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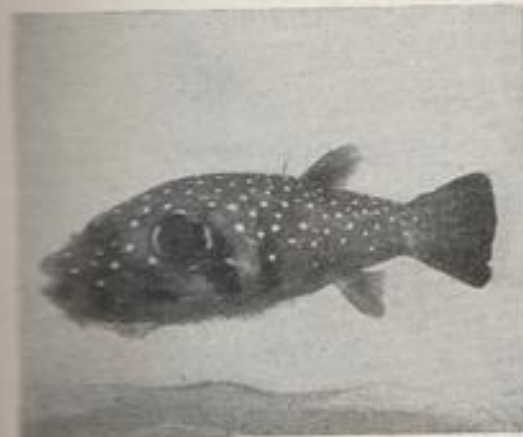
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W. S. Pitt

A "real" "stunt fish" is the puffer, one of the interesting tropical brackish and seawater fishes which have arrived here recently. How to keep them is discussed on page 56

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1952

Editorial

SOME time ago we were pleased to include in our correspondence columns a letter from two research workers of Sheffield University, who appealed for fishes showing signs of abnormal growths to be sent to them for laboratory examination.

As a result of some initial work one report has already appeared in *The British Journal of Cancer* concerning investigation of a male red platy from a private aquarist's collection. The fish showed a conspicuous irregularly-shaped lump on its belly surface, covered with thickened and fleshy scales. This was dark red in colour and proved to be a cancerous growth of the skin cells containing red pigment which gives the fish its colour—the erythrophores. The growth was first seen two months before death and the fish became extremely emaciated.

Similar tumours have been reported before, but the interesting feature of this fish was that it was believed to be from a pure strain of platys, whereas in the past these tumours have been seen only in hybrid platys produced from crosses with swordtails. Other platys in this particular strain have shown tendencies to develop similar growths and they are now being studied to determine what is involved in the transmission of the tumours.

It is not generally realised how difficult it is to obtain a strain of platys that is pure-bred. So many of the aquarium stocks have been kept with swordtails that relatively few of them can be surely stated to be free from genetical contamination by swordtail hereditary factors. This represents a serious drawback for the scientist wishing to use the fishes for genetical studies, and Dr. Myron Gordon, well-known American geneticist who has also been a contributor to our pages, found that for his research he had to collect stocks of fishes from their native pools. However, as the instance of the Sheffield University red platy shows, home fish-keepers can on occasion be of real help to the scientist, and to encourage and support such co-operation is the genuine desire of *The Aquarist*.

The Right Way to Culture Micro Worms

by D. JOEL

WHEN one considers what a boon micro worms are to the fish breeder, it is small wonder that, though unknown in this country a few years ago, they are now used extensively. These tiny worms are ideal food for all youngsters and, in my opinion, are the only convenient food available during that most important period, when the fry are looking around for something larger than Infusoria.

If you feed micro to your fry at this stage, you may see the tiny fish appear to swallow a worm, only for it to wriggle out via its gill opening. This is rather misleading, as one notices only the "worms that get away" as it were. Micro come in all sizes and you may be sure the fry will make short work of the smallest. The larger ones will live on to be eaten another day.

The "Starter Culture"

Micro worms will live (and swim) for a considerable period in water, consequently the busy aquarist can give one good feed each day secure in the knowledge that he will not be polluting the water in his fry tanks. No water-borne parasites or disease will be introduced with this food as may sometimes be the case with natural fish foods. There are many ways of managing micro cultures and I will now set out my own views on the subject, in the hope that one or two points will be new and may be helpful.

Firstly, it is of course, necessary to obtain a starter culture from your dealer. Kept under the right conditions, this will provide countless numbers of worms within a week or so. Fine oatmeal is the food I use and, judging by the numbers of worms obtained, I think it would be reasonably safe to say this is one of the best foods for the purpose. Regarding a container in which to cultivate micro, I favour articles made of glass or china and use anything which will hold oatmeal paste, such as soup plates, dishes, etc.

The fine oatmeal is placed in a basin and boiling water stirred in until a creamy paste is obtained. This paste should be just flowing—if it is too stiff, it will dry out quickly. It can now be poured into a suitable container and, when cool, the starter culture is placed in the centre, on the surface. Kept at a temperature of 70°-80° F. in a dark place (or with a cover for darkness), the surface of the feeding medium will soon be teeming with worms. It may be helpful to mention here that micro live only on the surface of the paste.

Collecting the Worms

When I require the worms in large quantities (usually in early summer), I find the greenhouse an ideal place in which to keep them. The temperature varies between 50° and 90° F. and this seems to suit them quite nicely. If they are required in large numbers during the colder months, then some additional heat will have to be provided. This can be in the form of an electric lamp or small oil stove and should not prove very expensive as the worms are required for a few weeks only, after which, your fish, having made good growth, will require something larger. Readers will observe from the foregoing, that it is necessary to provide heat only during the weeks the worms are required. At

A fish food that has come to be used everywhere by fish breeders, the micro worm is specially useful for early stage fry. Micro worms are easy to culture, but as there are wrong ways of doing most things this article sums up correct and rewarding methods.

other times they can be stored at normal temperatures and will always be on hand when needed.

One way of collecting micro to feed to the fish, is to scrape them from the sides of their container with a razor blade or something similar. This is quite a simple job, providing the worms can be induced to multiply rapidly and so cover the sides of their container. Some folk find that their cultures are quite satisfactory for a couple of weeks, after which they become sluggish and the worms will not leave the oatmeal for collecting in the above manner. This trouble can be easily avoided if the cultures are fed with fresh oatmeal paste at frequent intervals. Just one-eighth of an inch of fresh paste, poured over the culture every three or four days, will bring a great improvement.

After two or three weeks, the cultures should be started anew. Clean out the containers, provide fresh paste and restart the cultures by introducing the surface scrapings from the original cultures. The above remarks apply only when large quantities of worms are required. When they are stored away for future use, a small feed every few months will suffice. Another way of collecting micro is to place a small strip of paper on the surface of the culture. This should be removed immediately and will be covered with worms, ready to wash out in the fry tanks. With practice, this method is quick and very efficient.

Patience has its Reward

During the 1951 season, I reared over 500 fantail goldfish and had less than a dozen casualties. In my opinion micro played no small part in this most successful rearing, for once the fry were over that first all important month, it was a comparatively simple matter to raise them on other foods.

By the way, when you buy your starter culture, don't be too worried if you can find no worms in it. They are almost invisible when not moving. The following story will illustrate my meaning. Some time ago, I received a letter of complaint from a gentleman to whom I had supplied a starter culture. It appeared he had taken the somewhat unusual course of having various samples carefully examined by the zoological department of a famous university. He was informed that there were no worms in the samples and furthermore, he would be wasting his time if he used the culture.

I was rather dubious about these remarks, as it is most unusual for a good starter culture to fail. However, I sent him my apologies, together with a fresh culture. A week later I received, from the same gentleman, a note in which he stated the original culture had after all proved wholly satisfactory. I must say, I think this aquarist acted very decently in admitting his mistake.

To sum up then, keep the cultures warm but do not let them dry out. Frequently top them up with fresh paste and do not be afraid to start up fresh cultures from the old ones. With a little forethought and commonsense, readers will find micro are quite easy to manage and will surely be rewarded by the quick and healthy growth of their youngsters.

Varying Rates of Growth in Fishes

by N. E. PERKINS

WHEN drawing up the schedule for a show the question always arises—"What shall be the limit of size for fish born this year?" or "last year?" Now, there is such a diversity of opinion on this matter, even among experienced breeders, that it is evident that a fish's capacity for growth requires examination. The following opinions are based on observations made over a considerable period of time.

It is generally agreed that any success with the rearing of fish is dependent upon the amount of space that can be given them, and the ruthless culling of the poorer specimens, which is advised to allow sufficient space for the remainder, is obviously sound. When all this has been done, however, and we are left with a few choice youngsters enjoying exceptional conditions, how are we to account for disparity in growth and what, if any, are the differences between the fast and the slow grower? I have repeatedly noticed amongst my own stock that the early development of finnage, especially with twin-tails (and here I am not concerned with runts) is always accompanied by slow growth and definite limitation in adult size. On the other hand, the robust type with shorter finnage not only grows much faster but also continues to grow for a much longer period, the finnage eventually becoming the required size. This type, moreover, does not seem so prone to the early collapse of finnage, a marked fault with the others.

From this it would appear that I have two distinct types with possible intermediary stages. One of the accompanying illustrations shows four fish, all of the same age, the two smaller specimens having been reared under external conditions with no artificial heat, which probably accounts for their small size. The other two fish have had special treatment with heat, food, space, etc., yet, although both have had the same treatment, one is probably four times the weight of the other. These fish were hatched on 23rd May,



Four fish of the same age. The pair nearer the camera received special attention, the others were reared out of doors in a pond

1951; they were 8½ months old at the time of photographing. Their respective sizes can be gauged from the penny stuck upright in the sand on the right. The largest fish has a body length of 2½ ins., the smaller 1½ ins. The extra growth of finnage in comparison with its body size is very apparent in the smaller specimen.

It would appear that the characteristic for excessive finnage may be connected in some way with glandular deficiency and the very small specimens with extreme growth of finnage, which are usually found in spawnings of twin-tails, certainly supports this view. These fish are generally known as runts and never mature, usually dying within the year. I have many people ask me how it is that my young fish grow so much faster than their own so perhaps a few words on diet and treatment will not be amiss.

Goldfish Feeding

The goldfish is an omnivorous feeder and although it will exist on a fairly monotonous diet, better results will be obtained if a large variety of foods are given. To convey some idea of what I mean I append a list of the various foods consumed by the larger fish in the photograph:—

Hard-boiled egg, whale-meat, horseflesh, liver, prawns, cockles, shrimps, cod-liver oil, boiled fish, garden worms, white worms, *Daphnia*, *Cyclops*, bloodworms, mayfly larvae, mosquito larvae, *Asellus* (freshwater louse), *Gammarus* (freshwater shrimp), Bemax, porridge oats, biscuit meal, malted wheat, rice, potato, chopped spinach, duckweed.

These foods have not always been obtained specially for the fish for, as will be seen, many of them can be found in any household at various times. In addition to the foods mentioned, various mineral salts have been added to the water.

There is, of course, the question of food during the earlier stages of fish life and this is probably of the greatest importance, since a good start in growth can usually be maintained, whereas a bad start—i.e., failure to make sufficient growth during the first fortnight, is very difficult, if not impossible, to remedy later. The usual food for fry when they reach the free-swimming stage—that is two to

(Please turn to page 52)



L. E. Perkins

Young fish with finnage showing signs of late development

Theory of Genetics—for the Fish-breeder

by MARGERY G. ELWIN, B.Sc.

UP till now in this series I have dealt mainly with various specific practical problems which arise when we try to breed good "tropicals." I think it would be useful now to conclude with a brief outline of the scientific theories of inheritance which guide or should guide us in our attempts to improve our stock.

This month I shall deal with Mendelism, the orthodox theory of heredity which previous to the war was almost universally accepted. During the last few years, however, scientists from all over the world have observed facts which do not seem to "fit in" with this theory. Development of the work of the great Russian horticulturist, Michurin, has produced a host of new facts and resulted in an entirely new approach to the whole subject of heredity. The "Lysenko theory," as it is popularly called, accepts most of the results which have been observed by Mendelian geneticists but challenges some of their theoretical deductions. It is now generally accepted in Russia and is gradually winning support in other countries.

Unfortunately, owing to the international situation, many people seem to find it difficult to judge anything emanating from Russia at all objectively, but we really should not let our political opinions blind us to the fact that in 1939 Russia led the world in the study of genetics and particularly in plant breeding. I do not propose to take sides in this controversy but next month I will give as simply and objectively as I can the fundamental principles of the Lysenko theory. In some ways it will be found to support certain practices which have long been the custom among practical breeders but which are condemned as without scientific basis by the upholders of the Mendelian theory.

Mendelism—Orthodox Genetics

The scientific study of heredity, generally known as "genetics," is comparatively new, although, of course, for centuries man has found ways of improving his domesticated animals and cultivated plants. No one who looks around at our present domesticated forms and compares them with the wild types from which they were derived can be in any doubt as to the effectiveness of the methods used by the stock-breeders and agriculturists, but until the present century this work was entirely empirical and not based at all on scientific theory. In fact there was no scientific theory on which it could be based. The improvers were all practical men who knew their stock intimately and were keen observers. They experimented in various ways and found that when they did so-and-so, such-and-such a result was obtained, and in this way they built up a wealth of invaluable experience which served them as a practical guide although there was no theory behind it.

About the middle of the last century a monk named Gregor Mendel experimented with edible peas, crossing strains which differed from one another in one or two simple characters, such as flower and seed colours, smooth and wrinkled seed coat, tall and short stems. He found that, contrary to the commonly held idea that the result of such a cross would be an intermediate character, he in fact obtained plants showing the characters in unmodified form and in definite proportions. For instance, when he crossed

tall peas with short, all the plants in the first generation were tall. When plants of this generation were bred together both tall and short plants were produced, in the proportion of 3:1. He called the character which shows in the first generation "dominant" and that which apparently disappeared but turned up again later, "recessive."

When two pairs of characters were involved he found that in the first generation all the plants showed the two dominant characters. In the second generation he again obtained segregation of characters in definite proportions i.e., plants showing both dominant characters, plants showing one dominant and one recessive, and plants showing both recessive characters, in the proportions 9:3:3:1. This will perhaps be made clearer by the diagram.

Mendel's work attracted little interest at the time but it was rediscovered and its importance recognised in 1900. Since then thousands of experiments have been performed using similar simple characters in other plants and animals. As a rule the results obtained were very much the same as those observed by Mendel.

It has been postulated that the characters are due to hereditary units called "genes," which exist in pairs known as "allelomorphs." The two genes which made up the pair are derived from the two parents, one coming from the father and one from the mother. If the two genes are alike

	TTpp		ttPP	
	Tp	x	tP	
	/ \		/ \	
	TtPp			
	(Tall, purple-flowered) ... F ₁			
F ₂	TP	Tp	tP	tp
TP	TT PP	TT Pp	Tt PP	Tt Pp
Tp	TT Pp	TT pp	Tt Pp	Tt pp
tP	Tt PP	Tt Pp	tt PP	tt Pp
tp	Tt Pp	Tt pp	tt Pp	tt pp

Diagrammatic representation of the results of crossing tall, white flowered peas (TTpp) with short, purple-flowered peas (ttPP). In the first (F₁) generation all tall, purple-flowered peas (TtPp) result. When these are crossed, in the next generation (F₂) there are 9 tall, purple; 3 tall, white; 3 short, purple; 1 short white. T : tall (dominant); P : purple (dominant); t : short (recessive); p : white (recessive).

develop that colour if given the necessary conditions such as the right food or the right amount of light. But they believe that it makes no difference at all whether the character appears or not, the gene will be absolutely unaffected. You will get exactly the same result whether you breed from an animal which has not developed the character because it has not had the necessary environment, or whether you use an animal which has been able to develop the character. All that matters, they say, is whether it received the gene from its ancestor.

The Mendelists believe, in fact, that the genes are quite independent of the body. The genes control the development of the body but changes in the body due to changes in environment are not supposed to affect them. In the case of the gene they do not believe that the usual rule of action and reaction holds good. Following from this they believe that progress can only take place by recombination of genes, combined with selection, and by taking advantage of chance mutation. Mutation is a change in a gene which occurs at infrequent intervals and is, according to this theory, completely spontaneous and without relation to the environment. It is this chance modification happens to be favourable, individuals which show the new character will tend to be preserved and leave offspring, and so the gene will spread.

The Lysenkoists, on the other hand, believe that as genes are part of the living body they must necessarily be affected by their environment. They believe that changes in the environment will force the inheritance of an organism to change in a way which will make it "fit in" better, though they agree that the individual tends to resist such changes and maintain its original nature. They consider that it is ridiculous to think that such a highly developed organism as, for instance, a tree or our domestic cow, could possibly have evolved from a primitive single-celled organism simply by "chance mutation" and recombination of the resulting genes. They also believe, and this is a very important point, that not only do changes in the environment change the very nature of the organism but also that, as we learn more about the essential nature of our plants and animals, we shall find ways of directing this change in the direction we desire. In fact, they go further: they say, and there is some evidence to support their claim, that they have already succeeded in directing changes in some cases. I will give details of some of this work in my next article.

SOME TERMS DEFINED

Division of the cells which form all body tissues occurs continuously in the living animal and plant to replace dying tissue and to make new growth. The divisions which take place to form the sex cells or gametes (sperms and ova) are of a special type, for these cells fuse together (fertilisation) in the process of reproduction of a new individual and are each formed to provide only half of the essential material of this new individual's first cell. This, the fertilised egg, is called the zygote. From it, by further repeated divisions the complete new animal or plant will arise with cells each owing something to its mother and something to its father. The inherited material occurs in units within each cell, known as the genes; genes do not divide but are believed capable of spontaneous changes called mutations and can also duplicate themselves. They occur on cell "threads" called chromosomes; these do divide during ordinary cell division.

It is now assumed that the genes are particles of nuclear material situated in a definite order along the chromosomes. The genes derived from the father, the other set of chromosomes derived from the mother, are separated from the mother set being restored when the female gamete (ova) is fertilised. The fertilised ovum contains one set of chromosomes therefore contain a single set of chromosomes, the members of the pairs separate, one going to the one daughter cell, the other to the second daughter cell. When, however, the gametes or sex cells are formed, the members of the pairs separate, one going to the one daughter cell, the other to the second daughter cell. The two daughter nuclei are genetically exactly alike. When, however, the gametes or sex cells are formed, the members of the pairs separate, one going to the one daughter cell, the other to the second daughter cell. The two daughter nuclei are genetically exactly alike.

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IN THE Water Garden—by W. E. SHEWELL-COOPER

UP to now, month by month we have been discussing largely the different types of plants that can be grown in conjunction with a rock garden or pool. We digressed last month to deal briefly with the enemies in the garden but taking it as a whole, our aim has been beautification. One of the problems, however, that hasn't been mentioned, and my attention is quite rightly drawn to this, concerns shade. It isn't every pool that is wholly in the sun for every hour of the day—there are often shady spots that may need clothing or even need brightening up, for the pool is so often the centre-piece of a beautiful surround.

Fortunately for us, there are a number of plants which succeed quite well in shade and can either be planted in the dry wall surround, in the crazy paving or in the rock work provided. It is true that most alpinists like to have their heads in the sun and their roots in the coolness and moisture below. However, there are others like that daintiest of all treasures, *Arenaria balearica*, which loves to be growing on the stones or boulders of a north wall and there it will spread freely. Whenever just a little sun peeps down at it, myriads of white starry flowers will be produced. It is a microscopic plant and even though it does spread to carpet the stone, it should give far more pleasure than offence.

For those who like blues there is a lot to be said for the willow gentian. It is certainly very graceful: it has lovely slender flexible stems and is at its best usually towards the end of August and the beginning of September. I like it because it isn't choosy about the soil it needs. It can do quite well in chalky land. It seems to be equally happy in gardens where there is a preponderance of peat and once again, it does not really need the sun in all its fulness.

I shall never forget the day I first saw *Primula capitata*. It produces the most beautiful globular heads of dark violet flowers, which are made so attractive because the stems and the leaves are spangled all over with a kind of silvery powder. It is by no means as difficult to grow as some people make out and once it is established it will go on flowering for years. But there are other primulas which could be included. *Sikkimensis* for instance, which is quite tall, often growing 9 ins. in height—quite tall for a primula. It produces the most lovely yellow flowers in June and July and if there is a soil it prefers, I suppose it is a moist loam.

There is also *Primula farinosa*, with its lilac blossoms in May and June. Those who know the French *farine* (flour), will guess that there is a floury appearance about it. Or, what about *P. cashmiriana*, with its purple flowers in March and April? I always say that this species likes a richer soil

than most of the others. All these primulas can be propagated by division or by seed sowing and that is a very important point in their favour. There is a very lovely creeping forget-me-not whose real name is *Omphalodes verna*. It is not a forget-me-not at all, actually, but looks exactly like it. Some countryfolk call it "the blue-eyed Mary." The flowers are fascinating pale blue and have fine white lines that quarter each bloom. The leaves are comparatively large and these rise erect from the creeping stems.

These rock forget-me-nots as they are sometimes called, can easily be planted in late September and the only thing they ask for perhaps, is plenty of water in the driest of weather. They love growing near a pool for this reason. *Omphalodes luciliae* is the rock navel-wort with delicate pale blue flowers produced in abundance in the summer. It only grows 6 ins. tall. Venus' navel-wort is *O. linifolia* and this has received its name because it bears pure white flowers in June, growing to a height of 8 ins.

There are some anemones which dislike excessive sun and are quite happy in the normal shade. There is *Anemone alpina* for instance, the alpine windflower as it is called, which flowers from May to June and grows to a height of 18 ins. as a rule. The blooms are pure white. Or there is *A. apennina* producing rose, white or sky blue flowers on stems 8 or 9 ins. tall and looking at their best in March or April. The snowdrop anemone *A. sylvestris* is white and scented and adds a brave show during the months of May and June. There is, I believe, a *grandiflora* form with much larger flowers but I have not grown it yet.

It would not do to leave the plants for the shady spots without mentioning the *Ramonda*, so often mis-spelt *Ranondia*. These are pretty little hardy herbaceous perennials which love peaty soil. They may need to be watered occasionally in dry weather and they can be raised by seed sown in pans of sand and peat in a cold frame in March. *Ramonda heldreichii* bears violet flowers in June, and *R. pyrenaica*, violet flowers in May, while *R. serbica* generally flowers during the whole of May and June bearing masses of lavender blue blossoms.

Those who are longing to know the names of other flowers that might be included should be told of *Adonis vernalis*, which bears yellow flowers in April and May, and of the *Asarum*, most of which are hardy and like rich moist soil. They are easily increased by division in the spring. My favourite is *A. europaeum*; it produces greeny brown flowers which are rather unusual.

Varying Rates of Growth in Fishes

(Continued from page 49)

three days old—is Infusoria, which is generally largely composed of *Paramacium*. This is quite satisfactory providing you are able to supply sufficient quantities but, should you have the time and the interest there is a method by which quite phenomenal growth can be achieved in the first week of feeding.

The idea is to collect many hundreds of mosquito egg "rafts" prior to the hatching of the eggs. These are placed in small containers over the tank containing the spawn where any warmth will assist in hatching the larvae. By the time the fish are free-swimming you should have, if you have timed things correctly, several jars containing swarms of very small white larvae. If they have become black then

they are too advanced and must not be used. To overcome any difficulty here I strain each culture through very fine copper gauze, which allows only the smallest larvae to pass. Employing this method I have had fry reach $\frac{1}{2}$ in. overall by the end of the first week of feeding. Apart from the difficulty of obtaining sufficient mosquito rafts, however, the great drawback to this scheme is the fact that mosquitoes do not breed in any great measure before the middle of May which precludes its use for those breeders who like to start early.

Regarding heat: I like to maintain a temperature of 70°F. from the start. This ensures the hatching of the eggs in from three to four days and while it assists the growth of the youngsters it in no way weakens them. As evidence of this fact I have had veiltails reared at this temperature which have subsequently passed the winter in an outdoor pond during which period they have been under thick ice.

READERS' QUERIES ON COLDWATER FISHKEEPING

When to Feed Live Foods to Fry

When rearing young fish, at what age should the following foods be given:—Infusoria, yolk of egg, water worm, sifted *Daphnia* and Bemax?

Infusoria is the first food and should be given as soon as the fry are free swimming. Before then they feed on the yolk sac which is attached to them when they hatch. Yolk of egg may supplement the Infusoria and can be given at the same age. If the fry grow at a normal rate they can take water worms at from 10 days to a fortnight. Sifted *Daphnia* can be given from three weeks of age and the sizes of *Daphnia* can be increased as the fry grow large enough to swallow them with ease. Bemax can be given to forward the fry out over the age of a fortnight providing it has been passed finely and sifted. A silk stocking will provide the best sieve, and by stretching a piece over the base of a tin without a bottom, a series of sieves can then be made so that two or three fit into one another, the coarser at the top. This saves time in sieving. For very young fry the Bemax should be soaked first, before feeding it to the fish.

I should like to breed some Bristol blue shubunkins this year. Should I use a coloured male with a paler female?

I do not like breeding from shubunkins which are too pale in colour. I prefer the darker coloured ones. It may work out all right if the pale fish comes from a very good coloured strain as it is almost sure to throw some better coloured fish. If on the other hand the fish came from a strain of pale coloured fish it is quite likely that many such fish will be produced the strain will suffer.

answered by A. BOARDER

Is it possible to breed from a fish suffering from swim-bladder trouble, and if so would the failing be passed on to the fry?

I would not breed from a fish affected with any disorder of this kind. This swim-bladder trouble does appear to be often hereditary and so it can easily be passed on to the young. If the fish was a very good one and only developed the trouble late in life it may not be too bad, but if the fish did not improve with the warmer weather I should be inclined to prevent this fish from breeding. It must be realised that this type of fish in nature would hardly be likely to survive let alone breed. You may only be asking the question at generations ahead if you do breed from such a fish.

One of my goldfish has a lump under the jaw. Can this be cured or is it better to destroy ailing fish?

The lump under the jaw may be a cyst or a tumour. These sometimes develop through damage and may right themselves. The tumour may burst and the hole heal up all right. If this happens you can paint the wound with a mixture of equal amounts of tincture of iodine and glycerine. If the fish is badly injured or very ill and ordinary treatment

Many queries from readers of "The Aquarist" are answered by post each month, all aspects of fish-keeping 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.

does not bring a cure it is as well to destroy the fish, especially if it is ageing. The quickest way to do this is to dash the fish on a concrete floor.

I have a fantail which has suddenly adopted queer positions such as standing on its head and losing its balance; is there anything I can do to improve its condition?

It appears that your fish is suffering with some form of swim-bladder trouble. This may have been caused by a chill or indigestion. Place the fish in a solution of a gallon of water to which has been added a table-spoonful of sea salt. Leave it there for a few days and then add fresh water gradually so that the salt content is lessened. If the trouble persists you can help the fish by keeping it in shallower water which is slightly warmed.

Please could you tell me how to start a *Daphnia* pool? I tried with an old bucket and put in some cow-dung and water-cress. A week later I put in some *Daphnia* but after a time they all died. I am sure I had not put in too many.

I think that the bucket was the cause of the trouble especially if it was a galvanised one. I have never been successful in keeping anything alive for long in anything which is galvanised unless I have previously painted the inside with a good coating of cement. An old earthenware sink is ideal for your purpose and will prove better than a bucket. Your method was all right otherwise but it would probably have been better to have waited until the water had turned green with algae before putting the water fleas in. By providing shade the water-cress would have the tendency of preventing the algae from forming. *Daphnia* feed on Infusoria and algae and unless there is a sufficiency of these foods the *Daphnia* would soon die out. It may also be necessary to change some of the water frequently as soon as the water fleas increase in numbers. A better way is to try to keep two tanks going, one without *Daphnia* forming algae and Infusoria so that some *Daphnia* can be transferred to it from the other tank which could then be rested.

I have been asked to judge a fish show. Although I have had several years' experience at keeping and breeding fish I have not done any judging. Is it usual to write remarks on the tanks as to the quality of the fish or do I just award points?

Phew! Where's the ice pack? It is impossible for me to give all the information to ensure that you judge successfully in the space I have available. However, I will give one or two tips and hope that you will pull through. In the first place obtain a copy of the Federation Judging Standards and study them well. It is not usual for the judge to write anything on the tank. If the show were a club table show you could make notes as you judged and then give a short talk on them afterwards, and answer questions. This is usually impossible at an open show. If you point the fish and leave a list with the show secretary, exhibitors can then see where their fishes failed by the number of points obtained for the different features. The best recommendation is for an aquarist to have been a successful exhibitor himself for a good period before trying to judge. Classes

are also held for judges by the Federation of British Aquatic Societies. As there is no time for you to do this I will give a few points on how I judge myself.

I first read the schedule carefully and having chosen the first class ask the secretary how many entries there are. (Make sure that you judge all the fish in the class; don't miss that one round the corner—it may be the winner.) I then look at all the fish and pick out what appears to be the best fish and point that one first. I also tick off all those which I consider good and point them only. In a large show it is almost impossible in the time allowed to point all fish in a class. I may point about seven or eight fish, and having started with what seems to be the best, I have a good guide to follow when judging the others. As I point the fish I may have to go back occasionally to compare different qualities among the fish. I use a pencil in the first instance as sometimes when I have finished judging a large class I find that two fish may tie or even the fish with the most points does not compare with the second fish on a further comparison.

When the pointings are added make sure that the winners are the ones you have chosen and that you have not mistaken the tank number for the class number, and give the result to the show secretary. Carry on with the next class and by the time you have judged a hundred classes you will be able to see faults at a glance and then, sometimes, in your sleep. Anyway, the best of luck.

Would you please let me know if it is possible to breed veiltails in a 24 ins. by 12 ins. by 12 ins. tank. If not, what type of goldfish do you recommend?

It is possible to breed veiltail goldfish in such a tank. You will require one pair only. Unless you can remove most of the eggs when laid you will have to put in a partition so that the parents are kept from the eggs. If you are a beginner it will be as well if you leave veils alone for a time and gain some experience with shubunkins.

What fish do you think is the most popular at the moment?

Judging from the number of entries at many shows I should say that shubunkins are the most popular. The choice does vary with districts though. Beginners generally favour the common goldfish and then turn to the shubunkin when they have gained some experience. As they become more advanced they tend to the more fancy types such as the fantail and the veiltail. Comets are not very popular at the moment, largely due to the fact that there does not seem to be many good ones about. Moors, orandas and lionheads are usually only bred by experienced aquarists.

Would perch be difficult to breed from? I can get as much live food as I need.

There is no reason why you should not be able to breed perch. They spawn fairly early in the season when compared with other coarse fish. They are very fond of live foods and you would hardly be likely to succeed without plenty. You would need plenty of space and the fry would have to be kept from the parents. Perch are voracious feeders and can eat a fish half as big as themselves. I have even found sticklebacks in the stomach of a perch.

I sometimes find a creature on my goldfish in the pond like a worm with greenish stripes across the back. On removing it from the fish I find it full of blood. Is it a leech and how can I get rid of the trouble?

From your description it appears that the pests are leeches. I do not think that you can remove them from the pond without emptying it first. Strong Dettol solution may kill the leeches all right but it would also kill the fish if still

there. If you can lower a piece of meat or fish on a string over-night, it may be possible to catch several leeches clinging to it in the morning. Usually fish are too active to be caught by leeches, but it does happen, especially when the fish are quiet after a cold winter.

Can you tell me the cause of goldfish getting a fungus disease?

The causes of fungus are present in most waters like the germs of the common cold are present in the atmosphere. Many germs and pests are always waiting for any fish which may be a bit out of sorts. The very active healthy fishes seem to get by alright but as soon as a fish is damaged in any way or becomes a bit under the weather it is very prone to be attacked by fungus. Fishes in an outdoor pond subjected to very sudden changes of temperature are often affected by fungus. The salt cure as often recommended by me is the best treatment, and see that the pond is cleaned out and contains nothing decaying which can contaminate the water.

I shall be greatly obliged if you can tell me what fish are useful for clearing a pond of green scum which forms on the sides and water lilies in my pond?

The green scum on the pond is a form of algae, a small plant. One form of this floats in the water and gives it that green appearance, another forms as scum and yet another grows in fine strands and is known as blanket or flannel weed. All thrive where there is an excess of sunlight. Algae has probably formed in your pond since the water lily leaves have died down. Once they grow up again and cover much of the surface it is possible that most of the algae will go. I know of no fish which will eat all of the scum but several types of fish, the goldfish included, will eat some of this if they are hungry. If there are no fish in the pond you can introduce some *Daphnia* (water fleas); these may do a lot towards clearing the water. If fish are added later on they will eat the *Daphnia* and the pond may then keep clear. If there is a large amount of scum floating on the pond, much of this can be cleared with a fine net. Blanket weed can be raked out before it gets too strong a hold.

I have a pond in the garden five feet by three feet, stocked with fish and plants. For some reason the plants die. Can you tell me why?

It is rather difficult to tell why the plants have died without knowing more about the conditions. Perhaps they are not dead but are just in the resting state. They do not grow in the winter and some kinds almost disappear and then grow well again in the warmer weather. Your pond is not very large, and being only 16 ins. deep it exposes the plants to extremes of weather. I take it that you grow the plants in small containers. This is the best method. You should be able to grow a small water lily, such as the *pygmaea* type, some *Pontederia cordata*, and for underwater plants you have a good choice from the *Elodeas*, hornwort, willow moss and *Myriophyllum*. You say the fish are healthy and so there does not seem to be much wrong with the water. I expect that as the warmer times arrive the plants will grow well again.

Post-Mortem Examination of Fishes:

W. Harold Cotton, F.Z.S., 39, Brook Lane, King's Heath, Birmingham, 14.

Specimens should be sent direct to Mr. Cotton, with full particulars of circumstances, and a fee of 2/6.

It is important that the following method of packing fish be adopted:—Wrap fish, very wet, and loosely in grease proof paper and then in wet cloth. Re-wrap in greaseproof or wax paper and pack around with cotton wool in the box. Despatch as soon as possible after death, with brief history of aquarium or pond conditions.

I have a three-foot tank which has suddenly developed a slight leak. Shall I have to re-glaze or can I do anything to stop the leak without going to all this trouble?

It is quite possible to stop the leak if you know where it is. You will have to empty and dry the tank. Then try to force a small amount of putty into the crack from the inside. It is also possible to paint the inside edges with a good waterproof paint. The tank should be washed out before use and then when refilled the weight of the water may press against the partly fluid bitumen and seal the crack. Several types of tank cement are obtainable. This calls to mind the trouble I had with my first tank nearly 50 years ago. A plumber friend recommended red lead, gold size and boiled oil; the latter he pronounced "biled ile," and this has been a cure in the family ever since. I have always found that good quality oil putty is as good as anything.

AQUARIST AT HOME:

Mr. J. E. Powell

(WYKE, YORKSHIRE)

Interviewed and photographed by JAS. STOTT

My visit to the home of Mr. J. E. Powell of Wyke, Yorkshire, took place during the period when March was busy breaking weather records; it was cold enough to have been mid-winter and the month was living up to its reputation for high winds in fine style. However, the cup that cheers, provided by Mrs. Powell, soon chased away the effects of the cold outside and we got down to talking fishy matters. This produced a somewhat gloomy expression on the face of Mr. Powell and he told me that he had suffered a considerable loss of stock caused by an electrical failure which occurred whilst he had been away from home. The note of sadness soon passed, however, as is the way with ardent aquarists, and future plans were discussed.

Society President

Mr. Powell is the president of the comparatively new West and District Aquarist Society. Formerly, before the formation of this society, he was a member of the Bradford society for 18 months. He has been keeping fish for just over three years and he is essentially a tropical enthusiast. His fish room is situated in the house and is capable of holding some 16 tanks ranging in size from 10 ins. by 7 ins. by 12 ins. up to 30 ins. by 14 ins. by 15 ins. Most of the intermediate tanks between these sizes are 24 ins. by 12 ins. by 12 ins. The staging is made of wood and this, together with the tank frames, is painted a light cream colour giving a clean-line appearance to the installation.

Base-heating is used throughout and thermostatic control is used. I was rather interested in the heating elements used in the box benching. These are 0.3 "mains droppers" which are made for use in radio sets for voltage reduction purposes. Two of these are fitted under each tank and are wired in parallel, giving 130 watts per tank. Mr. Powell informs me that they provide a uniform distribution of base heating, have a long life and are extremely satisfactory in use.

Over the top of the main bank of tanks is situated a bank of fluorescent lighting backed by an appropriate

Some of my goldfish eat well but now and again one of them dashes about as though shot from a gun. What is the trouble?

The fish may be attacked by flukes. These cause the fish to dash about as you describe. Give the affected fish a bath in Dettol, a cubic centimetre to a gallon of water. Watch the fish and remove it in about 10 minutes; in less time if the fish turns over. Put it in clear water to recover. To sterilise the tank you can add some household ammonia after having removed the fish.

How can I rid a tank of Hydra?

Remove the fish and add a tablespoonful of Dettol or household ammonia to the water. Leave for a few days, clean out thoroughly and set up again.



Mr. and Mrs. Powell with two of their tropical tanks kept in a living room

reflector. I asked Mr. Powell his opinion about this and he informed me that he was not satisfied with it because he found that the plants did not respond very well and, therefore, he now used this mainly for room illumination. When desirous of providing artificial illumination for the plants he placed 60-watt, silver-backed incandescent bulbs over the tanks. The light from these bulbs is all directed downwards by the silvered part and separate reflectors were not necessary. One bulb was suspended over each tank.

Several of the tanks were empty, the result of the unfortunate electrical incident, and so opportunity was being taken for resetting a few of the tanks. Those, however, which contained fish made it very obvious that Mr. Powell is a specialising aquarist; nigger and tiger barbs are his speciality and several good specimens were to be seen of these species. Mrs. Powell finds considerable interest in her husband's hobby and enjoys visiting the various annual shows in the West Riding.

Summer Live Food

AT this time of the year a very fine food for the larger tropic fish is available throughout the length and breadth of the land—the tadpole of the common frog. Tadpoles are eagerly accepted by angels and all the cichlids, and also by paradise fish and the larger characins.

RAYMOND YATES

Beautiful and Bizarre Tropical Fishes for

by J. FRANCIS



Photo :

W. S. Pitt

AMONG this year's early imports has been a large consignment of the colourful and attractive marine tropicals, and the opportunity now exists for aquarists to indulge in this fascinating branch of aquarium keeping.

Although many of the fishes will tolerate transfer to water that is almost salt-free it is usually considered that they do best and show better coloration in sea-water. Accordingly, the aquarium chosen for them (a 24 in. or 36 in. tank is recommended) should be treated so that its exposed metal-work is not open to the corrosive action of the brine. A coat of bitumen paint along the inside top frame can be given, and it is also advisable to cover the inner angles, where cement may be visible, with the same preparation.

Washed coarse aquarium sand can be used to layer the bottom of the tank, and as water plants cannot be used (it is inadvisable to try to include sea-weeds when first starting) pieces of rock or coral will provide a proper setting for the fish. Do not use heaters or thermostats which have external metal parts unless these are stainless steel. An aerator is an asset for the marine tank, though it is not necessary to have the air-flow in continuous operation. A corner-fitting filter is another useful accessory—the filter medium need be nothing more elaborate than a layer of glass wool.

If you cannot obtain enough clean natural sea-water to fill the tank then you can make your own solution of salts according to one of the recommended formulae (one formula is given in the article on a following page). An average temperature of 70° F.—a range of 65° to 80° F.—will suit most fishes. Do not be tempted to stock the aquarium with fish to its full capacity judged by standards



Photo :

A. & B.

The clown fish is a brightly banded species which does well in the aquarium

Marine Aquarium

for freshwater fishes. One inch of fish to 48 square inches of water surface area should be the allowance for safety. Only moderate lighting is required by the tropical marine tank, since there are no plants to consider, so the aquarium can be placed away from windows and receive illumination for viewing from an overhead low-wattage electric lamp.

With regard to maintenance, the inside of the glass needs wiping over with soft paper occasionally, and the bottom should be siphoned to remove sediment once a week. Filter the removed water back into the aquarium. As concentration of the salts in sea-water will increase owing to evaporation from the warmed marine tank the level should be maintained carefully by the periodical addition of sufficient fresh tap water. The aquarist with some experience in aquarium-keeping will not run the risk of polluting the water by adding excessive amounts of food, and the beginner must be specially cautious about this or he may find

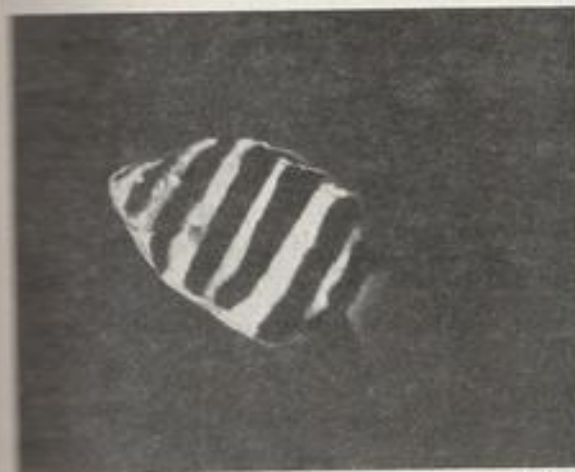


Photo:

One of the "scots"—*Scatophagus tetrocanthus*

that the delay in obtaining fresh seawater is more than the fish will tolerate in foul conditions.

Feeding the fishes is no trouble. Some of them will even take dried fish foods, but the fish-monger will be found to be a ready source of supply for the appetites of nearly all fishes. Chopped, boiled crab flesh, mussel or cockle, raw fish, shrimp or prawn are all welcomed. Fresh water live foods such as white worms, *Daphnia*, *Tubifex* etc., are also taken and, once again, chopped earthworms are an excellent standby.

Among the fishes which are adaptable in their requirements for marine or freshwater conditions are the scots (*Scatophagus* species), clown fishes (*Actinocola percula*), amber fishes (*Toxotes jaculator*), puffer fishes (*Tetraodon* species) and the Malayan angel fish (*Monodactylus argenteus*). Sea horses must have sea-water and they are also adamant about eating only live foods.

Scots are best obtained one to two inches in length, and they will be found to be lively and hardy aquarium inmates. The pectoral fins of these black-spotted fishes are moved very fast; their laterally compressed bodies appeal to all devotees of the angel fish. They will grow to about four



Photo:

W. S. Pitt

A prized possession these days is the Malayan angel fish, specimens of which have now arrived for the first time since 1939.

inches long with good feeding on any of the foods listed above. Like most of the fishes mentioned here aquarium breeding is a rare event and sex characteristics are not evident.

Clown fishes are very attractive with their sharply demarcated alternate orange and white banding. They too are hardy and non-discriminating in food requirements. Females are usually larger than the males and they do not show the broad black edge to the dorsal fin that the male has. Aquarium specimens do not exceed two to three inches in length.

The puffer fishes are very busy fishes of peculiar appearance. Their bellies are silvery white and backs and sides are white-spotted dark mottled green. They may be

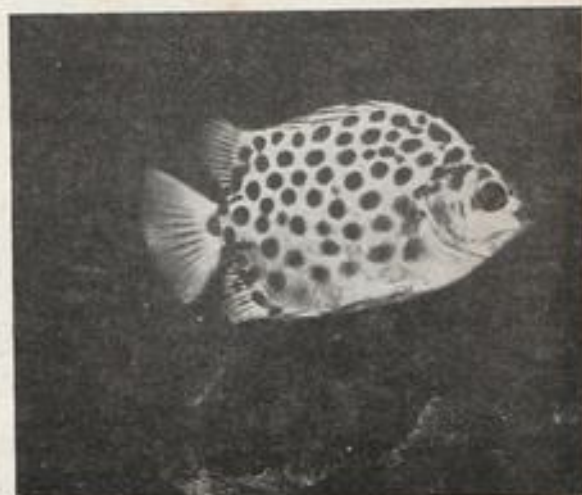


Photo:

A. & B.

Another "scot"—the common species (*Scatophagus argus*)



This archer fish is portrayed in the act of shooting down a fly with a jet of water. Special arrangement of its aquarium allows it to display this trick

aggressive in a tank of mixed species. Puffers can distend their bodies enormously when frightened, and whilst in this blown-up state a number of small spikes on the belly are erected, making the fish a formidable sight to its enemies. In addition to the usual foods puffers are fond of small aquarium snails to eat.

Another fish with an amusing trick is the archer. With a well-aimed jet of water it can "shoot down" flies and similar insects seen above the water line. If the aquarium is fitted with a glass superstructure into which flies can be released it is enabled to demonstrate its powers. A concentration of two teaspoons of sea salt dissolved in every

10 gallons of water is adequate for the archers; they will eat chopped worms, blood worms, mosquito larvae and unwanted baby livebearers as well as flies. Again, sex characters are not evident.

The new popular name for the fish that used to be known as "psittus" is the Malayan angel fish, and this is a truly beautiful species. Its flattened body is a gleaming silver with lemon yellow outlines and fins; there are black bands over the head and behind the eye. Malayan angels are timid when first purchased but soon settle down in a large aquarium. It is best that they should be given plenty of swimming space, when they will be found quite hardy. Living and dead "meaty" foods are relished. These fishes come from river estuaries and will tolerate fresh or salt water. Do not trust them with fishes smaller than themselves and do not place them in company with "harum-scarum" rapidly swimming fishes.

Sea Horses

Sea horses are specimens coveted by most aquarists but they are a trouble to keep alive. They must have sea-water and their demands for live foods are not always easily satisfied. Continuous aeration is also desirable with these fishes. When *Daphnia* are plentiful these can be given as food, or brine shrimps can be used, and white worms are taken if delivered close to the mouth of the fish with the aid of forceps. Some aquarists have found that newly-born guppies are eaten by sea horses. They are best provided with an aquarium to themselves and it should be furnished with branching coral for them to cling on to.

Sea anemones will provide additional attraction for the marine aquarium. Do not keep too many however, for they are oxygen users and will be competing with the fishes for this gas. Feed them by placing small strips of raw fish on their tentacles two or three times a week. Very brightly coloured specimens can be collected around the coast at times of the spring tides, and these will fully compensate for any bareness which the aquarist may think the unplanted aquarium possesses.

FRIENDS & FOES No. 3

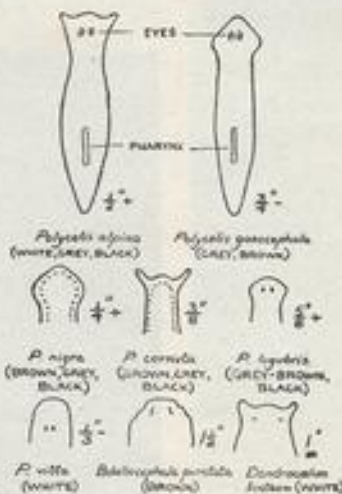
PLANARIANS

PHYLUM—Platyhelminthes, from Greek *platys*—broad (flat), and Greek *elminthos*—worm.

CLASS—Turbellaria, from Latin *turbella*—tumult.

PLANARIANS are extremely common creatures, inhabiting both stagnant and running water. Although often mistaken for leeches, examination will reveal that they are unsegmented and have no suckers on their under, or ventral, surfaces. Furthermore, they move smoothly along by lashing the myriad of minute cilia or hairs with which their bodies are covered. The tumult created in the immediate vicinity by the movement of these cilia gives the class its name.

In Britain there are eight distinct species, each with a somewhat similar body shape, but a characteristic head shape. Colour ranges through white to brown and black—size from one-third of an inch to an inch and a half. Some



species possess a single pair of eyes and others quite a number. Their mouths are situated in the lower halves of their

The Planarians

bodies—a surprising distance from the eyes.

Reproduction is of two kinds: by rapid division across the body, followed by regeneration of the missing parts, and by the laying of egg cocoons containing from 5-40 eggs. Food consists of small creatures of many kinds. The planarian wraps its body round that of the smaller of its victims, and swallows them whole. If too big, the pharynx is extruded and lumps of the prey sucked off.

There is no longer any doubt existing that planarians are in many cases directly responsible for the disappearance of numerous fish-eggs and fry. During bright daylight they hide away among the plants or under stones, and so often escape notice. If after several hours of darkness a light is suddenly switched on, however, large numbers may sometimes be seen gliding over the glass sides of aquaria. They have been caught in the act of swallowing small fishes and eggs.

C. E. C. Cole

THE AQUARIST



*A page for
the beginner
contributed
by
A. BOARDER*

THIS month should see breeding operations at the maximum, as during June there is plenty of daylight and the fry will thrive as long as they have room and enough food. When they are half an inch long overall it is advisable to sort them out and give all the best fish more space. At this size it is well to use a 24 ins. by 12 ins. by 12 ins. tank for 24 young fish. Remember that it is the surface area which is the more important; depth is less so. I have found that in practice shallower water does tend to keep more pure. Deeper water always tends to become more foul at the bottom, where gases will form which reduce the oxygen content of the rest of the water. See that plenty of food is given from early morning to late at night, always in small quantities. The fry can be fed every half hour as long as the temperature of the water is in the twenties. Large feeds at a time are quite wrong and will only cause trouble.

Sorting the Fry

By the time the fry are half an inch long many may be sorted out. The sooner this can be done the better. You will no doubt be breeding with the intention of improving your stock as well as to attempt to get some show specimens. Generally speaking the show fish will make the best breeders but this is not always the case. Sometimes there may be a fault in the strain such as insufficient fin development, lack of the correct colour or the body may not have enough depth. This can sometimes be rectified in a strain by using a fish among the spawners which may have the required feature well developed although it may have faults which would bar it from making a good exhibition fish. For instance, if a strain of fantails tended to carry the caudal fin tail in a drooping manner, then by using a fish for breeding which carried the tail very high, even if it failed in some other points, it is possible to breed this trait into the strain by careful selection of the fry.

The most often asked question relating to sorting the fry is how old should they be before the sorting can safely be done? No hard and fast rule can be given as not only will the rate of growth vary with different types but it will also depend on how the fry have been fed and the amount of space available. Another important factor is the colour change question. Whilst the shapes of the different types can often be determined at an early age it is impossible to judge the quality of the colour when dealing with fishes which are visibly scaled such as the common goldfish, the comet, the fantail and the moor. Where double tailed types are concerned it is possible to sort the fry at a very early stage and although at 10 days it may not be possible to pick a winner it is easy to pick out those which will never make a winner.

If we consider the case of the veiltails, the fantails, the comets, oranges and lionheads, it will be seen that all have to have a divided tail. The veil's is completely divided but the fantail's only up to three-quarters of their length. When commencing the sorting place a number of fry in a white

bowl in the first place. It is then quite easy to see from above which fish have divided tails and which have not. A tail which is joined or webbed will never open and a single tail will never develop into a double one. The spread of the tail can also be seen from above and in the case of fantails it is essential that the tails are well spread and show to advantage from this position. Those which carry the two halves of the tail so closely together as to look almost as one are not likely to make such good show specimens.

Characters to Look For

There is little more that can be seen of the other points required from above and so it is necessary to place the best youngsters into a clear-sided glass tank. Whilst still considering the tails it will be easy to see that the tails of the fantails are well forked and that those of the veiltails are not forked but have as straight a base as possible. From a side view the body shape can be examined next. Although young fish will develop considerably in body shape as they grow, it is possible to find certain faults even at this early age. The upper curve of the body should run in an unbroken line from the nose to the root of the tail. A bad snout (a dip in the line behind the eye), is a bad fault which will probably never improve. A humpty-backed fish is not likely to be of much use. I know it is possible by correct feeding to improve the depth of a body if the right shape is there but I do not think it possible to correct a break in the curve of the outline.

Having dealt with the tail and the body, the dorsal fin can now be examined. A thin, under-developed or badly shaped dorsal will never improve and so many more of your fry are likely to be cast out at this stage. The pectoral fins and the pelvics are not generally very different from the usual run of these fins and it is rare to find much fault with these. The anal fin, however, can prove a headache for you. With the double-tailed fishes the anal fin must also be paired. Many otherwise very good fish are spoilt by lacking this quality. Some have one anal and some may not have a trace of a fin there at all. Some again have one anal well developed and the other may be badly shaped and curling out to one side. These bad fins will never improve. A fish will not necessarily be disqualified for not having the paired anal fin but in the case of the fantail it can lose the maximum of seven points.

Shubunkin Selection

When sorting shubunkins it is not quite as easy to throw out the bad ones at an early age as the fin development is different. The shape of the tail of the Bristol shubunkin should, however, show promise at an early age. One of the most important points to look for in young shubunkins is that the body shape is free from any irregularities. The body should be well streamlined without any bad humps anywhere. These types should change colour early in life to the calico shades and while it is not possible to sort out those which will ultimately be winners, at three

months old those with washed-out colours are not as likely to make good fishes as those which appear to carry good depth of mottled colours. I do not mean that the bronze ones are of much use. It may be that if the fry have not started to change by this time, they may never do so at all and will be of no value.

Common Goldfish Selection

The sorting of common goldfish is rather difficult as one of the most important features is the colour. This will not show for perhaps a year or two. The young are always bronze at an early age and only change to the required red according to their strain and the amount of sun available. Much can be done to improve the quick changing tendencies of a strain but even this is of little avail in a sunless cold summer such as we sometimes experience. About all that you are likely to be able to look for among common goldfish when young is the shapes of their bodies, and the fins may also show some faults. The worst feature of many common goldfish seen to-day is the "snout." This gives the fish a humped-back appearance and the fault will not disappear. The required colour for the common goldfish is a rich warm red but do not expect this for a year or so. Some of my strain of red scaled fantails change colour at about three months of age but even then the deep red colour does not develop until the fish has had the best part of a warm summer in an open pond.

Hardy Fry

It may be of interest to relate what happened to some very small fry which I placed outside in a concrete floated galvanised tank last winter. The water in the tank froze very thickly on several occasions and for a short period it was almost impossible to break the ice. A small hole was made with a drill now and again but I did not expect the fish to stand the pressure and extreme cold. Much to my surprise the fry have come through this treatment with no apparent harm, yet they were only about an inch in overall length last autumn. The fry I had kept in an unheated greenhouse all the winter had been frozen over lightly once or twice and went through the cold times in an almost torpid condition. They showed little inclination to move about or feed but on the approach of warmer weather the difference in their behaviour was amazing. They came up to the surface for food, snatched at it in that eager manner and appeared to grow half as big again in a week or so.

This does prove to me once again that the whole success of rearing healthy fish is to be able to provide some form of

warmth during the fishes' first winter. It has often been written that young fish need to be about three inches long to be able to go through the winter safely out of doors but this last winter's experience shows that this is not true. Fishes half an inch long can go through the cold periods as long as the water is kept fresh.

At this time of the year it is a good plan to overhaul the indoor ornamental tank. It is possible to run such a tank for years without emptying it but the whole aspect of the tank can be improved by giving it a spring clean. After having well cleaned the front glass (I never clean any other glass of my tanks in the bright weather), trim the water plants up a bit. Many pieces get a bit soiled and brown during the winter and if this part is removed the plants are likely to make fresh growth. Perhaps some fresh plants must be added. When doing so see that they are clean and, if possible, have healthy roots. This is not imperative as there are likely to be plenty of other growing plants in the tank to keep it sweet whilst the new plants are getting established.

Tank Cleaning

Clean the rock-work a little but not so much as to make it look too bright. A weathered appearance is much better but where a quantity of blanket weed has formed some of this may be removed without losing effect. Siphon up a fair amount of the top sand and mulm. Then add some freshly washed sand and the whole outlook will be improved. See that the back corners of the tank are well planted. Next have a check up on the fish: take a rough measurement of their lengths and see that you are not exceeding the rule of 24 square inches of surface to each inch of fish. This rule is the maximum but you are more likely to keep the tank and fish in better condition if you err on the side of too few fish rather than too many.

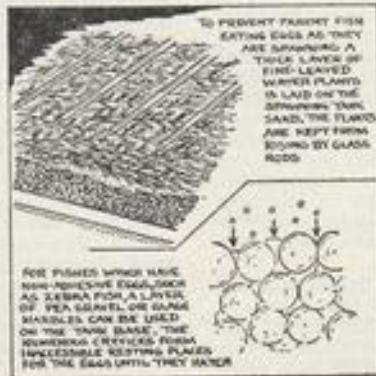
Plenty and Variety

The fishes will be eating more food now and so you must see that they have it in plenty as well as variety. After the spring clean of the tank see that it gets a weekly servicing, clean the front glass and siphon up the mulm from the front of the tank. Add fresh tap water to bring the water up to the top of the frame so that the surface of the water is just invisible from the front and all will be well.

Next month I shall deal further with the feeding and treatment of older youngsters and the care of the spawners. Notes on the preparation of fishes for shows will also be given.

THE PRACTICAL AQUARIST

Arrangement of the breeding tank



An Aquarium from the Sea-side

by W. GORDON ELLIOTT

This article is written with the object of introducing those aquarists to the unsuspected pleasures to be derived from keeping marine aquaria at home. The keeping of marine fish—and, more particularly, marine corals generally—is one of the most interesting and instructive of hobbies, and any difficulties may be fairly well overcome, even in places far removed from the sea, if the instructions given in this article are followed.

Obviously the first step is to obtain a suitable tank. This should be made entirely of glass. Tanks with metal frames should not be used because sea-water dissolves metals to an extent sufficient to poison marine life. Tanks with narrow wooden "sashes" should also be avoided as they do not allow sufficient air to reach the water, but this, of course, will be understood by all aquarists. Tanks with slate beds, teak ends and glass sides might well be used but here expense counts rather high and I think the beginner would be well advised to keep to all glass. I have used, with success, glass tanks 24 ins. by 12 ins. by 12 ins., which I have obtained from reliable chemists, and also many smaller sizes.

Having obtained a suitable tank, it must now be filled with sea water. You will probably have friends with cars parked on the seaside for holidays or week-ends and they will usually be pleased to fill jars or cans with sea water and bring it back for you. I find this always applies if they are children. Kiddies simply love helping marine aquarists.

Home-made Sea Water

Seawater is best because it contains much microscopic life which helps to feed the fish and keep them in good condition, but it is not absolutely necessary; you can, if you wish, make your sea water at home in larger quantities—using the following formula:—sodium chloride 2½ oz., potassium chloride ½ oz., calcium chloride (dry) ½ oz., magnesium chloride (crystals) 4½ oz., bicarbonate of soda ½ oz., magnesium sulphate (crystals) 5½ oz.; mix with one gallon of tap water. After mixing add potassium permanganate 1/1000 oz., chloride of iron 2½ grains, sodium phosphate 1/1000 grains. After mixing well, when the salts have dissolved add half a gallon of natural sea water. This puts the water over artificial water.

This is not really so difficult as it sounds, and it is quite easy to make your own sea water. If you like, the chemicals can be taken to a good chemist; they will then be weighed and put up in separate packets, or better, ready for mixing. With care the water will last a year or more and should not require changing. Use of a thermometer will keep the water crystal clear. Bags of seaweed at the chemist's should never be used for making seawater for your aquarium. A mark made at the water level on the side of the tank will show how much is lost through evaporation and tap water should be added from time to time to keep the water to the level of the mark.

Some animals, especially fish, require a good supply of air. If you have more than one tank, or your tank is covered, the water should be aerated. One diffuser to 100 gallons of tank length is a good rule. Choose a position

for the aquarium where it will not be in strong sunlight.

Having filled your tank with water, it should be left for a week to settle down before stocking with fish (although this is not absolutely necessary). It is advisable to start with only a few creatures, adding more from time to time as you gain experience. To begin with I should have one or two small fish, such as gobies and blennies, two or three tiny pebble crabs (no more than ½ inch across) a little hermit crab in a winkle shell, some tiny transparent shrimps and one or two small anemones. The crabs and shrimps are always active and interesting and every few weeks they will cast their shells and grow new ones. The anemones you will also find interesting, especially when feeding, and your little fishes will quickly become tame and friendly. All these creatures can easily be caught in rock pools.

Collecting Specimens

Food should be given twice a week. Drop small pieces of uncooked mussel or fish into the water until all the animals are satisfied. If mussel is not liked by all your creatures try them with small red garden worms. Remove any uneaten pieces of food after an hour or so, as they will probably foul the water if left.

Collecting your specimens at the seaside is most fascinating and will greatly add to the pleasure of a holiday. The rocky coasts of Devon and Cornwall are a particularly happy hunting ground, as are also parts of Wales, and a great variety of interesting specimens may be taken with little trouble. All you really require is a small net for catching the fish and shrimps and a carrying jar to put them in. Small crabs, which you will find in pools and under stones, you can catch with your hands. Anemones should be removed from the rocks with a blunt spade—never use a knife.

Once you have secured your specimens you can keep them in jars or bowls (changing the water once or twice a day) until you return home and can put them into your aquaria. Fish and shrimps will travel quite well in jars if not too over-crowded; the crabs and anemones may be packed in seaweed and put into a box or small bucket. A child's seaside bucket is just the thing.

You can make your tanks look attractive and natural with a thin layer of clean, washed sand on the bottom and by careful use of small rocks and stones. A few small shells in the sand on the bottom will help. Never attempt to keep seaweeds; these will gradually rot away and foul the tank. Besides helping to make the tank look attractive and pleasing the small rocks and stones will provide shelter and homes for the inhabitants.

Suggested Animals

I have mentioned a few of the creatures with which you might commence. As you progress and perhaps increase the number of tanks (as you are almost sure to do if you once start keeping marine life) the variety of life which you can introduce and study will be amazing. Besides the small rock fish which I have mentioned you may keep small free-swimming fish like tiny sprats and baby flat fish; these are all interesting. I have also kept wrasse, amongst the most brightly coloured of the sea fish, dragonets, and baby lump suckers. Always remember, however, to keep to small baby fish as much as possible and avoid over-crowding.

There are several kinds of lovely sea anemones which may be kept. One or two of the beautiful plumose anem-

(Continued at foot of next page)



Pond in the Picture—9

A summer-house terrace of elaborate and unusual design runs along one side of this informal pond at Hascombe Court, Godalming, Surrey. Tub plants on the rock-faced wall provide additional attractive features.

Photo:

H. & V. Joel

A-S-H means Better Mollies

by

E. GODFREY and A. MULLETT

EXPERIENCE has shown that for breeding of mollies (black *M. latipinna*) it is necessary to have a combination of three things, all very important to the breeding of this very attractive livebearer. The combination is of algae, salt and heat, the initial letters of each word giving the code word "ash." Taking the items in their order we will attempt to outline briefly the reasons why we think these three items so very important.

Since the molly is a vegetarian, it is absolutely essential that there should be a constant supply of green algae in tanks, both for adults and newly born fry. Observations have shown that in tanks plentifully supplied with green algae, mollies of all ages are found constantly nibbling at it—even after a feed; this action of healthy young fry seems to go on endlessly.

The next letter of the code word—S for salt. Mollies, being natives of salt water areas, simply love salt. Again experience has shown that by crumbling lump or common salt into powder form, these fishes love to eat it, and seem to race against time to capture the particles of salt before they are actually absorbed by the water. Apart from liking to eat this mineral, as we all no doubt know, it is a valuable tonic for most fishes and we find that a level table-spoon of salt sprinkled into our tanks at fortnightly intervals keeps our fishes in perfect condition.

The last of the initials which create our code word—H for heat. By heat we mean anything up to 88° or even 90°F. This no doubt surprises many of you, but we have witnessed

our adult female mollies in a temperature of 82° actually browsing over the heater, which has been operating at the time, and we have also witnessed them in a temperature of 84° laying in a blanket of algae in the direct rays of the sun. In both these instances, the temperature surrounding the fish must have been greater than that registered on the thermometer.

Another interesting event happened just the other day. A young female gave birth to six fry in a temperature of 85°; the tank was in a greenhouse and had been subject to a hot sun all the morning. These fry we gave up as lost as soon as we saw them, owing to their extra large yolk sacs. "Prematures" we thought, but an hour later we found four swimming in perfect condition, perfectly poised and balanced; the other two had been nipped by a larger female. Now, if high temperatures were not liked by these fishes, obviously these fry would never have survived.

In conclusion, in all we have related, the fishes concerned were black latipinna sail-fins, and now we leave you to sum up for yourselves—but for us ASH is the code word for success.

An Aquarium from the Sea-side

(Continued from the preceding page)

ones will always add to the colour and attraction of a tank. There is a great variety of crabs which may be kept. Besides the small pebble crabs a spider crab is interesting and there are three kinds of hermit crabs which you can keep. One or two kinds of star fish should be tried and there is also a sea cucumber. Corals and sponges are also living sea animals and they can quite easily be kept in your home aquaria. One or two small winkles give a homely touch.

With your tanks properly established and well stocked you will then come up against your biggest problem—controlling the crowds of friends, etc., who will want to come and see the "marvels of the deep." I solved this great problem by loaning my tanks to the local art gallery and history museum for a period. The authorities were pleased to show them and on some days more than 5,000 people viewed the tanks.

OUR READERS

Write—

Readers are invited to express their views and opinions on subjects of interest to aquarists. A selection from queries received will also be answered here. The Editor reserves the right to shorten letters when considered necessary and is not responsible for the opinions expressed by correspondents.



White Spot Treatment

In confirmation of Mr. Sayer's letter published in *The Aquarist* (March): the inhabitants of my 12 gallon community tank of mixed species were recently attacked by white spot and I decided to try the quinine treatment mentioned in the letter.

After finding a chemist who had in stock uncoated soluble quinine tablets (two grains each), I dissolved three tablets in warm water and poured the mixture into the aquarium (making half a grain per gallon). The lights were left on for about 10 hours daily and the temperature was varied by thermostat between 74° and 78° F. Within three days all signs of the disease had gone and I have not changed the water since.

On the seventh day a female guppy had a brood of seven young which are all doing well. The remainder of the aquarium are not affected in any way other than being slightly smaller, affected. I shall look no further for a cure in any further cases of white spot as I am really satisfied with this quinine treatment.

A. H. MATTHEWS,
London, N.1.

I had the same experience as Mr. K. Haslam (*The Aquarist*, April), with the use of quinine for white spot. Luckily, however, I only lost two *H. ulreyi* out of the more expensive fish—in fact, neon tetras and angel fishes seemed immune to the treatment.

A male fighter threw up a lot of half-digested food and afterwards refused to eat, dying within a week. Two *Blasienia* swordtails which had been unaffected by white spot and which had lain at the bottom of the tank throughout the quinine treatment, died shortly after I had changed the water as did two black mollies.

I agree with Mr. Haslam that quinine is a far too expensive and drastic method. Guppies died like flies—beginning going first. I have since had excellent results in treating tank with a proprietary white spot cure, used weekly throughout the tank, which also is fatal to algae.

H. L. KIRBY,
Bradford, Yorks.

One point about this report is that the proprietary cure used by our reader is known to have quinine as its active ingredient.

I am in full agreement with Mr. Haslam's remarks concerning quinine hydrochloride as a cure for white spot (*The Aquarist*, April). I have used this drug on several occasions and each time I have lost some fish. The losses were mostly livebearers, particularly guppies, and

those which survived the treatment were listless for several days afterwards.

I had a severe outbreak of white spot in a 20-gallon community tank in March and I decided to try a 2 per cent. solution of mercurochrome—four drops of this to a gallon of water. The temperature of the water was raised to 80° F. and the white spot disappeared within three days. On the fourth day I changed half the aquarium water and lowered the temperature to normal.

On succeeding days I continued to change half the water until all visible traces of mercurochrome had gone. During the treatment the fish remained lively and fed well, whilst plants withstood the treatment. No further outbreak of white spot has occurred.

J. H. MEDHURST,
London, E.2.

WITH reference to your editorial on white spot (*The Aquarist*, April), in conjunction with a Chinese doctor I have found that this disease can certainly be cured scientifically. It behoves everyone in the trade to stamp the disease out, for many a keen aquarist has given up the hobby through disappointment and before time to effect a cure has been allowed. My advice is—do not put newly acquired fish or plants from any source into your aquarium until they have been treated.

H. KENNETT,
Central Aquarium, Blackburn, Lancs.

Ageing Heaters

IN reply to your reader's letter in *The Aquarist* (April) the heat from any electrical appliance is directly proportional to the input watts, and therefore although with age an appliance may give less heat, it will also take proportionally less current, so that the efficiency will not be affected.

W. G. DICKINSON,
Sidcup, Kent.

Tough Fish

ONE evening this week I happened to notice a marked increase of top plants in one of my 24 ins. aquaria, so, taking a net I skimmed the surface to remove the surplus plants, which I threw into a bin. About 20 minutes later when examining the tank I could not find a male *Panchax panchax*, and remembering the discarded plants, I looked in the bin but without seeing any sign of the fish.

I later had occasion to light some newspaper which was also in this bin, and as the embers smouldered and gave off no small amount of smoke I threw in some water to douse them. It was then, in a small pool of ashes and water, that I saw my *Panchax*—and trying to swim too! Out he came, to be washed in a coffee strainer under the tap and then



Photo: Valerie Lilly
Coal has often been used as a decorative medium in place of rocks, and the claim has now been put forward that its presence in a tank can also clarify the water.

placed in a heated 12-ins. hospital tank—all regardless of temperature.

Next morning to my surprise the fish was still alive but still partly covered in ash and now having a patch of fungus on its back. I added sea salt to the tank and by the evening all signs of the fungus had vanished—also the ash. At present the *Punchax* seems to be his old self again, partaking of *Tubifex*. Although I do not recommend this spartan treatment I do think it has proved the toughness of one of the so-called "tropical" fish who went through fire, ash, hot and cold water.

G. OAKES,
Liverpool and District Aquarists Society.

Coal, and Water Clarity

DURING December last year our society was approached to put a few aquaria on show in a January Cage Birds Exhibition. Five 18 ins. by 10 ins. by 10 ins. aquaria (four tropical and one coldwater) were accordingly set up. For the purpose of attracting public attention and to show off the occupants of the coldwater tank (two shubunkins) small pieces of coal—well washed—were used to cover the bottom of the tank and two larger pieces used in place of rock decoration.

At the end of the exhibition the two shubunkins were left in the aquarium for several days, until our society's next meeting. We were prepared to change the water but we were surprised to see that instead of the tank being "milky" as expected, it was crystal clear, and the fish actually appeared to be "floating in mid-air!" The fishes were healthy, plants had grown, and it was decided to leave the tank as it was.

To-day, after 13 weeks the fishes are very healthy, more brilliant in colour and showing full sex characters; plants have had to be thinned considerably, and the water seems more crystal-like as time passes. Various experiments have been carried out by members of the society using all kinds of dirty waters, and it has been found that within a week or two ordinary household coal has had the same effect in clearing these waters.

The water in the original tank is gradually affecting the coal, for its mineral content, which first showed as a gold streak, is turning a distinct rust colour. But, contrary to our own previous belief, this does not appear to have a detrimental effect on the fish. Just one small piece of coal in a small aquarium seems to suffice to increase water clarity.

Our society would like to know whether other aquarists have seen similar happenings.

F. J. HOLDSTOCK, Chairman,
Battersea and District Aquarist Society.

Granite Chips

I HAVE established fairly recently two tanks, one 18 ins. by 10 ins. by 10 ins. and one 24 ins. by 12 ins. by 12 ins. In the smaller tank, started first, I used granite chips as a base material, and in this, after a while, *Cabomba* grew very well. In the other tank I used well washed builder's sand and *Cabomba* now shows considerable reluctance to grow properly.

Other plants do well—Sumatra fern, *Vallisneria*, *Rice Hygrophila*, and to a limited extent, *Myriophyllum*. The *Cabomba* shows peculiar distorted growth, and yet with granite chips it grew almost succulently. Both tanks receive light from 60-watt lamps for 5-6 hours daily. The main disadvantage of the granite chips was that they blocked the siphon tube.

A. B. MORROW,
Sydenham, S.E.26

Angel Spawning

IS this a record? I spawned a seven-month-old angel fish male with a two-year-old female and obtained about 200 youngsters. These are coming along fine. Many people say that it is necessary to have these fishes for a year or so before they will breed, but my experience proves them wrong.

W. E. GAWLER,
Romford, Essex

A Criticism

AS a criticism of *The Aquarist*—too much space is devoted to fish. How about an article on water-butts or fountains or drinking vessels? Or a discussion on how far "natural" foods are natural? Bloodworms for example are found in conditions too foul for fishes; in my aquarium if they find their way into a patch of debris the fish nose them out. Flatworms here are most common in a drainage ditch with only a trickle of water.

G. SPURGEON,
Maidstone, Kent

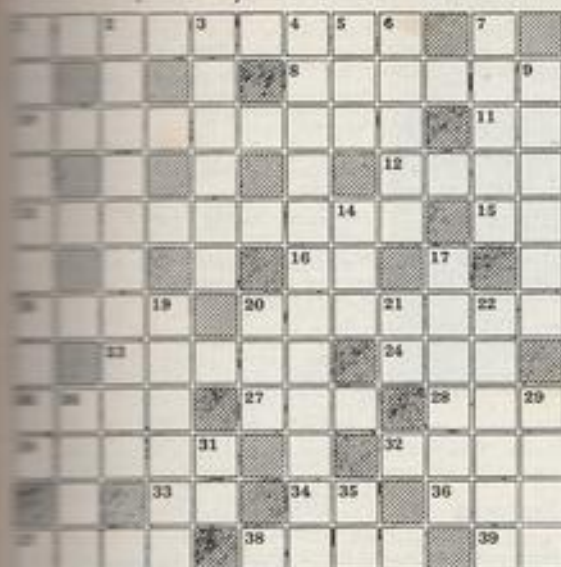


That reminds me dear—when did your mother say she was coming to stay with us?

THE AQUA

The AQUARIST Crossword

Compiled by J. LAUGHLAND



CLUES ACROSS

1. This family of fishes includes the tenies and danios (9)
 2. Desecrated from one high tide to another (6)
 3. Lowest tides (4, 5)
 4. King Emperor (1, 1)
 5. Sea (1)
 6. Water may do this from an unattended tank (9)
 7. A measure of power (1, 1)
 8. Branch back for on (2)
 9. Clear they may save your fish (1)
 10. Remaining to 29 down (7)
 11. Confused lady (5)
 12. Catch (3)
25. To empty with a ladle (4)
 27. Result of "drinking like a fish" (1, 2)
 28. Fish eggs (3)
 30. A fibre for cordage (5)
 32. Change (4)
 33. Appropriately he is in the sick mosaic gourami (1, 1)
 34. And decorated on his return (1, 1)
 36. Abbreviation for female Saint (3)
 37. Cleopatra's snakes (4)
 38. In some fishes the formation of this fin reveals the sex (4)
 39. Steam ship (1, 1)

CLUES DOWN

13. Shams of leptocephali (6, 4)
 14. Labriform fishes are of this family (10)
 15. A snake can give this movement to fish if well shaken (6)
 16. This snake is rather large for an amateur (6, 6)
 17. Sea (1)
 18. Stream on river (5)
 19. Branch fish or rod (5)
 20. Branch (2)
 21. They were? (3)
 22. These are large cichlids (6)
19. If your water does this it will 13 across (6)
 20. Age of a goldfish (3)
 21. You cannot be out in this (2)
 22. Loses young prematurely (6)
 26. The airship fish need not give itself these (4)
 29. Prominent feature of celestial goldfish (4)
 31. Look from a loach (2)
 35. She is the source, and the end of *Almas* (2)

PICK YOUR ANSWER

1. *Stenobothrus halopterus* was named by Bleeker in: (a) 1830, (b) 1850, (c) 1870, (d) 1890.
 2. *Almas* was named after: (a) A Greek goddess, (b) An Italian emperor, (c) A Roman empress, (d) A Spanish botanist.
 3. The Nigerian barb is the popular name of: (a) *Barbus callipterus*, (b) *B. fasciatus*, (c) *B. lineomaculatus*, (d) *B. scirviensis*.
 4. *Ctenopoma muriei* is popularly known as: (a) The banded catfish, (b) The blue catfish, (c) The bronze catfish, (d) The brown catfish.
 5. *Stenobothrus callipterus* attains a length of about: (a) 1½ ins., (b) 2½ ins., (c) 3 ins., (d) 4 ins.
 6. The French naturalist, Lacépède, who named several of our aquarium fishes, was a: (a) Baron, (b) Count, (c) Duke, (d) Viscount.
 G. F. H.

(Solutions overpage)

NEWS

from Aquarists' Societies

Monthly reports from secretaries of aquarists' societies for inclusion on this page should reach the Editor by the 5th of the month preceding the month of publication.

SOCIETIES in the Midlands have formed a **Midland Association of Aquarists' Societies**, and membership is open to any aquarists' society. A course of lectures for potential show judges and lecturers has been arranged and it is planned to form panels of aquarists for these functions. Secretary of the Association is Mr. L. W. Male, 880, Kingstanding Road, Kingstanding, Birmingham, 22c.

Retail Aquarists' Association

WITH the object of the formation of an association for retail aquarists, a meeting is to be held on Sunday, 15th June, in the Club room, Longsight Hotel, Belle Vue, Manchester, at 2.30 p.m. Interested people are invited to attend, and those requiring tea after the meeting are requested to notify (before 12th June) Mr. F. Mitton, 130, Deane Road, Bolton, Lancs ('phone Bolton 4456).

Water Life Study Course

APPLICATIONS are invited for admission to a residential school course on water life at the Maria Grey College, Twickenham, from 26th July to 1st August. The course will study aquatic life in general but with special reference to the River Thames, and the lecturer is Dr. Barbara M. Walshe. For board residence and tuition the fee will be about five guineas, and enquiries should be sent as soon as possible to E. J. King, University Extension Courses, University of London, Senate House, London, W.C.1. A further course of study of fishes will be held in London in the autumn this year, to which the Twickenham course will form a valuable introduction.



The solid silver Cussons Trophy, awarded for the best furnished aquarium at the British Aquarists' Festival, will again be competed for this year in October at Belle Vue, Manchester. Present holder of this trophy is Blackpool and Fylde Aquatic Society. The British Aquarists' Festival, 1952, is being staged by the Federation of Northern Aquarium Societies in collaboration with "The Aquarist" and show entry forms can be obtained from Mr. G. W. Cooke, Spring Grove, Field Hill, Batley, Yorks.



Aquarist on Holiday

OPEN invitation to visit, for readers of *The Aquarist* who may be holidaying at or close by the following towns this summer, have kindly been sent from the addresses listed:—

Eastbourne

Mr. D. L. Cann (secretary to the Platy Breeders' Association), 44, Westham Drive, Pevensey Bay, Sussex (Tel.: Pev Bay 385).

Falmouth

Falmouth and District Aquarists' Society meetings—third Tuesday of each month, 7.30 p.m., at Belmont School, Woodlane, Falmouth (or contact Mr. N. J. F. Storey, Rosslyn Hotel, Kimberley Park Road, Falmouth (Falmouth 699), or Mr. A. J. Lanyon, Ingestre, Agar Road, Truro).

London

Willesden and District Aquarists' Club meetings—second and fourth Wednesday evenings each month at the Court Restaurant, 74, High Street, Harlesden, N.W.10 (secretary, Mr. F. W. Keen).

Swansea

Swansea and District Aquarists' Society meetings—first Tuesday each month, 7 p.m. at Swansea Central Library (or 'phone secretary, Mr. W. Hal Jones, Swansea 4296—day; Swansea 57332—evenings).

Torquay

Torquay and District Aquatic and Pondkeepers' Society meetings at the Belgravia Club, St. Marychurch Road, Torquay, on the following dates: 26th May; 13th, 23rd June; 11th, 28th July; 8th, 25th August; 12th, 22nd September; 10th, 27th October. Information will be supplied by the secretary, Mrs. H. R. Brooking, 25 Belgrave Road, Torquay.



Advance notices of events of particular interest to aquarists taking place in holiday towns are welcomed for publication by the Editor, and aquarists and societies in seaside and country towns willing to meet visiting aquarists are also requested to write.

Coldwater section of the exhibition staged by the Swansea A.S. recently. Chairman, Mr. F. Bassett Jones, is seen in the picture

Secretary Changes

CHANGES of secretaries and addresses have been reported from the following societies: **Ashton-under-Lyne and District Aquarium Society** Mr. R. Jepson, 56, Board Street, Ashton-under-Lyne; **Dorking Aquarists' and Pondkeepers' Club** (Mr. R. K. Williamson, The Haven, Nower Road, Dorking, Surrey); **East Lancashire Aquatic Society** (Mr. S. Wood, 15, Brun Terrace, Brownside, Burnley, Lancs.); **Forest Gate Aquarist Society** (Mr. A. Drake, 73, Edward Street, London, E.16); **North of Scotland Aquarist Society** (Mr. J. E. Ross, 248, Union Grove, Aberdeen); **South London Section Guppy Breeders' Society** (Mr. H. Pearson, 41, Highshore Road, Peckham, London, S.E.15); **The Aquarium Club** (Mr. G. R. Minson, 3, Brecon Road, Fulham, W.6); **Walthamstow and District Aquarists' Society** (Mr. M. G. Thompson, 131, Angel Road, Edmonton, N.18); **West Middlesex Aquarist Society** (Mr. C. L. Wood, 19, The Crossways, Heston, Hounslow, Middlesex).

New Societies

Berkhamsted and District Aquarist Club: Secretary: W. A. Sunderland, 91, Sherblands Avenue, Berkhamsted, Herts. Meetings: Fortnightly, Friday, 8 p.m., at The George Inn, Berkhamsted.

Colchester and District Aquarist Society: Secretary: G. Potten, 59, Greenstead Road, Colchester, Essex.

Lichfield Aquarist Society: Secretary: D. Lock, Tamworth Street, Lichfield, Staffs. Meetings: Second Monday each month, 7.30 p.m. at Old Crown Hotel, Bore Street, Lichfield.

Peckham Aquarists' Club: Secretary: A. N. R. Bird, 8, Brimington Road, Peckham, London, S.E.15. Meetings: Alternate Wednesdays.

Warrington, Lancs., area aquarists interested in joining a new society there are invited to write to Mr. D. Shepherd, 21, Green Street, Warrington, Lancs.

Aquarist's Calendar

5th-7th June: **East London Aquarists' and Pondkeepers' Association** Annual Show at St. Margaret's Hall, Ripple Road, Barking.
6th-7th June: **Winchester City Aquarists'**

Second Annual Show at the Guildhall, Winchester.

12th-14th June: **National Aquarist Society** Annual Exhibition in the Royal Horticultural Hall, London, S.W.1.

14th June: **North Hants Aquarists' and Pondkeepers' Club** Annual Show of fishes, etc., at Messrs. Thomas Whites & Co., Union Street, Aldershot.

17th June: **Falmouth and District Aquarists' Society** Annual Show at the Falmouth Aquarium, Prince of Wales Park, Falmouth.

18th-21st June: **Wembley and District Aquarium and Pool Association** Annual Open Show at St. John's Hall, Crawford Avenue, Wembley.

19th-21st June: **Swinton and District Aquarists' Society** Annual Show. Full details from Mrs. I. M. Jowett, 6, Lawn Drive, Swinton.

20th and 21st June: **West Surrey Pondkeepers' and Aquarists' Club** Annual Show in the Congregational Hall, North Street, Guildford (Friday, 12-9 p.m.; Saturday, 9 a.m. to 8 p.m.).

23rd June: **British Herpetological Society** (London Group) meeting "Lizards (*Lacertidae*)," 7 p.m. in the Linnean Society's Rooms, Burlington House, Piccadilly, London, W.1.

24th-28th June: **North of Scotland Aquarist Society** Exhibition of tropical and coldwater fishes at the Y.M.C.A., Main Hall, Union Street, Aberdeen.

19th July: **Greenwich and District Aquarists' Society** Show at Charlton House, Charlton Village, London, S.E.3.

Entries Invited

Bethnal Green Aquatic Society. This Annual Show, includes classes for furnished aquaria and fighting fish, open to all London societies. Entry forms from P. W. Hillier, Esq., 4, Evering Road, London, N.16. Date: 6th September (entries close 22nd August).

Blackpool and Fylde Aquatic Society. Open show of furnished aquaria. Details from G. Robinson, Esq., 17, Victoria Road, Poulton-le-Fylde, Blackpool. Date: 4th-11th August.

Bournemouth Aquarists' Club. Second Exhibition and Open Show. Details from G. Matley, Esq., Breezeland, Dean Swift Crescent, Parkstone, Dorset. Date: 12th-16th August.

Hendon Aquatic Society. Fourth Annual Open Show. Club and individual furnished tropical and coldwater aquaria classes. Entry forms from B. P. Calrow, Esq., 6, Ashburn Avenue, Ridgway, Middlesex. Date: 4th-8th August.

Romford Aquarists' Society. Open Show. Schedule and entry forms from R. Alley, Esq., 13, Hayburn Way, Romford, Essex. Date: 28th-30th August.

Crossword Solution

C	H	A	R	A	C	I	N	S	P	
O	N	C	N	E	A	P	E	D		
N	E	A	P	T	I	D	E	S	R	I
G	B	J	I	I	S	A	C	S		
E	V	A	P	O	R	A	T	E	H	P
R	N	N	N	O	A	E				
E	A	T	S	O	P	T	I	C	A	L
E	I	T	A	L	Y	N	A	B		
L	A	D	E	D	T	S	R	O	E	
S	I	S	A	L	H	V	A	R		
R	M	O	O	M	S	T	E			
A	S	P	S	A	N	A	L	S	S	

PICK YOUR ANSWER (Solution: 1 (b), 2 (b), 3 (d), 4 (b), 5 (d), 6 (d))

THE AQUARIST