly weak. King British Fungicide effectively destroys these harmful fungus spores. *Bactericide.* This controls the damaging bacteria in ponds which can easily harm fish suffering from open wounds. Bactericide should be applied to the water as well as directly on to the wound by holding the fish in a wet net and using a swab containing neat solution. *Disinfectant.* Water in ponds which have been without fish for some time will need treating and freshening up with King British Disinfectant before new stock are introduced. It can also be used to clean new plants before they are placed in the pool, and as a gentle treatment for mild injuries to the fish.

All five new King British Pool Formulas are packaged in 300ml containers in a range of colours identifying each individual preparation. Complete instructions for use are included on each Pool Formula label, as well as a handy measure guide.

For further information please contact: Keith Barraclough 0274 576 241 or Bob Rushton 01-404 5575.

Pond Products from Interpet

A GARDEN pool adds interest to the garden and is even more attractive if it incorporates water movement. Until now, fountain pumps have been rather expensive, but Interpet's pool pumps have a totally unique approach, which has already proved highly successful. The Interpet Fountain Set is ideal to add life to a small pool and retails for less than £22·00 including VAT. It gives a spray about 35cm (1ft) high using 240 litres of water per hour and comes complete with spray unit and pre-filter. The Interpet Magic Mushroom Set has a different and very attractive water pattern in an umbrella-shape using 1200 litres of water per hour and retails for just over £33·00 including VAT. These pumps work on the 'revolving magnet' principle and have only one moving unit. They are therefore both reliable and economical.

If the fish in the pool are properly fed and the water is sufficiently deep, they do not normally develop any diseases, but if they do, then some of Interpet's remedies and aquarium aids are ideal solutions.

Pontox is specially formulated for treating Fungus and Finrot on fish, while actually in the pond. This is a big advance on products, which are either dubiously effective or else which involve removing the fish from the pond, thus weakening them further when in an already weakened condition. Unfortunately, however, this product must be used with caution when plants are present.

Liquisil is a general tonic. The standard size treats 1200 gallons and the breeders size treats 4800 gallons. There is some evidence that Liquisil is effective against ulcers on coldwater fish.

White Stop is the best possible water treatment to attack the White Spot organisms. Simply add 1 drop per gallon of water and the problem should clear up in one or two days.

Furanace is the latest product for counteracting organisms causing Fungus and Bacterial Disease and is available in packs of 12 tablets to treat 54 gallons or in bulk (trade) packs of 600 tablets.

Paratox is another very modern product, which is very effective against Anchor Worm, Fish Lice, Gill Flukes, Hydra and other parasites.

Algaway is Interpet's product for clearing green water. A standard size bottle will clear 600 gallons in a few hours.

Tetra on TV

HEAD of the Tetra Information Centre, Dr. Christopher Andrews, was seen by millions of TV viewers when he appeared on the BBC children's programme, Saturday Superstore, on 31 March.

Dr. Andrews (30) was featured three times during the three-hour programme.

He spoke about the care of aquarium fish in conversation with programme presenter, Sarah Green, and later dealt with live telephone calls on aspects of aquatics. A large, fully-stocked aquarium was set up in the studio as a focal point.

Dr. Andrews also mentioned the service offered by the Tetra Information Centre, which handles hundreds of inquiries from aquarists each year, and its address was flashed on screen.

Beginning with KILLIES

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tanks compared with other fish of similar size. A tank measuring 12 in. by 8 in. by 8 in. will house a pair or trio of killies, in fact up to six of the smaller sized species can be kept and bred in a tank of this size. As a rule of thumb species under two inches in length will be happy in a tank of the above size, species of up to four inches, in a tank size of 18 in. by 10 in. and the larger species, such as *Aphyosemion sjoestedti*, should be housed in a 2 ft. tank. Not everyone will agree with these sizes, but if you want good size and good quality fish (and who doesn't?) the larger tanks usually produce larger specimens. Most killies in the wild are found in shallow water so the depth of the tank is not important. A depth of 6 in. is adequate but a closely fitting lid is essential. Killies are excellent jumpers and if you leave a gap in the lid I promise you they will find it. A lot of rubbish is often talked and written about water conditions for killies. Certainly in the wild most are found in soft, slightly acid water. However, experience has shown that they can be quite satisfactorily kept in whatever conditions are provided, within reasonable limits. The most important thing to remember is to acclimatise species to your conditions very gradually. I know that there is a desire to get new fish into a tank quickly, but this could be the death of them. Sudden changes of water conditions can cause gill injury or death due to shock, so do please take care. Provided you follow this advice, most killies will accept very hard alkaline conditions, but I don't for one minute pretend that they will reproduce in them. You may well find that you will have to soften and acidify the water before some species will breed. But again some species, such as the *Epiplatys* genus, will breed in nearly all conditions. So in relation to water, make up your mind what you are able to provide and stick to it. Don't tackle the more difficult species until you have mastered the easier forms. Personally, I have always used aged rainwater to which peat has been added for a short time. A word of warning here: always boil the peat before using it, thus removing a lot of the brown stain which leaches out into the water in too great a quantity if it is not boiled. The water, when ready for use, should be tinged slightly brown. In order to prevent disease I also add a teaspoonful of cooking salt to each gallon of water. I have always done this and have never suffered from any major outbreak of disease.

The question of tank decoration is a matter for the individual. Killies can be kept in bare tanks with a nylon wool mop as an egg spawning site. Merely bundle thirty or so strands of nylon wool, cut to 12 in. lengths, together, fold them in half and tie either a cork or other floating object in the centre and you will have a very useable spawning mop. However, you may prefer to keep planted tanks, in which case always be careful to select the right plants for the right conditions. Plants needing soft water will soon die in hard conditions and vice-versa. For years I kept bare tanks with either mops or Java moss as a spawning medium but in recent times have come to prefer planted tanks. I find that most killies breed perfectly well without any interference from me and will continually produce a stream of youngsters if kept well fed. They also display better colouring in a more natural environment. However, this is a matter of personal choice.

When dealing with annuals and semi-annuals the requirements are somewhat different. In the case of annuals only one male per tank will be possible as males tend to be very aggressive towards each other. They are better kept in a bare tank with just some cover for the females to hide in as males can also be very aggressive towards the females. They are hard drivers so try to aim at a ratio of two or three females to each male. But, in any event, do watch them closely. As a spawning medium I suggest boiled peat, although it has the disadvantage that the eggs are somewhat difficult to find. Place the peat in an 8 oz. size margarine tub, or similar container, with a hole of about 1½ in. cut in the lid to allow the fish to enter and leave.

With semi-annuals either method will usually bring results. They will spawn in either mops or peat fibre or both. So bare or planted tanks can be used provided that, in the case of planted tanks, the spawning medium is removeable to collect the eggs for 'dry' storage.

Temperature

On the question of temperature killies prefer a much lower range than the average tropicals. In fact if they are kept at too high a temperature they will soon let you know that they do not like it. Aim for a temperature of between 68° and 74°F. Only in a few species does a higher temperature have to be used.

Feeding

In the wild killies eat mainly terrestrial insects, aquatic insects, larvae and crustaceans. Accordingly, they do better on live foods but they will eat dry foods provided they are supplemented by live foods or high protein food such as minced beef heart. Favourites with killie keepers are Grindalworms, Whiteworms and *Tubifex* worms—although I personally do not recommend *Tubifex* as I feel that they tend to foul small tanks quickly—wingless Fruitflies, Daphnia, Cyclops and a favourite of mine, Bloodworms. Seldom will killies eat more than when bloodworms are provided. I try to feed these once a week.

Good quality flake food can be given, but do so sparingly. Remember you are usually only feeding two or so fish as opposed to the usual tankful. Many other foods can be used and are readily taken.

Breeding

Non-annual species can be dealt with in two ways. Firstly they can be left well alone in a planted tank and, provided cover is made available for fry, they will usually come to no harm left with the parent fish. Secondly, the eggs are harvested from the mops and incubated in small containers. Most hatch between 10 and 30 days after spawning, provided they are kept at the appropriate temperature. On hatching most fry need *Infusoria* (these are the small microscopic creatures found naturally in water) and can also take newly-hatched Brine Shrimps and Microworms. Always be careful not to overfeed, especially Brine Shrimps which quickly foul the water in the incubation containers. A lot of killie keepers use 8 oz. size margarine tubs for this purpose so you can see that fouling must be avoided. If too large a container is used the fry have difficulty in finding food and, thus, starve. In most species growth is moderately slow but sure and a lot will live for three to five years. As they increase in size move them on to larger containers until by the time they are half an inch long they can be transferred to an 18 in. by 10 in. tank. With semi-annuals, I find the best method is to collect the eggs, don't worry about handling them as they can withstand considerable pressure. Store them on moist peat at the required temperature. By moist I mean more wet than that described for annuals. Add water until you can see it between the particles of peat. Just place the eggs on this and you can watch their development with a hand magnifyer. The fry inside the egg will usually tell you when it is ready to hatch. As a general rule when you can see the fry's eye clearly then it is ready to hatch. Return the eggs to water and they should hatch within four to ten hours. More often than not, some will hatch within minutes of being returned to water. Feeding the fry is the same as for non-annuals but growth is very much quicker so food requirements are greater. Only experience will tell you how much to give.

Epiplatys singa

The eggs of most annual species have to be 'dried' and stored for anything between six weeks and nine months depending on the species. What do we mean by dry? Well by dry I mean damp, aim for the same dampness of freshly opened tobacco. Remove the peat from the spawning container using a fine mesh net to hold it. Then gently squeeze out all the surplus water. You will not harm the eggs. When all the surplus water has been removed place the peat and eggs into a plastic bag and seal and mark it. Then store for the appropriate

Aphyosemion sjoestedti Blue

Cynolebias alexandri

period at a temperature of about 80°F. A high shelf in the fish house or an airing cupboard will be suitable. When returning the eggs to water always be sure to add salt as a lot of annuals are prone to velvet so precautions are a must. After hatching they grow at a fantastic rate and some are able to spawn after only six weeks. They require a large amount of food but again do be careful not to overfeed.

If the eggs of either annuals or semi-annuals fail to hatch then re-dry them for two weeks or so and try again. In fact several waterings will be needed to hatch all the eggs due to what is called diapause. This is the ability of certain eggs to suspend development, and, in this way, ensure that, if the first rains are only brief, then eggs will remain unhatched to await the second rains.

Conclusion

There is nothing mysterious about killifish or the organisations which are dedicated to their advancement. They are no more difficult to keep and breed than any other tropical species. The only difficulty is in obtaining species. The average aquarist dealer cannot obtain stocks and, when they do, the price is usually very high. Within the organisation in this country there are usually 50 to 100 different species readily available to members.

Well, there you have it. In the space available I have tried to give a general but as full as possible introduction to killie keeping. I sincerely hope that some of you will be encouraged to venture into the world of killies and enjoy this aspect of fish keeping.

Here are a few species of the three groups which are considered suitable for the beginner:

Annuals. *Nothobranchius foerschi, Nothobranchius kirki, Nothobranchius palmqvisti, Nothobranchius guentheri, Cynolebias whitei, Cynolebias nigripinnis, Cynolebias bellottii, Aphyosemion filamentosum, Aphyosemion robertsoni, Aphyosemion deltaense.*

Semi-Annuals. *Aphyosemion gulare, Aphyosemion ndianum, Aphyosemion marmoratum, Aphyosemion puerzli, Aphyosemion amieti* and *Aphyosemion gardneri* although some populations are non-annual.

Non-Annual. *Aplocheilus panchax, Aplocheilus lineatus, Aphyosemion ahli, Aphyosemion calliurum, Aphyosemion striatum*—possibly the best for colour and ease of breeding—*Pachypanchax playfairii, Epiplatys bifasciatus, Epiplatys sexfasciatus* most populations. *Epiplatys roloffi.*

Of course there are many more this being only a small sample.

A COLLECTING TRIP TO THE CAMEROONS

by Rod Roberts *(Chairman—British Killifish Association)*

I SUPPOSE every aquarist's dream is to go on a collecting trip to one of the many countries in the world where the fish that we keep come from. This, in most cases, for one reason or another, is impossible, the main one being the cost; and if you have enough money, finding someone else with the necessary cash and the same enthusiasm as yourself to accompany you. This article deals with my collecting trip to the Cameroons—having previously collected in Sierra Leone and Nigeria in West Africa, and in Florida and Georgia, two of the Southern states of the U.S.A.

The planning for this trip started in Vienna in August 1982, whilst I was holidaying with Dr. Radda, well-known in the Killi and live bearer associations. He, with another friend of mine, Ed Purzl, had just returned from Zaire. They planned to return to Africa in 1983 and I was invited to accompany them. Their aim on this trip would be to try and rediscover an annual killifish from the North of the Cameroons—*Nothobranchius rubroreticulatus*—a species already described but not having previously been in the hobby. Nine people wanted to go, seven Austrians, a Frenchman and myself, so it was decided to split into three groups of three people each and fish the area over a six week period; *Nothobranchius* being an annual fish it would depend on the rains arriving, filling the temporary biotopes where they live, and (of course) the fish then hatching. A six-week period would give us a much better chance of success if the rains were late. Each party would fly to Douala and then take an internal flight North, fish for approximately one week and then return South, where each party would fish a different area to enable us to bring back to Europe as many different species as possible.

The Cameroons is a French speaking country so it was a must to have someone able to speak French in each group. I went with Ed Purzl and Dr. Hubert Peturka, who spoke excellent French; I was lucky as they both spoke English. The trip started for me on 25th July, when I flew to Geneva where I was to meet Ed and Hubert and catch the Cameroons Airways flight to Douala, which had started from Paris. Our tickets had been booked in Vienna and should have been waiting for us in Geneva but, to our dismay, were apparently still in Paris. However, we were allowed to board the plane and told they would be sent to Douala on the next week's flight. Not a good start but, as it turned out, we did indeed collect them the night before we flew home. After an uneventful flight we were met at Douala airport by a member of the second party, we being the last to go, and were transported to our hotel for one night. The following day we were due to fly North to Maroua. Over beers and food we discussed with the second party how they had fared. They, of course, had been met by the first group, who had flown to Maroua but had been unable to hire a car. They had, however, been able to hire one from Hertz at Garoua airport, about 100 Km from Maroua, so the second and third parties changed flights to Garoua.

We were up early on the Tuesday morning and after breakfast got a taxi to the airline office to arrange the change of flight. At 2 p.m. we left on a Boeing 727 for the North, approximately one and a half hour's flight. On arrival a Toyota Carina estate car was awaiting us at the Hertz office. The first party had found a cheap hotel on the outskirts of the town, about 10 Km from the airport, run by a French lady, so this was used by us all. After having cooked ourselves a hearty meal we adjourned to the bar for light refreshments and to discuss our plans. Although all our flights had been booked in Vienna, we had to go to the airport to get confirmation before each flight, but on visiting the airline office were told it was too early to get confirmation and we should return later, so we now headed North to Mora, some 180Km, to another small hotel which we would use as a base to fish to the North, East and West. The road from Garoua to Mora is tarmac and very good. We arrived about 6 p.m., cooked ourselves a meal and once again propped the bar up most of the evening. We got talking to a French engineer who had lived in the country a number of years. He told us that in rice fields to the East of us, running along the border with the Central African Republic, fish did appear after the paddy fields had been flooded. Could this be the *Notho-*

branchius we were seeking, or perhaps some other annual species? The following day we went off to investigate. We left at 8 a.m. travelling over very bad laterite roads (dirt tracks). We found the rice fields and indeed they could have been the home of our fish, but unfortunately the only thing we found were thousands of tadpoles and a type of freshwater shrimp. We did find cichlids in other biotopes but no killies. We arrived back at Mora about 7 p.m., very tired and perhaps a little disappointed. The rest of the week was spent fishing various other areas to the West of us along the Nigerian border, and up to N'Djamena (Fort Lamy) in the extreme North of the Cameroons, but again without any luck. During our time in the North it did rain on two occasions, very hard, but the temporary pools we were looking for had either not been filled with water, or we did not find them. We had the name of the village where the fish had been discovered but, as often happens in Africa, the name can change or the village can become abandoned when the soil is no longer able to grow crops. For whatever reason, we could not locate this village.

So our quest in the North came to an end; not entirely fishless as we did find *Epiplatys spilargyreius* near Maroua the day before we flew to Yaounde, and these we brought back to Europe alive, where they are now breeding.

The second week was to be spent fishing the South. We flew to Yaounde, hired a car and drove South to Zoetele, where we knew there was a Catholic mission which would, hopefully, give us accommodation for five days, enabling us to use the mission as a base, going out to a different area each day to fish and returning in the evening.

This part of the Cameroons is entirely different from the North, being rain forest, the ideal area for killies; so with about two hours of daylight left we were off fishing. About a mile from the mission we came across a very nice stream, shallow with very little flow, lots of overhanging plants. Waders were quickly donned, nets at the ready and into the water we went. It is very rarely that you see fish in the open water. To catch any kind of fish you need to thrust your net into the overhanging plants at the water's edge and stamp one foot through the plants towards the net, driving the fish into the net. Straightaway we were rewarded with a very beautiful population of *Aphyosemion exiguum*, *Barbus jai* and *Neolebias ansorgei*. The colours of all three species were truly outstanding. We fished one other biotope before it got too dark and again collected the same three species. Feeling very pleased with ourselves we returned to the mission. The fish were sorted out into species and put into bigger bags. Over a meal that evening with the priests who ran the mission it was decided that the following day we would travel South to Djoum, very close to the Gabon border, and hopefully stay the night at another Catholic mission, and whilst in this area look for *Aphyosemion batesi* and *Aphyosemion splendidum*, two semi-annual fish inhabiting this part of the Cameroons. The road from Zoetele to Sangmelima is tarmac. From then on it is dirt, but generally speaking in better condition than the dirt roads of the North. We left early and started to fish South of Sangmelima. In the first biotope we found *Epiplatys sangmelinensis*, though not in great numbers and very difficult to catch. Another biotope fished contained *Aphyosemion batesi*, one of the semi-annuals we were looking for. This biotope was heavily shaded by trees where hardly any sunlight penetrated. It was very muddy and shallow, 6 inches deep with small bush-like plants covering the bank, and again this was where fish were hiding. We collected approximately twenty specimens of semi-adult size (2½ in.). The problem with this species is that the males fight if kept together so we had to bag them separately. One other biotope was fished but contained no killies, so we headed for the mission at Djoum, who were able to give us accommodation for the night. As we were so close to the border we were advised to report to the police. Next day we left Djoum, heading in a Westerly direction before turning North for Zoetele. During the day we collected from five biotopes; all contained *Aphyosemion exiguum*, two contained *Epiplatys sangmelinensis*, one *Aplocheilichthys cameronensis*—which swim in the open water in shoals and are very easily caught—and one contained *Aphyosemion splendidum*, the other semi-annual we were looking for, but only two trios. The day was very interesting as we came across two pygmy villages where we spent a couple of hours. The pygmies are, of course, nomadic, only staying in one area as long as the game is plentiful. We arrived back at Zoetele in the evening, fish were rebagged and water changed on fish caught previously. The evening meal was taken with Fathers Charles and Pierre then, over drinks, plans were made for the following day, when we would fish the Ebolowa area, looking for

Pygmy village close to Gabon border

Aphyosemion cameronensis. We found two populations in very small streams only about 18 inches across, very shallow with a moderate flow of water. Also found was

another population of *Aphyosemion batesi*. I was fishing on one side of the road, Ed on the other. On my side the fish were all juveniles, about 1 inch long, but sexable; Ed was catching semi-adults of about 2½ inches from his side. The smaller ones were ideal —as I said earlier, the males fight. One more area was to be fished, Mbalmayo, to the North of Zoetele. Fish were taken from six biotopes; another population of *Aphyosemion batesi* was found very close to Zoetele on the main road to Mbalmayo, five more populations of *Aphyosemion exiguum* and an *Epiplatys* species. From West of Mbalmayo is the range of *Epiplatys esekanus;* to the South of Zoetele is *Epiplatys sangmelinensis*. The *Epiplatys* species we found approximately in the middle of the range of both these fish had the characteristics of both species so, perhaps, this could be a new species, subspecies, or a hybrid.

And so the fishing came to an end and the following day, Monday, we returned to Yaounde to catch the flight to Douala, stay overnight and return to Europe on the Tuesday. Monday morning was spent sorting and packing the fish. Our stay in the South had been short and I hope to return one day and fish this area more extensively. We had collected eight species of killies, including the *Epiplatys spilargyreius* from the North—three populations of *Aphyosemion batesi*, ten of *Aphyosemion exiguum*, two of *Aphyosemion cameronensis*, two of *Epiplatys sangmelinensis*, one of the *Epiplatys* species and one of *Aplocheilichthys cameronensis*. In addition we collected and brought back *Ctenopoma ansorgei, Barbus jai, Neolebias ansorgei*, a *Nancharax* species, various species of cichlids, *Parauchenoglanis macrostoma*—a catfish—and a *Hapsetus odoe*, one of the pike characins. Very few fish were lost whilst in the Cameroons and I lost eight on the journey home.

We travelled by car approximately 3,500Km. Luckily for us the milometer was not working in the car we hired in the North so Hertz only charged us for 1,000Km—Garoua to N'Djamena and back, but of course we did many more miles than this. Even so, hire of both cars, including petrol and insurance, cost £650.

I would like to thank Ed Purzl and Hubert Peturka, my two Austrian friends; Father Charles and Father Pierre, the two French Priests who run the mission at Zoetele for all the help they gave to three total strangers who suddenly descended upon them (they fed us, kept us supplied with drinks and generally looked after us, telling us much about the country); and my wife for allowing me to go.

Aphyosemion batesii

A. cameroneuse

Biotope: ***A. cameroneuse*** **with Eduard Pürzl in background**

Company Profile

Roman Tropicals

Roman Tropicals' colourful shopfront

As readers will know, we regularly make a point of praising individuals, companies and other establishments who place the quarantine and care of their stocks high up on their list of priorities.

After meeting Yehuda and Rosaline Raz, the owners of Roman Tropicals, discussing their operation and seeing their water treatment set-up and quarantine facilities, there is no doubt that they give this aspect of their business top priority.

At any one time, Roman Tropicals hold upwards of 5,000 fish, plus numerous invertebrates and amphibious reptiles. Looking after such varied stock can, obviously, present considerable problems and health risks.

The approach to these potential problems taken at this shop is both simple and logical. Stocks are divided into three systems: (i) marine fish, (ii) marine invertebrates and (iii) freshwater tropical fish and invertebrates, with each system working individually on continuous aeration/filtration/sterilization as follows:

At the bottom of each stand of aquaria is a large reservoir tank from which water is circulated to the "sale" tanks via a cartridge filter, a sand filter and an ultra-violet sterilizer. Oxygenated, clean and pure water is fed from above into the tanks, each of which is fitted with overflows that channel the water back into the reservoir prior to starting the cycle all over again, at a rate of 3,000 gallons per hour.

The result of all this is that the fish (most of which have already been quarantined before arrival at the shop) were in tip-top condition when we visited the shop. Their colours were good (aided by well-chosen lighting), their deportment bright and their state of health self-evident. Talking to some of the customers elicited generous complimentary comments—always an excellent indicator.

An interesting "bonus" is provided for the enjoyment of visitors by the use made of the freshwater tropical reservoir tank. This houses some of the more unusual "giant" species, well-known to hobbyists but outside the scope of most home aquaria. Notable among these is an Amazonian *Arapaima gigas* which is among the largest freshwater fish known to science. The specimen at Roman Tropicals, even at about 4 feet in length, still has a lot of growing to do before it reaches full size at around 7-8 feet. Other occupants of this tank are a massive Giant Gourami (*Osphronemus goramy*), a very large Snakehead (*Ophicephalus sp.*), several full-grown Oscars (*Astronotus ocellatus*) and a selection of large Catfish—a most impressive collection by any standards.

The quarantine section, consisting of a large number of medium-sized aquaria, is situated in a room behind the marine fish stand. In these tanks, fish that have not previously undergone quarantine are kept until a thorough check on their health is carried out. Any fish which require individual treatment are also housed in this section and treated accordingly until they are clear of the disease and fit for sale.

Moving on to the actual selection of species offered for sale, the choice was quite staggering during our visit. The freshwater tropical section alone was represented, in addition to all the usual "bread-and-butter" species such as Guppies, Swordtails, Platies, Neons, Angels and the like, by a host of more unusual species. These included Porthole Catfish, Flagtail Portholes, Snakeheads, Brilliant Red and Turquoise Discus, Celebes Rainbows,

View inside the shop. Part of the water treatment system can be seen in the foreground

***Arapaima gigas*, one of the interesting giants on show at Roman Tropicals**

Frontosas, Plecos, Piranhas, Uarus, Talking Catfish, large Monos, several Dwarf Cichlids, Red Lobsters, Blue Lobsters, African Turtles, Red-eared Terrapins . . . and so on.

On the marine side, the selection was equally impressive, including a wide variety of Tangs, Wrasses, Blennies, Groupers, Butterflies, Angels, Scorpion Fish, Clowns, Damsels and (even) a Cat Shark. The invertebrate section was represented by corals, anemones, living rock, tube worms, hermit crabs, sponges and others, while the marine plant section (very unusually) offered five species of marine algae, including several *Caulerpa*.

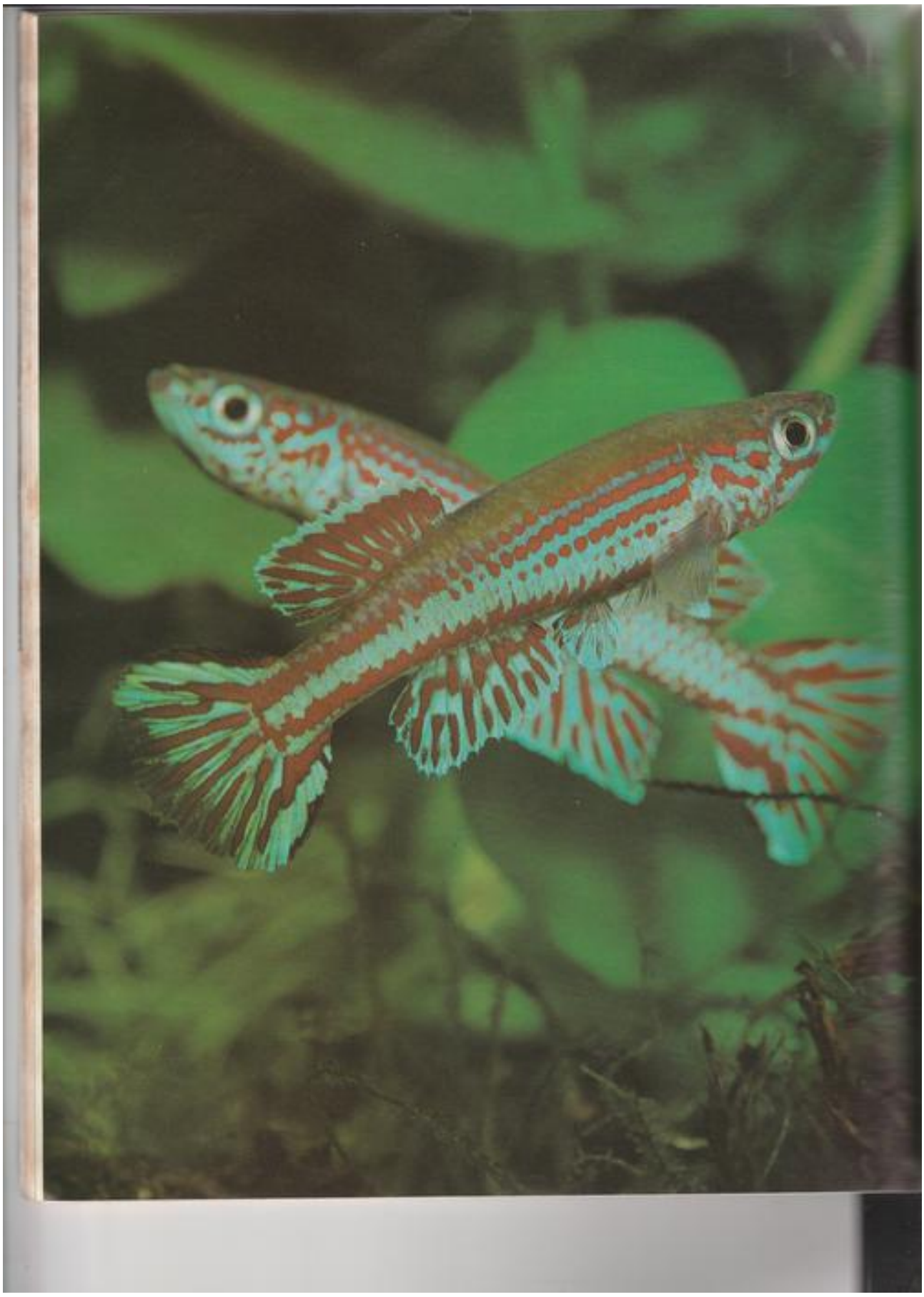
In addition, there was an extensive selection of freshwater (coldwater and tropical) plants and livefoods, such as Bloodworms, Glassworms, Daphnia, Tubifex, Adult Brine Shrimp and (interestingly) live River Shrimps.

In the Dry Goods section one can find products from most of the major manufacturers, ranging from items such as simple heater/stat suckers to the most sophisticated filter. Also available is a small selection of aquarium books.

The first floor houses the aquarium showroom in which customers can browse before making their selection and where a range of custom-built tanks are on display. This part of the business is really Yehuda Raz's domain. It was obvious, both from the models on show and from our discussions, that Yehuda's imagination knows no bounds. He can build a tank to fit virtually any space, irrespective of shape or size. Pride of place at the moment goes to a magnificent cylindrical tank which measures 3 feet in diameter and has its own specially-built cabinet and hood. Most commissioned tanks can be constructed and supplied within a week. If they require a stand or cabinet as well, then it can take a little longer. The shop has its own tank-building department situated across the road, so there are no in-built delays in the system.

If you would like to visit or contact Roman Tropicals, you can do so at 477 Roman Road, Bow, London, E3. Tel: 01-980 0607 or 01-981 4475.

★★★★★★★★★★★★



SPOTLIGHT

Aphyosemion ogoense ogoense Pellegrin, 1930

by Rod Roberts
(Chairman—British Killifish Association)

PRONOUNCED A-fi-oo-see-mie-on O-goo-en-se, named after the Ogoense River in Gabon. Sub-species—*Aphyosemion ogoense ottogartneri; Aphyosemion ogoense pyrophore.*

The genus *Aphyosemion* is the most widely kept of all the egg-laying toothcarps. They range from Ghana to Zaire. At the present time discussion is going on as to whether the genus *Roloffia* should also be included in the *Aphyosemion* genus, and if it is proven that they should, then their range will be extended to Gambia.

Generally they inhabit the coastal rain forest areas, and some species are subject to drought so they have evolved in a very similar way as the *Nothobranchius* species of East Africa in that they lay resting eggs. This is especially so of quite few species from Nigeria and the Cameroons, whose eggs have to be dried in damp peat moss, and can take anything from 6 weeks to 4 months development before they are ready to hatch. But most of the *Aphyosemion* species have a 14-24 days hatching period, fry needing to be fed straight away, some needing infusoria as a first food but most starting off on freshly hatched brine shrimp and micro worms.

The biotopes are generally small streams and brooks with very little flow on the water; which is normally very soft and acid. Fish can be kept in our tanks in much harder water but will certainly show off their magnificent colours and spawn better in conditions much nearer to their natural environment.

The *Aphyosemion ogoense* super-species consists of ten species and sub-species, inhabiting Gabon and the Congo. They are: *Aphyosemion ogoense, thysi, louessense, schluppi, wachtersi, buytaerti, pytophore, caudofasciatum, ottogartneri* and *mikae.* They are all smallish species and are not the easiest of fish to breed. Although *Aphyosemion ogoense* was described as long ago as 1930, it has only just recently become available in the hobby. Thanks for this must go to John Buytaert of Belgium, who has collected in the Congo on several occasions and in 1979 brought back to Europe 2 populations, RPC206 and RPC207. In 1980 Edward Purzl and Otto Hoffman of Austria also brought back populations from the Franceville area of Gabon. One of the populations collected by Purzl and Hoffman in Gabon is almost identical to the coloured photograph, but I am pretty sure that it is, in fact, RPC207 from the Congo. The different populations will cross so it is of the utmost importance, if we are to keep the populations pure, to always use the code number or location, and never interbreed with another population.

The male, as you can see, is a very beautiful fish, but as with most killifish the female is rather drab, having a brownish body with small red spots, fins having a slightly reddish tint. A tank to house and breed a pair need not be large, 16 in. × 8 in. × 8 in. being sufficient. I have peat moss covering the bottom. They are not the showiest of species and like a tank with subdued lighting in a quiet corner of the fish house. In these conditions you need plants that do not need a lot of light. I find Java Fern (*Microsorium pteropus*) and Java Moss (*Vesicularia dubyana*) gives cover, and the fish will pay their eggs on the Java moss. Eggs can be collected and put into small containers with water from the parents' tank, and should hatch in 14-21 days. I have two populations; in one I have fry that have hatched in the tank with the parents, but in the other tank no fry have appeared, obviously this pair eat them—as you can never find every egg laid. They are not prolific spawners, a few eggs a day and you are doing well. Another method for egg storage which I use with any eggs that I am having trouble with fungussing in water is capillary matting, which can be bought from a garden centre. I cut two strips approximately 2 in. × 1 in, wet both pieces, lay the eggs in rows on one piece, cover it with the other piece and put them into a small plastic box—I use car distributor point boxes. Any eggs that fungus will not effect the other eggs; and you can watch the eggs developing, putting them back into water when

A-Z of the Aquarium

Carps

CARPS belong to the Family Cyprinidae which has around 270 genera and 1,600 species. Of the 270 genera, only four contain fish commonly known as Carp. These are *Cyprinus*, *Carassius*, *Ctenopharyngodon* and *Hypophthalmichthys*.

Cyprinus carpio is found in a variety of forms, the best-known being the Common, Mirror, Leather and King Carps (valued primarily as food fish) and, of course, Koi (valued exclusively for their ornamental qualities).

The genus *Carassius* is represented by the Crucian or Bronze Carp (*C. carassius*), the Golden Carp (*C. auratus auratus*—much better known as the Goldfish) and the Gibel or Prussian Carp (*C. auratus gibelio*).

The Gibel Carp is the European, or "Western", subspecies of *C. auratus* while the Goldfish is the Chinese, or "Eastern", one. However, Goldfish have now been introduced into so many waters that the difference between the two subspecies may have disappeared in many localities. Further, close similarities between these and the Crucian Carp can make identification a real nightmare. For the record, the Table summarises some of the most significant characteristics of all three fish. The data is, largely, extracted from Alwyne Wheeler's, *Freshwater Fishes of Britain and Europe* (Kingfisher Books, 1983).

The Grass Carp, *Ctenopharyngodon idella*, is a large (1·25 m) slim-bodied fish, originally from China, but now widespread as a food fish and as a form of biological control of filamentous algae and other aquatic plants.

Another algae eater is the Silver Carp, *Hypophthalmichthys molitrix* (also from China) which has now been introduced into numerous waters where it feeds exclusively on free-floating algae.

Scientific Name	*Common Name*	*Size*	*Dorsal Fin Outline*	*Dorsal Fin Branched Ray Count*	*Lateral Line Scale Count*	*No. of Gill Rakers*
Carassius auratus auratus	Common Goldfish	30 cm. (12 ins.)	Straight to concave	15-19	27-31	35-48
Carassius auratus gibelio	Gibel Carp Prussian Carp	36 cm. (c. 14½ ins.)	Straight	15-18	28-32	39-50
Carassius carassius	Crucian Carp Bronze Carp	50 cm. (c. 20 ins.)	Convex	14-21	31-36	26-31

Dipneusti

Lepidosiren

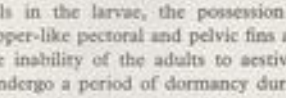
THE Dipneusti are commonly known as Lungfishes. They are fascinating fish, not only because of their unusual behaviour (see below) but because of their physical characteristics which make them difficult to classify above the Family level.

According to Berg (1940), the Lungfishes belong to the Class Dipnoi. However, in Romer's (1966) opinion, they constitute the Order Dipnoi. The classification followed here is that adopted by Nelson (1976), following the pattern set by Moy-Thomas and Miles (1971) and others and is one of the most widely accepted.

According to these ichthyologists, the Dipneusti form a Subclass of the Class Osteichthyes (the Bony Fishes), distinguished by having one of the skull bones (the palatoquadrate) fused to the lower neurocranium (the lower part of the brain case).

The Subclass consists of three Orders, the Dipterimorpha (extinct since the Triassic), the Ceratodiformes and the Lepidosireniformes. The Order Ceratodiformes is represented by just one Family, the Ceratodidae consisting of the single species *Neoceratodus forsteri*, the Australian Lungfish. Besides its geographical distribution, it can also be separated from other Lungfishes by the absence of external gills in the larvae, the possession of flipper-like pectoral and pelvic fins and the inability of the adults to aestivate (undergo a period of dormancy during the hot, dry summer months).

The Order Lepidosireniformes consists of two Families, the Lepidosirenidae represented by the single species *Lepidosiren paradoxa* (the South American Lungfish), and the Protopteridae consisting of four species of *Protopterus* (the African Lungfishes).



Neoceratodus

Protopterus

Both the South American and African Lungfishes have filamentous pectoral and pelvic fins, have larvae with external gills and aestivate during the dry season in mud/mucus cocoons. They can, however, be told apart by the number of gill arches and gill clefts that they possess. *Lepidosiren* has five gill arches and four gill clefts while, in *Protopterus*, the figures are six and five respectively. In addition, *Lepidosiren* has a more elongate body and a rounder caudal fin.

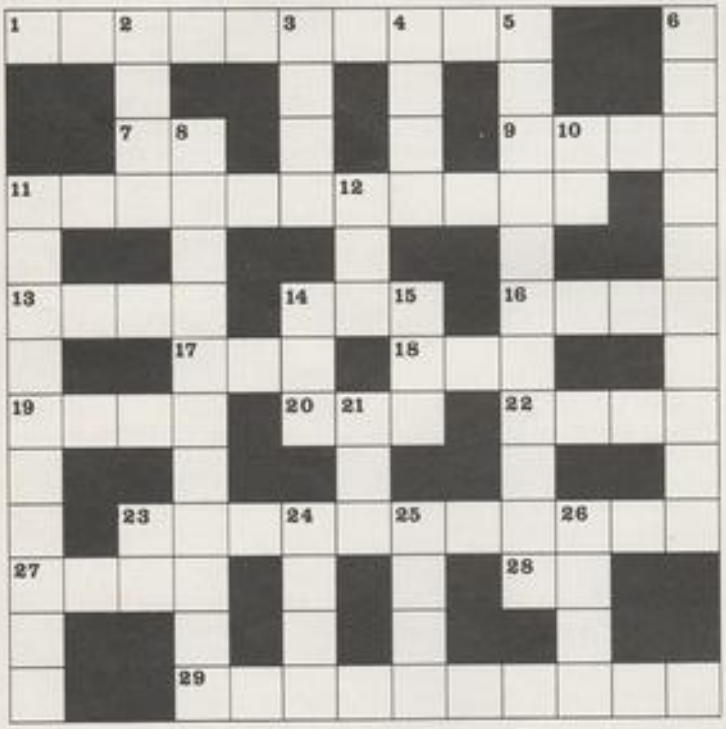
All Lungfishes, as their name implies, can breathe atmospheric air. They do so by means of an air bladder which is paired in *Lepidosiren* and *Protopterus* and unpaired in *Neoceratodus*.

SPOTLIGHT

the embryo is fully developed. This method can be used for not only the 14-21 day species but also for the semi-annuals taking 6-12 weeks, and also the annual species taking three months plus. The fry, on hatching, are very small and require infusoria for the first few days, then graduating to freshly hatched brine shrimp and micro worms. Growth rate is very slow. Weekly changes of water will keep your fish healthy and happy.

The two sub-species coming from the same area of Gabon and the Congo as *Aphyosemion ogoense* need identical conditions. If you are fortunate enough to acquire any of these species and are unable to get any eggs, then experiment: move the tank, try a mop, perhaps a shallower tank suits your pair, raise or lower the temperature; the list is endless of what you can try. I often hear people say 'My fish won't spawn' but when you ask them what else they have tried the answer is 'Nothing'.

CROSSWORD *by Isis*



CLUES

Across:

1. In a gay tank in East Africa (10)
7. Waveform abbreviated (1, 1)
9. Rags for spearmouted fish (4)
11. Genus for 9 (11)
13. Spotted Danio named after him (4)
14. Congratulatory tap (3)
16. Fish like *Monocirrhus?* (4)
17. Fish in March? (3)
18. Snakelike fish (3)
19. Stingy—average? (4)
20. Hide treatment (3)
22. Old Spanish colony (4)
23. Rummy Tetra might appropriately enjoy this (4, 7)
27. Lower unpaired fin (4)
28. Would be executive officer (1, 1)
29. Swamp near 1 (10)

Down:

2. A low tide (4)
3. One rope holds the fiddler (4)
4. Shortened time period (4)
5. A languid lie for eels (11)
6. Fit as a crew, this continental part (4, 6)
8. Midas cichlid (11)
10. Copper coin of arsenic? (2)
11. Home of Soda Lake Tilapines (4, 6)
12. Fish environment (3)
14. Oscar perhaps this (3)
15. Reverse fish catcher (3)
21. Curve muddled transport (3)
23. Each year? (1, 1)
24. Shout (4)
25. Eager (4)
26. Long chair (4)

Solution on page 60

ANNOUNCEMENT

In the "Your Questions Answered" section of our February issue it was suggested that any Killifish queries should be forwarded to Mr Ken Dosser of Burton Stone Lane, York. Unfortunately it appears that Mr Dosser passed away several months ago and we apologise for any inconvenience or distress caused by this error. Information on this species may now be obtained from Mr Richard Skoltock, 19 Bantam Grove Lane, Morley, Leeds, West Yorkshire LS27 8PQ.

Catfishes

THERE are about 2,500 species of Catfish. This large number has inevitably led to considerable debate, disagreement and confusion as far as the classification of this large Suborder of fish is concerned. For example, there is disagreement even over the use of the word "Suborder" since, according to some ichthyologists, Catfish constitute an Order, the Siluriformes, all by themselves. In the opinion of other workers in the field (e.g. Fink and Fink—Zoological Journal of the Linnean Society, Vol. 72, No. 4, 1981), the Order Siluriformes consists of two Suborders, the Siluroidei (the Catfishes) and the Gymnotoidei (the Electric Eels and Knifefishes). This, in accordance with recent trends, is the classification followed here. It, therefore, differs significantly from that of Chardon (1968) who proposed seven Catfish Suborders.

Greenwood et al (1966) gave the Catfishes the status of an Order consisting of 31 Families. The most recent classification subsumes two of these Families, the Akysidae and Cranoglanididae within the Amblycipitidae and Bagridae respectively.

To summarise, the Catfishes constitute the Suborder Siluroidei of the Order Siluriformes, represented by 29 Families, made up of 400-500 genera with about 2,500 species.

In keeping with this latest classification, an earlier Catfish item dealt with in this series, (Ictaluridae), should, therefore, now be "reclassified" accordingly.

The vast majority of Catfish are found in South American freshwaters. One Family, the Ariidae, is entirely marine (130 species), along with just under one half of the 38 species which constitute the Family Plotosidae. The smallest Family is the Heteropneustidae (1 or, at most, 2 species) while the largest by some considerable margin is the Loricariidae (600 species). One particular genus of Catfish, *Corydoras*, (with about 100 species) figures highly in any list of popular aquarium fishes. Along with related genera, it constitutes the Family Callichthyidae.

Although *Silurus glanis* (Family Siluridae), the European Catfish or Wels, is the longest freshwater fish known (it can, reportedly, measure up to a maximum of 5 metres!), the majority of Catfishes only grow to 10 or 12 cms. in length. This, coupled with their hardiness, relative peacefulness, harmlessness (with notable exceptions, such as the poisonous *Noturus* species) and adaptability makes many Catfish highly desirable as aquarium fishes.

***Pimelodus pictus*, the 'Angelica Pim,' is a good aquarium species. Photograph courtesy of David Sands**

Diseases

A HEALTHY fish is one that lives in balance both with its environment and with the pathogenic (disease-causing) organisms around and inside it. As long as this balance is maintained, a fish may be carrying potential pathogens but will not succumb to them. In fact, every fish is in regular contact with such organisms. Even in sterile conditions, fish will have some potential pathogenic organisms inside them.

There is, therefore, a safe "load" that fish can carry. It is when the balance referred to above is shifted beyond its tolerance limits that an outbreak of disease can, or will, occur.

Numerous factors can be responsible for shifting this balance, particularly within the confines of an aquarium.

Perhaps the most common of these comes under the general label of "stress". A stressed fish can be regarded as one experiencing some form of excessive pressure caused by adverse conditions. Chilling, overheating, overcrowding, overfeeding, lack of oxygen, excess of carbon dioxide, too high/low a pH, water that is too hard/soft, excessive illumination and countless other parameters will place a fish under the sort of pressure that will cause its resistance to pathogens to be lowered sufficiently for a disease to take a hold.

When this happens, one or more of the three main types of diseases will develop:

Pre-weakened fish, such as the male with damaged fins (bottom right), are more likely to succumb to disease than strong, healthy specimens

1. **Parasitic infections** can be external or internal. External ones, such as White Spot or Fungus, often affect pre-weakened fish like those recovering from another disease or those which have been subjected to chilling (White Spot) or have been injured (Fungus). Most external infections can be treated with proprietary remedies. Internal parasitic infections are usually only diagnosed after death. They, therefore, present a more serious problem.
2. **Bacterial infections** often attack fish that are kept under poor conditions. Among the most common are Fin Rot, Hole-in-the-Body, Mouth Fungus (despite its name) and Fish Tuberculosis. Bacteriocides and antibiotics will tackle such infections but cannot guarantee success.
3. **Viral infections** are sometimes the most difficult to diagnose. Some, like Lymphocystis, cannot be reliably treated. Others, like Fish Pox, are not normally fatal and may cure themselves spontaneously.

Meet the Societies

GOLDFISH SOCIETY OF GREAT BRITAIN

The G.S.G.B. logo

A globe eye

THE G.S.G.B. was formed in 1948 with the aim of bringing together aquarists who were interested in the "keeping, breeding, showing and study of all characteristics of the Goldfish (*Carassius auratus*)." This aim is taken to embrace all the other main variations of the original "wild-type" Goldfish.

Despite the "Great Britain" part of its name, the G.S.G.B. has members in U.S.A., Germany, Denmark, Japan and Spain. In UK alone, there are about 150 members dispersed far and wide as one would expect from a "National" Society such as this one. Regional identity is being encouraged through the formation of local Groups. At the moment, there are three, based in Scotland, Essex and Portsmouth. Full details of these are available from Tony Barnes, the G.S.G.B. Secretary (see below for address).

"National" G.S.G.B. meetings are held quarterly at the YWCA Central Club, Great Russell Street, London WC1B 3LR. At these meetings (which start at 2.30 p.m.), there are lectures and discussions given by, and between, members and Table Shows where members can exhibit their spawnings, thus presenting an excellent opportunity for newcomers to the Society to see what others have achieved. The opportunity is also taken at such meetings to train Judges for the major Shows and Exhibitions held throughout the country. In addition, at least one professional speaker per year is invited to address the membership on one or other of these occasions.

All members receive five information-packed Bulletins every year. These contain details of Society activities, the results of studies carried out by members, technical papers on specialist themes, and so on.

A much sought after G.S.G.B. publication, by members and non-members alike, is the Standards Book (always available from the *Aquarist & Pondkeeper*). Five other booklets have also been produced and are available for sale on a members-only basis.

Other important G.S.G.B. activities include their highly successful annual Convention and Show where an auction of "surplus" fish always generates tremendous interest.

Subscription Rates: Single Membership, £5·00; Joint Membership, £5·50; Junior Membership, £3·00; Joining Fee (all members), £2·00.

Apply to: Mr. Tony Barnes (Secretary), 10 Lower Farlington Road, Farlington, Portsmouth, Hants.

BRISTOL TROPICAL FISH CLUB

The B.T.F.C. logo

Betta splendens

THE Bristol Tropical Fish Club, which is affiliated to the F.B.A.S., was founded in November 1953 with an initial membership of 35.

Its original aims were to set up a Society for the "promotion of interest in the care and breeding of tropical fish". These aims still remain valid today, even though coldwater enthusiasts are also catered for. For example, there were 4 Coldwater Classes and 25 Tropical ones at last year's Show which attracted a total of about 200 entries overall.

Over the years, B.T.F.C. has played a prominent role in generating interest in tropical fishkeeping in the Bristol area by setting up display aquaria in department stores, cinemas and schools. In addition, B.T.F.C. was awarded a Silver Gilt Medal in each of the years 1955-58-59-60 for its exhibits at the Bristol Flower Club. Gifts of aquaria and accessories have also been made from time to time to local hospitals.

The first Open Show was staged in 1961. It was a two-day affair which proved so successful that it was decided to make it an annual event. This is still the case, even though (following current trends) it has been cut down to a single day's duration.

Efforts to provide a service to members are reflected in the activities that take place at the monthly meetings. These are held on the third Thursday of every month at The Black Horse, West Street, Old Market, Bristol, commencing at 8.00 p.m. Included in the varied programme are lectures by visiting speakers, film and slide shows, F.B.A.S. "Aqua-Talks" and a Club Shop where equipment can be bought at favourable prices. A comprehensive library is also provided for members.

Other facilities available are a monthly Newsletter and the opportunity to attend major Fish Shows and shops through organised outings. Prospective members are welcome to attend two meetings without any obligation before they make their final decision to join B.T.F.C. or not.

Subscription Rates: Adult (Single) Membership, £3·00; Joint Adult Membership, £3·50; Junior (10-16) and Senior Citizens, £2·00.

Apply to: Mr. T. E. Davis, 264 Badmington Road, Coalpit Heath, Nr. Bristol BS17 2QW. Tel: Winterbourne 775432.

WHAT IS YOUR OPINION?

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

'Photographs by the Author'

"I HAVE WANTED to write to you for some time," writes 17-years-old Mr. R. Knaggs, of 70 Hallam Grange Rise, Sheffield. He continues: "I have had a 24 in. tank for over 12 months and have progressed through the normal community livebearers and tetras to firemouth and blue acara cichlids. The firemouths have both turned out to be males after being sold as a pair; and because of the increasing aggression I have decided to save up for a 48 in. × 15 in. × 18 in. deep tank.

"I have had a red-finned shark since I first started keeping tropical fish. It started at 1 in. and is now 4 in. long. It is very impressive—if a little aggressive; but I can see its confusion when it tries to chase off the larger 3½ in. firemouth, which is now beginning to retaliate. In the January issue you asked for the name of an unidentified plant. I have one in my tank. It produces little plantlets on the ends of its leaves. I do not know its name but it was supplied by Gordon Palmer, of The Aquarium, who supplied it as a substitute plant. It is not growing too well because my U/G filter tends to stunt plant growth. My present 24 in. tank is lit by a 15 watt Natura-Lux tube which certainly shows up the fish well. I used an outside Twin Cascade Filter by Interpet once, but it didn't seem very effective and was difficult to fit because of the hood and depth of water below the top of the aquarium.

"I have experienced trouble with algae which grow in green rings on my plants. Conventional algal treatments did not seem to have any effect and so I bought a *Plecostomus;* but even this could not scrape it off. (Photograph 1 shows an unusual view of the underside of a *Plecostomus.*) The only visible change after using the algal treatment was the appearance of floating clumps of algae, and floating strands which covered the water surface in two weeks and which I couldn't seem to get rid of completely.

"I have bred dwarf gouramies and reared 12 to maturity. The male is very active and builds a bubble-nest every two to three weeks. The fry were difficult and expensive—I used Infusil tablets—to rear and so now I let the tiny fry be eaten by the female, or just die. There are snails in the gourami tank: they came in as ramshorn snails on the plants but have become dwarfed and never grow more than 3 mm. across.

"I received a camera for my 17th birthday last year and am experimenting with fish photography. I enclose a photograph of my darkly-coloured firemouth. The picture was taken on Fuji 400 colour film with an Olympus OM 10 camera with 35-70 mm. Zuiko lens with a three diopter close-up lens." (The photograph sent to me by Mr. Knaggs was quite good and showed off well the dark colours of the firemouth. Unfortunately I do not have space to publish it. B.W.)

I don't think I've ever received a letter for this feature written by three people—until now. R.G., D.F. and A.G. Gowing wrote to me from 165 Oak Tree Lane, Bournville, Birmingham B30 1UH. "As regular, though not long-standing, readers of your articles we have decided to respond to your appeal for correspondence in the hope that our experiences will be considered of interest to other readers.

"When we set up our first tank almost two years ago we took the advice of one of our local retailers—particularly with regard to equipment—and purchased a 24 in. tank complete with under-gravel filter, aluminium hood, fluorescent light and single outlet pump. We now consider that economics played a large part in the recommendations made by the retailer. We selected our fish after having read books on the subject, and although we were basically satisfied, it soon became apparent that many improvements could be made.

"After about a year, during which time we had gained much valuable experience, we decided to embark on an improvement programme. We began by purchasing a 27 in. John Allan 'Panavision' aquarium complete with a plastic hood incorporating a completely enclosed fluorescent lighting unit. We dispensed with the under-gravel filter, although we retained the air-lift tube which we used with an air stone and double-outlet Whisper 600 pump. The purpose of the air-lift tube was to control the flow of bubbles. For filtration we decided on an Eheim 2011 external power filter, and decided

Plecostomus sp.

Fancy goldfish

to retain our original Springfield 'Mariner' heater/thermostat. The advantages of the change over we find to be as follows. The excess water movement around plant roots, caused by the U/G filter, inhibits plant growth. With the external filter, plant growth has been improved beyond all expectations. Obviously with any system we have found that some plants are more suitable than others, and have also found that pot-grown plants, although more expensive, have a better root system to begin with and therefore a better chance of survival. We use plant food on a regular basis. With the use of an external filter, apart from the elimination of water movement below the gravel, the tank remains cleaner and more pleasing to the eye below gravel level.

"All items of electrical equipment are now wired individually to a four-way distribution board—available from any electrical retailer, or most supermarkets—and any item can therefore be disconnected easily by pulling out a plug and completely removed from the tank for maintenance—of either the tank or the item itself. The tank stands on a furnished wooden cabinet—we originally had an angle-iron framework—and the elimination of all metalwork is obviously an important safety factor. The cabinet on which the tank is now standing has an enclosed compartment which houses the filter, and therefore no working parts are visible when viewing the tank. We know from experience that with the type of external filter we are now using it is essential to have double disconnecting taps in both the inlet and outlet pipes in order that the filter can be completely disconnected and removed for cleaning, without water spillage from either the filter or the tank. This also provides a means of siphoning water from the tank when making partial water changes. Another considerable advantage with the John Allan tank is the sliding glass condensation trays—as opposed to the flimsy plastic trays we used originally. The glass trays are more convenient for feeding and cleaning, and the water evaporation is negligible.

"Despite the many changes to our set up we have lost very few fish and still have eight of our original 10 neon tetras, which are now approaching two years old, which we are led to believe is about their life expectancy. We have accumulated an interesting collection of catfish, including some of those which are more difficult to obtain, e.g. *Corydoras elegans, C. julii, Synodontis angelicus*—about which we wrote to you some time ago. He is very useful for controlling the snail population and is completely harmless to the other occupants of the tank.

"We did at one stage have an algae problem in our original tank. We now know that sufficient light to encourage good plant growth also encourages green algae, and we have therefore virtually eliminated our algae problems in the new tank by giving plenty of light—thus discouraging brown algae and encouraging (higher) plant growth, and at the same time adding a regular treatment of algae inhibitor to control any green algae which may occur. Good plant growth provides plenty of shade so that the fish are undisturbed by long periods of artificial light—approximately 15 hours per day—and the few snails which survive the attentions of our *Synodontis* (alias 'Dumbo') serve to keep the plant foliage clean. Since the snail population is maintained by in-tank breeding we are not worried about the introduction of disease into the tank via the snails.

"While on holiday we used vacation food blocks and next year we intend to fit a timer in the lighting circuit—a case of merely plugging the timer into the distribution board—and with the use of vacation blocks our fish will be completely self-sufficient during our absence.

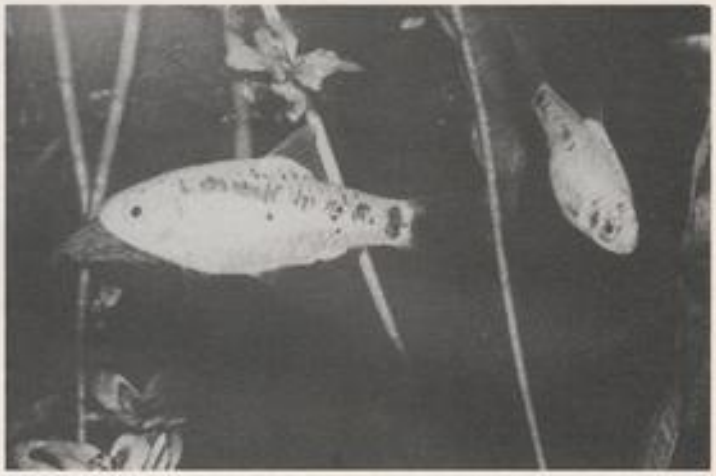
"To sum up this letter: our advice to any would-be aquarist is to study the equipment available and buy the best you can afford at the outset. If the hobby becomes the disease it does to many enthusiasts, then in the long run this is the cheapest and best for the well-being of the fish. Congratulations on your 20th anniversary."

Thank you for the congratulations, Messrs. Gowing. I found your letter most interesting. Remember, the most expensive is not always the best. Well-made, well-designed, reliable products are best—and that usually means that they bear the name of one of the many top class firms that manufacture goods for the hobby. One thing I have yet to find: a good, long-lasting aquarium 'sucker' that will, e.g. hold heaters and thermostats onto tank walls, and power-filter tubes—inlets and outlets—onto tank walls, for two or more years. I cannot get any such suckers to survive for very long in my tanks. The rubber

ones seem to dissolve/disintegrate; and the clear plastic ones turn as hard as plastic tea-spoons. I've tried British made and foreign made ones, but they don't last long enough for my liking. I used to use little round thermometers in my tank but eventually gave them up because most spent their life lying on the gravel. Conventional glass alcohol or mercury thermometers followed—and most of them spend their lives lying on the gravel to. The obvious answer—outside stick-on digital thermometers—are fine if you can see them; but my tanks are in dark corners of rooms, to escape excessive sunlight, and I can never see digital thermometers in these situations. My heater/stats are all resting with their tips on the gravel (not to be recommended) because the suckers on their holders have given up. Most plastic airlines have hardened, expecially at the ends; and the strainer and spray ends of my two power filters flap about in corners of tanks because their plastic suckers have hardened and become useless. Some suckers seem to have been designed for use with nothing that I have ever seen. I have several types of glass thermometers but most suckers I come across won't accept them. Please drop me a line if you have a source of good suckers—and include a little drawing of the end, e.g. knob, shank, clip, star. I live in a relatively soft-water area. Is this why suckers fail to survive? (I've just remembered a neat trick I observed some years ago when Dr. Neville Carrington showed me round his private tanks at Interpet. He'd stuck a little strip of glass across the rear angle of a tank or two using silicon sealant—if I recall correctly. A heater/stat could be neatly and securely slipped down into the corner thus. Obviously this would not work for stick-on items such as thermometers.

Photograph 2 shows an attractive fancy goldfish, photograph 3 a couple of golden barbs, and photograph 4 one of my clown loaches. Please send me details of your experiences with any of these beautiful species.

Recently BBC 1's *Saturday Superstore* happened to be on and I was interested to observe that my fellow-contributor, Dr. Chris Andrews, of the Tetra Information Centre, was a guest on the show answering youngsters' phone-in questions about aquaria, fish, etc. I dreaded the prospect of a guitar duet between Mr. Mike Read and Dr. Andrews. Fortunately the two gentlemen restricted their musical performance! Recently, in response to a reader's letter, Dr. Andrews kindly sent a copy of Tetra Information Leaflet No. 14—'Sensible use of Live Foods'. The main ones covered are earthworms, white worms, brine shrimps and infusorians. I've no doubt Dr. Andrews will send you a leaflet if you send *him* an s.a.e. c/o Tetra Information Centre, 15 Newlay Lane Place, Leeds LS13 2BB.



Golden barbs

Clown loach

For next time please send me a letter about Amazon swords; breeding good guppies; spawning goldfish in garden ponds; outside filters; your aquarium society; or *Vallisneria spiralis*. Write soon!

PRESS RELEASE

More new ideas from Clear-Seal

Four months after bringing out their very first catalogue, this Company have now published a second edition including two additional features one of which is a new style of packaging comprised of an oyster board box in traditional red, white and blue with '*Clear-Seal*' and made in Great Britain printed on the side.

Also featured is an exciting new type of aquarium named the *Classic* which has a conti-plas removable hood similar to that of the *Black Opaque*. It also has boxes with sliding cover plates to house all the fixtures and fittings within the aquarium. These are concealed by an attractive front panel available in a teak finish, Con-Tact vinyl or brown suedette. Yet another product from one of the top names in aquarium manufacturing!

Coldwater Jottings

by Frank W. Orme

THE season of competitive open shows is now getting into full swing, in the majority of cases these are mainly for the tropical fish enthusiast with one or two classes catering for the coldwater hobbyist. However, the coldwater enthusiast is not entirely forgotten, for there are a few specialist events devoted exclusively to this section of the hobby. The Koi societies arrange well organised open-air shows for devotees of these fish, whilst some of the goldfish societies are well known for their excellent indoor open shows. The dates of these various shows are usually announced in the 'Dates For The Diary' column of this magazine.

In the February issue of the newsletter produced by the Northern Goldfish and Pondkeepers Society I was interested to read that the Society is considering a class for Koi. They are looking into the feasibility of providing a section where Koi enthusiasts can exhibit their fish in large vats, in the same way that these fish are exhibited at the Koi shows, allowing the fish to be judged from above rather than by the method employed for judging goldfish in a glass tank. I recall that some years ago the Coventry A.P.S., arranged a show in which there were three separate sections; Tropical, Fancy Goldfish, and Koi. Each section was staged, managed and judged by invited groups from these three sections of the hobby. The tropical fish and fancy goldfish were in separate halls, whilst the Koi were in vats set out in a courtyard. The event was not repeated although, at the time, both exhibitors and public appeared to approve. Another feature of that show, was a room in which each of the involved societies, together with the sponsor, had a manned publicity stand.

From its early beginnings, held in a church hall a few years ago (1979 was the date of their first open show), the N.G.P.S., quickly progressed to the much more convenient and spacious Bolton Sports Centre. Within the space of five years this show has grown in prestige to become a major event in the diary of the goldfish keeper, attracting exhibitors and visitors from far afield. The date of the 1984 Open Show is Saturday the 4th of August.

Another specialist goldfish show of renown is that of the Bristol Aquarist's Society, staged at St. Ambrose Hall in Bristol. Held on a Saturday in September, this show attracts many of the best known names in the hobby, and allows visitors to see some of the best fancy goldfish in the country.

Not so long ago I was asked whether I thought it would not be a good idea for all Goldfish Societies to agree to follow their annual shows by a combined National Open Show, at which the class winners of the preceding shows would compete in special sections for championship status. On the face of it this does seem a good idea; however, I feel that having staged one event it would be doubtful whether any society would be willing, or able, to help finance a second show during the same season. Apart from any other problems, a decision would have to be taken agreeing which set of Show Standards the entries would be judged against. This could prove a 'thorny' problem. Each of the societies now, it seems, has its own Standards for Fancy Goldfish, and it is more than possible that each group would advance an argument in favour of its own particular set of standards.

A far better idea, I feel, would be for the societies to approach each other with a view to agreeing that a single standard should be used for each goldfish variety by each society. This would surely be much more sensible than having various different standards—no matter how slight the variation might be. The truth is that there is not a great deal of difference

The exhibition hall at the first Open Show of the Northern Goldfish and Pondkeepers Society, at church hall in Bolton, Lancashire

Coldwater Jottings

between these standards, although I have no doubt each society would claim that theirs was the best. I know that previous attempts to overcome the problem have failed due to a lack of give-and-take from some sectioes. Nevertheless, I fail to understand why the problem cannot be resolved, and a generally accepted single National Show Standard for Fancy Goldfish be produced for use at all shows. "Ah," I hear someone mutter, "but who will produce and pay for these Standards?" Surely that is not a problem—is it? Either each society could contribute a proportion of the cost or, alternatively, those societies which so wished could produce their own copies of the agreed Standards. The main thing is that each fish, no matter where the show may be held, should be judged to the same standard. Possibly my words will stir-up a hornet's nest, I hope not; rather would I hope that some serious, unbiassed consideration be given. At the moment we have standards produced by Goldfish Societies and Regional and National bodies, would it not be plain common sense to reduce these publications to one—one that would be acceptable to all? Like Dumas' Three Musketeers, let it be said: "One (Standard) for all; all for one (Standard)."

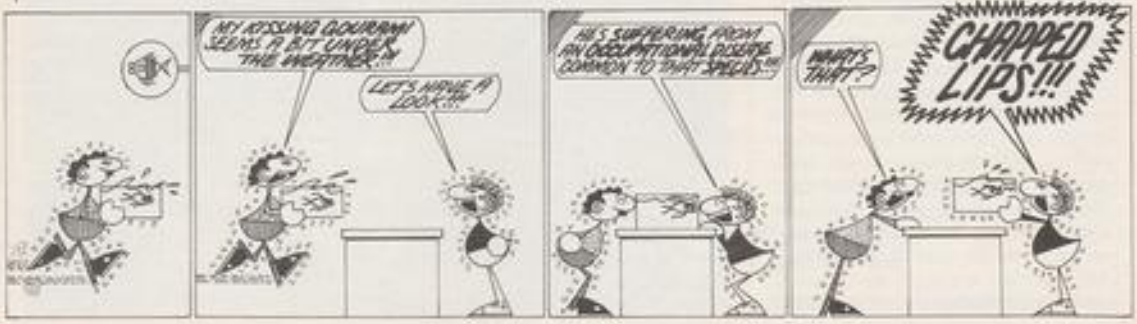
Exhibition hall in Bolton Sports Centre. Judging at N.G.P.S. Open Show. Mr. Lew Emery in background (right) with Mr. Bill Ramsden in the foreground

Cyanide poisoning

Over the past few months the American magazine *Freshwater and Marine Aquarium* has been carrying a series of crusading articles written by their Contributing Editor, Steve Robinson. In the articles he has made clear the damage done to both fish collectors and the reefs of the Philippines by the use of sodium cyanide to 'knock-out' the marine fishes. Reefs are dying and those fish which are not killed seldom survive for long; many of those which reach the aquarium of the hobbyist die shortly afterwards. Fish which are not suitable for the hobby are often cooked and eaten by the native collector/fisherman and his family. Eating these poisoned fish slowly results in the poisoning of the human. This unique, corrupt method of collecting marine fish is only practised in the Philippines, nevertheless it accounts for around half the marine tropicals imported into the United States. Now, he says, some retailers and wholesalers have begun to unite in an effort to reform this trade. Tropical marines can be obtained from other areas where the fish are caught by hand nets and other methods which do not rely upon the use of sodium cyanide. Fishes from the Caribbean, Hawaii, Africa, Mexico, Sri Lanka, Australia, Marshall Islands, Gilbert Islands, Fiji and Tahiti are, he advises readers, all cyanide free and represent tremendous variety. He asks that all marine hobbyists who believe, as he does, that the use of sodium cyanide to collect fishes should be banned, voice the loudest protest by writing to Attorney Ramon P. Binamira, Director of the Environmental Centre, Nayong Pilipino, Mia Road, Metro Manila, Philippines. This gentlemen is a champion of the environmental and poor peoples' interests. He is fighting for a ban on cyanide because of the deaths it causes amongst innocent villagers. Mr. Robinson asks that strong protests be directed to the uncaring and callous Director of the Bureau of Fisheries and Aquatic Resources, Bureau of Fisheries Building, Quezon City, Philippines.

Although I am not a marine fish hobbyist, I thought that those readers who are, might be interested in following the suggestion of Steve Robinson.

OSCAR **G. Robinson**



POOLSIDE PLANTS from SEED

Part 2
by Roy Pinks

IN THIS article I will discuss some of the species included in the seed catalogues issued by Dobies and Thompson and Morgan. Dobies will enable you to supplement your primulas and polyanthus with Cowslips. The common meadow varieties which enjoy damp conditions so much are now surrounded by a range of colour variations which are very nearly unpredictable, so every packet has something likely to tickle the palate of the buyer.

I will repeat the injunction to keep members of this family well watered throughout the year—the rewards will be very great. Another offering from Dobies is the Globe Flower, *Trollius*. I buy packets of this quite regularly in the hope of raising a plant prepared to raise its impressive golden blooms to the heavens, but just as regularly something has completely defeated me. To be sure the seedsmen always label this as a tricky starter, as the seeds take a long time to germinate and they do so erratically, as though nature were nervous about their survival and make sure of it by programming their starting times over a long period. A bog garden subject, this must always be kept moist, and this is perhaps where many of us fail, as seed boxes and pans tend to get overlooked at the busy season and when the sun is at its peak. Despite the difficulties, this is a plant with a challenge well worth facing, and once you have the knack of persuading the young plants to emerge it should not prove comparably difficult to bring them to maturity.

My final Dobies selection is another old favourite — the House Leek (*Sempervivum*) which may be thought of as somewhat odd for the poolside. Not in the least, as I would see it, for there are nearly always dry or inhospitable spots around the pond where these odd beauties can establish themselves and show off their secrets. In the case of my raised pond I incorporated a number of pockets intended to accommodate such favourites as Aubretia, but the soil is necessarily shallow and often washes out in severe storms, such that what is left is uninviting for many of the subjects we would naturally choose. It is here that I shall try to encourage the houseleeks—there are so many different ones that it will be something to look forward to in tagging them when they mature.

At that stage, of course, there are always the 'babies' which can be prised off and planted elsewhere. In the West Country they say it is lucky to grow them on the roof, which suggest other possibilities: no complete respecter of lore I would strongly recommend a sound ladder!

Thompson and Morgan have some tempting offerings, too. I have touched on Aubretia above, but the semi-double version is all too seldom grown, perhaps because folk think it difficult to cultivate. This is very far from being so, as any purchaser will find. In most cases this fine edging or hanging species, ranging from light pink to deep purple will flower from the same season's sowing, but do not despair if the first blooms look single. This sometimes happens, and they are followed by the more substantial and firmer coloured semi-double flowers. An easy species, with a high yield from each packet. *Caltha palustris*, the Marsh Marigold is such a firm favourite that many will simply buy the mature overpriced plants because they cannot wait to see the gorgeous spring blooms.

I cannot completely quarrel with this, as the temptation is great, but here is an opportunity to grow many for the price of one, and to extend the flowering area. A great golden blanket of these in spring is a truly fine sight and lasts well. A really moist spot is again indicated. It is not always easy to get hold of seed of hardy cyclamen. Not exceeding some 6 in. in height these charming plants should be planted amongst subjects like heather from which they will emerge in season and delight the eye for weeks on end. They are not very easy to raise in one go, as germination is again rather erratic.

I find that if I plant the seed in a tray and leave it alone for up to a year I get the best results. Care must be taken not to let it dry out. The young plants must be transplanted with some care and given some protection from being trodden on, but once they have got their roots down they naturalize and seed remarkably well. This is a plant to get to understand and to love: when the little plantations are sorting themselves out and reproducing, all the effort will be seen as worthwhile. Make a ten year plan for hardy cyclamen and then write and thank me when all comes good.

The discerning pondsman will also want some Angels' Fishing Rods (*Dierama pulcherrima*) which will offer a mild challenge to his gardening potential. This fascinating and delicate looking plant—suitable for rearwards in the planting can eventually form large clumps of thin sword shaped leaves, and I cannot fathom why they

Caltha palustris (Marsh Marigold)

are not more often available at the garden centres. My own efforts last season only yielded one decent plant, but I didn't try as hard as I should have done, so with some shame but greater hope I shall repeat the effort, in a quest for better things. I did far better with the Hostas, and managed to set out some nice little plants before autumn set in. These were simplicity itself, but I so like them that I shall do some more next season.

My final selection will have to be *Ligularia*. I bought a plant of this several years ago on account of its unusual orange coloured flower some 3 ft. in height. It has since produced large fleshy leaves rather like Elephant Ears, and has delighted us in the late summer days with huge heads of those lovely flowers which yield vast balls of tightly compacted seed when all is over. So many hundreds of these come from a single head that I wonder that the garden is not taken over by this extremely attractive plant—it seems not to intrude itself by over-seeding like so many others I could mention. However, I would expect this seed to germinate well and to yield good plants for removal to a nursery bed when large enough.

Like *Lobelia cardinalis*, *Ligularia* is a wonderful border plant as well as a poolside subject, so if you have too many for the pondside you can always cram a few into the back of the perennial area, where they would very likely stop most of the traffic if the drivers had the merest quota of good taste.

OSCAR **G. Robinson**

NEWS...

From Aquarists' Societies

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

SOUTH EAST

Sudbury A.S. open show results. Held at Neasden High School, Quainton Street, Neasden NW10 on 1st April.

Class B: 1 and 2, Mrs. D. Cruickshank (Hampton); 3, C. Tonna (Reading); 4, P. Whidden (Tonbridge); C: 1, J. Edwards (EKASG); 2, C. Bird (Strood); 3, Mr. Thame (Newbury); 4, P. Lagdon (SELAS). Ca: 1, Mrs. P. Edwards (EKASG); 2, R. Somers (SELAS); 3, D. Ford (Bracknell); 4, P. Lagdon (SELAS). Cb: 1, P. Whidden (Tonbridge); 2 and 3, R. Somers (SELAS); 4, H. Sheriff (Wellingborough). D: 1 and 3, D. Ford (Bracknell); 2, S. O'Donoghue (SELAS); 4, J. Rowney (Bexley Heath). Da: 1 and 2, C. Smith (EDAS); 3, W. Chapman (SLADAS); 4, Mrs. C. Wainwright (Leicester). Db: 1 and 2, J. Rowney (Bexley Heath); 3, R. Somers (SELAS); 4, J. Richards (Leicester). E: 1, B. Winteridge (Sudbury); 2, C. Wiseman (Romford); 3, C. Smith (EDAS); 4, M. and R. Coe (Wellingborough). Ea: 1 C. Tonna (Reading); 2, Linda Adams (WDAS); 3, R. Bowes (Sudbury); 4, R. Standorth (Kettering). F: 1, 2 and 3, C. Cheswright (SLADAS); 4, R. Somers (SELAS). G: 1, D. Macallister (Corby); 2, A. Finnigan (Leicester); 3, J. Edwards (EKASG); 4, D. Ford (Bracknell). H: 1, T. Cruickshank (CAGB); 2, Mrs. J. Edwards (EKASG); 3, R. Somers (SELAS); 4, P. Lagdon (SELAS). J: 1, B. Winteridge (Sudbury); 2, T. Schofield (Romford); 3 and 4, M. Smith (Romford). K: 1, R. Bowes (Sudbury); 2 R. Weston (Leicester); 3, C. Tonna (Reading); 4, R. Weston (Leicester). L: 1, Mrs. D. Cruickshank (Hampton); 2, J. Edwards (EKASG); 3, W. Grove (Bracknell); 4, A. Dempsey (Haringey). M: 1, M. Clarke (Bracknell); 2, J. Rowney (Bexley Heath); 3, S. Poynton (Leicester); 4, G. Hicks (Bexley Heath). Nbm: 1, D. Ford (Bracknell); 2, Mrs. C. Wainwright (Leicester); 3, M. and R. Coe (Wellingborough); 4, P. Lagdon (SELAS). Not: 1, S. Furseidons (WDAS); 2, C. Tonna (Reading); 3, P. Macallister (Corby); 4, D. and P. Lambert (SELAS). O: 1 and 2, T. Laughlan (Haringey); 3, "Frenchie" Walsh (Sudbury); 4, W. Chapman (SLADAS). P: 1 and 2, R. Bryan (Kettering); 3 and 4, T. Laughlan (Haringey). Q: 1, R. La Bond (E. Leicester); 2, E. Broderick (E. Leicester); 3, S. O'Donoghue (SELAS); 4, E. Broderick (E. Leicester). R: 1, E. Broderick (E. Leicester); 2, W. Chapman (SLADAS); 3, G. Rowney (Bexley Heath); 4, R. Somers (SELAS). S: 1, K. Calvert (Sudbury); 2, P. Lagdon (SELAS); 3, S. O'Donoghue (SELAS); 4, J. Rowney (Bexley Heath). T: 1, C. Chewright (SLADAS); 2, H. Smith (Sudbury); 3 A. Cale (Sudbury); 4, P. Andrews (Reading). Xbm: 1 and 3, D. Pidgewell (SLADAS); 2, J. Edwards (EKASG); 4, G. Stamou (Sudbury). Xot: 1, M. Smith (Romford); 2, C. Chewright (SLADAS); 3, D. and P. Lambert (SELAS); 4, K. Stamforth (Kettering). U: 1, D. Wiseman (Romford); 2, A. Barton (Wellingborough); 3, H. Iron (Kettering); 4, D. Wiseman (Romford). V: 1 and 2, P. Taylor; 3, E. Broderick (E. Leicester); 4, R. Somers (SELAS). W: 1, C. Chewright (SLADAS); 2, J. McCandless (Corby); 3 and 4, J. Taylor (Haringey). Z: 1, P. Lagdon (SELAS); 2, K. Lambert (WDAS); 3 and 4, P. Mills (WDAS).

Best Fish in Show: D. Ford. Best Eggleyer: D. Ford. Best Livebearer: C. Cherwright. Highest Pointed Visiting Society: SLADAS. Number of entries: 542. FBAS Championship Class C: J. Edwards.

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RESULTS of **Tongham Aquarists** Club Table Show held at the Victoria Hall, Ash on 16th February. Judge C. Tonna. Rasboras: 1, J. Ottley, Rasbora maculata; 2, R. Cooke, Rasbora sarawakensis; 3, R. Cooke, Rasbora heteromorpha; 4, J. Ottley, Rasbora heteromorpha. Breeders (Egglayers): 1, I. Legge, Geophagus brasiliensis; 2, I. Legge, Lamprologus tetracanthus; 3, S. Baines, Pseudotropheus livingstonii; 4, S. Baines, Lamprologus brichardi. Breeders (Livebearers): 1, M. Bird, Amica splendens. A.O.V.: 1, M. Bird, Dyodon santai; 2, R. Cooke, Nannaethiops unitaeniatus; 3, G. Horton, Colisa calia; 4, J. Ottley, Corydoras aeneus.

A total entry of 27 fish was recorded. Speaker for the evening was Ray Cooke, who gave an interesting talk with slides on Rift Valley Cichlids.

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Haringey A.S. held their 2nd open show on 11th March at Highgate Lower School. The following are the results: Class Ag: 1, Linda Adams (WDAS); 2 and 3, Paul Mills (WDAS). Ab: 1, Paul Mills (WDAS). Ba: 1, C. and D. Bridgeman (EKASG); 2, Martin Howells (ELAPA); 3, Robbie Summers (SELAS); 4, P. B. Riley (BGIAS). Bc: 1, S. O'Donoghue (SELAS); 2, P. Borton and C. Larman (CAEB); 3, K. Martin (Croydon); 4, M. Darshley (East Dulwich). Ca: 1, Mrs. P. Edwards (EKASG); 2, B. Winteridge (Sudbury); 3, Paul Coe (WDAS); 4, Mick Smith (Romford). Cb: 1, Mrs. P. Edwards (EKASG); 2, Mick Smith (Romford); 3, P. B. Riley (BGIAS); 4, F. Scarr (EKASG). Cc: 1, P. Taylor; 2, J. Edwards (EKASG); 3, T. Schofield (Romford); 4, Graham Gilbert (Corby). Da: 1 and 2, C. Smith (East Dulwich); 3, W. Chapman (SLDAS); 4, S. O'Donoghue (SELAS). Db: 1, Gary Rowney (Bexley Heath); 2, Colin Bellingham (Tonbridge); 3, Robbie Summers (SELAS); 4, Doris Winder (East Dulwich). Dc: 1, Mick Draper (Tonbridge); 2, Graham Gilbert (Corby); 3, E. Lock (EDAS); 4, M. Draper (Tonbridge). Dz: 1, S. O'Donoghue (SELAS); 2, Robbie Summers (SELAS); 3, E. Lock (EDAS); 4, Mick Smith (Romford). E: 1, Dave Winder (EDAS); 2, R. Summers (SELAS); 3, P. B. Riley (BGIAS); 4, D. Ridgewell (SLADAS). Ea: 1, D. Nice (SLADAS); 2, Doris Winder (EDAS); 3, W. Chapman (SLADAS); 4, Linda Adams (WDAS). F: 1, 3 and 4, C. Cherwright (Southend); 2, L. Eldridge. G: 1, J. Edwards (EKASG); 2 and 3, P. Burton and C. Larman (CAEB); 4, A. Dempsey (Haringey). Ha: 1, Gary Rowney (Bexley Heath); 2, E. Lock (EDAS); 3, W. Chapman (SLADAS); 4, Dave Winder (EDAS). Hc: Robbie Summers (SELAS); 2, J. Edwards (EKASG); 3, Mick Draper (Tonbridge); 4, E. Lock (EDAS). J: 1 and 3, Mick Smith (Romford); 2, Trevor Schofield (Romford); 4, W. Chapman (SLADAS). Ka: 1, Adrian Dempsey (Haringey); 2, T. Laughlan (Haringey); 3, Peter Lagdon (SELAS); 4, W. Chapman (SLADAS). Kz: 1, Frank Scarr (EKASG); 2, W. Chapman (SLADAS). La: 1, J. Edwards (EKASG); 2, Mick Draper (Tonbridge); 3, P. Burton and C. Larman (CAEB); 4, Mrs. J. Draper (Tonbridge). Lz: 1, J. Edwards (EKASG); 2, Mrs. J. Draper (Tonbridge); 3, Robert Howells (ELAPA); 4, Peter Lagdon (SELAS). Ma: 1, Gary Rowney (Bexley Heath); 2 and 4, W. Chapman (SLADAS); 3, Graham Gilbert (Corby). Mz: 1, Sean O'Donoghue (SELAS); 2, Mick Smith (Romford); 3, P. Mills (WDAS); 4, M. Darshley (E. Dulwich). Nb-m: 1, Frank Scarr (EKASG); 2, Robbie Summers (SELAS); 3, Adrian Dempsey (Haringey); 4, Andrew Waller (SLADAS). Nb-t: 1, C. Cherwright (Southend); 2, S. Furseidons (WDAS); 3, C. and D. Bridgeman (EKASG); 4, S. Furseidons (WDAS). Nb-w: 1 and 2, John Taylor (Haringey); 3, C. and D. Bridgeman (EKASG). O: 1, Sean O'Donoghue (SELAS); 2, W. Chapman (SLADAS); 3 and 4, Terry J. Williams (Bury St. Edmonds). P: 1 and 3, T. Laughlan (Haringey); 2, Robbie Summers (SELAS); 4, Mick Smith (Romford). Q: 1, John Egan (Port Talbot); 2, G. S. Roberts (Port Talbot); 3, Robbie Summers (SELAS); 4, Mrs. P. Edwards (EKASG). R: 1 and 4, John Egan (Port Talbot); 2, T. Laughlan (Haringey); 3, Mrs. P. Edwards (EKASG). S: 1, Peter Lagdon (SELAS); 2, S. Furseidons (Walthamstow); 3, John Rowney (Bexley Heath); 4, W. Chapman (Southend). T: 1 and 3, C. Cherwright (Southend); 2, A. Waller (Southend); 4, Frank Scarr (EKASG). U: 1, Paul Mills (WDAS); 2, Miss C. Edwards (EKASG); 3, K. Lambert; 4, C. and D. Bridgeman (EKASG). V: 1 and 4, T. Laughlan (Haringey); 2, Sean O'Donoghue (SELAS); 3, P. Taylor. W: 1, J. W. McCandless (Corby); 2, John Taylor (Haringey); 3, C. Cherwright (Southend); 4, Paul Mills (WDAS). Xb-m: 1 and 4, Frank Scarr (EKASG); 2, Martin Howells (ELAPA); 3, C. E. Bailey (CAGB). Xo-t: 1, C. Cherwright (Southend); 2 and 4, Paul Mills (WDAS); 3, S. Furseidons (WDAS). Xg-w: 1, 2 and 3, John Taylor (Haringey). Za: 1 and 2, Paul Mills (WDAS); 3 and 4, K. Lambert. Zb-c: 1, C. and D. Bridgeman (EKASG); 2, Stephen O'Connor; 3, Paul Mills (WDAS); 4, S. Grogan (Haringey).

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AT the A.G.M. of **Haringey A.S.** the following officers were elected. Chairman, T. Loughlin; Secretary, B. Walmesley; Treasurer, A. Stern; Show Secretary, A. Dempsey; P.R.O., J. Taylor; Committee members, R. Lopez and R. Gill.

The Society meet on the first and third Thursday of the month at Pax Hall, Park Road, London N8 at 8 p.m. New members are always welcome to come along or phone Ware 61697 for more details of our programme of speakers, tapes and slides, and table shows.

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CHANGE OF ADDRESS AND VENUE

ALL future correspondence for **Reading and District A.S.** should be addressed to Mr. C. Tonna, 19 Eskin Close, Tilehurst, Reading, Berks. Tel: Reading 412373. Meetings are now held at Southcote Youth and Community Centre, Coronation Square, Southcote, Reading.

SOUTH WEST

DUE to unforseen circumstances the **Dorchester Tropical Fish Society** have found it necessary, in the interests of all potential exhibitors, to change the date of their 4th open show which will now be held on Sunday, 16th September, one week earlier than planned. Results of the first monthly Table Show held in March were as follows: Tetras: 1 and 4, R. Paull; 2 and 3, P. Reeve. Siamese Fighters: 1, R. Paull.

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DURING a discussion about Ponds by **Bristol A.S.** several points of interest arose. In respect to Koi it was felt that a depth of 4-5 ft. in this part of the country was adequate and that some of the advocated rates of water turnover were unnecessarily high. While Water Lilies were admired for their beauty several speakers found that they harboured

Leeches which were difficult to eliminate. Pond liners got very good reports with the previso that it was good policy to buy the best that was affordable. The Table Show for Common Goldfish and Veiltails brought a remarkable entry of 25 in the Common Goldfish class. Results: Common Goldfish (25): 1 and 2, I. Mibbs; 3, M. Dibble; 4, V. Capaldi. Veiltails (8): 1 and 3, A. J. Harris; 2, G. Smith; 4, P. Pearl. Details and schedules of Coldwater Show on 15th September from V. Capaldi, 7a Walsingham Road, Bristol BS6 5BU (0272-426323).

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North Avon A.S. had the pleasure of having Mr. V. Capaldi to their meeting in April. He brought along a collection of slides depicting a varied selection of fish, etc., both tropical and coldwater, following which he very kindly judged our table show in the category of A.V. Coldwater. 1st, 2nd and 3rd and 4th places went to J. Arnold, J. Arnold, D. Spence and A. Hughes respectively. We are looking forward to seeing many of you at our 'Open Show' on 16th June at Hanham Folk Centre, which this year has been planned more than ever with the exhibitor in mind. All enquiries should be sent to the Secretary, R. W. Cummins, 1 St. Annes Close, Cadbury Heath, Warmley, Bristol BS15 5EH.

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RESULTS of the **Taunton & District A.S.** open show held on 8th April. Class: B: Mrs. Cruickshank (Hanaden). C: Paul Roberts (Jnr.) (Port Talbot). Ca: R. F. Adams (Salisbury). D: R. F. Adams (Salisbury). Da: D. Cox (Yeovil). Db: Mr. Holland (Nailsea). Dc: J. Northgan (Plymouth). E: J. Egan (Port Talbot). F: D. S. Langdon (Yeovil). G: D. J. Bruin (Plymouth). H: T. A. Cruickshank (Hanaden). J: M. Miller (Chard). K: Terry Guy (Jnr.) (Dorchester). L: R. Bond (Yeovil). M: P. Cooke (Bristol). Ma: D. Cox (Yeovil). Nb-m: P. Cooke (Bristol). No-t: A. Waller (Southend). O: T. Laughlan (Haringey). P: F. Cox (Bournemouth). Q: J. Egan (Port Talbot). R: J. Egan (Port Talbot). S: Terry Guy (Jnr.) (Dorchester). T: A. Waller (Southend). U: G. J. Ass (Yeovil). V: J. Ellis (West Cornwall Fishkeepers Assc.). W: J. Varndell (Plymouth). Xb-m: H. Miller (Chard). Xo-t: A. Waller (Southend).

MIDLANDS & WALES

Lower Gornal and District A.S. are a new society. New members are always welcome and we meet on 3rd Saturday of every month at St. Luke's Church Hall, Cradley Heath. For more information phone A. Brockhouse (P.R.O.) on Sedgley 77649.

Committee elected for 1984: Chairman, S. Nixon; Vice Chairman, P. Bynham; Secretary, G. Brockhouse; Treasurer, E. Brockhouse; P.R.O., A. Brockhouse; Show Secretary, C. Brockhouse; Asst. Show Secretary, R. Walker; Junior Member, D. Brockhouse.

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CHANGE OF MEETING VENUE

Dudley & District A.S. now meet at the Allied Centre, Tower Street, Dudley in the buildings rear of the Malt Shovel public house, on the first and third Friday every month. Everyone welcome. For further information please contact Mr. J. Clouds, 9 Linley Grove, Lower Gornal, Dudley; telephone: Dudley 59334.

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NEW SOCIETIES

A NEW Club called **Potteries Tropical Fish Club** (P.T.F.C.) has been established in Stoke-on-Trent. Membership fees are as follows: Families (including two adults and two children under the age of 16): £4; Adults, £2·50; Juniors, £1.

Meetings are held at 8 p.m. on every other Thursday at 23 Boughey Road, Shelton, Stoke-on-Trent. Programme includes table shows for adults and juniors. Each winner receives a trophy and place card for first in their class.

We also have raffles, lectures, trips, open shows, and auctions.

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RESULTS of the first joint **Rothwell & Wakefield A.S.** open show held at the Blackburn Hall, Rothwell on Sunday 1st April. The show attracted some 609 entries for which I would like to thank the exhibitors. It was our first joint open show and as a result of its success the two societies have decided to join forces to form one new society, the name of which has still to be decided. Best in Show went to B. and J. Heppinstall with 81 points, for a fine female livebearer as yet unidentified, collected by the exhibitors themselves several months back on a trip to Mexico and was exhibited for the Castleford A.S. Castleford also being the society to take away the most points for the show, second being Doncaster A.S. and York A.S. both with the same points, third was C.B.A.S. Best Exhibit went to Mr. and Mrs. G. Windle with some beautiful *Hoplosternum thoracatum* catfish in the breeders egglayers 1 and 2, with 84 points, the same exhibitors were also runners up in the same class with some *Tanichthys albonubes* both shown on behalf of Wakefield A.S. The trophies were presented by the Rothwell A.S. chairman, Mr. L. Nicholson who also thanked everyone for making the show a success. The trophies presented were engraved glass ½ pint mugs for classes and bound goblets for Best in Show and Best Exhibit all engraved with the R.A.S. discus logo. I would like to second our chairman's thanks to members and friends, donators, exhibitors, judges and anyone who came along. I hope everyone had a good show and will perhaps support our forthcoming events.

Guppies: 1 and 2, Mr. and Mrs. Thorpe (Doncaster); 3, K. Lockwood (Huddersfield). Platies: 1, L. and M. Price (Castleford); 2, Mr. and Mrs. Thorpe (Doncaster); 3, R. S. Cherryholme (Barnsley). Swordtails: 1, Mr. and Mrs. Pickford (C.B.A.S.); 2, R. S. Cherryholme (Barnsley); 3, Mr. and Mrs. Fawcett (York). Mollies: 1 and 3, B. and J. Heppinstall (Castleford); 2, A. D. Scott and Son (Castleford). A.O.V. Livebearer: 1, R. S. Cherryholme (Barnsley); 2, Mr. and Mrs. Fawcett (York); 3, Mr. T. Stansfield (Ind.). Small Characins: 1 and 3, Mr. and Mrs. Lake (I. & E. Louth); 2, Mr. and Mrs. Riley (Leeds P.O.). Large Characins: 1, Mr. I. Macbeth (Ind.); 2, T. Haynes (Doncaster); 3, Mr. and Mrs. Brown (Driffield). Rasboras: 1, A. D. Scott and Son (Castleford); 2, Mr. and Mrs. Fawcett (York); 3, Mr. and Mrs. Lake (I. & E. Louth). Danios and Minnows: 1 and 2, Mr. and Mrs. Lake (I. & E. Louth); 3, Mr. and Mrs. Bradbury (C.D.A.S.). Small Barbs: 1, Mr. and Mrs. Thorpe (Doncaster); 2, Mr. and Mrs. Carey (York); 3, Mr. J. Cartright (Huddersfield). Large Barbs: 1, L. and M. Price (Castleford); 2, Mr. and Mrs. J. Riley (Leeds P.O.); 3, Mr. Storey (Otley). Dwarf Cichlids: 1, Mr. and Mrs. Boccan (Pocklington); 2, L. and M. Price (Castleford); 3, Mr. and Mrs. Bradbury (C.B.A.S.). Large Cichlids: 1, Mr. and Mrs. Sles (Pocklington); 2, Mr. T. Stansfield (Ind.); 3, Mr. and Mrs. Cutts (Ind.). Endemic Rift Lake Cichlids: 1, R. Beal (Huddersfield); 2, Mr. J. Calvert (York); 3, Mr. and Mrs. Lake (I. & E. Louth). Angels: 1, Mr. and Mrs. Cutts (Ind.); 2, Mr. and Mrs. Thorpe (Doncaster); 3, Mr. I. Macbeth (Ind.). Fighters: 1, 2 and 3, Mr. and Mrs. Brackenbury (H.C.A.G.). Small Anabantids: 1, D. Jones (A.C.E.); 2, M. T. Cutts (Ind.); 3, A. D. Coxon (Retford). Large Anabantids: 1, D. Jones (A.C.E.); 2, A. D. Scott and Son (Castleford); 3, G. D. Coxon (Retford). Aphyosemion: 1, L. and M. Price (Castleford); 2, Mr. and Mrs. S. Clark (Doncaster); 3, Mr. and Mrs. Bradbury (C.D.A.S.). A.O.V. Egglaying Toothcarps: 1, L. and M. Price (Castleford); 2 and 3, Mr. and Mrs. Clark (Doncaster). Loaches and Botia: 1 and 3, Mr. and Mrs. Pickford (C.D.A.S.); 2, Mr. and Mrs. Brackenbury (H.C.A.G.). Sharks and Foxes: 1, Mr. and Mrs. Carey (York); 2, Mr. and Mrs. Brackenbury (H.C.A.G.); 3, Mr. J. Cartright (Huddersfield). Corydoras and Brochis: 1, Mr. and Mrs. Clark (Doncaster); 2, B. and J. Heppinstall (Castleford); 3, L. and M. Price (Castleford). A.O.V. Catfish: 1, A. D. Scott and Son (Castleford); 2, Mr. T. Stansfield (Ind.); 3, Mr. and Mrs. Brackenbury (H.C.A.G.). Matched Egglayer (Pairs): 1, L. and M. Price (Castleford); 2, Mr. and Mrs. Carey (York); 3, Mr. J. Cartright (Huddersfield). Matched Livebearer (Pairs): 1, R. and S. Cherryholme (Barnsley); 2, L. and M. Price (Castleford); 3, Mr. and Mrs. Moore (Cudworth). Breeders (Livebearer 1 and 2): 1, L. and M. Price (Castleford); 2, Mr. and Mrs. Bradbury (C.B.A.S.). Breeders (Livebearer 3 and 4): 1, Mr. and Mrs. Moore (Cudworth); 2, Mr. and Mrs. Bradbury (C.B.A.S.); 3, Mr. and Mrs. Pickford (C.B.A.S.). Breeders (Egglayers 1 and 2): 1 and 2, Mr. and Mrs. G. Windle (Wakefield); 3, R. Beal (Huddersfield). Breeders (Egglayers 3 and 4): 1, Mr. and Mrs. Pickford (C.B.A.S.); 2, Mr. and Mrs. Sles (Pocklington); 3, Mr. and Mrs. Silk (S.J.S.). A.O.V. Tropical (Small): 1, Mr. and Mrs. Riley (Leeds P.O.); 2, A. D. Scott and Son (Castleford); 3, Mr. T. Stansfield (Ind.). A.O.V. Tropical (Large): 1, Mr. C. Patterson (Keighley); 2, Mr. and Mrs. Cutts (Ind.); 3, D. Jones (A.C.E.). Fancy Goldfish: 1, Mr. and Mrs. Cutts (Ind.); 2, Mr. and Mrs. Silk (S.J.S.); 3, D. Gregory (Ind.). Common Goldfish: 1, Mr. and Mrs. Silk (S.J.S.); 2 and 3, Mr. M. Cooke (Wyke). A.O.V. Coldwater: 1, 2 and 3, Mr. and Mrs. Carey (York). A.V. Female (Livebearer): 1, R. and J. Heppinstall (Castleford); 2, L. and M. Price (Castleford); 3, D. L. Braithwaite (Castleford). A.V. Female (Egglayer): 1, Mr. and Mrs. Fawcett (York); 2, M. T. Cutts (Ind.); 3, Mr. and Mrs. S. Clark (Doncaster). Furnished Mini-Jar: 1, Mr. and Mrs. Brackenbury (M.C.A.G.); 2, J. H. Sharp (Bradford); 3, Mr. A. Ward (Otley). Junior A.V.: 1, D. L. Braithwaite (Castleford); 2, Simon Silk (S.J.S.); 3, A. Longmore (Castleford). Photographic: 1, L. Nicholson (Rothwell); 2, Mr. and Mrs. Macbeth (Otley); 3, Mr. and Mrs. Grayson (Wakefield).

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AT the A.G.M. of the **Federation of Northern Aquarium Societies** held on 3rd March, the following officers were elected: President, Mr. F. Mulls; Vice President, Mr. J. U. Hall and Mr. A. Darby; Secretary, Mrs. J. A. Cresswell; Treasurer, Mr. J. Corbett.

Management Committee Members: Chairman, Mr. F. Mulls; Secretary, Mrs. J. A. Cresswell; Treasurer, Mr. J. Corbett; Judges and Standards Chairman, Mr. R. Johnson; British Aquarist Festival Organiser, Mr. J. U. Hall; Publications Officer, Mrs. D. Robinson; Show League Secretary, Mr. A. Goddard; Sales Officer, Miss S. A. Cresswell; Programme Aids Officer, Mr. K. F. Robinson; Breeders Award Scheme Officer, Mr. A. Chadwick; Lay Members, Mr. A. Darby and Mr. D. Moore.

All membership and general enquiries to be sent to the Secretary, Mrs. J. Cresswell, 58 Great Meadow, Astley Village, Chorley, Lancs. PR7 1TA. Tel: Chorley 69312.

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THIS month's meeting of **West Yorkshire Marine Aquarist Group** was not as published in the agenda. We were treated instead to a slide show and talk by Dr. David Ford, of "Aquarian" on the development and manufacture of their flake food. Dr. Ford showed some very interesting slides of his laboratory at the start of his project, and took us through, step by step, to the modern factory now well established in production at Halifax. Dr. Ford went on to speak of two new developments he is currently working upon, both, I think, will be of enormous interest to both freshwater and marine aquarists alike.

It was encouraging for our club that we had another good turn-out, 14 members, and still potential members coming to see us.

After the subscriptions were collected a raffle was held with prizes by courtesy of "Aquarian". A vote of thanks was given to Dr. Ford for a very interesting and informative evening.

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York A.S. hosted the second Statesman's league match of the season, with the Bridlington A.S. taking their turn to judge. York came out of the match as victors with 86 points and take over from Hull as the top of the league, and with Hull judging the next match at Scarborough on the 16th May, will be looking to extend their lead. Full results and new league table: York, 86; Hull, 84; Scarborough, 43; Wyke, 42; Ebor, 14.

1st, York 174; 2nd, Hull 161; 3rd, Wyke 75; 4th, Scarborough 43; 5th, Ebor 24; 6th, Bridlington 13.

Following are a true record of results: Guppies: 1, D. Barker (Wyke); 2, A. Haugney (Hull); 3, R. Rutter (Scar). Mollies: 1, 2 and 3, R. Gould (Hull). Swordtails: 1, M. Fawcett (York); 2 and 3, G. Andrews (Hull). Platies: 1, J. Baddley (Scar); 2 and 3, D. Weathers (Ebor). A.O.V. Livebearer: 1, T. J. Douglas (Hull); 2, W. Sowersby (Scar); 3, G. Andrews (Hull). Small Barbs (up to 10cm): 1, Mr. and Mrs. Carey (York); 2 and 3, A. Rutter (Scar). Large Barbs (over 10cm): 1, 2 and 3, H. Smith (Hull). Small Characins (up to 7cm): 1, M. Fawcett (York); 2, Mr. and Mrs. Carey (York); 3, C. and S. Waller (York). Large Characins (over 7cm): 1, C. and S. Waller (York); 2 and 3, L. and P. Barker (Wyke). Rasbora, Danios: 1, M. Fawcett (York); 2, B. Calvert (York); 3, G. Nelson (Hull). Fighters: 1 and 2, P. Baddley (Scar); 3, K. Taylor (Hull). A.O.V. Cichlids (up to 10cm): 1 and 2, G. Andrews (Hull); 3, Bolton and Slee (York). A.O.V. Cichlids (over 10cm): 1, Mr. and Mrs. Frisby (Wyke); 2, Bolton and Slee (York); 3, K. Lawson (Wyke). Endemic Rift Lake Cichlids: 1, S. Shields (Ebor); 2, B. Calvert (York); 3, R. Taylor. Angels: 1 and 3, R. Forth (Hull); 2, C. and S. Waller (York). Small Anabantids (up to 10cm): 1, M. Fawcett (York); 2 and 3, R. Forth (Hull). Large Anabantids (over 10cm): 1 and 2, Mr. and Mrs. Frisby (Wyke); 3, Mr. and Mrs. Ellaker (Scar). Corydoras and Brochis: 1, W. Sowersby (Scar); 2, P. Baddley (Scar); 3, K. Lawson (Wyke). A.O.V. Catfish: 1, M. H. Smith (Hull); 2, L. and P. Barker (Wyke); 3, P. Taylor (Scar). Loaches: 1, Bolton and Slee (York); 2, N. Eastwood (Ebor); 3, Mr. and Mrs. S. Pearson (Wyke). A.V. Aphyosemion: 1 and 3, Mr. and Mrs. Tindall (York); 2, A. Balcam (Hull). A.O.V. Tropical: 1 and 3, K. Lawton (Wyke); 2, N. Eastwood (Ebor). Sharks and Foxes: 1, Mr. and Mrs. Carey (York); 2, R. McDonald (Hull); 3, E. Hodson (Scar). Breeders (Egglayers A4 B3): 1 and 2, Bolton and Slee (York); 3, M. Fawcett (York). Breeders (Egglayers C3 and D1): 1, M. Fawcett (York); 2, S. Shields (Ebor); 3, M. Rugg (Wyke). Breeders (Livebearers A4 B3): 1, 2 and 3, G. Andrews (Hull). Breeders (Livebearers C3 and D1): 1, M. Fawcett (York); 2, G. Andrews (Hull). Hatched Pairs (Egglayers): 1, Mrs. S. Richardson (Hull); 2, Mr. and Mrs. Carey (York); 3, R. Forth (Hull). Hatched Pairs (Livebearers): 1 and 2, C. Taylor (Wyke); 3, V. Rugg (Wyke). Common Goldfish and Comets: 1, Mark Waller (York); 2 and 3, M. Cook (Wyke). Fancy Goldwater: 1, C. Taylor (Wyke); 2, Mrs. Sowersby (Scar); 3, J. Baddley (Scar). A.O.V. Goldwater: 1, Mr. and Mrs. Ellaker (Scar); 2, C. and S. Waller (York); 3, Mr. and Mrs. Carey (York). A.V. Female (Egglayer): 1, K. Webb (Scar); 2, Mr. and Mrs. Tindall (York); 3, R. Rogers (Ebor). A.V. Female (Livebearer): 1 and 3, W. Sobersby (Scar); 2, G. Andrews (Hull). Furnished Mini Jars: 1 and 2, Mr. and Mrs. Tindall (York); 3, K. Webb (Scar).

Best in Show: Mr. and Mrs. Carey (York), Red Tailed Black Shark.

Best Exhibit: Bolton and Slee (York, Breeders *Apistograma nanasi*.

Judging Society: Bridlington.

Total entries 352.

Points	York	Hull	Scarboro.
6.3.84	86	97	Judges
	Ebor	Wyke	Bridlington
6.3.84	10	33	13
	York	Hull	Scarboro.
28.3.84	86	64	43
	Ebor	Wyke	Bridlington
28.3.84	14	42	Judges

SCOTLAND

THE **Paisley & District A.S.** held its last meeting on Tuesday 3rd April, when the table show on the night was Labyrinths. A Novelty Tank Competition was also held. The results were as follows: Labyrinths—Seniors: 1, Pearl Gourami, Sandy Holmes; 2, Dwarf Gourami, Sandy Holmes; 3, Three Spot Gourami, Bill Dunbar; 4, Siamese Fighter, Craig Lawson. Juniors: 1, Blue Gourami, John Thomson; 2, Dwarf Gourami, George Armstrong; 3, Pearl Gourami, Philip McArdle; 4, Blue Gourami, Steven Robertson. Novelty Tank Competition —the winner of this competition was Mr. Bill Dunbar for his Paisley and District A.S. Circus.

The Club meets on the first Tuesday of every month at 7.15 p.m., in the Museum and Art Galleries, High Street, Paisley. Everyone welcome, further details can be obtained from the Club Secretary, Mrs. E. E. Lindsay, 71 Wright Street, Renfrew. Phone: 041-888 5772.

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ON Tuesday, 13th March **Edinburgh A.S.** held a meeting in the club room where J. Milligan the secretary gave a slide show on rare livebearers. A discussion followed on what had been shown.

Tuesday, 27th March a bench show was held in two classes, livebearers and pencil fish.

1st in Livebearers: T. Milligan; 2nd. S. Kemp; 3rd, J. Wright; 4th, Niall Ballantyne. Pencil fish: 1st and 2nd, N. Ballantyne; 3rd, T. Milligan; 4th, A. Jeske. The judge for the night was grade 1 judge H. Kerr.

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ON 10th April **Edinburgh A.S.** held a meeting in the club room. A film show and discussion was given on livebearers and tetra.

On 24th October the meeting in the club room was given over to a table show of Platies and Cichlids. The results were as follows: Platies: 1, 3 and 4, J. Wright; 2, T. Milligan. Cichlids: 1, 2 and 3, S. Kemp; 4, T. Milligan. Junior Cichlids: 1, 2 and 3, S. Oswald.

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THE **Livingston A.S.** was recently reformed and at the election of officers the following were elected: President, Paul Fisher; Vice Presidenz, Philip Sutherland; Secretary, Linda Sutherland; Treasurer, Andrew Bowran; Show Manager, Brian Fleming.

At the meeting on 19th April a Bench show was held and the following results were obtained. Platies: 1, N. and J. Ballantyne. Guppies: 1, P. Meldrum; 2, N. and J. Ballantyne; 3, A. Bowran. Mollies: 1 and 2, P. Fisher.

Dates for the diary

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

JUNE

2nd June: SWINDON A.S. open show at Park South Community Centre, Cranmore Avenue, Swindon. 1st place trophies as well as perpetual trophies. Show Secretary, Mr. K. Curtis, 78 Beech Avenue, Swindon, Wilts. (Tel: 07933 2920).

2nd June: SOUTH PARK AQUATIC (STUDY) SOCIETY. Coldwater Fish and Plant Show, Wimbledon Community Centre, St. George's Road, S.W.19. Schedules available from Show Secretary, Dave Morgan, 10 Tennyson Avenue, Motspur Park, Surrey. Tel: 01-949 5597.

3rd June: MID-SUSSEX A.S. show will be held at "The Sydney West Sports Centre," Leylands Road, Burgess Hill, Sussex. F.B.A.S. Championship Class "B". Show Secretary, Mr J. Smith, 51 Easthourne Road, Brighton BN2 4DL. Tel: Brighton 602407.

3rd June: WORKINGTON & DISTRICT A.S. 5th open show of Tropical and Coldwater Fish, to be held in the Carnegie Arts Theatre, Workington. Enquiries to Show Organiser: Mr. P. Ward, 28 Jericho Road, High Meadows, Whitehaven. Tel: 4379.

3rd June: FEDERATION OF NORTHERN AQUARIUM SOCIETIES Council meeting to be held at the "Angel Hotel," Hyde Road, Denton. The meeting will start at 1.30 p.m. Representatives from all affiliated Societies are welcome. Further details can be obtained from the Secretary, Mrs. J. Cresswell, 58 Great Meadow, Astley Village, Chorley, Lancs. PR7 1TA. Tel: Chorley 69312.

9th June: LLANTWIT MAJOR A.S. open show, Ham Lane, Llantwit Major, South Glam., Wales. Details from Show Secretary, Mr. Colin Turner, 146 Arran Street, Roath, Cardiff, South Wales.

9th, 10th June: AQUARIAN FISHKEEPING EXHIBITION '84. Kempton Park Racecourse. Details and schedules from: The Secretary, The Association of Aquarists, 7 Wheeler Court, Plough Road, Battersea, London SW11.

10th June: S.M.T. AQUARIST SOCIETY annual open show in the Ballerup Hall, Civic Centre, East Kilbride. Admission: Adults 30p; Children & O.A.Ps 15p. For further details, contact: Show Manager Mr. M. Poulton, 69 Fernesse Crescent, Hill House, Hamilton or Show Secretary, Mr. B. Houston, 20 Birgidale Road, Glasgow G45 9NA.

16th June: NORTH AVON A.S. will be holding their 5th open show at Hanham Folk Centre, High Street, Hanham, Bristol. Benching will be 9.30 until 11.45 a.m. All enquiries to the Show Secretary, R. W. Cummins, 1 St. Annes Close, Cadbury Heath, Warmley, Bristol BS15 5EH.

17th June: ACCRINGTON & DISTRICT A.S. open show at a new venue, Harvey Street Community Centre, Harvey Street, Oswaldtwisle, Nr. Accrington. F.N.A.S. Show League. Schedules with s.a.e., Mr. S. Hindle, 10 Orange Street, Accrington BB5 5AQ. Tel: Acc. 395371.

17th June: ARBROATH A.S. open show will be held in the Arbroath Community Centre, Marketgate, Arbroath. Details and schedules from John R. Steven, 95 Brechin Road, Arbroath. Tel: 0241-76605.

17th June: LINCOLN & DISTRICT A.S. are holding their first open show at the Ancaster Day Centre in conjunction with the centre's open day. Booking in from 12.00 until 1.45 p.m. Details from: Miss H. Craven, 6 Drury Street, Metheringham, Lincoln LN4 3EZ.

17th June: CRAMLINGTON A.S. first open show at Cramlington High School, Dudley Lane, Cramlington. Benching 10.30 a.m.-1 p.m. Judging 1.10 p.m. prompt. N.E.F.A.S. rules apply. Enquiries to: Show Secretary, Dave Murray, 38 Wharnside Place, Southfield Lea, Cramlington. Tel: 715993.

23rd June: PORT TALBOT & DISTRICT A.S. (Change of Venue). Fourteenth annual open show to be held at "Four Winds" Hotel, Aberavon Seafront, Port Talbot, West Glam. Schedules from Show Secretary, J. Egan, 53 Penrra Afan, Baglan Moors, Port Talbot, West Glam. SA12 7RN (s.a.e. please).

24th June: THE BRITISH KOI-KEEPERS' SOCIETY are holding their National Koi show, once again at Billing Aquadrome, near Northampton. For further information, contact Show Chairman, J. Beattie, 96 Overstone Road, Sywell, Northampton.

24th June: ST. HELENS A.S. annual open show at Rainhill Village Hall, Rainhill, Merseyside.

24th June: ALFRETON & DISTRICT A.S. will be holding their 18th annual open show at Alfreton Hall, Alfreton, Derbyshire. Further details can be obtained by contacting M. Darrington, 48 Pennine Avenue, Riddings, Derbyshire. Tel: 0773 602077.

24th June: GATESHEAD A.S. open show at Gateshead Leisure Centre. Schedules from Mr. J. McCutcheon, 2 Lyndhurst Drive, Low Fell, Gateshead, Tyne and Wear NE9 6HB.

30th June: NAILSEA & DISTRICT A.S. 11th International open show, to be held at Scotch Horn Community Centre, Nailsea, Avon. Further details from show secretary, Mrs. K. M. Gadd, 22 Stoke Lane, Stoke Lodge, Patchway, Bristol. Also, would show secretaries please endeavour, when arranging dates for their shows, that dates do not clash in the same areas.

JULY

1st July: DARLINGTON & DISTRICT A.S. are holding their second open show at the Easthourne Comprehensive School, Darlington.

1st July: CHARD & DISTRICT A.S. Tenth annual open show, Furnham School, Furnham Road, Chard, Somerset. Details from Mr. D. Shepherd, 30 Forton Road, Chard. Tel: 04606 3985.

8th July: SCARBOROUGH & DISTRICT A.S. open show at Friarage Country Primary School, Longwestgate, Scarborough. Further details from: Mr. P. Baddley, 8 Endcliffe Crescent, Scarborough. Tel: 351952.

8th July: THE BILLINGHAM A.S. annual open show is to be held in the Billingham Community Centre, The Causeway, Billingham, commencing 1 p.m. Booking-in 11 a.m. until 1 p.m. We also hold an auction while judging is in progress. Please contact Club Secretary G. R. McGregor, 59 Cleadon Avenue, Low Grange, Billingham, Cleveland TS23 3RL, or our Show Secretary, E. Shackelock, 20 Woolsington Road, Billingham for further details.

8th July: DUDLEY & DISTRICT A.S. open show to be held at the Blind Institute, Wolverhampton Road East, Sedgley, West Midlands. For further details please contact Show Secretary, Mr. K. Wheatley, 69 Hillside Road, Wrens Nest Estate, Dudley; telephone: Sedgley 61286.

8th July: ROMFORD & BEACONTREE A.S. open show at Parkside Community Centre, Goodmayes Lane, Goodmayes, Essex. Schedules from B. Brown, 12 Tiptree Crescent, Clayhall Avenue, Ilford, Essex.

15th July: N.E.F.A.S. Convention to be held at the Grange Community Centre, Throckley, Newcastle upon Tyne. Speakers are Mr. John Dawes (Assistant Editor to the *Aquarist* Magazine, Chief Consultant to Aquarian Foods). Subject: The Language of Fishes. Dr. Randolph Richards (University of Stirling). Subject: Fish Diseases. Tickets £1·00. Admission by ticket only. For further information apply to: Mr. J. English, Henderson Filters, Throckley, Newcastle upon Tyne NE15 9DT.

15th July: The Lower Thames-side Section of the **B.K.K.S.** closed show at the Alpha Garden Centre, London Road, Wickford.

15th July: READING & DISTRICT A.S. open show to be held at the Southcote Youth Community Centre in Coronation Square, Southcote, Reading, Berks. For schedules please contact Show Secretary, C. Toms on Reading 412373.

15th July: THE SANDGROUNDERS A.S. open show at Meol's Cop School, Meols Cop Road, Southport. Schedules later from Bernie Baldwin, 10 Olive Grove, Southport, Merseyside PR8 6BG; telephone: 0704 43384.

29th July: MIDLAND KOI ASSOCIATION open show, Bagington Village Hall, Coventry. (Near Coventry Airport. Off A45). Further details from R. Cleaver, 59 Kensington Road, Earlsdon, Coventry. Tel: Cov. 79991.

AUGUST

4th August: THE NORTHERN GOLDFISH & PONDKEEPERS SOCIETY, will be staging their 8th open show at the Sports Centre, Silverwell Street, Bolton, Greater Manchester. Open to the public from 1 p.m. until 5 p.m. Details and entry forms from R. Hodgkinson, 9 Stratford Close, Farnworth, Bolton, Greater Manchester. S.a.e. with application please. (Tel: 0204 75281).

5th August: LEICESTER A.S. 4th open show to be held at the St. Matthew's Community Centre, Malabar Road, Leicester. Further details and show schedules from J. Richards, 29 Huggett Close, Rushey Mead, Leicester. Tel: Leicester 666314.

18th & 19th August: YORKSHIRE AQUARIST Festival. Doncaster Racecourse. Details and schedules from Mr. N. Bolton, 11 Sherburngate Drive, Pocklington, Yorks. YO4 2ED. Tel: 07592 3177.

26th August: LONG EATON A.S. open show, at Gregory's Rose Gardens, Toton, Nottingham. Any information may be obtained from the Show Secretary, Mr. G. D. Muckelroy, 51 Chesterton Road, Spondon, Derby; tel: Derby (0332) 671995.

28th August: SOUTH EASTERN SECTION of the **BRITISH KOI KEEPERS SOCIETY** open show to be held at Pollill Garden Centre (on the A21) near Orpington, Kent (South of Bromley, Kent). Benching 9.00 a.m. to 12.00 p.m. Open to visitors from 12.30 p.m. No charge for koi—people 50p each. Entry forms and further information from Chris Ball, 65 Daneby Road, London SE6.

SEPTEMBER

2nd September: PRESTON & DISTRICT A.S. annual open show. Venue Preston North End Supporters Club, Deepdale Road, Preston. Further details and schedules from Mr. W. Rawlinson, 364 St. George's Road, Preston. Phone: Preston 25270.

8th September: BRISTOL TROPICAL FISH CLUB open show will be held at the All Saints' Church Hall, Grove Road, Fishponds, near Bristol; benching 9 a.m./12 (noon). Schedules will be available from mid-June from Show Secretary, Mr T. E. Davis, 284 Badminton Road, Coalpit Heath, near Bristol, BS17 2QW, or telephone Winterbourne 775432. S.A.E. with application please. Show will be to F.B.A.S. rules and incorporate *Aquarist* Gold Fin, Championship Trophy Class and Brooch Scheme.

8th-9th September: Fourth annual Fish Keeping Exhibition to be held at the Memorial Hall, Littlebourne, Canterbury.

9th September: NORTHUMBRIA COLD-WATER FISH AND PONDKEEPERS SOCIETY will be holding their annual open show, but the venue has not yet been agreed upon. As soon as this is finalised you will be informed.

9th September: TONGHAM A.S. open show at "Bull Civilian" Restaurant, Buller Barracks, off Alison Road, Aldershot, Hants. Start benching 9 a.m.

9th September: CHELTENHAM TROPICAL FISH CLUB open show at St. Mark's Community Centre, Brooklyn Road, Cheltenham. Schedules from M. Jenkins, 3 Marlborough Place, Princes Street, Cheltenham. Tel: 0242 525199.

15th September: BRISTOL A.S. Coldwater Fish show at St. Ambrose Church Hall, Stretford Road, Whitehall, Bristol, from 3-5.30 p.m. Details and schedules from **Show** Secretary, V. Capaldi, 7A **Wadsingham Road,** Bristol BS6 5BT. Tel: 0272-426323.

15th September: HOUNSLOW & DISTRICT A.S. open show at the Hounslow Youth Centre, Kingsley Road, Hounslow and details from Mr. T. Bolingbroke, 2 Holmwood Close, Addlestone, Surrey. Tel: Weybridge 54976.

16th September: NORTH STAFFS & DISTRICT A.S. open show at Thistley Hough High School, Penkhull, Stoke-on-Trent. Schedules and further information from Mrs. E. Hackney, 146 Congleton Road, North, Scholar Green, Stoke-on-Trent.

18th September: DORCHESTER TROPICAL FISH SOCIETY. Change of Show date. 4th open show will still be held at the Boys' Brigade Hall, Sweenits Lane, Weymouth Avenue, Dorchester, Dorset. Schedules available from Mr. B. Symes, 3 Arnhem Green, Poundbury, Dorchester, Dorset DT1 2PS, or phone Dorchester 67557.

18th September: ST. EDMUNDSBURY & DISTRICT A.S. second open show at Northgate Community Centre, Bury St. Edmunds. Schedules available from Mr. S. Forrest, 70 Northumberland Avenue, Bury St. Edmunds (s.a.e. please). Fish auction, canteen facilities, annual trophies, other attractions are planned.

16th September: CHESTERFIELD AND DISTRICT A.S. open show at Westfield Upper School, Mosborough, Nr. Sheffield S31 9BN. For further details contact A. Joyce (Show Secretary), 27 Darcy Road, Eckington, Nr. Sheffield S31 9BN; telephone: Eckington 433 868.

16th September: TONBRIDGE AND DISTRICT A.S. are holding their open show at Tunbridge Wells Technical High School, Tunbridge Wells.

16th September: ELLESMERE PORT A.S. second open show will be held at the T.A. Centre, Stanney Lane, Ellesmere Port, Cheshire. Benching times are from 12 noon to 2.0 p.m. Plaques for all class winners, annual trophies, etc. Further information, schedules, etc., from Les Bowman, 50 Maple Avenue, Little Sutton, South Wirral L66 3QT; telephone: 051-339 6024.

23rd September: BASINGSTOKE AND DISTRICT A.S. will be holding their annual open show at the Basingstoke Carnival Hall. Further details can be obtained by sending a large stamped addressed envelope to the Show Manager, C. P. Ralph, 325 Abbey Road, Popley 4, Basingstoke, Hants. RG24 9BH.

23rd September: WOLVERHAMPTON A.S. open show, at Pendeford High School, Marsh Lane, Perdhouses, Wolverhampton. Show Secretary, Barry Jayes, 23 Hepworth Close, Penton, Wolverhampton. Tel: Wolverhampton 750144.

23rd September: WYKE SHOW SOCIETY, are holding their open show at the College of Further Education, Inglemire Lane, Hull.

30th September: DARWEN A.S. are holding their annual open show at the Library Theatre in Darwen.

OCTOBER

7th October: HALIFAX A.S. open show at Forest Cottage Community Centre, Cousin Lane, Illingworth, Halifax. Schedules on request. S.a.e. please to David Shields, "Cobblestones," Gaisnor, King Cross, Halifax HX2 7DT, or ring for details Halifax 60118.

14th October: PRESTON & DISTRICT A.S. autumn auction to be held at Preston North End Supporters Club, Deepdale Road, Preston. Further details from the Secretary, Mrs. J. Cresswell, Chorley 69312.

NOVEMBER

3rd & 4th November: BRITISH AQUARISTS Festival. Belle Vue, Manchester. Details and schedules from J. V. Hall, 34a Carr Road, Calverley, Pudsey, Yorks. LS28 5RH.

Solution from page 46

Across:

1. Tanganyika
7. A.C.
9. Gars
11. Lepidosiren
13. Kerr
14. Pat
16. Leaf
17. Ide
18. Bel
19. Mean
20. Tan
22. Ifni
23. Play Canaris
27. Anal
28. E.O.
29. Malaguraci

Down:

2. Neap
3. Nero
4. Inst.
5. Anguillidae
6. West Africa
8. Citriniellum
10. As
11. Lake Magadi
12. Sea
14. Pet
15. Ten
21. Arc
23. P.A.
24. Yell
25. Agog
26. Sofa