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EDITORIAL

THE Case of the Railway Goldfish Deaths caught the
interest of newspapers recently. It was the subject
of a question put by the Member of Parliament for
Barnsley to Mr. Ernest Marsden, Minister of Transport.
Why, it was asked, did 4,800 goldfish in polythene bags,
which had been flown from Italy in 14 hours, take 3 days
to reach Barnsley by train from London? Because of the
delay the fish were dead when received by the owner of the
pet shop to which they were sent. The British
Transport Commission admitted that the delay was due to
"failure to follow the procedure which had been laid down
for dispatching consignments of this kind."
In one report
the owner of the goldfish was quoted as saying that the
goldfish had cost him £8.5, i.e., less than fivence each,
which when the air-transport costs are allowed for, provides
an interesting indication of the price at which the Italian
fish farmers are able to produce these fish.

ALGAE to plague the lives of aquarists that most of
us are ready to believe the worst that could be said
about these tiny forms of plant life. However, how
many would accept that algae can cause disease and death
in fishes by acting as internal parasites? A report from
a West Virginian fisheries laboratory published in The
Progressive Fish-Culturist (U.S.A.) describes how a number
of swordtails and kissing gouramies from a Florida fish
farm, at which many deaths were occurring, were found to
have a green alga within the tissue of skin, gills and internal
organs. This alga was found to resemble a European
species (Macrophila cyprina), and is not the first type to
have been recorded as a fish parasite in North America.

A Happy Christmas
to all our readers from the Editor
and Staff of The Aquarist
Fast-Growing Tropical

by C. D. SCULTHORPE

Manipulative pruning of species which are planted as cuttings often yields the finest bushes of foliage to be seen in aquaria. Species from which cuttings may be taken resemble each other in their mode of growths. All have erect herbaceous or woody stems bearing leaves, each of which has in its axil a lateral bud which is inhibited by auxin-like hormones produced by the apical bud. This feature is also shown by many terrestrial plants; in both aquatic and terrestrial plants the precise details of the physicochemical mechanism whereby the inhibition is maintained or removed are still obscure.

The inhibition is more or less powerful depending on the species; the natural growth habits of different species show different degrees of lateral branching. But whatever the natural state, the removal of the inhibition, and hence the promotion of lateral branching, is accelerated by the removal of the apical bud. Species suited to propagation by cuttings are also characterised by the absence of persistent primary roots, the continuous development of adventitious roots from the lower nodes of the stem, and a fast rate of growth. Although their ease of cultivation renders them excellent plants for the novice the decorative effects which may be achieved with them appeal to even the most dilettante of aquatic-plant connoisseurs.

The family Acanthaceae contains three genera of well-known aquarium plants: Hygrophila, Limnophila and Symonema. The genus Hygrophila contains some 20 species originating in the hotter countries of the world; the two post-war introductions to Europe, H. polyperma and H. salicifolia, come from India and both will form bushes of pale-green foliage which may be used to fill the corners and to mask the sides of the tropical aquarium. H. polyperma, which is sometimes erroneously referred to by European dealers as Hygrophila or Onagracis, has deciduous leaves (i.e. opposite leaves but with successive pairs oriented at right angles to each other) on thin smooth and usually herbaceous stems. A detached leaf often possesses some or all of the minute auxiliary buds and, if allowed to float, it will develop into a young shoot. The tiny insignificant flowers of H. polyperma are sessile and rose-purple in colour. This species tolerates a wide range of temperatures, light intensities and rooting media. Production of the adventitious roots is accelerated, as in the growing of most cuttings, by stripping off a few of the lower leaves before planting the stems. H. salicifolia is a larger species with long pointed linear-lanceolate leaves.
Aquatic Plants

(Photographs by the author)

The related species *Nymphoides stricta* (Vahl) Nees, commonly known as plant *Hygrophila*, originates in several countries of south-east Asia and is a large versatile plant. Juvenile leaves are lanceolate in shape, but the more mature ones are elliptical; the colour is usually pale green. Though slender and herbaceous when young, the stems of mature plants develop anatomical characteristics of woody stems. *Nymphoides stricta* branches profusely and soon forms a luxuriant bush; its only disadvantage is that the leaves occasionally disintegrate in small areas.

Undoubtedly the most useful decorative plant to have become available in recent years, *Symphonia trifoliata* (Roxb. ex Nees) O. Kuntze was introduced and named water wisteria by Shirley Aquatics Ltd. The species shows a leaf form ranging from lanceolate or oval to indented or deeply divided and this variation is often displayed by leaves of different ages on just one plant. There is a superficial similarity between the dissected foliage and the foliage of the Indian fern, *Gymnosporangium thallicolodes* (L.) Brengniart. The water wisteria branches profusely without the removal of the apical bud and very rapidly develops into a beautiful bright green bush. It tolerates a wide range of water conditions and thrives in almost any rooting medium.

*Rivipha nasturtium-aquarium* (L.) Hayek, the water nasturtium, resembles the water wisteria in superficial appearance as a result of the equally variable leaf form and similar colour; it, too, produces aerial leaves differing from the submerged ones in having a thicker, sometimes hairy, texture and darker-green colour. The water nasturtium differs, however, in being more widely distributed, in having an even wider temperature range, which enables it to thrive in cold water and tropical aquaria, and in being a rosette plant with all the leaves produced from a short basal stem rather than on a long vertical stem. It is not related to the water wisteria and it belongs to the great family Cruciferae.

The large family Scrophulariaceae, which includes genera of common garden plants such as *Antirrhinum*, *Nemorina* and *Pentstemon*, includes two genera of important aquatic plants, *Bacopa* and *Linnaea* (Ambulina). The two species of *Bacopa* commonly used by aquarists, *B. monnieri* (L.) Wettstein and *B. caroliniana* (Walt.) Robinson, are native to the temperate regions of the Atlantic coast of North America and are therefore suitable for both tropical and cool water aquaria. *B. monnieri* is a semi-aquatic species with slender stems bearing small, obovate, opposite leaves which are rather fleshy in texture and medium green in colour. The species blooms when it is grown in shallow water and each flower has a calyx of five distinct sepals and an almost regular corolla with five lobes in the form of a little white bell. *B. caroliniana* is a larger species with thick ridged stems, which are often hairy, and blue flowers. The foliage usually emits an odour as of lemon and, like that of the previous species, becomes tinged with a reddish-brown pigmentation at lower temperatures and under strong natural illumination. Both species are easily propagated by cuttings, which will rapidly take root in course sand or gravel.

The *Ambulina* species are aquatic or semi-aquatic herbs.
as *Eichhornia* (water hyacinth) and *Pontederia* (pickerel weed)—the Pontederiaceae, comprises about ten aquatic and semi-aquatic species distributed throughout North and South America. The Brazilian species *H. zosteriformis* Martius has long slender stems clothed with pale-green smooth leaves which may reach a length of 2½ to 3 inches when the plant is growing strongly. When the species reaches the surface it often produces darker-green aerial leaves with glossy surfaces; it will also bloom in a good light, forming above the water small blue flowers in a herbaceous spathe. The structure of these flowers clearly shows the systematic relationship of the species to the other genera mentioned above. The North American species *H. graminea* Vahl has sessile linear leaves of pale green and surface flowers which have golden perianth. Both these species multiply rapidly and are easily cultivated since they will thrive in a sand or gravel rooting medium and under normal artificial light. Of the two, *H. graminea* is the more tolerant of low temperatures and may be successfully grown in coldwater aquaria.

*Tillaea recurvata* Hooker, belonging to a genus dedicated to Tillis, an eighteenth-century Italian botanist, is distributed over most of Australia and nearby islands and is useful in tropical and coldwater aquaria. It is naturally a bog plant but it suffers no decrease of growth rate when it is submerged and indeed often forms dense thickets of foliage rising to a height of 10 or 12 inches. It has opposite spiny leaves which are brilliant green and borne at an acute angle to the stem rather than an obtuse one as the specific name implies. Some authorities have considered it necessary to remove this species to the related genus *Crassula*, calling it *Crassula striata* (Nees) Ostenfeld.

The genus *Ludwigia*, though comprising a large number of species, affords few really suitable aquarium plants. It is essentially a genus of temperate regions and only one species, *L. pulchra* (Gil., is found in tropical Africa. One admirable aquarium species, with a temperature range of 60° to 80°F, is *L. aurantiaca* Walter, commonly known as the needle-leaved *Ludwigia*. It is a semi-aquatic species whose
submerged stems bear short, very narrow, lanceolate leaves which, like those of other Ludwigia species, become suffused with a red pigment in cool water and under good natural illumination. Cuttings grow rapidly once they are established in the compost and, on reaching the surface of the water, will produce large golden-yellow flowers borne on long stalks.

One of the lesser-known species of bog plant which may be propagated easily by cuttings is the North American variety of Lobelia cardinalis L., which, at certain stages of its growth closely resembles the commonly used Lobelia cardinalis Elliott. When they are first obtained, cuttings of this species of Lobelia frequently have a rossette form, with leaves consisting of broad oval blades borne on long petioles. Once established in the aquarium, the plant often loses this appearance as the main stem begins to grow, and the leaves become smaller and more rounded, and are borne on much shorter petioles. Under a strong light the ascending shoots show a tendency to emerge from the water but this may be prevented, and the plant converted into a stout, attractive bush, by removing the apical buds and encouraging the development of lateral branches. If the shoots are allowed to emerge, terminal racemes of pinkish-tose red flowers will eventually appear.

Several of the species I have described in this article and in previous ones show plant movements. For example, sleep movements are displayed by Siumanu thyrsiflorum, Myriopogon pseudopapaveroides, Nanaphila stricta, Petelia stricta and Limnophila stricta. Preliminary observations have shown that the closing and opening of the apical foliage of these species does not always coincide with either the fading and brightening of natural light or the switching off and on of artificial light. Controlled experiments with clonal material, i.e., specimens of identical genetical constitution derived by vegetative multiplication, of each species under different periods of light and dark are required to study this phenomenon. It may then be possible to interpret the results both in the context of the light fluctuations occurring in the natural habitats of the species, and in the framework of some hypothesis based on the principle of diurnal rhythms. Most aquatic plants which produce surface flowers show various types of post-floral movements. For example the Female flower of Elodea species and Vallisneria species is drawn downwards by the contraction of the stamens, or peduncle, and by the weight of the developing fruit. In species of Nymphaea and Calla the flower stalks bend over until the ovary and decaying perianth are some distance below the surface of the water. It is reasonable to assume that for normal development to occur the fertilised ovary of the flower must be submerged. The movements are assumed, without any critical evidence, to be caused by a redistribution of the auxin-like hormones which are presumed to be present in the flower stalk. Goodrich considered that the post-floral movements changed in direction with the changing metabolism of the flower and fruit, and did not think that they had much biological significance. Here again, there is a need for experimental work.

AMERICAN RAT SNakes

by ROBERT BUSTARD

SNAKES discussed in this article belong to the genus Elaphe, which is well represented in the United States. Many collectors will already be familiar with these snakes through the European members such as the essouilpat snake (Elaphe longissima) and the four-lined snake (E. quadrivinata). Recently, when writing about king snakes, I listed the important attributes of snakes that were worthy of a place in the vivarium; the members of this genus possess them also. The only one on which they could be faulted is their lack of docility, since many specimens, when new, bite at anything that will serve as prey, but they grow tamer when newly purchased, are apt to snap at their own tails, and the snake should be dealt with its head only when necessary.

Elaphe, the genus name, is the Greek word for a serpent, and the word is applied to these constricting snakes. Their attractive coloration, the manner in which they adapt themselves to vivarium life, makes them most desirable specimens.

The yellow rat or chicken snake (E. oboleta quadrivinata) and the black rat snake (E. oboleta obotota) require identical treatment and do well together. Both grow to about 5 feet so should be housed in a vivarium about 36 inches by 24 inches by 28 inches. They are active snakes and can climb well. The yellow rat, as its name suggests, is yellow, being often a bright orange-yellow shade. It retains four faint longitudinal brown markings. These are more conspicuous in baby specimens and until the life history was known immature specimens were often considered to belong to a different species, so different was their appearance.

This juvenile colour scheme is common to many snakes, and the South African mule snake (Pseudopappelus constrictor) is another good example. The young specimens on hatching are blotched (this may be a case of disruptive coloration being useful camouflage); as they grow they slowly assume the adult hue.

Another handsome snake requiring the same conditions in the vivarium is the red rat or corn snake (Elaphe guttata). This is a magnificent creature, the ground colour being rich orange and the dorsal region has frequent red blanches which extend well on to the sides. These are edged with black, and black markings also occur interspersed with the orange on the sides. Vertically it is white with some black markings.

Vivaria for Constrictors

My vivaria for these constricting snakes are covered with a good layer (about 3 inches) of dry sand as a soil, and on top of this 1 inch of dry moss and some heather. Branches are provided, as all these snakes are good climbers and the pool is large enough to allow them to lie in it. They will seldom enter the water normally, although they drink frequently, so the water should always be kept fresh. When they are about to slough, however, at which time the eyes are decidely bluish, owing to the old skin which covers the eyeball, they frequently enter their pool and rear largely submerged for a day or so, thus softening the skin and enabling the moult easier. This is most likely to happen after a journey or when newly purchased. When settled down in the vivarium and in the best of health they often slough in one piece without first entering the water. As with all of their order their colours are at their best soon after sloughing. The best temperature for them is about 78°F during the day, falling to 50 to 65°F at night.

THE AQUARIIST
habitats, especially farms, where they are attracted by the mice. All feed predominantly on mice and should therefore be protected. They are voracious feeders and will follow the rodents down their burrows and eat them and their young. The chicken snake receives its name because it is said to enter hen houses (possibly attracted in the first instance by mice) and eat the young chickens and eggs. Certainly these snakes will eat eggs, which are swallowed whole, there being no special mechanism for breaking the shell as in the egg-eating snake (Dasyptusequalis). Hens' eggs are perfectly acceptable since adults are far too large to be swallowed, and they can cope with them easily. I feed all my rat snakes largely on mice.

The common name "rat" snake is really a bit of a misnomer, since, as mentioned, they do in nature feed largely on mice. The speed with which they constrict and consume a mouse has to be seen to be believed. When I first obtained some of these snakes I had kept a number of boa constrictors (Constrictor constrictor), and was accustomed to see the slow swallowing process, where one side of the jaw edged slowly forward, and took a new hold, to be followed, after a pause, by the other side. The rat snakes on the other hand swallow their prey very fast and indeed, an adult specimen will have eaten a couple of mice before a similar-sized boa has swallowed one.

Incubation of Eggs

These snakes quite often lay eggs in captivity and most collectors will wish to make an attempt at hatching them. The main problem is to keep the eggs sufficiently moist, and at the same time warm (75 to 80°F). If they become too moist they will develop fungoid growths and perish, and if too dry they will shrivel up. The eggs of all snakes are covered with parchment-like shells which absorb moisture during the incubation period. The eggs actually increase in size and weight considerably as the embryo develops, owing to water uptake. The eggs, if collected whenever they are laid, can be buried in damp sand in jars covered with glass to avoid evaporation, or buried in a manure heap in a vivarium. If the latter method is followed they must be examined at least twice a week, disturbing them as little as possible, and any that look diseased or have shrivelled up should be removed.

There are several other species which are available occasionally and which require similar treatment in the vivarium. The price of an adult specimen will be in the region of 4 or 5 pounds but youngsters, which grow quickly and are interesting to watch assuming they adult coloration, can sometimes be procured for about 50 to 60 shillings.

Top: two young specimens of the prairie blotched chicken snake (Elaphe obsoleta). Centre, yellow rat or chicken snake (Elaphe obsoleta quadrivittata) with eggs. This species grows to about 5 feet in length. Bottom, a handsomely coloured and easily kept rat snake is the red rat snake (Elaphe guttata)
THE BRITISH AQUARISTS’ FESTIVAL

The British Aquarists’ Festival held at Belle Vue, Manchester, at the end of October was a great success.

Not only were there more clubs competing, 23 in all, but the number of entries had increased over last year by 250. Not only were the entries up on all the recent shows but the numbers of visitors far exceeded even the most optimistic hopes of the promoters. Both on the Saturday and Sunday the hall was filled with enthusiastic aquarists who crowded round the exhibits and traders’ stands. The size of the hall had been increased to 170 feet long by 70 feet wide, and it appeared at most times more filled with people than had been the case for many years.

Those pessimists who have doubted the increase of interest in fish-keeping during this year would have been greatly surprised to see this fine show and the interest taken by so many aquarists. We can be sure that at any rate in the north the interest is far greater than for some years.

The Federation of Northern Aquarium Societies can be congratulated on organising such a fine show and the many clubs participating can also be highly praised for their wonderful efforts. It was not easy for some of the clubs coming from a distance, from Sunderland for instance, to get all their tanks, tanks and fishes to the show. The clubs each erected their own stand and these ranged from fairly small and neat ones to others much more ambitious; one was 40 feet long! When the first of this type of show was held there were many spectacular exhibits which appealed to the public, but the idea at this year’s show was to present the exhibits not only neatly but also so that aquarists were able to inspect the fishes more easily than
FESTIVAL, 1960

before. At the first few shows of this kind it was often almost impossible to view the tanks closely, but at this show every tank was in such a position that it could be examined with ease.

The usual bands of workers very efficiently carried out their difficult task, and aquarists in the south would have been amazed at the type and attractiveness of the results of their efforts. Of the many neat stands, that of Salford A.S. was considered the neatest, but they were closely run by several of the others. Dewsbury A.S. was one club which narrowly missed the first prize by having an empty tank in their exhibit; just carelessness, I suppose, for it could have been filled with water and had a couple of plants in it to have made all the difference.

The style of show where each club is responsible for the erection of its stand is a very good idea, except for the convenience of the judges. I have had to judge many shows all over the country for a number of years but the Manchester show is by far the most difficult and tiring to judge. I had six classes to judge and when one thinks that the fishes competing in one class may be found on any of the 23 stands it can be realised that to walk about finding them and then making comparisons was no easy task, and, as one judge put it, one needed scales to get around.

It was heartening to see that the coldwater fishes were more numerous and of better quality. A few years ago there were only a couple of coldwater fishes on show but at this show there were very many, most of them exhibited by the Northern Coldwater Society. The quality of all the winners was very high and shows much improvement.

To sum up, the whole show, with a Sunday afternoon lecture by Dr. Gwynne Wevers, proved to be an enormous success and before it was over many were talking about the one to be held next year. It was not surprising that the show attracted visitors from Northern Ireland, Scotland, the south of England and even Holland. On Sunday a coach load of members of the Hendon Aquatic Society arrived to give an evening lecture with colour slides.

A. BOARDER
THE ANGEL FISH

by R. E. MACDONALD

Angelfish are the most popular of all tropical fishes, even perhaps to the uninstructed. When reference is made diagrammatically or otherwise to the various species of tropical fishes, the familiar black-barred, disc-like creatures with the filamentous pelvic fins are always produced as an example.

Angelfish belong to the genus Pomacanthus; they are members of the Cichlidae family and their natural habitat range includes the Amazon Basin. There are three species:

1. Pomacanthus synclini
2. P. valencienni
3. P. altum

Species (1) and (2) are so similar in their colour patterns that the only way to distinguish between them necessitates taking a scale count; this particular method of identification of a species is regarded as infallible. The method practised when taking a scale count was explained in my article “Breeding the Bumble-Bee Fish” (published in The Aquarist, May, 1960). On examination, P. synclini is found to possess from 28 to 36 scale rows and P. valencienni from 36 to 40 scale rows. P. altum, which incidentally, is consistently regarded as being a most unpopular aquarium fish, possesses from 41 to 47 scale rows.

The temperament of this genus is not so different from...
that of any other genus of the family Cichlidae, for they can be just as precocious and abusive, particularly at spawning time, as any of their cousins. Small fishes quickly develop chowed-up fins when in the company of angel fish if they can stay around long enough and do not get chowed-up to the point of digestion on introduction to the tank. Apart from fin-nipping habits, angel fish can become quite adept and sedulous in the art of fish-swallowing. From this it can be seen that angel fish are most certainly calamholic by nature. Like all bullies, however, these fish are easily frightened by shadows and quickly lose their colour when this occurs, so the tank should be well planted with such vegetation as Amazon sword plant (Echinodorus brevipedicellatus), the beautiful Madagascar lace plant (Apomicton convolutus) and giant sagittaria (Sagittaria sagittifolia).

Much attention should be paid to the question of vegetation, particularly if the tank is situated in a busy location. Angel fish are the only members of the Cichlidae family, apart from the dwarf cichlids, that will tolerate plant life in the aquarium.

Because angel fish are temperamental, it follows that temperament will play an important part in the pairing and breeding of these fish. For breeding purposes, "group pairing" is achieved by massing together as many angel fish as the tank and pocket will allow in one aquarium before the fish reach breeding size, i.e. approximately 3 inches. It will be noticed that as the fish settle down, pairs will separate themselves from the rest of the community and appear constantly to fight each other. Despite this strange way of showing affection, there can be every hope that the two fish observed acting in this manner will prove to make a satisfactory breeding pair.

Once paired, the angel fish will not allow any interloper to interfere with their wifely family squabbles and any intruder is instantly dispatched with a snorting, quavering semicircular motion due to the quick mouth-work of the outraged couple.

Generally speaking, angel fish make good parents and should be allowed to tend their young, but like so many other cichlids, young parents are not always good parents and therefore require careful watching. There is always the chance that an argument could start over a baby that has just happened to slip down somebody's pharynxal cavity, with the result that very soon all the fry start slipping down pharynxal cavities!

Eggs can also become quickly associated with parents' digestive organs if Mum and Dad are badly frightened in any way after spawning, so it becomes essential to take precautions against noisy neighbors as obviously all angel fish hold the opinion that the safest place for their fry at moments of danger is in the parent's stomach.

Breeding the angel fish is a task for the experienced aquarist and requires a good amount of "know-how," but briefly, for those interested, the standard procedure is as follows.

Each set of paired fish are placed in their own 15 gallons tank containing clean, slightly acid water (between pH 6.6 and 7.0), with the breeding temperature of 80°F. The spawning medium on which the fish lay their eggs can be either broad-leaved vegetation such as the Amazon sword plants or a piece of slate tilted on its side in the aquarium. Angel fish have been known to deposit their sticky eggs on glass tubes stuck upright in the sand.

The pair are then well conditioned by feeding with Tubifex, Daphnia, white worms and small fishes, e.g. newly hatched guppies. Remembering, of course, that angel fish are carnivorous. Within a few weeks the fish will begin to clean the surface of the selected spawning site thoroughly and afterwards to deposit their spawn.

Once the eggs are laid the parents will begin to fan them with their pectoral fins. This action serves two purposes:

1. It washes away any natural sediment that may be deposited on the eggs, which could cause a bacterial infection, and it also washes away any fungus spores that could destroy the eggs. From experience I have found that if it causes no harm to assist the parents in this fight by adding 2 drops of a 5 per cent. solution of methylene blue to the water in the breeding tank. (2) It ensures a constant supply of freshly oxygenated water to the developing embryos. This fanning action can be artificially reproduced by allowing a stream of bubbles from an aerator to pass over the eggs.

Once hatched, the fry can be fed on Infusoria such as rotifers and later with sifted Daphnia. If well looked after, angel fish can grow to some 5 or 6 inches in size.

One important factor that should not be overlooked is that concerning light. Angel fish need at least 12 hours of light per day, artificial or natural, and, if possible, the tank should be allowed a small fraction of direct sunlight. It is thought that the light cycle received by the fish affects the spawning cycle. This point is important as it is only by supplying the right kind of care and environment that specimens of the genus Petroglyphum can eventually be induced to reproduce.

Cacti in the Fish house

The Christmas cactus, Zygocactus truncatus, should flower later this month. This plant is sometimes called the lobster plant as the flattened stems resemble the claws of a lobster. The cerise-red flowers are borne on the ends of the stems and when the buds are forming great care should be taken to ensure that no draughts reach the plant or the buds may fall. The same thing may happen if the plant is moved from one room to another, if too dry or too wet. A little liquid fertilizer may be given once a fortnight when the buds are half formed.

December, 1960
MUCH has been written about feeding fish generally and I do not propose to enlarge on this subject. However, I must make one or two points. Live food is the most important part of the diet for guppies and I would say a must: screened Daphnia, brine shrimp, Grindal worm or chopped white worms; one of these foods should be offered every day in moderation. The guppy is a bag for food and can so easily be overfed, with consequent indigestion or constipation, to both of which guppies become easy prey.

Food size is important and everything that is offered should be capable of being forced through the average tea strainer of fairly coarse mesh. “Feed a little and often” is very true for guppies, and mine are fed four or five times a day. I make a policy of feeding youngsters as much as they will eat until they are 6 weeks old, and then I reduce the quantity considerably. Overfeeding can cause you more trouble with adult fish than almost anything else, and if your guppies do not rush to the front of the tank whenever they see you, then you are certainly overfeeding them.

Watch your fish for outline, and if the males have bulging tummies and the virgin females look almost gravid then you are overfeeding and you must cut it down. Overfed females will often droop their dorsals, and a spot of fasting for a day will work wonders with their general liveliness and deportment. Vary the diet, too, as much as possible and do not rely on only one brand of dried food, no matter how well advertised and expensive it is.

It is possible to enhance the colours of the males by special feeding, though a really fit and healthy male needs no help to make him sparkle. However, I will give some details of colour-intensifying foods. The coloration on a fish comes from pigment cells: melanophores giving black, brown or yellow depending on the concentration, erythrophores giving reds and chromatophores giving yellow. There is also a waste material, guanin, present in crystal form which may be mixed with the colour cells or lie freely in the skin, producing a silver coloration. Thus blues and greens are the effect given by colour cells intermingled with guanin.

The fish’s colour intensity is due to expansion or contraction of the colour cells, which is controlled by two chemicals in the blood (hormones), which have an effect on the pigment distribution. Colour pigments are derived from eating vegetation; suitable vegetable extracts may thus be fed to guppies to increase their colour.

Carotene obtained from young carrots will improve the reds, yellows and oranges, and old potatoes will improve the blacks and browns. Young deep-red carrots or old potatoes should be grated over a dish and then the juice squeezed out in a muslin bag. This juice can be mixed with Bimex or other dried food and spread on a plate for sun- or oven-drying. The mixture should be dried quickly, but not made too hot in an oven, or the essential part will be destroyed. When quite dry the mixture may be ground to a suitable size and fed alone or mixed with other foods. The colour intensification is a slow process, though a lasting one.
THE SIMPSON SWORDTAIL

by GENE WOLFSHEIMER

The latest new livebearer variety in the local area of Los Angeles, California, is the sensational Simpson Swordtail and for once, in my opinion, the adjective certainly fits the subject.

Mr. and Mrs. Thomas Simpson of Gardena, California, happened to see the first little high-finned swordtail, *Xiphophorus helleri*, swimming about with its normal brothers and sisters. It was saved because it was "so cute." This fish turned out to be a male. The original parents are somewhat obscure but one was a brick-red male and the other a "blue" swordtail. Naturally, the Simpsons found their single specimen with his long flowing dorsal fin much more "cute" as it grew up. It became most beautiful and high hopes were maintained that its future offspring might resemble it. As mates he was given a number of velvet-red swordtail females.

To-day, thousands of these Simpson swordtails are being produced in an attempt to fill the overflowing orders coming in for them. From experiences with my own breeding stock it has been found that these high-finned red swords are still not breeding true colours as yet. One spawning can include various shades of red as well as golden and some green. Constant breeding back to velvet-red swords will in time bring about a true strain of this long-finned red swordtail.

Even though various colours and shades still exist from one spawning, the majority of the young definitely are of the high-finned stock. In fact, the long fin is noticeable even on very young specimens. The dorsal fin on the females as well as the males begins to lengthen when the fish are still small, long before the sex is apparent. Although this variety of swordtail reaches a length of 4 to 5 inches, small ones with full growth of both swordtail and high dorsal fin can be grown through control of food and swimming space. These smaller specimens are ideal for the smaller aquarium.

(Reprinted from The Aquarium Journal, U.S.A.)
Reproduction in Water Fleas

MR. C. F. S. COLE'S letter (The Aquarist, September) calls for reply on three points.

1. My original letter was prompted by the feeling that in putting forward my own observations Mr. Cole was sweeping aside somewhat contemptuously, other views on this controversial topic. My aim was to put on record results and conclusions of other workers who have by observation and experiment come to conclusions different from those of Mr. Cole. I did not intend to belittle the meritorious efforts of Mr. Cole. In this connection, my use of the word "quite" was unfortunate, and if I appeared rude, it was unintentional and I apologise. I still maintain that the large amount of work which indicates a correlation between ephippial production and food supply is not something which can be lightly dismissed. I agree with Mr. Cole that his observations are not to be explained in terms of food supply, but nevertheless what is needed is a more general picture which will embrace and adequately explain both Mr. Cole's observations and those of others, not the discarding of the general consensus of opinion because a new set of facts are not in agreement. I would ask Mr. Cole why it is that, if development of ephippia is merely a stage in the life history, taking place because the Daphnia have reached the age or size at which ephippia are produced, ephippia are not produced all the year round? If they are found only at one season, surely some environmental influence is at work.

2. There are exceptions to the general rule that viable young are produced from ephippial eggs only when these are fertilised. Obsoletum (D. 1918) and Edmondson, W. T. (1955) have made observations on Daphnia populations in which no males have been found. These populations may not in winter and were entirely dependent on production of resting eggs for their continued existence. It could be argued, however, that though not found, males may yet have been present though extremely scarce. There is, however, laboratory evidence also. Papers published in 1920 by Banta and by Schoneder showed definitely that a clone of Daphnia pulzsi was able to produce viable ephippial eggs without fertilisation. Males were never produced.

3. I wish that Mr. Cole would distinguish clearly between fact and fancy and between objective and subjective judgments. It is to imagine a female Daphnia which is "ephippial-minded" or a male Daphnia as "amorous" or capable of "taking a hint"; and placing these expressions in inverted commas does not to my mind make them any less fanciful but only suggests that the writer does not mean quite what he says. I do not object to Mr. Cole holding these opinions, but I do feel it is wrong to present them as if they were statements of fact.

To take but one example: "But the females shake them (males) off, unless they are 'ephippial-minded'." The first half is a statement of observed fact, the second is a subjective opinion, unverifiable and almost certainly imaginary. Other examples occur in the last paragraphs of Mr. Cole's letter. Is it really true that there is no way of proving that a female ready to lay eggs is less vigorous than a parthenogenetic female? Berg's depression hypothesis lends some substance to this idea (for a review see Berg, 1934). I would have thought that rate of heart beat or antennal swimming movements could be measured and used as an indication of activity.

MR. W. J. P. SMYLY,
Ambleside.

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Keeping to the Point

I AM surprised that Dr. R. Affleck should imagine that I have any desire to "have a go at him" as he puts it (The Aquarist, October). Surely "the boot is on the other foot." I also regret that he should find it necessary to accuse me of evasion, and to imply that I am a liar.

However, let us take his points one by one and see what they are worth. In his first paragraph he says that my reference to his use of the erroneous term "non-scaled," had nothing to do with the point in question. Now, what was the point? He suggests that it had only to do with the use of U.S.G.R. terms. But in his final remarks on this subject he stated that these references were "inaccurate and misleading." Now, I put it to you: non-scaled: inaccurate and misleading, or not?

He next suggests that I am a stranger to the truth, since he can find no one in the G.S.G.R. who remembers my remarks on the three groups. To this I must ask, is Mr. Pearce of, I believe, Furnasborough, still a member? He and I were in complete agreement on this point. There is also an article which I wrote in The Aquarist (April, 1958) entitled "Goldfish Fallacies," where I stated my views on
this matter in no uncertain terms.

Now as regards his statement that I have hinted of knowing more about the inheritance of reflecting tissue than the rest; this simply will not bear investigation. Because a man states that he is aware that certain views do not fit other facts, that neither implies nor suggests that he personally does know what views will fit these facts. He merely states that in his opinion, the accepted views do not.

Finally, there is the kidney problem, which I am supposed to have evaded. If Dr. Affleck will deny categorically that the kidneys of fish have anything to do with the iridescence factors, then I will gladly give a full account of why I think otherwise, although I still think my previous statement sufficient.

A last word as regards evasion. Since in this last letter Dr. Affleck makes no reference to the ability of aquatic plants to release oxygen into the water under the influence of photosynthesis, are we to assume that he not only enjoys reading Mr. C. D. Sculthorpe's letters, but is also in complete agreement with that gentleman's statement (made on two occasions) that 'gases produced within the plant are most definitely not passed out into the water.'

For those newcomers to fish-keeping who really want to know the answer to this I suggest the following. Procure a large glass test tube, fill it with water, and place it over a piece of hornwort (Ceratophyllum demersum) so that the plant is completely encased by the tube, the whole contraption being housed in a container sufficiently large to support a small fish. If this is exposed to full sunlight during the summer months it will be found after a few weeks that the tube is half full of oxygen and therefore afloat. That the gas is definitely oxygen may be proved by placing one's thumb over the lower end of the tube, inverting it, and applying a glowing splint, which will be seen to burst into flame.

N. E. PERRINS
Beckenham, Kent.

Breeding of Siamese Fighters

A FEW days ago I was fortunate enough to see a pair of Heterophyllum spawning in the 5-gallon tank I had prepared for them. I have been a keen aquarist for over 10 years and have spawned fighters before, but this was the first time I had seen the actual spawning taking place—and I got a shock! I know that authors of various books on tropics may disagree about a lot of things, as your article “Vallisneria is a Mus” so aptly showed, but they all seem to agree that after an embrace the male recovers first, swims down after the eggs and deposits them in his bubble-nest.

During the spawning I witnessed, however, the male did not deposit so much as a single egg in his nest. Certainly he recovered first, almost immediately, but he remained just below the nest. Meanwhile the female sank down after the eggs and frequently did not recover until reaching the bottom of the tank (depth 9 in.). There she picked up the eggs and as she swam upwards she released the eggs, which floated, in their bubbles, up to the nest. The bubbles did not rise singly—as they often did—they were all stuck together like a miniature bunch of balloons. The female never swam right to the surface to deposit the eggs in the nest. They were always released midway. Everything else was perfectly normal (as in the books). The female took no part in nest-building and was driven away when spawning was completed. The male guarded the eggs, which proved to be fertile, quite faithfully.

I wonder if I have an unusual pair, or if many authors accept facts, as I did, without testing them?

W. A. CLEWS
Chorley, Lancs.

December, 1960
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.

THE first 50th of the Year Show at the last meeting of the Bournemouth and District A.S. was won by Mr. Grant with a display of a Black Gourami, followed by third prize to Mr. Finlay with a display of Guppies, second place to Mr. White with a display of Black Nettles and fourth to Mr. Liddin with a display of black velvets. At the conclusion of the display the Chairman, Mr. H. W. Jones, announced the winners and presented the trophies.

At the second meeting of the season of the

THE new monthly feature is news from AQUARIST STATIONS. Each month we will feature a different station, highlighting its recent events and successes. This month, we will highlight the Birmingham and District Aquarists' Society (B&DAS).

B&DAS has been active in the aquaria hobby for over 50 years, with a strong emphasis on community outreach and education. The society has over 200 members, ranging from beginners to experienced aquarists. They meet monthly to share their knowledge and passion for the hobby.

At the latest meeting, the society hosted a talk on the benefits of aquaponics, a sustainable farming method that uses fish waste to fertilize plants. The talk was given by Dr. Sarah Thompson, a leading expert in sustainable agriculture.

In addition to the regular meetings, B&DAS organizes various events throughout the year, including a 50th Anniversary Celebration in June and a Christmas Carol Concert in December. These events provide a platform for members to showcase their tanks, share their knowledge, and socialize with other enthusiasts.

The society also participates in various aquaria competitions, both locally and nationally. They recently won first place in the Best Display category at the National Aquaria Show, a testament to their dedication and skill in the hobby.

B&DAS believes in giving back to the community. They have partnered with local schools to set up aquaria in classrooms, promoting science education and encouraging a love for the natural world.

The society's commitment to education and community engagement has earned them recognition from the local government and other aquaria organizations. They continue to inspire and educate others, making the B&DAS a valuable resource for the aquaria community.

Next month, we will feature another society, highlighting their unique approach to the hobby and their contributions to the aquaria world. Stay tuned for more updates!
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December, 1960
AQUARIUM STOP

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E.C.D.—Early closing day.

BERKSHIRE

The Reading Aquarium
64, King's Road, Reading
Telephone: Reading 53632
E.C.D. Wednesday R. C.T.P.A.A.

BUCKINGHAMSHIRE

Brown, K. G.
190, Amersham Road,
High Wycombe
Tel. 1573
R. C.T.P.A.A.

CHESHIRE

Grussby, Joe, F.R.H.S.
"The Glen" Fisheries, Mobberley, Nr. Knutsford
Tel.: Mobberley 3272
W. C.T.P.A.A.R. & A.

Robert Jackson (Naturalists) Ltd.
Holly Bank Nurseries, Grove Lane, Hale
Telephone: Ringway 3301
WR. C.T.P.A.A.R. & A.

DURHAM

Metcalf, G. R.
2, High Northgate
(On main A.1 road) Darlington
Telephone: Darlington 5991
E.C.D. Wednesday R. C.T.P.A.A.R. & A.

ESSEX

Goodmayes Aquarium
Shaftesbury Parade, High Road, Chadwell Heath
Telephone: Goodmayes 2594
E.C.D. Thursday R. C.T.P.A.A.

The Hamlet Aquarium
14, St. Helen's Road (off Hamlet Court Road),
Westcliff-on-Sea
Telephone: Southend 44724
E.C.D. Wednesday
WR. C.T.P.A.A.

HAMPSHIRE

Arundel Aviaries & Fisheries
211/213, Arundel Street, Portsmouth
E.C.D. Wednesday
WR. C.T.P.A.A.R. & A.

Wingate Zoological Supplies
46, Jewry Street, Winchester
Telephone: Winchester 2806

HERTFORDSHIRE

Cara, L. & Sons
Water End, Hemel Hempstead
Telephone: Water End 44
E.C.D. Saturday W. C.R.P.A.

Wat-Pet Stores
66-68, London Road, St. Albans
Telephone: St. Albans 55939-55907
E.C.D. Thursday
WR. C.T.P.A.A.

KENT

Aquatic Suppliers
1 Castle Street, Tunbridge Wells
Telephone: Tunbridge Wells 291
E.C.D. Wednesday
WR. C.T.P.A.A.

Kingfishers Aquarium
138, Croydon Road, Beckenham
Telephone: Beckenham 3716
E.C.D. Wednesday (all day). W.(P), R. C.T.P.A.A.

Sherwood Pet Stores
(Proprietors, Fairbairns Aquaria, Ltd.),
252, Sherwood Park Avenue, Sidcup
Telephone: Bantry Heath 7217

LANCASHIRE

Hornby's
Trafford Bar, Old Trafford,
Manchester, 16
Telephone: Trafford Park 2989
E.C.D. Wednesday R. C.T.P.A.A.R. & A.

Letty Kremmer
34, Chesterhill Hill Road,
Manchester, 4
Telephone: Bla 2163
E.C.D. Wednesday W. C.T.P.A.A.R. & A.

Liverpool Aquaria Company
23, Sir Thomas Street, Whitechapel, Liverpool, 1
Telephone: Central 4691
E.C.D. Wednesday R. C.T.P.A.A.R. & A.

"Stanleys"
110-112, Shakespeare Street, Southport
Telephone: Southport 5369
E.C.D. Tuesday R. C.T.P.A.A.

LONDON (Central)

St. Martin'sKennels, Aviaries and Aquaria
49, Monmouth Street,
Upper St. Martin's Lane, W.C.2
Telephone: Temple Bar 4532
E.C.D. Saturday R. C.T.P.A.A.R. & A.

LONDON (North)

The Aquarium
41, Commerce Road,
Wood Green, N.22
Telephone: Bowes Park 9786
E.C.D. Thursday R. T.P.A.A.

Philip Castane Ltd.
91, Haverstock Hill,
Hampstead, N.W.3
Telephone: Primrose 1952 and 9452
E.C.D. Saturday W. T.P.A.A.R. & A.

 Paramount Aquarium
95, Haverstock Hill,
Hampstead, N.W.3
Telephone: Primrose 1952 and 9452

LONDON (South)

Fairbairns Aquaria, Ltd.
13, Well Hall Parade, Eltham, S.E.9
Telephone: Eltham 5859

The Jay妞r Organisation
(James North (London) Ltd.)
316, Lee High Road, Lewisham, S.E.13
Telephone: Lee Green 3717
E.C.D. Thursday WR. C.T.P.A.A.

Johnson's Aquarium
223, Longley Road,
Tooting Junction, S.W.17
Telephone: Balham 6742
E.C.D. Wednesday (all day). WR. C.T.P.A.A.
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