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<td>Black Barbels</td>
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<td>No. 1 50 plants including Dwarf Lily Crassula Hydrilla  £1</td>
<td>No. 10 5 Pond Plants</td>
<td>No. 20 50 Plants for your Aquarium February  £1</td>
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SPECIAL: Algae eating pond snails 1/- each

THE AQUARIST
What is your opinion? No. III
by B. Whiteside

At last the letters have begun to arrive in response to the first article in the series. I must admit to having been surprised and pleased at the response so far, as I had held the view that aquarists were rather wary about putting pen to paper. Letters have arrived from many parts of England; one letter reached me from Scotland but neither the Welsh aquarists nor those from my own homeland Northern Ireland have, as yet, decided to give us all their knowledge. How about a few letters from other parts of the United Kingdom as well as plenty more from English aquarists. Remember, you don’t have to be a long experienced expert to be able to contribute some useful information. The youngest people to send me information were 14 years old, and the eldest person admitted to being 76 years old. This goes to show that there is no age barrier to those who are keen enough to write even a few lines, or several pages.

Letters received from our readers

Now to the main point of the letters. Did they contain any information which would throw any light on the questions posed? i.e. the use of under gravel filters and the use of peat, loam etc. under the gravel, to aid plant growth.

Fourteen year old Stephen Harris, of Bognor Regis found that on using peat in his aquarium it took about a week for the tank to settle down but the water remained clear and the plants thrived. After a leak developed in his tank, he set it up again using loam from his father’s allotment but the only plants successfully grown were V. spiralis and V. torta. This water did not remain as clear as when peat was used. In conclusion Stephen finds peat to be the best medium for clear water and thriving plants. Another 14 year old, Geoffrey Leach of Bury, is not keen on the use of peat as he finds it is inclined to float to the surface when plants are moved or when large scavengers are present. He uses small pots of loam covered with gravel. Geoffrey also thinks that under gravel filters tend to stunt the growth of plants, and finds that tanks have to be cleaned out every few months due to an accumulation of mulm.

Continued on page 120
Feeding tropical marine fishes

by G. F. Cox

A LL living things, whether animals or plants, exhibit seven basic characteristics as follows:

1 Locomotion i.e. they are capable of autonomous movement.

2 Respiration i.e. they exchange gases with the environmental medium, free oxygen being consumed with the production of carbon dioxide as a waste product. This is true of green plants also, although the basic process is usually masked by their photosynthetic activities. A few forms of life can respire anaerobically, e.g. yeast cells change simple sugars into ethyl alcohol and carbon dioxide, releasing energy in the process, but they do not need oxygen to do it.

3 Reproduction. Since no living thing is immortal the species must be capable of producing their own kind to ensure the continuity of life.

4 Sensitivity. This means that a living thing is able to respond to a stimulus e.g. light, heat, sound, touch, gravity, etc.

5 Nutrition. All living things must either (a) synthesise their own organic food materials from basically inorganic compounds e.g. the green plants ability to make carbohydrates and simple nitrogenous compounds from CO₂, H₂O, and mineral salts in the soil, using light as the energy needed for the process (called photosynthesis) OR (b) they must obtain their food directly from plants by feeding on smaller animals which ultimately feed on these plants.

6 Growth. Leading directly from (5) above is the fact that, whereas some of the foods eaten are “burned” during catabolism (mostly fats and oils and carbohydrates), some of the foodstuffs—the amino-acid derived from proteins—are used during anabolic activities to make new protoplasm for new cells, tissues and organs or to repair damaged structures. The complementary processes of anabolism and catabolism are usually referred to collectively as METABOLISM.

7 Excretion. i.e. simply the removal from the body or the organism of the waste and unwanted materials.

In this article it is Sections (5), (6) and (7) above which mostly concern us.

In Section (5) above we stated that with the exception of the chlorophyll-containing green plants and parasitic or saprophytic fungi, organism is either herbivorous or carnivorous or in many cases omnivorous. This applies equally to marine tropical fish as well as other animals. As a direct result of the fact that no animal can synthesise its food but is dependent on other animals which ultimately depend on green plants, some very interesting food chains arise. A simple example is grass-zebra-lion, but nowhere are these food chains better developed and more complex than in the seas and oceans. A well-known example is the following—phyta-plankton-copepod-fish larveae-large predatory fish-
dog fish and shark. It is obvious, therefore, that with the exception of the purely herbivorous species and omnivores, whose normal diet includes a large proportion of vegetable matter, in capturing coral fish and keeping them in a "small" tank, (a relative term since even the largest aquarium in no way approaches the size of a coral reef), we are interrupting this food chain. With our power filtration, ozonation and low intensity illumination we effectively ensure that neither zoo-nor phytoplankton could exist. Fortunately, however, there are many omnivorous and carnivorous species which belong to the latter stages of a food chain and can therefore be fed in the aquarium using larger crustaceans (brine shrimp, infantish shrimp and prawns, daphnia, small crabs etc.) Molluscs (mussels, wrasses, abalone, sea urchin, white-water) and other smaller marine or fresh water fishes (e.g. Blenny, Whitefish, Guppy and Mollie etc.). The omnivorous species (i.e. Ablufus, Dascyllus and Abudelf species) will even take certain dried foods greedily.

Classification of aquarium species according to nutritional requirements

The following list was compiled as a result of my own experience with marine tropics. There are, of course, other species which are imported but I have not included them because, never having kept them myself, I am unable to make any observations regarding their feeding. Furthermore even the apparently specific feeders such as the surgeon fish can, with a suitable example set by a "feeding instructor" such as Monodactylus argenteus or a Surgeon fish (Abudelf), learn to accept suitably-sized pieces of animal tissue such as the choicest parts of a marine mussel, or small fragments of uncooked fresh-killed shrimp, crab or prawn.

Herbivorous Species

Surgeon fish. Tangs

In this group the food appears to consist almost entirely of green marine algae and various planktonic forms of life. In the aquarium they will take Enteromorpha species of seaweed but apparently no other of our native marine algae is acceptable. Ulva lactuca (Sea Lettuce), Cladophora sp. and Chaetomorpha sp. are never eaten in my experience. With training these somewhat difficult fish can be induced to eat brine shrimp, tubifex and small pieces of uncooked insect or the exoskeleton removed.

Omnivorous Species


These fish will take a wide variety of foods including the marine mussel, chopped shrimp, chopped earthworm, supcrworm, whiteworm and gnat larvae.

Filter fish. Scorpiophages. Snoppers. Thelan (Target fish)

This is obviously the largest group of fish which we keep in our aquaria, and in view of the catholicity of their diet this is not surprising. With the exception of most of the Chaetodonts pronounced not as Chaet-o-don as I have often heard, but as Ken-tor-don) and Heniochus, most fish in this group can even be trained to eat a good dried food. This suggests that the variable requirements of a little fresh Enteromorpha, helps to keep them in first-class condition.

Carnivorous and Predatory species


All the fish in this group are carnivores (i.e. they will normally eat only animal tissues), but whereas some of them will accept the flesh of recently killed foods, others will eat only living animals. Suitable foods for this group are as follows:—Earthworms and Ragworms, Mussels, Shrimps and Prawns, small Shore Crabs, pieces of steak, ox-heart. Whiteworms and, most important of all, perhaps, appropriately sized fresh-water and native marine species of fish. Worth mention here are the Trigger Fish which I have often observed on the coral reef surrounding the beautiful little island of Santa Carolina just off the coast of Mozambique. Whilst I often saw Triggers moving in transit over the coral-covered areas, I only ever saw them feed on the sandy stretches of the littoral zone. This they did in the same fashion as the Symphysodon species i.e. a high pressure jet of water is aimed at the sand in front of the fish. This dislodges all the small animals hiding in the sand e.g. shrimps, small crabs etc. which were promptly swallowed.

Some points with regard to live foods

1. Whiteworms

Everything I have read with regard to the culture of whiteworms recommends placing some water-logged bread on top of the culture medium (two thirds least to one third past) and then covering the whole box with a sheet of glass. With this method, however, I quickly found that both the bread and the medium became contaminated with strong growths of saprophytic fungi—mostly Mucor (Pin mould). In the accompanying diagram I have shown the method I use to obtain large quantities of worms over a long period of time (up to one year) without having to change the compost.

Method of culturing whiteworm

A tomato box may be used as a container but since these boxes are usually of poor quality I always line them with a sheet of polythene suitably cut to size.

August, 1967
Using this method the collection of the worm is also much easier since they cluster in large numbers on the glass beneath, and to the side of, the bread and can easily be removed.

2 Mussels

These molluscs are easily kept alive, easily fed to the fish and above all, they are extremely nutritious. I can well see them becoming the main aquarium what Tubificid worms are to the freshwater enthusiast but since this food is of marine origin and therefore possibly infected by microscopic parasites, I obviate the risk of possible diseases by keeping them in a solution of an easily obtained Sulphur drug, added to ordinary sea-water. These treatments turn the seawater an amber colour but appear not to affect adversely the mussel. After being in this solution at a low temperature (approximately fifty degrees F) for 3 days they are fit to feed to even your most prized specimens. As an example of their value I fed the fish in one of my community aquaria exclusively on live mussels for six months. During this period a Chiosodona exigua grew 1½ inches. The pieces most relished by the fish are the mantle, the adductor muscles and, most of all, the conical “foot”, (see diagram B). The kidney will also be eaten by most fish, and seems to be preferred by some species, e.g. P. melanochir.

Before leaving this section I would like to say that occasional feedings of mussel, shrimp, prawn or crab flesh are a vital addition to the diet of all marine fish in captivity and especially those kept in even the very best of artificial salt solutions if vital trace elements are to be provided.

Collecting Earthworms

Digging for worms, the time-honoured method of collecting this excellent bait and live food, is antiquated, tiring and unhygienic. Furthermore, few people can practise this activity because their garden area is nearly covered with turf lawn. Few people’s dedication to fish keeping is so strong as to permit them to plough up the front lawn. However, this difficulty is easily overcome by using the following method; a stock solution of 15 per cent formaldehyde in water (e.g. 1 cupful to 2 pints of water) is prepared. Next, a piece of rope or string 4 yards long is arranged as a square with sides 1 yard long on the lawn or cultivated patch. Now, the yard square should be watered quite heavily using a watering can, preferably the plastic rather than the galvanised type. (N.B.) This stage may be omitted if the ground is quite damp within 12 hours after a moderate rainfall. Next time dilute formaldehyde (30 per cent can be obtained cheaply from most chemists) solution is watered over the same area i.e. the one square yard within the rope. Within two or three minutes, worms will begin to appear from their burrows at high speed.

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Mytilus—the mussel

Diagram A. This shows the general external appearance of the mussel as found on the rocky shore. The byssus threads secure the mollusc to its chosen place of habitation.

Diagram B. Shown here is a mussel ready to be fed to the fish. A sharp penknife blade is inserted at the point where the byssus threads leave the shell, and run down until it reaches the powerful posterior adductor muscle and severs it. The two halves of the shell can now be prised apart although, like a book, they are still held together at the rear by hinge tissue.

Diagram C. This shows the right hand half of the bivalve only, with the thin ctenidium cut away. Clearly seen now are the heart, the unioventral papilla, the foot, the mantle and the adductor muscle. Only these five parts should be fed to the fish. Whilst feeding, an order of preference is soon made noticeable. Most prized is the foot, followed by the a-p papilla, then the mantle and finally, the heart and adductor muscles. It must be stated here that a large, hungry fish (e.g. Thalassoma sp. (wrasse)) will devour a whole mussel at one go. In my experience only a starving fish will eat the ctenidium tissues, (except for the wrasses mentioned above).
The Junior Aquarist

Ilyocoris scorpion

by Bill Simms

ANY aquarist who has incautiously handled one of these smaller water scorpions will probably be aware that they can cause pain. Like two others, Neocorus cinereus and R attentus, the Ilyocoris Scorpion, sometimes called *Nauticus cinnabaris*, has its front arms adapted for catching its prey, and a piercing mouth part with which to suck out its victim's juices.

It is this piercing mouth part, or proboscis, that causes the tiny but painful wound, for though this water scorpion is only half to three quarters of an inch long, the grip it can obtain with its front legs enables it to tear into quite tough skin.

The hind legs, well covered with hairs, are shaped so that they can act as most efficient oars, and the creature swims very well—unlike the other two water scorpions which merely crawl about.

Because of this free swimming habit the Ilyocoris Scorpion is frequently mistaken for a water boatman. There are four main kinds of water boatmen of varying sizes, so this mistake is not surprising. But the water boatmen, though capable of piercing soft skin, cannot heart so easily as can the three kinds of water scorpion.

All kinds of small water creatures are eaten by the water scorpions, particularly the larval form of insects. Because it can swim as well as crawl about among vegetation, this smallest of the three water scorpions is by far the most dangerous to fish fry and if one is seen in an aquarium it should be removed at once.

As well as the piercing mouth part the female Ilyocoris Scorpion has a sharp ovipositor, or egg-layer, at the rear. This is used to pierce the skin of underwater plants and the eggs are laid just inside the plant skin during May and June.

The larva pass through five molts before becoming adults, taking most of the summer to do this and then the winter is spent as an adult—always in or on the water.

Being rather solitary in its habits this water scorpion is not noticed very often but it is fairly common and can be found almost everywhere in still water throughout Britain.

When water plants are collected from the wild with the intention of using them in an aquarium, this creature is one of the many pests that may be collected at the same time. A close watch should be kept for it.

ESSAY COMPETITION

Winning entry in the 8-10 years age group

My first aquarium

by Colin Anderson (age 10 years)

NOT very long ago I was told to clean out the garden shed. I was putting away some sacks and I found an old fish tank under them. That evening I asked my parents if I could have some tropical fish. My father said "maybe," but he was interested and it didn't take long to persuade him.

We cleaned the tank and made sure it did not leak. We brought gravel, a heater, thermometer and thermostat. Mother and I washed the gravel, put it in the tank and filled it with water. We brought the water to a temperature of 80° and let it settle for a few days.

The great day came on Saturday. We went to the fish shop and I chose a pair of angel fish because of their shape and movement, a pair of zebra fish because they are fast swimmers and a pair of swordtails because of their beautiful bright colour. We got 7 plants and some food. We fed...
the fish three times a day—morning, mid-day and evening. I was surprised to find how little food they need.

At first the angel fish stayed at the back of the tank by the heater, the male swordtail stayed up in a top corner but the zebra fish flashed about the top of the tank and seemed quite at home.

For the first few days the zebra fish fed at the top of the tank, the swordtails caught the food as it fell halfway down the tank and the angel fish scratched around the bottom.

As the days went by the angel fish came to the front and got bolder and bolder. Sometimes they tried to feed at the top but were chased away by the zebra fish. The male swordtail also grew bolder—the female found it easier to settle, it seemed—and he came out of his corner even when it wasn’t feeding time.

In another few days we went to Blantyre to a shop called ‘Aquasene’ and bought a pair of tiger barbs, two wagtail platsy and two neon tetras. We were worried in case the first fish would not like their new neighbours and so we put some live daphnia into the tank at the same time to distract them.

I have found the tiger barbs to be most playful. They chase each other up and down and round and round the plants. The wagtail platsys are very funny to watch because of their jerky movement and wagging black tail. The neon tetras are so small that we wouldn’t be able to see them if they weren’t lit up.

I must get a filter soon and then start saving my pocket money to buy more fish. There are so many that I find interesting, but most of all I want a Siamese fighting fish, and perhaps someone might give me a discus fish for my birthday.

The blue whale

by M. Lorant

SMITHSONIAN Institution, America’s national museum, has opened its greatest, modernized hall, named ‘Life in the Sea.’ The new hall, most spec-
similar ever, shows how some of the world’s marine animals—ranging from the largest to the smallest—look in life.

A unique feature of the new hall is a life-size model of a blue whale, the largest mammal that has ever lived. Shown in diving position and suspended 30 feet above the floor, the 80-feet model is 92 feet long and weighs 4 tons. It represents a living whale that weighed about 135 tons. More than two years in the making, the model is an outstanding example of the highest degree of craftsmanship.

Blue whales are found from the polar to the temperate zones, and occasionally even at the equator. The migration routes followed by these whales depend largely upon the seasonal locations of their food supply. In winter, when the water surfaces grow colder and food is scarce or lacking, they move toward the ice and ice floes, the blue whales moving to warmer waters. There the young are born.

Whales are mammals and exhibit all the characteristics of true mammals. They are backboned, warm-blooded, four-legged animals, and suckle their young. The blue whale calf at birth may be as much as 20 feet long. It is nursed for about 7 months and is weaned when it has attained a length of about 50 feet. Full grown it may attain a length of 100 feet and weigh 150 tons. Life span of the blue whale apparently does not exceed 25 years.

Millions of years ago the ancestors of the blue whale lived on land and walked on four legs. During the Tertiary period whales became completely adapted to aquatic life. Now their physical characteristics are such that they cannot survive on land. Were the blue whale not buoyed up by the water, its great weight would crush its skeletal framework and collapse its lungs, causing suffocation and death.

The body of the whale has become streamlined and torpedo shaped. With forelimbs in the shape of paddles, the whale propels itself through the sea and maintains its balance. The hind limbs have completely disappeared and exist only as vestigial bones buried deeply within the body. Unlike the vertical tail of fishes, the tail fluke of the whale lies in a horizontal plane. By powerful up-and-down motion of its flukes the animal propels itself forward and for short distances can attain a speed of more than 16 knots.

The thick layer of blubber beneath the skin of the blue whale represents a further adaptation of the whale to the cold water in which it spends its life. The blubber serves as an insulation that retards the escape of the whale’s body heat into the cold sea. A large blue whale has been known to contain 20 or more tons of this blubber, normally about 28 per cent of its total weight.

Both eyes and ears of this whale show additional adaptations to environment. The tough membrane eyes are protected from salt water by a greasy secretion from the tear glands. The external ears have entirely disappeared, leaving only minute auditory openings. Whales, however, to be highly sensitive to water-borne vibrations.

The nostrils of the blue whale are located on top of its head, and so the animal is able to breathe while almost completely submerged. Water does not enter the lungs when the whale opens its mouth to feed, because the nasal passages lead directly into the windpipe instead of to the throat, as in land mammals. When the whale is beneath the surface its nostrils are tightly closed and the animal holds its breath. On coming to the surface from a deep dive the first "blow" of the blue whale may reach a height of 20 feet. The animal may then blow as many as seven times, with the height of the blast becoming relatively smaller until the vaporization formation disappears completely. Entirely in error is the belief that the water enters the mouth and is spotted out of the blow-holes. For the most part this spout is merely warm breath condensed in the colder air.

The mouth of the blue whale is equipped with blades of whalebone, or baleen, which hang down from each side of the upper jaw as long narrow strips with hairlike bristles on the inner edges. Whalebone originates in enormously developed horny protuberances, or papillae, along the edges of the upper jaw. During early fetal life conical tooth buds are located in the soft mucous membrane (gum) on the borders of the upper and lower jaws. However, these teeth disappear without trace when the horny papillae which grow into the baleen plates begin to develop.

The throat of a blue whale is so narrow that it can swallow nothing larger than a small fish. Because of this, its diet normally consists of immense masses of small crustaceans collectively known as krill. The external folds or grooves along the throat and abdomen are elastic and can be greatly expanded to increase the size of the mouth so that quantities of krill may be taken in. When the mouth is full, the whale closes its jaws, and its huge tongue, weighing as much as 4 tons, forces water out through the baleen sieve, leaving the krill to be swallowed. As much as a ton of krill has been found in the stomach of a blue whale, and this is probably not a full day's quota of food.

Because of man's modern methods of hunting and killing whales, their number has greatly decreased over the years. For centuries man has pursued them in small ships and killed them with harpoons, but toward the end of the nineteenth century the harpoon gun was perfected. Today whales are hunted with harpoons shot from cannons. The carcasses are processed at sea on huge factory ships fully equipped to quickly extract the whale oil.

Throughout history whales have served man in a variety of ways. In the nineteenth century whalebone sold for as much as $7.00 per pound and was used primarily as braces for ladies' corsets. Whale oil went into soaps, varnish, paints, and was used to treat leather. Now that new uses for whale oil have been discovered, such as the production of edible fats, including margarine, the search for whales is more active than ever before.

Despite international agreements limiting the yearly catch, whales each year take a toll in excess of the whale's natural rate of reproduction. If this exploitation of the whale stock continues, a time will come in the foreseeable future when whaling will become commercially unprofitable.
Christopher Heald of Bolton, who is 15 years old, on comparing his aquarium, which used a sponge filter, with another boy's tank which had an under gravel filter, found that his own plants grew much better and considered that the under gravel filter was removing plant foods from the gravel. Christopher's dealer was in agreement about the ill effects of sub-gravel filters. In buying the tank in question from the boy, Christopher established the tank without the filter and has had superb plant growth. Fifteen years old Peter Brown of St. Helens, has rejected under gravel filters in large tanks. He said that in a large tank which required two such filters, one at each end, plants only grow well in the 6 in. space in the centre of the tank, between the two filters. In smaller tanks Peter has found that an under gravel filter does a good job and does not hinder plant growth.

Mrs. M. Skinner of Birmingham tried peat under the gravel several years ago but had a lot of trouble with the peat rising over the gravel, and is still cleaning out peat, even after all this time. Regarding under gravel filters, Mrs. Skinner thinks them alright if they are kept running all the time, but she does not use any type of filter herself and cleans her tank every two or three weeks, replacing a bucketful of tank water with fresh water.

Mr. J. Boardman of Leigh, Lancs., uses peat and dried peat size pieces of clay, placed to a depth of 1 in. in plastic seed trays, covered with coarse gravel. The container is blended in with the existing gravel in the tank. Mr. Boardman states that the growth rate of most plants has been good and that to prevent clouding of the water when plants are moved, the whole seed tray is removed.

Another reader, Mr. J. Higham of St. Helens, set up a 36 in. by 15 in. by 15 in. tank, two years ago and decided to break all the rules by placing 7 lbs. of John Innes Potting Compost No. 1, between two layers of gravel, with an under gravel filter at the bottom. The only drawback which he found has been a slight brownish tinge in the water. Many species of fishes and plants have thrived, but the following plants are exceptions: Alternanthera, Ludwigia, Limnophila, Vallisneria have always been poor but Nymphaea strum, Limnelia cardinalis and Amazon Sword (Vittata) have always needed constant pruning. Angel fish and P. kribensis have spawned regularly. The under gravel filters have been almost in continual use and a power filter is also in prolonged use. From what Mr. Higham learned, he would not use the same medium again but states that no ill effects followed what he called his "trash experiment". He speaks very highly of the effects of e.g. filters on water and gravel. (The lime content of the John Innes P.C. No. 1 would render the water hard and alkaline, conditions which suit most of the plants which did well in Mr. Higham's tank).

Using the white, plastic, grid-type under gravel filters for 2-3 hours per day, for 4-5 days per week, Mr. Hipkins of Birmingham, found for the first 3 weeks, that all his plants became very light in colour, so he cut down the lighting in his 24 in. by 12 in. by 12 in. tank to about 6 hours per day, with two 40 watt lamps. The colouring since has improved greatly. For the first 4-5 weeks little growth resulted, but after 9-10 weeks the young plants originally planted had filled the tank to such an extent that some had to be cleared out to see to the back of the aquarium.

Mr. G. McMorran of Sheshed found that by using fine industrial peat he managed to get some of his plants to grow—something which was rare for him before using the peat. Mr. McMorran also uses sub-gravel filters and thinks that more information should be supplied when the filters are bought, as regards how to have them working best. He emphasises the use of large grained gravel and not the more commonly used fine stuff. Mr. McMorran also maintains that the top of the air lift pipe should be well beneath the water surface to allow for aeration and better uplift of water, and that the air flow should be slow and leisurely to prevent reprocessing of the water too many times, thereby allowing the bacteria to absorb the released plant foods.

Mr. N. L. Morrison, a scientist from Widnes, is pleased with the crystal clear water which results from his using under gravel filters. Having decided to reposition his filters, the removal of the gravel after three months continuous use resulted in water which was black. His tank was crystal clear again after only three hours use of the under gravel filters. Mr. Morrison would use no other type of filter.

Mr. D. Hubble of Sheppy has grown most common aquarium plants without any under gravel growing medium. He considers that fish waste is sufficient. Mr. Hubble thinks that under gravel filters work well but thinks that harrowing snails which are cheaper, more natural and do not agitate the water, are equally as good. Mr. Hubble is not impressed by the fact that under gravel filters give an allover constant water temperature which he considers unnatural.

Mr. S. Fox, chairman of the Newcastle Guppy and Livebearer Society, installed an under gravel filter when they first became available, in a 24 in. by 12 in. by 12 in. tank. At first the results seemed to be all that were claimed but after several months he found his plants to be deteriorating and his fish to be "out of condition". On stripping down the aquarium, Mr. Fox found the gravel to be packed solid to a depth of about 3 in. Beneath this layer the gravel was completely black, the water cold, and the plants' roots rotting away. Normal weekly tank servicing was carried out and the filter was in use for 12-14 hours per day. Mr. Fox suggests that under gravel filters only be used for 3-4 days per week, a box filter being used during the other days, and that the surface of the gravel is raked at least twice per week with a planting stick to prevent the gravel from cementing up. He also suggests a couple of catfish to keep the gravel on the move. Mr. Fox warns that no sub wall or peat should be used with under gravel filters.

Mr. J. V. Jeffery of Bournemouth sent an interesting
letter in which he stated that a peat base seemed beneficial to some plants but not to others. His common Sparter-
docks almost outgrew a 36 in. x 25 in. x 15 in. tank when
grown in peat, producing many hard, glossy surface leaves.
His Cape Four Sparterocks also showed a marked improve-
ment. Other plants which Mr. Jeffery found to benefit
were Aponeurostera fenestrata, A. umbulata and A. ulvacea,
all of which flowered profusely. (My own findings agree
with those of Mr. Jeffery, in the case of *Aponeurostera*
species.)

He noticed little or no improvement in *Vallisneria* or
*Sagittaria* growth, or that of the smaller Cryptocorynes but
found *C. haemastoma* (i.e. *C. affinis*) to benefit somewhat.
(I again except in the case of *Sagittaria*; for which I found
improvement quite a bit.) Mr. Jeffery also complained of
fragments of peat getting released onto the surface of the
ground in which was never really clear. As
he said, use of a filter would clear this although the filter
would need frequent cleaning. The writer also used
terminated, fine loam but he found this to become foul quite
quickly and has never used it since. He has not used clay
either as he thinks it packs down too tightly. Mr. Jeffery
has not used under gravel filters but considers outside
filters excellent for water clarity, although he states that they
only remove sediment which is already held in suspension.

From Alton, Hants., Mr. W. Savage sent me a long and
interesting letter, and I hope that he will not mind my
saying that he is 76 years old. Although Mr. Savage has not
kept fish for many years (not since his home, tanks and
pond were destroyed by a flying bomb, and Nenec cost
25s. each), he still, with a remarkable memory, recalls that
he got his best growing plants by using a 2 in. layer of
ground soil, covered with 1 in. of gravel. The water was
continuously filtered with an air-lift outside filter made from a
flat glass tank about 10 in. square and 2 in. thick, using glass
wool and activated charcoal. For fertilising the soil
medium, pellets of rabbit droppings were pushed into the
compost. Strip lighting was used and the tank was a
"perfect picture".

These are the views of those who were good enough to
reply to the first questions of the new feature. To try to
draw any fixed conclusions would, I think, be a mistake
which many authors are inclined to make, especially in
books. Rather than draw one conclusion from each of the
two questions which I posed, I would rather express my
own views and findings, for what they are worth.

I have used under gravel filters in all my tanks for about
five years, both with, and without carbon dioxide free
gravel, and found that they kept the water in both large and
small tanks very clear if lighting conditions were not so
excessive that they produced green water due to free
swimming algae forms. Having all my tanks filtered with
under gravel filters, I recently decided to remove them and
to experiment with under gravel peat in some tanks, and
loam etc. in others, together with external filters. In the
re-established tanks I found the Sago, which I had used,
produced hard and alkaline water which encouraged an
excessive growth of algae. Plants grew fairly well but
came rather choked with algae, despite cutting down on
light.

Under gravel peat, producing acid water conditions,
discouraged the growth of algae to such an extent that in
one of my smaller tanks, the algae-eating *Gyrinocladae*
*aymenioides* (one pair) died from lack of food, although other
fish of the same species are often seen to eat normal dried
foods. I would say that the plants in the peat based tanks
were the most satisfactory. Plants growing well include
dwarf lily, *Baccopa*, *Ludisia*, *Malayan Swords*, *Aponeurostera*
species and some species of Cryptocoryne, especially
*C. affinis*. Other Cryptocorynes are growing rather
slowly and they often have a period in which many lose
most of their leaves for no apparent reason. I have been
trying *Cabomba* again and it appears to be growing quite
well at present, but I do not want to make any premature
assumptions before a much longer trial period.

With a loam base, plants which appreciate fairly hard,
alkaline water have been growing quite well, despite
excessive algae. The two plants which are growing best
are *Eloise* and *Geraniophyllum* (Hornwort). The latter is
doing especially well although it does not form any roots.
Obviously the effect of the loam on the mineral salts content
of the water is the reason for the plant's success as it cannot
be obtaining any food directly from the loam, being rootless.

In a tank with a peat base and Gro Lux lighting, most
plants present have been growing quite well, especially
*Cryptocoryne* species and *Ludisia* and (dare I say it,
*Cabomba*). Some exceptions are an Amazon Sword which
is very slow indeed, and *Vallis.* spiralis and V. torta, both of
which I just cannot grow under any conditions in any
tropical aquarium. Some plants are developing malformed
leaves under Gro Lux but I will leave this subject for the
next article in this series. I was a keen hand of sand
burrowing snails but discarded them with my under gravel
filters (by boiling the gravel to kill off the snail population).
Their effect would have been a nuisance with under gravel
peat or loam. I never had any bother with under gravel
filters causing gravel to solidify except when I tried to
weten and acidify hard, alkaline water by using dilute
phosphoric acid, when the tanks contained gravel with a
proportion of solid calcium carbonate in the form of small
pieces of limestone and shell fragments. This was due to
a reaction between the acid and the CaCO3, forming
deposits of calcium phosphate. This would naturally have
happened despite the use of under gravel filters but their
use speeded up the effect.

Two more questions for discussion

My two questions for the next article are: (1) What is your
favourite method of raising brine shrimp as
one of the first foods for baby fishes? (2) What are
the conditions under which you successfully grow
species of Cryptocoryne plants? (Details of species,
lighting, water hardness and pH, type of gravel, feeding,
filtration etc. and other types of plants which are grown
with the Cryptocorynes would all be useful; however any
facts at all will be appreciated, no matter how few or simple
they are.

Just two requests. Please write your name and home
town or city clearly. A few of the letters were a little
difficult to decipher.

August, 1967

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B. Fry v. Small Fry

I HAVE a complaint to make about Mr. B. Fry's article on the Minnow (May), which runs as follows: Mr. Fry says that the minnow is a sociable little fish and likes the company of its own kind. I have a rather strong feeling that this statement (if he is talking on the subject of keeping minnows in an aquarium) is untrue. I have, at various times in the years gone by (and I am not getting confused with the stickback male) kept 4 or 5 minnows together in a small tank of dimensions 1 ft. x 10 ins. x 9 ins., and although the reason may be lack of open water space, the fish have attacked each other viciously and have bitten each other's tails; some went into convulsive leaps out of the water.

Conditions were as follows: the tank had galvanised zinc panes as corner supports and was, of course, not heated; river plants from a river, which (this may be of interest) runs through the grounds of a mill, and whose surface is foam-covered.

I leave this with you and my last statement is that perhaps Hertfordshire minnows are extraordinary.

Yours faithfully,

G. W. Berley

A newcomer to this magazine.

(age 12 yrs.)

"Torrey Canyon" Disaster

DOUBTFULS by now, every aquarist has heard of, and many have read reports on, the "Torrey Canyon" oil tanker disaster.

Every effort was and is being made to lessen the effect of both this and future disasters of this kind but, unfortunately, apart from a few organisations, the majority of this effort has been directed towards the affected bird and animal life and little towards the fish and other liminal zone fauna.

Since this disaster seemed likely to affect the coastal life, we in 1. Marine Study were one of the organisations on the scene to determine the best possible course of action that we could take in the alleviation or further prevention of this and other related disasters.

We established a nationwide Relief Fund for the furtherance of investigations into the effects of contaminants on the marine fauna; this was kindly given notice in both the Evening News and Manchester Evening News.

We have now produced a special report on the "Torrey Canyon" disaster and the role played by the I.M.S.S., in co-operation with other organisations working on the problem. This report we are making available to anyone wishing to obtain a copy as all proceeds from its sale go towards the Relief Fund.

This report, price 2s. 6d., plus 5s. postage, is available from: International Marine Study Society, T.C., 2 Gaccombe Road, London, N.19, England.

Any person interested in becoming a member of the I.M.S.S. should write to the Membership Secretary, Mr. K. Martin, 158, Oxford Road, Swindon, Wilts., who will be only too pleased to forward details on all of our many activities.

International Marine Study Society

Aphyesomum eggs required

CAN you please put me in touch with any dealer or organisation who could tell me eggs of the following: A. australis—A. brevitalatum—A. salare cuarunum.

I am unable to obtain either eggs or fish here.

Yours in anticipation,

James McCoy

Arndcliffe, Sydney, Australia.

Penfriends Required

HELLO everybody, friends of tropical fishes. My name is Stig Pettersson and I am 22 years old. The reason why I write to you is that I am seeking penfriends all over the world and I am hoping that you can help me a little like all sorts of tropical fishes and most Gouramis and Cichlids. If you can't fix penfriends direct for me I hope you can give me some addresses where I can find penfriends who are interested in fishes.

I am one of the two masters we have here in Uppsala for the young boys and girls who have fishes. It will be a short letter because I think you are in hurry and my English is not so very good.

Yours faithfully,

Stig Pettersson,
Wallington 28A,
Uppsala, Sweden.

The Aquarist
Aquarium Heater

AFTER reading and hearing of many aquarists losing fish due to chills caused by heaters going open circuit I am submitting a design which I have used on my tank and found to be successful. The resistors in the diagram are in series with their corresponding heaters. When the thermostat is closed a current flows through the resistors and heaters 1: R = V therefore a voltage is developed across each resistor which in turn lights a bulb. If one heater goes open circuit the correct shunt light goes out, but the others stay on so long as the heaters are in circuit. Calculations for bulb value and resistance: 100 watt heater: 250 volts mains supply. Current (I) = 100 watt / 250 volts = 0.4 Amp

If a 2.5v bulb is chosen as, in my case, then the value of each resistor is: 2.5 volts / 5 ohms (5 ohms preferred value) = 0.5 watt. 0.4 Amps = 2.5 volts = 1 watt. 2 watts for safety.

If a different heater value is used, just supplement figures where necessary.

In the July issue of Aquarium a safety circuit by Mr. Hugh Spencer was shown using neon. I would like to point out that all the three neon only indicate whether or not the thermostat is open or closed and not whether a heater is open circuit. This is because the two neon are across the mains supply whether the heater is open circuit or not when thermostat is closed.

Yours sincerely,
E. WELCH,
Banstead, Surrey.

A Slight Clarification?

WITH reference to Mr. Wood's comments (Letters, July issue), I feel that perhaps I did not express myself too well, so I will clarify the points raised:

Finely I did not mean "use twelve eggs" but twelve hatched shrimps. As for the digestive system of the brine shrimp I did not suggest that the adult shrimps swallowed the newly hatched ones whole at all but that they ate them. I have seen large shrimps devouring smaller ones many times and stick to my guns. Liquidity is perfectly alright provided it is not used too abundantly, for most people seem to kill off the shrimp by feeding too much Liquidity. Lastly, I prefer to use natural sea water every time in preference to artificial for the former is much richer in the brine shrimps' more natural foods.

Incidentally, I personally believe that brine shrimp purchased now (while the marine boom is on) is much more likely to be fresh and not old stocks, for the marine fanciers are using up great quantities at present and stocks are not allowed to age. I know the eggs last for some time but fresh eggs are undoubtedly better. A last point, when I set up twelve eggs to hatch they do just that—hatch!

T. Ravensdale.

August, 1967

Are Fish Conscious?

DURING my recent holiday abroad I had the opportunity of discussing the question of whether fish have consciousness. The point of view expressed by my friend was that fish have no consciousness, that their lives were governed by instinct, purely and simply. A further point arose regarding the state of fish when caught at sea, my friend maintained that when transported by boat to port that they were sleeping, as distinct from being alive or dead. To me this appears inconsistent, as the fish can only survive for a short time out of their natural environment.

I gave an example of feeding chub at the London Zoo, the fish were in a huge tank in the Aquarium and being a Fellow of the Zoological Society, I had the opportunity of visiting the back of the tanks for inspection and in fact to actually finger feed the fish, which rose to the surface and took the food from between my fingers. This surely indicates training but also proves consciousness. Perhaps, Mr. Ed, we could have the opinions and views of other readers.

Yours faithfully,
M. MICHAELIS.

Change of address

Keith Barracough has now moved to new premises at 566 Great Horton Road, Bradford 7.

Book review

The Vivarium by George F. Hervey and Jack Hems published by Faber & Faber at 16/-

Whenever I am requested to read, prior to publication (and with the submission of a review in mind), a popular or lightly technical survey of the herpetological possibilities of some of the more readily available creatures within this field, I find myself unconsciously adopting the attitude characteristic of a predatory mongoose rather than that of a consciously sympathetic squamophile! How readily do the hickies rise at the merest suggestion of a differing viewpoint and how often does the unwary critic emulate Kili-Tiki-Tavi when confronted by a cobra? It is on this account that I am aware of a blissful, almost dreamlike sense of satisfaction after having read this essentially successful collaboration of George Hervey and Jack Hems who have been able to create, within the relatively restricted ambit of 88 pages, an accurate, but not pedantic, examination of those batsuchians and reptiles which are of most interest to would-be vivarium-keepers—and, indeed, to many mature enthusiasts of vintage value for that matter.

I must on no account fail to accord due appreciation to Eileen Hill, the very able and observant artist whose delightful knack of selecting specific attitudes characteristic of individual species coupled with such accuracy of depiction makes it not only possible for the experienced eye to be independent of the captions but, in most cases, to relate the drawings to the sex of the subject! This is indeed a distinction of quality.

Masters Hervey and Hems are to be congratulated upon a timely and tasteful production.

E.G.
Coldwater fish-keeping queries answered by A. Boarder

Many queries from readers of "The Aquarist" are answered by each month, all aspects of the fancy being covered. Not all queries and answers can be published, and a stamped self-addressed envelope should be sent so that a direct reply can be given.

I would like to breed some goldfish with a deeper body than the ordinary goldfish. Could I obtain some by crossing a Crucian carp with my goldfish? It would be a very retrograde step to cross a Crucian carp with goldfish. The result would be a very mixed lot, and very few, if any, would change from the original bronze to the desired red. It would be much better to get some hybrids. These varieties of goldfish have deep bodies and large tails. They are often obtained in spawnings from veiltails and fantails as throw-outs.

In our pond we have a lot of recently born goldfish fry, and there is still some spawn on the bottom of the water lily leaves. These fry are rapidly being eaten by the older fish. Can you tell me how to stop them? You cannot stop the larger fish from eating the fry unless you can make a division in the pond and transfer all the fry into one section. Alternatively you could catch as many as possible of the fry and put them in another pond or container to rear in safety. The "spawn" on the bottom of the leaves is probably that of snails. Goldfish eggs are like tiny beads of jelly about the size of pips' heads.

We have a six foot path in the ground to make a small fish pond. There are a few water plants and goldfish in it, but the goldfish seem very afraid of us when anyone approaches them. Do you think it is because the bottom is white and would I be able to paint it to make them come back? It is quite possible that the fishes do not like the white base of the path. You can paint it with a very strong solution of permanganate of potash. This should darken it and it will be quite safe after a light washing out. In time the sides and base would become greenish-brown and so look more natural.

Having stocked my new pond with young goldfish, I have noted that they immediatly go on being taken out of the pond I find that pieces of bread and bacon have been eaten by some children in the pond. Do you think these minnows have killed the fish? I think it is highly improbable that the minnows have killed your orfe. These fishes do not usually attack any others. It is more likely that they have been killed by the larvae of either dragon flies or water beetles. These creatures will eat from the body of a young fish. It is possible that the fishes died because either they were unhealthy when procured or that the water was not in good heart. Orfe must have well oxygenated water in which to thrive. Search with a strong torch at nights and you may see the larvae which may be the culprits.

I would like some information on the Moor. I live in Fiji and would like to own some Moor carps. I have seen some here I have sent to Australia for a breeding pair. I have a large tank with water plants and a few snails. What are the breeding requirements for Moors. It may interest you to know that "The Aquarist" magazine is read here in Fiji by several of my friends. The Moor is a variety of the goldfish and as such requires the same breeding conditions if success is to be obtained. Your warm climate should be good for spawning and holding but I have an idea that if you keep moors in too warm conditions they may lose some of their sooty black and become bronze. I may be mistaken in this but I had this same thing happen to a moor of mine once lent for exhibition purposes and it was kept for some weeks in tropical conditions. When it was returned it was bronze instead of black. Have no snails in breeding tanks.

Would aerating clear my pond of blanket weed? It was cleaned out after the winter freeze-up and has become badly infested with the weed since. You would need a lot of aerating to have any effect in a pond, and then I do not think that it would stop the growth of the blanket weed. This weed has grown because the other water plants have not yet become re-established. Once they grow up they will help to choke out the harmful weed. Meanwhile thrust a broken stick into the weed and twist it. You will be surprised how easily the weed can be removed by this means.

I am recently moving and in transferring my water plants I wonder if it is possible to destroy the blanket weed on them by immersing them in any solution? Any solution strong enough to kill the blanket weed would also kill the water plants you wish to save. You must pull all the blanket weed you can see before replanting the needed ones. If the water plants are immersed in a pool of water the blanket weed will be more easily seen and can be removed.

Our concrete pond was grows and so we painted it with two coats of "Aquagard." We have filled the pond with rain water and returned the plants. Will it now be safe to return the fish? It would have been better to have washed the pond out before returning the plants, etc., and to have scrubbed it round but just a time. You could try out one fish to see if it lives for a day or so and then the others could be added if all goes well.

I have read Mr. Boarder’s articles about having a tank set-up for 17 years and Iam unaware how he does it. His fishes pull the plants up and the water becomes foul after a few days of feeding the fishes with various foods. What is the secret, please? There is no secret. My tanks in the living room keep perfectly clear and in good condition always in tip-top condition, too. One or two points may be of help. I do not use large fishes, not more than two-year-old fantails. My fishes never pull up a plant, perhaps because they are so well rooted and established. I think large fish in any tank no larger than 24 x 12 x 10 is out of place and certainly it is far more difficult to keep the tank in good order than if three or four fishes not more than two years old were used.

I have six Golden Orfe, 8-10 inches long, and six goldfish 6-8 inches long, which I wish to take to Cornwall in late autumn. Can these be safely transported and by what means? If you move the fishes in as cold weather as possible it will help a lot, as the colder the water the longer can the fishes survive. If you get in touch with one of the dealers who advertise in "The Aquarist" it is probable that you may be able to obtain one of the containers as used to import fishes in. These are sometimes strong plastic bags inside strong cardboard containers. Oxygen is often introduced into the bags before they are sent up.

I have read that when a fish has its dorsal fin down it is unwell. My fishes often have theirs down, is this a sign of ill health? Most healthy goldfish keep their dorsal fin nicely erect nearly all the time, unless they are swimming about in rather dense plants. The water may be rather sour or the fishes may have been over-fed. Cease all feeding for a week and see if the condition of the fishes improves. Then go carefully with the dried food, and make a change to see if you have been feeding with something which either upsets the fish or the water.

THE AQUARIST
Our experts' answers to tropical fish-keeping queries

What sort of conditions and food do you recommend for a fish known as *Echinorhincus labeolus*? Also, will this fish settle down satisfactorily in a community aquarium?

Nothing special in the way of water or temperature is needed for *E. labeolus*. But only small specimens are docile enough for a community tank. A generous diet of meat and worms is called for.

While some authorities give 6 in. as the maximum size for *Cichlasoma spadiceum*, others state that this species does not exceed 4 in. Can you say with any certainty how large the seedling will grow? Scraps of the start and later are kept in tanks which do not permit much swimming space, then 4 in. is about the limit of their growth.

I have prised away some dead ivy stems from an old wall. Would these aged and weather-worn stems be suitable for aquarium decoration?

Provided the dead stems are given a good soaking in several changes of water, a few of them introduced into an aquarium should not prove harmful to the fishes. You would be well advised, however, to try out the dead ivy stems on easily procured and/or inexpensive fishes. It is always best to play for safety.

I have acquired a couple of *Gymnogeophagus*. To which family of fishes does this species belong and what are its requirements in the tropical aquarium?

Ichthyologists include the genus *Gymnogeophagus* in the family Cypselodontidae. Until quite recently (as a matter of interest) *Gymnogeophagus* spp. were referred to under the generic name *Dionogrymus*. They require water in well-aerated water maintained at from about 77°F (25°C) to 78°F (26°C). They are great greenstuff eaters and like to browse on soft algae. To prevent this, they will take the usual live and dried foods.

Do freshwater shrimps make a suitable food for tropica? What is the best way to keep these crustaceans alive and available?

Freshwater shrimps make a valuable livefood for all fishes large enough to swallow them. The surest way to keep the shrimps alive and in good condition is to place them in an old bath or sink stored outdoors, but screened from too much sunlight. The bottom of the container should be furnished with washed fine grit or sand and some flat stones for shelter. Freshwater shrimps live on decaying animal and vegetable matter, but only small quantities of either should be permitted to remain on the bottom or else the water will become too polluted for the shrimps' well-being.

I have acquired a strongly made angle-iron aquarium frame measuring 6 ft. by 2 ft. by 1 ft. What thickness of glass should I buy to glass it?

You will need polished plate glass three-eighths of an inch thick.

I saw some aphyosomae for the first time at a local fish shop. I would like to set up my first aquarium as a community tank of these colourful species. Please supply me with the names of the most easily procured and managed species.

We are sorry to have to tell you that aphyosomae are not suited to a community tank. A number of them are antagonistic towards other fishes and the males of most species fight among themselves. The general practice is to keep a male and two or three females of a given species in a tank filled with soft and acid water and shaded from very bright light.

The other day I inadvertently knocked some flakes of rusty iron from the top of my aquarium into the water. I have been unable to remove the flakes from the camouflage compost. Will this accident result in any deterioration in the health of my plants or fish?

A small quantity of rusty iron in the water will do no harm to freshwater tropicals or plants. But we do advise you to scrape the loose rusted iron away onto a sheet of cardboard, and then cover the top bars of the tank with U-shaped plastic strip.

A friend has no more use for what remains of a load of fine granite chippings. Would these chippings do to cover the bottom of a tropical tank?

Granite chippings make a good planting medium (especially when spread over a thin layer of yellow clay or granulated peat), but you must be on the look-out for any unseen food working into the interstices and turning the water sour.

What sort of food and environment is preferred by the upside-down catchfish?

We imagine you refer to *Synodontis victorianus*. If so, this species is easy to care for but should have access to algae. If it does not grow in the aquarium it should be grown on plants stood in jars outdoors. Then, an algae-covered leaf should be given to the catfish to browse on every so often. A well planted aquarium maintained in the middle seventies (°F) is what the fish likes.

I have just purchased two *Brycon fasciatum* of a length of about 1 in. Please can you tell me how to tell the sexes apart and to what size will this species grow?

In well-grown specimens the females are paler in colour and show fuller bodies than the males. A length of about 4 in. is attained.

I have tried to keep two pairs of *Aphyesomae ramirezi* alive over the last nine months without any success. They were accommodated in a 3 ft. community aquarium stoned with various shrubs, cypselodonts and characins. The pairs were not at all eager for food and hid away in the plants. Please give me some information on the care of this fish.

*A. ramirezi* is not one of the easiest of the dwarf cichlids. A couple or more really need a tank to themselves. *A. ramirezi* is naturally shy and does need dense thickets of plants to retire into. It can be faddish about its food too. But often a lack of interest in food can be traced to unsuitable water. This cichlid is one that will only flourish in soft and neutral to acid water.

Female (left) and male *A. ramirezi* about to spawn on a rock.

August, 1967
Marine queries answered by T. Ravensdale

My query is about ozone in the marine aquarium. I have been maintaining marine fish for several months now in a 36-13 x 12 in. tank. I have an Eheim filter with a Series II UV unit that allows me to leave it on 24 hours a day. I have also been told by my dealer that ozone (with a reactor tube) should be left on day and night. I would like to know how much ozone is the variable type? So to condense my query is; how should I use my reactor 24 hours a day? Is it safe for marine fish? I have eight 1 in. fish in my tank.

You may leave your ozone on at full strength all the time provided you use a reactor tube. An average healthy aquarium, however, will only require 10 m.g. per hour and this can be left all the time. Signs of distress can be followed by an increase of 5 m.g. per hour but ozone should be dropped to 5 m.g. per hour for the first few days following a new arrival, raising it by 5 m.g. per hour per day until your usual strength is obtained.

In my 36 x 13 x 12 in. marine tank I have one pair of Apogonops peroni and I would like a few more fish. Please could you suggest a colourful community of fish? Also could you tell me what the ideal hydrometer and thermometer readings should be?

To suggest an ideal community is extremely difficult for many species of the same species have completely different temperaments. There are, however, several fishes which will mix with your A. peroni, and I would suggest one or two green chromis, a neon goby and one or two of the smaller butterflies such as Octofasciatus or the Parachromis. Your hydrometer reading should be between 1.020 and 1.027, a happy medium being 1.025. The temperature should range between 74°F and 80°F, again a medium being 76°F.

How large does the clown fish grow?

There are at least 12 different types of clown fish but I have actually seen A. peroni at a size of 8 in.!

Will the clown fish mix with damselfish?

The clown fish is a damselfish but this does not mean that it will mix readily with all damselfish. The blue fisted damselfish can be very aggressive towards the clown and the clown can be less aggressive towards other fish. Trial and error is the only answer.

Readers of Tom Ravensdale's articles on marine fish-keeping will be interested to learn that his book entitled Coral Fish will be published towards the end of this year. It will comprise 256 pages, contain 175 colour plates and deal with spawning, diseases and their diagnosis and cure, water filtration, poisoning, invertebrates, breeding, plants, etc.

The author has devoted many years of practical study to this subject both from the sea and in the laboratory and is a well known figure at many aquariums the world over.

Feeding marines

continued from page 116

They should now be collected, washed rigorously in a bucket of water, and then placed in damp newspaper until required for feeding. I need not stress here the importance of washing every worm thoroughly as soon as it is collected. The simple method I have collected as many as 54 worms per square yard within the space of 5-10 minutes when working on short-cut turf growing on chalk downland. With numbers as high as these one can ignore the worms which escape by going deeper into the adjacent untreated areas. I have been unable to detect any ill-effects on the grass within the treated area, but to be on the safe side I usually water the square yard containing the formaldehyde with the remaining fresh water. Potassium permanganate can be used instead of formaldehyde but the results do not compare with those described above.

Brine Shrimp

For those who cannot afford to use a tank for hatching brine shrimp, the following system will provide large numbers of shrimps with the minimum of debris in the tank. It requires no effort on your part except for the regular refilling of the hatching unit. (See diagram). The container is one of the small plastic marmalade pots sold to hotellers by a large jam-making concern. One small hole is burnt in the bottom of the pot with a hot needle. The pot is made to float by a circle of aerator tubing slightly longer than the circumference of the marmalade container. One end is then enlarged with a warm knitting needle and the other small end fed into it to make a "life-belt" which supports and floats the pot. Eggs are now floated inside the container. Some sink of course, but very few get through the small hole in the floor of the holder, whereas all the nauplii find their way out eventually into the aquarium to become a readily-available source of food.

Brine Shrimp hatcher

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THE AQUARIST
Award to winner at OPEN SHOWS

In recent issues of *The Aquarist*, announcements have appeared regarding an award being made to the winners of the "Best Fish in the Show" in connection with the Open Shows now being held.

The illustration shown is the gold-plated pin awarded to the winners of the "Best Fish in the Show" and up to the time of going to press the following have been presented with the award.

<table>
<thead>
<tr>
<th>Name</th>
<th>Club</th>
<th>Species of Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Aikens</td>
<td>International Marine Study Club</td>
<td><em>Sceneciphagus argus</em></td>
</tr>
<tr>
<td>P. Rickie</td>
<td>East Dunwich A.S.</td>
<td><em>Red Nile Swordtail</em></td>
</tr>
<tr>
<td>J. A. Donathan</td>
<td>Haslemere A.S.</td>
<td><em>Queen Australian Rainbow</em></td>
</tr>
<tr>
<td>K. Parker</td>
<td>Trowbridge &amp; Dist. A.S.</td>
<td><em>Turquoise Barb</em></td>
</tr>
<tr>
<td>P. Pears</td>
<td>A. &amp; R.</td>
<td><em>Monarch Gobies</em></td>
</tr>
<tr>
<td>A. Sallie</td>
<td>Reading &amp; Dist. A.S.</td>
<td><em>Bengal Tiger</em></td>
</tr>
<tr>
<td>C. W. Ewan</td>
<td>Woking A. &amp; Z. S.</td>
<td><em>Red Parrot</em></td>
</tr>
<tr>
<td>D. Sydney</td>
<td>Chesham A.S.</td>
<td><em>Attractive Clown</em></td>
</tr>
<tr>
<td>A. Fawcett</td>
<td>Woking A. &amp; Z. S.</td>
<td><em>Pygmy Moorish</em></td>
</tr>
<tr>
<td>A. J. Thomas</td>
<td>Haslemere &amp; Dist. A.S.</td>
<td><em>Cichlid Severum</em></td>
</tr>
<tr>
<td>A. Phillips</td>
<td>Reading A. &amp; Z. S.</td>
<td><em>Cichlid Severum</em></td>
</tr>
<tr>
<td>G. Robinson</td>
<td>East Lane A.S.</td>
<td><em>Black Parrot</em></td>
</tr>
<tr>
<td>R. J. Harvey</td>
<td>Herne Bay A.S.</td>
<td><em>Pea</em></td>
</tr>
<tr>
<td>R. J. Harvey</td>
<td>Bournemere A.C.</td>
<td><em>Rams</em></td>
</tr>
<tr>
<td>J. Andrews</td>
<td></td>
<td><em>Silver Shark</em></td>
</tr>
</tbody>
</table>

As it is possible that some winners have not received a pin, they are requested to apply to the secretary of the Open Show where they won the award, for the appropriate form. If in difficulty these forms are obtainable direct from *The Aquarist*, The Butts, Brentford, Middlesex.

Upon receipt of the completed form an award pin will be sent direct to the winner.

Book review


The beauty of the illustrations (reproductions in colour of paintings by a gifted botanical artist), the large number of plants adequately described in the well-printed text, the solid and attractive binding: these are the first things that catch the eye in this really splendid book. Both the author and the illustrator are Czechs.

It is to the great credit of Dr. Herbert Axelrod, of T.F.H. Publications Inc., that he should publish their work in such a style. Indeed, it is hard to imagine any subsequent book on aquarium plants—and this is what the book is all about—published anywhere in the world outshining it in the foreseeable future.

I believe it was William T. Innes who once said that an aquarium without plants is like a bird without feathers. But we all know, or ought to, that it is not just feathers, but fine feathers, that make fine birds. Reference to the *Encyclopedia of Water Plants* will enable any aquarist to feather his tank, or tanks, not only usefully—in regard to the cover and oxygen the right choice of plants will provide—but artistically. Furthermore, it will not take the aquarist with this book in his hands more than a few moments to look up just the plant, or plants, to fill his special needs: for the author has created (for the benefit of the non-technical reader) ten artificial groups of plants, which he refers to as Biological Types. Each group of plants has been given an identifying number. These are not dotted haphazardly about the book but rise in ascending order. After each description of a plant, or group of plants, the reader will find the appropriate illustration, or illustrations. Each plant is given its correct scientific name, with common name where known, its synonyms, and its country of origin. Its requirements in the way of lighting, planting medium and so forth are well covered. Other plants that will flourish with it in the same aquarium are listed. There is a generous glossary of botanical terms and a table showing the scientific classification of the plants written about.

I am so enthusiastic about this book that I would advise any aquarist with a deep enough pocket to buy two copies: one for ordinary use and one to preserve against the blemishes of frequent handling. Yes, the *Encyclopedia of Water Plants* is as good as that.

Jack Hems.

August, 1967
More fish on stamps

by A. G. K. Leonard

The world's postal authorities continue to make frequent contributions to stock the philatelic aquarium, steadily widening a collecting theme that is already extensive, as indicated in the writer's previous surveys of "fish on stamps" published in The Aquarist of February 1966, December 1964 and September 1962.

The latest addition comes this summer from Malawi (formerly Nyasaland) in the form of a handsome large quartet designed by R. Granger Barrett and photogravure-printed by a famous Dutch firm in full colours to display the beauties of four of the many tropical freshwater fishes to be found in Lake Malawi. The latest southerly of the Great Rift Valley lakes of Africa, it boasts some 240 species, of which three quarters are found nowhere else in the world, most of them belonging to the family Cichlidae.

The four selected for stamp designs are small enough for the domestic aquarium—although their nature unsuitable for the community tank and best kept in pairs in tanks furnished mainly with rocks because of the way they attack plants. These rock fish are known locally as Mbuma or Chindongo.

One of the most striking patterns of Lake Malawi fish is the black and gold of the female Pseudotropheus auratus, which makes an attractive stamp subject. A companion stamp depicts one of the severer colour forms of Pseudotropheus zebra; another illustrates Pseudotropheus trophone, no less variable in colour, and the set is completed with a miniature of the male Labrochromis trewavassie. The fascinating community life of the Mbuma fish of Lake Malawi and the variety of their feeding and courting habits were described by Geoffrey Fryer in a paper published in 1959 in the Proceedings of the Zoological Society of London.

Across the Indian Ocean, the Maldives Islands released in April another stamp series—designed by M. Shamsi of Tel Aviv and finely produced in four colours by the Israel Government Printer—illustrating five of the many different tropical fish that abound in the waters around the two thousand little islands making up this enchanted group.

One depicted Chaetodon ornatus, one of the most striking of butterfly fishes; with its bright yellow body marked with seven oblique stripes of dark brown and its tail rosy pink, it grows to about six inches at maturity. Longer and more variable in colour is the boxfish Ostracion longirostris, shown on another stamp, while two more are devoted to Pomacanthus semicirculatus, sometimes known as the Koran Butterfly Fish from the presumed resemblance of its tail markings to the characters of the sacred book of the Mohammedans. The other stamps depict Chaetodon auratus and Rhinecanthus aculeatus.

The latter also appeared last August on a pair of stamps—one inscribed in English, the other in French—serving the Anglo-French condominium of the New Hebrides. Another group in the Pacific, the British
Solomon Islands, signalled its adoption of decimal currency in line with Australia by re-issuing last year with surcharges in new cents values, the stamps which included a new representation of a Moorish Idol, mentioned in a previous article.

Australia's 1966 decimal stamps are a colourful pictorial series which includes three tropical fish designs. One depicts Chelmon rostratus, the beaked coral fish, striped rich orange and yellow, which frequents the coral reefs around Australian coasts and is sometimes known as the Longnose Butterfly Fish. A second stamp pictures the Crown Anemone Fish, Amphiprion percula, among the best known of marine aquarium fish but expensive because it cannot be raised to maturity under aquarium conditions and must therefore be imported. It lives among the tentacles of sea anemones, but for some reason enjoys perfect immunity from their poisonous stinging cells and is allowed to feed on scraps from the anemone's kill. Its white-banded orange body grows to about four inches in length.

The third Australian stamp is captioned Humbug Fish, this being Dasyatis aruanus, another of the Damsel Fish family. About three inches long, its body is silver with black bars, widely known from the Red Sea to the Pacific and found in large numbers among the staghorn corals of the Great Barrier Reef. When removed from its familiar coral branches, it seems quite lost and helpless.

During the past eighteen months, the Japanese Post Office has been issuing at almost monthly intervals an attractive series of artistic stamp pictures of various fish, mostly of greater interest to the fisherman than the aquarist. Now the Ryukyu Islands are following suit. Their April offering was Forcipiger limaexacta, the long-nosed butterfly fish, scientifically known as long ago as 1782; this was followed a month later by a postal miniature of Balistus nigro and in June by another stamp featuring Chlaodon ephippium, one of many attractive butterfly fish from Eastern waters.

Japan added a delicate picture of a goldfish to its regular stamp series last summer, while this year Thailand issued a quartet of multicoloured pictures of local freshwater fish. One of them was naturally the Siamese Fighting Fish, Betta splendens; the others were Pomacentrus axelrodi, Aulonocara rubrolineatus and Channa varullus, the pugnacious and voracious Snake Head or Walking Fish, which can propel itself overland and is a popular exhibit with itinerant showmen in the East.

Turning to the African continent again, the republic of Togo is generous in its issues of attractive stamps aimed at the philatelic market. A colourful set released this January was in eye-catching diamond style, having for its subjects the African Mouthbreeder, Tilapia malawiensis; the Yellow Jack, Gnathanodon speciosus; the Banded Dotichodus D. tetraactis, and the African Jewel Fish, Hemichromis bimaculatus—of which the male is literally a lady-killer, while both sexes display a wealth of colour at breeding time.

The same Red Cichlid was one of the subjects of a series of 10 stamps, each printed in six colours, which the republic of Burundi (the territory in Central East Africa formerly under Belgian administration) released in April-May this year. Other freshwater fish depicted on these stamps continued on page 135.
3rd British Coarse Fish Conference
by Eric Hardy

The third British coarse fish conference, held in Liverpool University for three days in March, saw biologists from several European countries in discussion with anglers and river authorities. They decided to form a new British Fisheries Society to link rod-and-line anglers with biologists who will investigate their problems and in turn receive more co-operation for their research.

The Penfold Lecture, which is to be a regular memorial to the late F. T. K. Penfold, was given by his successor, the Ministry's Chief Officer for Salmon and Freshwater Fisheries, I. R. H. Allen. Reviewing the mortality of fishes sent to the Ministry between 1948 and 1966, he said that of 26 species received, most were roach of which 30 had died from diseases with lesions; but there were also a few deaths from parasites, gall-bladder trouble showing necrosis at the base of the pectoral fins, pollution and even starvation. Carp, goldfish and bream were the next most frequently received. The peak of mortality was in July, and lowest in December, perhaps because parasites flourished in the fishes' main feeding season. Chondracus columnaris had been reported in roach by public health authorities, and epizootic outbreaks were more lethal in closed waters than in rivers and in water with high organic content; but it was not always greatest where weed growth was greatest. Much of it was a natural population control and some fish might be affected while other species in the same water were not. Salmon disease was not known to be transmitted from roach and was probably a different disease. Not everyone present accepted columnaris as the identification of disease in roach, and a Liverpool biologist did not agree with calling the Irish salmon disease dermal necrosis.

The Ministry was setting up a Fish Authority to investigate fish diseases and parasites as never before and under the new law, river authorities could gain permission to poison-out diseased fish in order to begin again with healthy stock. But Dr. Wynne Owen, of Leeds University pointed out that it was impossible to exterminate all fish-parasites, many of which were harmless, and nearly 900 had been found in a single fish. The larger and older the fish the more it carried, especially Black Spot, which accumulated with age. Fish obtained from gulls-food from fish-eating gulls via freshwater snails, the larvae of which penetrate the skin or the eyes of fish while another species infected the brain. Black spot, which causes cysts in roach, bream, silver-bream, chub, dace and minnow, and which deformed young fish, was caused by fungus transmitted by herons in this country and by herring and eels abroad.

Miss A. E. Caunt, a bacteriologist at the University, described the examination of diseased roach from the outbreak at Welbeck Abbey and from whom blood she showed us under the microscope the curved, rounded-ended little rods of Vibrio bacteria, as well as the less important Aeromonas and Clostridium bacteria her team of workers found. Vibrio bacteria thrive in alkaline waters and Japanese workers have found them in trout, and others have found three strains of V. anguillarum in pike, eels, finnock and places, identifying them by oxidation tests. Maybe roach are more easily infected because they are more loosely-scaled than many fish, and easily injured?

In any case the discovery of these bacteria still didn't rule out a possible virus. Vibrio mortality increases with a rise of temperature and there was more infection where sewage was in the Wash. Yet disease wasn't always linked with organic pollution from decaying weed. The safest treatment to disinfect tackle was a strong bleach solution, like chloroform, for 24 hours, then washing it off.

In the Wye, where Miss Elizabeth Davies has been working on the comparatively harmless Myxobolus caligatus encysted in the tissues of fish in the tributary Lug, it was found in 80 per cent of the chub, 30 per cent of dace and 11 per cent of the roach. A Wye salmon had been found with its eye destroyed by this parasite which can affect the brain and its optic tract in trout and salmon. Pomphorhyncha larvae, whose sheltered larvae are eaten by freshwater shrimps, continue development when eaten by chub, trout, dace and eels, which thus become infected, but little if any harm is caused them. Mature chub seemed to be its natural host. Echinorhynchus larvae in Balan spent part of their life in Gammarus, the freshwater shrimp, and mostly infected mature eels, only a few were in graying, pike and roach.

The second day was devoted more directly to fish themselves. A Dutch lecturer entitled "Methods of age determination of coarse fish using fin-rays" didn't seem to reveal anything more than that stocking canals or rivers with roach made the main influence on catches only very shortly afterwards, the major distribution being downstream, and that clipped fins could be recognised after a year. Dr. J. Williams of the Netherlands Institute for Fishery Investigation showed that only 1 or 2 per cent of pike were cannibalistic. Depending much upon what was most available, their food consisted mostly of cyprinodonts like roach and rudd, with frogs chiefly in winter. Less food was taken in November when digestion was slow and growth at a standstill. Maximum feeding was in February and March. There was no mention of birds in his list of stomach-contents, though in Britain I've known pike to take ducklings and other young waterfowl. It took 3 grams of fish food to produce a gram of pike growth, but its food conversion index varied a little from this 3 or 4. It could be 4 or 5 for a 28 inch fish. A catchable pike needs 4 times the amount in food compared with its weight increase and in Holland, where food is abundant, up to 6 times. Though pike below 20 inches rarely take a beam, a pike had eaten a beam over half its length. There was also talk of pike changing sex, and of Dutch... Continued opposite
Rasbora maculata

by Jack Hems

The subject of this article, popularly known as the pygmy or spotted rasbora, seldom, if ever, exceeds 1 in. in length, and is the smallest member of its widespread genus. It has the charm and attraction of many tiny living things—delicacy of colouring, merry, darting movement, and a pleasing shape.

It is found in the natural state in weedy ditches and ponds of the Malay Peninsula and Sumatra and the waters it inhabits are soft and acid. It hardly needs emphasizing, then, that similar conditions should be provided for this species in the aquarium.

It asks for nothing special in the way of food; in fact it eats anything alive or dried small enough to be swallowed, but like all very active fishes, it does keep in better health if it is fed several times every day. A temperature of from 73°F (23°C) to 78°F (26°C) is perfectly satisfactory.

The back is greenish gold to golden olive shading through pink to a greenish or yellowish white belly. The sides, which are overcast with a purplish to violet sheen, are adorned with three blue-black spots edged with red. One, the most conspicuous, behind the gill-covers, another just above the anal fin, and a third on the base of the tail. The fins are light to dark red melting into faint yellow posteriorly.

The anterior rays of the dorsal and anal fins are streaked with black. The female is rather plumper, and her colours are slightly paler, compared with the male. To see this enchanting little fish at its best it should be viewed against a dark green background lit brilliantly from above.

A community tank occupied by fishes that are rough in their manners or great in their bulk and/or curiosity is not the place for the pygmy rasbora. But in the company of neon teers, guppies, and the like, it should flourish well. Be this as it may, it does appear to be more contention and certainly lives longest—when it is given a tank to itself. A tank measuring about 18 in. by 12 in. by 12 in. makes a sufficiently roomy home for a pair or more.

R. maculata can be bred in the aquarium but demands all the skill, patience, and experience that the knowledgeable aquarist has at his command. The essential requirements (to stress what has been said above) are soft water giving a pH reaction of about 6.5 (rainwater collected in clean glass or china receptacles some short while after it has begun to fall and thus cleared the atmosphere of chemical pollution), passed through wet peat until the right degree of acidity is obtained is as good as any, a rather diffused light, and a temperature of about 80°F (26°C).

Since the eggs of this species are scattered haphazardly—or appear to be—as the energetic and, at this time, more brilliantly coloured male drives the female about the aquarium, and do not always adhere firmly to the foliage of the plants (thread-foiled plants such as nymphaea or scorpoxyllum must be provided), it is a good plan to cover the floor of the tank with a layer of well-washed shingle.

After driving is over, the fish must be removed from the tank without delay or else all, or most, of the eggs will be eaten. To return once more to the question of lighting, it is important to screen the tank from all strong light, even from above, during the period of incubation. This is usually of about twenty-four hours' duration.

The newly hatched fry need an abundant supply of freshly cultured infusoria dispensed from a clean jar (preferably by a slow-dripping siphon tube) until they are large enough to take the sort of varied diet their parents thrive on. The non-starters in the battle for life will die before the first nine days are out, but the fry left alive should make rapid headway. A partial change of water—soft and acid, of course—and heated to the same temperature as the aquarium—is beneficial after a month has passed.

The pygmy rasbora is far from a newcomer to the hobby. It was first introduced to tropical aquarium keepers in Germany in 1905 and was sometimes described in books and magazines published more than forty years ago under the erroneous name of R. halacha.
An outdoor reptile collection
by M. Peaker, B.Sc.

1. The Snake Pit

It is the ambition of most amateur keepers of reptiles and amphibians to own at least one outdoor reptiliary on the lines of those seen in zoological gardens and research establishments. The construction of outdoor enclosures and the maintenance of their inhabitants is a fairly simple matter and in a series of articles I shall attempt to describe how enclosures may be constructed and furnished to house snakes, lizards, terrapins, turtles and amphibians.

A typical design for a snake-pit type of reptiliary is shown in the diagrams. I strongly suggest buildings as large as enclosure as space and funds will allow so that the interior may be laid out to form a "natural type" of rockery facing south. Plants can be grown so that in several years the whole construction has a weathered appearance. The first reptiliary I built was three feet by four feet which was rather small. A second (seven feet by four feet) was more suitable but I would have preferred one that was even larger. A point to bear in mind when choosing the site is that a well-drained area should be chosen so that dampness can be avoided.

Construction

The most strenuous part of the job is excavating the pit to a depth of three feet or more. A further area should then be dug out and filled with rubble to make an effective soak-away for the pond. Over this a shallow concrete pool can then be constructed in the usual way. A drain from the pond into the soakaway is essential for ease of cleaning.

When the pit walls have been built of concrete, breeze blocks or bricks and mortar, the whole pit can be covered with a five inch layer of ballast for drainage. I cannot over-emphasise that the walls must be snake-proof and this means checking and doubly-checking that every crack is filled with cement.

The rockery can be built of any rock preferred. I have always used sandstone and left large soil-filled gaps in

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Plan view of the pit

Legend

- GRASS
- SAND
- WATER
- ROCKS

Cut away and elevation

THE AQUARIST
The grass snake—*Natrix natrix*

which plants can grow and thrive. Logs can be positioned and small shrubs can be planted in the centre of the pit but all plants should be kept trimmed down to prevent the inhabitants using them as a ladder to scale the wall.

I strongly suggest building the pit in late summer or autumn, allowing the concrete of the pond to mature and the plants to settle. In the following spring the first inhabitants can be introduced after the upper walls have been built. For the walls I have always used hardboard securely fastened to wooden frames. With sufficient paint I have had walls still in use after seven years. The shiny surface of the hardboard should face towards and an effective seal should be made between the bottom of the frame and the pit walls. I suggest that the height of the walls should not be less than three feet six inches. An overhang is useful not only to keep the inhabitants in but as a lodge to support a wire netting-covered frame to keep the neighbourhood cats out.

**Other Features**

Depending on circumstance it may be desirable to build hibernation chambers into the rockyery. They should be frostproof and therefore at least a foot below the surface and must also be in a very well-drained position. The entrance via a drain-pipe should be protected so that rain cannot run in. I prefer the chamber to be made of thick concrete with a heavy close-fitting lid which will very rarely need to be removed. Thick layers of moss can be left over the entrance in winter to reduce but not prevent the turn-over of air inside.

Another useful feature to observe specimens which are active at dusk or by night is a blue light over the structure which can be switched on at will. The lamp and the fittings should, of course, be suitable for outdoor use.

In the second article I shall describe and discuss some of the species available which are suitable for this type of structure.

August, 1967

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**More fish on stamps**

continued from page 129

included the small Egyptian Mouth-breeder *Haplochromis multicolor*, *Cichlasoma aculeatum*, the African Climbing Perch, which in the wild often leaves the water (although not to the extent of climbing trees as is sometimes related); *Channa obscura*, another walking fish; the six-banded *Panchax*; *Gnathanodon speciosus*; and *Namachoepeus unisieratus*, the African Tetra, an excellent aquarium fish of small size and handy disposition, attractive and friendly, which breeds easily and eats almost anything.

On the Arabian Gulf, the little shoal of fish of *Umm Al-Qiwain* has this year also catered for collectors with an even longer series of 27 multicoloured labels illustrating a variety of tropical fish of the local waters—too many to consider here. More modest in their output were the authorities of the French Somali Coast among whose stamps subjects last year were the graceful and brilliant *Regal Angelfish* (*Pomacanthus asfur*); the dashing or clown fish *Amphiprion ocellaris*; the squirel fish *Holocentrus spinifer*; a Surgeon Fish and the colourfully fearless lion fish, *Pterois volitans*, whose sharp dorsal spines contain poison.

Across in South America, Colombia's contribution to our theme last year included miniatures of an angel fish, *Holocentrus isabelita*, while Venezuela issued a set of six stamps, colourfully printed in Berlin, showing freshwater fishes of the region. Those depicted were the Chocolate Cichlid *Astronotus ocellatus*, known also as Peacock-Blue, an attractive fish but one whose size (12 in.) is unfortunately too large for the domestic aquarium; *Cichla ocellaris*; *Serrasalmus nattereri*, native to the Orinoco, another fish only for the specialist, being the most blood-thirsty of all freshwater specimens; *Cichlaeodes punctatus*, by contrast small and peaceful, which spends most of its time in a vertical position, head downwards and is popularly called the *Head-standing Fish*. The set was completed with the interesting little swordtail characin, *Corydoras normani*, and the dwarf butterfly cichlid *Apistogramma ramirezi*.

On the European stamp front, Albania, Roumania and San Marino are among those recently presenting through the post many diverse forms of marine life. The countries of Eastern Europe are prolific in their stamp issues as much for philanthetic as for propaganda purposes. East Germany's multicoloured half dozen devoted to aquarium fish last November included *Cichlasoma cyanoguttatum*; the Blue Gobies *Aphyosemion conculeus* and *Colisa chuna*, one of the gobies.

The latest offering from Poland is a set of nine artistic and colourful miniatures of exotic fish from the South Seas. This beautiful philatelic aquarium contains several members of the family *Chaetodontidae*, the butterfly fishes *C. ephippium*, *C. fasciatus*, *G. malacanthus* and *C. meleagris*; the showy yellow and purple *Pomacanthus imperator* and the spotted *P. semicirculatus*; the orange striped trigger fish *Balistapus undulatus*; another trigger fish, *Rhinecanthus aculeatus*, a fish of pride of place for *Balistodes conspicillatus*, perhaps the world's most beautiful fish.
Keeping the golden orfe
by A. Boarder

The golden variety of the Orfe (Leuciscus idus) is one of the finest fish for the garden pond as long as it is fairly well oxygenated. Small specimens can be kept in tanks as long as the tanks are not small and that care is taken to ensure that the fish can be removed to an outside pond when they grow too large. The golden variety appears to have developed from the silver orfe and in certain parts of Germany many of the young silver orfe turn to the golden colour. Orfe appear to adapt themselves to varied conditions and also to differing temperatures. They can stand any cold which goldfish are capable of putting up with but the larger specimens are soon in trouble if the water in the pond becomes unhealthy through too much foul gas and lack of oxygen.

In a medium to large garden pond a small shoal of golden orfe are always attractive and during the warmer months of the year will be seen near the surface cruising around after flies or other insects which have fallen on the water. They will eat most foods taken by goldfish but they have a preference for live food. Very little in the form of live food will be rejected by these fish and I have seen them take live wasps with gusto.

In general shape the orfe may be likened to the Herring as it is rather stream-lined and has no barbels. The lack of barbels indicates that this fish is not a bottom feeder, which is a good recommendation for the fish as an inhabitant of the garden pond. By being mostly a surface feeder this fish is not likely to stir up the mud from the bottom as would bottom feeders such as the carp and tench. The colour of the golden orfe is paler than that of the goldfish, being a soft orange-yellow. The under parts are paler being almost white. Many large orfe develop a number of black spots on the sides and on the back. There does not seem to be any logical reason for this appearance of the black spots, but many otherwise show-specimens lose points for the amount of black they show.

Orfe generally is a rather fast swimmer it requires plenty of swimming space and will not thrive without it. In a fairly large pond, providing the fish gets plenty of live food in the form of morays, rolled oats, bucket foods and normal dried food as used for goldfish, the orfe will appreciate practically all kinds of live foods and will ignore dried ones as long as the others are available. The garden worm is the usual standby for most pondkeepers as this food is a favourite one for the orfe. In addition they will take white worms (Chironomus), Water fleas (Daphnia), Mosquito larvae, Tubifex worms, Freshwater shrimps (Gammarus), Water louse (Asellus),

muggers, various crustaceans, such as water snails, and fresh water mussels (if small), most types of insects, including blue-bottles, house flies and wasps.

Orfe will also eat strips of meat and chopped horse heart or liver. I have even seen large orfe tearing at and eating the entrails of a chicken. From it will be seen that the orfe are not all fussy feeders and providing they get plenty during the warmer months of the year they will grow at a fast rate. This rapid growth must not be lost sight of if anyone stocked a garden pond which was rather small it is quite possible that the orfe would grow too large for the pond within two or three years. One very important point to watch for is the condition of the water during hot, close or thundery weather. Large orfe can soon be in trouble as soon as the oxygen content of the water drops. This condition can easily occur during one night if the water is a little foul through unseasoned dried food having polluted the water.

Goldfish can be bred in the garden pond but it seems that they have to be well grown before they will do so. I have had no reports of them having been bred either when small or when they are in a small pond. I have known them to breed in a fairly large pond which is kept in a good state by the presence of plenty of growing water plants and the occasional use of a small waterfall.

Breeding follows the usual pattern of the breeding habits of goldfish. The males show the white, raised tubercles on the gill plates and front of the pectoral fins. The females show an extended belly when in egg-laying condition. The chasing is very vigorous and the eggs are adhesive, being laid singly in large numbers. The under-water roots of such trees as Willows are a favourite site for the reception of the eggs. As with most fresh water fishes the orfe prefer to lay their eggs in shallow water where other fishes may not care to swim in search of them. It is also true that the water is warmer as a rule so that the eggs will hatch in a minimum of time. If the breeding orfe are kept with other fishes it is essential that watch should be kept when they are spawning so that the eggs can be gathered on their weed for hatching in a safe place. Most of the orfe eggs are kept with other fishes they will try and eat as many of the eggs as they can find, and this includes the orfe once the excitement of the chase has ended.

Continued on page 136.

THE AQUARIST
Champion of Champions contest

In the May issue of The Aquarist appeared details of a contest which would be held to find the Best Fish of the Open Shows. All entries would come from the winners of the “Best Fish in the Show” awards and the contest would be staged in conjunction with the British Aquarist Festival to be held at Belle Vue, Manchester on the 28-29th October.

The interest created by the various announcements which have appeared has already highlighted this contest as the outstanding event in the aquarist world this year, and a list of those so far eligible for entry at the time of this issue going to press appears on page 127. The awards which will be presented to the winners are shown below.

Award to winner of
THE CHAMPION OF CHAMPIONS CONTEST

The winner of the ‘Champion of Champions’ contest will be awarded a Hall-marked 9ct gold lapel pin in the shape of The Aquarist badge inscribed—‘Champion of Champions’. Laurels support this badge to differentiate between the ‘Champion of Champions’ and the ‘Best Fish in the Show’ awards. A cash prize of twenty guineas together with an inscribed plaque will also be awarded.

An oxidised silver-plated plaque, mounted on a hand-made Indian Rosewood back, will be awarded to the winner of the ‘Champion of Champions’ contest, together with a solid gold pin as described above. A similar plaque will also be awarded to the second and third successful contestants together with a cash prize of thirteen guineas and seven guineas respectively. The plaques are inscribed with the names of the recipients and the position gained in the contest.
Trout in the home aquarium

by T. Hinitz

Both our native Brown trout (Salmo trutta) and the imported Rainbow trout (Salmo irideus) make excellent inmates for the cold water aquarium. They are very attractive in all respects, being of pleasant coloration and interesting in behaviour. After only a short period they will take earthworms from their owners’ fingers and will display a very high degree of intelligence in their general behaviour. Belonging to the order Salmonidae, they inhabit fast flowing, clear streams, both in this country and many others, ranging from torrents in Africa to mountain streams in the Pyrenees. The coloration of both species is extremely attractive. Most Brown trout are liberally sprinkled with black and red spots whilst the Rainbow trout is similar but with the addition of a pink stripe along the flanks. The colour will vary depending on what type of water they inhabit. Those from weed-filled chalk streams will usually be a fairly light hue but with a greenish tint whilst fish from highland streams are much darker with a profusion of spots on the flanks and back.

To keep these delightful fish in good health is not the easiest task but as long as a few conditions are observed they will flourish for a considerable length of time. The fish are best obtained when they measure about three inches in length. At this size they are one year old and can be obtained from any trout hatchery for quite a moderate fee. Larger fish are considerably more expensive and are not so easy to acclimatise to aquarium conditions. The fish are usually sent by rail and have to be collected from the station on arrival. The aquarium for these fish should be at least three feet long and fifteen inches deep. A tank of this size will accommodate four three inch yearlings but any more and trouble will occur over territories. Trout are extremely territorial by nature and are quite aggressive towards intruders in their chosen area. Because of this they should not be kept with fish of other species.

The most important factor in the successful management of a tank of trout is the water temperature. Brown trout, especially, will not tolerate a sustained temperature above 55°F (13°C). If the water rises above this the fish will develop gill infections and will rapidly die. The best place to position the tank is in a cool outhouse or other situation where the water will not be liable to reach high temperatures. Rainbow trout are not quite so demanding as regards water temperature and will happily withstand anything up to about 65°F. For this reason they are possibly more suitable for the home aquarium. Both brown and rainbow trout like violent water movement. This can either be provided by a hosepipe for a period every day or by a power filter, such as the Eheim, running continuously. This is not expensive as these filters use very little electricity. When settled in the trout will hover in the current waiting for food to be given them. This forms a most attractive picture and, to my mind, rivals the beauty of a well laid out tropical aquarium.

Plants should not be put in the tank as they very rarely flourish in the current and will only rot away detracting from the appearance of the aquarium. The bottom should be lined with gravel interspersed with larger stones, which will provide shelter for the fish when they wish to rest out of the water flow.

Trout of both species are gross eaters and will consume large quantities of worms, house-flies and assorted grubs. As mentioned earlier, they will readily snatch food from the fingers once they become accustomed to their owner. (There is a wild trout in Germany that will emerge from the depths of a mill-pond to take a worm from a beer mug held just on the surface of the water by the owner of the mill). One point worth mentioning is that trout will not take dried food unless it is of a very meaty nature.

As far as I know trout have not been bred in the aquarium; possibly because they would have to be far too large before they reach maturity. However, I should imagine that it would not be impossible to obtain a spawning as small trout of 6 or 7 inches bred readily in mountain streams where the lack of space and food restricts their growth.

If possible, pay a visit to the cold-water hall of the London Zoo aquarium. Here they have a huge tank full of magnificent trout of both species. All the fish are in perfect condition and make a very fine display.

Keeping the golden orfe

continued from page 134

to grow at their maximum. Aeration would be essential in the early stages and at no time will these fish tolerate foul conditions. To stand any chance of success at breeding these handsome fishes I recommend that fishes at least a foot long should be used, that they are kept in as large a pond as possible and that either a waterfall or fountain should be available to freshen the water during warm spells.

For exhibition purposes the golden orfe should be undamaged, with as clear a colour as possible, that is few black markings along the back, and be of a fair size. As practically all orfe will be of the same shape, not having been altered from their original shape by mutations and selection as with the goldfish, it will be found that there is no difference in the general shape of the fish or its fins.

The only points the judge can assess will be for condition, colour and size. Naturally the larger the fish the more chance it will have of winning, other points being equal. When showing large fish inform the show secretary so that a large tank is provided.

THE AQUARIIST
Going marine Part 7—Diseases

by T. Ravensdale, F.B.I.S., F.M.S.S., A.M.Z.S.

Lymphocystis

This is a rather unusual disease and is usually caused by mineral masses which work up onto the fish's skin like over grown white spot. It is often thought to be iced and is usually found on newly imported specimens.

The only method of removing these infections I have found to be surgery. This often results in death, an inevitable condition in any case, so nothing is lost except perhaps a little ignorance. The incisions should be made in a wedge shape, one slicing underneath the growth and one to lift it off. The wound should often be bathed in a dilute iodine solution. The fish should then be provided with complete rest and darkness in a quarantine tank.

Sepioglossis

This state is more commonly known as fungus and can be caused in many ways, the most common being the aftermath of an injury which has not healed.

A chill can also cause fungus but, strangely enough it may also effect a cure! Although fungus on a fresh water fish is usually like a ball of fluffy cotton wool, it looks more like flat grey patches on a marine fish.

Water changes must be made when a bad attack occurs and a more drastic cure may be effected by a salinity change.

Argulus

This is a disease common to sea horses, in fact there aren't many imported which are free from this pest and all new sea horses should be inspected for it. It is a rather large parasite which can be seen with the naked eye clinging to the skin of the sea horse. Most aquarists prefer to pick them off with a pair of tweezers and I know of no better remedy.

Exophthalmus

This disease or ailment is of course the well known "popeye". Coral fish seem far more prone to catching it, probably due to a diet deficiency. So many marine arrive suffering from malnutrition and a further depletion of natural foods (inevitable) leads to weak blood and a poor circulation especially towards the smaller blood vessels such as those of the eye. Popeye due to these causes can often be cured by a new diet but look for other causes too.

Excess aeration with extra fine air bubbles can cause popeye by being taken into the blood stream and blocking a transfer capillary (where vein meets artery) in such delicate places as the eye. The blockage may cause a burst which is indicated by streaks of blood visible in the eye, or starvation of a blood supply. In either case the eye will swell to prodigious proportions. Popeye caused by over fine aeration is, however, quite rare and a more likely cause will be pollution. Dirty food or water can cause popeye and water changes must be made.

In all cases of popeye the lights must be turned off and the temperature reduced by five degrees.

Wounds

Cuts, damaged fins and wounds should be treated as highly dangerous when they first appear and, as they are usually caused by an aggressive fish, the culprit should be detected and dealt with. Severely damaged fish should be removed from the community tank and left in peace where a recovery should be made at a remarkably fast speed. No further treatment should be necessary but watch out for infections.

AQUARIISTS' SOCIETIES News

A.T the May meeting of the Yeoil and District A.S. the Society's Enrich Cup which is awarded annually for the best pair of Tropical fish on show was won by Mr. A. Nicholls, secretary of the Society, who exhibited a pair of Red Platy; the second was Mr. G. Gilliard with a pair of Pennant, and third Mr. N. Buisson who entered a pair of Schomberti Bars.

Members of the Society were entertained to dinner at the Yeovil Hotel, as part of the evening's entertainment, Mr. H. Good, Editor of Aquariums, was the principal speaker. Mr. J. Neaves, editor of the Aquarist, was also present. At the presentation of the Society's trophies, Mr. A. Nicholls, Will-Fin Molier, Mr. A. Nicholls second and fourth Red Plats; Mr. N. Wright, Rainbow (Breeder Class); third Mr. O. G. Gilliard, Red Plays, fourth Mr. G. Gilliard, Marygold, fourth Mr. W. Reeves, Goldfish, Highly commended Mr. W. Reeves.

The Honiton and District A.S. last meeting was devoted to a very interesting talk by the Club's chairman, Mr. John Thorne, on Hybridisation in Fishes. Some members have had the opportunity to experiment in this field but to the majority it was a completely new subject, and therefore doubly enjoyable.

The Yeoil Show for Livestock, held at Yeovil Show Ground, was attended by the following: Livestockers: 1. John Thorne (Rainbow Fish Breeder); 2 and 3. Colin B. A. (Platax, Guppy); 4, Miss Jacks (Chondy, Allosoma Sp.) Cats and Canaries: 1, John Thorne (Allosoma Sp.); 2 and 3, Gwilliam (Rainbow Fish). New members and visitors are always welcome to the Club's meetings which are held on alternate Wednesdays at 8 p.m. at the Community Centre, Clifton Road, Ilchester, or details can be obtained from the Secretary, Mr. Derek Woodrow, 46 Elmsdale Road, Honiton.

RECENT results held by Leamington and District A.S. were as follows: Prize (Livestockers): 1, Mrs. J. Smith, S. F. Underwood; 2, Mr. C. Clark; 3, A. P. K. Cott, A. V. Cobham; 4th, G. D. Lang; 5, Mrs. J. Smith; 6, Mrs. G. Ward; 7, Mr. M. Smith; 8, Mr. A. A. Thomas; 9, Mr. F. Underwood; 10, Miss R. D. E. Underwood; 11, Mrs. J. Smith; 12, S. F. Underwood; 13 and 4, T. Dobbs.

OZONE IN THE MARINE AQUARIUM.

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official programme of the American Fishing Association, and deals with aquaria throughout the world and is thoroughly recommended to all aquaria.

The Society meets on the first Monday of each month at the Mechanics Institute, Stratford, and special meetings and visits may be arranged on request. The Society is affiliated to B.A.A. and to the American Aquarium Society through its London Branch.

The address is 39 Wellington Road, Lee (2) Telephone...
THE Barrow and District A.S. was invited to put on an exhibition of tropical fish at the Walpole Continental Gala in June. An inland stand was erected in the pavilion containing ten tanks, and even the Club members were surprised at the display put up. The Club, visited the exhibit and dined at the Gala, with a fine view over the country. She proved to be an appeal, but not a member of the display.

NEARLY three hundred entries were made at the third annual open show of the Llanelli Major A.S. The results were as follows:

Superette: Fighters. 1, Mrs. King (Bredon); 2, Mr. W. B. Brown (Huntsbridge); 3, A. B. Brown (Llanelly). A.O.V. Laboratories. 1, Mrs. King (Bredon); 2, Mr. W. B. Brown (Huntsbridge); 3, A. B. Brown (Llanelly).

Neeser: Fighters. 1, Mr. King (Bredon); 2, Mr. W. B. Brown (Huntsbridge); 3, A. B. Brown (Llanelly). A.O.V. Laboratories. 1, Mr. King (Bredon); 2, Mr. W. B. Brown (Huntsbridge); 3, A. B. Brown (Llanelly).

Phelps: Fighters. 1, Mr. King (Bredon); 2, Mr. W. B. Brown (Huntsbridge); 3, A. B. Brown (Llanelly). A.O.V. Laboratories. 1, Mr. King (Bredon); 2, Mr. W. B. Brown (Huntsbridge); 3, A. B. Brown (Llanelly).

The Lewis A.S. held recently at the Threave A.S. headquarters, the attendance was more encouraging amounting to 50 members and their families. Mr. John Allen, the president of the Federation of British Aquariums, opened the exhibition. Two Republicans, Mr. A. L. Cooper and Mr. E. A. Bridle, presented the fish of the Lewis A.S. was held recently at the Threave A.S. headquarters, the attendance was more encouraging amounting to 50 members and their families. Mr. John Allen, the president of the Federation of British Aquariums, opened the exhibition. Two Republicans, Mr. A. L. Cooper and Mr. E. A. Bridle, presented the fish.
THE AQUARIAN'S CALENDAR

7th-12th August: Portsmouth A.S. @ The Aquarium

20th-27th August: British Aquarium Society - Second International Koi Show

22nd-26th August: Midland Aquarium and Aquatic Society Annual Open Show at Bingley Hall, Birmingham

26th-27th August: Heswall A.S. Aquarium Annual two-day Show

2nd September: High Wycombe A.S. Annual Open Show at the Rye, High Wycombe

3rd September: York and District A.S. @ The Open Air Museum, Castle Howard, nr. York

3rd September: Nottingham and District A.S. @ The Drill Hall, Triumph Road, Nottingham

10th-16th September: Bedford A.S. Open Show at Shelford, Hall, Sharnbrook, Bedford

11th-13th September: Attleborough A.S. @ The A.O.A. Class Show at the King's Lynn Aquarium

11th-13th September: Bridford and District A.S. Open Show at Shelford, Hall, Sharnbrook, Bedford

14th September: Medway A.S. Open Show @ Maidstone, School, Ordnance Stores, Chatham

14th-26th October: Hoywood and District A.S. Open Show at Labour Club, Bridge Street (opposite Swan Bar), Hoywood, Lipon

17th October: Midlands A.S. Open Show @ Birmingham, Victoria Street, St. Albans

21st-26th November: Devon and District A.S. Third Annual Open Show @ Devonport

23rd-26th November: North Yorkshire A.S. @ The Spires, Codnor Park, Codnor, nr. Matlock

23rd-26th November: North Yorkshire A.S. Open Day Show

24th-27th November: Lincolnshire and District A.S. Annual Open Show

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