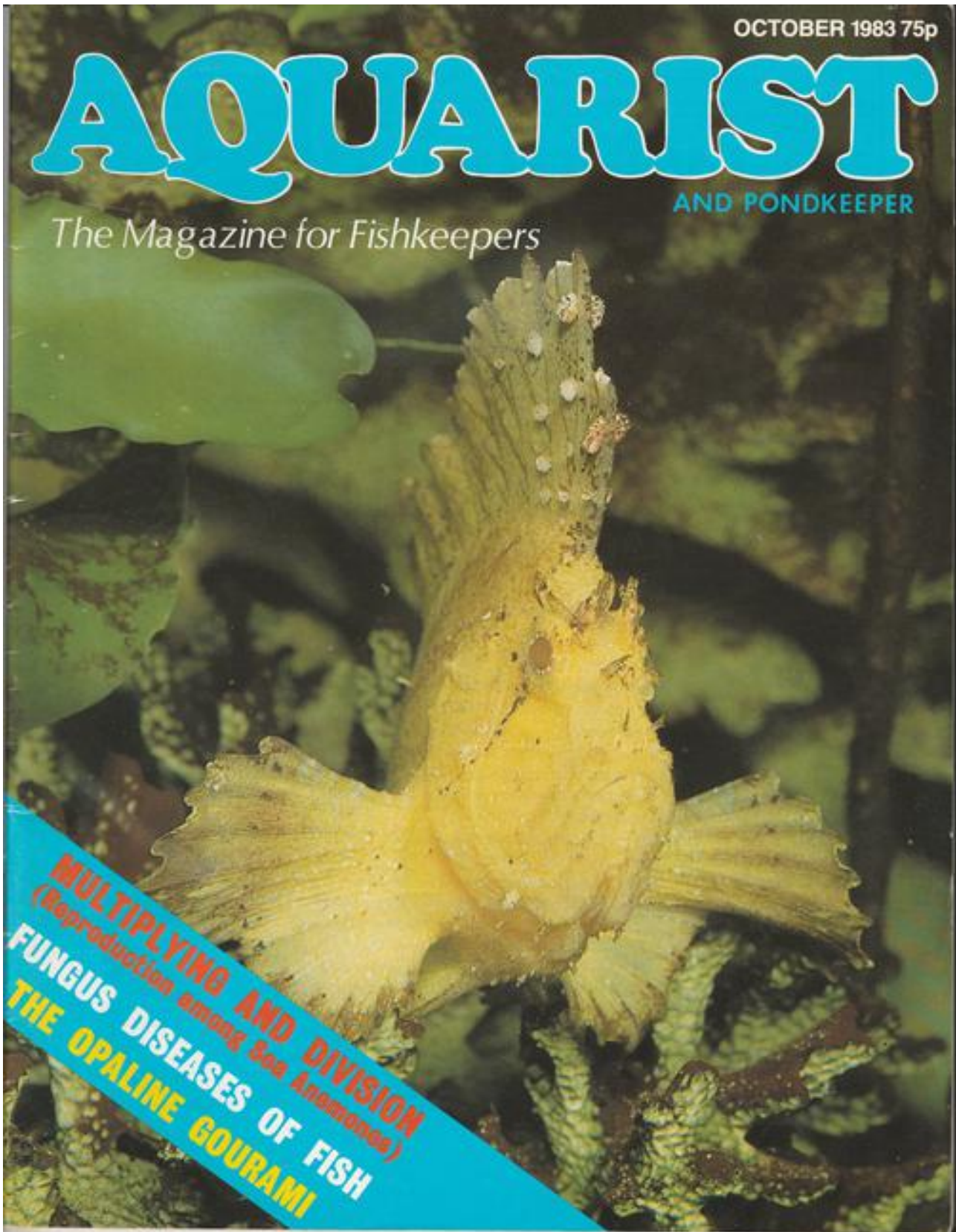


OCTOBER 1983 75p

# AQUARIST

AND PONDKEEPER

*The Magazine for Fishkeepers*



**MULTIPLYING AND DIVISION**  
*(Reproduction among Sea Anemones)*  
**FUNGUS DISEASES OF FISH**  
**THE OPALINE GOURAMI**

## COVER STORY *Photo: A. van den Nieuwenhuizen*



*Taenionotus triacanthus* is a member of the Scorpaenidae, the Scorpionfishes, a family which includes some of the most venomous fishes in the world. Among the aquarium species, the most common are those belonging to the genus *Pterois*, the beautiful but dangerous Lionfishes. *T. triacanthus* has two common names, the Sailfin Leafish and the Swayfish. Of these, the latter is, by far, the more appropriate since it describes quite accurately one of the most characteristic behaviour patterns of this predatory fish. Swayfish live among seaweeds in the tropical parts of the Indo-Pacific where they lie in wait for prey, swaying in synchrony with the weeds. This swaying becomes progressively more pronounced as the fish gets excited. If the prey does not swim within striking distance, *T. triacanthus* may stalk it with the same swaying motion. Despite its predatory habits, this species (which can attain a length of around 15 cm., or 6 in.), is quite delicate and should, therefore, not be kept with very active fish or "over-active" competitors.

Swayfish are only rarely imported, probably because of relative scarcity in the wild rather than their venomous qualities. In aquaria, normal tropical marine conditions with a diet consisting entirely, or predominantly, of live foods should suit *Taenionotus*.

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## AQUARIST



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

#### Subscriptions:

Renewable 31st December  
annually. (Surface mail)  
Nov.-December £2.00.  
Airmail quoted on request.

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

Founded 1924  
as "The Amateur Aquarist"

Vol. XLVIII No. 7, 1983

Editor: Laurence E. Perkins

Consultant Editor: John A. Dawes

Advertisement Manager:  
J. E. Young

The Editor accepts no  
responsibility for views expressed  
by contributors



## WHAT IS YOUR OPINION?



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

### 'Photographs by the Author'

I AM ALWAYS pleased to receive letters from readers who live in foreign countries—even if their English is not perfect. I always remind myself that many of us whose native tongue is English frequently make mistakes when writing or speaking the language; and that many people who spend five years gaining a G.C.E. 'O' level in a foreign language can hardly make themselves understood when they visit the country in question.

Mr. Marjan Vidic's address is Dobriška Ulica 1, 64248 Lesce, S.R. Slovenija, Yugoslavia. He writes perfectly understandable English, so rather than correct it, and remove all its charm, I'll type it as written. The letter is dated 28:VI:1983. Mr. Vidic writes: "This is my first letter to you and I hope not the last. I hope you will understand my English. I am very satisfied with the magazine *The Aquarist & Pondkeeper* and on my opinion yours articles are one of the best. The aim of my writing is your article—*Aquarist & Pondkeeper*, April 1983, p. 50—where you are talking about using video equipment. I'm considering to make a film of my fish by using video equipment; but I didn't track nothing about video-using for aquaristik. Can you give me some instructions?"

"Now something about me. I'm 22 years old—a profession laboratory technician. At work I study chemistry. In

October I'll probably start with study biology. I must to accentuate that is aquaristik very bad develop in my country. I concern with aquaristik six years. All equipment and fishes I buying in Austria. Of course I have problems with the customers, but I still insist on my hobby. It's more than just hobby: I'm simply love in my hobby. My mother and friends tell me I'm mad, because all my money I spend for fishes. In principal I'm concerning with discus and marine fishes. Now I have one big aquarium—570 litres—for discus for decoration, and next month I'll buy another—700 litres approximately—for marine fishes. In my plan is construction of breeding fish house—under the roof on the loft.

"I'm a member of Discus Study Group, New York, and I'm ordering on some magazines from U.S.A. . . . Now, Mr. Whiteside, I have some questions for you. Don't take amiss. I'd like to correspond with aquarists from your country—especial with aquarists who concern with discus and marine fishes. Of course, others are welcome too. Can you publish my address? Will you inform me?"

"In your magazine I saw address of British Discus Association. I was wrote to him sometimes, but I still didn't receive any answer. If you can, can you help me? I mean, can you see what is wrong? I'm very interested of B.D.A. Next year, or in 1985, I'll buy video recorder—using for aquar-

istik. Probably the best is portable. But unfortunately it's very expensive. I must work for one year for video recorder. Cheaper is stationary. What are you advising to me? I'm just asking you; don't take amiss. If I buy stationary and if I come in 1985 to England to see big aquarium shops will be possible to borrow a portable video recorder with camera to make a video film? Can you borrow for me just for one-two days if in 1985 year (I) come to your country? If you'll make a video film of discus and other aquarium fishes, will be possible to buy? Can you give me some instructions of using video in aquaristik?"

"Can you send me some photos of yours aquariums, fishes? In the end: I'll be very happy if I can do something for you. Please answer me as soon as possible. Best wishes from Yugoslavia, (signed) Marjan Vidic."

Mr. Vidic's interesting letter raises some problems in that 'my' country is N. Ireland and not mainland Britain. Also, my experience with video recorders and cameras is fairly limited. I do not know if short-term-hire portable units are available in England. There is an absolute video boom where I live. Ordinary non-portable VCRs may be rented for £5.00 for three nights—with a 'free' film or two—and I know of at least one shop that rents out a portable recorder and camera for £25.00 for one day.

When I filmed my fish using video



Young discus



Robert Robinson beside one of his tanks

I simply had to ensure that the glass and water were clean and that the tank was adequately lit. A tripod is necessary for a video camera if one wants a steady picture. One adjusts the colour balance and then simply films the fish. An automatic zoom lens is useful. As fish do not make noises there is nothing to record through the microphone—although an aquarium air pump will give a buzzing noise. It would probably be most interesting to over-dub a spoken commentary, using an appropriate microphone, after editing the film. To dub/edit video, one needs a second VCR and appropriate audio and video leads. Items filmed in low light levels don't copy very well, but those taped in good lighting usually copy well. Clean edits are quite simple with good video cassette recorders.

Perhaps some London readers could let Mr. Vidic know where one can hire a portable VCR and camera for a day or two. I've contacted the British Discus Association to ask if they'll reply to Mr. Vidic's letter. Photograph 1 shows a young discus.

Photograph 2 shows 16-years-old Robert Robinson beside one of his several tanks. Last week I visited Robert's home to photograph his pond fish but naturally I chose the warmest and sunniest July this century and found that Robert's pond fish were keeping well out of view. I did manage, however, to photograph some of his larger fish. Photograph 3 shows an attractive Oscar, *Astronotus ocellatus*.

It was the first time that I managed to get a set of reasonable photographs of fairly large Oscars. Photograph 4 shows another of Robert's large fish—*Tilapia mariae*, the tiger or zebra cichlid. I should be pleased to receive a letter from anyone who has kept Oscars or *Tilapia* species; indeed I should be pleased to receive a letter from any reader. I don't think I received a single reader's letter to W.Y.O. during the month of July; and I don't think that has ever happened before. Perhaps you've all been basking in the roasting sun. My lawns are badly burned; but I've seen more butterflies this year than for about 20 years.

Mr. Ron Edmunds resides at Lindley, Coombs Cross, Bovey Tracey. He writes: "I have enjoyed reading your columns in *The Aquarist* for more years than I care to remember. This is my first letter. My interest in fishkeeping began in 1950 when I was 14. My father was given a 30 in. tank and six goldfish. In those days we lived in a small terraced house where the kitchen was also the living room and the tank was installed on the sideboard in front of the only window. Incredibly, within a month, the fish had spawned and we had to look for advice from somewhere. At that time the Hendon Aquatic Society met in a church hall very near to my home and so I became a member. I have many happy memories of their meetings. At that time they were one of the leading societies in the south of

England—and perhaps even further afield. One of the members, namely Mr. Skipper, was, I believe, the first person to breed the discus, and appeared on television, to the delight of the members.

"It was at the Hendon Aquatic Society that I became interested in a branch of fishkeeping that still gives me great pleasure: furnished aquaria. The society held an open show every year that was extremely well supported and the furnished aquaria held me spellbound. To this day I have been trying to achieve the same result in what is normally called the community tank—although, to my family's disgust, I am quite content to have only one species in the tank—usually tiger barbs, harlequins or neon tetras.

"Until I got married I had two or three tanks in my bedroom, enjoying the normal pursuits of breeding the easier species. Since my marriage I have kept to just the one tank, always built into an alcove or similar so that only the front is visible, and surrounded by a picture frame. It has always been a source of enjoyment to friends and family. I still have the air pump that my father bought me for my 16th birthday; and it still works because for the last 22 years I have never used it. When friends have become interested in setting up a tank they have always asked where the air pump and filter are. When I say that I never use them they always ask how I keep the water clear. I kept one tank for four years without disturbance except for glass cleaning and partial water changes. What do you feel about the need for filters and pumps?

"A lot of my pleasure is derived from plants. This does not seem to be the norm because I have rarely found a retailer who had a good selection of plants. I have nearly always purchased mine from specialist dealers who supply mainly by post. There were exceptions many years ago when I worked in London—namely Tachbrook Tropicals, whose shop was a delight, and Queensborough Fisheries. I had often thought over the years that 18 in. and 20 in. high tanks never gave the effect I really wanted with tall plants, so about three



years ago I made an all-glass tank 30 in. high x 12 in. x 12 in. and installed it in the chimney breast. The visual effect when first set up was certainly stunning; in fact, when we had a chimney fire last year the firemen were almost more interested in the tank than in the fire itself. However, it has been a problem tank. The plants that I can keep healthy and growing are few. I have tried several types and wattages of bulbs, and varied the length of time lit, but have not managed to solve the algae problem—blue-green at the top and brown at the bottom. The tank looked superb planted with *Cobomba*—but it soon rotted away. Giant *Vallisneria* also looked really good but they also gradually died back. Even *Cryptocoryne* does not really succeed at the bottom. Amazon swords are now growing well but I still cannot control the algae problem.

"A mistake I made when installing the tank was in not leaving much room to get my arm in to scrape the glass. It's a long way down and although I have a long scraper I cannot get much pressure on the blade because of the angle of my arm. The brown algae seems to be harder to remove. I think I may make another tank of only 24 in. in height. My children have now almost grown up and the need for bicycle space etc. is beginning to decline; also, the aged deep freeze is on its last legs; and so my future plans are to install a few tanks in their place in the outside shed—that is, if I can make more time by reducing one of



Oscar — *Astronotus ocellatus*

my vices: playing tennis. Many thanks for the enjoyment your writing has given me over the years."

Did you see the ITV programme, *It's a Vet's Life*, on Sunday, 31st July? The Scottish vet and his blonde lady assistant talked a lot about aquariums and ailing fish. I was interested to see him perform cryosurgery on an ulcer on the side of a large goldfish. (Cryo is from the Greek *kryos* meaning frost.) The ailing fish was placed in water containing an anaesthetic and when it keeled over it was placed on a damp sponge for the operation, and held down with two pieces of what was probably damp gauze. A freezing cold probe was pressed onto the ulcer to kill the damaged cells. (I've been having cryotherapy for verrucas: a cot-

ton bud dipped into liquid nitrogen and then pressed onto the warts. It is relatively painless.)

Please write to me about your community tank, your filtration system and your garden pond. Goodbye until next month.



*Tilapia mariae* — zebra or tiger cichlid

## OSCAR



G. Robinson

# MYCOTIC DISEASES OF FISHES



by Dr. R. J. Goldstein

*MYCO* refers to a primitive group of plant-like organisms that have an unusual cell wall structure somewhat resembling the waxy, water-resistant wall of tuberculosis bacteria. They have no chlorophyll, and most of them live as saprophytes on dead or dying tissues. Commonly seen members of this group

Unidentified fungus in the liver of *Symphysodon discus*

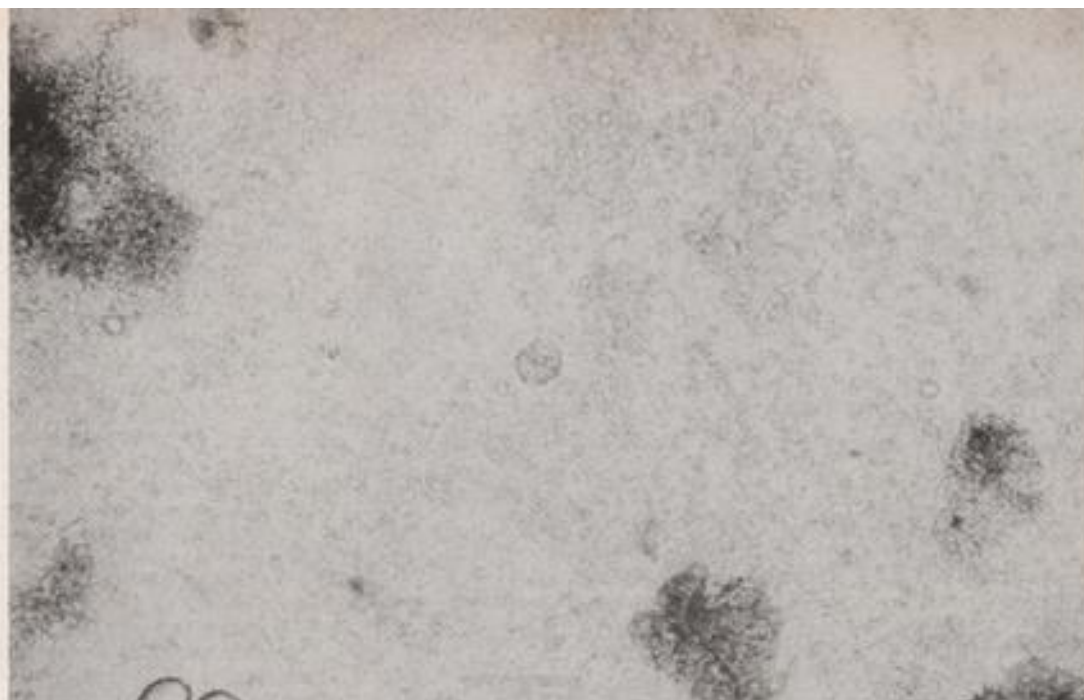
are mushrooms, toadstools, bread mold and yeasts. We speak of them collectively as *fungi* (sing.—*fungus*). Some of them cause a variety of diseases in man, domestic animals and fishes. Of course, there are others which infect plants as well. Infection with a member of this group is called a *mycosis*, but this word is not used much. The reason is that we have another word that refers to disease caused

by one of these agents, and rarely do you get infection without the production of the disease. A disease caused by fungi is known as a *mycosis*, and the study of all these agents is known as *mycology*.

Fungi come in all degrees of complexity. Some, like the yeasts, are single-celled. Other are multicellular. A multicellular fungus starts as a segment from another fungus, or as the product of a sexual or asexual spore. Spores are very resistant to environmental variables, and apparently evolved as a resting stage during periods of drought, heat, cold or lack of nutrients. A spore in the right place opens like a seed, and out grows a fibre which is called a *hypha*. Root-like, it quickly permeates everything before it, growing, branching this way and that, and ultimately forming a complex network through the substance upon which it is feeding by absorption of nutrients. This network is called a *mycelium*. After the mycelium has grown extensively through its feeding ground, it begins to grow on the surface and this is the sign that reproduction is imminent. Because fungi are usually colourless, you probably won't notice the hairy, surface growth of the mycelium at this stage. Soon, however, it begins to form two kinds of elevated hyphae, some that will produce asexual spores and others that will contact one another, exchange genetic material (sometimes from two different mycelia growing into one another) and produce sexual spores. The spores may be black or blue as in common types of bread mold, or any colour at all. In the woods you will see fungi on rotted wood and leaves with brilliant red or yellow colours, and this is often the colour of the spores. The spores ripen and are released, and eventually may settle on another suitable meal ticket and begin the process anew.

Spores of fungi are everywhere, and we see them in aquaria constantly. A dead fish will be quickly consumed by a subsurface mycelium and eventually we see





straight fibres growing out of the fish's body. These will be the early stages of spore production. If we wait, we'll see the tips of these fibres with white dots signifying white spore formation. These fungi will now grow on dead fish, left-over food, filthy, organic-rich gravel, slimy rocks, and even wounds in living fish where the tissue has been killed by bacteria. They thrive on infertile fish eggs, or eggs killed by other means.

Many fungi are not content to live saprophytically on dead and dying tissue, but actively kill other tissues once they get a toe-hold. Their mycelia emit juices which cannot be tolerated by other living creatures and which, once dead or weakened, fall prey to the quickly growing mycelial hyphae. An unusual group of soil fungi produce loops in their mycelia. When a roundworm (nematode) attempts to pass through, the loop quickly tightens into a noose, trapping the worm and eventually killing it for food.

Fungi are classified into numerous Orders, each Order containing a number of Families, and each Family then containing different Genera and Species.

Aquarists are most familiar with the Order Saprolegniales. While most tropical fish enthusiasts use the term *Saprolegnia* to describe the fungus on fish eggs or wounds, there are actually some 22 species that cause similar conditions, and they are included in several Orders. Within the Saprolegniales, Peronosporales and Leptomitales (three Orders) we have a great diversity of different disease-producing or simply opportunistic agents. Many infect freshwater fishes, while others occur in brackish water. They may cause the skin to break down and die, or even cause liquifaction of the underlying muscle tissue. The most dangerous of these fungi are *Saprolegnia parasitica* and *Saprolegnia ferax*. They can attack perfectly healthy individuals without any predisposing stress, such as handling, cold or a wound. By the time we see the results in the gills, skin or muscle of the fish, the damage has already been done. For we are observing the reproductive part of the mycelium after the feeding portion of the mycelium has already permeated through the body of the victim. At this point, all we can do is remove the victim so that it doesn't get eaten by

**Unidentified fungus in the liver of *Labotropheus trewavasae***

another fish, and hope that we have done so before the surface structure has produced another round of mature spores.

You have all seen black bread mold. That is caused by a fungus known as *Aspergillus*. It is a large genus, and it also has species that are aquatic and can infect fishes. Normally, *Aspergillus* lives on grains of various kinds. Recently, there was a report of cultured *Tilapia* dying of mysterious causes. The symptoms included sudden death after any kind of handling, even something as mild as sorting. The fish also had swollen bellies and became dark. When they were cut open after sudden death from handling, it was found that the liver was just about entirely liquified. Eventually the cause of the disease was found. It turned out that the feed being used for the *Tilapia* was infested with *Aspergillus* molds of two common species. Ordinarily, these molds are not considered disease producing agents. However, the molds continued to survive and grow inside the living *Tilapia*, causing

the severe symptoms and eventual death. The molds were *Aspergillus niger* and *Aspergillus flavus*, and it appears that they may be pathogenic in fish when combined, but not separately.

There are a number of other fungus disease agents infecting fishes. *Phoma herbarum* is known from the fry of salmon and trout, and begins as an infection of the air bladder, eventually spreading throughout the body. We may have something similar in tropical fishes, although we are probably calling it *Saprolegnia* out of ignorance. There is another salmon and trout fungus that occurs in the skin of the head and gets into the brain. This is caused by *Exophiala salmonis*, and causes the fish to whirl about and get popeyes. We should be alert to its possible presence in warm-water fishes. It can be diagnosed by its production of giant cells.

Another group of fungi cause a progressive gill rot that is localized but quite acute in severity. The agents are *Branchiomyces sanguinis* and *Branchiomyces demigrans*. Occurring in minnows, sunfishes and sticklebacks, they apparently can live in all kinds of fishes at all temperatures, and probably occur in aquaria. We just haven't been looking for them. They are identified by their branching hyphae in the gill tissues. The hyphae do not have *septa* or divisions, but they do have spores produced inside this mycelium. Thus, instead of looking for an aerial mycelium with upright spore-producing structures, the spores are within those branching tubular hyphae where they would only be seen with a microscope. These fungi are sensitive to low oxygen levels and the disease can occur in what most would consider healthy tank conditions.

By far, the most dramatic fungus disease in recent years is that caused by *Ichthyophonus hoferi*. Originally causing a furore in the hobby when it was found in discus fish, it quickly became the focus of everyone who lost a discus and didn't know why. It was much easier to

blame a newly described fungus than attribute the loss to poor fish management. Today we know that *Ichthyophonus hoferi* is widespread in both marine and freshwater habitats, but it is hardly the devil incarnate. It is not host specific and does cause mass mortalities in some groups of fishes such as herrings. But in many other fishes it produces only sub-clinical infections and never gets severe enough to cause debilitation or death.

Known from 35 species of marine fishes and 48 kinds of freshwater fishes, *Ichthyophonus hoferi* also produces internal spores within its hyphae inside the fish. When an uninfected fish eats an infected fish, the spores germinate internally, and the new fish then gets the infection. It has also been found that a common copepod, *Calanus*, can harbor the fungus and perhaps may serve as a means of transmission of the agent.

A large number of chemical compounds have been touted as fungicides over the years. Most of the reports were based on trial and error usage in hatcheries, and both dosages and temperatures varied all over the spectrum. Nelson Herwig (*Handbook of Drugs and Chemicals Used in the Treatment of Fish Diseases*) lists 36 different compounds, ranging from dyes and metals to antibacterial agents and medical compounds not available to hobbyists. He also provides information on the doses that were used by different people at different times, and their effects.

Recently, D. J. Alderman of England set up a system for testing fungicides on a comparative basis in the laboratory. Although primarily a study in methodology, his results have great application to aquarists. For example, he found the following drugs to be highly effective at just 1 part per million: Malachite green oxalate, Brilliant green, Crystal violet, Dahlia, Iodine green, and Thimerosal. At 10 parts per million, other drugs were also effective, including: Ethyl violet, Dichlorophen, Halquinol, Salicy-

lanilide, Terbutryne, Hexylresorcinol and Defungit. He also provided a further listing of drugs effective at 100 parts per million. Of considerable interest is the group of drugs that were not effective at any dose. These included Potassium iodide, Chloramine T, Potassium sorbate and, most interesting of all, Propylene phenoxethanol. You may recall from reading all kinds of literature that phenoxethol (phenoxethanol) was supposed to be a boon to aquarists, the only cure for that horrible discus fungus disease, *Ichthyophonus hoferi*. And here we see it as completely useless when tested in a laboratory under standard conditions.

True, the test organism for all these drugs was *Saprolegnia parasitica*, rather than *Ichthyophonus*. But the evidence for any efficacy of phenoxethol was always suspect. Its appearance in the hobby can be traced to a report by Van Duijn, which was picked up by all subsequent authors (including me). Herwig cites Amlacher in his 1961 German book on fish diseases as the first person to report on the use of phenoxethol. However, Van Duijn cites the aquarist Rankin, writing in *Water Life* for 1953, as the originator of the treatment regimen.

There are many other fungus diseases of aquarium fishes that have not yet been described in the scientific literature. I have personally seen a number of new species and have slides of the specimens still on hand. As in any other branch of parasitology, the parasites tend to follow the distribution of parasitologists. That is to say, they will be found wherever people look for them. The problem today is the paucity of hard information that reflects the very limited entry of scientists into the field of mycology. Those that do enter this specialty go where there is a pressing need: into veterinary or medical mycology. There are many serious mycotic diseases of man and domestic animals, and work on fish mycoses is usually conducted by people untrained in this highly

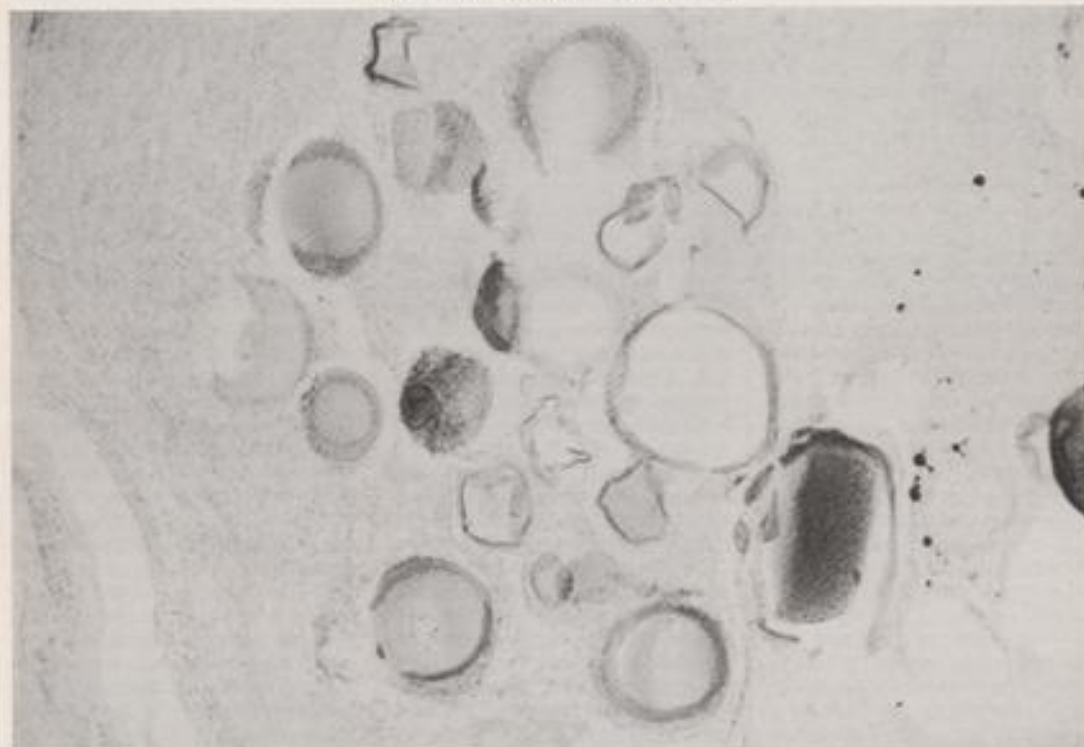


## MYCOTIC DISEASES OF FISHES

specialised discipline. We use standard culture media, such as *Sabouraud's Agar*, but are neither equipped to apply modern techniques nor aware of current advances from the medical literature. In addition, most fungi grow very slowly and some have complex life cycles. This compounds the difficulty of study by providing both surprises in, for example, life history

aspects and in keeping the cultures free of contaminating bacteria and other kinds of fungi.

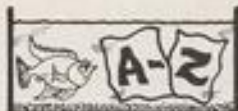
As information develops on mycotic diseases of fishes, it will filter down to the hobby. But always be suspicious of the source. The discipline is complex and full of pitfalls for aquarists, even more so than for biologists.



*Ichthyophonus hoferi* in the liver of a flounder

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## of the Aquarium

### Mosquito Fishes

WITHOUT a doubt, the best-known Mosquito fish is *Heterandria formosa*. However, when it comes down to efficiency, as far as controlling mosquitoes is concerned, this species cannot be regarded as the most significant of the Mosquito fishes. The honour must undoubtedly go to *Gambusia affinis*.



*Gambusia affinis holbrooki* represents one of the most efficient methods of mosquito control known

In a bibliography (published in 1968 by the Food and Agriculture Organization of the United Nations) of papers relating to the control of mosquitoes by the use of fish between 1901 and 1966, *H. formosa* only figures twice while *G. affinis* has well over one hundred citations. The list of species used makes interesting reading in itself, with more than 170 species being quoted! Many of these are Killifishes and Livebearers, but even Eels are named as having been used in various experiments.

Viewed in this light, calling *H. formosa* the Mosquito fish seems a bit of a misnomer. Nevertheless this does not detract in any way from the intrinsic interest of this small species. It has other, perhaps, more significant claims to fame.

For a start, it is one of the smallest vertebrates (back-boned animals)

known to science with an adult male measuring only about 2 cm. This places this species 7th in the "League of Dwarfs". The top place is occupied by a tiny Goby, *Pandaka pygmaea* (0.75 cm). A second significant factor about *H. formosa* is that, unlike most livebearers (Poeciliidae), females actually nourish their embryos during development and produce them either singly or in small batches over a period of weeks. This is referred to as SUPERFOETATION. In the wild, *H. formosa* is found in The States from South Carolina to Florida.

There are two subspecies of *Gambusia affinis*: *G. a. affinis* and *G. a. holbrooki*. Both are hardy, American and North Mexican (*holbrooki*) subspecies which have been widely distributed throughout tropical and sub-tropical regions of the world, including Africa, the Mediterranean, the Middle East and the Far East. It has been reported that a single *Gambusia* can eat its own weight in mosquito larvae per day. Bearing in mind how small these larvae are, it is easy to see how effective a method of biological control these fish can be.

### Nandids



*Badis badis*—the Chameleon Fish

DESPITE the existence of a maximum of just 7 genera with 10 species, the Nandids present considerable taxonomical problems. Some authorities believe the most common species, *Badis badis*, to constitute a Family on its own, the Badidae. Another believes the Nandids to be represented by three separate Families, the Badidae, Nandidae and Pristolepidae. Yet another believes the Badidae and Pristolepidae not to be closely related to the Nandidae at all. Here, the classification adopted is that of Joseph Nelson in his 'Fishes of the World' (John Wiley, 1976). There is, of course, no guarantee that

this classification will either be accepted universally or remain unaltered in the future.

According to Nelson, the Nandids all belong to a single Family, the Nandidae. This, in turn, is subdivided into three Subfamilies:

- the Nandinae with two Tribes, the Nandini and the Polycentrini;
- the Pristolepinae; and
- the Badinae.

Of these, the most common are the Badinae. It is to this Subfamily that *Badis badis* belongs. In fact, there is only one recognised species represented by two subspecies, *B. b. badis* and *B. b. burmanicus*.

*Badis badis* is known within the hobby either as *Badis* itself or as the Chameleon Fish. The latter name refers to the remarkable ability that this fish possesses to change colour within minutes according to its "mood".

*Badis badis* is also popular because it is quite hardy, and is the only Nandid that can be kept in a community tank. It has even been known

to spawn in such a tank, laying around 200 eggs in a sheltered hollow where they are guarded by the male.

Among the other Nandids, the Leaf Fishes are extraordinary in that they all resemble floating leaves to a greater or lesser extent. Of the various species, the South American Leaf Fish, *Monoacanthus polyacanthus*, is undoubtedly the most convincing. It even has a short, barbel-like outgrowth on the lower lip which looks just like a leaf stalk.

All the Leaf Fishes either swim or drift in a fashion that fools potential prey into a (very) false sense of security, only to find themselves disappearing down the gullet of these voracious predators.



*Polycentrus schomburgki*—a voracious Reef Fish



## Mouthbrooders

Most mouthbrooders, as far as the aquarium hobby is concerned, are found among the Cichlids. However, oral incubation is far more widespread than this.

There are, for example, the Marine Cardinalfishes (Apogonidae), many of whose 170 species exhibit mouthbrooding. In some, it is the female that incubates the eggs but, in others, the males are suspected of bearing this responsibility. One of the most common Apogonids found in aquaria is the Pyjama Cardinalfish, *Sphaeramia nematoptera*.

Among the Catfishes, mouthbrooding occurs in the Ariidae, the Marine Catfishes, where incubation of the eggs is undertaken by the males. In the Osteoglossidae, the Boneytongues, oral incubation occurs in at least one species, the Arowana, *Osteoglossum bicirrhosum*.

Mouthbrooding is even found among the Belontiidae, the Family that in-

cludes most of the Gouramis and Fighting Fishes. Here, mouthbrooding is known among some of the Fighters, *Betta* spp, including the "new" Brunei Beauty, *B. macrostoma*, a factor that undoubtedly has profound significance in the reclassification of the genus. The Chocolate Gourami, *Sphaerichthys ophromenoides*, is yet another species which exhibits this type of behaviour.

However, as mentioned above, the best-known mouthbrooders are found among the Cichlids. In many such species, the males have egg-like spots on their anal fins, or egg dummies (tassel-like fin elongations ending in an "egg"), which females interpret as real eggs during spawning. As they (the females) suck in the eggs they have just laid, they also attempt to suck in the males' "eggs". In so doing, they take in sperm, thus ensuring the fertilization of the real eggs.

After spawning, the brooding parent retains the large, yolk-rich eggs until the embryos hatch and consume the remains of the yolk sac. The egg membrane itself is normally swallowed

by the parent who, other than this, usually takes no food during the weeks of incubation.

In many species of mouthbrooders, notably the Cichlids, the fry periodically take refuge inside one or both parents' mouths for a time after they have been initially spat out.

An unusual modification of the mouthbrooding theme is found among the North American Cavefishes (Amblyopsidae) where incubation actually takes place inside the gill-chamber.



This female South African Mouthbrooder (*Pseudocrenilabrus philander*) shows a well-developed brood pouch

## Nudibranchs

NUDIBRANCHS (Order Nudibranchia) are members of the Subclass Opisthobranchia which, in turn, belong to the Class Gastropoda of the Phylum Mollusca. Taking each of these hierarchical divisions in turn, and starting with the Mollusca, the distinguishing features are as follows:

Phylum Mollusca: Commonly referred to as shellfish, this Phylum includes the Cockles (and Mussels!), Oysters, Clams, Whelks, Periwinkles, Snails, Slugs, Squids, Cuttlefish and Octopuses.

Class Gastropoda: This is the largest of the Mollusc Classes with over 35,000 living species and 15,000 fossil ones. It includes all the Snails and Slugs.

Subclass Opisthobranchia: These have a single auricle in the heart and a single kidney. They also exhibit various degrees of detorsion ("un-twisting"—common in all Gastro-

pods), a marked reduction in the size and nature of the shell and complete hermaphroditism (each individual is both male and female). All are marine.

Order Nudibranchia: These Molluscs, known commonly as Nudibranchs or Sea-Slugs, do not possess either a shell or mantle cavity. The body is symmetrical. Gills, where present, are secondary. Respiration in species not possessing gills is by means of "outgrowths" known as cerata.

Nudibranchs have become popular among hobbyists because of their brilliant coloration and elegant body shape. Despite these worthy attri-



Nudibranchs can have very specific needs in aquaria

butes, most Nudibranchs are difficult to keep in peak condition in aquaria unless livefood of a very specific kind and high illumination (in the case of those species which carry essential symbiotic algae) can be provided. Furthermore, the specific food is often another valuable species, such as other gastropods or, even, anemones.

In the latter case, such Nudibranchs exhibit a quite amazing adaptation. In ingesting anemone "flesh", they, obviously, take in large numbers of the stinging cells (nematocysts) which anemones themselves employ in capturing their prey. Those nematocysts that are taken in in the loaded state, i.e. not discharged, are passed, totally undigested, into the cerata. They are gradually pushed into the tips of the cerata, called cnidosacs, which are in direct contact with the surrounding water, where they remain inactivated until the Nudibranch needs to use them in defence. At such times, the nematocysts are discharged, causing any potential enemy to retreat.

## Meet the Aquarist

### Jerzy Gawor and Andrew Stagg

by B. Whiteside



Jerzy Gawor (left) and Andrew Stagg discuss some of their fish

THIS MONTH'S article features two professional aquarists who are as keen as any amateur in that they also keep fish in their homes. They are Jerzy B. Gawor, B.Sc. (Hons.), M.I.Biol., and Andrew D. Stagg, B.Sc. (Hons.), who is an Associate Member of the Institute of Biology. Both gentlemen are in their late twenties.

Jerzy Gawor was born in London and was educated at Finchley Catholic Grammar School—where he gained for himself the impressive total of twelve 'O' levels and three 'A' levels. Subsequently when he was a student at the North East London Polytechnic his main areas of study were biochemistry and microbiology, with animal and plant physiology, cell biology and organic chemistry as subsidiary subjects. His aim was to obtain an honours degree in applied biology. He spent an industrial training period of one year at the Fish Disease Research Laboratories, M.A.F.F., Weymouth, Dorset.

Andrew Stagg was also born in London; he studied for his 'O' and 'A' levels at Gunnersbury Grammar School, Acton; and then attended Brooklands County Technical College, Weybridge, where he gained the O.N.C. in sciences. Subsequently Andrew

became a student at the East London Polytechnic where he studied for an honours degree in applied biology, with biochemistry and microbiology as his principal subjects and marine biology as his subsidiary subject. Andrew spent an industrial training period of one year at Torry Research Station, M.A.F.F., Aberdeen, Scotland.

While at the Fish Disease Research Laboratories, Weymouth, where he was involved in pilot experiments in fish virology, Jerzy Gawor became interested in keeping fish as a hobby and was fascinated by the chemistry of aquarium water, together with the many methods for altering the various parameters of water quality. Work on fish diseases gave him a good background into the whys and wherefores of disease problems. After graduating, Jerzy worked for a Kent-based firm and was involved in much of the research into the firm's range of fish-care products. One of Jerzy's ambitions was to work in medical research, so when the opportunity arose he joined the National Institute for Medical Research, Mill Hill, London, where he worked on malaria and then on mycobacteria—tuberculosis and leprosy.

While at the Torry Research Station,

Aberdeen, Andrew Stagg was involved in studies concerned with the growth and production of various strains of algae as food for rotifers—which ultimately became the food for fish fry. After graduating, a research post with a large firm in Cambridgeshire gave Andrew experience in animal nutrition and microbial production of animal feed products. A year later he joined a firm in Kent and became involved in establishing a disease diagnosis centre for fish hobbyists, wholesalers and fish farmers—as well as working on new products for the hobby-fish market.

Andrew and Jerzy met while at college on the B.Sc. course and shared a lot of similar ideas. Each hoped that, at a future date, he would become his own boss. At a later date both young men discussed their ideas and produced plans for forming a business of their own. They spent two years planning their business to ensure that it would be a successful venture. Andrew and Jerzy's plans became a reality when they opened their business, Aquality Ltd., at 137 Southwood Road, New Eltham, London, SE9 3QS. Both gentlemen are directors—and their own bosses!

Last summer I decided to visit Andrew and Jerzy and boarded a



British Rail train that took me from central London to New Eltham. Although it was a damp, cool Saturday afternoon the shop was busy; but despite this Andrew and Jerzy—which I understand is Polish for George—made me very welcome and provided me with a cup of coffee. I was given the freedom of the establishment to wander round with my camera; and I managed to take some interesting shots with which to illustrate this article.

Our photograph shows Jerzy (left) and Andrew discussing some of the wide variety of fish—tropical, marine and coldwater—that they had on display. Also on show was a very varied collection of reptiles and amphibians and other small animals, e.g. spiders. A large snake, on display in the window, ensured that I kept well away from that part of the shop.

A wide range of foods, goods and equipment was also on sale; but what struck me most was the obvious health of all the animals being offered for sale. It was obvious that I was in presence of two professionals whose academic training and qualifications were matched with practical skills and, most important, experience. I was struck by their intense interest in their

animals, and by their enthusiasm—which could not fail to brush off onto their customers.

I showed an interest in an uncommon aquarium plant—and was soon clutching a polythene bag containing a couple of plants. I carefully cared for the plants during the remainder of my stay in London; and was not surprised when the air-filled bag of plants resulted in my being asked a number of questions by the gentlemen employed at Heathrow Airport to search carefully through the dirty underwear in the cases of passengers travelling from London to Belfast by Shuttle. I understand that the standard fare, in one direction, is now more than £50.00!

I was extremely interested in the Fish Diseases Laboratory operated by Andrew and Jerzy. In it they identify diseases and troubles affecting fish; and they also carry out analyses of samples of aquarium water brought or sent to them for that purpose. I have decided not to deal with that side of their service here as I feel it is important enough to merit a separate article.

Andrew Stagg and Jerzy Gawor also produce their own publication *Aquality Newsletter*, "for the serious aquarist and herpetologist". The duplicated publication costs £5.00 for five issues.

As closing time drew near, Jerzy's wife Elizabeth, accompanied by Master Wojtek Gawor and Miss Natalia Gawor, arrived. Jerzy's wife and children share his interest in fish and they help to look after the aquaria at home. Unfortunately Andrew's wife was not present during my brief visit so I did not get an opportunity to photograph her in the shop.

I thoroughly enjoyed my visit to New Eltham—despite missing my train home by seconds and having to spend some time in a local hostelry before the arrival of the next one. If I were to choose one word to describe Andrew and Jerzy I think it would have to be "professional". They are trained scientists who have applied their professional skills and knowledge to the keeping of fish, reptiles, amphibians, etc. They know what they are doing—and it shows in how well they do it.

I hope I shall have the pleasure of meeting Jerzy Gawor and Andrew Stagg again. Their professional approach, healthy stock and friendly personalities must certainly encourage customers to return. I think we'll be hearing more of them in the future.

Thank you, Andrew and Jerzy, for a pleasant and instructive afternoon.

## PRESS RELEASE

### Furanace—a powerful new agent against fungus, tail-rot, etc.

MANY FISHES can now be saved from previously killing diseases with Furanace, a chemical which Interpet has just marketed in the United Kingdom. It was previously considered that Furanace could only be marketed here as a medicine through pharmacies, but Interpet overcame this problem by careful wording on the packaging.

Furanace has been well-known for a long time in the USA and on the Continent, as the powerful product to act against organisms causing bac-



terial infections, fungus and Columnaris (*Chondrococcus Columnaris*) on Freshwater and Marine Fishes.

The rapid results obtainable in the case, for instance, of Black Molly Disease, Cotton Wool and Mouth Fungus, Tail Rot and gram-positive and gram-negative diseases have to be seen to be believed.

Furanace does not significantly affect pH or plants, but it can affect nitrification in biological systems.

One treatment is often enough, but the dose may be repeated every 24 hours, if necessary.

The standard pack is 12 tablets, each treating 20 litres (4½ gallons), the retail price of which is £2.21. Bulk tablets in lots of 600 are also available.

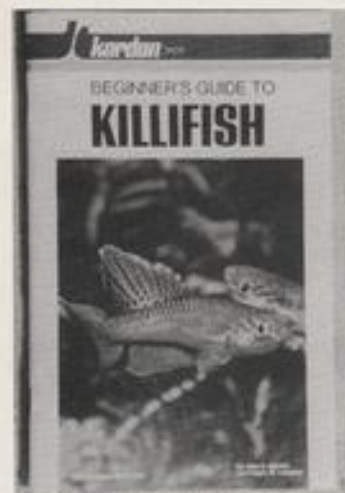
# Tomorrow's AQUARIST



## BEGINNING WITH KILLIFISH

There are numerous "Beginners' Guides" on the market dealing with a wide range of subjects, from the aquarium in general to specialised topics like, say, Guppies. Some of these guides are quite good but others, sadly, leave a lot to be desired (to put it mildly).

It is not easy to write a good book for beginners, as writers of the better guides will vouch for. The reason is that the balance between essential detail and general principles is often an extremely elusive one to capture on paper.



A good buy from the B.K.A.

Unsuccessful attempts can end up in one of two ways. At one extreme, the text can be of such superficiality and of such a patronising nature that any reader worth his/her salt soon feels (justifiably) insulted. At the other extreme, the text can sound cold, unemotional and mechanical to such

an extent that the reader is put off by the apparent complexity and seriousness of the whole subject.

When you do get it right, though, the result is a guide which will be used, not just by the beginners for whom it has been primarily written, but also by more experienced aquarists on a regular basis.

The British Killifish Association fall into this last category, their guides coming out with very good marks on all counts. Although the British version of their guide is currently being brought up to date, there are still stocks of the American edition entitled "Beginner's Guide to Killifish" written by Alan C. Markis and Roger W. Langton. The booklet was originally produced for the American Killifish Association with whom the B.K.A. has very strong links.

In its 44 pages of text (plus several introductory ones), it deals with all the major topics required by the newcomer (and the not-so-new) to the Killifish hobby. Subjects covered include:—What is a Killifish?, General Maintenance, Water Conditions, Feeding, Diseases, Breeding and Selecting Killifishes. There are good photographs, some in colour, in the text which is both readable and professionally written.

Copies are available to members (see Meet the Societies in this issue of *A & P*) at £1.50. The investment is well worth it.



## AQUARIST WITH A DIFFERENCE

MARTIN DIBBLE is a quite extraordinary aquarist. The mere fact that he is alive today is nothing short of amazing, let alone his string of successes in fish-keeping during the past year.



Martin with some of his trophies

Martin was born with half his heart in a non-developed, non-functioning state. In fact, he "died" several times during the first of his many trips to hospital when he was only three days old.

It was only the dedicated (and expert) attention of his nurse, aptly named Sister Heaven, that kept him returning to life during that first dramatic rush. Continued determination, repeated surgery and religious faith have kept Martin going over the years. During this time he has been on several pilgrimages with the Handicapped Children's Pilgrimage Trust, both as a pilgrim and a helper.

Martin started showing fish in September 1982 and, since then, has won quite a number of trophies, including a Best in Show. He has also bred Common Goldfish and Shubunkins and is, clearly, well on the way to becoming a first-class fishkeeper.

Martin is now dedicated to helping others who, like him, are handicapped in some way and would be delighted to hear from readers interested in the Handicapped Children's Pilgrimage Trust. Please contact him at 11 Strode Road, Clevedon, Avon. Tel. No. (0272) 876666.



THE AQUARIST



**MULTIPLYING  
DIVISION**

**MULTIPLYING  
DIVISION**

**MULTIPLYING  
DIVISION**

*(Reproduction by Scissiparity)*

by  
**Alain Breitenstein**

THE anemones display several methods of reproduction, certain of which are highly unusual. Generally, they possess both sexes but a number of species are Hermaphrodites and reproduction may also be asexual, without fertilisation.

Whether they are Agamous or Hermaphrodites, the Actinians develop their progeny inside the Mesenteries and expel it through the mouth.

In effect, it is an example of ovoviviparous reproduction. The egg is formed by special cells situated on the edge of the Mesenteries and hatching takes place in the gastrovascular cavity. In this case, the new-born offspring resemble miniature anemones equip-

ped with tiny tentacles and they are borne by the currents until they attach themselves to the substrate.

The oviparous species are much more prolific and give birth to several hundred eggs.

Two types of Asexual reproduction are particularly curious. (1) *Reproduction by Budding*: it is characterised by a contraction of the Basal Disc which results in the birth of young anemones; (2) *Scissiparity* which occurs repeatedly in the form of a longitudinal, or more rarely, transversal division.

The observations and the photographs which illustrate this article concern the species *Anemonia sulcata*, which is common on the Atlantic and Mediterranean coasts.

The complete splitting and forming of two distinct anemones lasted 1 hour 40 minutes.

The photos represent each stage of this unusual method of reproduction.

#### **A—Technical Conditions**

Originating from the coast of the French Mediterranean, the anemone was kept for several weeks in an aquarium containing a number of indigenous actinians. During these first weeks in captivity there was no sign at all of reproduction.

On Wednesday, 19th July, 1978, an anemone was transferred to a small 50 litre tank. Reproduction took place on the following day, the 20th July, commencing at 9.45.

The tank concerned had an abundant growth of *Caulerpa prolifera* and filtration was provided by a low-powered under-sand filter fed by a Réna 101. A few centimetres of coral sand form an excellent substrate for the luxuriant growth of *Caulerpa* and ensures efficient filtration.

In spite of the close proximity of a window, the natural light was too weak and was supplemented by a 30 watt GroLux tube. The water temperature varied with the sunlight and fluctuated between 18° and 22°C. The water density was maintained at 1025.

#### **B—Photographs**

The photographs were taken with a single lense Reflex Pentax camera equipped with a 50 mm F.1.4 lense and 8-16 and 32 mm extension rings, which provide numerous combinations with important focal lengths for close-up shots. The film used was a Kodak 160ASA artificial light, the grain of which remains quite fine in spite of high sensitivity.

#### **C—Process of Reproduction**

*Wednesday, 19th July—3 p.m.*  
The anemone is placed in the tank of *Caulerpa* and quickly attaches to the glass at the level of the sand. In the evening it moves gradually onto the sand and accepts greedily a small pellet of *Tubifex*.

*Thursday, 20th July—8 a.m.*  
The anemone is attached to the front of the tank high up the glass. The 6-7 cm long tentacles hang



20 minutes after the first stages of scissiparity

One hour 20 minutes. Scissiparity is coming to an end



One hour after the start of reproduction







One tentacle alone still links the two anemones



*Anemonia sulcata* in the Mediterranean Sea

limply, gently swaying in the water movement created by the outlet of the under-sand filter. There is no indication of reproduction which will take place one and a half hours later.

In fact, about 9.30 p.m., the basal disc of the anemone stretches horizontally and the centre becomes considerably thinner. About 20 minutes after this observation, the first cells split and scissiparity begins in earnest.

The slides reproduced with the

article explain much better than a commentary, in my opinion, this stage of reproduction. The times were carefully noted in order to enable one to study closely the different phases of this example of reproduction, and subsequently to establish the stages of scissiparity.

11.10 a.m. The two anemones slowly move apart, finally free of each other. At the moment of

*Continued on page 40*



# COMMENTARY

by  
Roy Pinks

IN the course of planning the internal layout of aquaria we usually take into account such factors as "tropical or coldwater?", "breeding or display?"—together with the quantity and size of the fish. In only two instances is it safe to forget other considerations: these are breeding and rearing aquaria and "plants only" tanks intended purely for decoration. In the former cases little attempt is made to render them attractive and you can play about with them to your heart's content without penalty, and in tanks without fish everything remains undisturbed barring occasional gentle and selective gardening. What does frustrate the newcomer to fishkeeping is our recurring failure to remind him perpetually that he must plan towards two other contingencies—firstly to the need to catch a fish or fish from within a planted tank, and secondly to meet in-tank medication against disease without incurring crippling loss or disruption.

To the uninitiated most fish look roughly alike, therefore they all act much the same! Realisation of at least one difference comes when you hand somebody a net and ask them to catch, from a planted tank, an individual goldfish or an individual kuhli loach. The former should take less than a few minutes, and the latter will probably end in stalemate. It

is odd how many people totally discount the need to catch fish as a matter of routine management, and who buy a net merely to scoop up the livestock when changing the water. You will almost certainly need to catch fish when pairing them up for breeding or for isolating sick specimens, and in some cases you will be fortunate enough to have fry to transfer to other quarters for rearing purposes.

It is therefore important, before arranging your furnishings, to imagine how you are going to trap the inmates, and it is worthwhile having a net handy, to practise a few dummy runs before you set the final touches to your layout. The conventional open area at the front or side of a tank will help you to effect a capture without uprooting too many plants, but in the event you may need somebody to help you to drive the fish towards the net and away from the plant thickets in which it will naturally tend to hide. Some aquarists are able, quietly and patiently, to herd their charges by holding a planting stick in the left hand and to catch them with a net held in the other, but this is difficult and needs a long apprenticeship! A quick scoop at feeding time is a crude but sometimes effective way of catching a fish (but remember that the sick will seldom join the ration queue); suddenly switching on the tank lights after dark will reveal motionless and dazzled fish, which can sometimes be caught without fuss—but you have to be quick as they soon reorientate. In some cases you can place small sheets of glass within the tank, one after the other, in such a way that the target fish is successively confined to a smaller and smaller space in which to swim, from which it is fairly simple to lift it.

In deciding how to deal with netting you will also need to categorise your charges into some sort of Escapers' League. The carp, for example, will be low and orfe high. Young fish will rate higher than adults. The cichlids are fairly reasonable characters—possibly the easiest of all as they tame so readily. Most livebearers are in the "easy" category, like the surface swimmers—Hatchets and so on.

Gouramis are tolerable, too, but the majority of the characins are extremely difficult and they defy the best thought-out strategies. Male zebras are my prize problem—perhaps readers have a better example?

As regards dealing with disease treatment, it is of course advisable to determine first whether it has to be dealt with "in-tank" or otherwise. The latter is infinitely preferable because most medications are harmful, in the long term, to plant life, and if you can remove the livestock for restoration and recovery to a separate, sparsely furnished tank, so much the better. It may, however, be impossible or of doubtful value to do this, notably in the case of White Spot, and the nettle has to be grasped. All the same, some prior planning may help to minimize the check to plants or to prevent their total loss. Whilst you may have to write off the cheaper com it is always worth planting your finer specimens in small pots (normally disguised by sand or rockwork), which may be removed to safer quarters during emergencies. There is absolutely no reason why all underwater plants should not be so treated, as such would greatly facilitate major re-fitting of internal layouts. I have little doubt that some enterprising spirits such as those who introduced SIMLAWOOD and the like will in due course produce something shallow enough and heavy enough to do the trick. The whole matter of mobility of contents is very important to the new aquarist, who understandably gets angry when trouble strikes and he sees a high proportion of his expensive plant life either floating away in broken useless pieces or reduced to mush by some medicine which carried no health warning.



Gouramis do not score highly in the Escapers' League





## Coldwater Jottings by Frank W. Orme

They appear to be springing up everywhere; it seems that every nursery now has to have a 'water garden centre' tucked away somewhere. Whilst some manage to live up to their title, others are, to say the least, deplorable in layout, management and quality.

Over recent weeks I have been intrigued by an advertisement, in a local newspaper, stating that a "Specialist Water Garden" had been established a short distance from where I live. "Expert advice for the beginner. Unbeatable quality of fish, plants and all equipment at realistic prices." So claimed the advertisement. As the location lay only a very short car ride away I decided to pay this establishment a visit.

The address proved to be a smallish nursery garden which apparently specialized in alpines and Bonsai trees. Passing through one of the glasshouses, a small area at the rear was reached—the water garden centre! Holes in the ground, lined with polythene, surrounded with housebricks formed the pools. Here and there were one or two preformed plastic pools around which a few pieces of sandstone had been placed to resemble a rockery. Along one side of the site was a line of tractor tyres, also lined with poly-

thene, which contained various water plants that were more dead than alive. The fish, a nondescript collection of common goldfish, long-bodied fantails, shubunkins and very small koi plus a few Orfe, were housed in the various pools. No prices were to be seen—but there was a notice advising that enquiries were invited for the installation and maintenance of ornamental garden pools. I found nothing to substantiate the claims made in the advertisements, and could only speculate upon the quality of the "expert advice for the beginner."

Earlier in the year I had visited a very large, well known garden centre to obtain replacement plants for the garden. A sign pointed the way to the "Pond and Fish Area", and, needless to say, I had to pay a visit to the section. There I found a wide display of all types of equipment; liners, pumps, fountain and waterfall kits, underwater lighting sets and so forth together with large fibreglass tanks containing the usual species of popular pond fish. A good variety of plants were on offer, all clearly named and priced, that appeared to be strong well-grown specimens. However, there was one off-putting feature to the fine display; the number

of large leeches and water tigers that were sharing the water with the plants was unbelievable.

Not too far away from my home there is another garden centre which also has a water garden centre sharing its grounds. This water garden centre has formed part of the nursery for around five years, mostly it is under cover. Large greenhouses contain large pools of coldwater fish, through which there is a continuous flow of freshwater. Another building houses a good selection of the necessary equipment, together with a good selection of books, foods, medicaments and various other items, such as aquariums etc. Outside is, generally, a good display of water and pondside plants, also the usual range of preformed plastic pools, plus an ornamental pool with waterfall and rockery. Here the assistants show an understanding of the principles of keeping fish and water gardening, they seem willing to listen to, and advise, their customers. Perhaps most noticeable is the fact that they are all neatly dressed in white coats, and remain unobtrusive unless they are approached by a visitor. The strange thing is, this particular garden centre advertises its nursery in large print quite regularly, but mentions its water garden centre in very small print—almost as an after-thought.

During one of the hot July days, I sat on the bank of the river Wye enjoying the sun. Above the water surface a myriad of flashing colours dazzled the eye. Dragonflies of brilliant blue, fiery red and vivid green danced, skimmed and hovered in hypnotic flight. I gazed in admiration, thinking how gaudily Dame Nature had enhanced this tranquil scene. What a pity it is, I reflected, that such eye-catching beauties should lead such vicious juvenile lives (rather like some of our own young), making them most unwelcome guests in our own fish ponds. I was not so enchanted to find, upon returning home, that a pair

*Continued on page 43*



*Anemonia sulcata* in the aquarium, just before reproduction

## MULTIPLYING DIVISION

*Continued from page 37.*

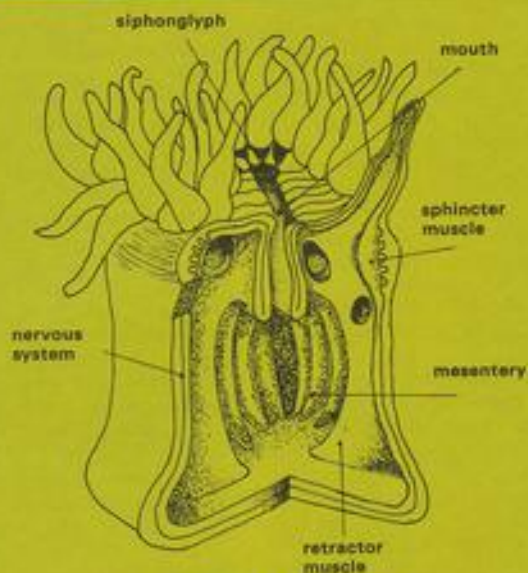
splitting apart the gap separating the two actinians, linked by a single tentacle, is 4 cm.

Five minutes later it is 4.5 cm and it will be 5 cm at mid-day.

During the process of division the activity of the Cnidoblasts continued. The tentacles remained adhesive, whatever the stage of reproduction.

Thirty-six days after this first reproduction, or to be exact, about ten o'clock on the 24th August, the anemone divided again in the same fashion (longitudinal scissiparity); the second division lasted a little more than two hours.

In spite of the apparent simplicity of these animals, which might be considered as simple 'glove's fingers', the anemones and the coelenterates in general have many surprises in store for us.



Cross-section of an Anemone

The cross-section of the anemone represents the principal anatomical parts and their arrangement.

The reality is a lot more complex, since each tentacle corresponds to a mesentery (*Anemonia sulcata* has about 200 tentacles) and the gastro-vascular cavity is furnished with long contractile filaments.

These long filaments, equipped with nematocysts, bear reproductive cells and others which secrete digestive enzymes



LAST year, the National Environment Research Council granted £606,000 towards 27 research projects in aquatic life sciences. East Anglia University got £11,226 to study the role of drainage dykes in the ecology of coarse fish; Lancaster University £2,445 for a 3 months investigation of various trout stocks' differences in physiological adaptation to acid waters and the effect of aluminium on gill-function. Cardiff University College got £28,888 for a 3 years to check the protective effect of zinc against cadmium-poisoning in freshwater fish. £29,858 went to a 2½ years study by UWIST of amphibian populations in mid-Wales.

Most interesting is £62,162 to Hull for Prof. G. Goldspink's 2 years current study of the adaptations of fish-muscle and swimming to altered environment temperature, etc, hoping genetic engineering may produce new strains of fish with different temperature-tolerances to their wild strains, and a more efficient food-muscle conversion for some, like trout, now reared on expensive protein diets.

A fish survives because of its swimming capabilities at different temperatures in relation to energy requirement and food. Energy it uses for swim-



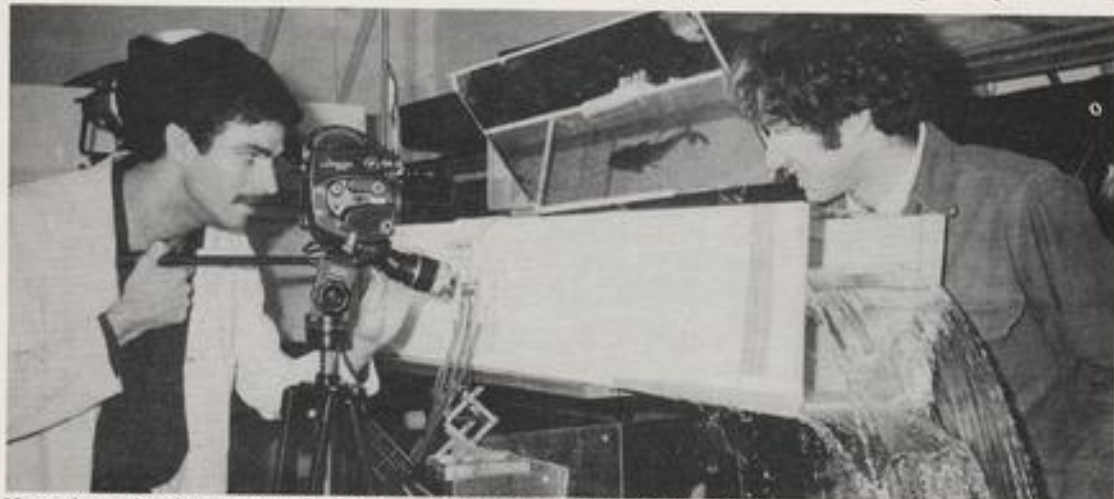
by Eric Hardy

ing doesn't seem to be available for growth. Prof. Goldspink and Dr. W. Davison found some fish need a certain amount of exercise to attain maximum growth. They seek to find how much exercise and what temperature changes affect the way the fish synthesises protein. The future may use this to

breed "domestic" races of fish which, like domestic farmstock, will be more economic to keep than wild forms.

Excepting for a few fish like tuna, fish cannot adapt to changes in water-temperature as they do to salinity and oxygen as thermostat "failures" reveal. So their wild distribution is largely influenced by water-temperature; cold water arctic fish and warm water tropics. However, several seasonal migratory fish range over fairly extensive changes, taking weeks or months to adapt to the new temperature range. A few, like the American mummichog, *Fundulus heteroclitus*, can adapt in a day and maintain their swimming ability when sea floods their shallow coastal marshes and a normal sunny temperature of 30 deg C in the pools is lowered to less than 15 deg C. It was found that their proteins are less influenced by temperature and calcium concentration than those of less adaptable fish.

Carp acclimatise to a different temperature-range by synthesising a different set of contractile proteins or swimming muscle. Goldfish placed in 10 deg C produce myofibrils with a rapid rate of protein activity, and their contractile protein system becomes



Measuring swimming performance of fish at Hull University Muscle Research Unit  
Photo: courtesy National Environment Research Council

very susceptible to heat. But goldfish acclimatised to 30 deg C produce myofibrils of a much lower activity, yet higher temperature tolerance. Other fish like trout cannot produce such different sets of contractile proteins when the water temperature changes.

A fish uses three types of muscle when swimming: red muscle in a narrow strip just under the skin for slow cruising at one body length per second; then as speed increases faster contracting pink muscles, next to these, and producing more energy are used. Faster still, it uses the very fast-contracting white inner muscle which forms 80 or 90 percent of its

musculature and has very few mitochondria, or blood-vessels, and fatigues very quickly. Thus fish cannot use bursts of speed for more than a few seconds. At lower temperatures, the fish has to use more of the faster type of fibre to maintain speed, a switch to fibres differing metabolically, using more energy.

Their fish-tank exhibit at this year's Royal Agricultural show attracted much interest in demonstrating how fish like rainbow trout exposed to too much sunshine can contract cancer of the skin, as is claimed with humans.

#### New British Fish

Over 20 years ago I wrote of a new

British fish, the Pacific pink salmon, which had strayed into a few northern rivers from introductions to Norwegian waters. Nothing permanent came from that stocking of European rivers. But without any decision yet, the Ministry of Agr. & Fish has alarmed purists by considering the prospects from introducing Pacific salmon to waters in southern England, for better fish-farming. Earlier spawning and a shorter river-life presented no competition to native Atlantic salmon in Norway. As their homing is not so accurately to their river of birth, there is the risk of them appearing in other rivers, hence the alarm.

## Coldwater Jottings

*Continued from page 39*

of large green Dragonflies were darting and weaving above my ponds. Both were caught and destroyed. However, others have arrived from time to time, and I cannot be present the whole of the day purely to protect my ponds from their attentions. Fortunately, due to the fact that my ponds will receive a clean-up during next month, and again in the early spring, Dragonfly nymphs are not likely to cause me any great problems—for most, if not all, will be removed along with the water and bottom silt.

Although the adult Dragonfly is predacious, devouring large numbers of other insects, including members of its own order, it presents no problems for the fish keeper. The young, however, are a different proposition. The nymph tends to be sluggish and prefers to wait for its prey to come within striking distance then, with lightning speed, it shoots out its mask to firmly seize the luckless creature which it then slowly devours. This creature is not averse to capturing and eating small fish, and it is for



**Dragonfly nymphs are predatory and must be kept out of ponds which contain fry**

this reason, as much as any other, that it should be kept out of the pond—especially one which contains young fish.

And what a glorious month last July was, fish spawned and the fry grew. The problem was to keep the tank cool, to avoid the water temperature climbing too high. I heard of Neon Tetras dying in water which reached well over the safe temperature for these fish. I also had goldfish enthusiasts tell me that some of their

fish developed swim bladder trouble due to the very warm water. Those who operated a water exchange system, or made daily water changes, did not suffer these problems to such a large degree as those who did neither. How different the weather and temperatures were in comparison to the preceding dreary cold and wet months, and very welcome. Perhaps, if high summer temperatures become a regular feature of the British climate—as some scientists predict—we shall start to see refrigeration units advertised, as they are in the American aquatic press.





# SPOTLIGHT

## The white cloud mountain MINNOW

*Tanichthys albonubes*

by  
R. Zukal

This fish is an ideal species for any aquarist. It comes from the area of Canton near Hong Kong. Its poetic name is derived from the man who discovered it and its place of origin. The Chinese boy scout, Tan, discovered the minnow, or neon as it is also incorrectly named, in a small stream which flows from the White Cloud Mountain (*albonubes*). That was in 1938. In the same year the fish was also imported to Europe, to Hamburg. Before long this beautiful fish had become a favourite with aquarists the world over. The checking of temperatures at its place of origin have shown that the fish does not need high temperatures. A temperature between 16° and 20°C is quite sufficient. In some circumstances the fish can be kept at lower temperatures, down to 10°C. A temperature of 20°-22°C is appreciated and these fish are at home in a well-planted aquarium which is well oxygenated (by means of a good aeration and filtration system). An unnecessarily raised temperature affects their well-being and they begin to die as soon as a temperature of 28°C is reached. It is an ideal species for aquarists who are unable to provide heating or who want to avoid in-essential heating.

It attains a size of around 4cm only, is peaceable and undemanding as far as food is concerned. It will accept both dried artificial and live foods freely. Its behaviour will soon show if it has been exposed to too much nitrogen or other harmful substances. It is a demanding fish,

therefore, as far as the water quality is concerned. As soon as the minnows are observed to be swimming at the surface and perhaps trying to gulp in air above it, or they lose colour and swim in an ungainly manner whilst other species are bright and lively, immediate action must be taken. A partial water change using fresh water of the same temperature is necessary. The material in the filter must also be changed or cleaned regularly.

The fish changes in coloration according to the conditions and circumstances it lives in and how well or otherwise it feels. This applies to many other species of fish too, of course, but it is particularly evident in this case. From the end of the mouth to the caudal fin a reddish-gold band runs along the middle of the body and ends with a dark spot. The belly is greyish-white, the back a brownish-green. The dorsal fin is yellowish near the body and red with a bluish higher up. The central part of the caudal fin is red. Small specimens about four weeks old, because of the brilliant band along their sides, resemble neons. Hence the fish has the other name of "false" or "imitation neon." Sexual differentiation is straight-forward in adult fish, as the male is a little smaller, slimmer, more brightly coloured and his mouth is lightly bordered

with a reddish tinge. The female has a fuller abdomen.

If the fish are not kept with other species, one does not need to take any special pains over their offspring. At a temperature of 20°-22°C the fish spawn amongst fine-leaved plants and take no notice of the eggs or the young when they are hatching or once they are free-swimming. It cannot be said of White Cloud Mountain Minnows that they will spawn regularly and often, but they will do so from time to time and as a result one can obtain plenty of offspring. In order to prevent the tank from becoming overcrowded the young fish can be removed as soon as they attain a size of 10mm and transferred to a rearing tank. Of course the fish can be bred in the same manner as other species, by placing a pair in a spawning tank. The young hatch after 36 hours and after six to seven days they are free-swimming and searching for food. They can be fed with the usual micro-foods available in aquarist dealers. They do in fact grow quicker if given live dust-food; however there is a big danger of these peacefully swimming fish being bitten by Cyclops.

The photographs were taken using a 15 litre tank filled with water which had been allowed to stand and contained Cabomba and Java moss, at a temperature of 23°C. The male was photographed in the evening and the female in the morning. The fish spawned readily before noon of the same day.



## 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



#### *fungus . . .*

Can you give me some information on the causes and treatment of fungus in fish?

Fungus is a common disease of pond and aquarium fish and is caused by *Saprolegnia* spp., *Achlya* spp., etc. It is extremely difficult to control the occurrence of fish fungus by quarantine. The spores that give rise to the infection are very common indeed. The most effective way of preventing this disease is by correct pond or aquarium care. Fungus most often attacks fish that have been roughly handled or are in poor condition because of recent spawning activity or fighting. Similarly, fluctuating temperature, overcrowding, excess debris and infrequent partial water changes may all predispose fish to fungal attack. Fungus is diagnosed by the presence of grey, cotton wool-like growths on the skin and fins of fish. Treat affected tanks with 5 ml of *Tetra Fungi Stop* to every 10 litres (2.2 gallons) of water. Fungus affecting pond fish may be combated by placing the fish in a treatment tank for a few days. In each instance, however, treatment alone is not enough—the conditions which brought about the disease must also be corrected.

May I take this opportunity of drawing your attention to the following points.

Excessive amounts of organic debris will reduce the effectiveness of most treatments and should be removed with the aid of a siphon tube prior to treatment. Filtration over activated carbon has a similar effect and should be avoided during the treatment period. Of course, the manufacturer's instructions for use of any treatment must be followed, taking care to avoid mixing treatments that are incompatible. If in doubt, don't mix! It is important to accurately calculate the volume of the tank to be treated.



Weakened fish, such as this injured Pearl Gourami are very susceptible to Fungus

This may be achieved quite easily by multiplying the internal length by the depth of water by the internal width (all in centimetres). The resulting volume is expressed in cubic centimetres (cm<sup>3</sup>). To convert this to litres, it should be divided by 1,000. If required, litres may be converted to Imperial gallons by dividing by 4.6. Thus, an aquarium measuring 60 cm x 3 cm x 30 cm has a volume of 54,000 cm<sup>3</sup>, which is equivalent to 54 litres (or approximately 11.7 Imperial gallons). In a set-up tank, about 10 per cent should be subtracted from the total (apparent) volume to allow for gravel, rock, etc.

Finally never overdose tanks since this may kill the fish, and never add less than the recommended dose (unless the fish are delicate or in very poor condition) since this will probably have little effect on the disease organisms.

#### *rift lake cichlids . . .*

I have heard a lot about rift lake cichlids but I am concerned about setting a tank up correctly for them. Can you recommend some reliable sources of information?

To begin with an excellent reasonably priced book is by Glen Axelrod and is entitled 'Rift Lake Cichlids'. It is in the TFH KW series, priced at about £2.00. Further information may also be gleaned from 'Making Your Own Aquarium' by J Hansen (Bell & Hyman, about £6.00), which contains three chapters on various types of cichlids, including those from the African rift valley lakes.

Naturally you should also contact the British Cichlid Association, c/o Dave Monk, 33 Kirkmeadow, Bretton, Peterborough. Do enclose a stamped addressed envelope. **C.A.**



*Pseudotropheus* species are among the most popular Rift Lake Cichlids

**COLDWATER**

Arthur Boarder

**PLANTS**

Vivian De Thabrew

**KOI**

Hilda Allen

**MARINE**

Richard Sankey

**DISCUS**

Eberhard Schulze

**Coldwater****Orfes in tanks . . .**

I have a four foot tank with 11 golden orfe. They are constantly rubbing themselves against rocks, etc., and jumping out of the water. I suspect that they are attacked by flukes. Do you think this is so, and what is the cure?

It appears from the actions of the fishes that they are infested with flukes, although incorrect conditions of the water may cause similar actions. If you examine a fish with a strong magnifying glass you may see tiny transparent creatures which move about with a looper movement as they have a sucker at each end. Sterilise the tank and treat affected fishes to a daily bath in a solution of one part T.C.P. to four parts water. Only leave the fish in for a few seconds and remove at once if it turns over. Any missing scales can be regrown as long as conditions of the water are correct. Golden orfe are not a good fish for a tank as they can grow to a foot long and require plenty of swimming space. You will be more successful with types of goldfish, except Comets which also need plenty of space as they are fast swimmers.



Goldfish are better "tank fish" than Orfes

**feeding pond fishes . . .**

I am starting to keep fishes in a garden pond and wonder if I shall have to feed them on flake foods as I do my tank fishes?

Flake foods can be used to feed pond fishes, but it is better to offer something more substantial according to the sizes of them. Small ones will be all right with flake foods but larger fishes will appreciate Trout pellets. You can also offer dried brown bread and, of course, any live foods available. I consider that garden worms are the best live food but maggots are also taken freely. A lot will depend on the types and sizes of the fishes. If large Golden Orfe are included in the pond, you will find that they are ravenous feeders. A friend of mine used to feed his with the entire entrails of chickens, and it was a sight to see the water apparently boiling as they tore at the food.

**stocking levels . . .**

I am rather confused as to the number of fishes I can keep in a tank and what is the size of tank you would recommend for a beginner? Some books state an inch of fish to a gallon of water and others an inch of fish to each 24 square inches of water surface.



The tail of a fish is not included in calculating stocking levels

The inch of fish to the gallon of water is not a good guide as this depends on the depth of the tank. A deep tank with a narrow surface would not be as good as one with a large surface which is exposed to the air. When a tank is overcrowded and the fish are mounding at the surface, one might imagine that the fishes are getting enough oxygen, but this is not so. Even though they gape at the surface for an hour they still cannot get sufficient oxygen. They have no proper lungs and extract their oxygen through the gills. They draw in water and as it passes through the gills oxygen is extracted. By gaping at the surface they are not passing water through their gills. The safest method of estimating the number and size of fishes for a tank is to allow an inch length of fish to each 24 square inches of surface area of water. The tail is not included in this measurement. This rule applies to a tank, but for a pond where there is usually a large area of water in relation to its depth, one can allow an inch of fish to each square foot of surface area. **A.B.**



**Koi****pumps . . .**

I have a fairly large pond of some 300 sq. ft. which holds about 5,000 gallons of water. From your various replies I accept that my under-gravel filter is too small for the job, particularly with the growth of my 30 Koi. There is a suitable area at the far end of the pond where I could easily install another filter, this will be smaller than the original but would bring the filter area up to 120 sq. ft. My pump of 1,000 gallons per hour will be connected to draw water from both filters and I would appreciate your comments on the proposed arrangements as shown in the drawing enclosed.

It is a welcome relief to receive a letter from someone who realises the problems associated with filtration and although I usually make a broad recommendation that filters should be  $\frac{1}{2}$  to  $\frac{1}{3}$  the surface area of the pond, there are other factors involved. Consideration must be given to not only the number or length, but the sheer bulk of large Koi and their dramatic effect upon the quality of water. Ponds should be kept as clean as possible and water changing is advisable.

By all means increase the total area size of your filtration now it has become essential, but I would suggest that your pump throughput of 1,000 gal/hour is only suitable for the original filter. A separate pump will be necessary for the second filter bearing in mind the need of a more rapid turn-over of the pond water. Also, even if your present pump had been larger it would not be a sound proposition to run the pipework of two filters into the suction connection of one pump.

The chance of two filter systems offering the same resistance to flow is most unlikely and inevitably more water would be drawn from one to cause starvation in the other and problems to develop.

**and pipes . . .**

I have read a great deal about the use of different pumps, pipes and filters recommended for Koi ponds that I am now completely lost on what to do for the best. Can you at least point me in the right direction?

Many queries received contain some element of your broad question, and I have written so much in previous issues that I hesitate to repeat the same information although everyone does get an individual reply dealing with their specific needs.

However, there are always new readers and new Koi-keepers and mainly for their benefit I can comment on at least some of the pitfalls awaiting unsuspecting potential keepers. To my mind there is no such thing as instant Koi-keeping, nor any hard and fast rules except the golden one of quarantine for new Koi purchases intended for adding to established, trouble-free stock.

The choice of pumps is arbitrary from a wide range of suitable continuously-rated units, which means one capable of running 24 hours per day every day with a service life of several years. Dependent on the size of pond, the variable-speed domestic control heating pumps, either in single or multiple installations have found great favour because of low capital and operating costs with a long, reliable life. There are few, if any, submersible pumps that can equal the overall performance of a good, outside surface type pump.

Many pumps are made of some sort of plastic or they can include parts of cast-iron, brass, bronze, aluminium, stainless steel etc. These will be quite safe from a corrosion point of view, but otherwise there must not be any other metal pipes or fittings in the filter system in order to avoid the chance of interaction and the production of toxic substances to harm fish, particularly if pipe or fittings made of copper were used.

Pipes and hoses of plastic material only should be used and they must be large enough to pass sufficient water without creating undue friction losses.

This is a waste of effort and money in expensive electricity for the water being, or rather, not being pumped.

For example, it is no use trying to pump 500 gallons per hour through pipes less than  $\frac{1}{2}$  inch internal diameter. 1,000 gallons per hour requires 1 inch pipes; 1,500 gal/hour requires  $1\frac{1}{2}$  inch pipes and 2,000 gal/hour requires  $1\frac{3}{4}$  inch pipes.

Equally, filters whether in the pond as under-gravel type, or external of multi-chamber construction must be large enough for the job they have to do and generally this means a filter area at least one-quarter or preferably one-third the surface area of the pond.

This will provide for a moderately stocked pond, the resultant waste products of feeding contributing to the green water, excess protein and nitrite problems once the filter has become established and biological. This usually takes from 4 to 6 weeks dependent on water temperature so patience is required.



Koi do not require crystal-clear water

As regards the clarity of water, there should be no problem during most of the year but different people have different ideas of what they would like, or what they are prepared to accept.

My own idea of acceptability is a clean pond where the Koi can be seen to a depth of 2 to 3 feet. Slightly green water will afford some protection against the damaging effect of strong sun and is somewhere between a neglected, unhealthy pond where the fish are barely visible unless actually at the surface; and the gin-clear sterile conditions beloved by many Koi-keepers. I am less sure about the Koi.

Personally, I find crystal-clear ponds containing large Koi unnatural and inhospitable for carp and can only speculate on how much stress such conditions inflict.

**H.A.**



## Plants



### planting medium . . .

I am thinking of changing the current compost (plant pillow) in my tank with a compost comprising John Innes No. 1. This will be topped with  $\frac{1}{2}$  in. gravel to a depth of approximately 1 in. I would therefore much appreciate your advice on my proposed choice of compost and gravel.

Your idea of using John Innes No. 1 is OK., but you must ensure that the total depth of your planting medium is at least 3 inches, to allow for good root development and anchorage, or your plants will not thrive. I suggest you put a  $\frac{1}{2}$  in. layer of coarse sand on top of your gravel.

V.T.

## Marine



### mixed tanks . . .

I have kept tropical freshwater fish successfully for a number of years, and 9 months ago ventured into the keeping of marine fish.

My 48 in  $\times$  15 in  $\times$  12 in tank has four fish, a Lionfish (*Pterois volitans*), a black velvet Damselfish (*Abudefduf oxyden*), a Regal Tang (*Paracanthurus hepatus*), and a Common Clown (*Amphiprion percula*), as well as some invertebrates, such as the Green Carpet Anemone, a Sea Cucumber and Tube Worms. I am thinking of adding to this a Copper Banded Butterfly, and a Fairy Booslet. Can you please tell me whether this selection would be compatible.

In reading "Exotic Marine Fishes" (T.F.H.) I have found that treating fish and inverts together is rather difficult, although they do say that it is possible to treat both with Sodium Sulphathiazole. However, neither my chemistry teacher or any local chemist seems to know anything about this or how I can get hold of it.

If you could help and advise me I would be very grateful, or if you can suggest any other treatment which could be used in a fish, invert tank.



Surgeonfish, such as this Powder Blue, *Acanthurus leucosternon* cannot be kept in mixed tanks

Maintaining an aquarium of mixed fishes and invertebrates can, especially for the novice marine aquarist, be an extremely risky operation. Sadly enough there are a number of infections that can be extremely difficult to eradicate without the use of a copper based medication, and I am sure you are well aware that copper based medications are extremely toxic to invertebrates. In the old days we always believed that such infections were Oodinium. However, in these more enlightened times we generally describe such infections simply as protozoan infections, as there are so many it is often difficult to specify each one. The use of sodium sulphathiazole is something I would not recommend, as this particular compound reacts rather like an antibiotic and fish can only be kept in the solution for a couple of days before the water becomes toxic. Furthermore, it is a compound that would only be available via a Veterinary Surgeon or Doctor, as a prescription is required by law. My advice to you is to keep either just a fish tank or an invertebrate aquarium. However, if you are really keen to mix both fish and invertebrates together, may I suggest that you place most of the emphasis on invertebrates and have a few smaller fishes of types less likely to contract infection. A good aquarium shop will advise you which fishes these are. Unfortunately it will eliminate any Butterflies, Surgeons and Angels.

## breeding anemone fish . . .

I am writing to let you know about my success in breeding Teak Clowns, (*Amphiprion melanopus*.)

On discovering my clowns had laid eggs, I was at a loss what to do with them. After losing all the eggs, I read in your magazine about New Aquariculture's Algae and Rotifer kits. I am now successfully rearing my second batch of fry. My first batch of eggs, 3 fry survived and are now about 30 mm long. In the second batch there are 30 surviving and are about 7 mm long.

I am at the moment waiting for another batch of eggs to hatch, and with the help and advice of New Aquariculture's Paul and Andy I am looking forward to even more success.

Thank you for informing me of your success in breeding anemone fishes. I am getting more and more letters from marine hobbyists informing me of such success. It is very pleasing to hear this as until recently most such successes had been confined to the United States.

From my observations of the two major commercial marine fish hatcheries in the United States, I am convinced that we will see a much greater degree of success at hobbyist level with the culture of marine fishes. May I suggest you try another Clown Fish species after which, I am sure you will be ready to progress onto something a little more difficult. I would also advise you to read the last chapter of Martin Moe's book "The Aquarium Handbook—Beginner to Breeder". In my opinion he is exceptionally experienced and successful, and is currently having great success with hybridising marine Angel Fish. In our own wholesale facility here in Borehamwood we are regularly offering up to a dozen species of aquarium raised fishes and I look forward to many more.

I trust this has been of some help to you.

R.S.



## Press Release



### Aquarian Remedies Re-Launch

EXTENSIVE market research has resulted in Thomas's, manufacturers of the top selling range of Aquarian Foods, relaunching their range of Aquarian Remedies.

This successful range still includes the popular Tapwater Conditioner, Dechlorinator, Plant Food, Aquarium Conditioner, Fungus Remedy, White Spot remedy and a newly developed Algae control proved to be more effective in the removal of unsightly algae in home aquaria.

Aquarian have added to these, three tried and tested products, the first of which is Tanksafe. Tanksafe comes in easy to administer tablet form that introduces good bacteria to rapidly mature a new aquarium.

Recognising the need for effective control of all ecto-parasites in both freshwater and marine aquaria, Aquarian have added Coppertafe to their range.

The third new product is a Disinfectant that kills 99.99% of the harmful bacteria found in aquarium systems. It should be used when cleaning aquariums or to ensure accessories are kept in a sterile condition.

The complete range of ten remedies is now available in modern eye-catching cartons each individually named and numbered, one to ten, for easy identification and selection in-store.

Each product with the exception of Tanksafe (which is in tablet form) comes complete with an eye-dropper type dispenser for easy application. The advantage of this method of dispensing is that the aquarist is able to accurately control the dosage without having to pre-measure it into the cap or similar dispenser. It is therefore much cleaner and less troublesome.

The recommended retail price of the Aquarian Remedies remains at £1.67.

For further details of the Aquarian range please contact your local supplier or The Aquarian Advisory Service, Thomas's, Pellon Lane, Halifax, West Yorkshire.

### Aquarian advisory service

THOMAS'S, manufacturers of the Aquarian range of flaked fish foods and remedies are distributing a leaflet entitled "Fish Make Ideal Pets," to

schools and Veterinary surgeries.

The leaflet contains information on setting up a home aquarium. It offers advice on popular varieties of Coldwater, Tropical and Marine fish. There are informative sections on equipment, maintenance and feeding, and each page is attractively illustrated.

The leaflet invites aquarists with specific problems or beginners requiring further information to write to the free Aquarian Advisory Service, Pellon Lane, Halifax, West Yorkshire, HX 5QP.

### New book range from Neptune

NEPTUNE'S Paradise of 5 Ramsden Road, Balham SW12 8QX have acquired the exclusive distribution rights for the British Veterinary Association's Pet Care Series of four books by the television Veterinarian James Allcock.

They retail at £1.95 and readers should apply to their local stockist. Our catalogue will be forwarded to any member of the trade on receipt of a letter heading.

The following ranges will be extended later in the year:

- A Pet Cat of Your Own.
- A Pet Dog of Your Own.
- A Pet Bird of Your Own.
- Small Pets of Your Own.

Our telephone number is 01-675 4394 and we look forward to hearing from you. All enquiries will receive our usual prompt and courteous attention.

### Good water management leaflets available from King British

FRESH with the dramatic success of the new Overhead Trickle Purification system—OTP for short, King British has produced a leaflet for the home aquarist which provides a comprehensive approach to effective water management.

One of the U.K.'s leading private aquatic manufacturing companies, King British has met with an overwhelming demand for OTP from the retail trade and home aquarists throughout the country. Overseas export enquiries are also running at a high level.

Keith Barraclough, chairman of King British said: "We believe that the effective control of water impurities, particularly in terms of killer gases is paramount to keeping strong and healthy aquarium fish". He added: "There has been a lot of talk among aquarists over many years about water chemistry and general water conditions and, quite honestly, a fair bit of this has been mumbo jumbo. What we have done is to simplify matters and to switch the emphasis away from the chemistry of water to the way in which nature itself plays its part in purifying water".

Keith Barraclough added: "An important distinction has to be made at this stage. OTP specifically is not a filter system, it is a water purification system which deals with gases rather than solids—that is why we say that OTP complements filter systems and is not a replacement for them".

Keith Barraclough said finally: "Early users of OTP are reporting that the fishes they have previously been unable to spawn are now meeting with unprecedented success. This fact in itself shows how effective the system is".

The new King British leaflet explains in great detail precisely how OTP works and why the system effectively increases the dissolved oxygen capacity in aquariums and in doing so removes unwanted gases from the water.

The leaflet, entitled 'Good Water Management for the Home Aquarist' is available from King British Aquarium Accessory Company Limited, Hayfield Mills, Haycliffe Lane, Bradford, Yorks.

For further information please contact: Keith Barraclough 0274 576241 or Bob Rushton 01 404 5575.

### Efficient filtering material from Austria

OPTIMA, a new type of filtering material, manufactured in Austria by B. Kuber

and distributed in the U.K. by: T. H. A. Distribution, 367A Archway Road, London N6 4EJ. Retail price: £7.95 including VAT per 1,000 cc pack.

Optima filtering material was originally intended for seawater aquaria, but has also proved very successful for tropical installations as well as for coldwater tanks with their usually very high content of uric acids. It is completely harmless to fish, algae in seawater and plant life. It will take out of the water many harmful substances but will not change the pH or the hardness of the water. Optima filtering material can do more, much more, than any standard activated charcoal.

These claims can hardly be ignored but I must admit that I was still very sceptical. Having used many different kinds of filtering materials over the years, the majority never fulfilled their often exaggerated claims, why should Optima be any different? To be really truthful, I did not expect any miracles.

I installed Optima filtering material for the first time in one of my Eheim power filters and used it on a well-maintained tank, stocked with a number of Red Nosed Tetras, some Corydoras barbatus and several Clown loaches. The tank had a magnificent growth of plants—mainly Cryptocorynes. Initially, I watched the reaction of the fish very carefully and found that within a very short time the fish became much livelier and much more intense in colour. After a while the water also became crystal clear. Was this all my imagination or did it really happen? It really did happen.

I changed over another aquarium to Optima filtering material and again I was pleasantly surprised. I also noticed that the plants produced many more new leaves, obviously because of the clarity of the water, the plants received proportionately more light. Although Optima filtering material was meant to remove from the water all harmful substances and therefore make the task of water changes, weekly or monthly, a thing of the past, I continued to change part of the water, as has been my normal

practice all my fishkeeping life; since no fish had ever died from clean fresh water—I found that the useful life of the filtering material could even be prolonged.

According to a guide by the manufacturers 500 grams of Optima filtering material will suffice for about 3 months in a 100 litre aquarium. As regular partial water changes will extend the life of Optima, overstocking of the aquarium and bad feeding habits will shorten the active life of the material. Optima filtering material has a certain capacity and the clarity of the water is a good indicator of the exhaustion of the material and it should be changed when the colour of the water loses its sparkle.

Once I had realised its effect on the fish and plants in the mixed tanks I was quite prepared to 'risk' some on an aquarium with baby Discus fish, where the water could be kept nitrite-free despite the very heavy feeding during the course of the day. The pH remained stable, and the hardness of the water also did not change. Again, the baby Discus fish became more lively and were always ready to be fed again.

What impressed me most when I was using Optima filtering material was the clarity of the water and the coloration of the fish. The fish displayed a colour not often seen before, what was once just a hue of colour became the most brilliant colour. The effect was absolutely amazing. If hobbyists would have been able to measure the various levels of pollution in the water, they would have found no real traceable amounts of any pollutants. This clarity of the water can, of course, also be achieved with a standard type of activated charcoal, but if one were to compare Optima filtering material with any standard type of activated charcoal the results are very surprising. Tests were carried out by the Waste Water Institute, an official authorised research establishment in Vienna, using the following input concentrations:

NH <sub>4</sub> (as NH <sub>4</sub> Cl)	1.09 mg/l
NO <sub>2</sub> (as Na NO <sub>2</sub> )	13.0 mg/l
CO (NH <sub>2</sub> ) <sub>2</sub>	4.3 mg/l

*Continued on page 53*



# BEGINNING WITH TROPICALS

## CONCLUSION

IN EARLIER articles I have warned the beginner to avoid the temptation of the Angel Fish in his first collection, but inevitably the time will come when the attractions of this magnificent fish will overcome all scruples, and its acquisition often signals the transition of the tyro to more serious aquarist. It is not so much that this is a difficult species to keep—far from it—but it possesses two important characteristics. The first is that it is deceptively innocent as a youngster, finds its way into many mixed collections under false pretences, and finishes up as the villain of the piece, having slaughtered many of the inmates. Blame not the fish, but its foolish keeper! Its second characteristic is that it has extremely fascinating breeding habits, not particularly difficult to encourage under quite undemanding conditions, and its fry, once off the mark, are good solid material for the would-be breeder to sharpen his teeth on. As a bonus, a tankful of one inch angel youngsters in top condition is a sight for sore eyes.

*Pterophyllum simensei*, or the Scalare, is the species usually offered for sale, and its silver and black banded body with towering and flowing finnage are familiar to all. In fact, this is probably the most obviously "exotic" of all tropical fish because of its combination of the graceful and the bizarre. Over years a number of mutations have been developed, few indeed matching the wild type for beauty or longevity, though it must be conceded that individual specimens, well cared for, can be extremely beautiful.

Many aquarists will join me, I think in regarding these derivations as mere gilding of the lily, because none really matches in pure natural beauty, a first class specimen of the natural type. This fish is so much misused that many aquarists fail ever to see one in really

by Roy Pinks



An Angelfish laying eggs on an Amazon sword leaf

good shape and condition, and it tends to be discarded at about the 2in. mark, just as it is becoming a nuisance, and its impact at the 5in. stage is totally missed.

#### Tank to themselves

It goes without saying that if you want to keep angels you should give them a tank to themselves. A 24in. container is quite enough, and one of the nicest I have ever had was 15in. deep, which allowed some of the larger plants to be employed. It you can manage a longer tank with a depth of 18in., so much the better, as an impression of height comes across very clearly when the larger fish show themselves in open water.

Planting can be very simple: great thickets of vallisneria and giant sagittaria are fine—they complement the lines of the angel to perfection. These

should take up the rear and one side of tank, with the other devoted to a sizeable plating of Amazon swords. The bottom can be of coarse gravel, and although these fish are not particularly fussy as to water conditions, I have always found them most appreciative of rainwater.

Whether you want to breed from them or not, it is advisable to buy 1in. specimens—they will cost about 50p each—and grow them on. If you think your tank will look bare with only half a dozen, don't hesitate to put in as many as will not overcrowd the tank, as you can usually sell off good unwanted large specimens quite readily.

You will probably notice that these young fish will vary quite markedly as to finnage, and you cannot tell for some months which will assume the best shapes. So much intensive breeding is done with this species that much poor stock survives and is marketed, and the mortality rate can be quite high unless you select your fish carefully. The thing to look for is a stocky body (all thin fish must be rejected) and purposeful swimming movements. Any specimens which seem to drift in the water will not last for long.

Smaller fish will usually get along very well for up to a year, provided that there is enough cover for the more timid ones. At the same time they will only prosper if they are fed on a largely protein diet. Some of the flaked foods are quite suitable as stop-gaps, but whiteworm, *daphnia*, midge larvae, hard herring roe and chopped earthworm are essentials to bringing angels to the perfection they deserve.

Earthworms, in particular, seems to make all the difference in the world once they are large enough to take them, and it is astonishing how much they can

## Beginning with Tropicals

absorb at one sitting. During feeding sessions their colours, especially the red around the eyes and the black bars, intensify most vividly, and the silver positively glistens. These features are accentuated even more during breeding, and are a magnificent sight.

### Susceptible to panic

Though angels will gradually become tame enough to take food from your fingers or from the end of a knife they are unusually susceptible to panic, seemingly suffering from this most often after dark. It is not quite clear what causes the trouble, but I have seen fish jerk or crash into the glass after some external noise. It is all very unpredictable and unpleasant, and sometimes ends in death. The best situation for the tank, therefore, is in a quietish spot with rather better than average lighting. Though rockwork and sunken logs are extremely decorative I do not advise them in combination with angels, as when the fish panic they usually get lodged into an angle of rock and suffocate because their gill plates are constricted. If all they have to negotiate are plants, they have a far better chance of survival.

As your angels grow they will begin to pair up by facing one another and seeming to kiss. This is not always female to male, but sometimes male to male as a test of strength. Sexing is difficult, despite numerous "infallible" descriptions of the one or the other. Generally, when two fish seem to be swimming mostly together and the

others give them a wide berth, this is a time for decision. You have the option of removing the rejected and leaving the pair to themselves, or selling the pair to another enthusiast who is just dying to try his hand with breeding.

We shall be running some articles on breeding shortly, and the technique for managing angels will feature in this. But whatever your fancy dictates, you will have in your tank some of the finest of all "big" tropical fish, and they will repay all the care you can give them. They are reasonably long lived—4 years or so being about the average—and they are extremely satisfying fish to bring to full maturity, because their contours do seem to change for the better as they age. Apart from the one difficulty mentioned above they are staid and good looking fish from the point of view of display. This is not to say that they are stodgy in any sense, as they will show a lively interest in what is going on, especially if worms are in prospect. But they don't fuss or annoy and they are supremely relaxed and relaxing fish—perhaps this is why I like them so much.

## PRESS RELEASE

Continued from page 51

By determining the adsorption isotherms, the following adsorbent capacities were determined per gram of adsorbent with the input concentration indicated:

	Optima	Charcoal
NH <sub>4</sub> (Ammonium)	19 µg	3.3 µg
NO <sub>2</sub> (Nitrite)	7.4 mg	0.19 mg
CO (NH <sub>2</sub> ) <sub>2</sub>	500 µg	40 µg

These findings show that Optima filtering material has a substantially higher adsorption capacity than any standard commercial charcoal investigated in eliminating ammonium, nitrite, nitrate and urea, harmful substances which occur in aquarium water. The increased adsorption of the harmful substances by Optima filtering material can be attributed to the process taking place not only on the visible surface but also in the pores, insofar as these are accessible to the adsorbate; the entire surface may amount to several 100 m<sup>2</sup> per gram of adsorbent.

In conclusion let me say that I have been more than just impressed with Optima filtering material, although it seems an expensive material, because of its very high capacity and efficiency it certainly is not much more expensive than standard type of charcoal and I am convinced that any hobbyist who has used it once on an aquarium will always use it again because I believe it has certainly made the task of keeping an aquarium, whether 'just goldfish' or a 'mixed bunch' of tropicals, 'expensive Discus' fish or 'difficult Marines' that much easier. Optima filtering material has increased the life expectancy of all of our aquarium fish; not only will they live longer but they will also wear a more colourful dress and after all, what is an aquarium: But a colourful living picture.

E.S.



## COLDWATER FISHKEEPING

by Arthur Boarder

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

### Algarde Biofoam '45' and '200' Aquarium Filters

It is always difficult to assess how biologically efficient a "biological" filter actually is. These Algarde Bio-Foam Aquarium Filters are no exception. If, indeed, the '200' model were only to have a surface area of 35 sq. ins. per element, as stated on the descriptive blurb, then the filter would be most *ineffective* in biological terms. Fortunately, though (but the manufacturers seem to have overlooked this), 35 sq. ins. is the *external* surface area of a single foam filter element. The total *real* surface area i.e., the area of all of the thousands of minute foam pores put together, is far in excess of 35 sq. ins., thus, almost certainly, rendering the filters quite effective in terms of biological efficiency.

Algarde must be complimented on

the thorough and easy-to-follow instructions printed on the reverse of the card mounting which forms part of the packaging for these filters. The instructions for the '200' model are particularly good. In fact, it is difficult to go wrong but, quite rightly, Algarde have taken no chances. In spite of this, there is one technical/scientific quibble (which, of course, Algarde are not alone in being guilty of):

The word 'bacteria' is *plural*. It is annoying, incorrect, suggests a lack of familiarity with these invaluable (and often dangerous) micro-organisms, and tends to create an unfavourable impression when they are constantly referred to in the singular. The instructions accompanying the Algarde filters fall into this trap no less than three times.

This quibble notwithstanding, both filters are easy to assemble and install and are very effective, at least, as far as mechanical filtration is concerned.

As mentioned earlier, though, biological efficiency is difficult to evaluate quickly. Much depends on the flow-rate through the filter medium, the level of pollution in the tank, the species and number of fish kept, the frequency of feeds, the type of food, the temperature of the water, the length of time between washings of

the filter elements (very important), and so on.

Nevertheless, both filters appear to do the job they claim to. During two months of constant use in a number of aquaria, the water remained clear and sweet-smelling at all times and both fish and plants remained in peak condition during the test period.

Both models are sturdily built and can be hidden from view behind rocks or decorations with only the airlifts remaining visible. The constant gurgling sounds of the air bubbles and the return flow of water may be either disturbing or relaxing, depending on your point of view—the reviewer found them relaxing!

The smaller model ('45') is designed for tanks up to 50 litres (approx. 24 in. × 12 in. × 12 in.) while the larger one ('200') can be adapted, by the addition of extra elements, for use with tanks up to 72 in. × 15 in. × 18 in. with a flowrate of 200 litres per hour.

Therefore, overall, the Algarde Bio-Foam Aquarium Filters can be recommended as reasonably priced, efficient, sturdy, easy-to-maintain filters for a wide range of aquarium sizes.

Recommended Retail Prices are:

- (i) BioFoam '45'—£1.15p (incl. V.A.T.)
- (ii) BioFoam '200'—£4.60p (incl. V.A.T.)



### Foodsticks from Tetra

TETRAPOND STAPLE FOODSTICKS, manufactured in West Germany by Tetra-Werke. The review sample had a net weight of 3.53oz. (US)—100g.

It is always exciting to test and examine a new food from the world-famous Tetra stable in West Germany. The large, green carton sent to me contained a very large number of small, spaghetti-like segments of fish food. They were the same colour as, and looked quite like, ordinary maggots. The smell was quite strong! The cardboard carton has a white, plastic lid.

## Product Review



The label states: "TetraPond Staple Foodsticks are a highly digestible, nutritious, floating food. Especially developed for pond fish, the foodsticks gradually soften on the surface of the water. The balance of protein, fats, minerals and other ingredients meets the specific needs of coldwater pond fish, and the foodsticks' format ensure(s) complete digestion of these nutrients. Feed your fish several times a day in small quantities—as much as they will consume in a few minutes. As the temperature of the water falls, the metabolism of coldwater fish slows down; therefore don't feed your pond fish below a water temperature of 10°C-50°F."

"TetraPond Staple Foodsticks represent a development of the leading hobby fish food manufacturer worldwide."

The ingredients are: ground corn, ground brown rice, soyabean meal dehulled solvent extracted (*sic.*), fish meal, wheat feed flour and algae meal. The guaranteed analysis is given as: crude protein—min. 25%; crude fat—min. 1.5%; crude fibre—max. 5%; and moisture—max. 10%. The product also contains food colouring material E102.

My fish ate this interesting, new product greedily. The pieces are of a sensible size to suit a variety of sizes of fish. I can certainly recommend the

new Tetra product to those who keep coldwater pond fish.

I do not know the price at the time of writing.

### Hillside Aquatics introduce new aquarium vacuum cleaner

PERFECTUS MOTORIZED AQUARIUM VACUUM CLEANER, manufactured in Germany by Nuova, and distributed in the U.K. by Hillside Aquatics, 46 The Service Road, Potters Bar, Herts, EN6 1QA, price, including VAT, £11.04.

'Delightful' is not a word that would normally spring to my mind when attempting to describe a small machine for cleaning the base of an aquarium, but the word is the term I have chosen to describe the Perfectus Motorised Aquarium Vacuum Cleaner. It's a delight to look at and to use!

Unfortunately the instructions supplied with this most useful unit are in German, and I cannot translate German; however, it took me only a couple of minutes to work out how to assemble and operate this fine cleaner for the bottom of aquariums. The whole unit is about 18½ in. long, with a pull-out extension rod that extends it to about 25½ in. in length. This means that it can be adjusted to suit aquarium water depths of about 9½ in. to 16½ in. The clear, plastic tube terminates in a brown, plastic strainer that lets the dirty water get sucked in and helps keep out the aquarium gravel.



The unit is powered by two Ever Ready SP11 1.5 volt batteries, situated in the unit's brown, plastic handle. A red knob on the top has a gold-coloured press button that switches on the small motor in the handle and operates the propeller-like impeller that draws up the dirty water from the base of the aquarium. The unit, when operating, emits a quiet buzz. Dirt and water pass up into a plastic chamber and flow into a small, sock-like filter bag that retains the dirt and allows the water to flow back through into the tank. The bag has an elasticated top and can quickly be removed and turned inside out to be washed under a running tap.

To start the unit all one has to do is lower the bottom section into the water until it reaches over the impeller (one can tilt the unit, if necessary) and push the starting button. One does not need the usual air lines from air pumps, or electrical cable. The fact that it is battery-powered means that the unit could easily be used anywhere, e.g. at aquarium shows. The white, filter bag means that the dirt can easily be seen—so one knows immediately the bag needs to be washed out. I don't know if spare bags are available but Nuova have a good reputation for supplying spare parts so I'm sure Hillside Aquatics could supply a spare bag, if it were required.

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# Meet the Societies



## THE CROYDON AQUARIST SOCIETY



The C.A.S. Logo



A young Brown Discus

The C.A.S. was formed in 1931 in Croydon to "promote the hobby of fish keeping and to further the study of aquatic life".

It is well worth noting that C.A.S. believe themselves to be the oldest Society of their kind in the U.K. and, probably, in the whole of the English-speaking world. Bearing in mind that they have actually made an international appeal for older claimants to come forward, but none have done so, it is reasonable to assume that this still-thriving Society can lay justifiable claim to the honour.

The range of activities organised by C.A.S. include lectures by visiting speakers, open discussions, slide shows, quiz games and (most originally) fish anatomy evenings during which dead specimens donated by a Croydon retailer are dissected for further study. This type of educational activity is particularly popular among the junior members who find it of direct relevance to their biology studies at school.

There are also trips to fish and plant growers and other Societies in the area for Inter-Club Matches. A car rally and picnic are organised annually as well as an Angling Competition leading to the award of the Annual Angling Trophy. During the year, there are several other competitions leading to the award of trophies such as the Attendance, Fish Exhibit, Breeders and Exhibitors Trophies as well as the Jubilee Cup awarded to the outstanding member of the year.

The Open Show is held every March/April where up to 50 Classes are available, including two for Reptiles and Amphibians. Judging is according to F.B.A.S. Rules, C.A.S. being affiliated to this Federation.

C.A.S. has strong links with the Kenya Aquarist Club with whom views, ideas and fish have been exchanged. The Vice-Chairman of K.A.S. has, in fact, attended one of the Society's meetings. These take place twice-monthly at 8.00 p.m. (2nd and 4th Tuesdays) at The Addiscombe, Woodside and Shirley Leisure Gardens Ltd., Glenthorne Ave., Shirley, Croydon.

**Subscription Rates:** Single Membership, £7.50; Married Couples, £12.00; Juniors (up to school-leaving age), £1.00.

Apply to: Mr. L. S. Derrick (Secretary), 5 Glenthorne Ave., Shirley, Croydon, Surrey. Tel. No. 01-654 0984.

## THE BRITISH KILLIFISH ASSOCIATION



*Cynolebias bellotti*

The B.K.A. was formed in June 1965 after a meeting at the "Three Horseshoes" in West Bromwich. The meeting itself was the outcome of a News Sheet sent to English members of the American Killifish Association which made it possible for U.K.-based Killifish enthusiasts to establish contact with each other.

A committee was formed from members in the Birmingham area who, following a number of suggestions, adopted the name "The British Killifish Association". Shortly afterwards, this was amended to "The British Killifish Association", the *e* in Killifish being taken out to make the term more scientifically correct.

The main aims of the B.K.A. are to further the keeping of Killifish by the propagation and stabilisation of the numerous species. Also, and very significantly, the B.K.A. collaborates with museums all over the world assisting, wherever possible, in the classification of new species.

As the above indicates, there are B.K.A. members in many countries, thus extending the influence of the Association well beyond the limits implicit in its name. With such a widespread membership, it clearly becomes impossible for monthly "general" meetings to take place. Therefore, there are numerous Regional Groups, each with its own committee.

In the U.K., these Groups are in the following areas: Midlands, North West, North East Yorkshire, West London, Berkshire, Collingham, Sussex, "Wessex", Kent, South East Essex, "Solent", Manchester, Crewe and Scotland.

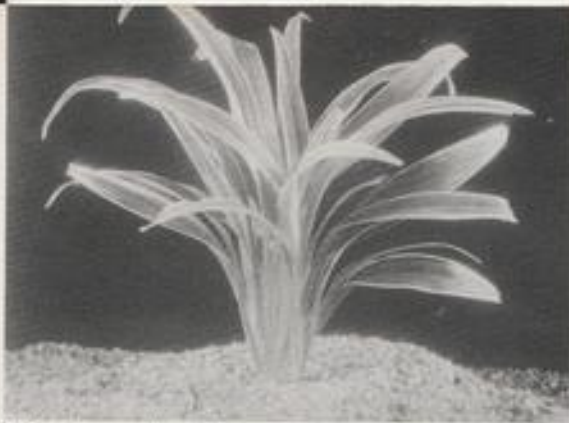
These Groups usually meet once a month and any member of the B.K.A. can attend any Group meeting (s)he wishes.

On a wider basis, members are kept informed by means of a monthly journal called "Killi-News". In addition to articles, this professionally-produced journal also includes views and ideas from members, plus a fish and egg list in which members can advertise free of charge. Through these columns, even members in different countries and continents successfully exchange fish and eggs by post.

Booklets are also published, including a "Beginners' Guide", which deal with the naming and classification of new species, with data on their collection and propagation.

**Subscription Rates:** U.K., £10.00; Europe, £14.00; Others, £16.00.

Apply to: Tom Scates (Acting Registrar), Heatherlands, Burts Lane, Mannington, Wimborne, Dorset.

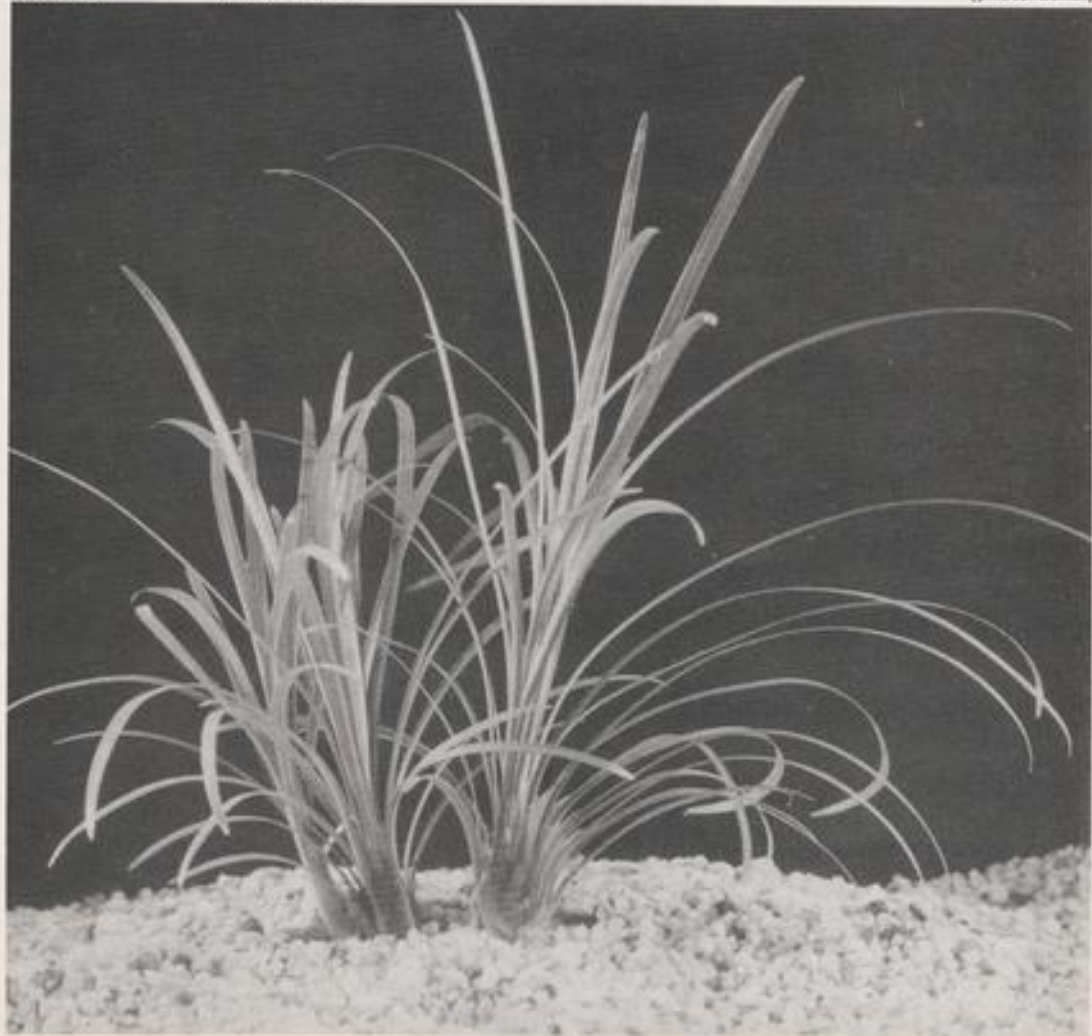


*Chlorophytum bichetii* is an attractive plant because of its bright coloration (photo Zukal)

'AQUARIUM PLANTS'  
OF THE FAMILY  
LILIACEA

by Karel Rataj

*Ophiopogon japonicus* var. *pusillus*  
(photo Zukal)



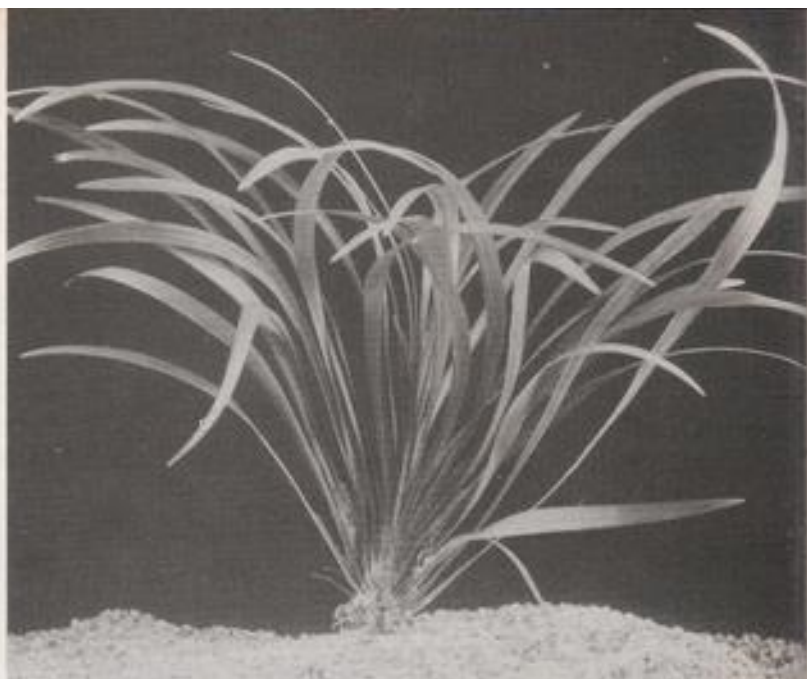


PLANTS of the above family have contributed greatly to the world of decorative gardening and a host of splendid species are grown in the garden, in rockeries and indoors. Many of them are plants which prefer dry conditions and in the wild they grow in locations which have a lot of moisture only in spring. After they have finished flowering, the plants wilt and they survive the rest of the dry summer and winter in the form of bulbs. Typical examples are the tulip (*Tulipa*), meadow saffron (*Colchicum*), numerous kinds of garlic (*Allium*) and, of course, lilies (*Lilium*).

A smaller number of species of this family are found in the wild in very wet and often submerged locations. Among these are, for example, the snowdrop (*Galanthus*) and the genus *Leucojum*. But we have awaited for a long time lily-like plants which could be grown underwater in the aquarium. Not until the last few years have three species suitable for aquaria been imported here and which belong to the genera *Chlorophytum* and *Ophiopogon*.

The genus *Chlorophytum* has about a hundred species which nearly all come from Southern Africa. Only six of them are cultivated. They are *C. macrophyllum*, *C. ionornatum*, *C. capense* and, most of all, *C. hoffmannii* and *C. comsonum*.

The last-named is an especially widespread and hardy indoor plant. In dark hotel hallways, dusty factory workshops and in smoky, badly ventilated restaurants, where any other plant would perish, *Chlorophytum comsonum* keeps on growing. In winter it is happy with a temperature of around 6°C and even though it appreciates regular and generous watering, it will survive if necessary several days with little moisture. It readily and frequently puts out creeping shoots on which young plants develop. For use in the aquarium, *Chlorophytum bichetii* is suitable and is currently imported on a large scale from commercial nurseries in Singapore. The plants grow between 15 and 25 cm high and usually have five to 20 leaves. The leaves have short leaf-stalks, 1 to 2 cm long at the most. The leaf blade itself narrows at both



*Ophiopogon jaburan* (photo Zukal)

ends, is pointed at the top end and often broadens out quite a bit in the middle. In fully-grown specimens the leaves are almost ribbon-like in that, between the narrower ends, their edges are parallel, and have a width of 1.8 to 2.3 cm. They are dark green, their edges and often many of the longitudinal veins are white or bright yellow.

The rootstock begins with a bunch of characteristic bulbs. These are whitish, longer than they are broad, being 1.5-2.5 cm long and 0.5 cm across. They are often broader at the top, becoming narrower towards the end, thus having a regular elliptical shape. There are 8 to 20 of them on each plant and from their narrow tips grow sparsely branching roots. The flowers are set alternately on the stem and have small, tightly-set bracts. They are reminiscent of miniature lily-like flowers. They measure about 1 cm on average and consist of five whitish to pinkish petals. Five stamens are a little longer than the pistil. The syncarp has the form of a three-cornered cap, is a little more than 1 cm in length and dark green.

*Chlorophytum bichetii* reproduces most of all in its emergent form. It

can also be grown in a flower-pot as a house plant. It grows very quickly and after a few months individual plants can be divided into a large number of new, independent ones. In doing so, care must be taken that all newly separated plants are complete with root bulbs. For planting in the aquarium plants with five to seven leaves and measuring up to 12 cm, or 15 cm at the most, are the best suited. Larger plants are not suitable for planting underwater as there is the increased likelihood of the leaves starting to rot.

*Chlorophytum bichetii* is a relatively resilient plant, but is not suited to tanks which have been recently set up. If they are placed in established tanks containing other vegetation the risk of losses is minimal. This lily-like plant does not grow particularly quickly under water and as a rule develops a single leaf a month. With its colourful and full appearance, however, it is an extremely attractive plant and at present is already relatively well-known amongst aquarists.

It grows well in water which has a pH reading of 5-7.5, withstands hard water quite well and prefers dispersed daylight to artificial lighting. In the winter months, of course, the latter is needed in order to lengthen the shorter days. Given that we are not dealing

with a typical tropical plant, however, the shorter days are not as dangerous for *Chlorophytum bichenii* as for the great majority of plants originating from the tropics—that is from the zone of the twelve-hour day.

The second genus of the family Liliaceae which has made its presence felt in the aquarist world over the last few years is *Ophiopogon*. It has eight described species, which come mainly from Southern Asia, including Japan. Two species are kept in the aquarium.

*Ophiopogon japonicus* is distributed up to the temperate zone and so one can grow the plant outdoors, where it is also able to pass the winter. The plants are 20 to 30 cm high, many of them combine together to form a dense, bushy growth, with each individual having only two or three long, straight leaves. This characteristic form is not really practical in the aquarium, however, as the plant's attractiveness is lost unless a full growth is created, consisting of 15 to twenty individual plants. As a result, *Ophiopogon japonicus* var. *pusillus* is better known.

This variety usually has 10 to 15 leaves, which arch over laterally and have a maximum length of 10 to 15 cm. Because of the arching of the leaves the plant normally attains a height of 10 cm. The individual leaves are only 2 to 4 mm broad, ribbon-like, pointed at the ends and have strikingly prominent, longitudinal veins. The root system is robust and dense, with firm roots which are almost as long as the leaves and are yellowish-white and very numerous.

Reproduction is carried out by shoots being put out from the root system which run laterally out over the surface of the sand. At intervals of 5-15 cm new plants develop on them. Reproduction in the aquarium is very slow. Our specimens are cultivated in a mixture of garden soil and peat and they reproduce relatively quickly and profusely. The plants we have cultivated have never flowered.

*Ophiopogon japonicus* var. *pusillus* is a hardy plant and extremely well suited for planting in the front or middle of the aquarium. An area of vegetation can be built up by

placing 15 to 20 plants together, while keeping each individual plant 5-7 cm from the next one.

The leaves are tough and adhere firmly to the plant, so it is rare for them to start to rot. This new plant for the aquarium is suitable for beginners to use in both well-established and newly-established tanks. It survives the winter well in aquaria in the house, without artificial lighting. It can be cultivated the whole year round in a hotbed, where it survives the winter with no problem, guarded against our climate and its snow.

The plant of the above family which has been least kept in the aquarium until now is the very beautiful *Ophiopogon jaburan*. It comes from the tropical area of south-east Asia and well-developed plants have up to 35 leaves. They are dark green, 25 to 35 cm long. Older leaves fall over to the sides and curve over, whereas younger ones in the middle are lighter green and upright, almost vertical. The leaves are without leafstalks, ribbon-like, often a little narrower near the bottom, in other cases having virtually the same width throughout their whole length. The width of the leaves varies between 1 and 1.8 cm. Longitudinal veins are also characteristic, being quite prominent.

The inflorescence is approximately the same length as the leaves and bears 20 to 30 snow-white flowers

which resemble the lily of the valley (*Convallaria*), their bell-shaped forms hanging downwards.

Reproduction is very slow. New plants generally develop at the base of the short rootstock and it takes a very long time for independent roots to form, thus enabling one to separate the plants. From a mother plant which has been cultivated as an emergent plant, one can generally aim at obtaining two to three new specimens at the most, over a year. It is, therefore, very difficult to obtain this species from growers within this country. *Ophiopogon jaburan* has been imported over the last few years, however, from Singapore. It is, of course, one of the more expensive plants. The plant is very hardy in the aquarium. It tolerates both daylight and artificial light, the company of *Cryptocorynes* and *Echinodorus* plants, relatively acid to slightly alkaline and soft to medium-hard water conditions. Its leaves are very sturdy and not susceptible to rotting. The root system is firm so, like *O. japonicus*, *O. jaburan* adapts well to an aquarium substrate consisting of washed coarse sand to which nothing else has been added. The only source of nutrient is then provided by mineral substances.

The flowers of *Ophiopogon jaburan* are reminiscent of lily of the valley (*Convallaria*) (Photo Rataj)





# NEWS...



## SOUTH EAST



IT was a successful evening for the Webbell family at the East Kent Aquatic Study Group August meeting, for their fish took no less than six cards in the two classes of this month's table show. The classes were for Characins and Guppies. There were thirty-two entries which were judged by Mr. John Edwards. Full results: Characins: 1, F. Neaves; 2 and 4, T. Webbell; 3, D. Wiby. Guppies: 1, S. Webbell; 2, 3 and 4, T. Webbell. A very enjoyable talk was given by Mr. Terry Walter. It included some superb colour slides and was all about the keeping and showing of "Rashoras". Terry was unfortunately beaten by the clock but it is hoped that he will return to the club at a later date to entertain us with part two of his talk. Fifty-eight members attended the meeting which was held at the Memorial Hall, Bethings, Herne Bay, on the second Tuesday of the month.

THE Wycombe Marsh A.S. meet at 8.30 p.m. at the Young Adult Centre, Wycombe College, High Wycombe, on the 1st and 3rd Thursdays of the month. Recent events have consisted of a visit to an aquarium shop at Thame, a raffle and show on Keeping Koi, a lecture by Dick Mills on his Sri Lanka trip and a bring and buy sale. Details of future meetings can be obtained from the secretary, Jeff Woodbridge, tel: High Wycombe 882875.

RESULTS of Tongham Aquarist Club table show held on 1st September, at the Victoria Hall, Ash. Medals: 1, M. Ash (Pocilia Latipinna). Gold or Gold: 1, S. Knott (Anabantus Punctatus). A.O.V.: 1, M. Bird (Hyodon Xanthurus); 2, A. Burgess (Pocilia Reticulata); 3, D. Barnett (Barbus Conchionatus); 4, A. Burgess (Phoxinus Phoxinus); 5, A. Burgess (Rhodeus Amarus). Judge: Mr. R. Cooke.

An interesting talk was given by Derek Lambourne on the subject of "Large Catfish".

THE South East Aquarist (S.E.A.S.) are inviting you all to come along to their "Bring and Buy" which is being held at the "Beveree", Hampton Football Grounds, Beaver Close, Station Road, Hampton, Middlesex, at 7.30 p.m. to 10.30 p.m. on Monday 21st November.

## SOUTH WEST



North Avon A.S. had an interesting evening on 15th August at Hanham Folk Centre, and

# From Aquarists' Societies

now established venue, with a talk by Mr. Andy Cowley on "Water Chemistry". After explanation of an analysis carried out by the local water authority, of tap water, Mr. Cowley explained the methods and recipes for attaining, and maintaining water conditions for various sections of the hobby. The Society meets on the third Monday of each month, and any enquiries should be directed to the Secretary, Bob Cummins, 1 St. Annes Close, Cadbury Heath, Wansley, Bristol BS15 5EH, tel: Bristol 877998 or 510886.

Bristol A.S. listened with great interest to an illustrated talk from Mr. R. Harper of the Bristol Chelonia Group. Slides showed clearly the different species, sexes and rearing progression. The speaker emphasised that Chelonians needed a place of retirement that was home, dry preferably with a transparent sun porch in front and benefited from the addition of meat to their diet as well as a vitamin supplement that is more usually given to dogs. He gave a word of warning over some Terrapins that could harbour pathogens and emphasised the need for the strict hygiene and a separate enclosure for feeding if at all possible.

Table Show results: Comets: 1 and 2, H. C. B. Thomas A.V. Goldfish Junior Class: 1, 2, 3 and 4, A. Hughes. Prettiest Goldfish A.V.: J. Day.

THE annual Salisbury and District A.S. open show was revived this year after a one-year break and proved extremely successful. Shortage of members led to last year's event being cancelled, but a recent intake of keen newcomers ensured that this year the Show did go on. Held as usual at the Activity Centre in the City's Wilton Road, the show on 4th September, attracted a total of 373 entries from as far afield as Wales and Southern and the nine judges who officiated were unanimous that the standard of entries was extremely high. Although the number of fish berthed was slightly down on recent years—due almost entirely to the poor support in the coldwater classes—there were some top-class fish on view. Best in Show went to Mr. and Mrs. P. Armstrong of Bracknell A.S., with a Cichlasoma fessae which came out top in the Cichlid class, while the FBAS Championship class winner in De was won by Havant's Bill Knight with a Cynocara botleyi. An innovation this year was a fish photography exhibition and the show organisers were overwhelmed and delighted to receive an entry of nearly 60 pictures, many of which were of the highest quality. Such was its success and popularity that it was won by Mr. C. Smith of East Dulwich—this it will definitely be staged again next year, though the contest will be divided into various different classes in order to give the novice photographer a better chance of success. The public turned up in bigger numbers than ever before, and the organisers' after-show verdict was that the show was a great success. With a regular meeting place now established, on the second and fourth Thursdays of each month at the "Black Horse" in Castle Street, Salisbury, there is great optimism that the Salisbury club is well on its way to returning to its former strength.

Results were as follows: Class B: 1 and 2, R. F. Adams (Salisbury); 3, R. Somers (S.E. London). B: 1, C. Raggio (Brighton); 2, Mr. and Mrs. Andrews (Reading); 3, D. R. Edlinstein (Salisbury); 4, C. Tonna (Reading). C: 1, R. F. Adams (Salisbury); 2, J. Andrews (Basingstoke); 3, R. Andrews (Basingstoke); 4, A. Waller (Southend). C: 1, S. Norris (Bracknell); 2, J. Handley (Solent); 3, W. Knight (Havant); 4, C. Raggio (Brighton). D: 1 and 2, C. Smith (East Dulwich); 3, D.

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.

Cox (Yeovil); 4, K. Gray (Chard). D: 1, R. F. Adams (Salisbury); 2, J. Jackson (Basingstoke); 3, A. Waller (Southend); 4, R. Somers (S.E. London). De: 1, W. Knight (Havant); 2, R. A. Bates (Salisbury); 3 and 4, D. R. Edlinstein (Salisbury). D: 1, Mr. and Mrs. P. Armstrong (Bracknell); 2, P. Couglan (Salisbury); 3, M. Coote (Salisbury); 4, S. Tibbenham. Ea: 1, W. Crookford (Peterfield); 2, J. Robinson (Solent); 3, Miss P. Taylor; 4, P. Handley (Solent). E: 1, R. Somers (S.E. London); 2, F. Cox (Bournemouth); 3, C. Raggio (Brighton); 4, S. Goodison (Chard). F: 1 and 2, C. Raggio (Brighton); 3, C. Rodway (BKA); 4, D. S. Langdon (Yeovil). G: 1, C. Raggio (Brighton); 2, 3 and 4, L. Goddard (Salisbury). H: 1, D. R. Edlinstein (Salisbury); 2, P. Handley (Solent); 3, R. F. Adams (Salisbury); 4, W. A. Knight (Havant). J: 1 and 2, C. Raggio (Brighton); 3, R. F. Adams (Salisbury); 4, C. Tonna (Reading). K: 1, S. Norris (Bracknell); 2, A. Whitley (S.E. London); 3, Mr. and Mrs. Andrews (Reading); 4, C. Tonna (Reading). L: 1, Mrs. P. Cripps (Newbury); 2, S. Norris (Bracknell); 3, A. Waller (Southend); 4, W. A. Knight (Havant). Ma: 1, W. A. Knight (Havant); 2 and 3, D. Cox (Yeovil); 4, Mr. and Mrs. P. Armstrong (Bracknell). M: 1, J. Hoar; 2, D. Cox (Yeovil); 3, C. Smith (East Dulwich); 4, R. Somers (S.E. London). N: 1, C. Martin (BKA); 2, R. F. Adams (Salisbury); 3, Mr. and Mrs. Andrews (Reading); 4, J. Jackson (Basingstoke). No-1: 1 and 2, A. Waller (Southend); 3, R. F. Adams (Salisbury); 4, J. Bath (Solent). O: 1 and 2, Mr. and Mrs. P. Armstrong (Bracknell); 3, P. Hooper (Solent); 4, F. Cox (Bournemouth). P: 1, R. Somers (S.E. London); 2, P. Langdon (S.E. London); 3, C. Tonna (Reading); 4, D. Cox (Yeovil). Q: 1, K. Gray (Chard); 2, W. A. Knight (Havant); 3, A. Waller (Southend); 4, A. Petty (Salisbury). R: 1, F. Cox (Bournemouth); 2, Mr. and Mrs. Andrews (Reading); 3, S. Norris (Bracknell); 4, J. Robinson (Solent). S: 1, S. Norris (Bracknell); 2, R. F. Adams (Salisbury); 3, Mr. and Mrs. Andrews (Reading); 4, A. Waller (Southend). T: 1, Mr. and Mrs. Andrews (Reading); 2, C. Tonna (Reading); 3, R. Somers (S.E. London); 4, P. Handley (Solent). U: 1, L. Goff (Bournemouth); 2, W. Crookford (Peterfield); 3, R. F. Adams (Salisbury). U-bc: 1, 2, 3 and 4, D. S. Langdon (Yeovil). V: 1 and 2, M. Sheilsky (Salisbury). W: 1, D. R. Edlinstein (Salisbury); 2, D. J. Kerr; 3, R. F. Adams (Salisbury); 4, C. Martin (BKA). X: 1, H. Miller (Chard); 2, R. F. Adams (Salisbury); 3, C. Tonna (Reading); 4, P. Bowring (Salisbury). X: 1, R. F. Adams (Salisbury); 2, A. Waller (Southend); 3, C. Tonna (Reading); 4, W. Harst (Salisbury). X: 1 and 2, W. West; 3, E. Bagden (BKA).

## MIDLANDS AND WALES



ON 26th June, the British Koi Keepers' Society held their National Show at Billing Aquadrome, Little Billing, Northampton. The Show, organised this year by the Northants Section of the B.K.K.S., proved to be the best ever, with over 300 Koi entered, varying in size from 3 in. to nearly 3 ft. They came from all points of the compass, from as far afield as South Wales to East Anglia and the far north, to Wrexham. The success of this year's show was due in no small measure to the enthusiasm of the Show Chairman, John Beattie and his team of assist-

tain, Eric Almond, Mike Batterson, Richard Gullford and Mike Parker, to name but a few, and the National Committee, at its meeting in Leicester on 24th July, unanimously agreed that these stalwarts of the B.K.K.S., should host the National Koi Show next year as well.

The results of "Koi 83" were as follows:  
**Best in Show:** 1, Sanka, Trevor Rees; 2, Kohaku, Trevor Rees; 3, Ai Goromo, Joe Williamson; 4, Sanka, Trevor Rees; 5, Gin Rin Shiro Usuri, Trevor Rees; 6, Sanka, Trevor Rees. **Best in Size (6):** 1, Sanka, Trevor Rees; 2, Ai Goromo, Joe Williamson; 3, Kohaku, Trevor Rees. **Best in Size (5):** 1, Sanka, Trevor Rees; 2, Sanka, Trevor Rees; 3, Kin Matsuba, Joe Williamson. **Best in Size (4):** 1, Ai Goromo, Trevor Rees; 2, Kohaku, Mary Riddoch; 3, Hikari Mono, Richard Cranmer. **Best in Size (3):** 1, Kohaku, Ford Webb; 2, Showa, Robbie Eccles; 3, Parachina, Rachel Gosling. **Best in Size (2):** 1, Showa, John Garmel; 2, Sanka, John Garmel; 3, Mr. Mall. **Best in Size (1):** 1, Sakura Ogon, Alan Livingston; 2, Gin Rin Shiro Usuri, Vivienne Thomas; 3, Gin Rin, Ken Smith. **Best Kohaku:** 1 and 2, Trevor Rees; 3, Mary Riddoch. **Best Sanka:** 1, 2 and 3, Trevor Rees. **Best Showa:** 1, Trevor Rees; 2, Joe Williamson; 3, Richard Cranmer. **Best Tancho:** 1, Joe Williamson; 2, Trevor Rees; 3, Dennis McClay. **Best Usuri:** 1, Harry Brundish; 2, Trevor Rees; 3, George Woodward. **Best Bekko:** 1, Joe Williamson; 2, Arthur Emson; 3, George Woodward. **Best Asagi:** 1, Trevor Rees; 2, Joe Williamson; 3, Dave Williams. **Best Shosai:** 1, Joe Williamson; 2, Mr. Ward; 3, Arthur Emson. **Best Harasake:** 1 and 3, George Woodward; 2, Vic Bennett. **Best Ogon:** 1, Barbara Gilbert; 2, Rachel Gosling; 3, Trevor Rees. **Best Gin Rin:** 1, Trevor Rees; 2, John Garmel; 3, Dave Williams. **Best Goromo:** 1, Joe Williamson; 2, Trevor Rees; 3, Harry Brundish. **Best Katsuki:** 1, Barbara Gilbert; 2, Joe Williamson; 3, Joseph Wilde. **Best Hikari Usuri:** 1, George Woodward; 2, Trevor Rees; 3, Tom Barham. **Best Hikari Showa:** 1, Richard Cranmer; 2, Mary Riddoch; 3, Trevor Rees. **Best Hikari Mono:** 1, Joe Williamson; 2, Richard Cranmer; 3, Dennis McClay. **Best Kawan Mono:** 1 and 2, Joe Williamson; 3, Trevor Rees. **Best Section Performance:** 1, B.K.K.S. Northern; 2, B.K.K.S. South Wales. **Best Koi over 150 Miles:** Trevor Rees. **Largest Koi:** Trevor Rees. **Best Home-Bred Koi:** Graham Mullins. **Best Batch of Home-Bred Young:** Graham Mullins.

**Leicester A.S. open show held on 7th August at St. Matthews Community Centre, Malabar Road, Leicester.** Total entries 562. **Best fish in Show:** R. Somers with a Chacha chacha. **Results:** Class R: 1, A. Waller (Southend); 2, T. Laughlin (Hastings); 3, W. Hastings (SELAS); 4, J. Such (Kettering). C: 1 and 2, J. Richards (Leicester); 3, A. Cole (Sudbury); 4, C. Wainwright (Leicester). Ca: 1, R. Smith (Leicester); 2, A. Waller; 3, A. Brown (Bedford); 4, H. Smith (Sudbury). Ch: 1, P. G. Stoodley (Leamington); 2 and 3, A. I. Brumell (Loughborough); 4, J. Rowney (Dunley Heath). D: 1, P. Gilman (Leamington); 2, P. Wilson (Sudbury); 3, H. Irons (Kettering); 4, R. Harris (Northampton). Dh: 1, T. Hodson (Halesowen Central); 2, R. Somers (SELAS); 3, Onions fam. (Dunley and Dist.); 4, G. Stronon (East Leicester). Di: 1, R. Harris; 2, Onions fam.; 3, H. Irons; 4, C. Swain (Northampton). E: 1, D. Goodwin (Dexley Heath); 2, R. Somers; 3, R. Winterville (Sudbury); 4, J. Richards. Ea: 1, C. Swain; 2, Mrs. S. Andrew (Hickley); 3, N. Craddock (Kettering); 4, R. Somers. F: 1, 2 and 4, I. Alford (Sudbury); 3, T. Laughlin. G: 1, R. Somers; 2, C. Richards (Sudbury); 3, P. Burton-C. Lerman; 4, A. Brown. H: 1 and 4, W. Hastings; 2, C. Richards; 3, A. Brown; J: 1, J. T. and F. Mayle (Nantony); 2, H. Smith; 3, P. Lugden (SELAS); 4, C. Wainwright. K: 1, C. Richards; 2, T. Laughlin; 3, A. Waller; 4, T. Wainman (Haringey). L: 1 and 4, A. Waller; 2, R. Smith; 3, M. Such (Kettering); M: 1, J. T. and F. Mayle; 2, J. Burns (Wolverhampton); 3, J. Rowney; 4, H. Smith. N: 1, C. Richards; 2, A. Cole; 3, C. Wainwright; 4, Mrs. Hodson (Leicester New Parks). Nc: 1, J. T. and F. Mayle; 2, Mr. and Mrs. Lloyd

(Workop); 3, H. Smith; 4, D. and P. Lambert (Kingston). O: 1, R. Bryan (Kettering); 2, R. Somers; 3 and 4, T. Laughlin. P: 1, P. Langley; 2 and 4, T. Laughlin; 3, R. Somers. Q: 1, A. Waller; 2, T. Laughlin; 3, R. Somers; 4, R. Stanforth. R: 1, N. Craddock; 2, H. Smith; 3, J. T. and F. Mayle; 4, Mr. and Mrs. Lored. S: 1, J. Rowney; 2, Mr. and Mrs. Descon (I. and B. Piddoppers); 3, A. Waller; 4, P. Lugden. T: 1, R. Winterville; 2, J. T. and F. Mayle; 3 and 4, N. Craddock. X: 1, J. T. and F. Mayle; 2, C. Swain; 3, S. Poynton (Leicester); 4, Onions fam. Xc: 1, J. T. and F. Mayle; 2, 3 and 4, D. and P. Lambert. U: 1 and 2, B. Tinkler; 3, P. G. Stoodley; 4, T. Laughlin. V: 1 and 2, B. Tinkler (Leicester); 3, N. and G. Parker (Wellingborough); 4, A. Burton (Wellingborough). W: 1 and 4, J. Taylor (Haringey); 2, N. Craddock; 3, A. Burton.

(Wyke); 2, R. Anderson (Wyke); 3, R. C. Leverick (Wyke). Pairs (Egglayers): 1, R. C. Leverick (Wyke); 2 and 3, M. Cook (Wyke). Breeders (Egglayers) (4 and 3): 1, Mary Rogg (Wyke); Goldfish and Comets: 1, Mr. and Mrs. Silk (SIS); Fancy Goldfish: 1 and 2, Mr. and Mrs. Silk (SIS); 3, R. D. Denton (Ind.); A.O.V. (Goldwater): 1 and 3, Mr. and Mrs. Silk (SIS); 2, C. Taylor (Wyke). Famed Aquaria: 1 and 2, G. A. Todd; 3, E. D. Tyler. **Best Fish in Aquaria:** G. A. Todd. **Best Fish in Show:** Mr. and Mrs. Frisby (Wyke). Number of entries 219.

**RESULTS of the Northern Goldfish and Pondkeepers Society 7th open show which was held on the 6th August at the Sports Centre, Silverwell Street, Bolton, Lancashire.** The show attracted 42 individual exhibitors from many parts of the country, including Scotland, Bristol and Devon. There were some very fine examples of fancy goldfish particularly the breeders team of Moore, who won the Aquarian Trophy, bred by Mr. W. Ramsden. **Best fish in show** was a Moor also owned by Mr. Ramsden and Mr. B. Rothwell.

**Class 1: Common Goldfish:** 1 and 2, W. Ramsden/B. Rothwell; 3, A. Ratcliffe. **2: Comets:** 1 and 2, A. Ratcliffe; 3, P. L. Norman. **3: Bristed Shubunkins (3 inch):** 1, P. Foster; 2, B. Rothwell; 3, C. W. Wainbank. **4: Bristed Shubunkins (over 3 inch):** 1 and 3, H. J. Whiting; 2, R. Jordan. **5: Veiltails:** 1, A. King; 2, W. Cumberland; 3, B. Rothwell. **6: Moors:** 1, 2 and 3, W. Ramsden. **7: Orandas:** 1, S. Wilson; 2 and 3, Mr. and Mrs. M. Smith. **8: Lionheads:** 1, 2 and 3, V. Capaldi. **9: Fantail Calico:** 1, Mr. and Mrs. R. Hodgkinson; 2 and 3, G. Williamson. **10: Fantail Metallic:** 1 and 3, V. Capaldi; 2, Mr. Bibby. **11: Columbian Bubble Eyes:** Poo Poo: 1, Mr. and Mrs. B. Colley; 2 and 3, W. Grogery. **12: Pansies:** 1, 2 and 3, J. Larter/N. Hayes. **13: A.O.V.:** 1, W. Grogery; 2, J. Day; 3, L. Baxter. **14: London Shubunkins:** 1, 2 and 3, Miss S. Anderson. **15: Breeders Team (Bristed Shubunkins):** 1 and 2, B. Rothwell; 3, A. King. **17: Breeders Team (Moors):** 1, 2 and 3, W. Ramsden. **18: Breeders Team (Fantails):** 1 and 2, Mr. and Mrs. B. Hodgkinson; 3, N. Harris/C. Coulson. **19: Breeders Team (Lionheads):** 1, 2 and 3, Mr. and Mrs. R. Hodgkinson. **20: Breeders Team (Common Goldfish):** 1, 2 and 3, T. and C. Platt. **22: Breeders Team (Comets):** 1, P. L. Norman; 2 and 3, T. and C. Platt. **24: Breeders Class 1: Fish Single tail:** 1, D. Piddfield; 2 and 3, B. Rothwell. **25: Breeders Class 1: Fish Twin tail with Dorsal:** 1, 2 and 3, W. Ramsden. **26: Breeders Class 1: Fish Twin tail without Dorsal:** 1, 2 and 3, Mr. and Mrs. B. Hodgkinson. **27: Pondfish European:** 1 and 2, M. Raugh; 3, Miss S. Anderson. **28: Pondfish (Non-European):** 1, Mr. and Mrs. M. Pilling; 2, C. Wainbank; 3, S. Walsh. **29: Matched Pairs:** 1 and 2, B. Rothwell; 3, A. King. **30: Novice Class:** 1, M. and S. Wright; 2 and 3, N. Jordan.

The Northern Goldfish and Pondkeepers Society would like to thank Aquarian Foods for their sponsorship, Mr. John A. Dawes, Consultant Editor, *Aquarian and Pondkeeper* magazine for presenting the prizes and everyone who gave their support to this very successful event.

**ON Sunday 26th August the Darwen A.S. held its annual open show at the Library Theatre in Darwen.** Exhibitors from all over the North, including Wrexham, Liverpool, Orley and Kendal, came to show their fish. A total of 370 exhibitors were on show from all corners of the globe—from the Amazon River, from the rivers and estuaries of Mexico, from the swamps of East Africa, the great lakes of Africa and from the Indian Ocean.

The main prizes were: **Top Tank Best Fish in Show:** J. T. Morris (Sandgrounders). **Top Tank Best Pair in Show:** J. K. Corbett (Marsyriids). **Top Tank Best Breeder in Show:** K. P. Robinson (Stretford). Exhibitor with most points: Mr. and Mrs. Baldwin (Sandgrounders). Darwen Exhibitor with most points: D. T. Milner. The prizes were presented by

## NORTH



**RESULTS of the Hall A.S. open show held at East Park on 30th July.** Guppies: 1, K. Riley (Leeds P. O.); 2 and 3, R. D. Tyler (Hull). Swordtail: 1, M. Lake (I & E, Leuch); 2, Mr. and Mrs. Silk (SIS); 3, Mr. and Mrs. Frisby (Wyke). Platy: 1, Mr. and Mrs. Silk (SIS); 2, K. Riley (Leeds P. O.); 3, S. Taylor (Wyke). Molly: 1, R. D. Beall (Huddersfield); 2, T. and J. Garton (Hull); 3, S. Taylor (Wyke). A.O.V. (Livebearer): 1 and 2, G. Anderson (Hull); 3, Mr. and Mrs. Silk (SIS). A.V. (Female Livebearer): 1, Mr. and Mrs. Silk (SIS); 2, Mr. and Mrs. Frisby (Wyke); 3, M. Lake (I and E, Leuch). Pairs (Livebearer): 1, Mr. and Mrs. Silk (SIS); 2 and 3, Mr. and Mrs. Frisby (Wyke). Breeders (Livebearer) (4 and 3): 1, M. Cook (Wyke); 2, B. Anderson (Wyke); 3, R. McDonald (Hull). Breeders (Livebearer) (2 and 1): 1, G. Anderson (Hull); 2, Mr. and Mrs. Frisby (Wyke); 3, R. Anderson (Wyke). Rainbow: 1, 2 and 3, Mr. and Mrs. Lake (Grimsby). Danos and Minnows: 1 and 2, Mr. and Mrs. Lake (Grimsby); 3, J. and A. Johnson (Wyke). Barbs (up to 10 cms.): 1, B. Anderson (Wyke); 2, Mr. and Mrs. J. Riley (Leeds P. O.); 3, P. A. Barber (Wyke). Barbs (over 10 cms.): 1 and 2, R. C. Leverick (Wyke). Angels: 1, D. Waterson (Hull). Rift Valley (Endemic): 1, Mr. and Mrs. Lake (Grimsby); 2, Mr. and Mrs. Frisby (Wyke); 3, Mary Rogg (Wyke). A.O.V. Cichlids (up to 10 cms.): 1, S. Taylor (Wyke); 2, Mr. and Mrs. Riley (Leeds P. O.); 3, Mr. and Mrs. Frisby (Wyke). A.O.V. Cichlids (over 10 cms.): 1, Mr. and Mrs. Frisby (Wyke); 2, E. Barker (Wyke); 3, K. Lawson (Wyke). Characins (up to 7 cms.): 1 and 2, Mr. and Mrs. Lake (Grimsby); 3, R. C. Leverick (Wyke). Characins (over 7 cms.): 1, Mr. and Mrs. Frisby (Wyke); 2, B. Anderson (Wyke); 3, L. Barker (Wyke). Fighter (Male or Female): 1, Mr. and Mrs. Riley (Leeds P. O.); 2 and 3, B. Anderson (Wyke). Anabantids (up to 10 cms.): 1, K. Riley (Leeds P. O.); 2 and 3, B. Anderson (Wyke). Anabantids (over 10 cms.): 1, Mr. and Mrs. Frisby (Wyke); 2, K. Lawson (Wyke); 3, D. Dalton (Wyke). Best Laying Tooth Carp: 1 and 2, Mr. and Mrs. Lake (Grimsby); 3, Mr. and Mrs. Frisby (Wyke). Corydoras: 1 and 3, R. C. Leverick (Wyke); 2, Mr. and Mrs. Riley (Leeds P. O.). A.O.V. Catfish: 1, Mr. and Mrs. Lake (Grimsby); 2, Mr. and Mrs. Riley (Leeds P. O.); 3, K. Lawson (Wyke). Loaches: 1, Mr. and Mrs. Riley (Leeds P. O.); 2, S. Taylor (Wyke); 3, Mr. and Mrs. Frisby (Wyke). Sharks and Foans: 1, M. Cook (Wyke); 2, R. D. Beall (Huddersfield); 3, D. Dalton (Wyke). A.O.V. Tropical: 1, Mr. and Mrs. Silk (SIS); 2, M. Appinall (Wetherby); 3, K. Lawson (Wyke). A.V. (Female Egglayer): 1, Mr. and Mrs. Frisby



Councillor P. J. Whelan, a member of the Entertainments Committee, and himself a keen aquarist.

**Results: Livebearers—(Guppies):** 1, 2 and 3, B. W. Carter (St. Helens). (Plants): 1, S. D. Kent (Wrexham); 2, Mrs. T. Gregory (Darwen); 3, Mr. and Mrs. Baldwin (Sandgrounders). (Swordtails): 1, B. W. Carter (St. Helens); 2 and 3, Mr. and Mrs. Marshall (Merseyside). (Mollies): 1, J. Lynch (Merseyside); 2, P. A. Jones (Wrexham); 3, Mrs. Daniels (Blackpool). (A.O.V. Livebearers): 1, Mr. and Mrs. Marshall (Merseyside); 2, R. I. Payne (Merseyside); 3, J. and K. Corbett (Merseyside). **Anabantids—(Spirals):** 1, A. Rigby (Blackburn); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, R. I. Payne (Merseyside). (Large): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, Mrs. Baldwin (Sandgrounders); 3, D. T. Milner (Darwen). **Fighters:** 1, Mrs. T. Gregory (Darwen); 2, C. A. Daniels (Blackpool); 3, Mr. and Mrs. Daniels (Blackpool). **Cichlids—(Dwarf):** 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, M. Parker (Blackburn); 3, A. Rigby (Blackburn). (Large): 1 and 2, P. Roberts (Independent); 3, J. and S. Casswell (Preston). **Angels:** 1, Mr. and Mrs. Rainford (Blackpool); 2, A. M. Redman (Blackpool); 3, H. and W. Birco (Preston). (Rift Valley): 1, P. Roberts (Independent); 2, Read and Nichols (Hilling Bridge); 3, Mrs. Baldwin (Sandgrounders). **Barbs—(Small):** 1, R. J. Stephens (Blackburn); 2, Mr. and Mrs. Hand (Accrington); 3, J. T. Morris (Sandgrounders). (Large): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, M. Storey (Darwen); 3, L. A. Holden (Stretford). **Characins—(Small):** 1, K. P. Robinson (Stretford); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, R. J. Stephens (Blackburn). (Large): 1, R. I. Payne (Merseyside); 2, B. W. Carter (St. Helens); 3, D. T. Milner (Darwen). **Youthcarps:** 1, J. Roberts (Accrington); 2, C. and E. Brindle (Blackburn); 3, D. Parkinson (St. Helens). **Rashoras, Danios, Minnows—(Danios):** 1 and 2, S. D. Holden (Darwen); 3, D. T. Milner (Darwen). (Minnows): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, D. T. Milner (Darwen); 3, Mr. S. Scott (Blackburn). (Rashoras): 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, J. Stephens (Blackburn); 3, D. T. Milner (Darwen). **Catfish—(Corydoras and Boshies):** 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, B. W. Carter (St. Helens). (A.O.V. Cats): 1 and 2, J. T. Morris (Sandgrounders); 3, Mr. and Mrs. Batough (Sandgrounders). **Loaches and Bettas:** 1, M. Storey (Osley); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Blackburn (Darwen). **Sharks and Poises—(Sharks):** 1, Mr. and Mrs. Baldwin (Sandgrounders); 2, Mr. and Mrs. Batough (Sandgrounders); 3, Mr. and Mrs. Daniels (Blackpool). (Poises): 1, R. I. Payne (Merseyside); 2, M. Storey (Osley); 3, L. A. Holden (Darwen). **Breoders—(Egg 1 and 2):** 1 and 2, D. T. Milner (Darwen). (Egg 3 and 4): 1, K. P. Robinson (Stretford); 2, J. Lynch (Merseyside); 3, D. T. Milner (Darwen). (Live): 1, Mr. and Mrs. Marshall (Merseyside). **Pairs—(Guppies):** 1 and 2, J. T. Morris (Sandgrounders); 3, R. J. Stephens (Blackburn). (Livebearers): 1, J. and K. Corbett (Merseyside); 2, Mr. and Mrs. Redman (Blackpool); 3, R. I. Payne (Merseyside). **A.O.V. Tropical:** 1, Mr. and Mrs. Baldwin (Sandgrounders); 2 and 3, J. Roberts (Accrington). **Junior—(Livebearers):** 1, Miss J. Baldwin (Sandgrounders); 2, Miss M. Carter (St. Helens); 3, C. A. Daniels (Blackpool). (Egglayers): 1, Miss J. Baldwin (Sandgrounders); 2, Miss M. Carter (St. Helens); 3, A. M. Redman (Blackpool). **Coldwater—(Common Goldfish and Comets):** 1 and 3, A. Turner (Accrington); 2, C. A. Daniels (Blackpool). (Shubunkins): 1, J. Foote (Accrington); 2 and 3, S. Walsh (Accrington). (Fantails and Veiltails): 1 and 3, A. Turner (Accrington); 2, C. Wallbank (Accrington). (Lionheads and Orandas): 1, A. Turner (Accrington); 2, J. Lynch (Merseyside); 3, C. Wallbank (Accrington). (Moons): 1, D. T. Milner (Darwen); 2, P. A. Jones (Wrexham). (A.O.V. Goldwaters): 1, S. Walsh (Accrington); 2, Mr. and Mrs. Baldwin (Sandgrounders); 3, Mr. and Mrs. Hand (Accrington). **Mini-Tanks—(Mini):** 1 and 3, D. T. Milner (Darwen); 2, B. W. Carter (St. Helens). (Novelty Mini): 1, Mr. and Mrs. Redman (Blackpool); 2, D. T. Milner (Darwen); 3, A. M. Redman (Blackpool). **Marines:** 1 and 2, J. Garry (Blackburn).

## SCOTLAND



**Goldfish Society of Great Britain 1983 open show held at Davidson's Main Parish Church Hall, Edinburgh. Results: Bristol (type) Shubunkins (Upchurch Cup):** 1, Alex King; 2 and 3, Scott Wilson; 4, B. Cook. Bristol (type) Shubunkins (L. Emery Trophy): 1, 2 and 3, W. L. Wilson. Veiltail (Martin Show Trophy): 1, 2 and 4, Alex King; 3, Bill Cook. Globe Eye (R. H. Reed Cup): 1, J. E. Parker; 2, Mrs. Peckin; 3, S. Wilson. Bramblehead (Bramblehead Cup): 1, 2 and 3, S. Wilson; 4, J. E. Parker. Pearlscale (Pearlscale Cup): 1, B. Robertson; 2 and 3, A. Levan. Celestial (Celestial Cup): 1 and 3, T. McLean; 2, B. Robertson; 4, Mrs. M. Collett. Rabbit Eye (Harris and Sumax Trophy): 1, Alex King. Common Goldfish (W. Leach Trophy): 1 and 2, I. McDermid; 3, D. Peden; 4, Mrs. M. Collett. Comet: 1, A. Young; 2, G. Scott. Fantail (A. Sutton Trophy): 1, 2, 3 and 4, T. McLean. Oranda (Stacy Trophy): 1, S. Wilson; 2, A. Young; 3, G. Young; 4, J. E. Parker. Broadtail Moor (E. Kadwell Memorial Cup): 1, G. Beardsmore; G.S.G.E. Novice (S.P.A.S. Trophy): 1, D. Smith; 2, E. Lindsay. Open Novice (Novice Cup): 1, D. Smith; 2 and 4, E. Lindsay; 3, Mrs. M. Collett. Breeders Teams—Bristol (type) Shubunkins (Fleming Cup): 1, 2 and 3, A. King; 4, B. Cook. Veiltails (J. Leake Cup): 1 and 2, B. Cook. Brambleheads (H. Berger Cup): 1, J. E. Parker. Pearlscales (M. Chase Cup): 1 and 2, A. Levan. Fantails: 1, T. McLean. Broadtail Moors: 1, 2, 3 and 4, Bill Ramsden. Singetail Varieties (Loxley Cup): 1, 2, 3 and 4, A. King. Doubletail Varieties (Len Clements Trophy): 1, 2, 3 and 4, B. Ramsden. Doubleless Varieties (R. D. Binn Cup): 1, 2, 3 and 4, J. E. Parker. **Special awards:** Best Basic Variety (G. O'Neill Cup); A. King (Shubunkins). Best Popular Variety (Singetail) (Albeck Cup): I. McDermid (Common). Best Popular Variety (Doubletail) (Whorlton Tankard); S. Wilson (Oranda). Best Owner Bred Oranda (Sanary Fisheries Trophy); J. E. Parker. Best Owner Bred Metallic Veiltail (Metallic Twintail Cup); B. Cook. Best Basic Variety Breeder (J. C. Saunders Cup); A. King (Shubunkins). Best Popular Variety Twintail Breeder (Strachan Kerr Trophy); B. Ramsden (Broadtail Moors). Best Intermediate Breeder (J. Linde Cup); A. King. Best Junior Exhibitor: S. Wilson (Oranda). Best Breeder Team in Show (Tottenham Trophy); A. King. Best Owner Bred in Show (Robin Kerr Trophy); J. E. Parker (Oranda). Best in Show (Tottenham Trophy); and Apparit Gold Pin: S. Wilson (Oranda). Total entries 141.

## Dates for the diary

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

### OCTOBER

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

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

**2nd October: LEAMINGTON & DAS** open show at The Bulls Hall, George Street, Leamington Spa. Schedules from: C.W. Soodley, 29 Buckley Road, Lillington, Leamington Spa, Warwickshire.

**2nd October: NEWBURY D.A.S.** open show at Corn Exchange, Newbury. Details from R. Barrett, 38 Digby Road, Newbury, Berks RG13 1TS.

**2nd October A & D FISHKEEPERS** 3rd open show at the Hilllocks Social Services Centre, Sutton in Ashfield.

**9th October: EDINBURGH AQUARIUM AND PONDKEEPERS** are holding their 11th annual open show in the Craigroyston Community Centre, Edinburgh. Details from Alan Scott, P.O. 11 Rowan Street, Dunbar, East Lothian EH44 1PX.

**9th October: BETNAL GREEN & INDEPENDENT A.S.** 3rd open show will now be at Lansbury School, Flanders Road, East Ham, E.6. Booking from 12 midnight on Saturday 9th until 11.30 Sunday 9th October. Entries and show schedules from the Show Secretary, Mr. L. Turk, 9 Harbord Street, Tower Hamlets, London, E.1. Tel: 01-791 0965.

**9th October: HALIFAX A.S.** open show at Forest Cottage Community Centre, Cousin Lane, Ilkleyworth, Halifax. Schedules on request. S.A.C. please to David Shales, "Cobblers", Gains, King Cross, Halifax HX2 1DT, or ring for details 60116 Halifax.

**16th October: BEXLEYHEATH & DISTRICT A.S.** open show at Lessnesshath Primary School, Bexleydean, Kent. Further details from Show Secretary, John Rowney (Tel: 01-304 5758).

**16th October: BRACKNELL A.S.** open show at Peasewood Community Centre, Peasewood, Bracknell, Berkshire. Show Secretary: S. Barron. Bracknell 0344 504911. Assistant Show Secretary, C. Kaye (Bracknell 0344 53296).

**16th October: DONCASTER & DISTRICT A.S.** 12th open show, Don Valley High School, Cawley Lane, Scawthorpe, Doncaster. Details from D. King, 78 Almore Avenue, Cantley 1, Doncaster.

**16th October: HARTLEPOOL A.S.** 24th open show to be held at Longcar Hall, Seaton Carew, Hartlepool. Booking from 11.30 a.m. to 1.45 p.m. For further information please contact: Show Secretary, E. Williams, 103 Chester Road, Hartlepool. (Tel: 0429 62025) or Club Secretary, Mrs. E. Smith, 11 West Street, Blackhall Colliery. (Tel: Fenale 863911).

**22nd October: BRITISH MARINE AQUARISTS' ASSOCIATION** hold their AGM/Marine Seminar at Dewsbury Club and Institute, Ganes Street, Dewsbury, commencing at 10.30 a.m. Guest speakers include Mr. Richard Sankey and Mr. Graham Lundgaard. For further detail write to Mr. S. Preston, 16 Fountain Drive, Roberttown, Liversedge, West Yorkshire, WF15 7PX, enclosing a s.a.s.

**22nd October: EAST LONDON AQUARIST AND PONDKEEPERS ASSOCIATION** 35th annual open Breeder's Show at the Catterall Hall, Cecil Road, Chadwell Heath, Essex. Further details are available from Show Secretary Mr. M. Howells, 30 Kingfishers Road, Goodmayes, Essex. (Tel: 01-590 1824).

**22nd October: NORTHERN COLDWATER FISH & PONDKEEPERS SOCIETY** open show at St. Mark's Mission, Goswetter Terrace, Newcastle upon Tyne. Details from J. English, The Cottage, Henderson Filters, Throckley, Newcastle upon Tyne.