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**PONDS AND
WATER
GARDENING
SUPPLEMENT**

SEE PAGE 44
for full details

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COVER STORY — Redcap

Photograph: Max Gibbs, The Goldfish Bowl, Oxford

Still as popular as ever, the Redcap (please note: NOT Redcap *Oranda*) is one of the best known varieties of Fancy Goldfish (*Carassius auratus*).

There are two 'broad' types of Redcap, one possessing a long, flowing double caudal (tail) fin — as found in Veiltails — and one with a shorter, almost 'upright', double caudal — as found in Fantails. In between, of course, there are all sorts of variations on this theme.

While purists may argue at length — and with considerable vigour — regarding the relative values and merits of long-tailed or short-tailed Redcaps, to the vast majority of aquarists, the beauty of this elegant fish lies primarily in its striking livery of white body and red hood.

The Redcap should be regarded as an 'aquarium' variety of Goldfish, but shorter-finned specimens could perhaps be housed in outdoor ponds in very sheltered areas.

Letters

Fish TB Action Plan

I note with interest the comments regarding Fish Tuberculosis, expressed in the March '92 edition of *A & P* (page 69). Considering the welfare implications of these views, and the potential risk of infection to the aquarist, I would like to propose what I would regard as a more appropriate 'plan of action'.

This plan begins with the decision of whether to treat or euthanase a fish suspected of carrying Fish TB. This decision is based upon:

① The welfare of the fish

Fish TB can be as crippling to fish as its human equivalent, although I must stress that they are separate diseases. Fish possess a complex nervous system and a behavioural repertoire which enables them to react quickly and appropriately to 'noxious stimuli'. They therefore appear to react to 'pain' and, until someone can prove it conclusively, they must be given the benefit of the doubt. On a purely philosophical level, the only animal that I know for certain can feel pain is myself!

② Value of the fish

This can be economic as, for example, in the case of a prize Koi. Certain fish are rare in captivity and, with continuing environmental pressure, many more may go the same way. In these situations, every individual is important. Finally, there are the 'family pets', the much loved Goldfish or a captivating Oscar who receive as much love and care as the dog or cat.

③ Infectiousness

The infection is potentially infectious to people.

The bacteria which cause the disease can invade cuts in the hands and set up a localised infection. Consult your doctor if you have any suspicions. Again, I stress that this is not the same disease as human TB.

④ Transmission

The disease in fish is passed on classically by the consumption of infected fish, either from eating dead fish, or directly by predation (remember this if you're using 'feeder goldfish', etc). In addition, the internal organs are usually affected before the skeleton; the com-

monest affected organs are the liver and kidneys. From these, the bacteria are shed into the digestive tract and urine, and so, eventually, gain access to the general aquarium environment. This brings me to my next point.

⑤ Infected Tanks

An aquarium with an infected fish is highly likely to be infected itself, with bacteria passed out with fish waste present in the muck on the tank bottom and in the filters. This is a further potential source of infection to both the fish and the aquarist.

⑥ Treatment

Treatment of Fish TB is often unrewarding and the drugs can be expensive relative to the price of the fish.

If, after considering the above points, treatment is chosen, consult your veterinary surgeon about appropriate treatment. If it is felt that this is not an appropriate course to take, then the fish, for its own sake, must be euthanased.

In both instances, the tank should be treated. Where feasible, all fish should be removed to a separate tank for treatment, with the main tank in the meantime being dismantled and thoroughly disinfected. If this is not possible, then ozone treatment is certainly effective, or the addition of chloramine (B or T) followed by a water change after 24 hours will help (Van Duijn 1981).

Fish TB is considered as one of the most common diseases affecting ornamental fish (Richards 1977), although it is rarely diagnosed. Van Duijn (1981) and Gratzek (1981) consider that any fish suffering from lethargy, loss of balance, anorexia, emaciation, rapid gill movements, ascites, skeletal deformities, exophthalmia, skin discoloration, scale defects and scale loss, skin ulceration and fin destruction, over a period of time, is a candidate for fish TB.

I have written this letter, not to frighten people about this disease, but to try to promote a more objective approach to ornamental fish health and welfare. I feel we owe it to them.

Lance Jepson,
MA, VetMB, GIBiol, MRCVS,
Rotherham.

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[For fuller discussion of Fish TB in humans, see the article by Mel Jones on pages 27 and 28 in the June '91 issue of *A & P*. Ed]

A & P Back Issues Sale For Worthy Cause

I have 30-40 copies of *Aquarist & Pondkeeper*, the first dating from January 1948, the last, 1954, all in perfect condition. What interesting reading they make, and all for one shilling! Plenty of bargains: Bronze Carp 2-3 inches 2/6d, but the same size Goldfish would seem expensive at 8/6d.

There is plenty of good reading, including *When the Frost Cracks the Pool* by L B Burrows, and many more interesting articles.

If any of your readers would like to make a reasonable offer for the magazines, from which the charity I support will benefit (The Ormskirk Blood Gas Analyser), they can contact me at the address given below. I am also open to all fund-raising ideas that will help my cause.

To provide your readers with a fuller background to the appeal, I would be very grateful if you were able to publish the letter which I have been sending out to prospective supporters.

Peter Cousins,
33 Whittle Drive,
Ormskirk,
Lancs L39 1PU

[We are delighted to help you in your efforts, Peter, and are therefore publishing excerpts from your appeal letter below. Ed]

Peter Cousins' Blood Gas Analyser Appeal Letter

In August 1989, my daughter and her friends went out to celebrate an eighteenth birthday at a restaurant in Southport. Then it happened! The moment that all parents dread, when their children are out late, police knocking at their door bringing to life your worst nightmare saying that your daughter has been in a car crash, and is badly injured.

My daughter was admitted into the Intensive Care Unit (ICU) at Ormskirk hospital with multiple injuries. In the first 48 hours it was crucial that the level of her blood gases was measured every 2-3 hours to ensure that the correct level of oxygen was being supplied to the brain.

This test had to be sent to the laboratory for analysis because the ICU did not have the equipment to carry it out. . . . The results then had to be phoned back to the ICU, after which, with supreme efficiency, the staff carried out the appropriate treatment.

It was at this point that I realised the desperate need for the Blood Gas Analyser in the ICU and I vowed to raise funds to buy the vital analyser. The cost of the analyser is £28,000 and £4,000 per annum running costs. We still need £4,000 to meet the target. . . .

My daughter will, in time, make a full recovery but, regrettably, there will always be a need for the Intensive Care Unit to own a Blood Gas Analyser. Your donation (by making an offer for the afore-mentioned copies of *A & P*) will help me to obtain this much-needed piece of equipment which will help save lives.

Thank you.

Peter Cousins.

We welcome readers' views on all aquatic, herpetological and conservation matters. Please address your correspondence for the Editor's attention and mark the envelope: LETTERS

Editorial

CITES AND THE DRAGON FISH

The latest round of CITES meetings was held in Tokyo in March, amid a great deal of public posturing and counter-posturing regarding emotive, and hugely important, issues like the ivory trade.

One of these days, I really must attend one of these international gatherings to see if it is at all possible to gauge at first hand just how 'genuinely' the discussions are carried out, or to what extent some of the decisions taken are politically motivated. . . or even to try to ascertain just how valid the thought that some of the proposals are used as 'bargaining chips' really is.

It would, indeed, be interesting to see how conclusions that have worldwide applications (and implications) are arrived at in the (perhaps) rarefied atmosphere of a debating chamber — a virtual light-year away from the raw realities of life for, say, Amazonian river people.

Someone who has, on several occasions, attended such meetings is David Alderton. David's last report on CITES appeared in *A & P* in March 1990 (see *CITES and the Aquarist*, on pages 15-16 of that issue); he will also be providing us with an update of this year's proceedings in the near future. I was very keen to talk to David on his return from Tokyo because, as I mentioned in my editorial *Draconian Rumbles* in our February issue, there were some ominous rumours doing the rounds just before the CITES 'summit', that Indonesia's export quota of captive-bred Dragon Fish (*Scleropages formosus*) was under threat.



Mouth-brooding Dragon Fish photographed in Singapore.

JOHN DAWES

To my huge relief, David reports that the 'constructive' tone struck at the October 1989 meeting (when the quota was granted) seems to have been maintained this time round. To quote from the actual notes produced with respect to *Scleropages*:

Reporting on the proposal concerning Scleropages formosus, the delegation of Indonesia agreed to a quota of 3000 captive-bred specimens, with a maximum individual length of 15cm, for 1993, with a provision for an increase of 1000 for 1994. They clarified that the quota for wild-caught specimens would remain at zero. The Committee agreed to commend the revised proposal to Plenary.

It's great to see that, at least in this case, progress does not appear to have been arrested, even though the size of the specimens allowed is so small. Yet, despite the significant advance made by Indonesia, several worrying factors remain.

For example, *Scleropages* — quotas notwithstanding — remains on Appendix I. And what about Singapore? The silence emanating from this great expert Dragon Fish breeding country is deafening!

From this end of the world, it is puzzling to work out why — when *Scleropages* was so successfully bred by the Primary Production Department (PPD) throughout much of the 1980's that surplus captive-bred stock had to be released. . . and when some Singaporean fish farmers can produce Dragon Fish of every hue — no official action has been set in motion to emulate Indonesia.

Perhaps someone somewhere can throw some light on this perplexing situation. If so, we'd love to hear from you.



John Dawes
Editor

News Desk

Goldfish in Drinks Causes Stir

Several complaints have been made to the Society for the Prevention of Cruelty to Animals in Wellington, New Zealand, following reports that a Wellington bar was serving live Goldfish in cocktails. (See also: *Goldfish Abuse in New Zealand* — page 5 — in the May issue of *A & P*.)

Called "Goldfish Laybacks", and sold at around \$10 each at the Route 66 Bar in Wellington, the cocktails consisted of tequila, lemon, and live Goldfish. Official enquiries received an initial denial, but the bar's solicitor is reported to have later admitted that the practice

of serving live fish in cocktails was taking place "as a joke".

At the time *News Desk* went to press, it is understood that a prosecution was taking place, and *A & P* is awaiting the outcome. However, regardless of the result of legal proceedings, the risk of catching disease — if not human decency — is expected to discourage drinkers from spreading the practice.

The New Zealand Central Institute of Technology health professions head, Gordon Hewitt, has warned that people who eat live Goldfish could contract Fish Tuberculosis. The disease, described by Mr

Hewitt as "particularly nasty", is similar to human and bovine tuberculosis, and causes fluid retention and swelling. (See *Fish TB in Humans* by Mel Jones, on pages 27 and 28 of June '91 issue of *A & P*.)

"The risk occurs if the fish is infected with the bacteria, and the swallower has a cut or ulcer in their mouth," remarked Mr Hewitt.

Ross McLauchlan, director of the Wellington Society for the Prevention of Cruelty to Animals, explained the society would be prosecuting the bar under the New Zealand Animals Protection Act. "It is a pretty sick sort of thing to do and the public themselves have to say 'enough'," he said.

Wellington Society for the Prevention of Cruelty to Animals Inc, PO Box 7069, 304

Mansfield Street, Newtown, Wellington South, New Zealand. Tel: 010 644 389 8044; Fax: 010 644 389 5577. Contact: Ross McLauchlan, Director.

OFI (UK) Condemnation

"Ill treatment of animals, particularly when planned, deliberate or systematic, is absolutely wrong. When one takes possession of an animal, whether for trade or pleasure, then a very special set of responsibilities must also be accepted. All reasonably practicable steps that do not endanger human safety, must be taken in their care.

"To use animals (and despite what many misinformed people think, fish are animals), as the

centre of an obviously cruel, malicious, self-serving, promotional gimmick is abominable.

"It is clear that we must all be on guard against those with warped senses of morality that allow them to perpetrate such stunts. OFI (UK) would hope that if the facts are as reported, successful prosecution is followed by a suitable punishment, reflecting the absolute lack of care in this instance."

OFI (UK)

Pure as the Driven . . . ?

Aquarists have been warned to beware of using water purifiers intended for domestic use for water supplies to their fish.

Charles Harriss, commercial director of Purity on Tap, explains that, while these products may be approved for drinking water supplies, the materials used to filter the water may be harmful to aquatic life. "Some of the water purifiers intended for use in domestic water supplies have been found to leak zinc and copper into the water at levels which would suggest injury to long-term health of fish," remarked Charles. "People should be made fully aware of the nature of the water which has been treated by such units."

Charles' opinion is shared independently by Neil Turner, director of Kent Filtrac, whose company has voluntarily withdrawn from sale certain filter products.

"We have done this because we cannot verify any removal of nitrate from tapwater whatsoever, nor any ability to remove phosphate or aluminium sulphate, despite some claims to the contrary," explained Neil. He said he had discovered that the filter media he had been offered were made from "fused copper and zinc" and that, in his opinion, there is no way that such a material could remove aluminium or negatively charged ions (such as NO₃) from water.

"Our testing revealed that any apparent removal of nitrate (as indicated by standard test kits) is merely an illusion — the presence of metals in the filtered water 'foiled' the test kit that was used."

Neil explained that the medium in some filters does remove some metals from the water, "but in doing so, will release zinc due to the rapid

corrosion of the medium. Zinc is a notorious irritant metal that can cause severe allergic reactions and even death in certain cases."

He concluded, "In our opinion, filters intended for domestic use are not necessarily suitable for fishkeeping purposes, and many of the claims made for their performance cannot be verified in practice."

Charles Harriss explained that he became so disillusioned with the claims made for domestic water purifiers that, with the advice of kidney dialysis specialists, he has developed a range of filters specifically for use by pond and aquarium owners.

"These contain powdered activated carbon, first activated then superstream heated to give maximum media area for a given weight and packed into briquette form to give up to 3½ million square feet of filter area per cartridge."

The filter medium is claimed to remove chloramine, chlorine up to .003 ppm from average quality tapwater, and pesticides; while a carbon and mixed media resin cartridge is claimed to remove 90% of particles of toxic metals, such as iron, copper, lead, and zinc, and over 80% of aluminium sulphate from water containing the maximum EC level permitted 2 ppm aluminium.

Purity on Tap Limited: Wickfield Farmhouse, Shefford Woodlands, Newbury, Berkshire RG16 7AL. Tel: 0488 39319. Fax: 0488 398997. Contact: Charles Harriss.

Kent Filtrac Limited: 7 Ivy Lane, Knockholt, Sevenoaks, Kent TN14 7LE. Tel: 0959 33048. Contact: Neil Turner.

Breeding Success for Extinct Species

The Zoological Society of London has reported a good start in breeding the Lake Victoria cichlid, *Haplochromis pyrocephalus*; while a colony of Monterey Platyfish, *Xiphophorus couchianus* is reported to have doubled within three months.

Both fish species are believed to be extinct in the wild, and form part of a collection of fish including Angelfish, tetras, Corydoras catfish and numerous species of cichlids and anabantoids which are also

breeding in good numbers.

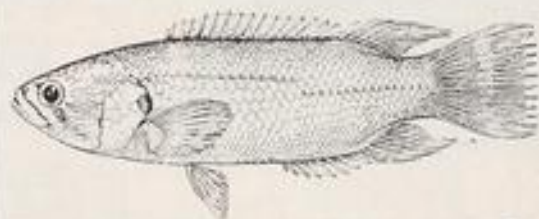
The Zoological Society reports that they have a batch of 10 to 20 *Haplochromis pyrocephalus* fry in excess of one inch (2.5cm) long; while the colony of Monterey Platyfish, *Xiphophorus couchianus*, was initially supplied by Derek Lambert, chairman of Viviparous — the Livebearer Information Service and frequent *A & P* contributor.

Derek has been breeding this colony for ten years and explained that, once the conditions are right, they should breed quite happily. "They are not an easy fish, but as long as they are kept with plenty of cover and with the right food, they will breed quite naturally."

Save the Rocky

A plea for contributions to help save the Eastern Province Rocky, *Sandelia bairdii*, from extinction has been issued by Albany Museum, Grahamstown, South Africa.

Jim and Eve Cambrey have an ongoing research project on the fish at the Blaauwkrantz



Sandelia bairdii — the Eastern Province Rocky — under serious threat in the wild.

Nature Reserve for *Sandelia bairdii*, where they recently cleared the Blaauwkrantz reserve of water fern which was completely covering the pools in the river. The two known species of *Sandelia* have no labyrinth organ but the air-breathing chamber remains intact; these species are therefore more riverine and are not well-equipped to survive in areas with complete cover.

"We were relieved to find that, after the rains in November, we still had a breeding population of the Eastern Province Rocky in the Blaauwkrantz reserve," explained Jim and Eve. "However, all was not well. During the hard work of our volunteers over weekends, during which we removed up to five tonnes of water fern *Azolla filiculoides* from the main pool

in the reserve, we have found that the young fish are stranding themselves on mats formed by invading water fern, when they jump out of the water to catch insects or to avoid predators.

The couple explained that the Eastern Province Rocky, *Sandelia bairdii*, is listed in the



A unique reserve?

South African Red Data Book-Fishes as vulnerable: "This means that the species is likely to move into the endangered

category, the final category before extinction. This species has a very limited distribution and only occurs in parts of four river systems in the eastern cape of South Africa."

The Algoa Regional Services Council has put aside a small reserve, the Blaauwkrantz Nature Reserve, for the Eastern Province Rocky. The reserve is on the Blaauwkrantz River, a tributary of the Kowie River system, and it is believed to be the only nature reserve specifically set aside for a species of Anabantidae.

Jim and Eve explained that the main threat to the continued existence of *S. bairdii* is habitat deterioration. "Water abstraction during dry periods, agricultural, urban and industrial pollution, and sedimentation caused by soil pollution,

have all been identified as the main problems," they remarked. "Also, the alien water fern *Azolla filliculoides* has been introduced into the Kowie River System, where conditions of prolonged drought periods, combined with enriched waters are ideal for the growth of the water fern."

Contributions to help save the Eastern Province Rocky and its habitat can be sent to: **The Curator of Freshwater Fishes, Albany Museum, Somerset Street, Grahamstown 6140, South Africa.**

A Fish Called David . . . ?

Comedy actor John Cleese is reported to have become a USA heart-throb when the film *A Fish Called Wanda* was released some years ago. So what are the chances of Aquarian's **Dr David Ford** following in his footsteps . . . ?

Dr Ford, head of the 'Aquarian' Advisory Service, was called in by producers of a new British comedy film being recorded this year for release in spring 1993. However, no strange antics or even silly walks were required: the task was to provide aquarium systems for a scene shot in a North London flat.

"Three aquariums were required," said David Ford. "One with marine fish, one

other than a pig farm!

David installed the tanks, donated by **Aquatop** of Oldham, with Aquarian filtration systems, heaters, and airpumps; while the fish were supplied by **Kingfisheries** of Beckenham and the lobster donated by **Billingsgate Market**.

Dr Ford's 'fan mail' was increased significantly, however, following a broadcast on Yorkshire Television. Thomas's factory in Birstall, West Yorks, where the 'Aquarian' range of foods, medications, and equipment are manufactured, was featured recently on the YTV programme *It's a Vet's Life*, during which David was interviewed at his computerised office, where he revealed that over 10,000 letters about the fishkeeping hobby are received every year.

"The effect was to bring in lots more letters from viewers . . ." exclaimed David.

First-Ever National Pond Survey

Ponds are still urgently in need of help to ensure the long-term future of their wildlife, according to results of a survey released by **The Wildfowl and Wetlands Trust**.

The survey is believed to be the first-ever national pond survey carried out by the national public, and included informa-

tion towards saving the 'poor relations' of the British countryside. Previous reports by other organisations are said to estimate that there are fewer than half the number of ponds which existed 100 years ago.

Of the ponds surveyed for **The Wildfowl and Wetlands Trust**, 65% of school ponds, 60% of garden ponds, and 37% of the total number of ponds surveyed were under ten years old. "This represents an important contribution to replacing the ponds lost since 1892," said **Caroline Aistrop**, of **The Wildfowl and Wetlands Trust**. "Over 66% recorded the presence of frogs, and 7% of garden ponds were providing a home for the Great Crested Newt, a threatened species protected by law."

The survey report concludes that the value of ponds for aquatic wildlife must be improved soon, or the less commonly-occurring animals will die out. The average invertebrate index (a measure of the health of a pond) for the whole survey was 30 on an index scale of 1-98: a very low level in the 'moderate value' band; while the index values for gardens and schools were 25.51 and 32.99 respectively.

In conclusion, the report calls for:

- ① encouragement of ponds to be designed particularly for wildlife;
- ② widespread publicity of the need for long-term care of ponds and wildlife;
- ③ restoration of neglected ponds in villages and the countryside;
- ④ creation of legal methods to protect ponds.

To give ponds a fighting chance, **Pondwatch**, the first national campaign to save ponds, was launched in 1989 by **The Wildfowl and Wetlands Trust**; while the pond survey is continuing, and further pond surveys are needed.

The **Pondwatch** awards were created to provide positive examples of what can be done to save ponds and their wildlife. Anyone in the UK who has created a pond for wildlife can enter the **Pondwatch Awards 1992**. Closing date is **30 June** and further details are available from: **Caroline Aistrop, The Wildfowl and Wetlands Trust, Slimbridge, Gloucester GL2 7BT. Tel: 0453 890333.**

High-Rise Society for Aquatic Plants

A dream has become a reality for a Leeds man who has, for years, had the desire to create an aquatic plants club. **Aquarist Ray Brabrooke** has received enormous interest since the launch of "**High Rise**" **Coldwater and Tropical Aquarium Plants Club (CWATAPS)** just over six months ago.

Already, the club, for aquarium and pond plant enthusiasts, has 36 members from throughout the UK, and is aiming to produce two newsletters this year and a regular quarterly publication in 1993. Said Ray, "This will incorporate contributions from members on any subject, not necessarily just plants and fish, and we would like to hear from overseas enthusiasts as well."

He continued, "If response to membership continues to grow at the present rate, I intend to arrange future club meetings in different parts of the country once or twice a year. These will take the form of weekend breaks consisting of plant and fish auctions, organised trips to plant nurseries, slide shows, talks by well-known aquarists and aquatic plant enthusiasts, then evening entertainment of members' choice."

The club will be appearing at **Aquarium '92** at Sandown Park (6-7 June), where, according to Ray, 115 varieties of aquatic plants, including 20 different types of *Cryptocoryne*, will be on the stand. In addition, plant food blocks, neutraliser blocks, a multi-purpose disinfectant cleaner, and bogwood will also be among the range available.

High Rise . . . ? Quite simply, Ray has converted a bedroom into a fishroom — despite the fact that it is on the fifth floor of a 16-storey block of high-rise flats. The fishroom accommodates no fewer than 54 tanks in immaculate condition. "I am a joiner by profession and was advised to get a hobby!" said Ray. "That was 20 years' ago and I have become rather 'immersed' in fishkeeping."

Among the plants, Ray's collection of fish includes **Rainbow fish, Swordtails, Guppies, Firemouth Cichlids and Angel-fish**; while he has experimented with propagating over 40 varieties of aquatic plants — without any additional heating. "Most



Setting up for stardom! Dr David Ford, head of the Aquarian Advisory Service, provides the finishing touches to one of three aquariums as part of a scene in the British comedy film, *Leon the Pig Farmer*, currently being filmed for release next spring.

with Goldfish, and another with a North Sea lobster." The film, called *Leon the Pig Farmer*, stars **Mark Franklin** as Leon and former James Bond girl **Miriam D'Abo** as the leading lady, and is a story of a devout Jewish boy who inherits none

of the fortune. The film is a production concerning 627 ponds from Scotland to Cornwall, gathered between July 1989 and July 1991.

According to the trust, the most important discovery is that ponds of garden owners and schools are making a signi-

plants will flourish at around 65 degrees, with no tank heating," remarked Ray.

Membership of CWATAPS is open to anyone throughout the UK. Further details are available by contacting Ray Brooke, 30 Wortley Heights, New Wortley, Leeds, West Yorks LS12 1JG. Tel: 0532 311758.

Obituary — H.C.B. "Tommy" Thomas

One of the hobby's greatest stalwarts, **Tommy Thomas**, the longest-serving president and life member of **Bristol Aquarists' Society**, died in March at the age of 80-plus.

Tommy was secretary of the society in 1938 and held the position of president in 1950, 1954, and 1983-85, having also shared the office of president with a committee in 1965.

Writing of Tommy in the society's newsletter, colleague **Stan Lloyd** said: "I first met Tommy in 1954 and, over 37 years, found him a good, kind, friendly and knowledgeable person. He was a chemist by profession and, for 53 years as a member, he was always available to help other members in any way he could. His knowledge of fishkeeping, water quality and treatment of fish was a great help."

"Over the years, he was devoted to the work of the society, particularly to judging and the standard of the Bristol Shubunkin. In the beginning he favoured tropical fish and I remember him telling us that his first tropical tank was made from a square biscuit tin with one side cut away and replaced with a piece of glass, fixed on a bed of putty, and the 'aquarium' heated with a small gas bunsen



A great servant to the hobby, "Tommy" Thomas, who died recently at the age of 80-plus, is seen here judging at Bristol Aquarists' Society Diamond Jubilee Open Show in 1989.

burner underneath.

"Over the years, Tommy kept Nymphs, Comets, Barbs and Platies, as well as White Cloud Mountain Minnows. Tommy

showed all of these at the Bristol shows between 1949 and 1958."

Stan Lloyd concludes: "He was a dedicated worker who helped to keep the hobby and

our society progressing. His contributions to Bristol Aquarists' Society were immense. We have lost a good friend and the hobby a great servant."

Trade Talk

Improved Standards From Israel

A party of 17 UK specialists in Koi and other ornamental fish has returned from Israel having seen for themselves the progress which has been made in the fish-farming industry in that country over recent years.

The trip was organised with the assistance of Israeli Koi producer and exporter **Mag Noy** and UK agents **Bach Aquatics**, whose agent in Israel compiled an itinerary which incorporated visits to fish farms and the chance to explore the sights of the Holy Land.

Among the party were professional fish retailers and private fish collectors, including **Glyn and Anne Johnson** of **K.G. Products**, **Tommy Croft** of **Belle Vue Koi**, and **Chris and Denise Cotterill** of **Worcester Aquatic Centre**.

The programme took the party to kibbutzim at **Ma'aborot**, **Gan Shmuel**, **Ma'agen Michael** and **Hazorea**. **Mag Noy** also hosted a dinner at which fish geneticist **Dr Samuel Rothbridge** gave a presentation on the history and

development of Koi in Israel.

At the hatcheries, the party was allowed to select fish of varying sizes from concrete holding tanks. **Tony Gambell** and **Keith Adams** of **Herne Bay** found fine examples of Koi up to 26 inches (66cm) in length to replace lost fish during the freeze of 1991; while a focal point of interest was the introduction of lemon Koi, which are expected to be available in reasonable quantities within the next two years.

The party was able to visit a hatchery at **Ma'agen Michael** at which investment of £2 million pounds had taken place. A substantial portion of this investment has, of course, been made in the filtration systems to support aquaculture on such a vast scale: at **Ma'agen Michael** the UV and gravel bed system cleans up to 300 cubic metres of water per hour.

Denise Cotterill, of **Worcester Aquatic Centre**, was impressed with what she saw during her visit. She told **News Desk**: "We raced around and did a great deal in a very short space of time. And the standards of fish are improving; as a result of selective breeding, they are equally as good as the Japanese."

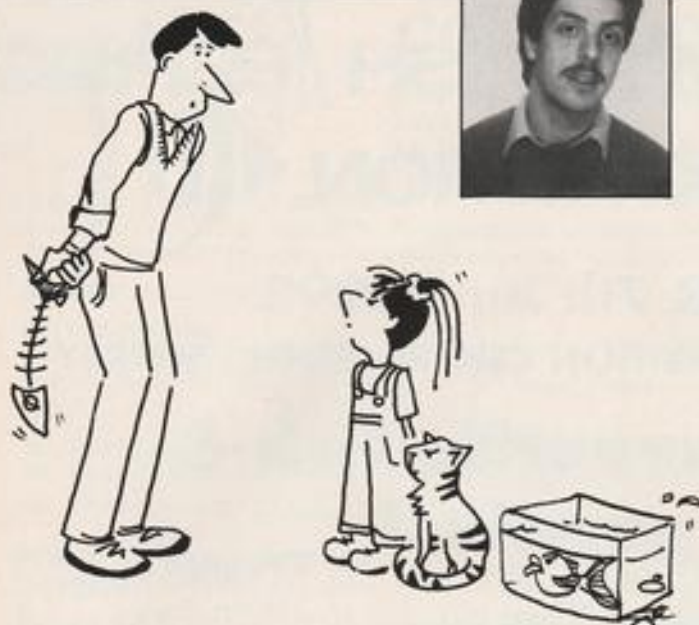


Part of a two-million pound investment in fish farming at kibbutz **Ma'agen Michael**, visited by a party of UK aquatic retailers as guests of Israeli Koi producer and exporter **Mag Noy**.



Visitors to Israeli fish farms, at **Ma'aborot**, **Gan Shmuel**, **Ma'agen Michael** and **Hazorea**, were treated to the sight of some spectacular Koi which, as a result of selective breeding, are reported to be equally as good as those from Japan.

Jason Endfield



AMY'S VIEWS ON 'BEANS' AND FISH

Mind-shattering in its simplicity, Jason Endfield's six-year-old friend's logic could well have a profound influence on adult and young fishkeepers alike.

This month I decided to tackle a difficult question: should fishkeepers eat fish? I've touched on the subject before I know, but the more I've thought about it, the more I've realised that, basically, most fishkeepers do eat fish. Even I do, and I'm appalled by the fact! Well I mean, dog owners don't eat dogs, do they? Of course not!

Actually, I once read a newspaper report about a man who ate his dog. He claimed it was during an identity crisis when he thought that he was a pig and that his dog was a chicken. I still don't see how that would explain it — I've never seen a pig eat a chicken, have you.

Anyway, where was I? Oh yes, fish-eating fishkeepers (that is fishkeepers who eat fish,

and not fish who eat fishkeepers, if you see what I mean. Bear with me please!).

All of this surfaced in my befuddled mind when I met a young friend of mine again recently. Some of you may remember six-year-old Amy Lyre who made her debut in my 1991 Christmas feature. Her potentially brilliant and presently 'interesting' poetry was featured in that article.

Well, she's even more 'into' fish now (and poetry) and she began to discuss the matter of eating fish with me, which she says is "unnecessary and it tastes horrible anyway". I was interested in her views because, to my mind, she will, when she grows up, be either a brilliant fishkeeper or one of those dubious 'modern' poets (I'm trying to encourage her aquatically-inclined ambitions).

She told me that she is not a vegetarian

because she has been to a farm twice with her school and that they "breed animals there specially for humans 'beans' to eat", and she added informatively that they are "bred specially with human consumption".

I think what she was trying to tell me was that the meat industry relies on factory farming — a much debated issue in itself — breeding animals purely as food, whereas food fish are mostly harvested directly from the sea. Amy went on to say that fish farms sound like a good idea but, as there were none in her vicinity, her school hadn't organised a trip to see one — although she intended to speak to Miss Willis (her teacher) urgently about the possibility.

I share Amy's general concern about the mass sea fisheries; stocks become depleted and are not as unlimited as many like to believe. But I was more interested immediately in the ethics of aquarists who, let's face it, keep fish primarily out of respect for the beauty, intelligence, variety and interest of their pets. How can they — should say 'we' because I must include myself here — eat fish with a clear conscience, apparently blind to any comparison between the fish in the tank and the one on the plate?

I put this to Amy, who, to my knowledge, is probably the only non-fish-eating aquarist in existence. "It's seriously weird", she said (where does she get these 'gems' from), "I like fish as fish and not as food, so I say to mummy not to give me fish to eat. If she shouts, I say 'I like you Mummy, so I would not eat you' and then she understands. Then grandma eats the fish and I have sausages, but that's OK because grandma doesn't have a goldfish like I do."

She made it sound so logical. "So, grandma doesn't have the same 'feelings' towards fish as you do because she's never had a pet fish?" I asked. "Yes", said Amy. So that was that.

I respect Amy's thoughts and I do wish I could live by her principles. Presently, I face a fish dinner with my eyes averted away from the aquarium.

I pondered towards the end of my conversation with Amy, then in a moment of sheer inspiration (I thought), I asked Amy why fishes eat other fishes. She looked at me in disbelief at my silly question. "Well, you see, that's because they're stupid", she said.

The whole discussion left me very confused, while Amy seemed sure that she was right and that I was ignorant. Maybe the next generation of fishkeepers will share Amy's ethics and refrain from the double standards of keeping and eating fish. We'll have to wait and see.

Meanwhile, I've since received another poem from Amy following our meaningful dialogue:-

*Dear Jason, thank you for our chat,
now I want to tell you this —
We went and bought a little cat,
and he, like me, will not eat fish.
I hope that you will soon agree
and cut down eating fish a bit
(my grandma still has fish for tea,
and makes rude noises after it).*

I'm seriously considering giving up eating fish. . .!

Your questions answered

Having problems? Send your queries to our panel of experts who will be pleased to be of service. Each 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 experts to whom your query should be directed.*

All letters must be accompanied by an S.A.E. and addressed to:

Your Questions Answered, The Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

Herpetology, Julian Sims. Koi, John Cuvelier. Tropical, Dr. David Ford. Coldwater, Pauline Hodgkinson. Plants, Barry James. Discus, Eberhard Schulze. Marine, Graham Cox.

TROPICAL

CARTWHEELING ANGEL

I have recently observed some unusual behaviour in a young Angel which I find both baffling and disturbing. At night, when I switch the lights off, the fish in question seems to panic and sort of repeatedly 'cartwheel' backwards.

Its behaviour indicates that it can't maintain its balance, yet, by morning, it is fine again. Other than this, the fish appears healthy.

Angelfish (*Pterophyllum scalare*) originated from South America. These fish were hardy, some even aggressive, and all grew very large and were long-lived. Over the years, ornamental fish farming has taken over and the vast majority of Angels are now produced en masse in the Far East and Florida.



Today, we can enjoy many varieties of farm-bred Angels. But have these fish lost something in the process?

By selected breeding, the original Angel has also been turned into Veiltails and Albinos, Gold and Silvers, Striped and Spotted, etc. To establish a true breeding line, at least 10 in-breeds may be necessary (brother x sister) ... which obviously leads to side effects. These include shorter lives, smaller size, nervousness and odd behaviour.

I believe the somersault of your Angel is pure nervousness. If the Angel is looking up at an overhead light which suddenly goes out — it throws a panic fit.

Some of the modern in-bred varieties can actually die of heart attacks when bright lights are switched on.

Either search for a hardier specimen, or fit a dimmer switch.

PLANTS

WEIGHTY PROBLEM?

I am told by my friends that I should wrap bits of lead around my plants to keep them in position while they take root. However, I believe that lead is harmful to aquatic creatures. Is this so?

Lead salts dissolved in water are ingested by organisms and can damage the nervous system. However, where the water (as in the UK) is normally quite hard, metallic lead oxidises and forms a hard insoluble coating which prevents the lead dissolving further.

In any case, the damage is longterm and fishes' lives are generally short, so it is unlikely that they would be affected by

lead poisoning from plant weights during their lifespan.

INDETERMINATE OXYGENATORS

We are about to embark on the construction of a pond which will

be fringed by 18in (45cm) deep margins throughout.

We consider it essential that these margins become a solid mass of oxygenators to deter algae. At the same time, we do not want plants that are of indeterminate length, since they will grow laterally once



'Crispa' is not only a good oxygenator, but also provides an excellent spawning medium. However, it is more of a deep-water plant than one well suited to cultivation along pond margins.

they reach the surface.

We would therefore welcome your advice on this matter.

By their very nature, I am afraid that all oxygenating bunch plants grow to an almost unlimited length.

I suggest that you use *Lagorhizon major* ('Crispa'). This is about the best plant for your purpose, but you will have to prune off the lateral and terminal growths. Of course, what you are doing is against the normal rules of planting, but you may nevertheless be able to keep matters under control.

Oxygenators are normally planted in the deeper areas of the pool, while marginal plants are used along the edges and in varying depth shelves.

HERPETOLOGY

HORNED FROG SUPPLIES

Having kept the Argentinian Horned Frog, *Ceratophrys ornata*, I would now like to obtain either *C. cornuta*, the Amazonian Horned Frog, or *C. aurita*, the Brazilian Horned Frog. Can you help me in locating suppliers of these fascinating amphibians?

As Marc Staniszkewski stated in his article Horned Frogs featured in the January 1992 edition of *Aquarist & Pondkeeper*, the Amazonian Horned Frog (*Ceratophrys ornata*) is a difficult species to keep, and the Brazilian Horned Frog (*C. aurita*) is only occasionally available from "reptile shops".

Therefore, to acquire these frogs, I would first be inclined to place a request in the regular monthly newsletters of the leading herpetological societies and the quarterly *Bulletin of the British Herpetological Society*. The relevant addresses to contact the editors are as follows:

ASSOCIATION FOR THE STUDY OF REPTILIA AND AMPHIBIA (ASRA)

ASRA's monthly newsletter is called *The Reptibary*. To place a request for livestock, details of the species required (for example, age, sex and number of individuals wanted) should be sent to:

Trevor Rose,
The Reptibary Editor,
19 Longmead,
Abingdon,
Oxon OX14 1JQ.

SOUTH WESTERN HERPETOLOGICAL SOCIETY (SWHS)

The monthly newsletter of the SWHS is produced by the Society's Secretary:

Frank Gibbons,
"Acanthus",
59 St Marychurch Road,
Torquay,
Devon TQ1 3HG.

INTERNATIONAL HERPETOLOGICAL SOCIETY (IHS)

To have a 'wanted' advertisement published in this society's monthly newsletter, relevant details should be sent to:

Tony Mobbs,
65 Broadstone Avenue,
Walsall,
West Midlands WS3 1HA.
BRITISH HERPETOLOGICAL SOCIETY (BHS)

The *Bulletin of the BHS* is edited and produced by John Pickett and Simon Townson. Relevant details of your request should be sent to:

John Pickett,
84 Pyles Lane,
Loughton,
Essex IG10 2NW.

With regard to the commer-

cial supply of amphibians in general, and Horned Frogs in particular, you might try:

Blades Biological,
Scarletts Oast,
Furnace Lane,
Cowden,
Edenbridge,
Kent TN8 7EG.
Tel: 0342 850242.

If this specialist biological supplier cannot help you, several other suppliers of amphibians and reptiles now advertise regularly in *Aquarist & Pondkeeper*. Another source of suppliers of amphibians and



Horned Frogs may not be widely available, but they are nevertheless fascinating. This is *C. cornuta*, the Amazonian Horned Frog.

reptiles can be found in the Animals & Pets section of *Exchange and Mart* — published weekly. For example, there is a supplier of reptiles in the West Midlands who frequently advertises in that publication:

Midland Pet Aquarium &
The Serpentarium Ltd,
8 Freer Street,
Walsall,
West Midlands WS1 1QD.
Tel: 0922 34657.

REP-TECH in Buckinghamshire are very large suppliers of wild-caught and captive-bred amphibians and reptiles to the pet trade. On a recent list, they were advertising the availability of captive-bred Argentine Horned Frogs (*C. ornata*). They might also be able to provide *C. aurita* and *C. cornuta*. If REP-TECH have these species, but will not sell to you direct, they will probably be able to give you the address of a pet shop in your area which they supply with livestock. Contact them at:

Rep-Tech,
P.O. Box 303,
Wooburn Green,
High Wycombe,
Bucks HP10 0LY.
Tel: 0494 680022.

The Pet Shops section of the *Yellow Pages* will also give the names and addresses of local suppliers of animals (specialist and general) in your area.

MARINE

ALGAL FILTERS v UV v OZONISERS

I have recently set up a 48 x 20 x 18in (c 120 x 50 x 45cm) marine aquarium which, so far, houses 2 x Percula Clowns, 1 x Cleaner Wrasse, 1 x Emperor Angel and 1 x Feather Duster Worm, which all get along fine. I am writing to ask you if it would be beneficial for me to install an algal filter and a ultraviolet steriliser, or an ozoniser and a UV steriliser. I am planning on adding more fish, too.

If you advise me on an algal filter, would a 36 x 16 x 12in (c 90 x 40 x 30cm) tank divided into three equal parts be enough? If so, it will be 12in (30cm) of coral gravel x 12in, with the tank water entering this from above by a spray bar. I will also house the skimmer in this first part.

In the second part, will be 10 x 12in (25 x 30cm) of coral sand. This part will also house 2 heater/stats. In the third part will be a suitable size power head to return the water to the main tank. The gravel and sand areas will have 2 x 100w bulbs hanging above them.

The filtration system I am using at the present is one Fluval 303 external. Media are: at the bottom, ceramic prefilter; middle = filter-wool; top = poly filter and foam block, and I am using an Aquaclear power head on reverse flow. Is this system suitable for keeping invertebrates and fish? Lighting is 1 x 36W Powerglow, 1 x 36W Trison and 1 x 40W Acinic tube.

I regret that I am unable to reply to your query direct owing to the incomplete address details you supplied us with.

However, I hope you are reading this.

Algal filters are always beneficial in any marine aquarium, since they represent one of the best ways of controlling nitrate build-up in the seawater. Phosphate build-up is also retarded and life-giving oxygen is released into the seawater during the time that the lighting is switched on. On the debit side, these self-same algae will remove oxygen from the seawater during the night-time 'lights-out' period, but this will be adequately compensated for by the water movement created by the filtration system.

I don't think that you need both an ozoniser and an ultraviolet steriliser on such a small aquarium. Personally, I would settle for the ultraviolet steri-

liser, since these are a lot less trouble to maintain. Indeed, all you have to remember to do is to change the U/V emitting tube periodically as its useful lifespan expires.

Your filtration system is adequate to enable you to keep both coral fishes and invertebrates, but I would avoid keeping filter-feeders because of the U/V steriliser.

In view of the 20-inch depth of the tank, I would add at least one more 'Daylight-type' fluorescent tube before buying any photophilic invertebrates such as anemones, living corals, etc.

[The above query was received from regular A & P reader, Mr E Barnes. We hope that publication of both the query and response will help Mr Barnes in tackling his water quality 'challenge'. Ed.]

JAMAICA

Part 2

The Follow-Up

Pat Lambert concludes her two-part account on the fish that she collected during her trip (made in the company of her son, Derek) with a report on their subsequent aquarium care and breeding.

Photographs by Derek Lambert

Once home in England, the fish we had collected in Jamaica settled well and, within a few months, started to reproduce. The livebearers we collected fell into two genera — *Gambusia* and *Limia* — which needed different aquarium care for best results.

AQUARIUM CARE

Gambusia are carnivorous species and therefore need as much live food in their diet as possible. If this is not available, we use liquidised beefheart and other meaty foods. *Limia* are omnivorous and do better on a diet in which some vegetable matter is included.

Layout

The aquarium layout for each genus is somewhat different as well. While *Gambusia* do not object to plant cover in the tank, it does not seem essential to their well-being. However, *Limia* much prefer plants to hide in.

If given plenty of food, *Limia* fry will survive in a well planted set-up. *Gambusia* fry rarely survive more than an hour or two with their parents, no matter how much plant cover or food is available.

When breeding *Gambusia* we use a small 1-gallon (4.5-litre) tank packed full of Java Moss or wool mops and place a heavily gravid female in the tank in the late evening. Hopefully, the fry are born during the night and the mother can be returned to the main tank directly after.

For this reason, we keep all our *Gambusia* tanks bare so that we can clearly observe the females during their pregnancy.

Temperature

Temperatures can vary in the wild, depending upon time of the year and where the fish are living, with coastal areas being obviously warmer than mountainous regions. However, while lower temperatures slow down growth and reproduction rates, the fish produced are often stronger than those maintained in warmer conditions.

Therefore, we maintain all our Jamaican

fish at temperatures around 72-75°F (22-24°C). This suits them well and young females produce broods on a monthly cycle.

Old female livebearers, particularly *Gambusia* females, become erratic with regards to fry production. An old female may go six months or more without producing a baby and then have a huge brood of young and die.

Selection

The *Limia* and *Gambusia* genera are two of the most prone to what aquarists often term 'Inbreeding' or 'Inbreeding Depression' in that they fade in size and colour with each passing generation. While inbreeding depression has a specific scientific definition, what we are seeing with many livebearers is not inbreeding depression, but lack of proper selection of the breeding stock.

When aquarists breed egg-layers, they select the best male and female they have and place them in a breeding tank. With livebearers, what most aquarists do is save young from their best female and rear these together. When the first male sexes out he will go round and mate with all the females in the tank and, since many livebearers can store sperm for six or more broods, virtually all the fry produced by these females will be from the first male to sex out, which is usually the smallest and poorest-coloured fish.

After a few generations of breeding from the earliest sexing out male, the stock will have decreased in size and colour. What we need to do is keep our females virgin until some of the larger males have sexed out, and then place a group of about four males in with the females so that they can compete with each other. This way, size, colour and stamina will be maintained over the generations.

KILLI CARE

The Jamaican Killifish, *Chirospodes pengelii*, were very much an unknown quantity. Since we found them in hard alkaline water, we decided to try them in our hard alkaline tapwater to start with and see what happened. They were so tiny we placed them



Top left, a female Jamaican Killifish at five months old.

Top right, a male *Gambusia oligosticta* collected in the Rio Cobra (see Part 1 for more information on this collecting site).

Above, this is the same Black-Bellied *Limia* female shown in the accompanying photograph. As can be seen, it is virtually impossible to determine this since, by the time this photograph was taken (two weeks after the first), the coloration had changed considerably. (See Part 1 for further details).

Centre, Black River Marsh — home to the Black-Bellied *Limia*, Wray's *Gambusia* and the Jamaican Killifish.

Centre right, a wild-caught Black-Bellied *Limia* female.

Right, male Jamaican Killifish are spectacular fish, particularly in sunlight.



in one of our small (10 x 8in - 25 x 20cm) growing-on tanks and fed them just like all our young fry - two feeds of baby brine shrimp per day, with the occasional feed of dried food or other live foods.

To start with, the water in the tank was only 2in (5cm) deep, of which about 80% was water collected with the fish. The water level was gradually raised until the tank was full. This was done over a period of two weeks and, after that, 20% of the water was changed each week. The fry grew very well in these conditions and were sexable in a few months.

Expectations Fulfilled

Our expectations of just how beautiful this fish is were completely fulfilled. The female is plain enough, being of yellowish coloration, with a black lateral line running from the mouth through the eye to the caudal peduncle.

The male has this same stripe, but then the body is overlaid with a wonderful iridescent blue coloration which extends into the caudal fin. The dorsal and anal fins are also enlarged in the male and are lemon-yellow, edged in gold. Altogether, this is a lovely fish and one which made all the effort of collecting them so worthwhile.

Breeding

The young adults were moved from the growing-on tank into an 18in (45cm) breeding tank. This had some floating plants

and a couple of wool mops on the bottom. Water changes were stepped up to 60% weekly, but the same diet was fed. We checked through the mops daily but, for the first few weeks, nothing could be found.

By now it was May, and Derek had to visit America to do a lecture at the American Livebearer Association Convention. While in New York, he visited a member of the Long Island Killifish Association who had been breeding the Jamaican Killifish for some years. This gave him the opportunity to observe the fish and discuss his experiences with the hobbyists concerned. Apart from water conditions, everything seemed the same, so he crossed his fingers and hoped something would happen soon.

Meanwhile, back in England, our fish had started to court and, possibly, spawn. I left the tank as it was and told Derek as soon as he arrived back at Heathrow. Once home, we immediately searched through the mops for eggs. We only found one, but it was a start. The egg was carefully covered into a shallow margarine tub full of tank water and, over the next couple of months, we found a few more eggs each day. After an incubation period of 10-12 days, these hatched and the fry were fed on Liquifry, followed, after two days, with brine shrimp. The fry grew very quickly and were sexable in about two months, and breeding at only five months old.

Derek and I have now been able to distribute a good number of pairs of our Jamaican Killies to members of the British

Killifish Association, so, hopefully, this beautiful species will now become well established within the hobby. **ADP**

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For further details of the livebearers mentioned in both Jamaican articles, as well as for information regarding Viviparous - the Livebearer Information Service - contact: Angela Moore, Public Relations Officer, 43 Lamb Lane, Monk Bretton, Barnsley, South Yorkshire. Tel: 0226 291832.

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FIG 1: Divided tail in *Hemidactylus flaviviridis*

TAIL DROPPERS OF SAUDI ARABIA

Why do lizards shed their tails? William Ross discusses some possibilities.
Photographs by the author

Much has been written about caudal autotomy (tail shedding) and regeneration of lizards' tails (see, for example, Pianka 1986 and Arnold 1990). Yet, seldom, if ever, have

recordings been made of tail deformities arising out of caudal autotomy and regeneration. The observations in this article were made during field studies on the geckos in eastern Saudi Arabia. Most of the tail deformities observed appear to have occur-

red due to incomplete shedding of part of the animals' tails.

OBSERVATIONS

The six cases of tail deformity discussed in this article were recorded between 11/8/1988 and 22/11/1990.

1 *Hemidactylus flaviviridis* Ruppell, 1835 (Fig 1)

The impression that this largish adult animal portrays, is of having an almost completely regenerated tail, with thickening and dividing at approximately two thirds of the distance from the body.

2 *Pristurus rupestris* Blanford, 1874 (Fig 2)

Four individuals of this minute diurnal gecko were observed with maldeveloped tails. One specimen had two regenerated tails arising from the stump of its original tail. The second animal appeared to have broken its tail which now lay at an angle to a



FIG 2: Specimen of *Pristurus rupestris* showing two regenerated tails (one pointing vertically) from the 'old' original stump.

regenerated tail. The third animal had an appendage at the terminal end of its tail, and the fourth animal was observed with a deformity similar to that of the third animal, its appendage being smaller than that of the third gecko.

These maldeveloped tails appeared to have occurred following injury and not as a genetic fault. The four animals were found on widely spaced territories.

3 *Ptyodactylus hasselquistii* (Donndorf, 1798) (Fig 3)

This animal has its original tail, which has broken close to the tip, and what appears to be a horn of regenerated tissue developing



FIG 3: *Ptyodactylus hasselquistii* with a V-shaped tip to its tail.

from the breakage point. The horn is of a similar length to that of the original tail, distal to the break.

DISCUSSION

According to Arnold 1984, most geckos have functional autotomy planes (places 'predisposed', to breaks). The same paper (Fig 2) records that the three species of Gekkonidae in this article are climbers. It also shows that among the specimens of these species collected from the United Arab Emirates in eastern Arabia, and maintained in The Natural History Museum, there is a

high incidence of naturally autotomised tails: *H. flaviviridis* 81%, *P. rupestris* 64%, *P. hasselquistii* 39%. In 1990, I found that, of 632 *P. rupestris* which I observed, 56% had damaged or regenerated tails. These animals can autotomise part of their tails without it being touched, the autotomised segments continuing to move.

From these observations it can be assumed that caudal autotomy and regeneration is a common function for all three species. Therefore, the possibility of a 'mal-function' is also high.

The damage to the tails of the six animals in this article may have occurred as an anti-predatory mechanism. If so, it can be considered a successful system, as the six geckos obviously escaped predation.

After the tails regenerated with deformities, the 50% of geckos with the small horn-type appendages possibly experienced little inconvenience. The *P. rupestris* could have gained an advantage with their tails being more noticeable when they were signalling. The remaining 50% with the gross abnormalities appeared to be more at risk.

There could be many reasons for these six geckos to have regenerated maldeveloped tails. Injury may have caused partial severance of the tail and damage to the vertebrae at a functional autotomy plane. This would account for the portion of the tail, distal (nearest the tip) to the injury being viable and for the regeneration of the replacement. Congenital defect in the autotomy mechanism is unlikely as only isolated individuals were found.

The four *P. rupestris* were found on extensive territory. A possible cause could be a chemical contamination at the injury site. Eastern Saudi Arabia has a large oil and oil-related industry and atmospheric pollution associated with these industries is well known.

This short article was written to draw attention to some naturally occurring abnormalities, especially with the recent war in the Gulf increasing the risk of associated nuclear, biological and chemical threat to eastern Saudi Arabia. AMF

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BIOLOGICAL FILTRATION: A SOLUTION TO POLLUTION

Proper management of the biological aspects of pond care is absolutely vital for the well being of *all* pondfish, but particularly so for those excellent water polluters — Koi.

Peter Skinner of Koi Kraft shows how all the major pitfalls can be avoided.

Illustrations by the author

Have you ever wondered what life would be like if we were denied the use of our modern plumbing systems? If we lived in small groups in the middle of the forest, there would be no problem, but just imagine what would happen in the centre of a city. For a short period of time the situation would be tolerable, but

healthy because nature will look after the situation, but conditions would very quickly deteriorate if the population were too high.

NITROGEN CYCLE

In a natural situation, there exists a constant chain of events called the Nitrogen Cycle. This is the process which provides

This natural process will work only if all parts of the Nitrogen Cycle are complete. The natural pond will have silt and stones which provide a home for bacteria and there will be plants, algae, zooplankton (microscopic bugs) and animals. If one part of the process is missing, or inadequate, there will be an imbalance of some kind in the pond.

Different species of fish have different metabolic rates. For instance, a Goldfish will eat small amounts of food and will not grow too large. A Koi, on the other hand, consumes a larger volume of food in relation to its bodyweight and, consequently, pollutes the water more quickly. One 6in (15cm) Koi will produce approximately the same amount of waste as 2-3 Goldfish of the same size.

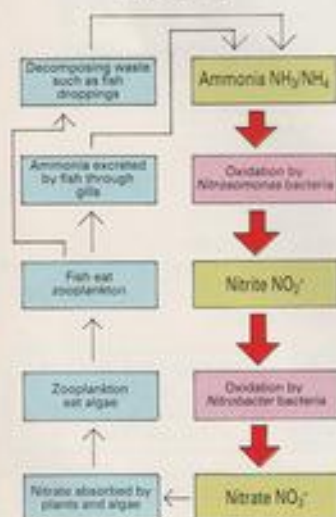
THE NATURAL WAY?

Many customers have said to me, "You're telling me that I need a filtration system, but my next door neighbour has a pond full of fish, has no filter and he hasn't lost any fish for ten years".

I hear this story frequently but, more often than not, the population will be predominantly Goldfish varieties, Orfe, Tench, etc and there will be many plants in the pond. There may also be a growth of Blanketweed, or the pond may be green as a result of the proliferation of unicellular algae.

All this plant life will maintain a balance in the pond for the time being but, as the population increases, either by breeding or by additions, the safety limit will eventually be passed and there will be major problems.

THE NITROGEN CYCLE (simplified version)



it wouldn't be long before disease claimed many lives.

What on earth has this to do with fishkeeping, I hear you ask. In fact, the above is an exact description of what happens in garden ponds; if you have a small population of fish, the water conditions will remain

food for plants and animals and then ensures that any waste products do not accumulate to dangerous levels (see Nitrogen Cycle diagram).

In a fish pond, the main cause of water deterioration is the fishes' metabolism of food which produces ammonia, urine and faecal matter as waste. In a natural pond, the ammonia would be converted to nutrients for the aquatic plants and algae by the bacteria living in the silt and on any object in the pond. The urine and droppings would also be broken down and converted into products harmless to the fish.

COMMISSIONING A NEW BIOLOGICAL FILTER ... THE MATURATION PROCESS



Chemical concentrations would normally be expressed as mg/litre but as these levels vary in direct relation to stocking densities, pH, dissolved oxygen and temperature, they have not been given. This graph should be interpreted as a schematic diagram.

For every Koi keeper whose pond is successful for a long period of time without a filter, there will be dozens who are not so lucky.

DROPPINGS

Although actual faecal matter does pollute a pond if it is allowed to accumulate, it poses less of a threat to the fish than ammonia because, once faeces have been in the water for a few hours, most of the chemical contaminants will have leached out of the droppings, leaving just matter.

This solid matter does not directly harm

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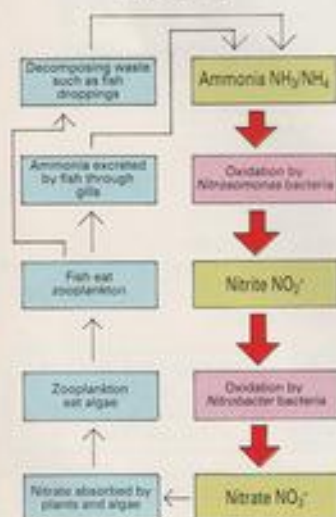
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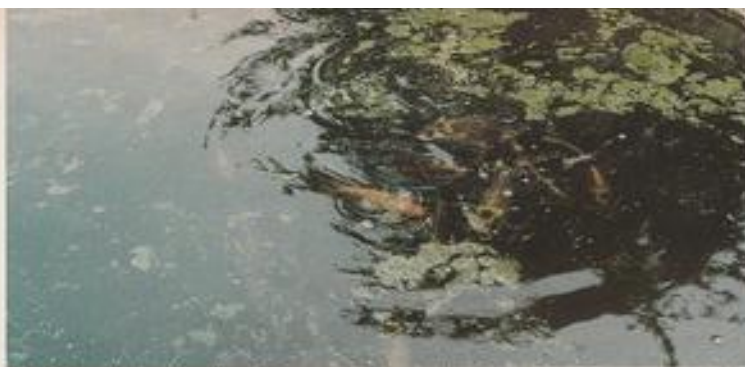
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This picture shows how dirty a Koi pond will become if adequate filtration is not employed.

the fish, but it can sometimes contain pathogenic (disease-causing) bacteria and also other species of parasite. It is therefore a good idea to remove the accumulated waste from the pond at regular intervals to help prevent the proliferation of these harmful organisms.

FILTRATION

The answer to the pollution problem is, either a regular change of water in a garden pond, or the recirculation of the water through a filtration system.

Droppings and decaying plant material can be removed in a settling chamber and/or by passing the water through a fine medium to trap any particles which are in suspension. After this stage in the filtration system, the water should be physically clean, but will not be chemically clean. The main chemical contaminant at this stage will be ammonia. If this is allowed to accumulate to high levels, the fish will be physically damaged and stressed and they will eventually die (see my article on water quality in *A&P* in May 1991).

A biological filter bed is required to process the ammonia in the water. In fact, the principle of biological filtration is remarkably simple. All you need is a suitable medium on which bacteria can live, this material being arranged in such a way as to allow water to be passed through it. After the pond water has been pumped through the biological filter bed for a few weeks, the required bacteria will have colonised the material, and, Hey Presto!, you have a mature filter.

WHICH FILTER MEDIUM?

The criteria which determine the suitability of any filter medium are many and, although an absolutely perfect filter medium

is not yet available, some materials are very good.

The material should, ideally, be porous and rough, which means that the surface area to which the bacteria can adhere will be large in relation to the space the medium occupies. To illustrate this point just think how much more paint you will use to cover a rough stone wall than a smooth piece of timber. The actual paint thickness on the two will probably be the same, but the rough wall has a much greater surface area.

A good filter medium should also be light and should not pack down tightly, which would prevent good water flow and, therefore, encourage blockage. Also, the material must be inert, so that it will not directly affect the chemical make-up of the water.

BACTERIA

A biological filter bed must be regarded as being alive and, as such, it requires a suitable environment and a constant supply of those things which it needs for survival. Bacteria are simple life forms and, therefore, have simple requirements.



Biological box filter with associated pipework.

The main types of bacteria we need in our filters are *Nitrosomonas* and *Nitrobacter*. These are both aerobic types, meaning that they need oxygen to survive; they also require something to cling to, which, for our purposes, will be the filter medium.

The waste carries oxygen to the bacteria, together with their food in chemical form, supplied by the fish. It is, thus, imperative that a constant supply of water to all areas of the filter bed should be maintained. If it should stop for any length of time, the colony of bacteria will begin to die.

MATURATION PROCESS

The benefits to the Koi keeper of a mature biological filter are great, but it takes a long time to establish a mature bed. When the system is first commissioned, the biological section of the filter will have no appreciable effect on the water.

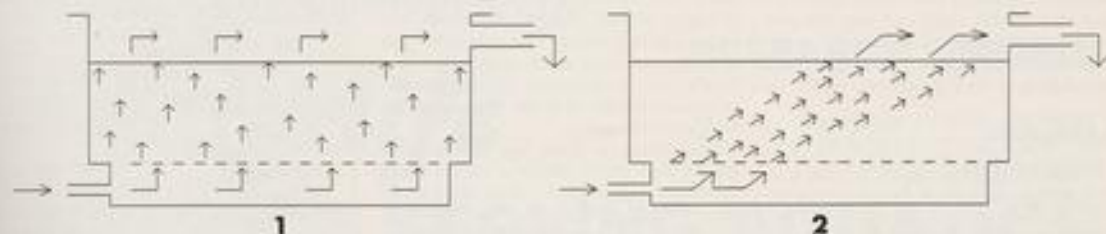
After a couple of weeks, the nitrite level will rise as a result of the *Nitrosomonas* bacteria forming and converting the ammonia to nitrite. It will take several weeks more before the *Nitrobacter* have reached sufficient numbers to reduce the nitrite level.

In fact, it can take many weeks or even months before full maturity is reached (see graph). It is possible to accelerate the maturation process, but it is not possible to have an instantly mature filter. If you want a mature oak tree you have to start with the acorn; planting a sapling instead will save time, but you still need to be patient.

One of the ways to hasten the process is to take some material from an already mature 'healthy' filter and mix it into your new filter. This will help 'seed' the filter, but it will still take time for the bacteria to spread.

The other way, if you are impatient, is to add one of the proprietary filter start-up products. These are available from your local dealer, but I would suggest a little caution regarding the claims that are made for some of them. It seems that most of these products assist in the formation of *Nitrosomonas* bacteria, but usually do not help with the *Nitrobacter*.

Since *Nitrosomonas* form more readily and more quickly than *Nitrobacter* anyway, most of these products are particularly helpful if they are added right at the beginning when the filter is commissioned. After about three weeks, the *Nitrosomonas* should be up to maximum density and therefore there will be little point in adding more of the product. In fact, I have seen cases where the



This shows how the flow of water will be distributed throughout the filter bed if, as in (1), it is clean; or, as in (2) it is dirty.

fishkeeper has detected a low level of nitrite which he has wanted to reduce so he has used one of the proprietary start-up products and has then seen the nitrite rise to an alarming level. The artificial encouragement of *Nitrosomonas* in this situation sometimes seems to set off a serious imbalance within the pond which can have damaging consequences.

FILTER DESIGN

As already mentioned, the requirements of a bacterial colony are simple, but providing these is not always easy because of the many considerations of design in the garden.

For instance, the system must be easily accessible for maintenance. In the winter, a badly positioned or inadequately insulated filter will act as a radiator and will allow the loss of valuable warmth from the pond. Also, the filter must be designed in such a way that it will be efficient with the available flowrate provided by the pump.

Perhaps the most common fault is a lack of consideration given to the removal of solid waste from the water before it has a chance to enter the biological stage of the filter. This is so important because, by virtue of the density of a good biological filter medium, a certain amount of the waste will be trapped within the bed. The bacteria will be able to digest some of the waste but, usually, the bed will become progressively congested.



Left half, a box filter which has not been backflushed for a long time. Note the build-up of waste matter.

Right half, the same box filter after it has been backflushed. The filter medium can be seen clearly now.

Water will, of course, always take the easiest route from one point to another. And so it is generally the edges and corners of the filter which become blocked because the water flow is usually slower at these points. As a result, the cross-sectional area of filter through which the water is now flowing will be reduced, thus increasing the velocity of the water.

Eventually, self-cleansing velocity may be reached which means that a small area of the filter will remain clean and will function well, but the rest will be so severely congested as to render it unable to make much of a contribution to the purification effort.

CLEANING

The first rule of biological filtration is to try to prevent solid waste from entering the filter bed but, inevitably, some will get through; this should therefore be removed at regular intervals.

Each biological chamber should have a

valved outlet at the base, so that it can be drained. At cleaning intervals, the water ingress from the pond should be stopped, the chamber drained, and, while it is empty, a few bucketfuls of pond water should be poured over the whole surface area of the filter. This will wash almost all of the waste out of the filter medium, and it will go down the drain. With this method of cleaning, the filter medium will not be disturbed.

Some professionally designed filters I have seen still require all the material to be dug out and washed. Not only is this more damaging to the bacterial colony, but it is also a very messy and laborious task.

FLOWRATE

There have been many attempts by different people to come up with a formula or rule of thumb as a guide to the ideal flowrate through a filter. Unfortunately, this cannot be achieved, because there are so many different types and designs of filter, that what might be right for one may not be right for another.

The variation of flowrate in systems I have installed ranges from the fastest, where the entire volume of the tank passes through the filter once every 40 minutes, to the slowest, which is once every 4 hours. These systems work equally well, but are designed differently.



As a rough guide, the flowrate per minute through each chamber in the system should be between 20 and 55% of the total volume of that chamber. If the flowrate is any slower, the medium will be prone to blocking; if it is any faster, there is no advantage and the extra cost of running the large pump will be waste. (This applies only to submerged biological filter beds).

There is a common, but erroneous, belief that a very rapid flow of water through the biological bed will prevent a dense colony of bacteria from forming. This misguided idea is sometimes used as an explanation of a filter's poor performance, but it is almost always some other deficiency in the design which is to blame.

This theory is borne out by the well-known high performance of trickle tower filtration. In this system, there is no actual water level within the filter material; instead, it just passes through by trickling down from above. The contact time is very brief; indeed, one would think that the

bacteria would not have time to purify the water as it passes through so quickly. It is also difficult to imagine how the bacteria can cling to the filter material beneath the torrent of water. In fact, this design of filter is very efficient.

SHUT-DOWN PROCEDURES

If your filter is going to be shut down for more than about three hours, then be sure to drain out the water. That way, a certain amount of air will be able to circulate among the filter medium and thus keep the bacteria alive. The material must also be kept wet; this can be done by throwing a bucketful of water over the medium every few hours.

An alternative is to put an air supply into the water. If this action is not taken, the filter will progressively die after a few hours as the dissolved oxygen in the water is consumed. This happens more rapidly in dirty filters than in clean ones. Once anaerobic conditions (without air) prevail, it is possible that harmful bacteria will start to grow. For this reason, it is essential that an improperly de-commissioned filter should be flushed out to waste before being returned to service.

The technology of biological filtration is such a wide subject that I have room only to cover the basics in this article. In fact, once you have got the filtration system right, the pond will be forgiving to your small mistakes, but get it wrong, and you may as well turn your pond into a sandpit for the children!

GOLDEN RULES OF BIOLOGICAL FILTRATION

- 1 Always use pond water to flush a biological filter, as opposed to using mains water which is chlorinated and will have an anti-bacterial and damaging effect on your filter.
- 2 Never allow a biological filter bed to become blocked.
- 3 Choose your filter medium with care; some media are better than others.
- 4 Make sure your filter runs 24 hours a day.
- 5 Make your filter as large as possible. The bigger the filter, the better the pond!
- 6 When starting up your system from scratch, it is much better to have a small population of fish; otherwise, their lives may be at risk because the water is not being purified adequately until the filter reaches maturity.
- 7 Always try to avoid shutting the filter down for long periods at a time.
- 8 Avoid putting chemicals into your water that will retard the filter. Fortunately, few of the proprietary medications are harmful to the bacteria, soluble antibiotics being a notable exception.
- 9 Make sure that the filter bed has an adequate supply of oxygen. Supplementary aeration is beneficial, particularly when the demands on the filter are high, such as in warm weather.

Koi Talk

By John Cuvelier

FROM STRAW TO WOOD

If, like me, you read the science section of *The Times* from cover to cover, you will find it quite surprising how often little tidbits of information of interest to our hobby surface.

The latest was an article concerning algae growth retardation in natural waterways, which, of course, is equally applicable to our own man-made pools, etc. In the present case, investigators have moved on from the well publicised barley straw method and are now studying the effect of rotting wood.

Apparently, scientists at the Open University have been packing ladies' tights with pieces of old timber debris (as opposed to the more normal and attractive contents!), and suspending these in streams and ponds. Theory has it that the action of rotting down releases some high molecular weight chemical which inhibits the growth of the dreaded algae, thereby keeping the water clear. Recent work by people at the Agricultural and Food Research Council's Aquatic Weed Centre at Sonning, Berks, has been concentrated towards identifying the chemical ingredient responsible.

We must just watch this space for further news. Who knows, perhaps all the hard work and research put in by the various manufacturers of the algicides whose adverts fill our pages have been following parallel paths to a degree?

LONG-FINNED KOI

Moving on to a subject more in a fishy vein, I see that a long-finned variety of Koi has made an appearance on the scene! I don't know about you, but I'm not impressed!

With my usual cynical approach, I can't help feeling that this is yet another instance of somebody hoping to make a fast buck from something which is not too far removed from genetic engineering. I mean to say, this new strain of Koi don't even look attractive with their unbalanced finnage.

Mind you, I have to admit

that varieties of Goldfish like Orandas, Bubble Eyes and Lionheads, etc, have an equally unappealing appearance as far as I'm concerned. Still, it wouldn't do for all of us to have similar tastes, otherwise life would be exceedingly uninteresting!

BATTLE OF THE FILTERS

Have you noticed of late the build-up of a battle of words between the various filter and filter media manufacturers? If we are to believe everything we read within these and other pages, there would not be a pool of green water left in the UK!

We are even told about an inert and magical material which somehow manages to reduce nitrate simply as a function of passing water through it, without the benefit of mundane and expensive things like ion exchange resins. Has anyone informed the water treatment industry who are already reeling under the prospect of having to spend millions of pounds on ultra-sophisticated equipment for just that purpose?

I'm also highly intrigued by the knowledge that a tiny box filter filled with man-made media will maintain a high degree of clarity in a pool with continuously circulating water and yet will only require cleaning, perhaps, once a year.

Now, I'm the first to admit that after only a lifetime in the water and related technology industry, I've still got a hell of a lot to learn, but really, but I do wish a few of the claims made by some (and only some) companies could be toned down just a little. This would benefit us all, but particularly the poor individual battling his or her way through reams of conflicting evidence aimed at setting up a system which will, without the threat of bankruptcy, allow us the benefit of actually seeing the fish swimming around our pools!

RAY'S 'BRAINCHILDREN'

Every once in a while somebody comes up with an idea which one could kick oneself for not thinking of it sooner.

Such an idea was the brainchild of Ray Talbot who I met only once many years ago.

If you've ever struggled to replace the dome on a bottom drain under several feet of water, then Ray's innovative hinged cover could well be the perfect answer to your prayers.

Ray's establishment in Norfolk is also marketing a new device which I have to admit I have reservations about. Not because it does not work, but because of the reasons given for its working! The *Eradicator* is claimed to work on the basis of, and I quote: "Partial reverse osmosis by magnetic interruption".

If a technical writer ever desired to blind a prospective customer with science, then the one who wrote this has certainly succeeded! Removing the jargon leaves us with a plastic moulding containing a series of ceramic magnets which present alternate magnetic fields through which water flows. The principle has been around for some time, though not in a form familiar to Koi keepers.

The theory of the system is that the magnetic fields exert lines of force which vary the molecular arrangement of the salts present in hard water, thereby preventing the formation of the familiar white scaling which we find in our kettles (limescale). This effect does not reduce the hardness of the water because the salts are still present, but remain in suspension, as opposed to precipitating out as a coating.

What the system does do, and very effectively, is to prevent algae and Blanketweed from growing, simply because without the limescale, there is less chance of the growth becoming

established. The claimed reduction in levels of nitrate in the water as a result of magnetic influence is something I've yet to be convinced of, though.

Ray Talbot can be contacted for further information at The Real McKoi, 8 Back Lane, Garboldisham, Diss, Norfolk. Tel: 095 381 368.

PLEA FOR QUEEN'S ENGLISH

Anyway, moving on, we find that an entirely different maker has come up with the following gem, one which I have no reservations about presenting a gold medal to for 'Gobbledegoose'! Once again I quote from their own literature: "It is widely considered beneficial to pretreat water with M.D.H. (Magnesohydrodynamics)? When water is passed through the magnetic specific orientated, electro-field in the MAG-NATRON, molecule conditioning occurs", etc, etc.

I won't bore you with the rest of the 'blurb' as I find it too tedious for words! Come off it chaps, let's stick to the Queen's English!

QUICK AMMONIA REMINDER

If you are just starting up a new filter or have recently cleaned an existing system, the problem of coming to grips with a build-up of ammonia, etc, can be a bit of a pain.

I'd just like quickly to remind you about the benefits of placing a bag of the trusty Zeolite in your filter. This natural clay substance will ease the situation during the start-up period by removing the toxins. A soaking in a strong salt solution will re-generate the material for further use.

A net bag, as illustrated, is probably the easiest method of utilising the material.



Zeolite: tried and tested reliable ammonia remover.

Seaview

By Gordon Kay

I trust that the 'experts' among you will forgive me if I am preaching to the converted but, you know, it does no one any harm to be reminded of basics now and again. So, here we go...

CARRYING CAPACITY

Any type of aquarium — be it seawater or otherwise — can only support a certain, finite number of organisms for any length of time. This is known as an aquarium's carrying capacity. Many factors, both environmental and behavioural, contribute towards this carrying capacity, and each aquarium will have its own.

However, there are certain generalisations which we must, by necessity, make. In the old days, before reliable air pumps were so widespread, the ability (or otherwise) of carbon dioxide to leave the water imposed terrific restrictions on how many fish a tank could hold. In view of this, most older aquarium books expressed carrying capacities in relation to surface area — something like: "so many inches of fish for each square foot of surface area".

All that has changed now, of course, with the advent of reliable and relatively cheap equipment, until, nowadays, just two things govern the carrying capacity of a marine aquarium:

- ① the ability to manage the nitrogen cycle, and
- ② the behavioural characteristics of the animals within the aquarium.

Influence of Nitrogen Cycle

Forgetting about behavioural patterns for a while, a quick reminder of the mechanics of biological filtration will go some way towards showing us the relationship between the nitrogen cycle and carrying capacities.

First, we must remember that a marine biological filter depends (like its freshwater equivalent), upon the activity of a community of bacteria to function. The size of the community is limited by the amount of suitable substratum for them to colonise, while the

amount of nitrogenous waste that the filter can degrade is limited by both the amount of oxygen available and the size of its bacterial colony.

Unless the marine aquarist is careful when stocking the tank and feeding its inhabitants, (s)he could quickly find that the waste load far exceeds the capacity of the filter to degrade it. Under these circumstances, toxic by-products of the nitrification process will accumulate and reach levels which would kill everything.

In this way, as the amount of food going into the system increases, the bacteria can increase their metabolism to cope with such 'plenty' and also to multiply very, very rapidly. Having said that, a point will eventually be reached where further increases in metabolic efficiency or numbers of bacteria will cease. When this point is reached, then the aquarium has attained its own carrying capacity.

Any further additions will result in death, starting with the weakest fish first, because the amount of toxic ammonia being produced will be greater than the filter's capacity to break it down. Put in street-level terms, there is not always "room for just one more".

Formulae

Many complicated formulae for calculating carrying capacity have been developed over the years by professional mariculturists, which take into account surface area, rate of water flow through the filter, water temperature, oxygen availability and even the weight of waste produced over a given period of time (!!).

However, many years ago, **Graham Cox** came up with a simple guide which still holds up today. The rule says:

One inch of fish for every four gallons of water for the first six months, and then a maximum of one inch of fish to every two gallons thereafter.

These numbers should, of course, be reached gradually over a period of time. This should be etched onto your memory, for there is no rule more important, nor more regularly broken.

Remember to calculate stocking levels based on the net volume in your marine aquarium after displacement by decorations and sand. Also bear in mind that many of the fish offered for sale are juveniles and that they will grow rapidly if properly cared for. Therefore, use the adult length of fish when doing your sums. Invertebrates can be stocked — within reason — ignoring all of the above.

These stocking rates may seem rather harsh, when compared with those encountered in freshwater aquaria. The fact is, concentrations of ammonia are much lower at the pH ranges found in freshwater, while freshwater fish are less sensitive to short-term exposure to nitrate than are coral fish to comparable ammonia levels. What is more, a water change in a freshwater aquarium is no further away than the nearest tap. Therefore, it is an easy matter to carry out regular partial water changes in overcrowded conditions.

Compatibility

The other thing, if you remember, which we must account for, as well as the mix of different species within the aquarium, is their ability to live together over an extended period of time. Here, the marine fishkeeper has the edge. The

freshwater aquarist has to consider the environmental requirements — such as pH and temperature — of each and every addition to his or her community aquarium, as well as their behavioural peculiarities.

Fortunately, coral reef animals, wherever they come from, share the same pH and temperature requirements. While differences exist in salinities between the different oceans of the world, they don't seem so important in the long term to the fish's well-being, as do differences in water hardness to many freshwater fish.

Medications

A far more important consideration when selecting coral fish to live together is their sensitivity to the medications commonly used to treat parasitic diseases.

As a group, invertebrates are completely intolerant of dissolved copper and formalin — the most commonly used compounds in proprietary medicines. This, more than anything, explains why it is generally considered impossible to keep fish and inverts together in the same aquarium. It can be done, of course, but it takes the sort of skills usually learned over a long period of time.

Space dictates that I cannot carry this on here, so I shall continue next time.



What's your opinion?

By Billy Whiteside,
BA, ACP



NON-READING CATS

Regular reader, C. H. Clark lives at 25 Andrew Street, Manchester, and he writes: "After reading your February column, asking about fishes or plants that don't behave as the books suggest, I wish to tell you of some *Corydoras* catfish that don't read books. All my books state that Peppered and Bronze Cats should be 2½ to 2½in (5.7-6.4cm) long before they breed. Well, nobody told mine. I bought them as young Peppered Cats in December 1991 and was not 100% sure what sex they were. I knew for certain that one was a female by her shape, and as she was slightly larger — 1½in (3.8cm) — compared with the others at 1½in (3.2cm).

"Alas, I found out just over a fortnight ago that I have two females and four males, and now I have quite a few more as they started to lay eggs — which started my small 1½in (3.8cm) male Bronze Catfish into action. Another thing I was reading about the young in one book was that in two to three months they would get to a size of just over ½in (0.64cm). At the time of writing this letter, the fish are ten days old and the smallest fish is ½in (1.3cm), while the largest is ¾in (1.9cm) long. They have been fed on brine shrimp, microworms and cat food pellets. Keep up the good work."

[Please drop me a line if you have ever had catfish breed in your tanks. BW]

HUMANE DISPOSAL

Miss Pat Lynden's address is 237 Dalmeny Road, New Bar-

net, Herts, and she writes: "I read with interest your item on humane disposal of fish in the February 1992 issue. In the 'American school' goldfish book *A Complete Guide to Goldfish*, by Robert Mertlich, I read that Mr Mertlich states: 'The most humane way to end the life of a goldfish is to place it in a container of water and place it in the freezer until it is frozen solid'. He goes on to say that by adding a little salt to the water, the goldfish's metabolism and awareness will drop, and it will die quietly before the water freezes. I should be most grateful to receive your expert view on this method of terminating the life of a goldfish. Also, I wonder what amount constitutes 'a little' salt for this to be successful?"

I don't know the book, Pat. My 'bible' about goldfish was, and is, the standard work written by the late Jack Hems — a contributor to this magazine for many years, and a friend with whom I exchanged many a fascinating letter, but who passed on before I had the opportunity to meet him. He probably knew more about the hobby than anyone else I know. At a guess, I should imagine that a dessert spoon of salt in a pint of water should be about right.

I've never used that method to put down a fish. I'd prefer to place an ailing fish into a solution of some chemical that would produce anaesthesia. The *Interpet Manual of Fish Health* by Andrews, Excell and Carrington suggests an overdose of an anaesthetic in a small volume of water. A couple of those suggested are benzocaine and quinaldine, but the book suggests that one should consult a vet. Other methods the book suggests include stunning, and decapitation.

INTERPET VISIT AND CORRESPONDENCE

I'm hoping to visit Dr Neville Carrington at Interpet next week, so I'll ask him in person. It's 20 years since my last visit to Dr Carrington's establishment and I'm looking forward to all the changes that have occurred. My return visit will be made 20 years later — almost to the day — and per-

haps, as last time, I'll publish an article about my trip if our Editor permits. Interpet was 20 years old when I made my first visit, so it must be 40 years old this year.

It seems appropriate that the remainder of this month's feature should be devoted to a letter from Dr Neville Carrington.

Dr Carrington begins by saying: "When I read in your March article your invitation for me to contribute to the May edition I decided to look out the article which you kindly wrote when you last visited us. By sheer coincidence, this was on the first page I opened in the scrapbook and I enclose a copy of the article in case you do not have one to hand. Another coincidence is that your visit was exactly 20 years ago this April.

"I remember the visit very clearly, and it seems just like yesterday to me, so that I am amazed that it was actually so long ago.

"I wonder how many other people have been reading your articles for 25 years. It is a real achievement that you have managed to maintain such a lively and interesting column for so long.

Major changes

"I suppose 25 years ago it would have been possible to predict some of the changes which have taken place in the aquatic hobby, but other changes will have been much more difficult to predict, particularly those which are now being driven by legislation.

"One of the major changes which have taken place is in the design of aquariums. Silicone rubber was just coming on the market, but we, as a company, certainly did not believe that it would be strong enough to hold sheets of glass together to make an aquarium, and it was several years before present aquarium-making techniques were accepted. In the meantime, as you say in your article following your visit to us, stainless-steel-framed aquariums had a vogue, tending to replace angle-iron aquariums. I still use several stainless-steel-framed aquariums in my fish house.

"The design of filtration equipment has changed radically also in the past quarter of a century. At that time, none of the motor filters, as far as I am aware, used the modern technique of having a revolving magnet immersed in the aquarium water, and it is only in recent years that the technology has improved sufficiently so that these units do not burn out if they accidentally dry out. Even air pumps were in a relatively early stage of development and were by no means as reliable as present-day equipment."

Dr Carrington continues: "I believe a lot of the changes that have taken place stem from a growing awareness of the importance of water quality in aquariums. Despite my background in pharmacy and chemical engineering, I had not really given sufficient thought to the importance of pH, hard and soft water, and the build-up of waste products. The increasing awareness within the hobby of the importance of water quality has led to tremendous advances in methods of filtration and the type of filter media used. Now, with the increasing importance of the aquatic hobby, we are seeing a whole new lighting technology developing.

"There has, of course, been parallel progress in the techniques used in pond keeping.

"On a commercial basis, techniques of farm breeding of fishes and transportation have improved tremendously and, 25 years ago, people were just beginning to experiment with continuous circulation systems in commercial establishments; these are now commonplace.

The Future

"What of your future?" Dr Carrington asks himself. He continues:

"In 1967 I was not particularly good at predicting what would be happening in the following 25 years, but there are some pointers as to what will be happening in the relatively near future. I believe that many of these changes will be led by various legislation. For instance, manufacturers of con-

Continued on page 41

Books & videos

NEW BOOK NEWS FROM T.F.H.

1 Piranhas — Fact and Fiction

By: John R Quinn
ISBN: 0 86622 172 7
Price: £13.95

This new book brings together all the latest understanding on the subject of Piranhas: what they are, where they come from, which are the dangerous species, what is fact . . . and what is fiction, feeding and other subjects. Also included is a section on legal aspects of Piranha keeping (as it applies to the US) and an interesting chapter on the Piranha keeper's 'Code of Conduct'.

There are 150 full colour illustrations, some as photographs, others as drawings, in this hard-cover 128-page book.

2 Brand New Discus

By: Hiroshi Yamada and Fumitoshi Mori
ISBN: 0 86622 173 5
Price: £20.99

While most other Discus books tell the

reader *what* to do, Brand New Discus tells the reader *how* to do it. The text can therefore be seen almost as a series of 'lessons' to be learned from the most prominent Discus breeders in Japan, all of them recognised as the best in their respective specialisations.

This book covers all aspects of keeping and breeding Discus, from wild-caught fish to numerous aquarium varieties.

Brand New Discus is 224 pages long and contains over 250 full-colour photographs.

3 Boas and Pythons (And Other Friendly Snakes)

By: John Coborn
ISBN: 0 86622 603 6
Price: £13.95

This colourful book (containing more than 175 colour photographs and drawings in its 192 pages), provides an easy-to-read text on these popular snakes. Details are presented on terrarium design, maintenance, feeding, health, breeding and other aspects of captive care.

Aimed both at beginners, as well as estab-

BOAS & PYTHONS AND OTHER FRIENDLY SNAKES

BY JOHN COBORN



lished herpetologists, *Boas and Pythons* sets out to provide snake keepers with a comprehensive book that also includes sections on snake biology and classification. Contents: Natural History of Snakes, A Selection of Species, Terrarium Construction and Maintenance, General Care and Feeding, Captive Reproduction, Suggested Reading.

Dynamic Aquaria (Building Living Ecosystems)

By: Walter H Adey and Keren Loveland
Published by: Academic Press
ISBN: 0 12 043790 2
Price: £24.50

At 643 pages in length, including 52 colour plates (concentrated in the centre of the book), numerous line drawings and charts, some black and white photographs, references at the end of each chapter and an index which is nearly 12 pages long, *Dynamic Aquaria* is a book, the likes of which I've never really come across before.

The nearest comparable title that I can come up with - *Aquarium Systems* (edited by A D Hawkins) - was also published by Academic Press. That was in 1981, since when there have been numerous developments in aquatic technology and expertise. Therefore, in some ways, we can perhaps look on *Dynamic Aquaria* as the successor to *Aquarium Systems* . . . and what a successor!

It needs to be said at the outset, that this book is not for the faint-hearted. Neither is it for anyone looking for a book that has full-colour photographs on every page. It is, however, very much for the seriously committed aquarist who craves for the knowl-

edge which underpins all aquarium management regimes . . . knowledge that is nearly always lacking in other publications. I say this, not as a negative criticism of these 'other' publications (since an aquarium-type book just cannot afford to give detailed principles the space they require), but, rather, as a positive criticism of *Dynamic Aquaria*.

The byline on the front cover - *Building Living Ecosystems* - describes both the approach and content of this magnificent book probably better than the main title itself. The text is divided into five parts, four dealing with major parameters - Physical Environment; Biochemical Environment; Biological Structure; Ecological Systems in Microcosms, Mesocosms and Aquaria - and, bringing up the rear, a Summary which draws together all the main conclusions in a very useful 15-page section.

Some topics within these excellent sections that apply directly to aquarists include: Home Aquarium Notes (within Chapter 2 which deals with shapes, materials and construction of the 'physical environment'); Algal Scrubbing and Water Composition, and Marine Microcosms and Aquaria (both found within Chapter 4 which deals with Water Composition); Detritus and the Aquarium (within Chapter 19 which concentrates on Detritus and Detritivores, is

detritus eaters); A 130-Gallon Home Reef Aquarium (within Chapter 21 dealing with models of coral reef systems); A 130-Gallon Brackish-Water Aquarium (within Chapter 23 on estuaries); Black Water Home Aquarium (within Chapter 24 on freshwater ecosystem models); and Ecosystems in Home Aquaria (within the Summary section at the end).

I recently criticised a book for opting rigidly for metric measurements which many aquarists are still either loathe to use or are 'uncomfortable' with. In *Dynamic Aquaria*, this same criticism is also largely applicable . . . but in reverse. For instance, the two 130-gallon systems mentioned in the preceding paragraph are likely to be based on US units (a US gallon being somewhat smaller than an Imperial one). However, we are neither told this, nor given the alternative volumes in litres, so we can't really be sure what sized set-ups are being discussed.

One other subject which could have done with better coverage is denitrification. We are intriguingly told on page 228 that denitrification within aquaria is only partial, but the matter is not discussed in full.

This is probably because of the authors' undoubted preference for tackling denitrification and phosphorus overload by means of photosynthesis. Preferences are, of course, perfectly OK, but why not give us the

full benefit of the evidence 'against' partial denitrification?

On the other hand, the treatment given to alternative methods of denitrification involving 'algal turfs' and 'algal scrubbers' is, to say the least, eye-opening. I thoroughly enjoyed these sections.

Dynamic Aquaria is an immensely absorbing technical book from which dedicated aquarists, public aquarium keepers, researchers . . . and, no doubt, manufacturers of aquatic hardware and water treatments, will derive tremendous benefit . . . and all for £24.50.

John Dawes

Thailand II

Filed and Produced by: Stan Kemp
Available from: Kingfisheries Ltd
308 Croydon Road
Beckenham
Kent BR3 4HR.
Tel: 081-650 3716

Price: £9.95, plus 70p postage and packing

This latest video from Stan Kemp is No 13 in his series of unique and very personal films about matters aquatic.

A & P readers who are already familiar with Stan's previous films will know just what to expect in *Thailand II*. For those new to Stan's work, a few words should help set the scene.

Stan Kemp is an exceedingly enthusiastic member of the aquatic trade. He owns a very

successful shop in Beckenham and regularly travels the world in search of new fish and plants. His constant travelling companion on these trips is a video camera through which he records scenes never before brought to the notice of aquarists and pondkeepers. Stan also adds the voice-over, which is more a series of personal insights, anecdotes, educational and informational snippets, than the slick, cut-and-thrust job we are used to in TV documentaries.

The end result is invariably a film that shows 'warts and all', so aquarium plumbing, dirty glass on tanks, the odd reflection on the front of the aquarium being filmed . . . and so on, form integral parts of the show. Personally speaking, I find this approach tremendously refreshing. I also always learn a lot from these videos.

Thailand II is no exception. I was absolutely spellbound by some of the fish, including such unusually named varieties as

5-colour and 7-colour Discus. However, what really fascinated me were the sequences showing the unbelievably simple, but superlatively effective, culture methods used by the Thai breeder who was responsible for bringing us the first-ever Albino Tiger Oscars and who now exports large numbers of these spectacular fish. It's all so obvious . . . once you see it, that you wonder why the practice is not more widespread. You'll have to view the video to see what I mean, though!

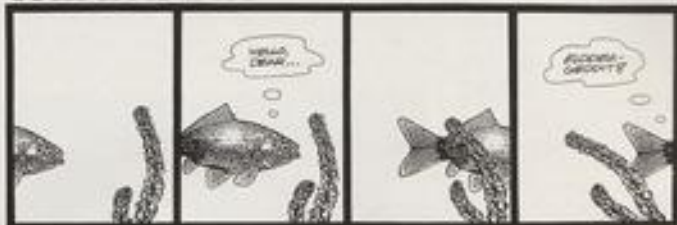
Stan Kemp's films are not aimed at the casual viewer, but at anyone who is serious enough, or interested enough, in where our aquarium fish come from and how they are produced. As such, they provide a series of windows, particularly when taken en block, rather than as individual films, into a world that most hobbyists will only rarely get the opportunity of experiencing at first hand.

Congratulations on your latest 'window', Stan!

John Dawes

THINKTANK

© flint



Continued from page 38

ventional bi-metallic aquarium heater-stats will probably have difficulty in meeting the latest electromagnetic compatibility legislation. As far as safety is concerned, it has already improved greatly over the past few years, and I am chairman of a committee which has been working under the auspices of the association of manufacturers of Domestic Electrical appliances to ensure that the new international regulations for electrical aquarium equipment are in the best interests of everyone. Another electrical matter still under discussion is whether or not pond pumps will have to operate off only twelve volts or if earthed mains pumps will, in future, be allowed. At present, it seems only that the low voltage option will be permitted.

"Yet another change concerns the chemicals permitted in medications. Within the next year or two, it is almost certain that all products using dye materials, as well as some other chemicals, are likely to be banned, and I presume that we are not the only company which

has carried out an intensive development programme over a considerable period to produce new medicines which not only comply with all the latest regulations, but are also even more effective than those at present on the market.

"When you visited us twenty years ago, virtually all the development work was carried out by myself. We now have a team of highly-qualified scientists whose sole task is to develop new products and to answer queries from members of the public. I cannot help thinking that if I had had the foresight to build up such a team 20 or 25 years back, there would have been a good chance that we could have helped the hobby to progress even more quickly than it has done.

"Long may your column continue. I look forward to the chance to congratulate you on its survival for the next 25 years," concludes Dr Carrington.

I greatly appreciate the many letters written to me over the years by Dr Neville Carrington — one of the very few British mainland aquarists I have actually met. (I still have not man-

aged to meet up with our Editor, John Dawes, but I look forward to meeting John when the opportunity presents itself. No doubt he and I will have plenty of stories to exchange — as is always the case when we chat on the telephone.) [I, too, look forward to this, Billy. Ed]

FUTURE TOPICS

The photograph shows some Glowlight Tetras, *Hemigrammus erythrozonus*, that I bought

recently. The Glowlight has been a favourite of mine for decades. (a) Drop me a line if you have bred the species. I'd also like to have your opinions on: (b) breeding catfishes; (c) transporting fishes to shows; (d) selling young fishes that you have bred in quantity; (e) growing water lilies; (f) marine algae in the home aquarium; and (g) your favourite dealer and shop.

I look forward to receiving a letter from you. Send it to me c/o *A & P*.



The Glowlight — a great favourite of mine.

OUT AND ABOUT

KINGFISHERIES LTD

By John Dawes
Photographs by the author

Having reviewed some of Stan Kemp's videos in *A&P* in the past (the most recent appears in this month's issue), I was not surprised to be approached more than once at the Yorkshire Aquarist Festival, held at the end of March, by several of our readers who were also familiar with these interesting films.

"Stan produces great videos for the serious aquarist," one Yorkshireman had said. "The same goes for his shop — it's great. Have you ever been there?"

I had to admit that I hadn't, as yet, visited Kingfisheries ... but I had every intention of doing so, I've now done this, and have to agree with our Yorkshire reader ... up to a point. Certainly, Kingfisheries is a great place to visit if you are an established aquarist, but the same applies if you are a beginner. Therefore, if you are looking for, say, Cardinals, Platies and Angels, you'll find a good selection somewhere among the 200 or so aquaria. Equally, though, if you want an African Pike Fish, or a Golden Moray, or a room stacked from floor to ceiling with tanks given over solely to African Rift Lake Cichlids, you'll have a great time.

Kingfisheries is one of our long-established specialist aquatic businesses, having been in existence at the same location since the 1950s. It is therefore a 'mature' shop in a 'mature' setting which is largely dictated by the building itself. This substantial retail outlet is located in a typical busy 'South London' (North Kent, actually) high street and, in keeping with the very best of such establishments, it boasts a wealth of stock and experience, as well as courteous, knowledgeable service.

Stan and his team really know their stuff. As a result, the fish (which are fully quarantined) are in excellent condition, while the range of freshwater tro-

picals almost defies 'cataloguing'. In fact, the variety is so extensive and up-to-date that some fish have not even been scientifically described yet!

Over the years, I've come to see more species of fish than I can ever hope to remember by name. Even so, at Kingfisheries, I was stumped quite a few times by species — particularly of Suckermouth Catfishes — that I had never seen before. And some were real beauties too.

Kingfisheries is also very strong on marines, carrying a

wide selection of both fish and invertebrates. Perfectly in keeping with Stan Kemp's philosophy regarding conservation and over-exploitation of species, notices are pinned up by the invertebrate tanks pointing out to customers why so few hard corals are stocked. The reason is quite simple: Kingfisheries is backing TMC's (Tropical Marine Centre's) approach to hard corals, restricting the species on offer, not to those that can be legally imported under licence (hard

corals are listed under CITES Appendix II), but only to those species which both Stan and his supplier genuinely feel can be adequately maintained in aquaria.

On the coldwater side — in addition to all the common species and varieties — Kingfisheries regularly stock some of the very latest and exotic Fancy Goldfish, such as Pandas, Jikins and the like, along with Chinese Bitterlings and even Butterfly Koi.

Then there are Kingfisheries' own Discus breeding 'pots', designed by Stan himself as a direct consequence of his many visits to Far East Discus breeders. To the best of my knowledge, Kingfisheries is the only shop in the country that carries this excellent item. Of course, there are rudely healthy adult Discus to go with these pots.

And so it goes on. In the best tradition of the all-embracing aquatic shop, Kingfisheries is a veritable treasure trove of both the usual and the unusual, the expected and the unexpected — not packaged in glitzy, squeaky-clean wrappings, but in a genuine, honest, straightforward, competent fashion.

I offer my sincere thanks to our Yorkshire reader, whose name (I must confess, to my considerable embarrassment) I have forgotten, for providing me with the stimulus to visit Kingfisheries. I hope that my write-up has a similar effect on all our other readers.

Opening Hours:

Monday to Wednesday — 9.30 am to 5.30 pm.
Thursday — 9.30 am to 8 pm.
Friday and Saturday — 9.30 am to 6 pm.
Sunday — Closed all day.

For further information, contact Stan Kemp, Lee Ingham (Manager), or Graham Tett (Assistant Manager), at Kingfisheries Ltd, 308 Croydon Road, Beckenham, Kent BR3 4HR. Tel: 081 650 3716.



Top left, a mature shop in a mature setting that welcomes all members of the family.

Top right, what a poser! One of the Kingfisheries' superlative Suckermouth Catfishes.

Centre, part of the 'Tanganyikan' Room.

Above left, Stan Kemp's latest design of Discus-breeding 'pot' is much taller than more traditional models.

Above right, the coldwater selection includes such delightful species as these Chinese Bitterlings.

Supplement

PONDS & WATER GARDENING

PUBLISHED BY
AQUARIST
AND PONDKEEPER

FISH — PLANTS — EQUIPMENT



Pond or pool? See Definitions for further details.

A Matter Of Choice

A & P editor John Dawes tackles one of the most important decisions facing the newcomer to pondkeeping and watergardening: choosing a pond.



A properly and creatively installed pond, when coupled with appropriate planting — as in this award-winning display from Anglo Aquarium Plant Co, photographed at last year's Hampton Court International Flower Show — can change your whole life.

When we talk of a body of water containing fish or plants, or both, established in a patio or garden, usually for recreational purposes, we refer to it as a pond. Yet, if we look at the available literature, in both books and magazines, we find two words in general use. 'Pool' and 'pond' can repeatedly appear on the same page, in the same paragraph or even in the same sentence, often used interchangeably to refer to the same body of water.

DEFINITIONS Pool v Pond

My dictionary defines 'pool' and 'pond' as follows:

Pool — A small body of still water; a temporary or casual collection of water or other liquid: a puddle; a deep part of a stream.

Pond — A small, usually artificial, lake; the stretch of water between locks in a canal.

Clearly, a pool and a pond have a number of features in common. But a pool needs to be small and still, temporary or part of a stream.

A pond does not have to fulfil such criteria (after all, even a small lake can be relatively big). This, added to 'usually artificial' reference, tips the balance firmly in favour of a pond.

Ponds are usually artificial and they are usually 'small lakes'. They can also vary greatly in design, shape, construction and content and can incorporate moving water in a variety of forms, including fountains, waterfalls and watercourses. All these variables can be accommodated comfortably under the term 'pond' as defined in my dictionary. (The second pond definition referring to locks in canals, does not, of course, invalidate the first definition).

Natural v Informal Pond

A further possible source of confusion arises from the use of the terms 'natural' and 'formal' describing types of ponds. The fact is that very few people are fortunate enough to have a genuinely natural pond in their garden. What is more, the number of natural ponds found in the wild has steadily decreased over the years — silent victims of the bulldozer, drainage programmes, and many other 'progress-associated' projects.

To qualify as a true natural pond, a body of water must be formed of natural products, without human intervention, and must be inhabited by wild plants, fish, amphibians, invertebrates and other organisms. We only begin to appreciate the real significance of the term 'natural' if we apply these criteria to the vast majority of ponds.

When garden and patio ponds are referred to as 'natural', it is their shape more than any other single feature that is usually taken into consideration. What we mean by natural, then, is a pond with an irregular, informal shape, as opposed to a formal one with straight sides, matching inlets, smooth and regular curves.

A natural shape can be achieved in many ways. Even concrete can be worked into informal designs. However, the two most popular approaches adopted in obtaining a natural outline involve the use of either prefabricated ponds or pond liners.

Each of these will be dealt with in greater detail later. I only want to make two points here:

- ① Liners provide maximum flexibility and so are better suited to the natural approach than most other materials.
- ② Considering how inaccurate the word natural is when applied as I have described, perhaps we should avoid using it altogether and restrict ourselves to the term 'informal'.

We could perhaps use the term 'natural' for ponds stocked with plants and animals belonging entirely to native species. But, even here, the term 'wildlife pond' seems more appropriate.

Irrespective of the material used in their construction, all informal ponds have one feature in common — a lack of symmetry. They are therefore characterised by an absence of straight edges or smooth, matching curves. To be truly informal, one would have to choose a random shape. But this is considerably more difficult than it sounds. Just try drawing a random shape and you will see what I mean.

Even if you can produce a genuinely random outline, it will not necessarily be attractive, or even appropriate. In the end, most people compromise. So long as a shape is asymmetrical, pleasant to look at, and adequately provides for its aquatic inhabitants, it can be regarded as informal.

Formal Pond

At the other end of the spectrum are formal ponds, magnificent examples of which can be found in the grounds of stately homes and palaces. In some of these, the symmetry takes priority over everything else. In fact, some formal ponds contain no fish at all. Their beauty lies in their shape, or the design and use made of lighting or moving water in the form of watercourses, fountains and other features.

Although they are as far removed from the concept of the natural pond as possible, they are just as 'valid'. They merely have different qualities.

Other Possibilities

Some gardens or patios may be too small, or just not suitable, for a pond. Or one may want a modest-sized decorative feature, rather than a fully-fledged system. Several options are available for either situation, each with its own characteristics and attractions.

Virtually any non-toxic container can be converted into a small water feature. Some that have been used with considerable success are ceramic bathtubs, refrigerator liners or sinks, and half-barrels or water butts, often referred to as tub ponds.



Preformed ponds such as this one take the hassle out of having to plan a suitable shape.



An almost instant small water garden — complete with back-drop.

Millstones have also been developed into moving water features by means of a few simple, ingenious adaptations, including the installation of a water/fountain pump. These millstone fountains have all the soothing effects of moving water, housed in a compact unit which can be installed to stunning effect in the smallest of patios.

POND MATERIALS

Deciding on what type of pond to go for (as classified in the preceding paragraphs), may prove a little difficult, since every category has tremendous positive features to it. Even so, the job must never be rushed, however long it takes. In addition, early considerations must not only concern the type of pond — formal, informal or wildlife — but also the type of construction material. These can be grouped into several categories.

- Concrete, cement, brick, blocks
- Liners, e.g. polyethylene, PVC, butyl
- Prefabricated materials, e.g. plastic, fibreglass
- Wood, as in tub ponds
- Ceramic, as in sink ponds
- Artificial/reconstituted/natural stone, as in millstone water systems

Each of these materials has advantages and disadvantages. Further, personal circumstances and opinions will also influence the final decision one way or another.

Concrete, Cement, Bricks and Blocks

Concrete, overlaid with cement, is an extremely durable combination, and a pond constructed of these materials can be made to fit any shape. Such flexibility is an important advantage. If brick and/or blocks are worked into the plans, then a vast range of raised formal designs becomes possible.

On the debit side, concrete is not the easiest of materials to work with, particularly during hot, dry periods. Consequently, the best time of year for constructing a concrete pond is autumn, when the air is relative humid but frosts have not yet started.

If concrete cracks, it can prove difficult to repair. It is often a major operation to repair quite a small fracture, particularly if it occurs below water level.

Another potential drawback is the fact that the lime which concrete and cement release is highly toxic to plants and animals. Water-proofing, sealing, or a long maturation period — accompanied by repeat

filling, draining, and refilling — are therefore essential to make concrete ponds safe.

Liners

Butyl and rubber-modified polyethylene liners are not only durable, but also tremendously flexible and quite easy to work with. What is more, ponds incorporating these products can be installed virtually all the year round.

Despite these and other advantages, it would be wrong to think of these materials as the ideal solution for every occasion. For example, it is next to impossible to achieve clean-cut straight lines, or perfect crease-free curves. This could present problems if a trim, precise, formal layout is desired.

Butyl is also expensive and this aspect of pond construction can be an important deciding factor. If a temporary pond is required, it might therefore make more sense to use a cheaper, though less flexible or less durable, liner.



Cement ponds can be quickly rendered useable with one or other of the excellent range of 'coating' products now available.

Polyethylene, PVC (polyvinyl chloride) and PVC laminated with nylon or Terylene weave are, in ascending order of price, the most popular alternatives to butyl and rubber-modified polyethylene. Non-rubber-modified polyethylene is the least durable of these liners. It is also sensitive to ultraviolet radiation (a component of sunlight), becoming brittle over a period of time. However, it is inexpensive and therefore a good choice for temporary ponds.

PVC, especially if reinforced, is considerably more durable than polyethylene. It is also more expensive, though still cheaper than butyl.

Prefabricated Materials

The two materials most commonly used in prefabricated ponds are plastic and fibreglass. In recent years, though, black polyester ponds have also appeared.

Of the three, plastic is the weakest. Fibreglass, particularly if reinforced, and black polyester, are considerably stronger and can last for many years. In fact, some companies



Liners come in a range of materials and prices. Among the more durable ones are butyl and — as shown — rubber-modified polyethylene.

dealing in these ponds offer guarantees of 10 years or even longer.

For the pond owner who does not wish to plan the shape of a pond, or build it afterwards, a prefabricated system presents a very welcome way out. There are shapes and sizes to meet most needs, though some designs are rather shallow. This can present considerable problems with the survival of some pond inhabitants in areas that experience harsh winters.

Many prefabricated ponds are also on the small side. Though this could be seen as an obvious disadvantage where large, permanent, collections are envisaged, it can prove a significant advantage for temporary, quarantine, or hospital quarters. Small ponds of this type can also provide excellent, manageable facilities for rearing young fish during spring and summer.

Children love these ponds too because they are so accessible, and parents like them because they are safe. If frogs, toads and newts are seen as welcome additions to a water garden, small prefabricated ponds can provide ideal spawning sites, particularly if fish are omitted during the appropriate months of the year.

Wood

Wood has already been mentioned in connection with tub ponds, but it can also be used to construct raised, formal ponds.

Tub ponds consist of barrels cut in half, so they are usually water-tight. It is possible,

therefore, for anyone to create a very attractive water feature in less than half an hour. So, instant water gardening — well, almost instant — is a reality for tub pond owners.

Ceramic

Ceramic basins or sinks can also be used to great effect for creating small water features. Though they can be used without pre-treatment, such arrangements tend to look rather unattractive. One solution is to coat them with a suitable artificial mixture.

The drawback when such treatments are used is that they need a drying period, followed by detoxification treatment (as for concrete) to render the coating safe.

Artificial/Reconstituted/Natural Stone

Other water features besides millstones fall into this category, e.g. pebble fountains.

All these systems have the obvious advantage of small size, which makes them suitable for small patios. One disadvantage is that the total volume of water required is small. This could prove a problem because the splashing and recirculation of water which makes these systems so attractive result in considerable loss through evaporation. Because of this, the volume of water in the reservoir/pump chamber can quickly drop to dangerously low levels, particularly during hot, sunny weather. If not rectified, there could be permanent damage to the pump.



A delightful formal semi-circular pond, available almost 'off the shelf'.



Blocks, cement and liner being incorporated into a formal raised set-up.



There's no end to the permutations that one can employ to take full advantage of existing contours. This attractive stepped system belongs to Aquarian's Dr David Ford.

CLOSING REMARKS

As I hope to have shown, choosing a pond is considerably more than just a question of popping down to your nearest water garden centre or aquatic shop and taking pot luck.

A lot of time needs to be taken over these early decisions. After all, the general idea is that your choice should result in something that will beautify your patio or garden and provide you with a source of enjoyment and leisure for years to come.

Go to your garden centre or aquatic shop and talk to an experienced member of staff. He or she should be able to help iron out your problems. Some outlets even offer an installation service, further relieving any pressures you may feel about working with unfamiliar materials or applying unfamiliar techniques.

First, though, read the other articles in this Supplement. They should prove helpful in arriving at some other key decisions before 'diving' into this fast-growing and hugely enjoyable aspect of aquatics.

MAIN CHARACTERISTICS OF VARIOUS SYSTEMS

TYPE OF SYSTEM

Informal Pond

Wildlife Pond

Formal Pond

Tub/Sink Pond

Millstone Water Feature/
Pebble Fountains

MAIN CHARACTERISTICS

Irregular shape (lack of obvious symmetry). Relatively wide selection of plants and/or fish.

Irregular shape. Selection of plants and/or fish — restricted to native species. All forms of natural waterlife encouraged, e.g. frogs, toads, newts, dragonflies, etc.

'Artificial' shape. Symmetrical/matching sides common. Even if patterns are not repeated, the pond outline shows obvious signs of planning. Range of plants and/or fish usually more restricted than in informal set-ups. Ornaments, fountains, etc. are common features.

Small water feature with restricted stocks of plants and/or fish. Ideally suited for small areas. Freestanding and compact.

Emphasis on appearance, particularly water movement. No fish and/or plants. Ideal for patios.



Siporax filter. The small instant pond needs effective filtration to avoid water quality problems. This pond has a fountain mounted over the A1 GSM Filter by A1 Garden Aquaria (0270 882733) where magnets coagulate biological matter and Siporax cylinders degrade it to nitrates and, eventually, nitrogen.

Stock in the Pond

Dr David Ford of the 'Aquarian' Advisory Service, puts forward his suggestions regarding the best fish for a variety of ponds.

Photographs - unless otherwise indicated - by the author



Two new coldwater fish from JMC of Sheffield . . . Chinese Rainbows (a Bitterling) and albino Channel Catfish (USA)

Many fish owners become so because they own a garden . . . they are hobby gardeners who decide on a water garden feature, install a pond with aquatic and marginal plants, perhaps a waterfall and fountain, and then decide fish have to be added to complete the scene. There are many books for these reluctant aquarists (such as our own *John Dawes's Book of Water Gardens* from TFH) but what about the committed aquarist? Is a pond of interest to the fishkeeper? After all, you can't actually see the fish most of the time!

THE TRADITIONAL POND

The gardener's pond is a delight, with its tinkling mini-fountain or trickling waterfall . . . and a few fat, golden *Carassius auratus auratus* does indeed 'complete the scene'. These Common Goldfish will live some 20 years or more and see a generation of their family owners come and go.

The aquarist can include more exotic fish in such ponds, such as Comets, especially the colourful Sarassa (red on white) or Shubunkins (multi-coloured Goldfish).

One thing you cannot do with the traditional pond is stock it to the maximum, or water quality problems and consequent diseases will follow. For healthy fish and an easy-care pond, always understock, just a few pet fish in a well-planted aquascape.

Maintaining this pond is more gardening than fishkeeping. There is sufficient natural food for the fish to survive any length of time, but occasional feeds with a floating pellet will allow you to see your pets.

They will survive winter without attention and will probably do what comes naturally and spawn a family you can't afford, come spring! Net any baby fish into aquaria or give them away . . . you do not want a population explosion in the traditional pond.

THE NATURAL POND

Anyone interested in the conservation of wildlife, should install a natural pond. The one major difference from the traditional pond is that a natural pond slopes. This allows access to the water by frogs, newts, birds, perhaps even animals such as hedgehogs. (See *A Matter of Choice* by John Dawes elsewhere in this Supplement.)

The pond must be well planted to include submersibles, floaters, marginals, bog plants and moisture-loving varieties around the edges. This gives a total ecosystem to attract insects and their predators.

The fish stock can be the same Goldfish or varieties recommended for the traditional pond, or local wild species . . . but not both. Man-bred species such as Goldfish or Koi will not have a natural resistance to the parasites carried by endemic fish.

Note that captive-bred local species (such as Minnows and Gudgeon) are now entering the market. These fish are free of parasites and disease, which is most welcome. How-

*See page 59 for more pictures
Text continued on page 62*



Hand-feeding Koi is part of the fun of keeping pond fish . . . these are display fish at the Koi and Butterfly Centre, Isle of Wight.



Left, the Green Sailfin Molly will grow larger and deepen in colour if housed outdoors for a few weeks at the height of (a good!) summer.



Right, Goldfish . . . the common gold or red varieties are the best pond fish for all seasons.



Giant Koi make ideal pond pets even if they are not pedigree.

ever, until such fish are common, remember that *all* wild fish, without exception, carry parasites. However, a shoal of such fish will live quite happily with this burden in your natural pond.

Once established, a natural pond becomes a Noah's Ark. From diatoms to protozoa, from rotifers to snails, from crustacea to insects, a food web develops that has your fish at the top. Actually, the top of the food web is the heron, seagull or cat... but that's a

separate problem.

Hopefully, the sloping edge of the pond will allow the tadpoles and efts which frogs, newts and toads produce to leave the water in due course. These amphibians will not harm your fish (except, perhaps, the over-amorous male frog).

Endemic fish that can be used to stock the natural pond include the Common Minnow (*Phoxinus phoxinus*), Gudgeon (*Gobio gobio*), Roach (*Rutilus rutilus*), Carp (*Cyprinus car-*

pio), Chub (*Leuciscus cephalus*), Dace (*Leuciscus leuciscus*) and so on. The list is much greater than the number of hobby coldwater species.

A splendid fish for the natural pond is the Pike (*Esox lucius*), but not with other fishes; they would all be rapidly eaten!

All these species were freely available in British waters of years gone by. I recall collecting minnows with just a sweep of the (home-made) net in the River Trent in the 1940's and taking them home in a jam jar to a pond made from an earthenware kitchen sink. Such days are gone because of pollution and (necessary) wild-life controls. If you want to collect wild fishes for your natural pond fish, check the Wildlife and Countryside Act and then, if the species you are interested in is an 'allowable' one, obtain the owner's permission of any pond, lake or stream.

THE KOI POND

The Koi pond is the complete opposite to the natural pond. If you want to keep these majestic fishes, you need deep, but clear, water in a pond that must not slope, to discourage predators. Clear water is needed to see the beauty of the fish, so plants are excluded and filter systems are essential.

There are many Koi books available (ask to see the TFH list and the Interpet/Salamander series at the local aquatic store) which include details of filter systems. The



Butterfly Koi photographed at Kingfisheries Ltd, Beckenham, have fairly recently arrived on the pond scene.



The Chub (*Leuciscus cephalus*) — a candidate for the natural pond.

ideal Koi pond is planned and designed before a sod is turned. This is necessary to install devices like bottom drains, settling tanks and biological, polishing and trickle filters (Consult the current series of articles by Peter Skinner for detailed guidelines).

Actually, it is all great fun for the DIY enthusiast, as well as the Koi lover. The arguments over the best systems rage on, even to the media, which can be simple hair rollers (eg available in 4-foot cube boxes from the Midland Koi Association) to denitrifying sintered glass (such as Siporax).

Once a clear-water pond is up (or down) and running, and the filter is over its nitrite crisis, the Koi can be added. One advantage with these beautiful creatures is their amiable nature. No hassle, no predation, no fights or sulks, they just amble along eating and growing in a kaleidoscope of colour. They even allow their owners to give them a scratch and will take food from your hand.

Koi tolerate all other fishes, but it detracts from their natural beauty if not kept as an exclusive shoal of varieties. However, many aquarists combine Koi and Goldfish. This must be in the pond... it is wrong to restrict Koi permanently to the confines of the home aquarium (only young specimens are suitable for aquaria).

The varieties of Koi available are numerous, from the red and white Kohaku, red, white and black Sanke, blue Asagi, metallic Ogon, and so on, to the new shapes such as the Butterfly Koi with long fins. Devotees of these fish are as numerous as the fish

themselves and many are members of societies, such as the British Koi Keepers' Society, the Midland Koi Association and the Yorkshire Koi Society, each with very informative (and glossy) monthly magazines.

THE AQUARIST'S POND

The true fishkeeper can install an instant pond with modern equipment, such as a plastic or fibreglass unit or sheet butyl. These are virtually outdoor aquaria and so all the methodology familiar to the aquarist can be applied... power filtration, water changes, pH adjustment, water treatment and remedies. (See John Dawes' article elsewhere in this Supplement for a fuller discussion on pond materials).

To see my fish better, I like a raised pond so I can stand and look into the water. This is also safer for children and discourages predators. A brick or breeze block support is easily built on suitable foundations and this can be lined with butyl for permanence, or even cheap polythene for a season.

The instant ponds in preformed shapes can also be raised by surrounding them with a brick wall of the correct shape and height. In fact, several can be built linked by plastic waterfalls for quite spectacular effects.

The advantage of the 'outdoor aquarium' is that aquarium fish can be grown on to their full size and certainly better colour. This applies to all coldwater species, but also (during the warmer months) to the more exotic varieties such as Orandas, Moors,

Veiltails, Comets, Fantails, Jikin, Ryukin, Tosakin and all the new varieties of Fancy Goldfish coming from breeders. Showers will grow much larger and better-coloured fish by placing pedigree goldfish outdoors for a spell before placing them on the show bench.

This must not be done until the fear of frost has gone, of course, since exotic goldfish do not tolerate water temperatures much below 10°C (50°F). In summer the natural sunlight and availability of green (algae) water deepens the colour of the fish, especially the red and black hues.

Even some tropicals can be sited in the pond if the weather is warm day and night. Sailfin Mollies will restart growth and develop better finnage when moved to the greenwater pond. Guppies will also breed happily in shallow-water ponds during warmer weather. If global warming gives us another heatwave, even some of the more delicate tropicals may, one day, be given a holiday in the garden.

Breeders, too, will find an outdoor aquarium-pond useful. Housing vast numbers of fry is a water volume problem and the dedicated aquarist's pond is much better than lots of mini-tanks, but, again, during warm weather.

THE SPECIES POND

The trade is now selling farmed coldwater species for the fish fancier to keep in ponds. JMC of Sheffield, for example, has farmed Sticklebacks, *Gasterosteus aculeatus* — don't mix these with goldfish, the spines mean trouble — and Gudgeon (*Gobio gobio*). The ever-popular Bitterling (*Rhodeus amarus*) is still available, but new species are arriving with the opening-up of Eastern Europe. The Rudd (*Scardinius erythrophthalmus*) is still available in a golden variety.

A rather special species pond that some people appear to be keeping is the one that raises fish for the table... if you can bear to do it! For more information, see *Backyard Fish Farming* by Paul Bryant et al, Prisma Press, (1980) ISBN 0 904727 24 6. Another book is *Fish Farming* by Cyril C Harris in the Garden Farming Series, Pelham Books (1978) ISBN 0 7207 1040 5. If you are into the heavy stuff, see *Nutrition of Pondfishes* by Balfour Hopher, Cambridge University Press (1988) ISBN 0 521 34150 7.

SWIMMING DEPTH OF FISHES IN THE NATURAL POND

Surface... Perch (but keep alone)
 Upper... Roach and Minnows
 Middle and Lower... Bream
 Lower... Tench and Gudgeon
 Bottom... Carp (except goldfish) and Black Catfish
 (Note that lower and bottom dwellers will rarely be seen)



POND PLANTS OCCASION

All aquatic and semi-aquatic plants have a specific habitat in which they thrive. Some are capable of growing completely submerged, while others merely need moist soil around their roots. Yet, they all share one important char-

acteristic: their need for water is greater than their terrestrial cousins'.

FIVE GROWTH ZONES

If we take a cross-section through a typical pond, we find that, in that small area, there

are no less than five distinct regions inhabited by water plants. Approaching the pool from dry land, we find that the soil on the bank above the pool is moist. This is because water rises from the pool by capillary attraction across the soil particles. Here, we will find moisture-loving plants which,



Top left, a well-planted pond in an open setting.

Top centre, the elegant and popular *Iris kaempferi*.

Above, the Pickerel Weed or Plant — tougher than it looks.

Far left, Escarboucle is, in my opinion, the best water lily of all.

Centre left, the Bog Arum has interesting white blooms and unusual fruits.

Near left, this is the double form of the Kingcup or Marsh Marigold.

S FOR EVERY

As the range of pond plants continues to expand, choice becomes progressively more difficult. **Barry James** presents his own personal favourites for the five distinct planting zones which most ponds possess.

Photographs by the author

although needing a moist soil, also need perfect drainage to survive during the growing season.

Before areas of free water are encountered,

there is an area where the soil is permanently waterlogged. Here, we find the so-called bog plants. The shallowest areas of water support a lush growth of 'marginal' plants, which

need their roots underwater, but their foliage and flowers stand proud of the surface.

Deeper still, and we find the deep marginals (also sometimes known as surface plants). These plants have their roots in the bottom mud, but send up long stems, at the end of which are the floating leaves. Their flowers, similarly, float or stand erect out of the water. This group includes the water lilies.

Growing completely submerged, although some species produce floating leaves and flowers, are the so-called oxygenating plants. Finally, the fifth group float free on the surface of the water. These species have

many devices for staying afloat, including spongy, air-filled stems and leaves. These plants are completely at the mercy of the wind and current and are therefore not found in fast-flowing streams, except by accident.

PLANTING GUIDE

Each of these plants has a part to play in the ecological pattern of a pool. Without them the water would only support a huge growth of filamentous and other types of algae. It is essential, therefore, to approach the planting of the garden pool with a pre-conceived plan as regards the number and variety of plants we intend to use.

The minimum quantities needed for starting a successful pool are, basically, as follows:-

- ① One water lily for every 15-25 square feet (1.4-2.3 sq m) of surface area (depending on the variety).
- ② One floating plant for every 15 square feet (1.4 sq m).
- ③ One marginal plant for every three feet (90cm) of circumference.
- ④ One bunch of oxygenators for every two square feet (1,800 sq cm) of surface area.
- ⑤ One deep marginal plant (in addition to the water lilies) to every 15 square feet (1.4 sq m) of surface area.

I must emphasise that these are minimum quantities. A few more plants will speed up the maturation of the pool.

Your dealer will advise you as to how to plant the pool vegetation, and supply baskets, fertiliser, hessian liners and, usually, even the soil itself.

Pond plants vary enormously in price; some white water lilies can cost only £3 or £4, while the finest reds and yellows may be as much as £15. In general, the more rampant the plant is, the cheaper it will be. The choicest varieties will not only be more expensive, but are also the fastest sellers, so it will pay to establish your pool as early in the season as possible.

MY FAVOURITES

I describe below my favourite varieties. This is not an exhaustive list, but merely indicates my own preferences.

Water Lilies

White: My choice for a vigorous variety would be 'Gladstonia'. Growing in up to three feet (90cm) of water and with a surface spread of four feet (120cm), this variety produces blooms up to 10in (25cm) in diameter.

For a medium grower I would choose 'Gonnere' for its 'snowball-like' double flowers.

A smallish variety, 'Odorata Alba' has scented blooms with a yellow centre.

Finally, for tiny pools I would choose 'Pygmaea Alba' for its star-shaped blooms only 1½in (3.8cm) across and tiny leaves to match.

Pink: 'Brackleyi Rosea' is ideal for large pools; it has scented rose-pink flowers.

'Mrs Richmond' is an old favourite of mine for medium-sized pools. The blooms are freely produced, pale pink when first opening, later changing to satin pink.

'Firecrest' is an ideal choice for a smallish pond. Clear bright-pink blooms with red-tipped orange stamens ensure this variety a steadily increasing popularity.

'Laydekeri Lilaceae' is a pleasing pink for tiny pools.

Yellow: 'Colonel A K Welch' is the largest hardy yellow, with canary yellow blooms often carried 3in (c 7.5cm) above the surface.

'Sunrise' is an American variety and, although not performing well in bad summers, is a large-flowered variety of exceptional beauty. However, the price may be prohibitive for many people.

The darling of the yellows is the diminutive 'Pygmaea Helvola' with tiny 2in (5cm) yellow blooms and surrounded, like all the yellow varieties, with maroon-blotched foliage.



The widest-selling oxygenator is 'Crispa'.

Red: 'Charles de Meurville' has large wine-red flowers, and enormous leaves the size of dinner plates. One for the large pond.

'Escarboucle' is, in my opinion, the finest of all water lilies. Bright scarlet blooms with a yellow centre are produced in profusion all summer. A medium grower.

'Froebeli' is the best flowering red for small pools, while the smallest of the reds, and suitable for tub gardening, is 'Pygmaea rubra'.

Copper Varieties: Most of these varieties come into the small category. I am very fond of 'Commanche' which has coppery-red flowers when first open, but then deepens in colour with age.

Deep Marginals

Aponogeton distachyus, the Water Hawthorn, is by far the most outstanding of this

group. Growing from a tuber, it throws up petioles up to three feet (90cm) in length, topped by dark-green oval leaves.

The flowers are white, have a sweet scent and are continuously produced from spring to late autumn, with a short break in mid-summer. This species throws viable seed in some profusion, so it doesn't take long to colonise large areas of natural pools.

Marginals

Caltha palustris plena is a double variety of our native Marsh Marigold. It is the first marginal to flower in the spring and carpets the edges with golden-yellow fully double flowers. The plant reaches a height of 9in (c 23cm). It will grow in a bog, marginal or damp soil situation, so it is very versatile.

Caltha palustris is often called the Bog Arum. It produces glossy heart-shaped leaves arising from a creeping stem. The white arum-like flowers are followed by bright-red berries. Suitable for bog or shallow water. Height 6-9in (15-23cm).

Of the Irises, I am very fond of the variegated form of *Iris laevigata*. You then get the advantage of attractive green and silvery-white foliage when the light blue flowers have finished. Height 24in (60cm). Shallow water. *I. kaempferi* is also beautiful.

No water garden is complete without at least one variety of *Mimulus*. *Mimulus guttatus* with its yellow flowers blotched with orange is my favourite. Grown in shallow water or damp soil, it will flower for several months.

The Pickerel Plant, whose correct name is *Pontederia cordata*, looks too exotic to be hardy in the UK but then, appearances can be deceptive. Glossy heart-shaped leaves on stems two feet (60 cm) long are almost enough, but the delightful spikes of clustered blue flowers are a welcome bonus. Grow in shallow water.

Of the Reed Maces, I suppose the Japanese dwarf species, *Typha minima*, is the one for smallish pools. Growing only 18in (45cm) high with thin grass-like leaves, its inflorescence is egg-shaped, brown, and sits atop the flowering stem in the same way as the 'pokors' of its larger relatives. Grow in 3-5in (c 7.5-13cm) of water.

Oxygenators

While no pool can be without the ubiquitous *Lagarosiphon major* or 'Crispa', I am very fond of the Water Violet (*Hottonia palustris*). With its bright-green highly dissected foliage and pinkish-white flowers, it is also deserving of inclusion in every pool.

Floating Plants

For neatness and elegance of form, the Frogbit (*Hydrocharis morsus-ranae*) takes some beating. The spongy, rounded, floating leaves have a glossy upper-surface. Long trailing roots are much favoured by goldfish for spawning, while the tiny white flowers are, in themselves, a point of interest if viewed closely enough.



An excessively large fall of leaves can lead to raised pollutant levels and acidic water conditions.

Tackling Common Pond Problems

Dr David Pool of the Tetra Information Centre presents a detailed guide to essential 'healthy' pond care.



Limestone and, particularly, cement can — if left untreated — cause dangerously high pH (alkaline) values.

Most of the time pondkeeping is a relaxing, trouble-free pastime with a minimum of maintenance being required to keep the pond in pristine condition. From time to time, however, minor problems can occur, but these are relatively simple to overcome, providing you understand what is causing the trouble in the first place.

In this article I will examine some of the most common problems which occur in a garden pond.

1 'NEW POND SYNDROME' Problem

When a new pond is set up, problems can often occur in the first few weeks, in the period when new fish are being introduced. Such problems are often indicated by the

fish being very lethargic and staying just under the water surface, or laying on the bottom. In severe cases, the fish may gasp at the water surface, rub against underwater objects or even die.

Cause

'New Pond Syndrome' occurs in all newly set-up ponds as they mature. During this period, there are raised levels of pollutants, such as ammonia and nitrite, which cause the unusual behaviour.

These problems occur because, in a new pond, there are very few beneficial bacteria which can decompose fish waste or other pollutants. Therefore, in the early stages, any fish waste that is produced remains undecomposed and starts to accumulate in the pond. Once the raised levels of fish waste are present, the bacteria which decompose it will increase in numbers, converting it firstly into ammonia, then into nitrite, and finally into nitrate.

The raised levels of ammonia which occur cause severe irritation to the fish, resulting in them rubbing and jumping. The high levels of nitrite which occur prevent the fish from utilising any oxygen in the water, causing them to be very lethargic and gasp at the water surface.

Solution

Raised levels of ammonia and nitrite will occur in any new pond as things settle down. However, with care, the levels can be kept low enough to have no adverse effects on the fish. The following points will help to achieve this.

- ① Only add a small number (3-6) of fish initially, leave them for a week and gradually increase the stock over a period of weeks, or even months.
- ② Take great care not to overfeed in the period soon after the fish have been added. Ensure that they consume all of the food given within 2-3 minutes.
- ③ Check the nitrite level in the pond at 2-day intervals, using a good-quality test kit, when the pond has first been set up. If high levels are recorded and the fish are showing signs of distress, a 10-20% partial water change will help.
- ④ Feeding the filter with a commercially available filter start preparation or filter material from an existing 'healthy' pond will ensure that all of the necessary bacteria are present and should speed up the maturation.

2 LEAVES AND/OR BLOSSOMS BLOWING INTO THE POND

Problem

Leaves in the autumn, and blossoms in the spring, will blow around in the garden until they end in the pond. Once in the pond, the leaves and blossoms will decompose, polluting the water and harming the fish. The leaves also block the pump and, as they decompose, encourage unsightly algal growth. Leaves from certain trees (e.g. Laburnum) are toxic to fish.



Careful feeding will ensure that fish remain healthy and able to resist disease outbreaks.

Cause

Leaves and flowers obviously originate from trees and shrubs, particularly if they are in the vicinity of the pond. Leaves, however, can blow for long distances, only stopping when they get wet — in your pond!

Solution

Planning, when installing your pond, will help to minimise problems. Avoid placing the pond underneath or close to deciduous trees or shrubs, or those which have large numbers of flowers.

Although a net may look unsightly, it is a good idea to position one over the pond when leaves and flowers are falling. The net does not need to be in position throughout the year, and can be removed as soon as the threat has disappeared. Leaves that fall into the pond should be removed before they start to decompose.

3 WATER WHICH IS TOO ALKALINE

Problem

If the water in the pond is too alkaline (the pH is greater than 8.5) the fish and plants can often be adversely affected. The fish may show signs of irritation, such as jumping and rubbing. In extreme cases, the body can become very inflamed and the fish may die. The plants can show poor growth and, in some cases, will fail to establish.

Cause

In most cases, the high pH values in the water are caused by the use of cement in or around the pond. Only small amounts of untreated cement will cause the pH to rise greatly, often to values in excess of 9.5, at which the fish cannot survive. Cement used in the construction of waterfalls and paved areas around the pond (if they drain towards the pond) can be easily overlooked.

Solution

The simple solution to this problem is always to use a cement sealant on any cement that comes into contact with the pond water. These sealants are available in a range of colours, including clear; therefore, they do not need to look obvious or unsightly. The

sealants must be applied to dry cement, so the pond may need partly draining before application.

If the pond pH is high due to cement, it can be gradually lowered through weekly partial water changes using tapwater.

4 GREEN WATER

Problem

The water in the pond turns a green colour making it difficult to see any of the pond inhabitants.

Cause

'Green Water' is caused by suspended algae which can be present in large numbers in the pond. In extreme cases, where the pond water resembles pea soup, there may be up to 50,000 algae in every teaspoonful of water! These algae thrive in conditions where there are high levels of nutrients and plenty of light.

In a newly set up pond, there are large numbers of nutrients present from the tap-



Suspended (free-floating) algae give rise to 'green water'.

water; therefore the pond will usually turn green after 2-3 weeks, only to clear once all of the nutrients have been used up.

If there are relatively few plants to remove nutrients, these can build up, encouraging the algae to grow. Similar high nutrient levels can occur due to excess debris decomposing in the pond or from garden run-off.

Solution

There are a number of methods of overcoming or preventing 'green water'. These

can be broadly divided into artificial means of killing the algae, and natural means of preventing them receiving sufficient light and nutrients to grow.

Artificial Methods

① Use of an Algae Killer

Algicides are available which will kill the algae or cause them to clump together and sink to the pond bottom. In all cases, the algae should be removed after treatment to prevent them decomposing and polluting the water. This can be achieved using a siphon, pond vacuum or even a fine net. It is important to use the algicides as directed in the instructions to ensure they are effective.

② Use of Ultra Violet (UV) Light

UV light is used in many ponds to control green water by damaging the algae that pass through the unit, causing their death, or resulting in them 'clumping' together and sinking out of the water. If used together with a good filter, some manufacturers will guarantee the water remains clear.

③ Straw

The use of barley straw to control algae in the pond has been widely publicised. The research, conducted at Reading University, suggests that it works by releasing a chemical as it decomposes and that it is this chemical which stops the algae growing.

The barley straw must be untreated, e.g. with fungicides which are used on straw for small animal bedding. The best straw is therefore that sold for horse use. Add 50g (1.75oz) of straw for every 220 gallons (1,000 litres) of pond water, pack it loosely in a mesh bag and position it where it will receive a good

water flow. The straw normally takes approximately four weeks until it can control the algae.

Natural Methods

① Encouraging Plant Growth

Rapidly-growing plants will use up large amounts of nutrients and starve the algae. 'Oxygenating' plants are ideal for this purpose. Aim to have one bunch of 6-8 strands of plant for every 2 sq ft (c 1,570 sq cm) of water surface area.

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These plants can be trimmed regularly to encourage the growth of new and fast-growing shoots.

③ **Shading**

Aim to shade part of the water surface in order to prevent the algae receiving sufficient light. Tall marginal plants are ideal, as are water lilies which can cover one-third to one-half of the pond surface.

⑤ **BLANKETWEED**

Problem

The plants and sides of the pond are covered with a long green hair-like growth. The Blanketweed can form dense mats which smother the plants and can clog filter systems and pumps.

Cause

Blanketweed is a name used for any of the many filamentous algae which can grow in the pond. Given favourable conditions, some species (e.g. *Cladophora*) can grow at an



Above, lightly stocking a pond with fish, as well as encouraging healthy plant growth, will help establish crystal-clear water.

Below, a net positioned over the pond will stop leaves and flowers dropping into the water. It will also deter predators... and it needn't look unsightly either.

incredible rate and can double their own volume every 24 hours.



Blanketweed can clog NOT just the pond, but also the filter and pumps.

Solution

Most of the methods suggested for controlling green water will also work for Blanketweed.

Ultra violet light often has the opposite effect and, following its use, Blanketweed growth will often increase. This is due to the green algae being killed by the UV and not therefore removing the light and nutrients which can then be fully utilised by the Blanketweed. If UV is used, healthy plant growth should be encouraged, either in the pond or, in Koi ponds, in a vegetable filter.

⑥ **CLEANING THE POND**

Problem

Throughout the year, debris will gradually accumulate in the pond. If not removed on a regular basis, it can result in poor water conditions, with the fish becoming distressed.

The excess debris can encourage algal growth; it is also easily disturbed, causing the water to become cloudy.

Cause

Debris accumulates in the pond from many sources, such as uneaten food, fish waste, leaves and garden run-off.

Solution

A partial water change once a year is usually sufficient to keep the pond clean and free from excess debris.

When cleaning the pond, it is advisable to remove 25-30% of the pond water, taking the water from the bottom of the pond, together with any debris. This can be undertaken using a siphon, pond vacuum or a pump. It is advisable to remove any large particles of debris beforehand, using a net.

With the water at its lowered level, you have an ideal opportunity to remove dead leaves from the plants and divide them if necessary.

Ensure the replacement water is the same temperature as that in the pond, and has been dechlorinated before being added to the water.

7 HERONS

Problem

Herons are a potential problem for any pondkeeper, with these birds even visiting ponds in the centre of large cities. Indications of heron problems are usually the mysterious disappearance of fish and, possibly, a chance sighting of the bird first thing in the morning.

Herons can take fish of up to 10in (25cm) in length, and may badly damage larger fish without being able to lift them out of the pond. The bright coloration of Koi, Orfe and Goldfish, together with the shallow nature of many ponds, means that the heron can easily catch the fish, and often devastate the pond population.

Solution

Preventing herons from catching the fish in your pond often involves a little ingenuity. Commercial scarers are available which are effective. These work on the principle that the heron will land in your garden and then stalk towards the pond. In doing so, the heron interrupts an Infra-Red beam, or touches a 'trip wire' which causes a visual and audible deterrent.

Nets are also a good deterrent suspended 6-8in (15-20cm) above the water surface so that the heron cannot land on the net and push it into the water, enabling it to stab the fish. Suspended wires or fishing line around the perimeter of the pond (12 and 18 inches

— 30 and 45cm — above the ground) will also deter herons by stopping them walking into the pond. However, a hungry heron can overcome this by landing directly in the water!

8 DISEASE OUTBREAKS

Problem

Disease outbreaks can exhibit a number of symptoms which are visible to the pondkeeper. For example, the fish may show obvious signs of disease, such as lumps of fungus, or white spots, in which case identification and treatment is very easy.

In other cases, the disease organism may be smaller and it is only apparent that the fish is diseased by its behaviour. In these cases, the fish may be lethargic or show signs of rubbing or gasping at the water surface.

In severe cases, disease can affect all of the fish in the pond and can cause the death of severely affected individuals. Therefore, early recognition of the unhealthy specimens, followed by prompt treatment is advisable.

Cause

All of the fish in your pond and, for that matter, any ponds, are diseased. That is they are all infected by, at least one, and often several, species of parasite. These parasites are a natural part of the fish's environment.

If the fish are in good condition generally, their immune system (the body's natural means of countering disease) will be active

and able to control the infection, ensuring the parasites are only present in very small numbers.

If the fish becomes unhealthy for any reason, for example, owing to poor water quality, unsuitable nutrition, stress, etc, the immune system will be suppressed, allowing the existing parasites to increase in numbers, thus causing problems.

Solution

To prevent disease outbreaks, it is obvious from the above that you should strive to keep the fish in the best possible condition through good maintenance procedures and providing the correct food.

Occasionally, however, disease problems do occur. The identification and treatment of these diseases is summarised in the Table. Further details on the diagnosis of diseases are available in the following texts:

ADI 49: Water Chemistry and Fish Diseases. (Published by Tetra — available from the Tetra Information Centre, cost £1.85 + 20p p & p).

A Fishkeeper's Manual of Fish Health by Dr Chris Andrews, Adrian Excel and Dr Neville Carrington. (Published by Salamander).

The problems addressed in this article are the most likely that the pondkeeper will experience. If you require any further information on these problems, or on any other pond troubles, write to me at Tetra, Lambert Court, Chestnut Avenue, Hants SO5 3ZQ.

DISEASE DIAGNOSIS AND TREATMENT TABLE

DISEASE	SIGNS	TREATMENT
Fungus (e.g. <i>Saprolegnia</i>)	White cottonwool-like growth on skin and fins. Only affects fish previously damaged by poor water quality, bad handling, etc.	Add commercially available fungus treatment. Improve pond hygiene and avoid damaging fish.
White Spot (<i>Ichthyophthirius multifiliis</i>)	Small, pinhead-sized white spots on body and fins. Cause irritation to fish, which may rub, clamp fins, etc.	Add recommended dose of White Spot treatment.
Fin Rot (Bacterial infection)	Fins become ragged and, in severe cases, reddened. Often affects fish previously damaged by poor water quality or bad handling.	Add bacterial treatment. Improve pond hygiene.
Sliminess of the skin (External parasite or poor water quality)	Severe irritation (rubbing, flexing), rapid gill movements, fins folded. Slimy grey coating on skin — most noticeable against eyes and dark areas.	Check water quality and improve pond hygiene if necessary. Add general external parasite remedy if parasites suspected.
Pop-eye	Eyes swollen, protruding out of sockets. Various causes.	Check water quality and improve if necessary.
Ulceration (Bacterial infection)	Red sores on body of fish, caused by bacterial infection of a wound (e.g. missing scale).	Isolate affected fish and raise water temperature by 3-4°C (approx 5.5-7°F). Bacterial treatments may be effective in early stages. If inflamed, paint neat bacterial treatment onto ulcer (avoid eyes and gills) and repeat at 2-day intervals. In severe cases, use antibiotics available from a local vet.
Gill Flukes	Irritation (rubbing, flexing), gasping and rapid gill movements. Fish often show sudden rapid movements, followed by lethargy.	Add general external parasite remedy.
Swimbladder Disorder	Fish have difficulty swimming and float to surface or sink to bottom. Often affects goldfish following over-feeding or sudden temperature change.	Feed small amounts more frequently. Maintain constant temperature. Add 1 teaspoon cooking salt/5 litres (1.1 gal) water (except for softwater fish).
Mouth 'Fungus' (<i>Flexibacter</i> bacteria)	White tufts around mouth. Erosion of mouth region.	Use bacterial remedy. Improve pond hygiene.

Pond paradoxes

Dick Mills airs some thoughts on the unforeseen consequences of apparently sensible courses of action.



JOHN DANES

Clear water in a shallow pond... but at what price?

In the rarified heights of higher physics there is a Law that says that, for every action, there is an equal and opposite reaction. Now, while there may well be one or two qualified physicists among the ranks of fishkeepers who might like a deeper discussion on this theory, the rest of us will have to be satisfied with observations made at water level, in the pond to be precise (and this will represent the limits of any further talk about exact sciences).

GREEN WATER CONVERSATIONS

In recent months, the current conversation subject matter between any two pondkeepers chosen at random will probably have been green water, blanketweed and any successful treatments against them.

Past approaches

Going back a few years, recommended treatments for green water were very varied. To some, the easiest (and most immediate) remedy was to do a massive water change. This certainly resulted in clearer water but, all too often, the nutrients in the new tapwater

simply gave the next generation of algae plenty of food to feed on, as they developed from any residual cells not completely flushed out.

Taking a more considered approach, two alternative treatments either used algicides or more oxygenating plants. Resorting to the first course of action often brought the desired results but, unfortunately, some pond owners unwittingly carried out only half of the remedy. Killing the free-floating unicellular algae was the easy part; what many did

not appreciate was that unless the dead algae were removed from the pond, the sudden increase in decomposing material in the water would lead to even more problems than the green water actually caused in the beginning.

Alternative 'green' approach

OK, so let's fight the green menace on another, 'healthier' front — using more plants to starve out the algae. Oxygenators, such as *Elodea*, *Lagarosiphon* ('Crispa'), *Myriophyllum* (Milfoil), etc, seem ideal: they're quick-growing (so it won't matter if the fish chew up a few) and you can see they're living up to their reputation when you notice streams of oxygen bubbles rising to the surface on a sunny day. So now you've got clear water, but do consider what happens when the sun goes in, and especially so at night-time during summer months.

Lack of oxygen

The snag with so-called 'oxygenators' is that they work only when 'the light's on' (this applies to indoor aquariums too, only, in this case, substitute 'tanklight' for sunlight). When the light goes out, their photosynthesising factories seem to go into reverse and they actually consume oxygen and directly compete with the fish for this vital dissolved gas. (* See Editor's Note)

A common question is "why did some of my fish die overnight?" Usually this occurs during warm weather, when the dissolved oxygen level in the water is lower than usual anyway, and the fish have simply suffocated in an otherwise healthy, yet over-planted, pond.

pH

There another change in conditions that can occur with plant over-stocked ponds; the pH can vary quite considerably between early morning and late evening readings.



JOHN DANES

Thick plantings of 'Crispa', Hornwort and other oxygenators (seen here in conjunction with the Lily Attraction) may well help prevent green water problems... but may produce pH fluctuations.

After night-time, the pH can have fallen (become more acid) due to the extra carbon dioxide 'breathed out' by the plants during the period of darkness. After a day of sunshine, the pH will rise again as carbon dioxide is re-absorbed by the plants. (To make sure you get true comparative readings, always take pH readings [whether in pond or aquarium] at the same time of day).

The moral here is to keep an eye on the plant stocking levels of your pond during summer, and also leave your fountain running (or a hose trickling, if water regulations allow) during hot weather. If running a hose is out of the question, then fit up a simple airstone in the pond to keep it aerated — by turning over the water and venting off excessive carbon dioxide.

Efficient filtration

Blanketweed is an annual curse, if we are to believe most pondkeepers, yet it can be 'self-inflicted' under certain circumstances.

Returning to green water again, the most up-to-date remedy is to install a modern, efficient filtration system. In today's terms this means a multi-media system — foam, brushes, biological chamber and UV tube — if crystal clear water is to be the rule, rather than the exception.

Now turn your attention to the requirements for rampant blanketweed growth and what do you find? Top of the list, if you don't include things like high plant nutrient content in the water (been overfeed-

ing again, or gone mad with the plant fertiliser?) is excessive light — and just how does this excessive light reach the depths of the pond so much more easily than before? By courtesy of your extra-clear water, thanks to your filtration system!

Speaking of filter systems, another apparently good idea would be to have the return from the filter at the opposite end of the pond to the intake, so that the whole pond is scoured and cleaned. No doubt, you've all guessed that this isn't such a great idea where water-lilies are concerned — they don't like running water, or even water splashed on them.

Killing the algae, or removing the blanketweed, can eventually be achieved, but doing so can have yet another perhaps unnoticed side-effect, this time upon the nitrate level in the water.

Algal filters are often recommended for removing nitrates from aquarium water (watercress in any poolside cascade will work just as well — and you can eat the surplus!), so it's a good idea to keep an eye on nitrate levels before and after dealing with algae and blanketweed problems.

Unanticipated consequences

It just goes to show that, whatever you put into your pond, for whatever reason, will both good and, perhaps, not quite so good effects.

Treatments may well work well on the very things you were trying to cure — but it pays

always to be on the look-out for possible, unanticipated reactions to your very best of intentions.

*Editor's Note:

A common misconception is that green plants photosynthesise during the day and respire at night. This myth has arisen because, during the daylight hours, plants produce oxygen, a process that stops at night. The truth of the matter is that plants breathe *all* the time, using up oxygen and releasing carbon dioxide — day and night.

However, during the day, they also photosynthesise. For this, they need carbon dioxide so, quite naturally, they use up all of the carbon dioxide which they generate during respiration... plus some more besides. A by-product of photosynthesis is oxygen. However, plants produce more oxygen during the daylight hours than they require for respiration. They therefore release this gas as bubbles.

At night, when photosynthesis stops, no more oxygen is generated, of course. Respiration, though — which has been taking place during the day as well — continues, so the end effect is that, during the hours of darkness, plants and animals can end up competing for an ever-decreasing oxygen supply.



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EQUIPMENT OVERVIEW

BY DICK MILLS

Having dealt with quite a few pond accessories in my last Equipment Overview (Coldwater Supplement — *A & P*, April '92), I've decided (and I hope you-know-who approves of my choice) to concentrate this article on pond maintenance equipment.

ADEQUATE FILTRATION

In last month's *A & P* Product Round-Up (see? It's at it again!), there were details of a range of water filters which provided excellent water quality for the pond. However, the provision of original high-quality water is only part of the story, for fishes need to be kept in good water conditions from then on as well. This means that some form of pond filtration must be used.

Pond filters mean various things to various people: to some, a filter means no more than the block of foam stuck over the inlet to the water pump. To others, it can mean a multi-chambered, 'whole-water' treatment plant hidden beneath a planked patio area. In between these two extremes (incidentally, the first type only protects the pump and doesn't

do too much for the pond water itself) there is the right filter for every type of pond.

Each filter should be sized to the pond's requirements, and here subjects, such as flow rates, heights (head) of water level, submerged or surface pumps, flocculation, UV, sedimentation and so on should be understood *before* any filter is installed.

And, talking of installation, the best time to do it is right at the start, especially with large Koi ponds where bottom drains and gravity-fed systems are to be used. In addition to pumped, media-filled external filters, there is, of course, the option of fitting an under-gravel, biological system within the pond itself. Don't neglect pump maintenance either... whatever type of pump is used.

CONTROL OF ALGAE

Excellent filtration is fine but it does have a side-effect (apart from wallet-shrinkage!); the clearer water, the easier the sunlight can penetrate, and this usually means green water and/or Blanketweed. To deal with these two undesirables, chemical and mechanical means are used.



A growing number of pond filters come with in-built ultra-violet sterilising unit these days.



Algicides will treat both free-floating and filamentous algae — but the underlying cause must be located as well.



This decorative planter may not look like a trickle cascade pond filter... but it is!

Algicides are efficient, of course, but dead algae must be removed, as their subsequent decomposition will seriously deplete oxygen levels in the water. Another method is to inject a special chemical into the water; this will cause the algae to flocculate and the resulting floating masses can be netted out.

Ultra-violet light (used in conjunction with an external filter system) will also cause the algae to clump together, thus making it easier for the filter medium to trap it as it passes through the filter.

Blanketweed appears to have its match with modern agents such as Interpet's Pond Balance, but treatments such as this must be continued at regular intervals if the pond is to

remain clear for the whole season.

POLLUTION CONTROL

Pond pollutants can come from many quarters: food is one of them. It is easy with indoor aquarium fishes to control how much food they get, but outdoor fish have their own food supply supplemented by all manner of natural things — insects, larvae, crustaceans, worms, etc, so it is very easy to overfeed inadvertently.

However, floating foods (sticks, hoops or pellets, it matters not which) provide a ready-made indication as to whether or not the fish have eaten them all — they're still there on the surface! The continuously-

active digestive systems of most pondfish means they should be eating continually, but any uneaten food will eventually contaminate the pond, storing up trouble for the future.

Remember that pond fishes need a change in diet around autumn time, so that they can store up fats, on which they depend during the winter months as they lay dormant at the bottom of the pond. Check the ingredients list on the side of the food containers — looking out for extra wheatgerm content, etc, for winter use.

A pond 'vacuum-cleaner' used regularly will keep the pond floor clear of debris with the minimum of effort. Two types are available: the first is

powered by water pressure from the tap forcing the detritus up the pipe into a collecting bag; the second uses an electrically-driven water-pump and does away with the need for long hoses back to the tap — just a long cable to the nearest power-point (protected by a residual circuit breaker, of course!).

Extra pond pollution comes from leaves, berries, fruit, etc, falling into the pond itself. Autumn time is particularly dangerous, as any unremoved decomposing material in the pond will cause toxic gases which, if trapped beneath the winter ice, can kill the fish.

A pond cover net will catch leaves from trees and shrubs, but you'll have to remove dead



A net over the pond won't just keep predators out — it will also prevent leaves falling into the pond in winter.



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Maintaining an ice-free hole during extremely cold weather will allow toxic gases to disperse from pond water and will, therefore, help fish survive their winter 'slumber'.

water-plants yourself.

Now that we've arrived at winter, investing in a pond heater or a floating polystyrene bell will keep the pond partially clear of ice and allow necessary ventilation to occur.

'Eyeballing' the pond and its inhabitants' behaviour is a recommended way to spot signs of trouble, but you cannot always see poor water conditions. Water Test Kits are indispensable for this, and there are a number around to use for all manner of tests.

Modern kits are easy to use but be sure to follow manufacturers' instructions closely; as with filtration, some prior understanding of water chemistry would be advantageous to avoid mis-interpreting test results.

HEALTH MONITORING

Even if you know what you're doing, make changes over a long period of time to avoid stressing the fish, otherwise you'll soon be reaching for the next items on the agenda — Remedies and Treatments.

Modern remedies are easy to use, but they must be used correctly if they are to give the best results. Although some remedies come in pre-packed portions, you still need to know the exact volume of water in your pond to mix up the most effective dose; never add treatments directly to the pond water, always dissolve them in a small volume of water before use.

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EQUIPMENT OVERVIEW

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Test Kits should be regarded as absolute essentials if water conditions are to be accurately monitored.

It may be easier to treat individual sick or physically-wounded fish separately in a suitably-sized aquarium, rather than treat the whole pond unnecessarily. Consider side-effects on water plants and/or filtration plant bacteria. Remove any carbon modules from filters and add extra aeration if necessary (airstones or simply turn on the fountain).

Capturing a fish for treatment is also a stressful business (not only to the fish) and suitable nets must be used; lifting a large fish from the centre of the pond needs a strong arm and a net with a very strong handle!

Examine large fish in the water, and take a tip from Koi keepers; float the fish in a submerged perforated container — a plastic clothes basket is a good improvisation — much better than manhandling a wriggling fish in wet net.

After any treatment (successful or not) water conditions must be returned to normal; partial water changes can be carried out to disperse the remedies and a trickling hosepipe into the pond over a period of

days (if allowable) is the best way to do this.

POND REPAIRS

At one time or another, water losses will be encountered. Obviously, the first thing to look for is a leak in the pond itself, maybe cracked concrete, a split or punctured liner. Both these failings are remedied fairly easily, but not without some inconvenience.

Patching with concrete is not always successful (even with some Unibond or similar adhesive used in the mix) and a fibre-glass patch might be better. As a last resort, re-lining the whole pond might be easier.

Repair Kits are available for liner ponds, but do get one suitable for the particular materials used in your pond.

Not all water losses are due to damaged ponds, of course. Leaking cascades, faulty hose connections, un-vertical fountains and even windy days can cause water to be lost from the system. In these days of water shortages, we may well see water-thieves at work, too!



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Tomorrow's Aquarist

By Gina Sandford



'FORGOTTEN' WATER HOLE

Three warm days a short while ago and there was activity in the pond, apart from the usual bird that walks on water to have a bath. Let me explain. My pond is what one could term 'natural'. At my last house, I used to have a fibreglass pond in the greenhouse, which was great — I could grow *Cryptocorynes* and Amazon Swords. When we moved, I couldn't take the greenhouse, nor was I able to replace it, but I could take the pond. So it was left in one corner of the garden and forgotten about.

Over the winter, the pond filled with rainwater and mosquito larvae, bloodworm and *Daphnia* appeared, presumably feeding on the decaying leaves at the bottom. That summer, I got my greenhouse, and the soil from the excavations was used to infill around the pond. That was six years ago.

In the early days I introduced some pondweed (*Elodea densa*) and last year, Water Mint (*Mentha aquatica*), Water Forget-me-Not (*Myosotis palustris*) and Water Crowfoot (*Ranunculus* sp). None of the plants are potted and the *E. densa* is now so thick that birds — even large Magpies — literally stand in the middle of the pond for a bath. In the summer, the water level drops, but it is never topped up.

Seven years since its installation, the pond supports a breeding colony of newts, I think they are Smooth Newts, but I've never bothered to catch them to find out. The frantic activity I referred to in my opening paragraph was caused by the newts parading about in the water plants.

So far, I've found one of last year's youngsters and some very tiny efts (newt 'tadpoles') which I presume to be this year's.

This water hole also supports a good insect population — dragonflies, damselflies, stoneflies, etc, but is only home to a single frog and a single toad.

I've no doubt that many of you have been keeping tadpoles and are now beginning to wonder what to do with the small frogs. If you have no pond of your own, you could make enquiries as to whether anyone in your area wants a colony of frogs or toads in their pond; otherwise, release the animals at the pond where you collected the spawn.

Now, I need your help. My daughter's school is hoping to construct a wildlife pond this autumn and we are now at the planning stage. Have any of you created such an area at your school or youth centre and, if so, can you give me any advice?

SCIENTIFIC OR COMMON NAMES

Most of us shy away from using the complex scientific names when we start keeping fish, but why are they necessary? Some 200 years ago, Linnaeus, a Swedish natural historian, devised the basis for names of all living things. This system — binomial nomenclature — meant that two names were assigned to each creature or plant and, once used, the

same name could never be used again.

The idea behind this was that, no matter what language you spoke, or what the creature was known as locally, if you used the scientific name, everyone would know precisely what you were talking about.

Fish are often referred to by their common name, but imagine the chaos that could ensue if you went into a shop and asked for a Butterfly Fish. The shopkeeper could go to his marine tanks, catch a Butterfly and you could take it home and put it in your freshwater aquarium.

Result: dead fish, and all because of a misunderstanding over the common name. I am not suggesting that this scenario would occur, as most shopkeepers would make further enquiries from their customer, but I have used this extreme case to illustrate a problem.

By using the scientific name, this situation could be avoided. The ichthyologist ('fish' scientist) assigns a new species to a genus (the first part of its scientific name) and then gives it a specific name which identifies that fish for all time. You can liken the generic name to our Surname (e.g. Sandford) and the species name to our first name (e.g. Gina), though with our names the generic and specific titles are reversed.

When writing these scientific names, the generic name

always begins with a capital letter and the species is in lower case, the whole name being written in italics, e.g. *Poecilia reticulata*, commonly known as the Guppy. If referred to again in the same text, the name can be shortened to *P. reticulata*. The specific name should never be used on its own, as this can cause confusion.

Linnaeus appreciated the confusion that could be caused by common names. Now we should try to use the scientific names to avoid that confusion and only use the common names once we have defined the species.

WORD SEARCH COMPETITION

The Word Search is designed to help you get used to scientific names. Hidden in the square are the common names of 10 readily-available freshwater tropical fish. I have given you the scientific names. What you need to do is find the common names: they could be horizontal, diagonal or vertical... some are even back-to-front! Having found the names, either photocopy the whole Word Search with the names circled, or copy the Word Search on to a separate sheet and then circle the names. We wouldn't like you to have to tear out this page, but if you must... you must.

Interpet have kindly donated two copies of their *Interpet Guide to Community Fishes* as prizes.



If referred to as "*reticulatus*", the catfish *Corydoras reticulatus* could be confused with *Prochilodus reticulatus* or *Hypessobrycon reticulatus*, both characins.



A C L O W N L O A C H A
 A R T E C B D R F B S C
 X A T S W O R D T A I L
 G N Z E O Y R H I E F M
 E G R Q T O G A I L L W
 V U Z A O N X L R U E H
 T P L S B Y O V M Y G I
 W P N C K O Z E R R N P
 R Y T A C L H U N X A T
 B L A C K W I D O W Q A
 N P I K J F P T E I D I
 B R A B Y R R E H C W L

Hidden above are the common names of the following fish:
Barbus niseya *Xiphophorus maculatus*
Loricaria sp *Parachanna innesi*
Poecilia reticulata *Gymnocorymbus ternetzi*
Betta macracantha *Pterophyllum scalare*
Xiphophorus helleri *Acanthophtalmus khuli*

Don't forget to send in your full name and address **IN BLOCK CAPITALS**, along with your age (THIS COMPETITION IS ONLY OPEN TO TA READERS UNDER 16 YEARS OF AGE). Closing date: 30 June '92.

Please address your envelope: TA / INTERPET WORD SEARCH and post it to: Gina Sandford, Tomorrow's Aquarist, Aquarist & Pondkeeper, 9 Tufton Street, Ashford, Kent TN23 1QN.

GOOD LUCK!

AND FINALLY . . .

Finally, another request for a penpal. Simon Garrad, 129 Edge Avenue, Scarths, Grimsby, South Humberside DN33 2SDH. He is 11 years old

and is looking for a penfriend of his own age in another country.

At present Simon has a 36 x 12 x 18in (90 x 30 x 45cm) community tank with a wide variety of fish, and is hoping to build a pond later this year.

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AT RAINHILL VILLAGE HALL - MERSEYSIDE

SUNDAY, 28th JUNE 1992

*** PLEASE NOTE: BENCHING 11.30 to 1.15 PM ***
 *** JUDGING COMMENCES 1.30 PM PROMPT ***

- * 27 ANNUAL TROPHIES
- * PLAQUES FOR ALL CLASS WINNERS
- * CARDS AND PRIZES FOR 1st, 2nd AND 3rd
- * AQUARIST GOLD PIN FOR BEST IN SHOW

JUDGING TO FNAS RULES AND STANDARDS
 5 'A' AND 2 'B' CLASS JUDGES

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VISITORS/ADULTS	20p
CHILDRENS & OAP	10p
ENTRIES	15p

THE CHALLENGE OF THE BLACK-LINED TETRA

Robert Kirkup reports on his experiences, persistence and success with this beautiful, challenging fish.

Photographs by the author

I first came across the African Black-line Tetra (Gold-line is probably more apt) — *Nannaethiops* — in 1978. The fish were around 35mm (c1.4in) in size, silver in colour, with a black 3mm (c0.1in) line running along the lateral line, beginning at the caudal peduncle and continuing anteriorly all the way into the eye. Above this line was a thin gold line.

Not a very captivating description, I admit, but what really impressed me was the way the fish held themselves in the water. There were only four specimens in the tank, but all were in view, either right at the front or in the centre of the aquarium. To me, the fish appeared to be in shock; they were hovering some 20mm (0.8in) from the gravel floor, with all fins sprayed out, the dorsal fin being very square shaped.

After watching for a while, I decided this was a natural pose for the fish, and I believed that a dull coloured fish that departed like this would be a sure winner on the show bench, so I purchased all four.

wild shipment, and were not commercially bred. It is one of those species which you only see from time to time.

AQUARIUM CARE

My four fish were put into my community tank, pH 6.8, sharing it with *Corydoras*, various Rasboras, and other Tetras.

They settled in straightaway, and took flake food immediately. It was only now that their beauty began to shine through, the gold line being very intense indeed. It did not take long for my females to fill out, which led me in search of males for them, since I wanted to attempt to breed this species.

The females lived up to my expectations, growing to 60mm (c2.4in) within 9 months, and their temperament made them excellent exhibition fish. They lived in my aquarium for three years, but, unfortunately, my search for males during this period was unfruitful. Even a trip to the continent to well known fish establishments failed to turn up a single



Two adult males, bickering over territory.

species in clear, clean flowing water in aquariums. Power filtration or internal filtration will do nicely.

Regular water changes and a pH of around 6.5 will keep *Nannaethiops* looking at its best, although this fish is quite hardy (I have kept it in various types of set-ups with pH up to 7.5 and no visible signs of ill effects).

CLOSE RELATIVE

The Black-lined Tetra is the only species in the *Nannaethiops* genus, but there is a very similar species with a faint black line above and below the lateral stripe (also endemic to West Africa), known as *Neolebias nilinanz*.

Both *Nannaethiops* and *Neolebias* belong to the subfamily Distichodinae. They are all similar in shape, chunky-bodied, laterally compressed, with square-shaped dorsals, and with mouths situated near the bottom of the head — useful for bottom grubbing.

SECOND ATTEMPT

When I came across this species again in a local pet shop, in 1987, I bought two pairs. Over a period of a few months, this African Tetra appeared in a few shops up and down the country. The males were half the size of the females, were a lot slimmer and showed red coloration in the tail end of the body.

All the fish were housed in a 120-litre (c 26.5 gall) community aquarium, along with barbs and Tetras. The aquarium decorations were in the shape of bogwood covering the rear of the aquarium, Cumbria slate and roots up to the front. Planting was heavy on the left handside, tapering down to just right of centre. Plants used included two species of *Anubias*, *Cabomba*, Twisted and Giant *Vallis*, *Cryptocoryne* and *Swordplants*. The base of the aquarium was covered with fine gravel and the temperature was maintained, by space heating, at 26°–29°C (c 79–84°F). Filtration was by means of a powerful external



Two adult female *Nannaethiops*, one of which exhibits a well-defined golden body line.

I found out from the shop dealer that he had around a dozen of these fish, and that their Latin name was *Nannaethiops unitaeniansis*. The males, I was informed, are colourful, with red fin flashes. Unfortunately, I was not the first to see this Tetra; other fishkeepers had been in and bought the colourful ones (males), so I was left with four females. The *Nannaethiops* came in as a

specimen. It was to be six years before I saw this species again!

Nannaethiops unitaeniansis was first described by Günther in 1871, and first introduced into the hobby way back in 1931. It occurs in the River Niger area in West Africa and is found in the smaller tributaries and streams, so it is used to flowing clear water. It is therefore advisable to keep this

power filter; two 20 watt tubes were used for the lighting.

The pH of the water was around 6.5, altering slightly with the fortnightly water changes. The right handside of the aquarium was comparatively clear, for feeding and observation purposes.

The *Nannathrips* settled in immediately and could be seen drifting in and out of the foliage and decor. With them being totally at ease with their surroundings, I could always view them at their most colourful.

Nannathrips ussuriensis does not attack plants or molest its tank mates, unlike its larger cousin, *Ditrichodus*. They eat almost anything offered them, but benefit from occasional live food feeding.

COLORATION

The coloration of this species, at its best, has a thick black line running through the eye into the caudal and through the inner fork of the fin. Above this, is a vivid gold 2mm (0.08in) line, beginning behind the gill and running into the caudal peduncle. Above this line, the body is olive grey-green. The edges of the scales show silver. Below the lines, the body is a silver-white; again, the edges of the scales are noticeably coloured.

This, the females' coloration, is almost identical in the males. However, under the right conditions, the males have a vivid red colour. From the centre of the dorsal fin, down to the body, there is a red blotch; but it's the tail region of the fish that shows the most red. The caudal fin is red, making the black line more pronounced. From behind the dorsal fin to the caudal fin, the body is also red, at times obscuring the longitudinal stripes with its brightness.

This coloration may not always be present, but young fish may stay colourful all day. In adults, the full colours are sometimes

visible only at lights on (maybe due to shock) or when putting the fish on the show bench. Males always colour up when interested in a female, but when they grow older and reach a size of 40mm (c 1.6in), they will only colour up occasionally.

DIFFICULT AQUARIUM BREEDING

My next step was to have this species breed for me. People I had spoken to around the country had not managed this, so I had no tips to put into practice.

I found *Nannathrips* a very difficult species to get to spawn, which, because of its docile nature, I found surprising. I tried and failed four times, using 25 to 50-litre (5.5-11 gal) breeding aquariums, planted, aerated, or filtered, fed or unfed, shallow or deep water, with no success.

I gave up for a while, but then came an Open Show. I had a pair of Rainbows in a small (35 x 25 x 20cm — c 14 x 10 x 8in) aquarium, the sides and back of which were painted black. Fine gravel covered the floor and the tank was filtered by a sponge filter. The pH was 6.5 and the temperature 28°C (82°F).

On removing the Rainbows for the show, I remembered a member of the Mount Pleasant AS who used to breed Cardinals and Neon Tetras when they were problem fish. One of the things he used to do, was completely black out the breeding tank with brown paper, as he believed the fishes' bright colours were used to locate each other in the dark waters of the Amazon. I had a planted background paper, so I taped this over the front of the tank.

There were already some *Daphnia* in the aquarium, so I added some Blackwater Tonic and three fish: two males and the fullest female. I then left them in peace and quiet.

The first two mornings, a quick inspec-

tion showed no activity. On the third and final morning, I removed the covering from around the tank and the first thing I saw was a red fish darting around, but with more red than I had noticed before. At 65mm (c 2.5in) in length this was not one of the males, but the female. Her lines were completely blotted out by a vivid red streak; her fins were also red.

It was the first time I had seen a female as slim as a male. To my delight, a quick inspection of the plants showed spawn. I believe the spawning had taken place in the last few hours, as there were no fungused eggs.

I have since discovered that the female only shows this bright coloration during actual spawning. As far as I am aware, this colour mode of the female has not been reported in any aquatic journal. Despite having kept this species for years, I have only witnessed the intense female coloration during the few hours it takes her to spawn.

'DIFFICULT' EGGS

Because this species is an egg scatterer I swiftly removed the parents for fear that they might eat their eggs. On netting them, though, I realised that there was no hurry, as the aquarium was swirling with tiny clear eggs. The eggs were everywhere! They were not adhesive, however, as when I moved the Java Moss, they fell out as if it were snowing.

I have bred barbs and gouramis, and have found them very prolific. Even so, *Nannathrips* proved exceptional. I tried to calculate the size of the spawn, but it was immense. Every square centimetre of the aquarium floor had, at least, twenty eggs.

Unfortunately, as time went on, the bulk of the eggs (nearly 100%) proved infertile, and no amount of Methylene Blue would stop them turning white and fungusing. On careful inspection, I realised that the few



A shoal of youngsters 16 weeks old.

Coldwater jottings

By Stephen J. Smith



TANK MATES? ... CONTINUED

I am always delighted to receive comments from readers of *Coldwater Jottings*, but I was more than delighted to receive correspondence from a reader updating me on a previous letter which was published in these columns four years ago!

Geoff Smith, of London NW4, wrote to me initially with regard to a Pearlscale which was being consistently attacked by a Hamanishiki (see *Coldwater Jottings*, November 1988: Tank Mates? ... 1).

Geoff started keeping Gold-

fish after several years of keeping and breeding tropical frogs and toads and, he says, was influenced into moving over to Goldfish while reading one of my articles [*You are too kind, Geoff S.J.S.*]. He continued, "The simplicity of maintaining a bare tank with only an internal power filter seemed a relatively easier and more relaxing pastime."

"After a tour of North London retailers, I eventually succeeded in finding a predominantly white Pearlscale which I accommodated in a bare three-foot tank with an internal power filter and spray-bar. The tank was intended principally as a decorative feature in my lounge so that I could relax on the sofa and spend many peaceful hours observing the fish."

After many weekends trying to find another 'good' fish, Geoff eventually found a Hamanishiki. "On introducing it to the tank," explained Geoff, "the Hamanishiki kept nipping the Pearlscale's caudal fin. So, after some thought, I decided to try to see what effect it would have to use one of the tank's glass condensation covers as a tank divider with one fish either side."

"I achieved this by using four

large Eheim suckers to keep the glass vertically in place. The Hamanishiki continued to lunge at the Pearlscale whenever it came near, but its efforts were obviously thwarted by the glass. After two days I removed the glass and, although the frequency of the attacks diminished the fish persisted, so I replaced the glass for a few more days, after which it was removed again and, to my great relief, the two fish lived harmoniously together."

Geoff subsequently installed a reverse flow undergravel filter using an internal power head, together with an air powered foam filter, which alleviated problems with water quality: "This filtration system worked extremely well, with no recurrence of fluke and ulcer problems, which the fish had experienced previously. Over the subsequent year, one-third water changes were carried out, and the fish grew so well that a three-foot tank became barely big enough for them."

"It also became evident during that time that the white Pearlscale was a male, by his persistent chasing and muzzling (not nipping) of the Hamanishiki which, at that time, I also believed to be a male."

The conclusion to the tale, according to Geoff, is happy/sad. One evening, he returned home and, casually glancing at the tank, spotted what looked like a tiny glass splinter — fry!! "That very morning I had carried out a weekly partial water change oblivious to the fact that the fish had spawned and fry were present: I must have inadvertently disposed of many, while others must have been drawn into the power filter."

However, he did manage to rescue three, which were kept for up to four months; while the Hamanishiki, unfortunately, developed dropsy. "I sold the white Pearlscale back to the shop as, by that time, I had decided to move on to other things."

Geoff concludes: "Apart from my initial traumas, I did very much enjoy my Goldfish interlude and, some day, when time and space permit, I hope to return to keeping them. Although my experience was limited to a short period, I did

form the opinion that a three-foot tank ought really to be the absolute minimum — even for only one Goldfish — to allow for proper growth and development."

BACK TO THE WAKIN

Regular correspondent David Silk has reported some success with his quest to develop the Wakin in the UK (see *Coldwater Jottings* January and May 1992).

Unfortunately, David's show-winner, illustrated in January's columns, was lost to the great aquarium in the sky before he had the opportunity to spawn her. However, he was able to find two slightly inferior female Wakins from which he has received a total of three spawnings.

"One female, surprisingly, produced all single-caudal fins, while the other produced some fairly good offspring from which I had 35 Wakin," explained David, from Bramley near Rotherham. "These have been culled to 11 young double and tri-tails, but the tails have not split. From these, I hope to obtain a male which I can crossbreed back to the mother."

David is also investigating the possibility of producing a Calico Wakin. Now that really will be something to look forward to ...

TAILPIECE

The best of Hollywood's greatest movie stars have proven to be no match for the (not so humble) Goldfish. According to a recent *Daily Mirror* report, the most popular rented video in the USA last year was ... *Video Goldfish!*

Unfortunately, the columnist who wrote the *Mirror* piece was evidently not a fish-fancier, writing: "What does this top attraction provide to so please the punters? Two and a quarter hours of watching a Goldfish going back and forth, back and forth, round its little bowl. Without so much as a word of commentary."

Perhaps "no comment" would be my most appropriate response, but I, for one, will reserve judgement until I have seen the video for myself.



The harassed white Pearlscale which turned out to be a male.

Breeding:

THE FIRE GOBY

German aquarist, writer and photographer, **Roland Schreiber**, recounts his experiences maintaining and breeding this spectacular and challenging Sleeper Goby. *Photographs by the author. Text translated by Mary Bailey.*



A male Fire Goby in full breeding colours is a truly spectacular sight.



Spawning well and truly underway. As can be seen by her slim appearance, the much plainer-coloured female has now laid most of her eggs.

Most of the ornamental fishes kept in aquaria on the European mainland are imports from Africa and America. Rather more rarely, we receive fishes caught in the Indo-Pacific area. The Australian Fire Goby (*Hypseleotris compressus*) is one of these. It inhabits a large part of Australia and is best treated as a freshwater fish, although in its native range it is not uncommon in brackish waters.

The Fire Goby is found mainly in the western part of the continent, in Kimberley, Pilbara, and adjoining regions, as well as on the east coast. This small Australian fish occurs mainly in coastal areas, especially in Queensland and the southern part of New Guinea. In these areas it is found in slow-moving streams as well as in large lakes.

Its native range remains in part unexplored, ichthyologically speaking, and, in consequence, a more detailed description of its habitat would be of value even if this only included exact data on water conditions.

ORIGINAL DESCRIPTION

This Fire Goby, which belongs to the Sleeper Goby family, the Eleotridae, was first described by Krefft as *Hypseleotris compressus* in the middle of the 19th century (1864). The synonyms, *Eleotris compressus* and *Carassioptis compressus* are still sometimes used today.

The Australian Fire Goby is found only rarely in the trade on the European mainland. Therefore, anyone who has the opportunity to buy a few specimens should not hesitate for long.

There is hardly any information on these fishes in the literature. Only occasionally does one find a brief reference to their appearance, or to their maintenance and breeding. There is no detailed description or observations on breeding available. This should, however, be no deterrent to a close acquaintance with this 'Fiery Star'.

APPEARANCE

To the keen-eyed observer, the Australian Fire Goby is a striking fish at the very first glance. The brilliant coloration of the male is an ornament for any aquarium.

The base colour of the fish is a pale grey-green. Males have an appreciably more beautiful coloration than females, even outside the breeding season. A reddish band runs from the snout to the posterior tip of the anal fin, occupying the entire lower part of the body. In addition, the first and second dorsal fins, as well as the anal, have wine-red edges, shading, from the outside in, into dark and then light blue areas. The vertical fins are spotted with red-brown at their bases.

Like all *Hypseleotris* species, *H. compressus* exhibits clear sexual dimorphism. Females are appreciably less showy in their color-

ation: the base colour is a plain grey or grey-green, with no coloured markings, and, accordingly, they are easily distinguished from their mates.

These fishes attain a length of up to 11cm (4.3in), with females remaining somewhat smaller at 8-9cm (c 3.1-3.5 in). Moreover, adult males are easily recognised by their humped foreheads. The body shape is elongate, and both body and head are strongly compressed laterally.

Fire Gobies are already sexually mature at a size of some 5cm (2in).

AQUARIUM MAINTENANCE

These fishes are well suited for the community aquarium, as, after a short settling-in period, they are neither shy nor too aggressive. In an environment which has plenty of hiding places and is not too brightly lit, they lose their initial shyness very quickly and soon begin to explore. At



A male jealously guarding some eggs laid on the front glass of the aquarium.



The genital papilla of this male is clearly visible in this shot. Some of the white flecks are newly-laid eggs.

feeding time, they swim excitedly up and down and across the front glass as soon as their owner appears.

To reflect the natural environment of these fishes, the aquarium should have a fine substrate and a slight-to-moderate water current. The fishes will happily pick around for food in a substrate of fine gravel; any pieces of substrate taken in by mistake are immediately spat out again.

If danger threatens, the substrate is also used as a refuge, with the fishes disappearing like lightning into the sand. As soon as the danger is past, they reappear. In view of these habits, it should be apparent that the use of a sharp-edged gravel may have fatal consequences.

This peaceful species can be kept with other species without problem. It is important to allow sufficient open swimming space,

though, and if this requirement is met, they will regularly be seen in the open water. If swimming space is too restricted, they will prefer to remain among the stones or bogwood. In sufficiently large aquaria, these active swimmers will often be seen swimming around in the middle and lower levels.

In their natural habitat, Fire Gobies feed mainly on small crustaceans (water fleas, shrimps, hoppers), insects (mosquitoes) and their larvae, and also, in part, on algae and other small plant growths.

BREEDING

In many respects, the breeding of this Australian Fire Goby resembles that of other gobies; in other words, it is rather tricky!

The very large spawn is laid on stones, bogwood, tank glasses, or, if needs must,

even on filter pipes or heaters. There are often as many as 3,000 eggs spread over a very large area, but aquarists should not raise their hopes too high. If 1/10th of the spawn survives, then this should be regarded as a good success rate.

The display of this small 'Australian' counts as one of the most splendid to be seen in the hobby. Resplendent in fiery-red, and with fins spread to bursting, the male frenziedly circles his mate. Some males go to the chosen spawning site and go through the motions of fertilisation, moving the body over the spawning substrate, quivering with the back curved. After a lengthy courtship, the female eventually follows him.

The eggs are deposited within a two-hour period — with short pauses. They are very small and milky/slightly muddy in colour, and highly adhesive. Often, they cannot be removed from the spawning substrate, or only with considerable difficulty. This is an indication that, in nature, these fishes are often found in strong currents. If disturbed, the eggs cling firmly to each other.

The ensuing broodcare is carried out by the male alone. If necessary, the female is driven forcibly away, but not injured. It is sensible to remove the female from the breeding tank at this stage, especially as these fishes may eagerly make a meal of their own offspring. The male will then take on the care of the eggs and guarding of the young by himself.

The rearing of the fry, and maybe even the hatching of the eggs, can sometimes present major problems. My first clutch of eggs, for example, all fungussed. Only after several attempts did things improve. Leggett and Merrick have indicated that it is very difficult to achieve successful hatching, and both authors regard rearing as very tricky.

Continued on page 109

Koi Calendar



By David Twigg

JOBS FOR THE MONTH

The warmer weather should now be well established and pond temperature sufficiently high to make feeding of a wide variety of food possible. I am sure most of you will feed your fish with a range of pelleted foods; but what of other things? My own Koi have such delicacies as brown bread, oranges, lettuces, peas, sweetcorn, boiled wheat, boiled barley, mashed potatoes, cookies and prawns.

I doubt that this is a complete list, as I learned just the other day of several people who feed Weetabix and cornflakes! See Dr David Ford's article entitled *Ten Golden Rules for Koi Nutrition and Health* in the August 1991 issue of *A & P* for comprehensive guidance on feeding Koi.

I am hoping for more success this year on the spawning front. My spawning ropes have been disinfected by dipping in a strong solution (1mg/litre) of Potassium Permanganate, and are ready for use when required. While the solution is made up, it can be used to disinfect handling equipment, bowls and nets, etc.

JUNE SHOWS

Five shows this month:

6/7 — **Yorkshire Section, BKKS.** English-style Open Show at Lotherton Hall, half a mile from A1 at Garforth, near Leeds. Entrance to the show is £1, adults and children; and senior citizens 50p. As well as Koi on show, there

will be birds of prey, a craft fair, and bouncing castle for the children. This year, 15 dealers are expected to be in attendance, a bar, restaurant and disabled toilets are available on site, and ice cream vans will be present. This show has been held at Lotherton Hall for the last two years and, for the non-Koi keeping members of the family, offers the alternative of a moderately priced visit to a stately home, bird sanctuary, deer park, pony stables and beautiful gardens in which to browse, all of which sound very attractive.

Contact **Fred Harston** on 0226 722578 for further details.

7 — **Middlesex & Surrey Borders Section BKKS.** English-style Open Show at the Hampton Football Club Ground, "The Beveree", Beaver Close, Station Road, Hampton, Middlesex.

As last year, 15 dealers are expected and, again, entertainment is offered for the non Koi-nuts by way of Craft Fayre, Bonzai dealers, bouncy castle and roundabout for the children. Of interest to all, I am sure, are displays of falconry and wild-life habitat, etc. Contact Show Manager, **Chris Pinchen** on 0895 440341.

13/14 — **East Pennine Section BKKS.** English-style Open Show at the new £34 million Sheffield Arena which is only 2 minutes from J34 of the M1. This section of the BKKS was originally formed in 1982 as the Hoylelake Koi & Pond-keepers Society and, since joining the BKKS, membership has leapt from just over twenty to in excess of two hundred. The previous two shows have attracted crowds of over 6,000 and that is why this large new site has been chosen this year.

Apart from its easy access from the M1, the Sheffield Arena has other plus points for visitors. Some of these are a large Craft Fayre (with more than 30 stalls), parking for 1,500 cars and coaches, air conditioning, First Aid stations, and stewards and technical staff on hand. The popular bouncing castle and

JUNE

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				



other side shows are being laid on for the children.

At the time of writing, 16 leading dealers will be present and well over 400 Koi are expected in the competition for true Japanese-style prizes and certificates.

The entry fee at £1.50 adults and £1 for children and senior citizens makes this sound an excellent day out. Contact **John Timmis** on 0226 289507 for further details.

20/21 — **Lea Valley & Harlow Section BKKS** Closed show. Van Hage's Garden Centre, Great Amwell, Nr Ware, Herts. Contact **Barry Ford** on 0279 419101.

28 — **Worthing Section BKKS.** Closed Show. East Preston Scout Hall, The Street, East Preston, Nr Worthing. Several dealers, plus craft stalls, bouncy castle, etc. Contact **Steve Willard** on 0243 267893.

WHAT'S ON IN JUNE

1 — **Kennet Valley Section BKKS.** *Water Chemistry of Koi Ponds* presented by **Adrian Exell** of Interpet Ltd. 8 pm at Newbury Rugby Club, Pinchington Lane, Newbury, Berks. Contact **Bob Thompson** on 0734 713640.

2 — **Yorkshire Section BKKS.** **Ian Birkinshaw**, a BKKS judge, discusses *Preparing Koi for Shows*. 8 pm at Holme Leas Inn, Ossett, Nr Wakefield. Contact **Fred Harston** on 0226 722578.

3 — **Suffolk & North Essex Section BKKS.** *Show Preparation*. 7.45 pm at the Prince of Wales PH, London Road, Marks Tey, Colchester, Essex. Contact **Dennis Preou** on 0371 856450.

4 — **North Wales Koi Club.**

Koi Quiz Night at 7.45 pm. David Bryant Bowling Centre, Frith Beach, Prestatyn. Contact **Eileen Price** on 0745 591730.

4 — **Middlesex & Surrey Borders Section BKKS.** 8 pm at Hampton Football Club. Contact **Alan Harrington** on 0932 845808.

7 — **Essex Section BKKS.** *Visit by Kennet Valley Section.* Contact **Bobbie Barton** on 0702 611750 or **Margaret Bishop** on 0702 522388.

7 — **Lea Valley & Harlow Section BKKS.** *A Bar-B-Que.* Contact **Barry Ford** on 0279 419101.

7 — **Mid-Somerset Section BKKS.** *Coach trip* to look at Mid-Staffs Section ponds. Contact **Alan Purnell** on 0458 72132.

8 — **Northants Section BKKS.** *Casuals Rugby Club, Northampton.* Contact **John Byles** on 0604 718648.

10 — **South Hants Section BKKS.** 8 pm, Denmead Church Hall, Hambledon Road, Denmead, Hants. Contact **Roy Moody** on 0705 450530.

10 — **Merseyside Section BKKS.** *Millbrook Manor Restaurant, Knowsley Village.* Contact **Phil Adamson** on 051 220 2970.

11 — **East Pennine Section BKKS.** *The Phoenix, Platts Common, Barnsley* (5 minutes from M1, J36). Contact **John Timmis** on 0226 289507.

14 — **Central Section BKKS.** *Pond Visit.* Contact **Mike Higginbottom** on 0922 37682.

17 — **Mid-Staffs Section BKKS.** *RNA Club, Elmore Green Road, Bloxwich.* 8 pm start. Contact **Don Dye** on 0543 425178.

18 — **Wirral & District Section**



Spotlight

DIFFERENT LOOK-ALIKES

They may look almost the same, but these two species are very different indeed. Gordon Kay has the details.

Photograph: Max Gibbs, *The Goldfish Bowl, Oxford*

Well, here's an amazing thing — the sort of photo-opportunity that doesn't present itself every day: two members of what, at first sight, appears to be the same family, both very similar (some would even say, identical), yet each having its own, sometimes very different, characteristics. Just the stuff good Spotlights are made of? We thought so, too!

Both of these species (the Royal Gramma — *Gramma loreo* — is the one on top; the other one is Paccagnella's Dottyback — *Pseudochromis paccagnellae*) are related to the family Serranidae — the Sea Basses and Groupers.

The two wonderful species in the picture were once classified in this family. Now they are regarded as constituting two separate families: *Gramma loreo* belongs to the Grammididae (Pygmy or Fairy Basslets), while *Pseudochromis paccagnellae* belongs to the Pseudochromidae (Dottybacks). All family members are hermaphrodite and therefore lack clear sexual dimorphism. This phenomenon notwithstanding, many species undergo colour changes during the breeding season, turning darker, paler or even changing pattern.

SIMILAR BUT DIFFERENT

As I said, although the Royal Gramma and Paccagnella's Dottyback appear very similar, they are very different in terms of their natural characteristics. For a start, they come from different sides of the world. The Royal Gramma is a native of the Western Atlantic, with the Indo-Pacific playing host to the Dottyback.

Secondly, the Royal Gramma grows to over twice the size of its look-alike relative — five inches (c 2.7cm) or so, as opposed to a meagre two (5cm), and yet, the Dottyback is far more aggressive than its larger cousin. I have kept both these beautifully striking species over the years.

In fact, I have a Royal Gramma at the moment — and, while I have never known an aggressive Gramma, I have, by contrast, never experienced a peaceful Paccagnella's Dottyback.

ROYAL GRAMMA

Gramma loreo is of exclusively Caribbean provenance, ranging from Bermuda and the Bahamas, south to Venezuela. It lives along the front of the reef, at depths of between as little as 1.8 metres (c 6ft) down as far as 61 metres (200ft), but it is most commonly found at depths of 20 metres (c 65ft) or more.

The length of time which a collector can spend at such depths is, naturally, limited, and the complications which this can mean to the Gramma's collection account, in some part, for the relatively high price which this species commands. Their natural preference is for sheltering in caves and underneath ledges or hiding in small holes. They orientate themselves to be pressed against the substrate so that, within these caves or under ledges, they frequently lie against the roof or overhang belly-upwards.

Grammas are hermaphrodites and, within this group, are protogynous — all individuals beginning their lives as females and becoming males as they grow older and larger. They are also mouth-brooders, with the male carrying the zygotes until hatching.

PACCAGNELLA'S DOTTYBACK

The Dottyback (*Pseudochromis paccagnellae*) is, like all Dottybacks, restricted to the Indo-Pacific region, where it seems to function as the ecological counterpart of the Gramma. It tends to be common in the sub-tidal zone, and so, is far more accessible and easily collected than the Gramma. Therefore, it is much cheaper than that species. Like Damselfishes, the Dottyback spawns demersal eggs, which are painstakingly cared for by the male.

BREEDING

I'll probably get letters from lots of disgruntled aquarists telling me that they have been breeding one (or both) of these species for years, but — to my knowledge — no one has ever reported successful spawnings of either in captivity.

However, I can think of no earthly reason why this should be the case, and so, believe it to be just a matter of time.

I did, once, hear of an authenticated account of *Gramma loreo* spawning in the aquarium. Apparently, they moved stones and broken pieces of coral out of their cave. They then moved *Caulerpa* seaweed into the hole, to create a good base for the eggs.

The two fish then began to build a stone wall in front of their cave, with only a tiny opening in it. At this stage, they became very aggressive and even attacked two *Holocentrus tricolor* Angels and, believe me, Rock Beauties can be very bolshie!

The female secured just a few eggs to the algae strands and the male fertilised them immediately. This has happened with remarkable regularity but, unfortunately, the aquarist concerned has yet to produce a single fry, since the eggs become mouldy and he has yet to discover why.

AQUARIUM CARE

Anyway, regardless of which species you choose to keep, you will find that you have a tough little fish that won't cause you any grief — provided that:

- (a) water quality is good;
- (b) it is in the correct surroundings; and
- (c) you don't try to keep both species together!

I refuse to discuss water quality again — it is excruciatingly boring and I've written it all so many times before. We'll therefore go straight to (b).

I firmly believe that the best way to keep either animal is in an invertebrate aquarium or — at the very least — a fish-only tank with an abundance of cover. Neither of these species will do well if they do not feel secure, especially the Royal Gramma. It will feel so intimidated that you will just never see it, and it will die of starvation. The Dottyback will try to guard every one of the few nooks and crannies that are available and become very aggressive. Bullies are a definite no-no, and I should never have to tell you not to keep either fish with Lionfishes.

With regard to (c), although Grammas are fairly peaceful, I cannot stress enough that Dottybacks most definitely are not. With this in mind, it would be prudent to avoid keeping the two together, in view of the close similarity between them.

In both species, feeding simply couldn't be easier. Both will eat anything offered, including flake food. Their usual preference is for things like Brine Shrimps, Mysis, Gamma Shrimps and Bloodworms. Whole prawns and mussels have no place in their diets — that would be rather like feeding Brine Shrimps to Lionfish. Useless!

PERSONAL PREFERENCE

Of these two species, my personal preference is for the Royal Gramma — the Dottyback simply pales into insignificance by comparison. There are other far more spectacular, Pseudochromids — witness *P. daioi*, *P. flammicauda* and *P. diadema*.

However, it really makes no matter, for whichever of the two you choose to live among your anemones and tubeworms — they are sure to be there for years.

PRODUCT ROUND-UP

BY DICK MILLS

I feel like Alice in Wonderland (not that you should draw any particular conclusions about my personal habits from that statement, you understand), just that there is so much to review and so little space to do it in. The season of

Trade Shows is upon us with a vengeance — some might even ask "When did it stop?". My immediate problem is how to make sure everyone who was kind enough to provide us with details of latest products gets a fair 'mention' in these dis-

patches; some will therefore be held over until a future issue, so don't despair if you don't see every product (or especially yours!) in this report. Headlines from PETINDEX (held on 12-13 April at the NEC) were:

Best Aquatic Product — Bow-fronted Aquarium from CLEAR-SEAL.

Runner-up — Test Kits from INTERPET.

Best Packaging Award — 'Pond Centre' Pond Products Display by INTERPET.

Clear-Seal

"Any shape you like as long as it's square-cornered" was once the aquarium-maker's equivalent statement to Henry Ford's "Any colour you like, as long as it's black" car-selling motto. Looking at CLEAR-SEAL's range of aquariums, it now seems that anything is possible. Take their PANORAMIC

RANGE as a good example: can you really believe what your eyes are telling you? A bow-fronted-cornered oblong tank in one? Half-moon shape? Tanks with as many (or as few) corners as you wish? Yes, thanks to new glass bending and forming techniques, all are possibilities. Two panoramic-ended tanks with flat or bowed fronts are also available in acry-

lic. Add to these exciting new ideas, matching cabinets and you can understand how Clear-Seal walked off with the Best Aquatic Product award at PETINDEX.

No fewer than 13 wood effect melamine finishes are available and Clear-Seal aquariums, cabinets, wood-stands and hoods can be made to any size unless otherwise stated. Aquariums carry a five-year guarantee against leaks. As part of their Innovation series, there are five fully integrated Clear-Seal SYSTEM AQUARIUMS (ranging from 16 to 82 gallons — 70-357 litres) each with built-in, three-section, flow-through filtration system. You need to buy your pump, heater and lighting as extras.

The TROPISILK aquarium has tropical aquatic plants stencilled on the front glass and has a plain or mirror back as required. A sloping front aquarium (also with plain or mirrored back) has a longitudinal planter incorporated at the front. The VISION aquarium comes in seven dazzling tank trim colours (with matching hoods) in two sizes 16 x 10 x 8 in.



and 18 x 5 x 10 in. Diversifying even further, LIVESTOCK HOUSING UNITS, SHOP KITS, VIVARIUM TANKS, PLANT CASCADE DISPLAY TANKS and even a TURTLE FILTER (to convert the aquarium into a turtle or terrapin home) make up the range of products. A brochure is available from:

CLEAR-SEAL, 38-40 Cherrywood Road, Bordesley Green, Birmingham B9 4UD. Tel: 021 771 0266/0249; Fax: 021 771 0059.



A & P editor John Dawes with Clear-Seal's Irene Hancox photographed in front of one of the prize-winning tanks after presentation of the Best Aquatic Product A & P plaque.

Pet Mate

If you were a goldfish you may well think the world has passed you over in favour of tropicals when it comes to new

equipment. Just to redress the balance a little, **PET MATE** have launched **FISH MATE P21** a pond fish feeder. Battery-operated, suitable for all foods with adjustable feed quantity

and timings, it is easily installed over ponds and, of course, open-topped tanks and patio pools. Unlike some tank-top feeders, moisture ingress and subsequent caking of food seems

unlikely with this more open-sided design. Details from:

PET MATE LTD, Ferry Lane, Shepperton, Middlesex TW17 9LQ. Tel: 0932 254854; Fax: 0932 243070.

Underworld Products

There's nothing like a personal recommendation, so it's interesting to see that **OCEAN NUTRITION**, the specialist fish food manufacturers (among many other aquatic products), have hit on the idea

of a **PROFESSIONAL SIGNATURE SERIES** for their range, using approvals from famous fish authorities. The first six foods to feature this form of patronage are **COMMUNITY TANK FORMULA** and **CONDITIONING FORMULA** (Heiko Bleher), **CICHLID VEGI FORMULA** and **CICHLID OMNI FORMULA** (Ad Konings) and **DISCUS**

FORMULA and **FRY FORMULA** (Jack Wattley).

As you can see, these are guys who really know their stuff in their respective aquatic fields and are in a good position to know what's best for their types of fishes. Heiko and Ad have vast experiences of studying fishes in their native habitats, while Jack has commanded much respect over the years for

Discus culture and worked with Ocean Nutrition in creating his two particular 'recipes'.

For details of these foods and other Ocean Nutrition products write to:

UNDERWORLD PRODUCTS, Units 1/2, Belton Road West, Loughborough, Leicestershire. Tel: 0509 610310.

Rolf C Hagen

I doubt that fish ever want to know the time, which is just as well, for that's about the only thing ROLF C HAGEN's new internal BIOLIFE FILTRATION SYSTEM won't provide for them! What it will do is to provide a comprehensive maintenance and cleaning process on the aquarium water. It's not just a filter either, as a heater is incorporated in the unit too.

The unique design is the first complete filter system to use a biological 'dry' area, thus expanding the filter's working capacity and as the bacteria working in this area utilise atmospheric oxygen, there is no drain on dissolved oxygen levels which otherwise might stress the fish. Once water has passed the mechanical and chemical clean-up compartments, a small proportion of it is fed through a riser tube to the overhead (though still within the unit) drip tray whence it falls through ceramic material and subsequent 'Hex-Nodes' for semi-biological treatment before passing to the main returning water flow. Having the heater within the waterflow means equalisation of water temperature throughout the tank at all times and, being

shielded, the heater cannot be knocked about by large fish nor burn timid ones hiding near it.

Fitting the BioLife unit shouldn't present any problems: being hung on a suction-pad-held bracket, it won't interfere with those 'shelves' running around the tank and hood-cutting is, at last, quite unnecessary. All it requires is a 12 x 12in (30 x 30cm) vertical space, so it can be located almost anywhere in the tank — sidewall fitting is no problem and as the only thing sticking out of the tank is the mains cable, you can have your tank right back against the wall.

Despite its seemingly complex design and functions, the BioLife Filter is simple to install

and maintain; the various filter 'mediums' require minimal care (apart from periodic rinsing and replacement depending on item), ranging from fortnightly to twice a year attentions. One note of caution: because the filter unit contains a heater, it is recommended that you switch off the heater for at least 20 minutes before removing the unit from the water, otherwise early exposure to air will result in a very rapid rise in temperature with an increased risk of cracking the heater's glass tube. Effectiveness of the filter can be further enhanced by regular use of CYCLE, the live bacterial biological filtration supplement and sludge preventive. This is particu-

larly important in order to maintain the 'dry' area in a clean condition.

In use, the BioLife is quite flexible, as water flow from the return nozzle can be directed as required to create all-round aquarium currents. Extra aeration, via a venturi, is yet another feature and only at a minimal expense of flowrate. The impeller on the larger 55 model (98-113 gph, 370-430 l/h, 200 watt heater) consumes 5.5 watts of electricity. In terms of comprehensive usefulness yet contained in a very manageable size, the BioLife filter system looks like being on everyone's 'wanted list'; as it is comparable in price to many bulkier, space-consuming, hose-connected external filters and yet has none of their installation or siting complications I just hope Hagen's are ready for the rush of orders! Details from:

ROLF C HAGEN, California Drive, Whitwood Industrial Estate, Castleford, West Yorkshire WF10 5QH. Tel: 0977 556622.



MORE NEWS OF OTHER "PETINDEX" PRODUCTS NEXT MONTH.

Interpet

'Trouble-free pond care' cannot possibly come without a price, you might think, but you could be wrong to a certain degree. The main weapon against problems in fishkeeping is advance knowledge (of not only what might go wrong,

but also why) and here is the good news — a guide to obtaining such information is *absolutely free*. All you have to do is send a stamped self-addressed envelope (110mm x 220mm size) to INTERPET and they will send you their new 12-page POND CARE LEAFLET.

Packed with practical

information for all garden fishkeepers, it points you on the way to success, and helps you stay that way, whether you are a specialist pondkeeper or just someone with a pond as part of the overall garden design. From books to help you plan the pond right from the start, right through to dealing with those

summertime green water and blanketweed threats, it's all here for the price of a stamp and maybe a healthy stroll to the postbox. Interpet's address is:

INTERPET LTD, Vincent Lane, Dorking, Surrey RH4 3YX. Tel: 0306 881033; Fax: 0306 885009.

Lahaina

With the current emphasis and attention focussed on more sophisticated forms of filtration, improvements to the long-established 'undergravel' systems probably have gone unnoticed.

The new SYSTEM 3 BOTTOM FILTRATION SYSTEM offered by LAHAINA is suitable both for saltwater and freshwater aquariums (including without gravel in a reef tank). Immediate inspection reveals that it comes with an extra 'sedimentation' plate; this sits beneath the familiar slotted top plate and provides a clear area beneath the gravel into

which debris collects and from where it can be safely drawn out of the system.

System 3 can be operated in various modes, with the supplied airlift, with a powerhead or adapted to use with internal hanging filter box or other types of internal and external filters. Because the water flow has a clear run, no anaerobic areas form beneath rocks (which can sit directly on the top plate); its modular design makes for perfect tailored-fits to any aquarium — and all adaptors are included.

REEF SALT is specially formulated for use in aquariums containing marine fish and invertebrate and living corals.

It has no nitrate or phosphate content, so inhibiting the growth of Hair Algae. Available in 10 and 20 kilo packs.

It's not altogether unexpected that Lahaina insist on making a lot of noise about their QUIET PUMP, for the simple reason it doesn't do it of its own accord. This single-speed pump moves 1,140 gallons per hour and it's so quiet that you need to watch the movement of water in order to realise that the pump's actually working!

Hair Algae and Red Algae can both be troublesome, but a special inhibitor against these unwanted growths is included in one version of the PHOSPHATE FILTER PAD range.

This new pad contains immobilised Iron Hydroxide (Fe(OH)₃) which turns phosphates into immobile and insoluble iron phosphate. Pads are available in 6in x 9in and 12in x 12in formats. SURE START and NEW START are products for eliminating lengthy maturation periods in any new aquariums (freshwater or marine) and for improving the efficiency of biological filtration in existing aquariums respectively. Details of these products are available from:

LAHAINA AQUARIUM SYSTEMS LTD, Kellas, Elgin, Morayshire IV30 32TW. Tel: 0343 89209; Fax: 0343 89296.

Independence (UK)

Pond Care is the topically-appropriate underlying theme of new releases from **INDEPENDANCE (UK)**. No fewer than seven products are on hand to keep your pond (and its inhabitants) safe and sound all year round.

CHLORINE AND HEAVY METAL NEUTRALISER is the thing to start off with, as it makes our chlorine-polluted tapwater safe for use as well as neutralising any heavy metals present in it too.

Introducing fish is always a stressful business, especially with the relatively larger pond fishes who may become ever-so-slightly physically-damaged in the process. **STRESS COAT**, a slime coat replenisher with Aloe Vera healing powers, will replace any lost natural slime from the fish, protecting any



wounds against infection or further damage; a quick tip from Doc Wellfish (Aquarium Pharmaceuticals Inc's Mascot) is to soak some cotton gloves in Stress Coat before handling large pond fish such as Koi.

Cloudy pond water can be cleared with regular applications of **ACCU-CLEAR**; this causes suspended particles to clump together for easier removal, either by vacuuming out or by the pond's own fil-

tration system. **POND-ZYME**, the enzymatic pond cleaner, is a blend of beneficial bacteria that produce digestive enzymes that break down pond sludge, leaving a carbonised inert waste.

DRY-TAB MASTER TEST KIT is claimed to provide the quickest, easiest and most accurate tests for pond water. The four-in-one kit contains tests for pH, ammonia, nitrite and nitrate. The instruction manual also provides guidance

on how to interpret the results and how to take appropriate actions if needed.

AQUATIC PLANT STIMULANT hardly needs describing but only includes nutrients necessary for aquatic plant growth, not those extras which simply encourage algal blooms.

I've saved the best one for last — **POND FEEDER SIGNAL BLOCK**. Feeding blocks, as such, aren't that new but, in the depths of your pond, how would you know if they'd all been eaten or not? Enter the Signal part: once the food has been used up, a brightly-coloured float bobs to the surface to tell you! Details of these, and other Aquarium Pharmaceuticals products from:

INDEPENDANCE (UK), Units 9 and 10, Lady Ann Mills, Lady Ann Road, Soot-hill Road, Batley, West Yorkshire WF17 0PS. Tel: 0924 422644; Fax: 0924 422652.

A-Tech

I must say I like companies that stick to their word; in a recent list of releases from **A-TECH** came a promise of new products at Petindex, so I am very pleased to tell you about their latest. **SUPER-SPOT** is something your fish certainly won't mind catching, for it's not any form of disease but a very useful range of lighting kits. In today's aquariums, it seems that you have to go physically big to get better if those wonderful metal-halide pendant-style lamps are any-

thing to go by. However, the lamps in the Superspot system aren't overlarge and they have the advantage of working at a safe 12 volts. The two systems are known as System 3 and System 6, and while both come complete with two spotlights, the code number indicates that they can be expanded up to 3 and 6 lamps respectively. Each 20 watt halogen lamp comes with 2m of cable and, like all other A-Tech units, the lighting control module (as well as the lamps) is splashproof and saltproof. Designed to supplement existing lighting, the

spotlights will add dramatic effect to rocky outcrops or specimen corals or plants.

We can all list some of the many stressing factors that can upset fish at one time or another; abrupt changes of lighting is one that is commonly-quoted. Very soon you can have dimming fluorescent tubes to ease your fish into and out of the 'tanklight' hours without stress. The **BASIC SOLAR SYSTEM** will work from any conventional mains timer and its controller will turn up your tubes in the morning from 10% brightness

to full, over a selectable period and do the same thing in reverse at night-time. The **ADVANCED SOLAR SYSTEM** has its own digital timer and will also switch on full brightness of other associated lighting (once the tubes have reached their full luminance) and switch them off again before the tube-dimming process begins. Details of all **AQUA-RANGE** products from:

A-TECH WATER MANAGEMENT SYSTEMS LTD, PO Box 18, Aylesbury, Bucks HP18 0UG. Tel: 0296 770034; Fax: 0296 770 038.

Water Scene Enterprises

Our final dazzling selection comes from **WATER SCENE ENTERPRISES** who are featuring a number of perhaps-new-to-you products.

MARINE ENVIRONMENT dual-phase seawater not only gives the correct balance of trace elements, vitamins, etc, but also contains enzymes, colloids, shock preventives, slime coat replenishers, dechlorinators and numerous water conditioners all in one easy-to-use package.

BI-OX SUPER (a **BIO-SEA PRODUCT**) is a high-efficiency, low-cost, one-time purchase filter medium which never needs replacing. It is claimed that less is used per

gallon of water than any other mediums or combination of mediums; for instance, when used in a properly-designed filter, 1 cubic gallon of B-Ox Super will maintain 55 gallons of salt water or 88 gallons of freshwater (NOTE: US gallons).



If you've been looking for a miracle in life, look no further: the **AMIRACLE** range of products is here to help out. **Amiracle REEF FILTERS** come in

two ranges — the **SL** models cover 70-500 gallons; the two **Pro-Plus** models (300 or 500 gallons) include a Protein Skimmer and Carbon Box. All filters include **Bi-Ox** filter medium. No fewer than seven **Amiracle ACRYLIC AQUARIUMS** with built-in **TRICKLE FILTERS** are available, each with matching **CANOPIES** and, for the three larger sizes (36in, 48in and 60in), suitable **AQUARIUM STANDS**.

The full range of **CORALIFE** marine products is also carried, including such diversities as **Invertebrate Foods** (Gourmet Gumbo!), **Macro-algae Foods**, **Freshwater Supplements**, **Marine and General Care** products, **Frozen Foods** (Reef Stronganoff!), **Lighting Systems** (Fluorescents, Metal Hal-

ide, Actinics, Fan-cooled Hoods) and so on.

For the show-stoppers, look at tanks designed and built by **AMERICAN ACRYLIC MFG**: (seamless cylindrical tanks from 2-8 feet in diameter!); 10ft long tanks; double-bubble tanks on a room-divider scale; walk-in aquariums for displays — if you can visualise it, then they'll build it! **Bio-Reactor Filtration** systems are also part of the complete story too, so if you want to have something really different in your lounge, office, or penthouse, then send for the brochures from:

WATER SCENE ENTERPRISES COMPANY LTD, 17 Mounbatten Drive, Ringstead, Kettering, Northants NN14 4TX. Tel: 0933 623108; Fax: 0933 460886.

OUT AND ABOUT

Newport Nurseries, I.o.W

By Dick Mills

Photographs — unless otherwise indicated — by the author



Keith Pemberton looks on as Dick Mills 'opens' the new coldwater area.



The sloping site provides plenty of scope for pond and rockery design.

Recently, your intrepid *A & P* reporter went 'overseas' in the constant search for new occurrences in the aquatic world. I had been invited to 'open' the coldwater fishes section at Newport Nurseries, slap bang in the middle of the Isle of Wight, so it was something slightly different, with the Hovercraft crossing to add extra excitement. If it wasn't for the hills in between, there'd be a stunning view of the English Channel but, to be fair, the green hills and valley surrounding the nurseries more than made up for the lack of blue — there's even a trout fishing 'lake' at the foot of the hill.

Naturally, I arrived in plenty of time and so was able to spend a useful period looking at the other fishes in the main aquatic shop. Five large tanks greet you, one with Oscars and a Red-tail Catfish, another with Angel-fishes, complete with above-waterline paludarium; the third had albino Oscars, with more large cichlids in the tank below, and the fourth (which led you back to the front again) housed a very busy marine reef scene.

Around the corner, past the book shelves, the stock-holding display tanks were arranged in a pleasant labyrinthine layout (nothing too testing) which led you from tank to tank so that each area brought new interests; the African cichlids faced the marines, and so on. One feature was the 'plants only' tanks along one wall; this

obviously made plant selection easy and causes no stress to the fish at all; there was no large 'cascade style' display tank to

take up valuable floor space.

Adjoining the dry goods area was a very welcome restaurant serving delicious home-cooked meals and snacks — I had to be dragged away to officiate!

Outside and downhill, the coldwater section is attached to the garden centre proper (I

declined to have a turn on the Bouncing Castle or inspect the swimming pool display). Here again, everything was laid out in apple-pie order, with a good selection of Koi, Common and Fancy Goldfishes (plus a few natives) on display.

A small space outside the main undercover area was given over to a limited display of pond shells and water plants but, no doubt the manager, Keith Pemberton, will soon have that developed into something much more impressive by the time of my next visit. There is certainly plenty of room for a really good water garden feature, especially as the sloping ground would provide a natural route for a cascade or two (sorry Keith, didn't mean to lumber you with even more work!).

The event itself, the opening of the coldwater section, was ably backed up by members of the resident Island aquatic society, the Isle of Wight A.S., who were there on hand to talk to people about any fishkeeping problems and to publicise the society and its (then) forthcoming annual Show at the Whitecliffs Bay Holiday Camp over the period 13-15 June this year (report in *A & P* to follow soon).

Obviously, a lot of people are going to visit the island in months to come and many of them will be fishkeepers of one sort or another. The I.o.W. is a relatively small place, and it would be a shame if these visitors missed out on this latest of the island's many attractions during their stay.

Newport Nurseries are at Watergate Road, Newport, Isle of Wight. Tel: 0983 524543.



Large tanks house native coldwater species above goldfish pools.



Large cichlids are waiting to greet you! Note 'above water' plants in central aquarium.



Well laid out coldwater pool equipment, fancy goldfish varieties and well-positioned *A & P* poster.

Helping Hand

By Kevin Fox



Hil! Welcome to our corner of the magazine. Lots to fit in this month, so let's dive straight into it.

SPARSHOLT IDEA

Thanks Jane Lloyd for the smashing letter. Jane is a lecturer at Sparsholt College near Winchester, and has suggested a one-day course for anyone (abled and disabled... we certainly don't make any distinctions) interested in the subject of fishkeeping. Anyone could come to the event, where there would be a variety of lectures and demonstrations taking place throughout the day.

Obviously, there would need to be enough people interested to make such an event financially viable (everything costs something nowadays). At this stage, the offer from Jane is a tentative one, but if enough people are interested — and remember, we're not just talking about disabled aquarists — then please write to me via the

office and let me know. It certainly sounds like a good idea to me, as there will be something for everyone: coldwater, tropical, marines, pondkeepers, at beginner and advanced levels.

By the way, Sparsholt College is the ONLY college in this country which runs the National Certificate in Aquatics and Ornamental Fish Management. I'll be returning to Jane's letter in a while.

PONDS FOR THE DISABLED AT HAMPTON

This year's Hampton Court International Flower Show takes place from 8-12 July. In the Aquatic Village there is a special feature called THE AQUADUCT which Airport Aquaria, Interpet (who always give so much back into the hobby), Heathrow Garden Centre and the Disablement Association, Hillingdon — DASH, have all got together to create various water garden ideas with special emphasis on access, creation and maintenance by disabled people.

The Aquaduct features various ideas which can be erected and enjoyed by wheelchair users, those who are partially-sighted or blind, arthritic, and almost anyone suffering from any other type of disability. For example, there will be a pond for a partially sighted person which will be planted with high-fragrance flora, and will

have a variety of waterfall and fountain features which give a very euphonious background to the sweet smell of the plants. Where in the rule book does it say that a garden pond must have fishes in it?

I hope to be there in person — although any future plans I make are always full of 'ifs' and 'buts'. I shall, of course, be dressed incognito in my own clothes so that no one recognises me!

DISABLED AQUARISTS' SOCIETY

Returning to Jane Lloyd's letter for a minute, it did provoke in me what I considered to be an excellent idea.

You may have heard of my efforts to establish a national organisation to deal exclusively with disabled aquarists, the idea being that there would be a national resource centre for both disabled and able-bodied aquatic enthusiasts.

For example, a use of the proposed organisation would be when a local aquatic club is setting up an area show. The organisers of the show could contact the National Disabled Aquarists' Society to ask advice about entrance and egress — gangway clearances, height and spacing of exhibition tanks, etc, making certain that their show would be enjoyed by *everyone* on equal terms.

If we can get the ball rolling on this one, then we could make

good use of Jane's generosity, and use the college not only for day-long courses, but to establish the working direction in which we should be heading to ensure that a National Disabled Aquarists' Society does actually come into being, what its aims and objectives should be, and (presuming that everything so far has gone OK), create a steering committee to take the matter further.

I shall be contacting DASH personally to talk over this idea (as well as writing to Jane, of course) and would like very much to hear from any similar groups like DASH to enlist their help and support.

DONCASTER 'BASH'

For those of you who attended the Doncaster bash, I hope that you enjoyed it. From what I heard, it was yet another triumph for the Yorkshire aquarists, and easily as good as last year's.

I seem to be jinxed over this exhibition; for the past three years I've been in hospital during the show's weekend. However, this year I wasn't in the bandage factory, and was really looking forward to going to the show on the Sunday. Unfortunately, I had a narcoleptic fit (a remnant of last year's brain haemorrhage) on the Saturday night preceding, and managed to bust a rib and my right big toe! So, yet again, I missed it. Ah well. Perhaps next time.

'THE' COMPETITION

I'm going to run a little competition with some truly awesome prizes up for grabs. In fact, there will be a prize for everyone taking part!

What I want you to do is to take a photograph of your aquarium, or get someone else to do it for you, it doesn't matter which — this isn't a photographic competition — and send it to me via the A & P office.

What the judges will be looking for are: ingenuity in how you've positioned your aquarium bearing in mind your disability, and any special

adaptations you've made to accommodate your various accessories, such as power filters, etc. Again, I'm not looking for the professionalism of your photography (although the better the quality of the print or slide, the better it will reproduce in the magazine should you be on the winners' list).

Being an 'Integrationist' — fighting for equal access for the disabled, etc — I hate to exclude able-bodied aquarists from this competition, and I do promise that it won't happen again. Naturally, the nature of this competition does preclude able-

bodied aquarists from taking part, although there's nothing stopping them taking the photos for any disabled fishkeepers they happen to know.

The Rules

The rules are quite simple: Firstly, you have to be a disabled aquarist. It doesn't matter whether or not you did the actual work on the aquarium location just as long as it *was* your idea and *NOT* someone else's.

Send your print or slide to me A & P — remember *not* to use

glass mounts for any colour transparencies as they nearly always get smashed in the post and ruin the slide.

Add your name and address, brief details of your set-up and the type of disability you suffer from (this is very important, as disability and solution will be the main criteria for judging the winners).

Send your print or slide to me via A & P — remember *not* to use glass mounts for any colour transparencies as they nearly always get smashed in the post and ruin the slide.

See over for full details

My favourite: *Fish*

Mary Bailey's top choice is a large, beautiful . . . and surprisingly peaceful, Amazonian cichlid.
Photographs — unless otherwise indicated — by the author.



many species as possible) when the telephone rang one Friday evening.

A friend of the caller had bred *Uaru*, and had no idea what to charge for the youngsters. Did I have any idea? For once, I was quite lost for words. At that time, hardly anyone was keeping *Uaru*, no-one was known to be breeding them, and they were generally regarded as worth their weight in gold. I had never even seen one!

So I, in turn, 'phoned the BCA chairman of the time, for advice. To cut a long story short, he bought the entire brood and pro-

ceeded to distribute them to people who he thought stood a chance of doing something meaningful with them, so that they might finally become established and available in the hobby.

With water coming out of my taps with a hardness of half a degree, I was a prime candidate, so, casting any remaining vestiges of commonsense to the winds, I agreed to buy half a dozen and face the problem of accommodating them as it (and they!) developed. I didn't know much about them — apart from their water requirements and

Unlike *A&P* Editor John Dawes (see *My Favourite Fish* in January's *A&P*), I didn't start serious fishkeeping in my 'infancy', although I have vague recollections of a goldfish when I was about 4. More accurately, I have recollections of its tank, which leaked almost continuously, to my mother's understandable annoyance. It was, I suppose, there for my education, but, petwise, I had eyes only for my ginger cat. Eventually, the goldfish succumbed to the passage of time and was not replaced; the tank, not surprisingly, went to the tip!

My love affair with 'furries' (with horses added to cats) continued undiluted until my early twenties and university, when I was introduced to the joys of fishkeeping and developed a bad case of 'cichlidocy' spontaneously and simultaneously.

Over the next ten years or so, I ventured into various areas of cichlids — Mbuna first, then Tanganyikans; later Discus, softwater dwarfs, and some of the smaller Central Americans. There were species which I preferred to others, but none which I could point to and say "that is my favourite fish". I probably don't need to add that non-cichlids were never in the running!

UARU INVASION

Then six little *Uaru* invaded my life. Not that I had ever had any intention of keeping this species, or anything else of that size, having (I thought) got large fishes out of my system via an Oscar phase early in my history of insanity. I was quite happy breeding Apistogrammas and small West Africans (large numbers of which can be packed into a 15 x 8ft — 4.5 x 2.4m — fish-house, thereby helping to alleviate the confirmed cichlidophile's need to keep as



Two female *Uaru* examining a batch of eggs laid by one of them. Note the extensive 'excavations'.



Adult *Uaru* guarding its offspring. One or two of the fry can be seen 'glancing' off the parent in their search for nutritious mucus.

reputation for "being difficult" as very little information was available (*see Footnote) — but I was used to working with newly introduced species, so I was not particularly worried by this deficiency.

HUGE EATERS

The fish were just over an inch long when I got them, and spent a few weeks in one of my 18in (45cm) *Apistogramma* breeding tanks (without Apistos!), during which time it became increasingly evident that the species ate a lot and had a growth rate in proportion to its appetite.

The young fish were endearing, always on the look-out for a snack, and I had soon lost my misgivings about taking on such a difficult and demanding species, even if I was beginning to wonder how much (little?) time I had left to sort out adult quarters for them, and how I was going to afford to feed them. They were already looking far too big for the 18in tank.

I had a 48in (120cm) tank, fairly well planted (a rare achievement for me; my fingers are green only out of water) and with only a couple of Apistos and tetras in residence, so I decided to use this as an interim measure for the next stage of the Uaru's development.

It was at this point that I learned the first major lesson of Uaru-culture: *Uaru* are predominantly vegetarian. That is to understate their impact on my beautiful tanks. I left the fish-house for the night, proud owner of an underwater garden; the next morning it looked as if someone had run a Flymo over most of the substrate. Only the Amazon Swords still bore any resemblance to growing plants — and they, too, were quietly demolished over the next week or so.

Did I scream and shout and make threats about frying pans? Never! Already, this aquarist was firmly hooked, indulgently muttering something about plants being easy enough to replace. I did 'phone our Chairman — "Guess what? *Uaru* eat plants!" "Oh, didn't you know...?"

SPECIES PROFILE

Uaru amphiacanthoides originates from the Amazon system in South America, where it lives in extremely soft acid water, normally slow-moving. It was one of the cichlids collected by Johann Natterer during his expedition to Amazonas in the 1830's, and was formally described by Heckel in 1840, along with *Discus* — *Symphysodon discus*, *Angels* — *Pterophyllum scalare*, *Severums* — *Heros severum*, *Festive Cichlids* — *Mesomiza* adults looking decidedly the worse for wear from glancing.

A further species, *U. imperialis*, was described later, but was subsequently regarded as a synonym. I have heard reports of *Uaru* with an 'abnormal' colour pattern being seen in the hobby, but whether these are a separate species or aquarium sports remains to be seen.

Uaru is the native name for this fish, and means "toad", for reasons which escape me. Another version, *Uaru-uru*, "toad-bird", is



Group of half-grown *Uaru*s beginning to adopt the characteristic body patterns of adults.



While we, quite rightly, admire *Uaru* as large attractive ornamental fish, the river people of the Amazon regard them very much as food fish.

similarly unflattering! Heckel gives the derivation, but fails to elaborate. The specific name, *amphiacanthoides*, means "like *Amphiacanthus*", a marine genus notable for its spines. *Uaru* have a higher-than-average number of spines in the unpaired fins, as can easily be seen with the naked eye.

Size and Sex Differences

Eventual size can be as large as 15in (38cm), with 10-12in (25-30cm) a more normal aquarium maximum. In my experience, sexual maturity is reached at about 5in (c12.5cm). There are absolutely no evident external sexual differences.

To my eye, one half of my breeding pair (the male?) was longer in relation to its depth, the other (the female?) was more rounded in profile. Applying these criteria to a further couple, I was quite sure I had a second pair, even though for some reason the eggs always failed to hatch. Then they both laid eggs simultaneously. So, unless you can

obtain a guaranteed proven pair, six youngsters is the best bet — and a lot of fun!

Diet

As already mentioned, *Uaru* will eat most things in quantity, with earthworms and duckweed being favourites. Mine also relished Tetra pond pellets, which have a high vegetable content. On one notable occasion they managed to scrounge a piece of chocolate digestive biscuit from one of their fans, but this is not a recommended dietary item.

They do not like fish very much (shell-fish being an exception), and will eat it only if desperately hungry. On several occasions, I have given them a netful of duckweed (from another tank) inadvertently laced with a few Zebra Danios — which I have been able to remove unscathed, even though the duckweed quickly disappeared. What other large cichlid can be said to be non-piscivorous?!

As a bonus, they are not prone to smashing up equipment either, though it has to be said that they will 'mooncape' the substrate when breeding.

Water Conditions

Uaru have a reputation for being difficult, but, as with any species, it is just a case of providing them with the conditions they require. They will survive in hard alkaline water, but soft and acid is far better, and an absolute necessity for breeding. I kept and bred mine at a pH of about 5, with a temperature of about 80°F (c 27°C).

Other Requirements

Some of their other requirements are, however, what can only be described as idiosyncratic:

① They like to chew bogwood. Under no circumstances should they be given varnished bogwood, as they will chew the varnish with equal gusto and then die. Mercifully, I do not relate this from personal experience!

② They cannot tolerate being kept as singles. If separated from other *Uaru*, an individual will stop eating (yes, I did say STOP EATING!) and pine away. If, for some reason, an individual has to be separated, it will be quite happy, as long as it can see other *Uaru*, either from an adjacent tank or through a clear divider.

Don't worry about a 'single' upsetting a pair if the divider is transparent — *Uaru* do not regard the presence of other fishes as a deterrent to breeding. The first time mine spawned, the sequence went: female laid eggs; male fertilised eggs; other four ate eggs while male and female waited patiently to begin the next spawning pass.

③ They are easily dominated by other fishes, even if the latter are much smaller. I had to use a divider to protect my 4in (10cm) *Uaru* from a breeding pair of Kribbs (*Pel-*

ricachromis pulcher), who had them bottled up in one upper corner of a 42in (c105cm) tank and were taking turns to go over and beat them up!

④ Once they have assumed adult coloration, at about 3.5in (c9cm), they are liable to lose their body mucus at the drop of a hat, specifically when moved, even if out of the water only for seconds. This can be alarming to see, but is not normally a problem, as long as they are being kept in water of the correct chemistry and which is of good quality. I have heard of deaths following a change of owner, and would guess that this is due to poor water matching.

I cannot personally regard as oversensitive to disturbance any fish which: having somehow managed to lift a heavy cover glass and jump down the BACK of the tank; and then having been rescued by the long arm of the aquarist, emerges covered (aquarist and *Uaru*) in dead woodlice, cobwebs, and the other detritus that accumulates behind tanks at floor level in a fish-house... and, after being rinsed off in fresh, not desperately warm water and returned to its tank, sits there, trailing mucus all over the place, begging for a handout as if nothing had happened!

BREEDING

Given the right conditions and diet (in my case, 0.5 dGH, pH5, earthworms, duckweed, and pond pellets) *Uaru* are not difficult to breed. Mine appeared to be triggered

initially by an unseasonable hot and sunny spell in June, during which the day-time temperature in the fish-house rose to the upper eighties Fahrenheit (around 30°C); obviously, this is easy enough to simulate, failing meteorological cooperation.

Usually, the first sign that something is up is a decided change from the normal "Where's breakfast?" soliciting first thing in the morning. The observant aquarist will note the putative male charging at (and into) the front glass, atypically hostile to the human presence. The half-asleep aquarist may well not notice the change of mood until (s)he receives a nasty nip to the fingers during feeding.

This phase does not last long, the desire for food soon reasserting itself, but it is still unwise to put one's hand in the tank for the next two-three weeks. During this time, the fry will have hatched, and immediately followed in their father's (and mother's) 'finsteps' by eating everything in sight, including a large amount of parental mucus covering. Like Discus, *Uaru* fry 'glance', though, in this species, the behaviour is not obligatory.

By the time they are about three weeks old, they will measure about 1/2in (c1.3cm) and are truly 'little bellies with fins', with the adults looking decidedly the worse for wear from glancing.

I was most interested to hear from *AGP* Editor, **John Dawes**, that there has been a report (from a wild habitat), of parental *Uaru*, during the period of extra mucus

production, being parasitised by Rummy Nosed Tetras (*Hemigrammus rhodostomus*), which apparently join the *Uaru* fry in feeding on the mucus.

This raises some interesting questions: is there, for example, any concomitant predation by the tetras on the tiny *Uaru* fry? Or vice versa, if the fry are larger?! It could be well worth a little aquarium experimentation to find out, or just to observe this unusual phenomenon at first hand.

I was not so happy, though, to hear of our afore-mentioned Editor's personal involvement in the 'predation' on my favourite fish! (see photo!) [Not gaily! Ed.]

Endearing though the adults are, fry are totally charming, even if you know perfectly well that it is love of food, rather than love of you, that brings them rushing eagerly to the front with expectant looks on their faces. The fatal charm of juvenile Oscars is notorious, but believe me, little Oscars have nothing on little *Uaru*.

It was only practical considerations that eventually forced me to let other aquarists have a look-in. Those who have left my fish-house, happily clutching a bag of *Uaru* fry, have no idea how hard it was for me to let them go. Or perhaps they do now! **AGP**

*Footnote: There is now a newly revised British Cichlid Association information pamphlet on *Uaru*, price 75p + SAE, available from BCA (AP), 7 Delamere Avenue, Sale, Cheshire.

Diary dates

Saturday 13 & Sunday 14 June

Isle of Wight: The Lo.W. 'Aquatic Experience' will be staged at Whitecliff Bay Holiday Park, Bembridge, Lo.W. The society's Open Show will be held on the Sunday. For full information of all the scheduled events, contact **Paul Corbett**, Secretary of Lo.W.A.S., The Orchard, Gatcombe, Isle of Wight PO30 3EF.

Sunday 14 June

Skelmersdale & D.A.S.: The annual Open Show will take place at the Skelmersdale Labour Club, Westgate, Skelmersdale, Lancs. Benching: 10.30 am-12.30 pm. Judging: 1 pm. Refreshments available. For more information, contact **Ron Lewis** on 0695 28971.

Huddersfield Tropical Fish Society: The H.T.F.S. Open Show will be staged at Rawthorpe High School, Netherhall

Avenue, Rawthorpe, Huddersfield. Judging and Auction: 1.30 pm. Full details from the Show Secretary, **David Graydon**, 36 Long Lane, Dalton, Huddersfield, W Yorks HD5 9LB. Tel: 0484 538504.

Sunday 21 June

Association of Midland Goldfish Keepers: Open Show to be held at Foleshill Community Centre, Foleshill Road, Coventry. Show entry forms available from **Andrew Barton**, 41 St Barnabas Street, Wellesborough, Northants NN8 3HA. Entries close on 6 June.

Saturday 11 July

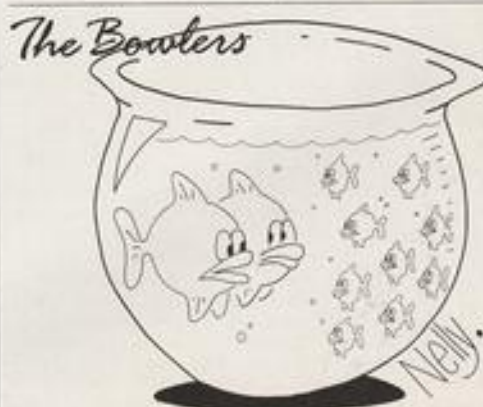
Port Talbot & D.A.S.: 22nd Open Show to be held at the Tiabach Youth Centre. Benching from 10 am; Judging: 12.30 pm. For further details and Show Schedules, contact **Mark Morgan**, 15 Blodwen

Street, Aberavon, Port Talbot, West Glam SA12 6ER. Tel: 0639 883603.

Sunday 15 July

Cannock & D.A.S.: Open Show at the Avon Road. Com-

munity Centre, Cannock. Doors open: 10 am; Judging (to F.B.A.S. Standards): 1.30 pm. Full details from the Show Secretary, **Dave Cook**, 24 Marlborough Street, Bloxwich, Walsall, West Midlands WS3 2HZ. Tel: 0922 494988 (between 6-8 pm).



"Are you absolutely sure I'm the father?"

THE VICTORIAN AQUARIUM

A prominent feature of the nineteenth century was that anything rare and expensive, or new and expensive, would set exceedingly wealthy persons jostling each other in order to own it. Thus, the first examples of the small cactus *Ariocarpus kotschyanus* changed hands for £40 each, one, naturally, to the gratified Prince Kotschubey.

It was possible to live for a year on £40 at the time, but this was an insignificant sum compared to the thousands reputedly bid at auction for tropical orchid rarities. And, in a remarkable example of mistaken prodigality, Napoleon III had the imperial gold dinner service replaced by one made of a new light metal, then extracted laboriously and in minute quantities — aluminium.

Early Influences

So it would be remarkable if some of this ostentation had not rubbed off on to aquarium keeping. It certainly did with the popular fashion of growing ferns, referred to as pteridomania; some of the larger Edwardian cases were so elaborate as to resemble junior editions of the Crystal Palace. Influence there certainly was, as the illustrations show. The two-foot aquarium with twisted glass pillar and tinted statuette cost four guineas (£4.20), more than a month's wage for the average skilled tradesman. The Rustic Aquarium, looking like a small rainforest, was presumably a conservatory model.

These examples are from advertisements in a copy of *Freshwater Aquaria; their Construction, Arrangement and Management*, by the Reverend Gregory Bateman. He would probably not have approved of them, warning as he did, against vulgar ornaments. Written in 1890, this book set out to be a complete guide to making aquaria, stocking with plants and animals, and keeping them healthy. It succeeded very well; he knew his subject intimately, and obviously derived much pleasure from it.

First Make Your Aquarium

Failing a commercial model or an upturned bell glass, making an aquarium was a laborious task. The glazier and the slate merchant would cut their product to size, but a slate base would have to be grooved, while zinc angle was moulded from sheet, using simple jigs, either purchased or home-made.

Tanks could be made of metal and glass, or partially of wood lined with slate or glass, being made watertight by a variety of hard cements. The only cement which might have had some flexibility consisted of pitch and gutta-percha, a Malaysian tree resin.

The finished article could be painted in black picked out with gold, and provided with a polished wooden base. It could be incorporated with a fernery in a window

Bill Melrose offers a rare insight into early aquarium keeping.

Photographs by the author

MAJOLICA FOUNTAINS.



M. PETHER, "WHITE" CRYSTAL PALACE.

AQUARIA.



M. PETHER, "WHITE" CRYSTAL PALACE.

Two advertisements from the late 19th Century. What response would they elicit today?

conservatory, and provided with a fountain, using a bucket above and one below.

Intermittent aeration could be contrived by a small bellows, or by a water pump involving a rubber ball with valves, and a sponge filter. Lighting was by daylight, with judicious side shading, hence the partially wooden tanks.

Early Aquarium Species

What was kept in them was anything aquatic large enough to be visible: fish, amphibians, molluscs, beetles, bugs, fly

larvae, spiders, worms, crustaceans and *Hydra*. Naturalist's shops sold snails, mussels, beetles and crayfish.

The variety of fish available was limited to the native species and European carp, with a few additions. The Goldfish, the 'common or fish-shaped' variety, was popular, of course, though it was noted as a curiosity that it was prone to produce the odd specimen with missing fins, or tripod or double tail.

Golden forms of the Orfe and the Tench could be purchased, as well as the North American Black Bass, introduced for angling. The exotics, the hot-house fish, were represented only by the Paradise Fish brought from Canton to France in 1869 and bred there shortly afterwards.

This fish, it was considered, would be suitable for ladies to look after in warm rooms, and might eventually become acclimatised.

Not a great variety, really, and many species would not be considered for aquaria now.

The herpetologist had rather more choice, with reptiles from around the world, and amphibians such as Axolotls and Horned Frogs, with vivaria to keep them in from two shillings (10p), and the handyman could even contrive heating with tiny hot water pipes and a spirit lamp.

Aquatic plants, apart from a few such as the imported *Vallisneria spiralis*, the rampant introduced Canadian Water Weed, and the rare and presumably introduced Water Fringe (*Nymphaoides peltata*) were native, but some of them would be used now only as pond marginals.

On the other hand, Water Crowfoot and some species of *Potamogeton*, elegant plants all, but unpopular now due to their requirements for daylight, were spoken of familiarly as aquarium subjects.

Smelly End

Apart from an occasional and short-lived fashionable incursion into the drawing room, usually ending malodorously, the Victorian aquarium did not reach the height of popularity. The lack of exotic and rare fish offered no inducement to the rich, whose head gardeners did very well with tropical plants.

Heat was available in stove houses and the ideas of aeration and filtration were there, while electric lighting was practical towards the end of the century, but no grade of 'Head Aquarist' appeared to translate ideas into reality with the unlimited labour of teams of 'Under Aquarists'.

For those of more modest means, the lack of technology meant that a good deal of attention had to be given to ensure the success and health of the aquarium, and much learned about the animals and plants they kept. The Victorian aquarium was therefore an interest only for the true enthusiast.

Herpetology matters

By Julian Sims

AMPHIBIAN HAVENS

A garden pond can provide an environment favoured by many of Britain's native amphibians, especially Common Frogs (*Rana temporaria*) and Smooth Newts (*Triturus vulgaris*). Garden ponds might also be inhabited by Common Toads (*Bufo bufo*), Palmate Newts (*T. helveticus*) and even Great Crested Newts (*T. cristatus*).

However, owing to different spawning preferences (especially depth of water) and the predation of tadpoles by adult newts, very few ponds support all of these species. Even so, the use of garden ponds as spawning sites has emphasised the importance of these pockets of freshwater in the conservation of amphibians, particularly in a mad-made urban environment.



Garden ponds are becoming increasingly important in providing spawning sites for many species of British amphibians.

In view of this role of garden ponds, I have drawn attention to seasonal 'spawn exchange' schemes in past editions of *Herpetology Matters*. In the spring, some of the most successful garden ponds have so many Common Frogs returning to them that vast quantities of spawn are deposited.

Local County Naturalist Trusts, under the central co-ordination of the Royal Society for Nature Conservation (RNSC) in Lincoln, have organised an annual scheme whereby some of this excess spawn can be transferred to someone else who wants to introduce frogs into their garden.

Spawn exchange is clearly a spring-time activity, but if you are interested in encouraging some of Britain's native amphibians to breed in your

garden next year, now is the time to prepare the pond. The British Herpetological Society (BHS) have recently updated their leaflet *Garden Ponds as Amphibian Sanctuaries*. The new eight-page leaflet is illustrated with six colour pictures and provides useful information about the position, design and construction of a pond for amphibians. Examples of suitable water plants are also given, including oxygenators, plants with floating leaves and marginals.

Suggestions are also given to help overcome the problem of fish eating all the tadpoles of frogs and newts and thus wiping out an entire generation before these larval amphibians have completed their development.

For example, by keeping about half the pond densely covered with water plants, it

should be possible to establish small populations of Smooth and Palmate Newts. In contrast to most other species of amphibian, Common Toads tend to thrive in water inhabited by fish, including lakes used for rearing trout. This is because the glandular skin of adult toads and their tadpoles produces secretions which are distasteful to fish.

Copies of the *Amphibian Sanctuaries* leaflet can be obtained by sending a stamped addressed envelope (A5 size), together with a postal order for 30 pence to:

BHSCC,
28 Old Fort Road,
Shoreham-by-Sea,
West Sussex BN43 5RJ

SNAKE VENOM

During January of this year, I was thoroughly entertained by

the three-part television drama *Nest of Vipers* in the Taggart detective series made by Scottish Television and shown on network ITV channels. The plot centred around two murder victims, who turned out to have been supposedly killed by the secretions from a species of Dendrobatid — a South American Arrow Poison Frog. A second series of murders were effected by spiders and venomous snakes stolen from a pharmaceutical research laboratory.

Scientific advice for this television production was provided by the Liverpool School of Tropical Medicine which is affiliated to the University of Liverpool and is a World Health Organisation (WHO) Collaborating Centre for Venom Research.

Investigating the composition of snake venom is an area of herpetology where much biochemical research is currently being conducted. Research findings have important medical applications including the production of anti-venoms for snake bite victims, particularly in the Third World, and for the manufacture of other drugs, such as anaesthetics.

As an aid to feeding, venom has evolved in some snakes (and two species of lizard) to help overcome their prey and to start the digestion of this food. The way in which venom performs these functions has led to the system by which it is classified:

- ① If the venom mainly acts on the nervous system of the prey, resulting in paralysis and its inability to escape, then these venoms are described as **neurotoxins**.
- ② If the venom affects the cells of the blood and the vessels of the circulatory system, then it is described as a **haemotoxin**. In mammals and birds — animals with rapid 'double' circulation of the blood — haemotoxic venoms are quickly transported around the body, causing massive damage to the body tissues. For example, **cytotoxins** in the venom digest the cells of the blood vessels, resulting in blood

loss. This gives the appearance of 'bruising' under the skin. **Anti-coagulants** in the venom prevent the blood from clotting so that the bitten animal effectively bleeds to death.

However, some haemotoxic venoms contain **coagulants** which cause clotting of the blood throughout the body. These clots block the blood vessels, preventing oxygen from reaching the muscles of the prey. Lack of circulating oxygen and paralysis of muscles results in the death of the animal.

These results serve to demonstrate that snake venoms are very complex substances. Their classification is further complicated by the fact that some snakes produce venoms which contain both neurotoxins and haemotoxins. For example, venom from the 'Spitting' Cobra group (*Naja nigricollis*), found in West Africa, can block nerve pathways and cause the destruction of tissues in the animals into which it is injected.

This breakdown of tissues in prey animals is a very important function of snake venom. To date, more than twenty different types of digestive enzyme have been identified in reptile venom, although no one species possesses all of them. Experiments have shown that if the venom ducts of Florida Cottonmouths (*Agkistrodon piscivorus conantii*) are surgically closed, then these snakes could no longer completely digest the Leopard Frogs (*Rana pipiens*) that they swallowed.

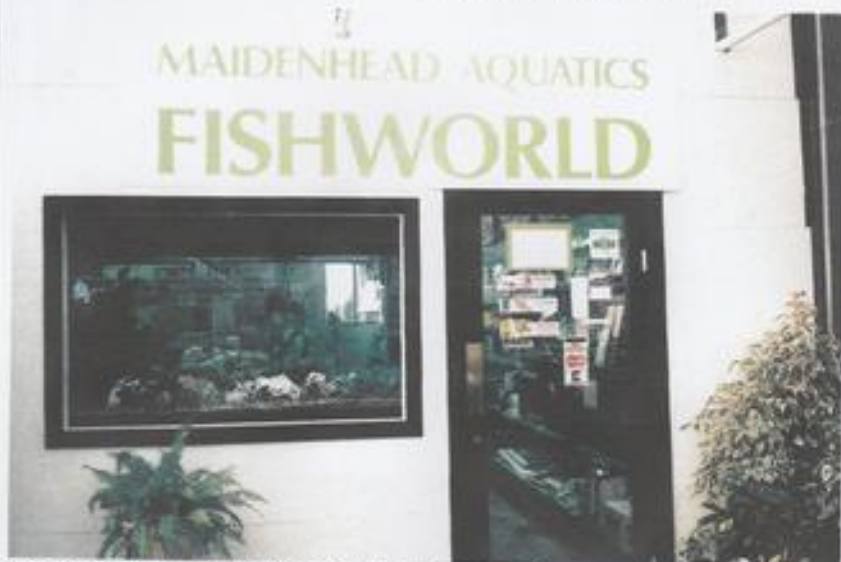
Analysis of the venom from North American Western Diamondback Rattlesnake (*Crotalus atrox*) has revealed the presence of five previously unknown protein-digesting enzymes. These enzymes cause the rapid and extensive haemorrhaging in animals which are bitten by this species.

Although seldom receiving the high profile provided by *Taggart*, investigations into the composition of reptile venom is an area of research which is a very important herpetological matter today and will continue to be so for many years to come.

OUT AND ABOUT

IVER FISHWORLD

By Dick Mills
Photographs by the author



Once you start peering through the window, you just have to go in!

If you think you are experiencing a sense of 'deja vu' while reading this, fear not, it really is a new report and not an old one dredged up! The problem stems from the fact that, so successful are some aquatic outlets, that they set up a mini-chain of them and all trade under the parent name.



Above centre, row after row of well-maintained tanks at Iver Fishworld. Note the large aquaria on the floor.

Above, the filtration system pipework doesn't impede close inspection of the marine stock.

However, on with the story...

Iver Fishworld is part of Maidenhead Aquatics and is situated, like the original, within the confines of a garden centre; this time it's at Flowerland in Iver (slightly nearer to London than the other site at Bourne End, also in Buckinghamshire). The establishment is well-lit, not only from the high glass roof, but also from the all-metal-halide lamps over the tanks. The entrance features a large window tank (holding some fine Discus on my visit) which serves to attract the attention to the aquatic store from within the main garden centre area.

The tanks are over to one side of the aquatic store with the dry goods, tank displays and plant stocks all taking up the rest of the floor space. It is only after you have made several 'circuits' of the stock-holding aquariums that you realise just how many there are. And, as at the other branch, don't forget to look down, for under the rows of tanks are several very large ones housing substantial specimens of cichlids and catfish.

Approximately 120 normal-sized tanks, plus 11 large ones, are given over to freshwater tropicals; 17 (plus 2) house an excellent collection of marines, while the coldwater enthusiast has to be content with just 9. However, the outside coldwater area with its numerous holding tanks is now up and running, being well-stocked with Koi, Fancy Goldfish, Ghost Carps, etc. Back inside, two large, 5-chamber 'cascade displays' show aquarium plants off to their best advantage and everything looks spotless.

A casual question to the manager, Simon Langdale, brought forth the information that the filters for the display tanks are situated beneath them — well out of sight and prying fingers!

Iver Fishworld can be found inside Iver Flowerland Garden Centre, Norwood Lane, Iver, Bucks. Tel: 0753 630130.