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JANUARY 1988

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Photograph by John Dawes
The Asian Arowana (*Scleropages formosus*) is a magnificent fish which can grow up to around 90cm (c 36in) with a reported weight of about 7.2 Kg (c 16 lb). The vast majority of specimens are basically silvery (but golden and rarer red specimens also exist). Over-exploitation has resulted in trade being banned. Fortunately, successful commercial breeding in the Far East could result in the lifting of the ban in a few years' time, once three full generations have been bred in captivity and numbers are sufficiently high to ensure the survival of the species.

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Seaview

by Gordon Kay



What a thrill! When John (Dawes) first rang me with the idea for this page, asking if I would like to do it, I couldn't believe it. The chance to write a regular feature, with carte blanche to bring into it anything, so long as it was marine-based — well, I nearly jumped down the phone at him!

Seaview will be just that. My thoughts on all the multitudinous aspects of marine life — from conservation to aquatics, I will be reporting on anything new which I feel will be of interest, plus anything else I come across which might educate us all in some small way, with a paragraph or two on a few different topics every time — and a few 'snippets' to end every page.

If **Seaview** gets you thinking, or better still, talking, then I'll be delighted. If this developed into a kind of 'Discussion Page', with you writing in with your thoughts (or snippets of your own) that would be even better. The most important thing, however, is that **Seaview** should be fun!

Tropical Trans-sexuals

To some coralline families, sex changes are a way of life, and **hermaphroditism** — when both male and female tissues exist in the same individual — is common. Within different species, we may find all of the individuals being born male — with some or all of them changing to females as they grow older, while in other species we find the reverse situation. To complicate matters further, other species have

primary males (born male) and secondary males (those changed from females) in their ranks. When all individuals are born male we know this as **protandry**, with **protogyny** being the term when individuals are born exclusively female. Once the sex change has occurred, it is irreversible, but sometimes both ovaries and testes function in the same individual, although self-fertilisation is rare. This is known as **Functional, or Synchronous Hermaphroditism**.

One famous example of **Sequential Protogynous Hermaphroditism** is the Cleaner Wrasse — *Labroides dimidiatus*. These fish live in harems of a dozen or so females to one male. If the male were to be removed or killed, the most dominant female would change sex and take on his role. Physical changes start almost at once and she will be a fully functional male within a day or two. Only female Cleaners are born and all have this potential to change — this being kept in check by male domination. The Clownfishes represent the best-known example of **Sequential Protandrous Hermaphroditism**, with all fish being born male, while in some Groupers, **Functional, or Synchronous Hermaphroditism**, is quite common.

Heating

We are all aware that coralline fish have little or no ability to adapt to fluctuating conditions because the coral reef is one of the most stable environments on earth, and so they have no need to evolve any "fluctuation tolerance". Should conditions not be to their liking, they can just swim away until things return to normal.

We need to keep conditions in our aquarium as stable as possible if we are to succeed and temperature is no less important than any other water quality parameter.

Aquarium Systems of America have recently launched the **Visitherm** — a heater made specifically for seawater aquariums. Superb quality can be taken for granted with products from this company, and all components used are designed to withstand the harsh treatment the heater will get in a

marine environment. The temperature setting is easily read on a large, clear scale on the side of the unit and the control knob is large enough for anyone to use without any fuss. Most important, though, is the fact that the thermostat is sensitive to fluctuations of less than 2 degrees. At less than £15, the **Visitherm** is a golden investment next time you buy an aquarium heater.

Snippets (Fascinating Facts For Your Amusement)

1. DID you know that corals actually fight? They engage in rather long, drawn-out battles for living space on a reef, and a coral will always pick on a weaker species or individual (how does it tell?). The battle involves the victor sending out special tentacles which enable it to suck up the insides of its opponent, leaving just a bare "skeleton". It takes about three days for the winner to gain space and a meal.

2. A lot of nudibranch species have the ability to eat anemones and other coelenterates and extract the stinging cells from them to use later as defence against would-be predators. This is just one way that nudibranchs defend themselves now that they do not have the traditional mollusc shell (nudibranchs are molluscs). The two major groups of nudibranch are the Dorids (which feed on sponges and sea-squirrels) and the Aeolids, which are the coelenterate feeders. These Aeolids are the sea-slugs with the longish tubular projections on their backs, called cerata. At the end of these cerata is a small sac in which the stinging cells are stored. Could this poison be the reason that some nudibranchs have such wonderful colours — to warn off anything that's about to eat them?

3. **ANEMONES** without adequate lighting and active zooxanthellae, or sufficient external food supplies, will slowly consume their own insides. They start to utilise their lipid reserves. Lipids are fat deposits for storing energy.

4. **THE** Australian name for

Cardinalfishes is 'Gobbleguts'!

5. A tea-cup sized sponge will pump about 5000 litres of water through it's body EVERY DAY.

6. **SPEAKING** of mega-gallons, it would take 10,000 pumps — each with a turnover of 450 million litres of water a day — **ONE MILLION YEARS** to pass the total amount of water in the world's oceans once — phew!

7. **THE** plankton drifting under one hectare of coastal water weighs more than one hectare of fully grown potatoes.

Dealers' Dilemma

It is not uncommon for hobbyists to moan about dealers — about the service they provide and the prices they charge. The thing is, though, that we expect perfect dealers, but are we perfect customers? I think not!

Far too often, people pay several visits to their local dealer, talking to him or her and picking his or her brains about how to set up their new tank, what fish to put with which etc. They then go elsewhere to buy their set-up for £10 less. Likewise, some people buy their new power filter from a discount house and then take it to their corner shop for instructions (or worse still, when it goes wrong!) or they may visit their local dealer just to buy a 50p portion of brine shrimp every now and then, while spending the real money here, there and everywhere, but expecting their dealer to help them out in times of trouble.

Can you put your hand on your heart and say you've never been guilty of such things? We should all consider that time is money and a dealer should be able to expect money in the till in return for an investment of precious time. No retailer ever made any real money by selling just fish — it's stuff like power filters and aquariums that generate profit, and without profits, a dealer goes out of business. Where do we buy fish then?

The moral has to be — **find a good dealer and stick with him or her**. Bad dealers don't deserve to stay in business, but good dealers are the lifeblood of our hobby ... and deserve our support.

**FOCUS ON
WATER QUALITY**

PRODUCT ROUND-UP

By Dick Mills

pH AND HARDNESS TEST KITS

Elsewhere in this issue, the two good Doctors (Ford and Pool) will enlighten you into the not too mysterious ways of water quality and its necessary maintenance. Here, we concentrate on two necessary items to evaluate such conditions, the pH and Hardness Test Kits.

When considering buying the various test kits available, although you only get what you pay for (generally the more expensive equipment is more accurate), the actual cost per test may be lower by investing in a larger initial outlay.

Is absolute accuracy necessary? As the whole point of testing is made on a comparative basis (eg, where changes of condition are the important factor) results obtained from inexpensive equipment, although not accurate to a minutely-exact degree, will generally suffice, as long as tests are made under similar conditions (same time of day, same water temperature, etc).

pH TEST KITS

The pH of water is a logarithmic measure of how acid or alkaline it is (usually, around a fairly narrow range, 6.5-7.5 being the normal extremes in freshwater aquariums, around 'as stable as you can get' — 8.3 in marine tanks where pH measurement is a vital test to assess the ageing process of the water).

Generally, pH kits are based on a simple colour change comparison occurring in a sample of the aquarium water to be tested. Kits range from the inexpensive sensitised paper strips, through more accurate dry and liquid indicators and colour wheel comparators (which also take into consideration the colour of the sample water too) to top of the range



Above, the Laborett from Tetra is an example of the range of "multiple" kits currently being offered by several companies.



Left, the Hanna Redox Potential meter in operation.

electronic meters. Whatever the sophistication of the test kit you use, it is very important to use the correct test kit, i.e. for freshwater or marine use.

Aquamagic Ltd (Tunze Products)

Two electronic pH meters ready for instant use. Analogue model 7046 (moving needle display) pH range 4-10; includes buffers for calibration. Digital model 7052 (LCD display) pH range 1-14. Highly accurate but correspondingly expensive.

Hanna Instruments

Electronic 'dip in' type. Freshwater and marine use. Also available in combined unit with Redox Potential Tester (see NEW PRODUCTS).

Instant Ocean

SeaTest Marine Kits: uses dry, pre-packed individual-dose indicator reagents.

King British

KB12 pH Test Kit. Also available KB1 Acidity Adjuster, KB11 Alkalinity Adjuster.

New Technology Products

Two ranges, one for freshwater, one for marine use: each kit contains relevant pH adjuster — the freshwater kit provides a downward adjuster, the marine an upward adjuster. Accurate screen printing ensures that there is correct colour comparison chart.

Technical Aquatic Products

Based on the AquaMerck range of test kits. Two pH ranges 5.00-9.00 for freshwater: 7.1-8.9 for marine. Approximately 200 tests per kit means low cost per individual test.

Tetra

Two ranges for freshwater and marine use. Colour comparison by colour chart or using 'Colour Wheels' in association with Laborett complete range of water Test Kits.

Waterlife Products

Two ranges. Saltwater: narrow range (7.2-8.5). Freshwater broad range (4-10) with different clear colour changes at each cardinal point (each kit contains free pot of acid and alkaline buffer).

HARDNESS TEST KITS

Like pH test kits, these are also based on observing a colour change occurring. Most are liquid based, although there is a 'dry' type which uses pre-packed sachets of reagents for added accuracy. Kits may differentiate between General and Carbonate Hardnesses and usually give the final reading in European units, ie °GH (General Hardness) or °KH (Carbonate hardness). Hardness due to non-carbonates is then calculated by the simple equation, °NKH = °GH - °KH.

Aquamagic Ltd (Tunze Products)

Electronic Conductivity meters. Analogue model 7005 measures salt content in freshwater. Digital model 7030 has larger range, measures salt in solution in freshwater and marine.

Hanna Instruments

Electronic 'dip in' type. Measures Dissolved Solids. Freshwater only (see NEW PRODUCTS).

New Technology Products

Two ranges. Total Hardness and Carbonate Hardness.

Technical Aquatic Products
Two ranges: Total Hardness and Carbonate Hardness. 50 tests per kit.

Tetra

Two ranges: General Hardness and Carbonate Hardness.

Instant Ocean, Technical Aquatic Products and Tetra also supply "multiple-test" kits which allow a wide range of tests to be carried out — eg. Ammonia, pH, Hardness, Nitrite, Nitrate, Oxygen, Iron and others.

Finally, don't be intimidated into buying or using these kits until you clearly understand their purpose; while you cannot cause damage by carrying out the tests (which are all done outside the aquarium), the knowledge that the results provide can panic beginners into over-treating the water for the best of intentions, only too often ending with the direct consequences. As with all good aquarium practice, remember, make any adjustments s-l-o-w-l-y.

NEW PRODUCTS

HANNA

The HANNA range of Electronic meters includes four different types, all of which may be of use to the aquarist. Based around a pocket-sized 142 x 29 x 15mm common unit body, they are elegant to look at and very easy to use. They are all powered by replaceable, four 1.4v camera-type batteries, have LCD readouts, a non-locking ON/OFF switch and a pull-off bottom cover which exposes the relevant measuring probes. Working life for most of them is around 1000 hours and each can be re-calibrated if necessary by immersion in a liquid (whose particular characteristic is known) and adjusting a trimming device with a small screwdriver.

The EITH Electronic Thermometer hardly requires any description, except to say that it is necessary to screw in the 130mm measuring probe before use. Models are available in Fahrenheit and Celsius modes.

The pHep measures pH in both freshwater and marine situations, covering the whole pH range (0-14).

The ORP unit measures the Redox Potential of the water, that is, its ability to allow reduction or oxidation processes to occur. For marine use only, some care must be taken in using this unit: only water from established, matured tanks can be measured, and the test sample of water should be taken from 2 to 3 inches above the bottom of the tank and allowed to become static in a suitable container before measurement occurs. A reading of between 100 and 350 is typical of good 'oxidising' conditions, whereas a negative reading indicates 'reducing' conditions.

The DIST unit measures Dissolved Solids and is suitable for freshwater only. A reading of between 37-40 is normal but allowances must be made for the initial dissolved solid content of the water to begin with. Some tapwaters indicate 80+

before you start!

The results from the more 'sophisticated' units should only be evaluated in consideration with other parameters as many are inter-related to, say, temperature and pH.

Each of the above Units costs £45.00: a Combined Unit — pH, Thermometer (°C) and Redox Potential — is available for marine and freshwater use at £230.00 and the necessary Redox probe will add £65.00 more. A Dissolved Oxygen unit for marine and freshwater use costs £230.00 including probe.

All are available from good retailers or from LAHAINA TROPICAL AQUARIUMS, School Lane, Udimore, East Sussex TN31 6AT (Tel: (0797) 224237) who will be glad to send details (dealers apply for terms).

ADDITIONS TO TECHNICAL AQUATIC PRODUCTS RANGE

Technical Aquatic Products have extended their comprehensive range of Water Test Kits with the release of Iron and Phosphate Testing Kits. Details from Technical Aquatic Products, Avonmouth, Bristol (Tel: (0272) 692345).

FRITZ-ZYME 9

The process of maturing a newly set up marine aquarium can be hastened along quite remarkably with FRITZ-ZYME 9. To give you some idea of the concentration of naturally-occurring and essential nitrifying bacteria, each ounce of solution contains over a million of them! So efficient is this are doing the job of reducing ammonia and nitrite levels below the toxic levels that a 'load' of fish at the rate of half-inch body length per gallon can be introduced immediately, with a gradual subsequent build up to full load.

Controlled tests using three 20-gallon set-ups were used, two had air-operated under-gravel filters and one used an external canister power filter only. The same salt-mix was used and all were kept at the same temperatures. FRITZ-ZYME 9 was added to all three at the rate of 8 ounces (235 ml) per 10 gallons. Fish were added

at the above rate and then after seven days a further similar dosage of FRITZ-ZYME 9 was given.

The tests were carried out under less than favourable conditions — no water changes were made, minimum filtration was used, overfeeding was deliberately introduced and even the choice of fish was hardly the usual 'nitrite-tolerant' Damsel-fishes, as in addition to Yellow-tailed Damsel (*Pomacentrus melanochir*), Blue and Yellow Devil (*Abudefduf elizabethae*), Percula Clown (*Amphiprion percula*) there were also a Raccoon Butterflyfish (*Chaetodon lunula*) and a Coral Beauty Angelfish (*Centropyge bispinosa*). As the product worked well under these exaggerated conditions it should perform even better when used in properly-managed aquariums.

Daily checks were made and showed that an immediate sharp increase in ammonia (which peaked out within 24 hours) declined equally sharply over a similar period. Nitrite peaked more slowly (48 hours) and its decline, although slower than ammonia, nevertheless fell quicker than expected. Nitrates were tested for, but these tests were primarily concerned with the ammonia/nitrite levels found to be more hazardous in newly set up tanks.

FRITZ-ZYME 9 is apparently a two-state formula — the one for ammonia seems to be longer lasting than that for nitrite control which may both deteriorate with age and be sensitive to extremes of temperature (an unlikely occurrence). Shelf life is around six months and the product should be used within this period. Storage in cool, non-direct sunlight conditions are best and temperatures should be between 32°F and 120°F. The solution may change colour to light grey or even black over the period of storage but this is normal and, like the presence of any bad odour, does not indicate the liquid has lost any of its effectiveness.

The above review was adapted from a Product Test by Don Smith, which first appeared in FRESHWATER AND MARINE AQUARIUM magazine, and appears with the Publisher's permission courtesy of EXOTIC FISH PRODUCTS, 135 High Road, New Southgate, London N11 1PP. (Tel: 01 361 2782)

NAN, YOU'RE AN ANOMALY

A new year . . . and a new fish. But, as Amanda Grimes found, her *Nannacara anomala* were certainly anomalous!

A new year and a new fish — that was the story several years ago, when I ended my search for a different dwarf cichlid to breed. *Nannacara anomala* — the Golden-Eyed Dwarf Cichlid we had finally tracked down. Just one — a male — but with the promise of further supplies.

He was one of the most unprepossessing fish I have ever seen — small and dull-coloured, with nothing much to recommend him save the possibility of at last witnessing the famous cichlid 'brood care' at which these fish are said to excel. They are also reported as being so easy to breed that the absolute beginner can take them on. Those who know my record will be rubbing their hands with glee by now . . .

The male was introduced to one of the community tanks and left to settle in. There were no other cichlids present to harass him and he painstakingly investigated every cave and corner of the tank, feeding well and displaying, when startled, the most glorious colours I have yet to see in any cichlid other than *Kribia* and some of the *Aputogranosa* males. His drab overcoat at times revealed a peacock-like sheen of turquoise brilliance.

Within a week, he was in trouble. Several white spots had appeared on his scales and his appetite was dwindling. We investigated further. Examination of the other fish ruled out White Spot and the male was transferred with eight gallons of his water to a two-foot isolation tank. After the standard salt-bath treatment, we studied the disease sections of our books.

The closest we came to his symptoms was Lymphocystis and the bad news that no effective treatment was known. The one hope was that he might be one of those fish in whom spontaneous remission had occurred after several months. And there are always new medications on the market.

Over the next few months, he was subjected to doses of all the medications we could find. He attained an air of importance, having his exclusive tank further specialised by the outside addition of a checklist of drugs used, in what quantity and frequency. Between these medicinal experiments, we cleared the water with the introduction of a charcoal filter and water changes.

Whether one of the medications worked or the remission finally took effect, I'll never know; but during those long months he became a very special fish to us and, by his tenacious grip on life, earned the name 'Scrapper'. A clumsy name, you might think, but one which he lived up to as soon as he was restored to the community tank — and we introduced a female.

This demure lady was lowered into the water and left in her transit bag as usual for about 15 minutes. Scrapper was there like a shot, almost pop-eyed with excitement, twisting this way and that in his emerald glad-rags. He followed her slavishly around for days, cutting round the back of flowerpots to glide out in front of her casually in such a display of narcissism it was little wonder she took to ignoring him.

Our attention wandered to other things and it wasn't until quite a while later that we realised they were both intent on cleaning a coconut shell. Breeding was obviously imminent and we set up a two-foot tank, complete with plant and the favoured coconut. As an extra incentive, we divided this tank down the middle with a pane of glass, held in place by suckers, and installed the female and coconut in one side and Scrapper in the other. The glass partition worked and they both spent most of their time up against the glass, displaying and carrying on something chronic.

The glass curtain was duly raised and we were treated to one of the funniest, most energetic and muddled courtships we have ever seen among fish — a courtship that ended in near disaster . . .

As soon as the glass was removed, the female — now nicknamed 'Nan' — retreated to the coconut shell . . . and stayed there . . . for hours. Scrapper stationed himself outside and danced. John Travolta, eat your heart out. Could that fish dance! Words cannot describe the fluidity, variety and sheer energy of his movements. We invited friends over to watch! Still no sign of the female — for all I know she was reading a book in there. And the longer she stayed in there, the more Scrapper danced. I could say that you would have to see it for yourselves to understand my enthusiasm

and admiration for this game little fish but I would have to add that I have kept another male *Nannacara* and his display was more a Military Two-Step than the Galloping Major Scrapper achieved. He was a one-off . . .

Nan had entered the coconut shell in a suspiciously rounded state and when she finally emerged she was thin again. We waited for Scrapper to oblige by fertilising the eggs that were obviously in the shell, but though his dancing showed him ready for fatherhood, Nan's attitude left a lot to be desired. She just wouldn't let him in the coconut. I introduced some live food into the far end of the tank, to entice her away and Scrapper dived in.

He emerged quickly from the shell, grabbed Nan by the mouth and threw her round and round the tank. Not knowing much about their courtship ritual, we thought maybe this was just a final act in their parenthood and didn't attach much importance to it, particularly as our books told us that the female would see the male off as soon as the eggs were fertilised.

But our anxiety grew as Nan and Scrapper — the male the more aggressive — hauled each other around the tank until, exhausted, they lay on the gravel. At this point, we intervened, transferring Scrapper to the community tank and leaving Nan to raise her brood and recover her equanimity.

She ignored the coconut and spent all her time feeding. After two weeks we investigated the coconut — fungused eggs.

That, of course, is not the end of the story, which I shall be continuing in my next feature. But if I have discovered anything about this fish, it is that, however inadvertently, it is aptly named. Nan, if anything is written that can adequately sum you up, it is that you are an anomaly . . .

A 'normal' pair of *Nannacara anomala* — not quite like Scrapper and Nan!



FOCUS ON WATER QUALITY

WATER IS H₂O — Plus

Despite its deceptively simple chemical formula, water is a remarkable compound, as this fascinating insight by Dr David Ford of 'Aquarian' into nature's "universal solvent" reveals.

Water is an unbelievably complicated liquid (that is why it is called H₂O *plus* in the title). Liquids normally become denser as they get colder, until they solidify . . . from the bottom up. Water, however, is at its most dense at 4°C and then begins expanding again. Hence ice forms on the surface, not the bottom.

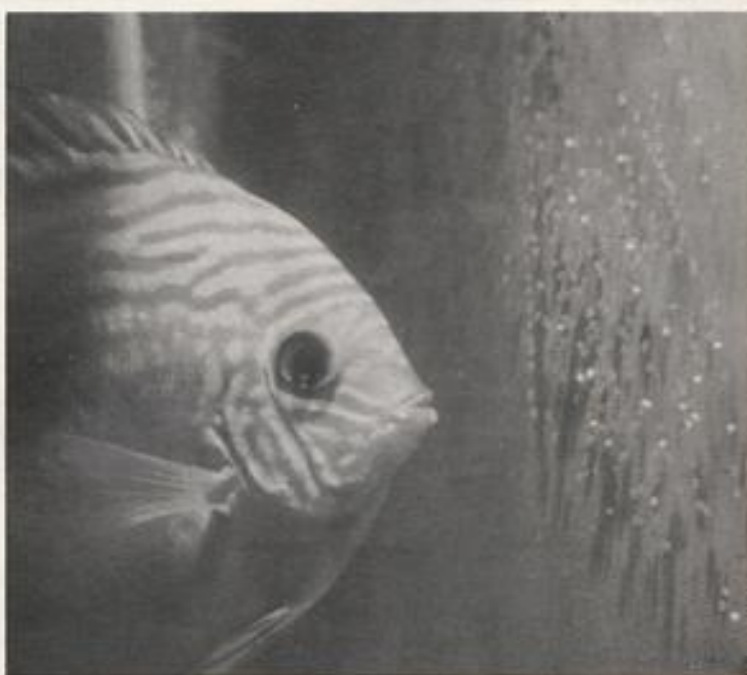
Were it not for this peculiarity, life itself could not have developed on earth (or at least life as we know it). Certainly no fishes.

Pure water is almost impossible to obtain because it is the universal solvent. It dissolves everything, perhaps only tiny amounts, but **everything**, including the container the 'pure' water is placed within.

In the 1960's the Russians discovered "polywater" a new kind of ultra-purified water with different melting and boiling points to the expected 0°C and 100°C. This caused great excitement in the scientific world and many a research student wasted valuable hours trying to study polywater. Eventually it was proved that chemicals dissolved from the container housing the purified water were the cause of the change in properties!

If you want to collect a sample of your aquarium or pond water for analysis, remember the Russians' error. The common glass bottles (for "pop" or milk) are made from sodaglass, from which water can extract within a few hours, sufficient sodium, calcium and silicate to alter these values on analysis. Furthermore, it alters the water pH — a value often required by aquarists. Borosilicate glass (e.g. Pyrex) is better, but very expensive. Polyethylene (Polythene) is ideal, being light, unbreakable and non-contaminating. It is important to remove every last trace of the previous contents of the polybottle. Trace sugars from soft drinks can give an indication of pollution where perhaps it does not exist.

Some aquarium and most pond waters will contain algae. Under the influence of light, these algae will continue biological processes that alter the chemical content of the sample. After a few hours of daylight, for example, a positive nitrite reading can be obtained, whereas the problem probably doesn't occur in the aquarium or pond. Hence, place the sample in the dark (wrap-



Above, in good water, Discus will spawn regularly . . . so different to the other Discus photograph accompanying this article. (See page 13)

Right, this Snakeskin Gourami (*Trichogaster pectoralis*), is suffering from Pop-eye or Exophthalmia, a condition often associated with poor water quality.



ping in polyfoam is effective) immediately after collection.

For long term storage, the (partly filled, to allow for the expansion mentioned above) polybottle can be deep frozen. This method may show a slightly altered hardness value since high levels of calcium are precipitated by the freeze/thaw process, but freezing is excellent for dissolved gases analysis (oxygen and carbon dioxide usually).

The Aquarist's Four Waters

Fish alter the water in which they live. In fact, water isolated from nature, in aquaria or ponds, exists in four types: new, aged, conditioned and polluted.

Aged is not the same as **conditioned**. A good biofilter will soon convert new water (pure from the tap, well or rain collection — well, fairly pure anyway!) into **aged** water when biological material is added. This need not be fish. For example, flaked food can be sprinkled daily into a bare tank to start the "Nitrogen Cycle" going. Bacteria in the filter convert the ammonia, ammonium, nitrite and other more complex molecules (all nitrogen-containing, hence the cycle's name) into nitrate via an oxidation process. Once this cycle is underway, the poisonous ammonia and nitrites disappear because the bacteria oxidise them faster than they form: the "new" water is then "aged" and safe for addition of fishes.

Fish can alter the **aged** water to **condition** it for their own well-being. They do this via pheromones, which are much the same as hormones, but excreted into the environment rather than part of their internal metabolism. No chemist has yet isolated these pheromones (not for want of trying), but it is simple to demonstrate that they are there. If the water from a **conditioned** tank is pumped into another tank with only **aged** water, a growth phase can be triggered in otherwise stable fish, or pairs will suddenly start spawning.

Overdo the feeding, crowd the tank or neglect maintenance, and then the fourth type of water, **polluted**, will stress the fish. In an effort to protect themselves, fish will excrete excess mucus (often called Velvet or Slime Disease). Surplus mucus may become infested and Fungus will grow (Cottonwood Disease). The gills also become coated and appear pale pink or even white (Gill Disease); the fish then becomes starved of oxygen. Such fish can be seen gulping air at the water surface.

Excess bacteria can grow in **polluted** water reducing the oxygen level and any pathogenic strains will affect the fish, giving Fin Rot, Body Rot, Septicaemia, or the fish cannot cope with the water it absorbs, giving "Pop-eye" or "Dropsy". One can see from this list of so-called "diseases", that many problems are not within the fish — they were quite happy and healthy — but in the water quality. There's no point in treating a "sick" fish when it's the water that's at fault.

Chemical Complexity

There are hobby kits available for aquarists to monitor some aspects of their water



This Discus is in very bad shape. Not only does it have problems with its lateral organ but (not clearly visible in the photo), it is also suffering from Hole-in-the-Head. Both conditions were triggered by poor water conditions.

chemistry. Only use these as a guide rather than an analysis of total conditions.

The true chemistry of water is much more complex than many people realise. For example — did you know that pH is only half the story? pH is a measure of the "proton" content of a liquid and is actually $-\log(H^+)$. For every proton there is an "electron" and the value of these is given by $pe = -\log(e)$ (note Greek epsilon — ϵ) and, just as pH value is related to acidity and alkalinity, so pe is related to oxidising or reducing conditions. The balance between these states is called the redox potential. Water in balance with atmospheric oxygen and at the normal aquarium values of pH7 and 25°C, has a pe value of 13.6. At this value the redox potential is strongly in the oxidation state, so elements dissolved in the water are usually present in their highest oxide. For example, carbon is carbon dioxide CO_2 , nitrogen is nitrate NO_3 , sulphur is sulphate SO_4^{2-} , iron is the ferrate Fe_2O_3 and so on.

Water in such a finely balanced chemical state is affected by addition of biological material because it alters the redox potential. Fish are simply "biological material" if viewed from a chemical viewpoint. Hence the very presence of the fish and the life forces they bring alters the pe and dramatic shifts in oxidative states occur, whereas your pH measurement may reveal no changes at all.

Nitrates can become nitrites and ammonium, even ammonia, sulphates can become sulphites (obvious from the foul odour aquaria can develop). So fish living in aged water affect that water in positive (pheromones) and negative (changes in pe) ways.

Dissolved Salts

Salt is the chemical name for a whole range of stable compounds such as calcium sulphate, magnesium carbonate, sodium phosphate, etc. To be a "Salt" a compound has to be the product of mixing an acid and an alkali giving a neutral salt. Mix strongly alkaline sodium hydroxide (caustic) and strongly acid hydrochloric acid, and one

gets neutral sodium chloride — just another salt, but adopted by the culinary world as the proper name for Common, Rock or Cooking Salt. Using the correct chemical term, salts are found in all waters that fish live in, from the melting snow streams to the deepest ocean. The amount varies enormously; spring water may have only a few parts per million salts; seawater is 3.0 to 3.4% salts.

Salts also occur in fishes' tissues and are an essential part of their metabolism. As such, the levels of the various elements that make up these salts have to be held within rigid limits. The external salts, however, can vary enormously. (Especially where hobbyists add spoonfuls of Common Salt to their freshwater tanks!)

This presents the fish with a balancing problem because of the effect called "OSMOSIS". Salts try to make their concentrations equal by moving water across semipermeable membranes (skin — scales). Hence, freshwater fish are absorbing water all the while, whereas saltwater fish are losing water all the while. To compensate, fish have "osmoregulation", a process where unwanted salts are excreted — or retained. Many saltwater fish have a Rectal Gland, a special organ attached to the Cloaca (anus) for concentrating and excreting salts. The mucus layer in saltwater fish is also filled with salts excreted via special skin cells. The gills also have these cells (but not exclusively, as some works on fish physiology indicate — the bulk of the salts are excreted from the skin and cloaca).

Freshwater fish have the problem in reverse; water is absorbed, diluting the salts in their bodies, so this water needs to be excreted (copiously and continuously via the kidney) and the body salts retained. Powerful muscles in the "throat" allow food to be swallowed without any water entering. A seawater fish, however, drinks its seawater: Blennies, *Blennius pholis*, for example, ingest 60 mls of seawater every hour per kg of total fish weight! This is why polluted seawater kills marines in a few hours, but freshwater fish can withstand toxins for days or weeks.

Water Quality

Obviously, water is a very complex substance and has a life or death role for fish. Never put fish in **new** water, always use **aged** or, preferably, **conditioned** water. This means the aquarist who leaves his/her tank until it is **polluted** and then throws all the water away, scrubbing and cleaning the tank and its decorations until all is sparkling and clean, is rapidly killing the fish. On the other hand, the aquarist who boasts of never having to change the water ("I only top up evaporation losses") is slowly killing his/her fish.

Dilution is the key to water quality. Remove a portion (never more than 50%) regularly, to maintain the conditioned state. Weekly is best, but certainly within the month. Saltwater too, although cost may limit the amount, but every little helps such a lot.

Look after the water and the fish will look after themselves!

THE BIRTH OF THE MARINE HOBBY

Graham Cox of Waterlife Research Ltd. delves into the origins of the hobby and uncovers a fascinating advertisement among the pages of the earliest known publication on marine aquaria.

The hobby of keeping living marine creatures in home aquaria appears to have begun in Britain in the mid-19th century. The great publicist of this new hobby was Philip Henry Gosse, a distinguished English naturalist and Fellow of the Royal Society.

In 1856, Gosse published a revolutionary book entitled "A HANDBOOK TO THE MARINE AQUARIUM". I have obtained a photocopy of this, the earliest known publication in any language dealing with the science and art of marine aquarium keeping, and extremely fascinating reading it makes.

Within the book is a four-page advertisement placed by Mr W. Alford Lloyd who, trading out of a double shop premises in the very exclusive Portland Road, near Regent's Park, London, must surely go down in history as the World's first marine aquatic trader.

Lloyd's advertisement shows that, in 1856, he was supplying aquarium tanks, real seawater (six pence a gallon!) a wide variety of North Sea small fishes, invertebrates and algae, microscopes, hard lenses and shallow, all-glass pans.

For the then princely sum of £21-5 shillings, he could supply an all-glass, moulded aquarium measuring 6 feet long by 2 feet wide by 2½ feet vertical depth. To put the costs of such an aquarium tank in perspective, one has to realise that in 1856 the average Londoner's wage was one pound fourteen shillings! It would thus take exactly 12½ weeks' wages to purchase this empty tank, i.e. before any ancillary equipment or creatures were purchased.

The smallest tank in Lloyd's shop measured 1 foot 4 inches long by 9½ inches wide by 9 inches vertical depth, i.e. 5 Imperial gallons (about 23 litres) capacity, and cost exactly £1.00 — or nearly 60% of a week's wages.

It would appear from the advertisement that Lloyd's biggest seller in the way of tanks was a glass-fronted wooden tank internally lined with Welsh slate on the bottom, ends and back, and fitted on wooden legs to give a normal table viewing height. Each of the tank's legs was fitted

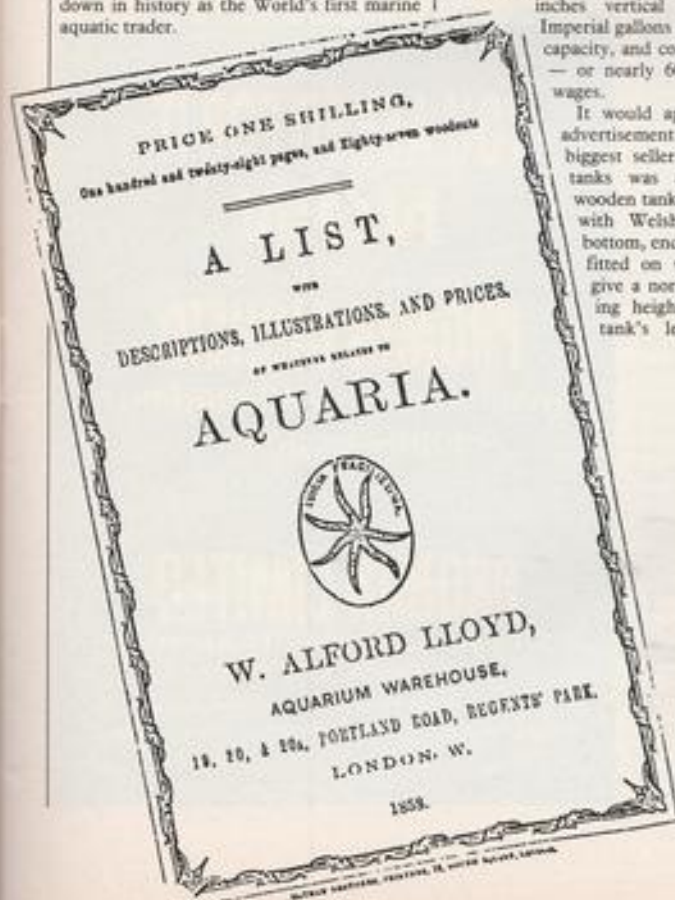
with castor wheels to facilitate moving the tank from room to room — an astonishingly early forerunner of today's furniture aquaria on sale all over Europe.

I feel that Lloyd's opening pre-amble to his 1856 advertisement is so interesting that I quote it here in its entirety — random capital letters and all!

"MR W. ALFORD LLOYD begs to announce that he has made very extensive arrangements for the sale of Living Marine Animals, Sea-Weeds, Tanks and all other accessories for the study of Aquaria Natural History.

MR. LLOYD ordinarily keeps a stock of fifteen thousand specimens, comprising two hundred genera, acclimated in fifty large plate-glass tanks, aggregating more than a thousand gallons of sea water. The peculiarity which distinguishes this collection above that which any other single spot can furnish, and which renders it an object of attention not only to the amateur and student residing in London and in other inland places, but also to naturalists living at distant parts of the coast, is, that it is the result of an organised body of gatherers, posted at intervals in the richest localities, and thus our Marine Fauna and Flora are very adequately represented, as to variety, in the Metropolis, and may be had from thence much more advantageously than from the coast direct, in as much as the specimens are selected with the special view of their respective capabilities of enduring confinement. Arrangements with foreign correspondents are also in course of progress. The most delicate organisations may be sent by rail or by post with perfect safety.

The "(BRITISH)" discovery of a mode of making Artificial Sea-Water gives large facilities for the successful prosecution of the study "(my emphasis)". Much time, therefore, has been spent in assimilating it to the condition of the actual water of the ocean, so that it is offered as an analytically correct compound, which thoroughly answers every purpose, and which improves in good qualities the longer it is kept in use unchanged. Thus the permanent maintenance of a collection of Living Marine Animals and Algae is rendered a far more easily attainable matter than even the domestic culture of flowers. To render this yet more practicable in the hands of inexperienced persons, MR LLOYD makes it a point to keep in stock great numbers of small portable Aquaria ready stocked, and with the balance of existence properly adjusted.



Front cover of Lloyd's 1858 catalogue which ran to no less than 128 pages and contained 87 woodcuts!

Although from their nature the inhabitants of the ocean have a greater interest than Fresh-Water collections, the latter are duly provided and are stocked with appropriate inhabitants, both vertebrate and invertebrate, many of them with a view of more accurately observing the habits of these creatures which have hitherto been only imperfectly preserved in cabinets, or which, from their perishable nature, cannot be preserved at all, except in a living state. Various arrangements have also been adopted so as to combine the Aquarium with methods of growing Ferns, Mosses, Lichens, etc., and to fit them for the study of the habits, embryology, and development of Semi-Aquatics, both animal and vegetable. A list of this department is in preparation.

The Tanks are constructed exclusively by the eminent firm (for whom MR LLOYD is sole Agent) of SANDERS and WOOLCOTT, Makers of the Zoological Societies of London and Ireland, to his Grace the Duke of Devonshire; to the Right Hon. Sir Robert Peel; and to various public and private collections throughout the Kingdom. As at present improved, these are not merely vessels for the reception of Plants and Animals, devised without reference to a purpose; for a long series of observations on the scientific requirements demanded of them, has so perfected them, that they very accurately imitate natural conditions by attention being paid to the direction, intensity and colour of the light employed by the furnishing of various depths and densities of the water, by the regulation of

THE BIRTH OF THE MARINE HOBBY

the temperature, and by the arrangement of the whole for special purposes. Nor has external decoration been neglected. As complete and independent pieces of furniture, many are made of ornamental woods, are mounted at table-height, and are placed on castors, for the facility of being easily moved when full to any part of the room or house, as the aspect of the sun or the time of the year may demand.

The wants of Microscopists are met by the preservation, for the use of that class of observers, of such organisms (both living and dead) as are not otherwise easily attainable.

To render MR LLOYD'S establishment as complete as possible, the literary portion of the subject has received prominent notice, and all the Books and Periodicals in any way allied to it, are recognised as forming a portion of the stock, and are laid upon the tables for the use of visitors, and for purposes of sale.

*Students of English history will remember that Sir Robert Peel was the organiser of Britain's first full-time national police force. Indeed, policemen are still known as "BOBBIES" to this day in many parts of England.

By 1858 Lloyd was still prospering, having taken a third shop unit, No20A, to merge with the Nos 19 and 20 Portland Road which he began with in '56. By 1861, however, the business had unfortunately been forced to close down. I have no concrete evidence of why a totally unique aquatic business with a nationwide monopoly situation should have folded within only 5 years. However, I think all of us who are actively engaged as marine-life traders some 130 years later, can make educated guesses which won't be far from the truth.

In the 1850's Michael Faraday's new-fangled science of ELECTRICITY was still in its infancy. Lloyd was quite unable to offer his clients small home air pumps, power-filters, electric lighting or refrigeration. Therefore, once spring arrived in England in April/May, the seawater in Lloyd's non-aerated, non-filtered, non-chilled and stagnant aquariums would begin to warm up. Once the seawater temperature exceeded 15°C (59°F), the living creatures in these most biochemically-fragile natural systems would die. The resulting stench in the "prim-and-proper" wealthy Victorian drawing room, and its effect on the lady of the house's actions, can easily be imagined!

Thus, in 1861, only five years after its' birth, the infant world marine hobby died. It is interesting to imagine the effect that a beautifully maintained tropical (— or temperate!) marine aquarium of the later 1980's would have had on these early pioneers.

Tomorrow's aquarist

By Alan Balfie

Tyro's Diary

I finally got around to visiting an aquarist shop. Went to Bir-stall Aquatics near Leicester and was promptly amazed. Rows and rows of fish tanks all full of fish of every different colour and combination of colours you can imagine. Big ones and little ones, transparent ones and opaque ones. Spell-bound I just wandered around the shop for over two hours.

Eventually I made up my mind and got 5 Neon Tetras, 5 Silver Spot Tetras, 1 Male Guppy and 2 Females, a huge bag of gravel (because it was much cheaper to buy it in a large quantity) and some live plants. All told I spent about £15. I would have liked more fish but I'm not sure how many I can get into the tank and there wasn't anyone who could help me. I lugged everything out into my neighbour's car and we set off for home.

Once home I quickly decanted the fish from the tank into a freezer box, to maintain the water temperature, and added

in the new fish for good measure. I threw away the old gravel and then scrubbed the tank clean before disinfecting it with a strong saline solution. It took me nearly an hour to get

the tank looking the way I wanted it. I built dunes of gravel stabilised by the new plants, the airline was carefully buried and the airstone positioned. Very gently I added

clean, fresh water and once the temperature had settled I replaced the fish.

The completed tank looked lovely, the fish swam in and out of the plants just as I hoped they would; the bubbles of air wafted through the leaves and stirred them softly. I felt really pleased. Went to bed feeling very satisfied.

Came down next morning and found the gravel as flat as a pancake, all the plants were floating on the surface, the airline curling around the tank and the airstone bobbing up and down in its own current! I tried to tidy it up with the fish still in the tank and managed to wake the Catfish in the process. She promptly shot around the tank like a black comet before fixing herself to the back glass.

All the fish are fine but one of the new female Guppies appears to have a "beard" or something. I wonder if she's supposed to have it? Must try and get a good book about fish.

Next time: Tyro manages to identify all his fish, and the beard!

ANSWERS TO NOVEMBER'S COMPETITION SPONSORED BY AMPHILL AQUATICS

I asked you to provide the common names for eight plants. Here are the correct answers:—

Scientific Name	Common Name
<i>Vesicularia dubyana</i>	Java Moss
<i>Egeria densa</i>	Giant Elodea
<i>Eleocharis acicularis</i>	Dwarf Hairgrass
<i>Hygrophila difformis</i>	Water Wisteria
<i>Samolus parviflorus</i>	Water Cabbage
<i>Microsorium pteropus</i>	Java Fern
<i>Echinodorus paniculatus</i>	Broad-leaf Amazon Sword
<i>Crinum thalictroides</i>	Onion Plant

The 10 winners of the competition are...
G. J. Smith, 12 Mill Road, Aylham, Norwich, NR11 6DU. Mr. D. G. Denning, 46 Holmleigh Avenue, Dartford, Kent, DA1 5AS. Allan Stewart, 34 Darroch Brae, Abers, Ross-shire, Scotland. Steve Willis, 8 Cheney Close, Parkwood, Gillingham, Kent, ME8 9PB. Mr P. Sutherland, 1 Graig Avenue, Margam, Port Talbot, Mid. Glam., SA13 2LH. Mr. L. Stenning, 9 Cadogan Avenue, Stone, Dartford, Kent, DA2 6ES. Mark & Wendy Baird, 7 Doldgryn Close, Craig-y-Don, Llanbadno, Gwynedd, LL30 1UH. Frank Clark, 83 Daisy Road, Edinburgh, EH11 2AA, Scotland. Mr. D. Tinkler, 9 Church Road, Watton, Thetford, Norfolk, IP25 6DQ. Mr. J. L. Surrledge, 12 Netherfields, Leigh, Lancs., WN7 5LD.

Each winner gets a complete Potting Kit, along with an extra packet of 25 Plant Treats and a selection of aquarium plants, all courtesy of Amphill Aquatics Ltd., Abridge Road, Theydon Bois, Essex. Sincere thanks to Amphill for their sponsorship, and to you for your fantastic response.

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 the name of the expert to whom your query should be directed. All letters must be accompanied by a S.A.E. and addressed to:
Your Questions Answered, The Aquarist & Pondkeeper, Buckley Press Ltd, 58 Fleet Street, London, EC4Y 1JU



TROPICAL
Dr David Ford



COLDWATER
Pauline Hodgkinson



PLANTS
Barry James



KOI
Roger Cleaver



MARINE
Graham Cox



DISCUS
Eberhard Schultze

Coldwater Blanket problem

Last summer I experienced considerable problems with Blanket Weed. How do I prevent the same happening next time round?

The best method of controlling Blanket Weed is to rake it out. You can also use a stout twiggy stick which should be pushed into a mass and twisted so that the fibrous plants wrap themselves around and can be pulled out.

A continuous onslaught must be waged against this intruder until it is under control. To help prevent future growths give more shade to your pond by adding more surface floating plants and by increasing the number of oxygenating plants.

There are also several products on the market designed to rid ponds of Blanket Weed.

Swim bladder problems

I have a twin-tailed goldfish which keeps floating to the top of the tank. It also swims upside-down. What is it suffering from — and how can I cure it?

Your fish is suffering from disorder of the air bladder (also known as swim bladder). This is a common complaint in twin-tailed, round-bodied varieties of goldfish and is not always curable.

In some cases the trouble is caused by an inherited weakness, and a cure is therefore unlikely. Incorrect feeding or rapid temperature fluctuations can also bring on an attack. Even eggs in a female can cause a problem as they may restrict the space needed for the air bladder.

To avoid causing this condition always make sure that fresh water is no more than 5 degrees F different in temperature than that which it replaces during water changes.

Always hold dried food between fingers underwater so that it soaks up the water and is not still in dried form when eaten by the fish. This method will ensure that it can be easily digested.

Feed the occasional meal of live foods if possible, such as chopped earthworms, white worms, and *Daphnia*. These are rich in protein and easy to



Swim bladder problems are more common in round-bellied fancy varieties of goldfish than in slimmer ones.

digest, and therefore can act as a laxative.

Some fish are perfectly happy when temperatures are on the high side but, when the water temperatures cool, may show signs of distress. Such fish will respond to treatment i.e. warming the water slightly and fasting for four or five days. As the fish take on an even keel the temperature can be reduced slowly back to normal. *Daphnia* should be fed for a few days until the fish recovers. This treatment is usually only successful for those fish which have developed this condition due to a chill or shock brought on by too drastic a temperature drop.

A fish may suffer slightly from swim bladder problems all its life and still lead an active existence, but badly affected specimens are better destroyed humanely.

Tropical Breeding tank queries

I have recently been given a 17in x 14in x 8in tank which I would like to use for breeding. I want to run a box filter and a 12in airstone off a Whisper pump. Which model should I use?

I bought a piece of bogwood but it turned the water the colour of tea. What should I do?

The smallest airpump in the Whisper (or any other) range will suffice for a 17-inch tank.

A small tank like this is ideal for breeding, but only when fry are at an early stage. As they grow, larger (or more) tanks will be required.

A 12-inch airstone is too large and may cause turbulence right across such a small tank. Use a small stone and light aeration. If you like slightly tinted water, remove the deep stain by boiling the bogwood in some container with a few table-spoons of sugar. Change the water a few times. To prevent any colour change, dry the bogwood thoroughly and paint it with polyurethane varnish from any DIY store. Give at least three coats, allowing each to dry thoroughly.

Breeding kissers

I have two Blin Kissing Gouramis. How do I go about breeding them?

Kissing Gouramis, *Helotoma temminckii*, are easy to keep and feed. They require no special water type and just love floating flake food. Breeding is easy too, but only when the specimens are mature. This is not until the fish are about 5 inches long!

Use at least a 30-inch tank and neutral pH water at 80°F. A female is seen when swollen with eggs and, if isolated with a similar size male, the pair should lock together exuding eggs and milt. The eggs float, but these Gouramis do not normally build nests.

When the female is spent,

remove the pair and have Infusoria ready for the fry. These are numerous — hundreds — and hatch within 24 hours.

Plants Basic and trace fertilisers

What is the difference between basic and trace-element fertilisers? I have seen both these products advertised recently but don't know much about them.

N.P.K. is short for Nitrogen, Phosphorus and Potassium. These elements form the basis of fertilisation, hence the term "basic". All three substances are essential for the synthesis of protein molecules in the plant body.

Trace elements are so-called because they are present in the soil, normally in minute quantities, but are essential for the biochemical processes of all living organisms. The functions of some are well-known, but the way a plant uses others is not at all clear at the present time.

Their absence leads to growth

deformities. For instance, lack of iron leads to chlorosis, where the leaves are pale yellow and photosynthesis is retarded.

Abnormal growth due to lack of these vital elements are known as "Deficiency" diseases". Trace elements in the aquarium are continuously being lost to the system (ie) by water changes and absorption by detritus, and must be replaced on a daily basis.

Marine Best filtration

I am thinking of starting a marine aquarium. Not having a great deal of knowledge on keeping fish of any kind, I would like your help in choosing a filtration system for my tank which will be 48in x 15in x 24in. Could you please give me your opinion on the best systems available?

REVERSE-FLOW U/G FILTRATION, (ie) a suitably powerful, external power filter operating a normal undergravel filter in REVERSE-FLOW MODE is, in my opinion, the best system to use. This means passing the mechanically filtered water from the external powerfilter downwards through

what would normally be the airlift of the U/G filter, so that it then percolates upwards through the cockle-shell/coral-sand biochemical filter bed, thus driving all the non-biodegradable "sea-humus" out of the filter-bed and into the external power filter from where it is easily and conveniently removed.

The power filter should contain coral gravel (2/3rds), filter "wool" and marine-grade charcoal. Please note that, in the unlikely event of a disease outbreak, the charcoal must be temporarily removed from the power filter until treatment is successfully completed.

You should purchase a power filter which will give at least a 30-minute turn-over period. In other words, if your aquarium has a capacity of, say, 60 gallons (ie) 48in x 15in x 24in, you will need an external power filter offering, at least, 120 gallons per hour turnover rate.

Partial water changes

How often should I carry out partial water changes in my 60in x 24in x 24in tropical marine aquarium? How much water should I change each time?

There are two major, easily measured, parameters which determine when a partial water change has become necessary. These are:

A. pH. Once the pH of the seawater falls below the range 7.8 to 7.9 and a suitable buffering compound fails to restore it to the range 8.0 to 8.3 for more than a few hours at a time, it is imperative that a 25% to 35% water change takes place.

B. Nitrate. Once the nitrate test kit shows a reading in excess of 50 ppm, it is time to change 25%-33% of the seawater.

There are only two practical ways of keeping the nitrate level of aquarium seawater down to manageable levels. These are Algae harvesting, ie. growing dense stands of *Caulerpa prolifera* in the aquarium and periodically removing three quarters of these algae, (and all the nitrate which they have absorbed) from the aquarium and, secondly, regular partial water changes. The partial water change method is not so successful nowadays in some areas of Britain due to the fact that the tapwater which one uses to dissolve the sea salts may contain in excess of 20 ppm of nitrate itself.

Meet the societies

Brighton & Southern Aquarist Society

Brighton & Southern Aquarist Society was formed in 1954. Over the years, the club has enjoyed periods of widespread support.

Meetings are held throughout the year (on the first Thursday of each month) in the rear room of the Windmill Inn, 190 Old Shoreham Road, Southwick (opposite Fixit store), starting at 8.00 p.m.

New members are especially welcome. The first meetings may be attended free of payment. Annual subscription is £5 (£7.50 for a joint membership). Reduced subscriptions (one-half) apply from July onwards. Attendance is 50 pence per week.

Meetings consist of talks by fish and aquariology experts, biologists and hobbyists on all matters of life in or near water, nature conservation and related

issues. Slide shows accompany some talks, and form an important part of the meetings.

Table shows of tropical freshwater fish are held on a regular basis. The club is a member of the Federation of British Aquatic Societies (F.B.A.S.), and Association of Southern Aquarists Societies (A.S.A.S.).

The club and members hold various reference books and journals. In addition, experienced hobbyists are present at all meetings to answer any queries and problems and to exchange information and experiences. Newcomers to the hobby are welcome, as are pondkeepers, coldwater enthusiasts and mar-

ine aquarists, both tropical and native.

The club also arranges visits to museums, aquariums, retailers and other societies. For further details, contact Andy Horton (PRO), 14 Corbyn Crescent, Shoreham-by-Sea, Sussex BN4 9PQ. Tel. (0273) 465433.

News from the societies

Surrey Marine Aquarist Society

Surrey Marine A.S. have changed their venue from Redhill Methodist Church Hall, to the Ifield Community Centre, Ifield Drive, Crawley, West Sussex. The change took place on Wednesday 2 September, and thereafter, meetings will normally start at 8 p.m. approx. on the first Wednesday of every month. For further details, con-

tact: A. Parkinson, Information/Liaison Officer, 9 Ransome Close, Bewbush, Crawley, West Sussex, RH11 6AR.

The Scottish Goldfish Group

The main awards presented at the S.G.G. 9th Annual Open Show (sponsored by Tetra) were:

Best Single Tail Fish in

Show: Fiona Dunn.
Best Double Tail Fish in Show: Bill Ramsden.

Best Fish in Show: Fiona Dunn.

Best Breeders Team: Watt family.

Best Owner-bred Fish: Tommy McLean.

Best Junior: Fiona Dunn.

Best Single Entry (Breeder): Bill Ramsden.

Best Fantail: Tommy McLean.

OUT AND ABOUT

with John Dawes

Health and Disease in Koi

I have just received the following report on Tetra's successful one-day course held recently at Liverpool University. If you missed this one, keep an eye out for the next one which will, of course, be publicised in *A & P*. Congratulations to Tetra and all those involved with the venture which, by all accounts, was thoroughly enjoyed by all those who were lucky enough to obtain one of the 100 available tickets.

“The Tetra-sponsored course entitled 'Health and Disease in Koi Carp' held in the Department of Continuing Education at the University of Liverpool proved to be a great success. The course was organised by Dr David Pool (Tetra) and Dr John Manning (University of Liverpool) and included lectures by Dr Pool, Dr James Chubb (University of Liverpool) and Mrs Helen Bentley (Fish Care), all of whom have considerable experience in the field of fish diseases.

All 100 tickets for the event were sold well in advance with Koi-keepers travelling from as far as Devon to attend the course.

The lectures covered all aspects of fish diseases, their prevention, diagnosis and treatment. The first lecture, by Dr Pool, covered the prevention of disease. This included information on maintaining the correct water quality, correct handling, nutrition and quarantine methods.

Dr Chubb then introduced the audience to the wide variety of parasites that can be found on Koi. Each parasite was illustrated and the ways in which they infect and affect the Koi was described.

How unhealthy fish can be recognised at a very early stage was discussed by Dr Pool. The early signs of poor health were described, followed by some clues as to how to identify the cause of the problem (where no signs are obvious it is necessary to conduct a simple post-mortem). Using a video camera and television monitors to facilitate viewing, this was demon-



Dr Pool dissecting fish while the audience watch on a video monitor.



Right, Dr Pool during a busy question time. Photographs courtesy of Terry Maloney.

strated, to the great interest of the audience.

Mr Bentley completed the lectures with an excellent description of the methods used to administer treatments to Koi. This included a warning of the dangers of wrongly treating, together with a recipe for preparing medicated feeds.

Throughout the day there were opportunities for the very knowledgeable audience to contribute to the proceedings with

their personal experiences and views. Many very interesting points were raised and discussed, which undoubtedly contributed to the success of the course. Few of those present will fail to remember poor old 'Warty Walter', or the Koi that eats baked beans!

Demonstrations of a wide range of the diseases of Koi were on view during the coffee and lunch breaks. This included a number of diseased Koi and

Goldfish, together with individual parasites which could be viewed under microscopes. This was very popular because, to quote one Koi-keeper, "One bug in a dish is worth ten descriptions".

A booklet containing a summary of the course was given to each person attending. It is hoped that this will help to jog the memory in the event of a Koi becoming diseased in the future.

FRED THE PIRANHA.

©ST PETER McGEOUGH.



Helping hand



Nick Lushchan

I would like to wish all readers a Happy New Year and thank the traders for their support with advertising with the wheelchair logo in 1987. There has been an increase of 25% from the March to November issues. This small (but vital) Logo plays an important part for the wheelchair disabled and, at the same time, provides the trader with premises that are more accessible to families with push-chairs. Well done the traders. I hope the increase continues in 1988.

Problems for the Partially Sighted

I had a letter from Mr Lyn Porter of Mid-Glamorgan pointing out the difficulty that partially sighted and elderly folk face with some advertising and instructions leaflets. Mr Porter states "These days adverts are printed with coloured backgrounds; you get black on blue, green on green, pink print and even black on dark blue."

He, personally, finds all these forms very difficult to read. "The print seems to merge into the background on this type of coloured advertising print. I am sure that for the elderly and partially sighted you cannot beat GOOD OLD BLACK AND WHITE. I have complained to many firms about this. They say, (if they reply at all) 'Your remarks are noted' and that is generally the end of the matter. I so often feel like a voice in the wilderness! Do you know, by writing this letter I feel better already."

The above highlights a very real problem, yet one that is

hardly ever mentioned. I therefore hope that people in advertising will take Lyn's letter into consideration when they plan their future advertising plates. As an example of what Lyn Porter sees as the problem, here is his letter, with different parts printed on a number of coloured backgrounds.

"Dear Nick,
May I take this opportunity to express my grateful thanks for your letter and help with my query regarding the Whisper 2 Power filter?

I received some very good enlarged drawings from Mrs K. Meak of Interpot and a beautifully large print letter which, for me, was a joy to read. Have you realised, Nick, how many forms, etc., these days are printed with coloured backgrounds?

You get black on blue, green on green, pink print and even black on dark blue.

I, personally, find any such forms very difficult to fill out — simply because the print seems to merge into the background. I realise I'm the "odd boddy" — but there must be many others registered blind (not always completely so, as myself), partially sighted and elderly folk who, I'm sure, would appreciate good, old, reasonably sized BLACK AND WHITE.

I've complained to many firms and they say (if they reply at all), 'Your remarks are noted' and that is generally

the end of the matter.

I so often feel like the voice in the wilderness — but do you know, just by writing to you, I feel better already?

Best of everything,
Yours sincerely,
Lyn Porter"

Nite Spots

Traders have reported an increasing amount of interest regarding Garden Lighting and, having had a few inquiries about this, I thought it might be a good idea to take a look at one type in **Helping Hand**. Sincere thanks to Mike Allen of Amptill Aquatics for supplying me with a pack of NITE-SPOT lights to try.

NITE-SPOTS come with four weatherproof garden lights that are ideal for highlighting the garden or pond. Not only do they give an attractive appearance to garden features, but, by providing light, add a little to overall safety; they also act as a deterrent to potential pond poachers.

The lights come in a box complete with 50 feet of cable. Although the lights operate off the mains, they are made totally safe with a 12-volt transformer. The light units themselves are strongly constructed and very simple to assemble. In fact, the angle adjusting screw is manageable even with one hand; i.e. holding the light unit in your right hand, it is possible to turn the angle adjusting

Nite-Spots can be held and adjusted using just one hand.



screw with the thumb. The adjuster is therefore very conveniently designed for the use of disabled pondkeepers and watergardeners who, in NITE-SPOT, now have a set of garden lighting which they can use both simply and safely.

CSM Lighting, the distribution agents, have said that, for people who are unable to manage the light connection, they are quite prepared to make them up to the customer's requirements. Full marks to CSM.

An easily adjustable heater/stat

Apparently, **Helping Hand** has filtered through to the manufacturing side of the hobby, and although readers might think this has taken rather a long time to happen, I can assure them that the response is very encouraging indeed. It takes time to change even a small part of any component, test the item, and then make it safe before placing it on the market.

One such item is the VISITHERM, distributed by Underworld. It is a heater/stat with a difference, in that you are able to select the temperature on the glass face before submerging it; this eliminates the guesswork during the installation. VISITHERM have also eliminated the rubber cap over the adjustment control, replacing it with an absolutely waterproof system that is simple to operate. Even with one hand this part is extremely easy to manipulate. This is a good sign, not just for the hobby in general but for disabled aquarists in particular. Any improvements contribute to the pleasure we derive from fish-keeping.

If you have a problem with the hobby, please do not hesitate to write to me. We will make every effort to help.

Please enclose a S.A.E. and address your letter to: Nick Lushchan, (Helping Hand), Aquarist & Pondkeeper 58 Fleet Street, London, EC4Y 1JU.

Until next time, Good Health and Happy Fishkeeping.

FOCUS ON WATER QUALITY THE SECRET IS IN THE WATER

Poor water quality results in poor quality fish. Dr David Pool of the Tetra Information Centre explains why.

The health and survival of the fish, invertebrates and plants that are kept in aquaria and ponds is closely linked to water quality. Poor water quality may result in the fish and invertebrates appearing dull, listless and being susceptible to disease, while the plants stop growing and appear very ragged. Such conditions occur in many aquariums. Indeed, it is probably true to say that over 80% of the problems experienced by aquarists can be traced back to poor water quality. And yet, with a little knowledge of the subject, most of the pitfalls can be avoided and the aquarium or pond inhabitants will remain healthy and active.

What is water quality?

Water quality is, by definition, the characteristics of the water. Pure water is a simple compound containing two hydrogen atoms and one oxygen atom. But, as the water falls as rain, or flows over rocks and in pipes, it picks up numerous impurities, and it is these that cause the water quality to vary from region to region. If we say that the water quality is good, it means that the impurities make the water suitable for keeping fish and plants.

A list of the more important water quality parameters is provided in Table 1. This list is by no means exhaustive and a large number of other contaminants could be



Unless water conditions are kept on the soft, acid side, some species, like the Ruby Barb (*Barbus nigrofasciatus*) will experience low egg fertilisation rates.

added. Aquarists interested in aspects of water quality not covered in this article should consult the suggested further reading at the end of the article.

Water hardness

Water hardness is a measure of the quality of dissolved salts that are present. Pure rainwater has very few dissolved salts and is termed **soft water**. As it runs over rocks and soil rainwater becomes enriched with various salts. The quantities of salts absorbed depends largely on the type of rock that the water flows over. So, for example, if the rocks are limestone, the water absorbs many salts and is known as **hard water**. However, if the rocks are granite or sandstone, fewer salts are absorbed and the water is **soft**.

Water hardness is measured in Degrees of Hardness (°dH) and may be divided into **General Hardness** and **Carbonate Hardness**. General Hardness is a measure of the amount of calcium and magnesium salts present, whereas Carbonate Hardness is a



The majority of tetras prefer soft, acidic water conditions. This one, the Blind Cave Tetra (*Astyanax fasciatus mexicanus*) is an exception.

TABLE 1 WATER QUALITY PARAMETERS OF IMPORTANCE TO THE AQUARIST

General Hardness
Carbonate Hardness
Conductivity
pH
Ammonia/Ammonium concentration
Nitrite concentration
Nitrate concentration
Temperature

measure of the bicarbonates and carbonates.

As an approximate, but very useful, rule the **General Hardness** is comprised of the **Carbonate**, plus the **Non-Carbonate Hardness** (hardness produced by others salts, such as chlorides). In occasional cases this does not hold true and the Carbonate Hardness is greater than the General Hardness. This occurs when there are metal carbonates, other than those of calcium and magnesium, in the water (such as strontium and barium bicarbonates).

Water with a General Hardness value of 0-4°dH is regarded as being **soft**, 5-12°dH as being **medium** and above 12°dH as **hard**.

Fish from different areas of the world are used to different degrees of water hardness. So, for example, Discus require soft water, whereas Rift Valley Cichlids require hard water. If the hardness of the aquarium water is unsuitable for the fish that you keep, the internal functions of the fish, and the skin and gill membranes may be damaged. Affected fish may become swollen and will rub against underwater objects or shimmy in the water (swim without getting anywhere). Methods of altering the water hardness are shown in Table 2.

Conductivity

The salts which influence the hardness of the water (together with many other salts) form charged particles known as **ions** when they dissolve in water. So, for example, when cooking salt (sodium chloride) is dissolved it forms positive sodium ions and negative chloride ions. These ions allow an electric current to pass through the water, the size of which is related to the concentrations of ions present. By measuring the ability of a water sample to conduct electricity an accurate measure of the total number of ions in the water can be obtained. This provides an accurate measure of the hardness of the water, with harder water containing more ions and conducting electricity more easily. Ammonium, nitrites and nitrates also form ions, but their concentration in aquarium or pond water is so small that it is insignificant in comparison to that caused by the salts.

Conductivity can be measured very simply using a conductivity meter. This meter passes a small electric current down one electrode and measures how much is conducted by the water to a second electrode. The resultant value is measured in **Siemens per cm**.

Acidity and Alkalinity

The degree of acidity or alkalinity of water is expressed in terms of the **pH** which ranges from 1 (acidic), through 7 (neutral) to 14 (alkaline). The pH scale is logarithmic, which means that a pH change of 1 unit actually means a 10-fold change in the acidity or alkalinity. It is obviously important to avoid such changes within the aquarium.

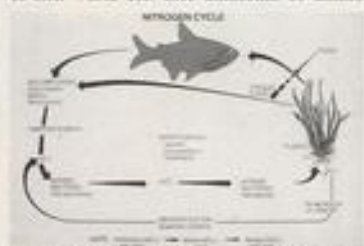
Bicarbonates within the water are very important as they help to buffer any changes in pH. Any excess acids or alkaline substances bind to the bicarbonates so preventing such fluctuations in the pH. It is only when all of the bicarbonates have been

used up (ie the buffering effect is exhausted) that any additional acid or alkaline substances can drastically alter the pH.

The pH and hardness of the water are usually closely related. So we find fish that prefer soft acidic water and others that require hard alkaline water. Most fish can withstand temporary, slow changes in the pH. However, sudden changes will be lethal. Rapid pH changes, or extreme and unsuitable pH values, affect the skin and gills of the fish. Affected fish may have trouble breathing and show signs of skin and gill irritation such as flexing, rubbing and reddened areas.

Nitrogen Cycle

Within the aquarium fish waste, uneaten food and dead plants and fish are decomposed in a process known as the **Nitrogen Cycle**. This cycle involves the breakdown of fish waste etc. into ammonia or ammo-



nium, then into nitrites and, finally, into nitrates. Each of these stages is accomplished by means of bacteria in the presence of oxygen.

Although ammonia, nitrite and nitrate are toxic to fish and plants they should only be present in very low concentrations in an established pond or aquarium and so pose no problems. This is not, however, the case in a newly set up aquarium where there are too few bacteria to complete each stage of the Nitrogen Cycle. Fortunately, this time can be reduced by 'seeding' the filter with material from a mature filter, or by using one of the commercially available bacteria preparations.

The first stage in the decomposition of organic waste is the production of ammonia (toxic) or ammonium (non-toxic). These two substances are easily converted into the other within the aquarium, with the ratio of ammonia to ammonium being largely dependant on pH and temperature. At a pH greater than 8.5 (and as the temperature increases) the amount of ammonia increases greatly. An ammonia concentration of only **0.25 mg per litre** of water can be lethal to certain aquarium fish. Fortunately, this low level is unlikely to be reached if the pH is maintained below 7.5, and so, ammonia poisoning is only a real problem in Marine or Rift Valley Aquaria.

Ammonia is converted by *Nitrosomonas* bacteria into nitrites. Although less toxic than ammonia, nitrites can pose more of a problem in aquaria with a low pH and temperature (ie those where there was only non-toxic ammonium). A nitrite concentration of **0.5mg nitrite per litre** of water can be lethal for certain fish species. Wherever possible, the concentration should

TABLE 2
THE CAUSE AND CORRECTION OF WATER QUALITY PROBLEMS
(All changes should be made slowly to avoid stressing the fish).

Problem	Cause	Remedy
High General Hardness (GH)	Tapwater with high GH. Limestone, coral or shell in substrate.	Dilute with rainwater or distilled water. Remove offending substrate. Use ion exchange resin.
Low GH	Tapwater with low GH.	Add limestone, cockle shell or coral sand to aquarium or filter.
High Carbonate hardness (KH)	Tapwater with high KH. Carbonates in substrate.	As for High GH. Boil water before adding to aquarium. Use ion exchange resin.
Low KH	Tapwater with low KH. Dense plant growth associated with infrequent water changes.	Add sodium bicarbonate to water before introducing into aquarium.
High pH	Tapwater with high pH. Limestone, shell or coral in aquarium.	Use aquarium peat in filter or in water before adding to aquarium. Remove offending substrate. Use commercial pH adjuster.
Low pH	Acidic tapwater. Decaying material in water.	Add limestone, coral or shells. Use commercial pH adjuster. Improve tank hygiene.
Raised ammonia and nitrite concentration	Overstocking or overfeeding. Build-up of organic debris. Filter malfunction.	Immediate partial water change and remove debris. Decrease feeding and/or stocking level. Check filter. Add chemical filter media.
Raised nitrate concentration.	As above. Infrequent water changes.	As above. Regular partial water changes. Add plants and encourage growth.

be kept below 0.2mg per litre.

Nitrites are finally converted to nitrate by *Nitrobacter* bacteria. Nitrates are considerably less harmful to fish and plants, and, at low concentrations, are actually used as a food source by plants and algae. In most aquaria there are too few plants and algae, and too many fish. Therefore the nitrate concentration gradually increases. Nitrate levels of greater than **40mg per litre** can adversely affect the fish and reduce plant growth.

Ammonia, nitrite and nitrates have a range of effects on fish and plants. Sublethal effects include reduced growth rates, increased susceptibility to disease, unusual behaviour, and failure to breed. Plants show retarded growth and reproduction, and the leaves become pale.

At higher concentrations the skin and gills are irritated resulting in the fish rubbing against underwater objects and producing an excess of protective mucus. The gills often become coated with mucus and this, together with damage to the delicate membranes, prevents them working

efficiently, causing the fish to gasp at the surface and breathe rapidly in order to obtain sufficient oxygen. Internally, the kidney of the fish is often damaged, affecting the water balance and causing the fish to swell.

Water quality monitoring

Regular monitoring of the water quality using one of the available test kits allows the aquarist to detect and correct problems before they adversely affect the fish. Possible causes of these troubles, together with the methods of overcoming them, are indicated in Table 2.

Further Reading

Aquarists requiring more information on water quality are recommended to read the following books.

'A Fishkeepers Guide to Maintaining a Healthy Aquarium' by Dr. N. Carrington, published by Salamander.

'The Aquarium Technology Handbook' by A. Jenno, published by Barry Shurlock.

Coldwater jottings



Stephen J. Smith

Island hop

Members of the Isle of Wight Aquarists Society visited South Park Aquatic (Study) Society in November for their annual inter-club competition, held at Wimbledon.

Over 55 coldwater fish were on display — all of them of extremely high quality. Each society's best four fish were selected for the "major" class, while the remainder were judged in a subsidiary class.

A notable winner was six year-old Katie Bassett, whose Common Goldfish won first prize in the singletail "major" class. Katie has owned the fish since the age of three when, in common with hundreds of aquarists, she won the fish at a local fair.

It looks as though we have another young keen recruit to the ranks of true Goldfish enthusiasts.

This was the 16th inter-club competition between SPASS and IOWAS — an annual event which began when a former SPASS founder-member, Doug Crisp, moved to the island.

As IOWAS is mainly a tropical fish society, it would perhaps be expected that SPASS should win the trophy. This year was no exception, although they came close to losing it a few years ago when IOWAS managed a draw! I sincerely wish the islanders the best of luck for next year.

In addition to the show, the annual trip provides the opportunity to visit a number of aquatic establishments in the area. This year these included Coral Bazaar at Walton on the Hill, Star Fisheries in

Sutton, Surrey; Mortlake Aquaria; and West London Aquatic Centre, East Cheam.

In the true spirit of aquatic hobbyists, most members returned home with more livestock than they brought away!

Further information on SPASS or IOWAS can be obtained by contacting the respective club secretaries at the following addresses:

Isle of Wight Aquarists Society: Jean Fenn, 85

Six year-old Katie Bassett receives her top award for her Common Goldfish from SPASS chairman Dave Brooks, following the annual inter-club competition between South Park Aquatic (Study) Society and Isle of Wight Aquatic Society.

Orchard Road, Seaview, Isle of Wight PO4 5JJ. Telephone: (0983) 613350.

South Park Aquatic (Study) Society: Norma Brown: 4 Coombe Lane, Whiteley Village, Walton-on-Thames, Surrey KT12 4EL. Telephone (0932) 842011.

History of SPASS

Still on the subject of South Park Aquatic (Study) Society member, Larry Brown, is compiling a history of SPASS. He would be delighted to hear from anyone who can provide information or even photographs, and can be contacted at the Club Secretary's address (above).

Widow's Lament

It is easy to spot a fishkeeping widow (or widower!); (s)he is the one with the grey hair and a huge telephone bill!

Sounds familiar? A recent "quick call" to a fishkeeping colleague stretched to well over an hour, during which time we covered not only the initial subject of the call (which took about 45 seconds) but also just about every fishkeeping subject, including: building a fish-house, aquarium manufacture, pond construction, overwintering Goldfish, spawning, next year's programme of visits to coldwater establishments...

Perhaps the acquisition of BT shares should be included somewhere in the itinerary!

A Happy New Year to all readers and correspondents of "Coldwater Jottings" — and to British Telecom!



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Left, *C. nigripinnis* spawns in typical *Cynolebias* fashion, i.e. by diving into the substratum.
Right, This male *Cynolebias alexandri* is in full breeding condition.

SOUTH AMERICAN PEARLS

John Skillcorn of the British Killifish Association introduces the fascinating annual fishes of the genus *Cynolebias* in the first article of our new occasional series on Killies.

The term 'annual fish' has been adopted by most aquarists to mean those fish which naturally live in waters of a temporary nature, such as ponds which either dry up completely during the dry season, or are severely reduced in size. (These are often called "Killifish", but not all killies are true annuals.) The adult fish may die out completely, but in their short lives (perhaps little more than two months) they may have produced, and left behind in the mud, countless tough-shelled eggs which survive the drought and hatch within an hour or two of the rains falling at the beginning of the new wet season. The eggs are so persistent that they may, in exceptional circumstances, survive many months. This resting phase is essential for the majority of true annuals to develop to the hatching stage.

Cool water

Through the assistance of friends and contacts within the British Killifish Association (B.K.A.), I have had the good fortune to obtain and enjoy breeding many species of *Cynolebias*, often called Pearl Fishes. Many of them have proved fairly easy to keep in my experience, and the majority require only cool water, 59 to 68°F (15 to 20°C) in order to thrive.

At one time I had some fifteen species of these fish, and most were kept in unheated aquaria, where the temperature at times went down to 59°F (15°C). This is permissible because these South American fish come from countries which have quite cool winters. From the point of view of the electricity bill, they are very economic fish

to keep!

They are not perfect, however, and I have found them to thrive only on a good variety of live food. Nevertheless, I do know of many aquarists who use beefheart. Also, males are often very aggressive toward each other, and for this reason, killies are best kept as single pairs or trios (one male to two or more females) in small aquaria. My preferred size of tank for most of these species is 12" by 8" by 8" (30cm x 20cm x 20cm), and this seems to suit them well. This would not suit the larger species, of course. You would have to exercise common sense in this respect.

Water quality

With regard to the hardness of water tolerated by these fish, I have to say that this has never been a worry for me. I am extremely lucky to live in the north-east of England where we enjoy very soft water of

Right, "Eyed" eggs of *Cynolebias mabeis*.

Below, All *Cynolebias* fry grow very quickly as this one-week *C. boitoni* shows.



only 3°GH. This proves absolutely perfect for the vast majority of soft water fish, and *Cynolebias* are reputed to demand soft water. This may be true, but I have carried out no experiments in order to find out if harder water would affect them.

At first, though, the pH did worry me, as I found that with all that peat in such a small amount of water, conditions became very acidic. The pH was usually almost as low as three! This did not affect the fish at all (apparently) and they spawned non-stop in their brightest colours.

I should say, however, that I am always very careful when introducing fish into an aquarium, and take a long time to mix the water in the travelling bag with tank water before finally releasing the fish into their new quarters. With such precious fish one simply cannot take chances in this direction. I normally take three hours mixing the waters, and use an eyedropper to mix a few millilitres at a time.

The water is always filtered. Small poly-filters are used, and these work extremely well. I clean them every week simply by rinsing the foam under a running cold tap, squeezing it to make sure that most of the particles are washed out. One couldn't wish for an easier method. My small aquaria are covered by close-fitting cover glasses at all times, as these fish will jump out of any container they are kept in.

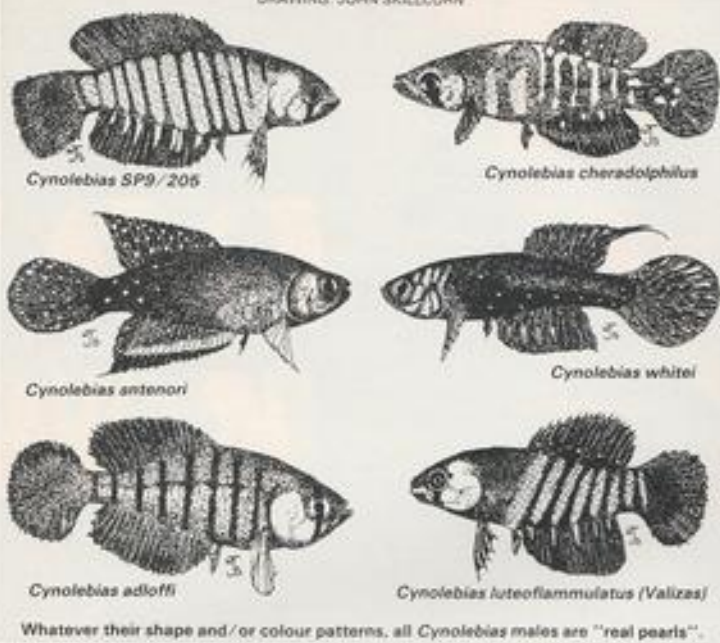
International exchange

The fact that the eggs have to undergo a period of storage out of water in damp peat leads us on to what is, for me, the most fascinating aspect of keeping these fish, for this gives us the opportunity of sending the resting eggs by post to other aquarists, and, of course, of receiving new species ourselves from others.

There is, in fact, a healthy international exchange of eggs going on by post, and this even extends to the fish themselves. Many of them can survive many days in transit between countries, packed only in a few millilitres of water in polythene bags. The bags themselves are packed in strong, insulated boxes to guard against extremes of temperature, and, generally, this system works very well.

The main exchange goes on in egg form, though. It never ceases to fascinate me when I receive eggs from, say, a friend in South America on Saturday morning at nine o'clock, that, by ten o'clock, I have a

DRAWING: JOHN SKILLCORN



Whatever their shape and/or colour patterns, all *Cynolebias* males are "real pearls".

batch of twenty tiny fry swimming around, eagerly feeding on newly-hatched brine shrimp!

The fish of this group normally grow so quickly, that within six weeks they are, themselves, laying eggs and thus producing the next generation. I have had great success in receiving young fish through the post, not only from other enthusiasts in this country, but also from South America. You may think it impossible for such a journey to be survived, and, perhaps, also a little cruel in expecting small fishes to survive ten days in the post in their little bags, but survive they do, and produce the most interesting breeding stock.

There was one instance that I remember, of receiving two pairs of the Argentine Pearl fish, *Cynolebias bellotti*, from Eduardo Susena, an aquarist in Uruguay. Eduardo packs fish well, and these fish survived ten days in transit to arrive fit and in perfect condition, showing signs of wanting to spawn only two days after arrival. Looking at them that

spring morning you would never have believed that they had just made such an arduous journey. Another example was the then suspected new species, known at that time as *Cynolebias* sp. "Velázquez", discovered by Eduardo in a small stretch of water near to the town of Velázquez, some distance from Montevideo in Uruguay.

A new species

The B.K.A. produces a monthly magazine called *Killifish*, and in one issue Eduardo wrote a short article on some of the *Cynolebias* species to be found near to his home in Montevideo. In this article he happened to mention finding a small species of *Cynolebias* in a stretch of water which was noted as having had a temperature of only around 39°F (4°C).

I immediately wrote to Eduardo asking for eggs, and was delighted when he replied at once, including some twenty eggs of this new species. On examination, some of the eggs seemed fully formed and eyed, and I

therefore decided to attempt hatching them. That was my downfall, as many hatched but only one was normal. The rest were what are known as 'belly sliders' due to the fact that they seem to lack a fully developed swim bladder, and flip about on the bottom in a fairly pathetic sort of way. The exact reason why some fish hatch like this puzzles me, but I am sure that, if I had waited a little more time, I would have had a much better success rate.

However, I was not daunted, and all the fish were precious to me anyway, regardless of their ability to swim. They were reared and produced a few viable eggs, the single healthy fish, which proved to be female, spawning with the largest of the belly sliders, a male. It was rather frustrating, nevertheless, not to have a healthy male to match the female, and so I wrote off to Eduardo once more, asking if it was possible for him to send me a male of that species. He must have replied by return of post, because two weeks later I received a package from him containing, not only a male *Cynolebias velázquez*, (now known as *C. gimonocentris*) but a male *Cynolebias curviflorus* as well. I was overjoyed, and soon had a hundred eggs to send out, in batches of twenty, to other interested members, in case anything happened to my stock.

The prospective breeder of South American annual fishes such as *Cynolebias* must be the patient sort! I'm a fine one to talk, but I do, on most occasions, manage to wait the full length of time in order to achieve the maximum number of hatchlings! An average length of time required for eggs to develop would, I think, be about two to three months, but when they do eventually hatch, the fry grow at a super-fast rate, and may be spawning in only six or eight weeks.

I hope that you will see by now that this family of fishes really does offer something special, not only in its breeding habits, but also in the ways in which new stock may be obtained. In subsequent articles I will be describing one or two of the special techniques you will need to adopt in order to be successful in the breeding of these fish. I hope you will find them interesting and will give the Pearl Fishes a try!

For details of the British Killifish Association contact Steve Davidson, The Publicity Officer (B.K.A.), 34 Burchells Green Road, Kingswood, Bristol, BS15 1DS.

NEXT MONTH

In February's packed and colourful issue:

● We follow up our spectacularly successful 1987 series of Beginners Supplements with **Tropical Freshwater Aquaria (A guide for the more experienced hobbyist)**. Features in this comprehensive self-contained supplement will deal with:

- Some of the more difficult plants (Barry James)
- Soft Water tropicals (Dr Chris Andrews)
- Hard Water tropicals (Dr David Pool)

● The role of vitamins and trace elements in a fish's diet (John Dawes)

● Over £500 worth of AquaMerck water testing kits to be won, including a complete portable laboratory valued at more than £100, courtesy of **Technical Aquatic Products**

● Koi, coldwater, tropicals, news, diary dates, cartoons, questions and answers, marines and much, much more...

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Letters

Sources of European Tortoises

I was very interested to read Julian Sims' article in the August '87 issue of *A & P* on 'Breeding European Tortoises'. Is it now possible for members of the public to purchase *Testudo* for private breeding as a hobby? If so, I would be very interested to know the names and addresses of any breeders from whom I could purchase some.

T. B. Lemon
Maidenhead, Berks.

Julian Sims advises:

Importation of European Tortoises into Britain ceased after 1 January 1984, with the implementation of protective International legislation — the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Additionally, the CITES legislation has also imposed restrictions on selling or exchange of tortoises within the British Isles.

Owning a tortoise does not require a licence. However, if a tortoise owner, breeder or trader wishes to dispose of one or more tortoises, either by sale or by barter (exchange without the medium of money) a SALE EXEMPTION must be obtained from the Department of the Environment at the following address:

Room 1105, Wildlife Conservation Licensing Section, Department of the Environment, Tollgate House, Houlton Street, Bristol BS2 9DJ.

The DoE does not issue application forms for sale exemptions. Therefore, as much information as possible should be sent in the style of a letter. These details must include the species of tortoise, its sex and how it was acquired.

A sale exemption is only required by the person disposing of a tortoise, not by the person acquiring it. The exemption is in the form of a letter of authorisation from the DoE.

The best way of making contact with a tortoise breeder — the most likely source of a hardy reptile from adult stock

acclimatised to life in the British garden — would be to place a request in the newsletter of a specialist society:

THE ASSOCIATION FOR THE STUDY OF REPTILIA AND AMPHIBIA (ASRA)

Newsletter Editor: Jenny Swainston, 11 Champions Close, Fowlmere, Royston, Herts SG8 7TR.

THE BRITISH CHELONIA GROUP (B.C.G.)

Newsletter Editor: Henny Fenwick, Newbarn Farmhouse, Toft Road, Kingston, Cambs CB3 7NS.

Julian Sims,
Swindon, Wilts.

The Saum Story (continued)

In the cover story of the *Aquarist and Pondkeeper* of June '87, you asked for background information on the cichlid shown there. In addition to the many letters you will have received let me add my comment. In May 1984, Jack Moyes of Lochgelly, Fife, Scotland was my guest on the occasion of the German Killifish Convention in Mülheim, the town where I live. I gave Jack about half a dozen half-grown cichlids, then known here as "Goldsaum-Aequidens" or "Goldsaum cichlid". These cichlids were well known and wide-spread in Germany at that time, as they are now.

Jack bred the fish prolifically and spread them in Britain. He says, in fact, that the "Goldsaum" existing on the island now, stem from his tanks. "Fish World" of Edinburgh who reportedly imported the "White Saum" would probably have done so from West Germany (the fact that it has a half-German name does not suggest a fish imported from its native South America).

I think that the term "White Saum" was invented by Willi Harvey of Moffat, a German-born Scot, and a good friend of Jack's and mine, for the name "White Saum" is not used in Germany.

So much for the origin of the "Goldsaum" in Britain. What fish is it, then? When I gave Jack the fish, it was generally believed that it was a type of *Aequidens rivulatus*, as yet not



described scientifically, and, consequently, referred to as "*Aequidens rivulatus* spec. Goldsaum".

Uwe Werner and Rainer Stawikowski, two eminent German cichlid specialists, flew to Ecuador to find out about the "Goldsaum". In December 1985 they published the results of their investigation in the German aquarist magazine DATZ, under the heading of "The Gold saum cichlid is *Aequidens rivulatus* (Günther, 1859) Surprising result of an ichthyological collecting trip to Ecuador". Werner and Stawikowski found out that the Goldsaum is, in fact, *Aequidens rivulatus*, that it is spread all over western Ecuador and (to answer your question) that specimens with a white, yellow, or red edge of their fins live in the same habitat, a case of polychromatism, not of different populations distinguished by colour.

This result of polychromatism is confirmed by breeders of these cichlids who have found that, from one breeding pair showing one of the three possible colours of fin edge, the fry will have all the three colours, but never a mixture in an individual. So, it is not surprising that you have Gold Saums and White Saums in Britain now.

The DATZ article makes the difference clear between the Goldsaum and the Silversaum, as it is called in Germany ("Green Terror" in the English-speaking world). The Silver Saum is not, as previously believed, *Aequidens rivulatus*, but a fish that has still to be described by science. The article points out the differences between Goldsaums and Silversaums, the most striking one being the pattern on the scales. I don't know whether the "Green Terror" is spread in Britain, at all.

May I add one word concerning the names of these new and beautiful cichlids? Some

weird German words have found their way into the English language, like "Weltschmerz", "Poltergeist" and, unfortunately, "Blitz", and fairly recently "abselling". I'm all for a united Europe, but doubt if the English word "Gold" or "White" combined with the German word "Saum" are a happy pair to live on in the mouths of fish fanciers. If you ask me, they are, linguistically speaking, atrocities. Although it is difficult, almost impossible, to change the name of a fish once it has been well established, I suggest calling the newcomers the "Gold-rimmed" and "Silver-rimmed" cichlids respectively, or, as aquarists — and dealers — prefer short names, couldn't one call them the "Gold Rim" or the "Silver Rim"? Or does that remind one too much of spectacles?

If the "Saum" as a term can't be eradicated any more, perhaps the proper pronunciation would help. The "s" is voiced as in "zoo", the "au" sounds as in "how" or "brow". So it should be pronounced as if it was written "zowm". Well, forget it as another piece of useless information!

After fighting a losing battle with the English language and with my typewriter for over an hour my concentration has gone. I do hope, though, that my letter has given you some information on *Aequidens rivulatus*.

Hoping that this beautiful fish will become popular in Britain.

Best wishes,
Paul Schlagböhmer
Mülheim,
West Germany

***Editors Note.** Thank you, Paul, for such an excellent and illuminating letter. It should now solve the White Saum beyond doubt — and we are all much better informed than before. As to your "losing battle with the English language" is concerned, I've printed your letter virtually word for word. I can assure you that, had our situations been reversed, you would have been faced with an impossible task. Mine was easy — your English is perfect.

John Dawes

"A SNAIL DILEMMA"

Experienced pondkeeper and photographer, **Harvey Wood**, reports on a rarely-recorded and unusual snail problem.

Snails are regarded by many pondkeepers simply as scavengers and poor ones at that, making as much mess as they clean up. However, they are fascinating organisms and add greatly to the interest of a pond.

They can occur in any pond due to birds transferring eggs stuck to their feet. The most common kinds, and the ones sold by pond suppliers, are the Great Pond Snail *Lymnaea stagnalis* and the Ramshorn (*Planorbis* and *Planorbarius*).

Because they have "lungs" and so can breathe air directly, these organisms can live in the often oxygen-deficient water sometimes found in ponds. Indeed, Ramshorns seldom have need to come to the surface as they can fill their "lung" with water and use it as a gill. Also, their blood contains oxygen-carrying haemoglobin, making them better able to extract oxygen from water. The "lung" is merely a cavity in the snail's shell which opens to the outside through a small tube. This can sometimes be seen when they come to the surface and push their foot through the surface tension to pump in air.

Snails breed prolifically, and many species are hermaphrodite, which means that each individual has male and female organs so they can mate as either sex in quick succession. Sometimes they can be seen in groups fertilising each other simultaneously. Snails can also fertilise their own eggs, so only one need be introduced to a pond to secure a population. Great Pond Snail eggs are laid in batches of 3-500 in long sausage-shaped ribbons. Ramshorns lay eggs in smaller rounded masses.

It is said that snails eat plants. Possibly in an aquarium, with little algae allowed to grow, this is true, but in a pond they prefer the algae attached to plants and rocks, together with any decaying plant parts. Great Pond Snails will also eat animal life, whether dead or alive.

While gazing into one of my ponds I noticed that the Ramshorn snails appeared to have quite large holes and grooves in their shells. The Great Pond Snails in the same pond were much less affected. Thinking that something must be attacking them, the pond was searched for a culprit, but none was found. Fish were ruled out as there were none in this pond.

As time went on their condition got worse — parts of the shells had been completely eaten away revealing the snail's body underneath. Something had to be done and, in turn, all the local aquarists and pond suppliers were contacted. Unfortunately, no-one had heard of such a thing. It was suggested I contact the Ministry of Agriculture and Fisheries, but they were



This Great Ramshorn Snail (*Planorbarius corneus*) clearly shows signs of severe shell "erosion".

also unable to help. They suggested I try the local Water Board, which I did.

I was surprised and pleased at their very prompt attention, for that very evening, an official arrived to take a look. He was used to being involved with rivers and lakes and our pond was the smallest water area he'd been asked to look at.

Although he was most helpful and examined the snails and the pond, he did not know the cause of the erosion and, in the end, took some snails away in a jam-jar to show his colleagues, saying that he would advise me of his findings.

After some weeks, no cause had been determined, so I then took several close-up photographs of affected snails and sent

them to the British Museum (Natural History) in London.

At last I struck lucky: an answer arrived. The snail shell erosion was the work of other individuals. This could have been because the snails had a growth of algae on their shells (which is food for other members of the population in the pond) or that they were overcrowded, or that the water was short of calcium and the snails were trying to get the wherewithal to make their own growth possible.

I determined that the latter reason was the correct one in my case. Apparently, Ramshorns are rather well-known for this behaviour! The photographs showed the people at the museum quite clearly that each hole was deepest at the centre and that the edges were often zig-zagged, which is the result of the scraping action of the snails' radula (tongue).

In an attempt to cure the problem and provide a source of calcium, I placed a cuttlefish bone in the pond and within a short time the snails recovered, thus confirming my earlier conclusion on the primary cause of the erosions.

Personally, I like snails in a pond as I feel that they add to the variety of life and interest. The eggs and young make food for the fish — my garden thrush tends to like them too!

Editor's Note:

Tropical freshwater species of snails also appear to suffer periodically from this problem. It would be very interesting to know if this is restricted only to species housed in soft, acid water or whether it also occurs in hardwater communities. Drop me a line on the subject.

John Dawes

Of the 26 species of pond snails* in Britain the most common ones are:

Name	Size	Description
Great pond snail (<i>Lymnaea stagnalis</i>)	Up to 50mm high 5 whorls in shell	Plain green-brown. Prefers hard water. Very common
Wandering snail (<i>Lymnaea pregra</i>)	Up to 20mm high 4 whorls in shell	Brown. Found in hard and soft waters
Nerite (<i>Theodoxus fluviatilis</i>)	9-10mm high solid shell	Variable colour with mottled markings. Common in hard water
Ramshorn (<i>Planorbarius corneus</i>)	30mm diameter concentric circles	Large brown shell. Commonest ramshorn. Found in hard water
White ramshorn (<i>Planorbis albus</i>)	7mm diameter concentric circles	White shell containing spiral marks. Common everywhere

* All snails require calcium to produce their shells and are therefore found in higher numbers in areas of hard water.

News

As reported last year, Thomas's, the manufacturers of Smackos, Marrobone, Biscrok, and, of course, 'Aquarian' (among other well-known brands), had long outgrown their premises in Halifax and were in the process of moving to a new multi-million-pound purpose-built factory "down the road" at Batley.

The move duly completed (and following an official opening by Mrs. Audrey Maes on

Dr David Ford welcoming the Lord Mayor and Lady Mayoress of Kirklees to the Aqualab. Also in shot is Laurie Raper, Thomas's General Manager.

'Aquarian' Open Day



Aquatic Rendez-vous in Monaco

The world-famous Oceanographic Museum of Monaco will be hosting the 2nd International Congress of Aquariology between 22-27 February 1988.

The Congress will be held under the "High Patronage" of His Serene Highness Prince Rainier III of Monaco, and will be presided over by Captain Jacques-Ives Cousteau, the Museum's colourful and illustrious Director.

Scientists and aquarists from all over the world are expected to attend the event at which top-level discussions will take place on a wide range of aquatic subjects, as the proposed list of topics shows:

1. Technical equipment:
 - natural and artificial seawater
 - fresh water
 - the treating of water, filtration
 - physico-chemistry of the environment
 - lighting, heating, cooling systems
2. Biology, ecology, behaviour, reproduction of cultured species.
3. Pathology of cultured fish.
4. Aquariology and aquaculture
5. Aquarium: a teaching tool.
6. Aquariology and conservation of the environment.

A room will be available for projection of audiovisual programmes: slide projections, films, videos, so that all participants can present their work.

During the Congress, the annual meetings of the EUAC — European Union of Aquar-

ium Curators and of the UCA — Aquarium Curators Union (France) will be held.

An exhibition of equipment — aquariology, audiovisual, etc., will be on display from Monday 22 to Friday 26 February.

Various excursions — visits of the Principality of Monaco and of the main museums in the area — are planned for people accompanying participants. Simultaneous translation

(French-English) will also be provided during the Congress and technical visits to the Aquarium installations of the Oceanographic Museum and of the Exotic Garden greenhouses will be organised for participants.

For further information contact J. Maigret, Manager of the Aquarium, Musée Océanographique, Avenue Saint-Martin, Monaco-Ville, MC98000, Monaco. Tel: 93 30 15 14. Telex: 469037 MC.



LMB/Aquatop competition winner receives his prize

The LMB Aquatics/Aquatop Ltd. competition which we featured last September drew a tremendous response, with the full list of winners being announced in our November issue.

The first correct card drawn was Robert Stevenson's entry which won him the top prize consisting of an LMB/Aquatop cabinet, tank and accesso-

ries worth £270.

Robert, who visited the British Aquarist Festival held at G-Mex, Manchester, with his family (courtesy of our sponsors) is seen in our photograph receiving his prize from Linda Dainton of LMB/Aquatop at the A & P stand.

Our thanks go, once more, to LMB for supporting this highly successful competition.

23 October), local dignitaries and press were invited to an Open Day on 30 October. A very professional video (produced by the Company's associates themselves) gave a full and colourful account of the company's continually-accelerating growth from its humble beginnings 110 years ago, a far cry from today's ultra-modern and hygienic 24-hours/day, 7-days/week factory.

Of particular interest, from the aquatic point of view, are both the new 'Aquarian' production line, specially designed to meet the ever-growing demand for this extremely popular range of flaked foods, and the brand-new, and exceptionally well-equipped Aqualab, home-base for the Company's famous 'Aquarian' Advisory Service which handles several thousand letters from aquarists worldwide every year, and its sister brand, 'Atlantis'.

The introductory speeches were followed by tours of the factory, including a visit to the Aqualab, under the guidance of Dr. David Ford, Head of the 'Aquarian' Laboratories, who was kept extremely busy answering all sorts of questions from the groups of fascinated visitors, most of whom had never before seen so many excellent, and varied, aquaria in a single room.

The day's activities were rounded off by two speeches, one from Councillor George Speight, the Mayor of Kirklees, who was accompanied by his wife, the Lady Mayoress, and the other from Mrs. Elizabeth Peacock, MP for Batley and Spen. Both speakers were impressed by what they had seen and fully paid deserved compliments to all those responsible for the successful move.

As Laurie Raper, Thomas's General Manager, said, "Over the past few years, we have built up a real business success story here in West Yorkshire ... and we believe this move (to Batley) will help us to maintain our programme of sustained and planned company growth".

'Aquarian' Advisory Service, 'Aquarian' Laboratories, Oakwell Way, Birstall, Batley, West Yorkshire, WF17 9LU.

Spotlight

THE RYUKIN

Photographs reproduced by courtesy of
Macho Ranchus (Singapore)

Every variety of Fancy Goldfish holds its own individual fascination for Goldfish fanciers. However, not all varieties have achieved the popularity in Britain which they might deserve. *A & P's* regular coldwater contributor **Stephen Smith** investigates the characteristics of one of Japan's most popular Goldfish varieties, the Ryukin.

It is with some surprise that such an attractive and hardy fish as the Ryukin has not been held in higher esteem in the UK. What more could the coldwater aquarist wish for in a fish?

Attractive finnage, deep body-shape, reliable to breed, and hardy enough for pond or aquarium: all of these features are combined to provide a variety of Goldfish which in Japan is second in popularity only to the Lionhead.

The Ryukin is thought by many to be one of the original round-bodied deviations from the slender forerunner of today's Goldfish varieties.

However, the exaggerated "humped back", the major feature of the Ryukin, is so pronounced that it is more likely, in my own opinion, to be a development of the Veiltail.

This is borne out by the flowing finnage of the Ryukin, which, itself, provides this variety with its most attractive features.

The dorsal fin resembles that of a Veiltail Goldfish, being almost as high as the depth of the main part of the body (i.e. from below the "hump" downwards); while the caudal fin, unlike the Veiltail, is forked.

A further difference with the Veiltail is that the finnage of the Ryukin is enhanced if the rays of the dorsal lobe are as upright as possible, thus "fanning" the tail out. As with all the twin-tailed Goldfish varieties, the caudal fin should be fully-divided; while the anal fins, which may be quite elongated, should be paired and completely separated.

I cannot recall having seen Society Standards for the Ryukin, and this may be the reason why the fish is, sadly, rarely seen on the show-bench in Britain.

However, the "humped back" feature is occasionally seen in some of the Fantail varieties as well as other of the round-bodied Fancy Goldfish.

The reason for this is not clear: it may be assumed that at some stage, breeders have

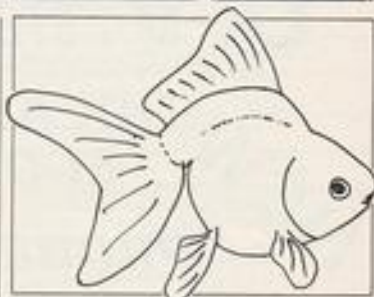


crossed a Ryukin (or a fish with predominant Ryukin characteristics) into their breeding strain — perhaps to introduce some of the hardiness of the Ryukin into their offspring.

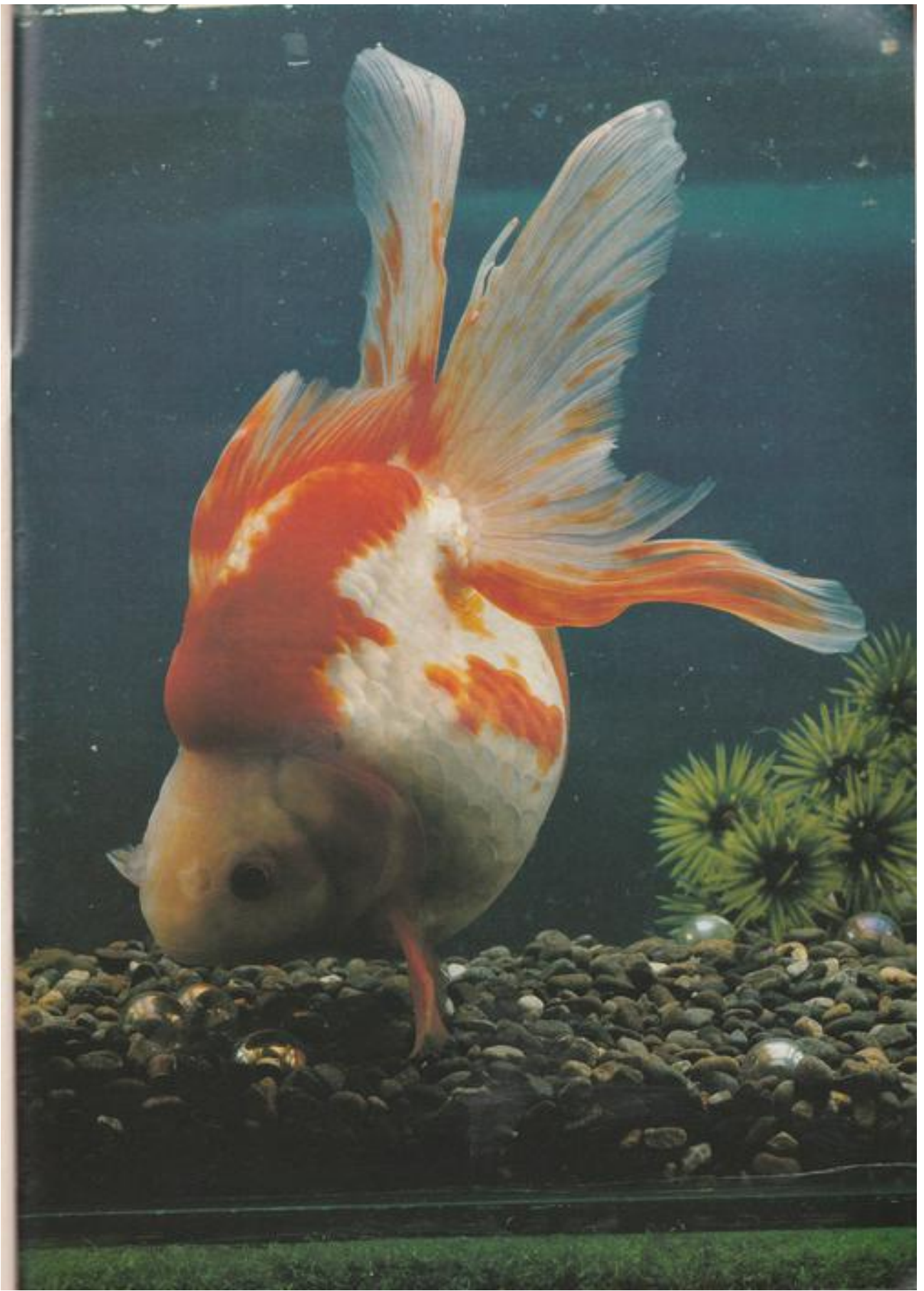
Such cross-breeding is not to be encouraged, however, as it would appear that the gene which carries the "hump" characteristic is a dominant one and will thus easily become "fixed" into the strain — becoming almost impossible to eradicate by future selective breeding.

The Ryukin is a metallic fish, usually red-gold; while red-and-white Ryukins are a popular and most attractive variation.

I have yet to find any calico or nacreous Ryukin, and would be interested to find out whether such fish exist. Calico Fantails with Ryukin-type backs are now quite common, but even selected offspring cannot be considered true Ryukin.



It would appear that no Society Standards currently exist in the UK for the Ryukin; perhaps this outline drawing could form the basis for the establishment of a national Ryukin standard and, perhaps, increase the popularity of this elegant and hardy Goldfish in this country.



Koi Talk

by John Cuvelier



Welcome to the debut of a new feature for Koi-keepers. I hope to bring you an interesting and informative assortment of tidbits associated with the art of keeping your fish in the way they deserve and, in the process, reminding you of old ideas, but at the same time bringing to your notice any new developments which may appear over the horizon.

The newcomer to the hobby has a tremendous amount to learn, something which old hands tend to overlook, so I ask the pundits to bear with me if at times I seem to be teaching you to suck eggs!

John Cuvelier

Concrete problems

A number of readers have been in contact with me regarding one particular problem which always crops up when a concrete pool is under construction and pipework is being installed.

Obtaining a good seal between plastic pipework and a concrete pool wall has caused many a headache, so here's a simple solution. I assume that a filter feed pipe of 4in dia. is to be used (anything smaller is not recommended). Any builder's merchant will be able to supply a 4in clay pipe and an adaptor for connecting 4in plastic pipe to it. The brand I have used is marketed under the name of 'Super Sleeve', and all one needs to do is to use the clay pipe for the section passing through the concrete wall, and an adaptor to convert to plastic pipe.

Cement will bond perfectly to clay pipe which, incidentally, can be cut quite easily with a 4in cutting wheel, the technique



Left to Right: 4in plastic soil pipe, adaptor, 4in clay pipe (ask for unglazed type).

being merely to score deeply round the diameter; then, a couple of taps with a hammer on the scoring will afford a clean break. Both the pipe and adaptors are inexpensive — a bonus not to be sneezed at! The accompanying photograph shows both 'bits'.

Green water & U.V.

The problem of green water is another favourite topic of conversation among Koi addicts, with many different views and solutions being expounded. There is a pool not far from where this is being written which was designed in the traditional way with multi-chambered filter etc. which has been a continual source of embarrassment by refusing to clear in spite of all the usual methods being tried. Last year, however, the installation of an ultra-violet steriliser wrought a minor miracle by transforming 'pea soup' into something akin to gin in just one week!

U.V. sterilisers have been in use within the water industry for many years but have not been available, until recently, for hobby use (apart from some small models not really suitable for heavy duty use). A lamp emitting light in the ultra-violet spectrum is enclosed in a quartz tube for maximum transmission of the rays, with the water being treated passing around the tube. The U.V. rays kill off any algal cells and, incidentally, in any bacteria which might also be present. Having seen

how effective this device was on my friend's pool, I can unreservedly recommend these units to anyone who has tried unsuccessfully to clear green water.

The initial cost of the unit varies according to required flow rate and whether you have a 'Standard' or 'Deluxe' model, but in any case, does not anywhere near approach the figure which some are prepared to pay for one Koi. Installation is a piece of cake and running costs are just a few pence per week.

One word of caution! U.V. light is dangerous to the eyes, so don't make a habit of looking at it. Also, don't assume that when your pool finally clears that all is well. I've known crystal clear water which has been highly toxic, so do continue with your ordinary biological filtration and regular water testing. Further details can be obtained from: Quality Koi Company, Bridge End, Brighouse, West Yorks. Tel: (0484) 722015.

The price of Koi-keeping

Changing the subject rather abruptly, some of us could be forgiven for wondering if Koi-keeping is assuming the appearance of a pastime exclusively for the wealthy. Whenever I examine the prices asked for even basic requirements like Koi food, my eyes glaze over. Some varieties cost much more, weight for weight, than the best fillet steak, which let's face

it, is a rare treat on my table! Now, I've no doubt that these high prices can be fully justified by the manufacturers, but from a purely objective viewpoint, I do feel that many prospective Koi-keepers are scared off from starting the hobby because of the impression that any Koi-related product automatically commands a higher price.

At the risk of raising a few hackles (or should it be do-sab's?), some comment must be forthcoming regarding the almost obscene prices being paid in some quarters for Koi (admittedly, very beautiful Koi), some of which command prices in five figures. Much of this madness has been engendered by the emergence of the elite Koi-collector, ever anxious to expand his/her collection of trophies obtained through participation in the exhibition 'circus', for want of a better word. Needless to say, they have every right to indulge themselves if they have the wherewithal; who could say otherwise?

Unfortunately, ordinary Koi lovers who could never imagine trading in their pets for better models, are adversely affected by the spin-off of high prices others pay without a second thought.

All I can do is to repeat my oft-spoken words of comfort to the average 'Koi-Nut': A pool full of Koi costing, perhaps, a tanner a throw, will give you as much, if not more visual pleasure (thanks to their patches of 'wrong' colour in the 'wrong' places) than all the expensive Koi possessed by the so-called connoisseurs.

Open Invitation

I would like our readers to participate in this new feature, so if there is anything you would like to say, or questions to ask, drop me a line via the Editor.

You might even have a good tip which would help fellow enthusiasts. Let's face it, much of my knowledge has been gained through the efforts of others, and I am only too pleased to pass things on.