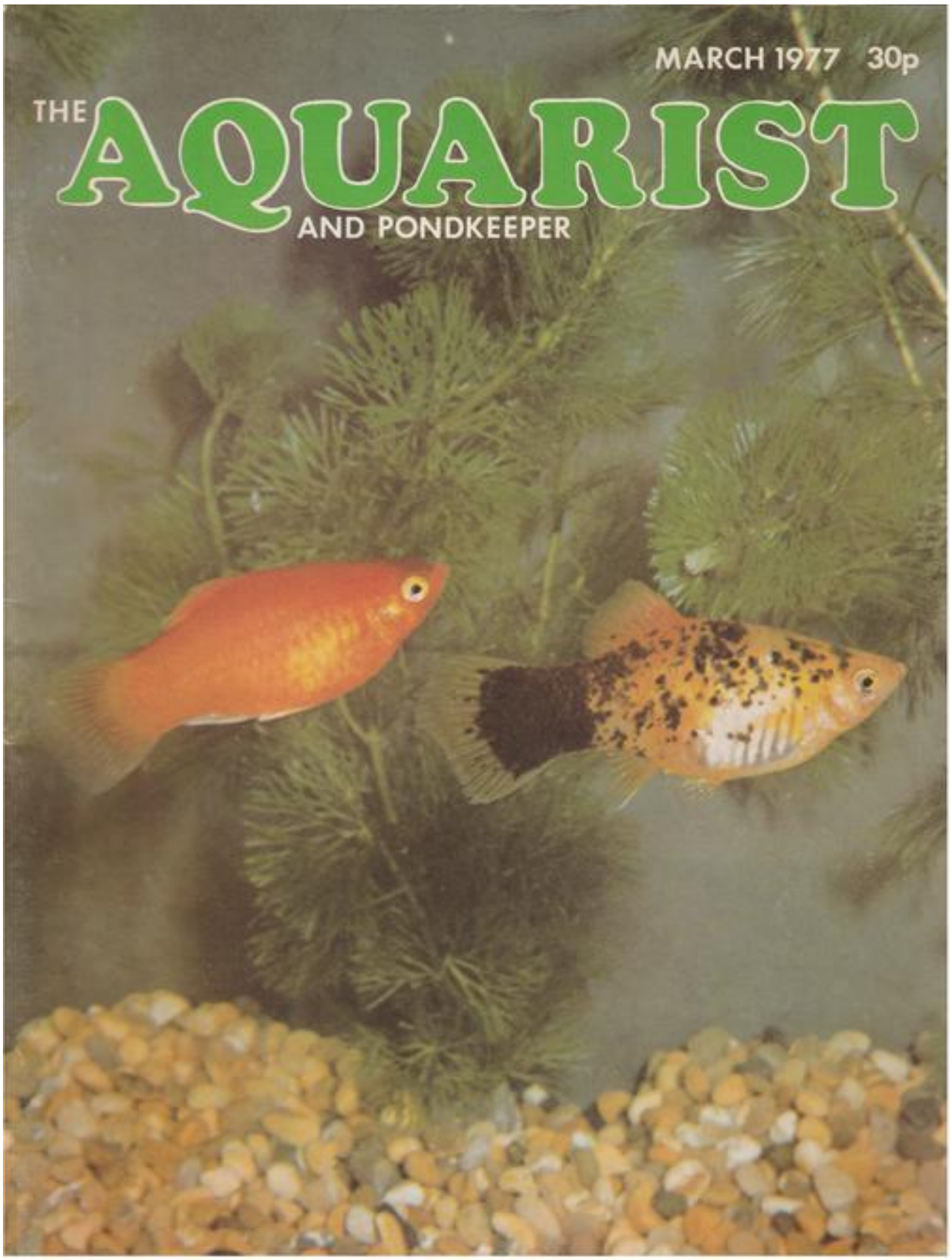
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THE AQUARIST
AND PONDKEEPER

THE AQUARIST AND PONDKEEPER

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[illegible] Laurence E. Perkins
[illegible] Manager:
[illegible]

Our Cover:
Xiphophorus variatus

THE VARIATUS PLATY

Written & Illustrated by Jack Hems

Herr Kurt Jacobs, in his diligently researched and beautifully illustrated (line and colour) *Livebearing Aquarium Fishes* (Studio Vista, London, 1971), states that there is one species of variable or variatus platy ('platy,' be it noted, after *Platypoecilus*, the generic name applied to all aquarium platyfishes earlier than 1963) and two bub-species.

Xiphophorus variatus—to give the subject of this article its technical label—is widely distributed over the Rio Panuco and Rio Jamesi river system in eastern Mexico; the sub-species are localized. The fish occurs in still waters (lakes and ponds) as well as running waters. It is larger and more elongated in the body and dorsal fin than its congener, *X. maculatus*, the common platy from southern Mexico to Guatemala and beyond. Further, though *X. variatus* occurs in more than a few different colour forms or geographical races in the wild, *X. maculatus* has the largest variety of colour patterns than any other vertebrate indigenous to Central America. So Herr Jacobs.

Even so platyfishes found in the natural state are drab in comparison with the aquarium-bred forms known to the aquarist at the present time. Let us return, however, to the variatus. This fish, sometimes designated in books published many years ago as the Montezuma platy, did not appear in dealers' tanks until 1931-1932; whereas *X. maculatus* was known to hobbyists years earlier. At full size, the domesticated male variatus reaches a length of about 2 in. The female, heavier bodied than the male, attains 2½ in. or more. A temperature in the middle sixties (°F) can be endured for a short period of time provided the fall is very gradual and, almost always, without any untoward effect. (The visible signs of physical distress brought about by too low a temperature are inactivity and the adoption of a slightly head-up position in the water. All the same, I hasten to add that there are other signs too involved to go into here). Normally it is advisable to maintain its aquarium in the middle to upper seventies (°F).

X. variatus is ideally suited to add life and colour to a community tank. It is peaceable, easy to feed on any food readily acceptable by non-finical fish, active, swims at all levels in the water and does not hide away in the plants. It has a life-span of about two years.

The female delivers young about every seven or eight weeks of her productive life. As the day of parturition draws near the typical gravid spot of the general run of the *Poeciliidae*—an almost circular patch of slate-blue in the posterior part of the increasingly distended abdomen—assumes an inky blackness. It is said that as many as 200 young have been delivered by a large female. Ordinarily, however, the number of young delivered at short intervals is much smaller, say, about 30 to 70.

The beginner must be warned right away that a male or female variatus will mate with any other species of *Xiphophorus* such as the swordtail. Hence it is of the greatest importance to keep a pair of good quality variatus isolated from other members of the genus *Xiphophorus* to prevent undesired cross-breeding taking place. Indeed, it is the ardour with which species of *Xiphophorus* have sexual relations with one another that has played such an important part in the creation of new colour varieties with fancy fins (derived, of course, from swordtail ancestors or from sports or mutations).

The male variatus of years past was essentially greenish olive on the back giving to brighter hues lower down as, for example, yellow speckled with

black over patches of green, lilac-blue or red. Some old-time males had their sides adorned with darkish bars. Forms with black blotches on the bottom and top parts of the caudal peduncle or a black bar encircling the root of the tail were common (they occur in some variatus today). Another thing, the male was usually characterised by a yellow dorsal fin and a red tail-fin. The females of between the two World Wars lacked the more exciting hues of the males and were garbed in olive-green shading to white underparts. Two lines of markedly dard-edged scales extended from behind the gill-covers to the tail. This type of female still persists. It bears a close resemblance to the wild-type fish.

Over the years some very beautiful variatus have emerged from specialists breeders' tanks among them the sunset variatus, the male of which has a yellow or golden green body overlaid with black spots and a canary yellow dorsal fin and fiery red caudal fin (the female about the same in fin and body coloration, with the addition of some narrow, dark or shadowy, vertical bars on the sides); pink-eyed variatus, with white bodies (albinos) or yellow bodies with orange tail-fins; varieties of black variatus in which the bodies of both sexes are black and the males characterized by the most decorative red, orange, orange-red or delicate yellow dorsal fins. Then there are topsail variatus in which the males, in particular, have extraordinary tall or sail-like dorsal fins.

To keep the variatus platy satisfactorily siphon away some of the water from the bottom of the aquarium every so often and then top up with boiled mains water cooled down to aquarium temperature. Better still, use rain water collected in a clean glass, china, or plastic container. Do not, however, use rain water channelled into any non-toxic container from a newly painted surface, from a new or comparatively new galvanized iron roof, from new metal or dirt-filled gutterings. Further, do not put the clean container outdoors until rain has been falling for about a quarter-of-an-hour to clear the atmosphere of oily fumes, noxious gases and industrial dust particles.

One or two pairs (for breeding) is enough for a 5-gallon tank. It should be thickly planted along the back and ends with lacey-leaved plants that reach the surface; for fry instinctively seek the shelter that top-growing vegetation has to offer. Platyfishes love a bright light. It is important, then, to provide adequate illumination for about 14 hours a day. If the light is bright enough to keep plants growing well then it is reasonable to assume that the light is right. Recommended plants are warmwater grown species of *Myriophyllum*, *Ceratophyllum* (a rootless plant that may be weighted to the bottom with a few inches of nylon thread to attach its stems to a sliver of granite or slate), *Limnophila* and *Ceratopteris thalictroides* (a true tropical aquatic fern). Moreover, plants that grow free-floating provide fry with a protective green partly submerged counterpane. The pygmy bladderworts, riccia, azolla, duckweed and floating fern (*Ceratopteris pteridiodes*) are well-suited to such a position.

If the parent fish are well fed the fry will seldom be sought after as an addition to the daily menu. The fry themselves will begin to feed soon after birth. To hasten development give them micro worms or freshly hatched brine shrimps twice or thrice daily for the first nine to fourteen days of their lives, after which gnat larvae, Grindal worms and powdered dried food or a proprietary fry food will do. Overcrowding stunts growth, so if you have a larger tank that can be given over to fry-raising remove the best looking of a brood for growing on and feed the poorly shaped or obvious weaklings to larger fishes as a supplement to their normal diet.

CLARIFICATION

On behalf of the North Staffs Aquarist Society, I would like to 'clear the air' regarding our recent entry of the Gypsy Caravan stand at the 1976 British Aquarists' Festival at Belle Vue which was disqualified.

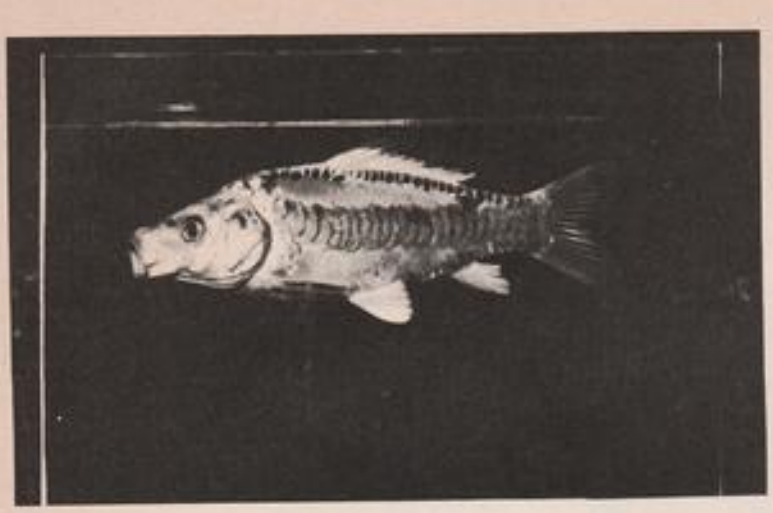
Certain members of the public approached many of our Society members stating to a similar effect that our entry had been disqualified due to the fact that it had been constructed by professional craftsmen.

The North Staffs Aquarist Society would like to dispel this theory by publishing the following list of society members who, by donating materials and sacrificing their own free time for the five months prior to the show, helped to produce the Gypsy Caravan: A. Ankers, Chairman, Foundry Safety Officer; J. Ankers, Secretary, Electrician; D. Ankers, Show Secretary, Mechanical Fitter; K. Ankers, Club Member, Pottery Worker; E. Richardson, Club Member, Shop Fitter; I. Shakespeare, Club Member, Flooring Specialist.

All of the construction materials were donated by members of the Society, with the exception of approx. £25.00 which came out of club funds for extra accessories.

It should be apparent to everyone in doubt, by consulting the list of members' professions, that the Caravan was constructed according to the rules laid down for entry, and that the resultant disqualification, we were told, was because of the size of the tank used for the furnished aquaria.

A. ANKERS,
Chairman.



This Koi specimen shows the typical scaling of the Mirror carp and being gold in colour is a *Doitsu Ohgon* type.

KOI

by Hilda Allen

FOR ANYONE thinking about keeping Koi it is advisable to find out as much as possible about the requirements of these fish in the same way as is necessary for other varieties of specialised fish. It must not be simply a matter of purchase and putting them in water, be it an aquarium or pond, unless of course you insist upon acting in ignorance and wasting your hard-earned cash. Such action may easily create nothing but trouble to all concerned and foster the belief that Koi are difficult fish to keep.

To experienced aquarists the main features of successful Koi-keeping may be easily explained and based on well-known commonsense practices. To an absolute beginner the subject of fishkeeping in general must be fully explored and it may well be better to gain experience with the beautiful but less demanding goldfish, shubunkins and orfe.

Good quality Koi that have been imported from Japan are expensive and they do require an understanding of their needs. They have the potential of growing to large fish up to 18-24 inches in length with a body weight of 10 pounds or more, if given the required satisfactory conditions of water and feeding in a suitable environment.

Only what may be called smaller Koi of about 3-12 inches are usually imported because of the problems associated with expensive long-distance air-freight and the very high cost of the larger specimen fish in Japan. Dependent on the size of the Koi being purchased and the time of year for survival out-of-doors, they may either be placed in an indoor aquarium or an outside quarantine pond. There is no doubt that Koi, along with most fish, suffer from the stress of travel and handling. There is a very real need for quarantine as Koi in a weakened condition will not feed and a close watch must be kept for any incipient disease.

Today a number of illustrated books on Koi are available here costing from around £1 to £12 and the ideal thing to do would be to join a Koi society for the opportunities of meeting and discussion with fellow Koi enthusiasts.

Koi are coloured carp and variations derived from the Common carp (*Cyprinus carpio*) known in Japan as *Ma-goi*.

It is generally recognised that the common form of carp originated in Central Asia and being useful as food fish they eventually became spread across Asia and Europe in the warmer areas where they could live naturally.

The early Chinese writings of around 300 A.D. refer to the cultivation of carp and the earliest record of carp in Japan dates back to around the year 700 A.D. but it is not known if these were coloured carp.

Carp were raised primarily for food but they were often regarded as pets and so it was natural that any unusual mutation of colour would not go unnoticed. Such carp would be given special care and attempts made to breed them and it seems certain that the early strains of coloured carp thus became established.

Previously these food carp had been kept in the open waters and rice-paddies of Japan but with the appearance of coloured carp the rich and noble families began to keep them for their ornamental beauty alone and the ancient capital of Kyoto became noted as the centre of excellent gardens with carp-ponds.

In the Niigata Prefecture of North Japan the long severe winters and deep snows made breeding carp out of doors very difficult and local farmers made ponds that extended into houses where the carp could swim when it became too cold. Carp easily become tame household pets and they provided enjoyment and recreation during the winter months.

During the summer the farmers held competitive exhibitions and these sharpened their desire to breed ever more colourful and beautiful carp. Two German carp, known as mirror carp (with big scales) and leather carp (without scales) were announced in the eighteenth century and in 1904 the Director of the Fish Diseases Institute in Munich sent 40 fry of the German carp as a gift to the Director of the Fisheries Institute in Japan. Only seven survived the 40-day voyage to Yokohama and three of these died later leaving four female leather carp and one male mirror carp to grow on and later be cross-bred with Japanese coloured carp. Today the Japanese word *Doitsu*, meaning German, is used as a prefix to describe Koi that have the scaleless or mirrorscale characteristics of German carp.

By selective breeding the strains improved and gave even greater variations of colour and in 1914 the beautiful ornamental carp of Niigata attracted large crowds to the Grand Exhibition in Ueno Park, Tokyo. It was at this time that they were named *Nishiki-goi*, meaning the Brocaded Carp. Following this exhibition the demand for *Nishiki-goi* rapidly increased and other professional breeders began raising them.

The highly popular golden Koi with glittering scales was developed in 1946 by Mr. Sawata Aoki of Yamakoshi Village in Niigata. Together with his son and daughter he worked for 25 years to produce this metallic variety called *Ohgon* which has since played an important part in the development of many other varieties.

The *Ohgon* may well be the first choice of people attracted to Koi, it has a metallic finish of great beauty and *Doitsu Ohgon* are magnificent fish.

A typical variety of Koi is *Kohaku*, produced in 1917. *Ko* meaning red, and *haku* meaning white, it is a white carp with red patterns. It is not easy to breed good *Kohaku* of clear white with deep scarlet markings and such fish command a high price, even in Japan.

Koi known as *Taisho-sanshoku* (or *Taisho-sanke*) are very beautiful. *Taisho* refers to the era (1912-1926) when this Koi was first produced. It is a tri-colour, the basic colour being white with red and black patterns in the dorsal area. There is also *Showa-sanke*, a coloured carp developed since 1926 in the era of *Showa*. This also is a tricolour with the difference that the background colour is black on which patterns of red and white are scattered. *Shusui* is a fish of great beauty produced by Mr. Kichigoro Akiyama by crossing German mirror-carp with the blue Japanese *Asagi*. It has mirror scales, the upper part of the body is sky blue and the abdomen is bright red.

It would be quite impossible to describe the enormous number of Koi varieties available today. The highly-skilled techniques of Japanese breeders over many years, and which continue today, offer us a tremendous choice of colours, patterns and sealings. Good specimens of Koi actually have colours as vivid and striking as those of marine fish and I personally hope that Koi are never developed for variations of body-shape or fins since this could only detract from their graceful beauty and incomparable colourings. Koi are very highly thought of in Japan where they symbolise success, strength and beauty and it is a Japanese custom to celebrate the Boys' Festival Day on the 5th May by flying Koi-shaped kites and streamers from the roof-tops; these are called *Koi-no-bori*.

To us, because of their dignity, longevity and large size, carp are known as the "King of Freshwater Fish." They are peaceful and do not harm smaller fish and are not territorial. The Japanese coloured carp known as *Nishiki-goi* or simply as Koi live and thrive in the ponds of hundreds of amateur British Koi-keepers today. Their grace and beauty have brought delight to all who see them and the many thousands of young Koi spawned and reared here bear testimony to the health and fertility of fish that have been maintained successfully in well-managed ponds.

All queries on Koi-keeping will be answered if letters are addressed to me, c/o Readers' Service, *The Aquarist and Pondkeeper*, The Butts, Brentford, Middlesex TW8 8BN. A stamped, addressed envelope must be included for reply.

BASIC GUPPY GENETICS

by Jeff Hutchings

THE average guppy breeder often uses the "rule of thumb" when selecting breeding stock. He will select what he considers to be the best male and mate to the best female. In doing this he is relying on basic hereditary principles; that physical traits are passed from parents to offspring in some way. As hopes that the best parents will produce the best offspring. This is true in many strains but is not always so, especially if a good male from one strain is mated to a good female from another strain.

In the next two articles I am going to outline the basics of genetics as they apply to the guppy.

All the physical characteristics are imprinted in genes which are on the chromosomes (rods of chromatin which appear during meiosis and mitosis). The chromosomes build up the genetic picture of all creatures; they are its blue print. A guppy has twenty two pairs of chromosomes determining the size, colour, finnage shape and one special pair of chromosomes determining the sex of the guppy. These twenty three pairs are brought together at mating, half coming from the male (sperm) and half from the female (egg).

First, an understanding of the processes occurring in the production of eggs and spermatazoa.

Mitosis is the normal process of cell-division by which each chromosome is duplicated as the cell divides into two daughter cells, each containing the same number of chromosomes as the parent cell.

Meiosis is the process of cell-division by which four cells are formed from the original, and each daughter cell has half the number of chromosomes originally in the parent cell.

At fertilization the twenty three single chromosomes from the mother's egg combine with the twenty three single chromosomes from the father's sperm. What influence the different chromosomes of each pair have on the embryo depends on a number of factors.

As I wrote previously there is a special pair of chromosomes which determine the sex and they are labelled X and Y chromosomes. The female produces eggs all containing and X or female determining chromosome, whilst the male produces both X and Y (male determining chromosome. If an X sperm fertilizes an egg the resulting embryo is XX, a female. If a Y sperm fertilizes an egg the result is XY, a male.

This can be illustrated using a Punnett Square which is a method of setting out how individual chromosomes from one male and one female will combine.

FEMALE		X	X
MALE	X	XX female	XX female
	Y	XY male	XY male

From this the expected sex distribution in any cross is going to be 50 per cent males and 50 per cent females. For various reasons this does not always occur in individual broods of guppies. While the above example of determining probable genetic outcome deals specifically with chromosomes, it can be applied equally as well to genes.

Remember, the genes control individual factors within the offspring and that they are in pairs. Taking colour as an example, I am next going to show what happens if one gene is dominant over its pair mate if they are different. The other is said to be recessive. This factor is extremely important especially if the factor wanted is recessive. This phenomenum is well illustrated by the difference between the basic grey body and a gold body.

It is known that grey (expressed with a capital G) is completely dominant over gold (g) and therefore g is recessive to G. With this information the Punnett Square can again be used to illustrate what happens in a specific situation.

Take the example of mating a gold male to a grey female.

Female	G	G
Male g	Gg	Gg
g	Gg	Gg

As all the genes are in pairs they are expressed as two letters: gold male gg (both genes being recessive and GG grey female.

The males and females produced by this cross will all look alike and we can see that GG and Gg will both produce grey-bodied fish but the genetic combinations involved are different.

The way a fish looks is referred to as its phenotype whilst the actual genetic make up is the genotype. Thus GG and Gg have the same phenotype but different genotypes. Furthermore the GG genotype is referred to as homogenous as both genes are of the same type and the Gg is heterozygous as the two genes of the type are different.

The following results would be achieved if the heterozygous brother and sister from the first mating were mated.

Female	G	g
Male G	GG	Gg
g	Gg	gg

The ratio is 1 GG (grey), 2 Gg (grey), 1 gg (gold). This ratio, like many others, was first noted by Mendal and they are known as Mendelian ratios. Such ratios are constant.

However, a different mating could be carried out; that is to mate father and daughter, a practice used when fixing a new strain.

Female	G	g
Male g	Gg	gg
g	Gg	gg

Fully 50 per cent of this mating would be gold. In this way a particular type can be multiplied up rapidly.

These first three examples then serve to illustrate some of the basics of genetics. Do not think that these rules are not broken; they are, constantly. If they were not then how would the new types of guppies have come into existence? This is one of the facinations of guppy breeding.

The next article will expand the theme introduced in this one.

FISHPONDS IN GALILEE

by Judy Carr

In the hilly, northern region of Galilee, with its windswept heights and sunny valleys, fish farming is a popular enterprise. This aquaculture was pioneered by the early settlers, the Schwartz family, fish breeders from Yugoslavia, who on their own intiative, began carp breeding in the late thirties and still continue. From their small beginnings enterprises developed in many Galilee villages which now cover considerable areas of land.

The fishponds are constructed on heavy clay soil and sweet water is used instead of the brackish water used in fish farming in other parts of Israel. The average yield is 25 kilograms per hectare of land. During the last 20 years the fish crop from ponds amounts to around 60 per cent of the total fish production in Israel of which 25 per cent comes from Galilee. Since the establishment of the State, the yield from fish ponds has increased more than five fold.

Most of the fish farms are located in Kibbutzim, enabling expertise and highly skilled manpower and close contact between fish farmers and scientists. Much research goes into the work, plus efficient economic organisation and planning.

Eighty per cent of the fish cultivated in ponds are carp. The other 20 per cent are *Tilapia*, a tropical perch, and grey mullet which spawn in the estuaries of the Mediterranean, from where the fry is brought. Each farm deals with every step independently from spawning to marketing.

Ponds are fertilized with nitrogenous and phosphate fertilizers and fish are fed daily, partly with wheat and sorghum and partly with 25 per cent protein pellets.

Much of the work is mechanized, especially fertilizing, feeding catching, sorting and loading for market. The labour in producing one ton of fish is only 10 to 12 working days. Live carp are supplied to the local market in aerated tanks and may be bought at any supermarket or fish shop.

A few years ago a totally new branch of fish farming was begun at Kibbutz Dan on the northern border. The Kibbutzniks began to cultivate trout in fresh running water straight from one of the sources of the River Jordan. The cool, oxygen-rich water comes from the river and passed through specially constructed tiled basins. In this way, on a small area, very high yields of trout are obtained . . . Unfortunately they are so expensive that the average Israeli cannot afford them and they are eaten mainly by tourists.

ARACEAE FAMILY,

Lagenandra and Anubias species

by Vivian De Thabrew

THE NEXT TWO articles are devoted to those plants of the Araceae family which are marsh loving and truly can only be used in the aquarium with certain limitations. The only exception to this being *Pistia stratiotes*, the "Water Lettuce" which is a stagnant water plant in its natural habitat.

In these articles the following species will be discussed:—*Anubias*, *Lagenandra*, *Orontium*, *Acorus* and *Pistia*. With the dubious exception of *Pistia*, none of the others are recommended as good aquarium plants for reasons the reader will see. They, however, are excellent vivarium plants.

Among the few genera of aquatic plants belonging to the Araceae family, *Anubias* is closely related to Cryptocorynes. *Anubias* are marsh plants which are native to West Africa and the Congo river basin. There are nearly a dozen species in this genus, but only two or three are suitable for aquaria. Of the species which have been tried and documented, *A. congensis*, *A. lanceolata* and *A. nana* are prominent.

Family: Araceae
Genus : *Anubias*

A. congensis N. E. Brown

This is native to Spanish Guinea and the Congo river. It is found growing in shady and swampy situations along the rivers, and favours soft and acidy water conditions. The plant has branching, horizontally spreading stout rhizomous root stock. The leaves are lanceolate or even ovate, borne on leaf-stalks of about 10 in. long. The leaf blades are slightly hairy with several cross-veins spreading from the mid-ribs. The upper sides are emerald green, while they are slightly lighter in colour on the undersides.

Propagation and cultivation: This is not really a plant suitable for the home aquaria, as it is a swamp plant. However, young plants acclimatised in a deep sandy layer of about four inches deep will adapt themselves to the aquarium condition. Here then is a species for a tall and spacious tank. It also requires plenty of shade and acidic soft water conditions. Requiring a temperature of around 77°F., and high humidity, this is an ideal plant for the terrarium.

It propagates by means of a stout rootstock, which bears many plantlets. These can be divided and planted in a muddy or sandy mixture immersed in an inch or so of water. As the plants develop and grow taller, the water level can be increased gradually and eventually the plant can be submerged.

A. nana Engler

This species comes from West Africa especially the Cameroons, favouring the same sort of habitats as *A. congensis*. Another marsh plant which is believed to be the smallest species of the genus.

It is of creeping habit and the many branching rhizomes bear oval shaped leaves of approximately four inches long and up to one and a half inches wide. The leaves are usually shiny, dark green to emerald green on the upper surface and pale green on the undersides. Very prominent veins spread out from the mid-rib. The leaf-base is pointed and the tip is curved. This sturdy little species is perhaps the best one suited for the aquarium.

Propagation and cultivation: The species is a slow grower, prefers slightly acid water and like all other *Anubias* species requires shady conditions. The aquarium should therefore have subdued light. The average tank with a depth of up to 15 in. will do. The planting medium should be about four inches deep and the muddier it is, the better it is for good plant growth.

Like *A. congensis*, it develops a thick rootstock which produces many young plants. Propagation is by division and the plants thus divided can be placed in damp, muddy or sandy compost.

A. lanceolata N. E. Brown

Like most of the other species, its native habitat is Tropical West Africa. A true marsh plant growing on the banks and swampy rivers, *A. lanceolata* will tolerate less shade than the other two species discussed so far.

A sturdy plant, it has wiry rhizomes bearing narrow ovate or egg-shaped leaves about five inches long borne on a leaf stem of up to six inches in length.

The leaf base is fairly pointed while the tip can be pointed or vaguely round.

Propagation and cultivation: This, too, is a slow grower and needs special care in acclimatising to the home aquarium. Plenty of light, a temperature of around 76°F., and high humidity are its main and essential requirements. If these conditions can be met, then it will readily flower in the aquarium. I have seen this species flower in a tank in a herbarium in Cairo. As regards its water requirement, soft, acid conditions should prevail. Unlike the other species, a higher acid level is tolerated.

Propagation is by root division and this should be done in the same manner as described for the other species. It should be noted that this and many other *Anubias* will not live too long in the submerged condition.

Genus: *Lagenandra*
Habitat: Sri Lanka and India

The genus *Lagenandra* is very similar to the genus *Cryptocoryne*, the main difference being the structure of the female blossom in the two genera.

Being a swamp plant, *Lagenandra* is not very well adapted to growing submerged, though one of the species can be grown in the aquarium.

Lagenandra ovata (L.) Thwaites
Habitat: Sri Lanka, India

This is a very tall species, perhaps the tallest one of the genus. Its stocky rootstock produces long, elliptical, broad and fleshy leaves of about 15 to 20 in. long. The leaf colour varies from dark green to brownish green.

It is ideal for the vivarium or heated greenhouse where it can be grown in a deep layer of muddy soil or a mixture of sand, clay and compost. A true light-loving plant, it also requires plenty of humidity and a temperature of around 74°F.

It is a very common sight to see thick clusters of this tall, broad-leaved plant covering large areas of

Continued on page 460

PRESS RELEASE

Research Programme on Marine life and Aquatic Flora of Sri Lanka

Suhada Aqualife Research will shortly be establishing a research station in Sri Lanka. It will be the first one of its kind to be established in any aquarium supply country of the east, solely for the aquatic hobby.

The organisation will embark on a programme of detailed systematic observation and research in marine ecology and the study of aquatic plants, in their natural habitat.

Special emphasis will be made on experimentation to maintain both marine fish and invertebrates in controlled aquarium conditions as those encountered in home aquaria in Western countries. It is hoped that research into propagation and acclimatisation techniques on aquatic plants will enable Suhada Aqualife Research to introduce many hitherto unknown species to the Western aquarist.

It was in 1971 that Suhada introduced the true species of *Nymphoides indicum* to the British aquarist. During last year twenty-two species of new aquatic plants have been under experimentation, and several of these species will be made available to the aquarist this year.

Three *Aponogeton* species, *A. fenestralis*, *A. henkelianus*, *A. ulvaceus* and two *Nuphar* species, *N. microphyllum* and *N. japonicum* are now being cultivated in selected localities, thus giving them a wide range of growing conditions. The propagation rates are most encouraging and it is envisaged that all the above species will commonly be available to the aquarist as are *A. crispus*, *A. natans* and *A. undulatus*, at an extremely low price.

The organisation is at present preparing a report on aquatic plant species which may become extinct due to the indiscriminate collection by some plant exporters. This report will be submitted to the government of Sri Lanka for consideration.

The results of all research will be documented and made available to the aquarist in an easy-to-read style, in book or report form. Further useful general handbooks will also be produced. The first of these, "Popular Aquarium plants" will be published in June this year. The other titles planned are:

Handbook of Aquatic plants of Sri Lanka.
Keeping a successful marine aquarium.
Keeping marine invertebrates.
Hints on marine behaviour for the aquarist.

ARACEAE FAMILY, *Lagenandra & Anubias species*

Continued from page 459

banks of rivers and streams. Those plants which root in the water itself, or are by the water's edge, do not grow as stout as the more terrestial specimens.

Propagation is by root division, and the root segments thus cut should be planted in a very moist soil, or preferably in a mixture of compost and clay.

Lagenandra lancifolia (Schott) Thwaites
Habitat: Sri Lanka

Now this species has lanceolate leaves which are about 3 to 4 in. long, borne on a leaf-stalk 3 to 6 in. in length. The upper side of the leaves are dark green, while the under sides are greyish green or light green with whitish spots. The very young plants appear almost silvery.

It requires soft, acid water, a high temperature range of, say, between 74°-82°F., and good strong light. The species is comparatively small and hence can be used as an aquarium plant. Growth rate is quite slow, and in the aquarium it may appear to be dormant for many months.

As is characteristic of the species, propagation is by root division. The thick long root bears the young buds in clusters, and fibrous roots begin to develop under the root-stock immediately below the growing buds.

Lagenandra thwaitesii Engler
Habitat: Sri Lanka

Lanceolate leaves of up to 4 to 6 in. long are borne on petioles of similar size. They are about 1 to 2 in. broad; the base is slightly rounded and the tip pointed. It has the characteristic nervation on the dark green upper side of the leaves, which is bordered with white. The light green under side, too, has similar characteristics. The leaf edge is more often than not wavy.

The long, stout root-stock develops sturdy little buds, and propagation is by division.

Lagenandra koenigii (Schott) Thwaites
Habitat: Sri Lanka

This is a much smaller species, growing in similar terrain. The leaves are much narrower than those of the three species described earlier, but are dark green on both sides like them. This is an ideal plant for the vivarium. However, it can be acclimatised to the aquarium very gradually, provided plenty of humidity is given.

The water should be slightly acid and soft. The preferred temperature range is between 72°-75°F.

WHAT IS YOUR OPINION?

by B. Whiteside, B.A., A.C.P.

Photographs by the Author

Miss J. A. Fox, S.R.N., who resides at 50 Morley Grove, Harlow, Essex, opens this month's feature with the following comments: "I am motivated to reply to Mr. James Thompson's theories regarding shallow tanks as he seems to ignore one very basic fact about fish life—which is that they live not only laterally like humans but also vertically. Just think how much more we could make of our living-rooms if we could use the ceilings! I would suggest that any community used to this style of life—meaning three dimensional—but barred from it, is deprived of important elbow—or fin—room which allows it to live peacefully.

"He comments about small fishes congregating in shallows at the edges of ponds, etc. I would say, from my observations when out fishing with my nephew, that shoals of fish bask near the surface just as much in the centre of the pool as they do at the edge, certainly because they like it there since the surface of the water is warmer from the sun and their body temperature—need I say in this magazine?—is directly affected by their immediate environment. Their defence from predators is in their numbers and it is not in their nature to seek shelter as he suggests. Further, he remarks about small fishes seeking areas with lower water pressure in which to browse and feed. Mr. Thompson, any schoolboy could tell you that water pressure remains constant at a given depth be it in an aquarium or mid-Atlantic and those areas of low pressure exist just as much in an aquarium 15 in. deep as they do in the shallows of your new tank. My fishes appear to browse just as happily 15 in. deep as they do at the surface. Your argument, sir, if you'll forgive the pun, hardly holds water!"

Readers are reminded that I accept no responsibility for the views expressed by contributors to this feature.

Mr. David Vollor's address is 40 Bournville Avenue, Chatham, Kent, and he has the following to say: "A few months ago mention was made of Torquay's Aqualand, and my wife and I were on holiday in the vicinity so we decided to go along and view the inmates. It was the first time either of us had visited such a place and, with the eagerness of children, in we walked. The display area was dim—the effect of being underwater. At the time we felt that the display left much to be desired, the labels having numerous spelling mistakes describing non-existent fishes, and having amateurish drawings portraying them. Nearly all the tanks were small, dimly lit and lacking in appeal; even dirty and uninteresting—words I am loath to use! We left sad and very disappointed that such a collection of fishes was housed in these surroundings. All this came home to us even more forcibly when, two months later, we were fortunate enough to go to Majorca. Whilst there we visited an Aquarium on the eastern coastal area of the island, near Porto Cristo. This place was large, airy and well lit. The tanks covered two floors, and were clean and pleasing to look at, with some large tanks 15 to 20 ft. long—maybe longer—having an internal wall to enable the fishes to get away from the public, presenting a far more interesting spectacle as well. We could easily have spent a second, even a third hour there. Well done the Majorcans.

"It is here permissible to make a couple of suggestions for future magazine articles? I am in the process of setting up a 1½ metre long tropical fish tank. Some things seem well documented, others sadly lacking or difficult to discover regarding information. 1. A description of how the different tropical fish fit into families—the discus, oscar, swordtail, guppy, etc.; not their stripes: their relationships—even what their Latin names mean, possibly in chart form. 2. A review of the importance, uses and results of the different chemical tests—pH, NH(?), DH, etc. 3. The advantages and disadvantages of various filtering systems, e.g. undergravel versus external, rather than a review of a particular product."

Mr. George Hann sent me the following letter from his home at Corner Bungalow, Havelock Road, Warsash, Southampton. "I noted in the January edition that you have some Java moss to spare and as I have tried unsuccessfully to get any from normal supplies I should very much appreciate it if you could send me some. Unfortunately I have no plants to exchange as I am going through an unsuccessful stage with most of my plants, which seem to be the victims of fish and perhaps snails; but I would willingly pay for the moss, if you can put a price on it. I have a small pond in a glass conservatory and most winters in the past the weather here has been so mild that my koi and shubunkins have been lively and taken food all through the winter. This winter being colder they

have not been lively and I learned the lesson that I have known Mr. Boarder to preach many times—and that is the danger of overfeeding. I was a bit careless until I found my fish looking uncomfortable, when I realised that the water was getting foul with uneaten food. Fortunately by a quick change of water I brought them back to health and happiness and now they have to be really eager before they get any food during the cold weather. By using a U/G filter operated by a submersible pump I keep the water clean and aerated and can keep a greater concentration of fish in this small pond.

"I have rigged up a sort of hoovering arrangement to a small rotary pump attached to my Black & Decker drill, so that I can suck up the mulm that settles on the bottom and sides of the pool. This gives me a clear view of my fish all the time. I have just fitted a brush on my hoover attachment so that I can really brush as I sweep as I clean. I should be happy to go into further details with any of your readers who may care to enquire." (I was able to send Mr. Hann some Java moss; and, while writing this in January, I still have some to spare; however, it's impossible to know if I'll still have an excess when you'll be reading this in March. If you have any particular plants you'd like to swop or give away to other readers please let me know: I'll try to publish details in a future feature. Some stamps to cover the cost of postage and packing would be appreciated by those who are willing to send plants to other aquarists.)

"... I find *W.Y.O.* a consistently interesting article as I find it very easy to identify with the contributors," writes Mr. Keith Jackson, from 49 Sandringham Drive, Spondon, Derby. He continues: "I have never written to you before but was prompted to do so by Miss Kaighin's letter in the November, 1976 issue, having had similar problems dog me until recently. I am not trying to say that my idea is unique; far from it as I saw a similar suggestion by Mr. Hems in the March, 1976 issue, afterwards. My problem was that I prefer U/G filtration which precludes a peat or similar substratum for the plants to root in. It was solved by using the small plastic saucers sold for use under flower-pots. A half inch or so of peat was put in the bottom and the plant put in this. The gravel was put on top to keep it all down and the saucer hidden in the gravel.

"This produced a marked increase in vigour for a fortnight or so when the rate suddenly slowed, but no deterioration set in. I put this down to a lack of nutrient and added some proprietory fertilizer, which did the trick. I now have two tanks planted using this method and the plants in the pots are doing well. Some *Vallisneria spiralis* used as a control and just pushed into the gravel is much less healthy. Using this method my tatty Amazon sword and *Aponogeton crispus* have gone from two-leaved runts to virtual aquatic cabbages! I wonder, though, if most people take as much interest in the water quality as they should with respect to plants. Most of my tanks have soft water but until I put the saucers in I didn't bother all that much with the pH value as long as it was between 6·8-7·4. One example that proved it to me was when I set up another tank with soft water but without bothering about pH. Into this I put seven lemon tetras and a red-tailed black shark. Although there were no obvious signs of distress, after about a fortnight I lost five tetras one night and the remaining

Australian Rainbow Fish

tetras looked a bit sad. The shark sulked in a corner. In desperation I transferred the inmates to a tank set up for discus. I put in the plants as well, which were looking poorly—in pots as well—and now they are all doing well. The difference between the tanks was only 0·6 pH from pH 6·6-7·2. Perhaps some of your readers can help me identify one of my catfish. It is similar in size and shape to a *Corydoras* but the head is a different shape, being tapered rather than rounded; and the barbels are longer. Its coloration is similar to *Corydoras melanistus* but instead of the dorsal stripe it has a spot like *C. julii*. Could it be a type of *Brockis?*"

Mrs. D. Hutchinson lives at 16 Upper Kinneddar, Saline, Dunfermline, Fife, and she has the following to say: "Tiger barbs. I bought six youngsters and put them in a community tank with three Australian rainbows (photograph 1), six zebra danios and a red-finned shark. It is generally held that as many as six will be too busy amongst themselves to bother other fishes. These were observed to 'break formation' and nip their tank mates frequently. Inevitably bits of fins went missing: the red fin shark had pieces bitten out of three fins at once. I set up another tank, bought three more tiger barbs, and put the nine into it; peace all round ever since. Tigers are voracious and eat absolutely anything at tremendous, flapping, splashing speed, including the aquarist's fingers. Two large females were killed in the spawning drive last summer. They are great fun to watch though, forever rushing, twirling and chasing. I would urge anyone to keep them for sheer entertainment value; but insist that they be always in a tank to themselves—for their owner's peace of mind as well as the safety of other fishes.

"Unhealthy goldfish stock. Most fancy goldfish in our shops these days are riddled with so many diseases that any purchaser who succeeds in keeping his specimens past their first year is fortunate indeed. Thirty years ago one could buy beautiful stock that was usually reared by serious breeders who sold the largest percentage of their youngsters to local pet shops. Nowadays nearly every shop imports goldfish, the standards are way below what they used to be, and some varieties are even unobtainable. Shop assistants think 'cold water' and fill tanks straight from taps, tip new stocks in—already battered and travel-weary—and wonder why they promptly get white spot. Excited children buy their first ever goldfish, nurture it carefully according to books, are heartbroken to see their pet develop lumps, pimples, sores or ulcers for which there seem to be no cures, and are probably put off trying to keep fish. I have twice been obliged to buy fantails with white spot because of all visible ills on available stock, this was curable. I have succeeded in keeping and breeding these fishes for six years, though one has developed a cauliflower-like growth on its back. A batch of three calico fantails with no visible signs of any sort of trouble on them was dead within *one week*. I am sorry you have experienced the same disappointment; the only advice I can offer, and follow myself, is that fancy goldfish be bought in batches of at least five, in order to end up with the two or three required.

Angel pair

"Velvet disease. I cured a bad case of velvet by moving the sufferers into a small plastic container with four pints of water and a readily-available cure for fungus—which seemed to be a mix of one part potassium permanganate to three parts rock salt, administered in ONE rounded teaspoonful. Next

day an identical container was prepared with four pints of water and same measure of medication; fishes were moved into it and the first container emptied and dried; net also dried, ready to use on the third day. This change-over was carried on for a week. The improvement was almost magical as the disease had reached the hideous final stages; every fish was nearly clear in eight days! The cure was completed by the end of the second week.

"I recently followed this procedure again with a Siamese fighter, and after six days the rusty peppering had gone from his fins, and only faint traces remained on his body. After eight days he was completely clear of it. I cannot state with certainty whether it is the medication that is doing the trick, or simply the daily new water. I have cured white spot with nothing but daily water changes, so it may be possible. Almost too simple, isn't it—especially as velvet is one of the most obstinate diseases aquarists have to cope with. Incidentally, living in Scotland does not make me a Scot! I am English and hope eventually to return to Northumberland."

Dr. D. J. Price, of Plymouth Polytechnic and Plymouth & District Aquarists & Pondkeepers Society, lives at 44 Pentyre Terrace, Lipson, Plymouth. He writes as follows: "In the *W.Y.O.* spot of the November, 1976 edition a report was carried concerning the spawning of a male convict cichlid with a female firemouth; it was by a Mr. Harris. Mr. Harris was interested in finding out more about hybrid cichlids. No doubt the British Cichlid Association would be pleased to provide more details; but the following points may be of interest. 1. Spawning between related species of fish to produce hybrids is relatively common—when compared to other groups of vertebrates. 2. F. J. Schwartz compiled a bibliography of nearly 2,000 references giving information about hybrids involving 56 families of fish. This is available direct from Gulf Coast Research Laboratories at a cost of $2·25. 3. 53 of these references concern cichlids and Schwartz lists 66 types of matings between different cichlid species. Most of these are concerned with crosses between the various species of *Tilapia* which are of commercial importance, but one deals with the cross between a firemouth and a convict. I have not seen the Wurmbach paper but no doubt it would be possible to obtain a copy from a good library. References: 1. F. W. Schwartz (1972). World literature to fish hybrids with an analysis by family, species, and hybrid. Publications of the Gulf Coast Research Laboratory Museum, No. 3, Ocean Springs, Mississippi 39564, U.S.A. 328 pages. 2. H. Wurmbach (1953). Unfruchtbare artbastarde bei fischen. Naturwissenschaft, 13 (40), 357-359."

It's time now to give some of our younger readers an innings. No. 44 Alexandra Road, Hemel Hempstead, Herts., heads a letter I received from 12 years old David James and his 13 year old friend Tim Thurs-

Female Angel Fish showing breeding tube as eggs are laid

field, both of whom are members of Hemel Hempstead A. Society. David writes: "We are both surprised to see that so many people nowadays dismiss the proper names of fish without even thinking twice about doing so. They are more necessary than the common names by far—not only to the really serious aquarists who have many qualifications and so on; but also, if anyone asked if we had kept a pencil fish as there are several species that are known as pencilfishes but there is only one species of *Nannostomus anomalus*! Whilst we realise that many less serious aquarists do not really wish, or need, to learn them, some consideration really should be given. Therefore we are pleased about the FBAS publication about the proper names etc. discussed in the December, 1976 issue. However, we also think that in your magazine the proper names should be followed by the corresponding common

names—and also for beginner aquarists who would be perturbed by this complicated jargon.

"Also, we would like to know if *Tubifex* have ever been bred in captivity. Our local shop says it can't be done—but there's no such word and I'm trying to breed them using cold water with a lot of rotting fish food, which they seem to thrive on. I have kept fish for about 2 years now and specialise in cichlids and gouramies. Tim has kept fish for about six months and likes the catfishes best. Finally, we have received varying data, from books, about how many inches of fish we can have per square inch of surface area. One ridiculous piece of information said that a 5 in. fish only needs 60 aquare inches of surface area. This made visions spring to my mind of a 5 in. cichlid flopping about in a 10 in. × 6 in. × 6 in. tank! This does, however, work in large tanks. Your magazine is especially valuable to beginners. P.S.—I am in full agreement with Mr. Thompson in the first letter of the January edition because it also looks better as well as being comfortable for the fishes; however, for cichlids it had better not be too shallow."

Mr. Keith Puleston is the P.R.O. and magazine editor of Hemel Hempstead Aquarist Society, and he resides at 27 Cuttsfield Terrace, Chaulden, Hemel Hempstead, Hertfordshire. He writes: "What a superb article *W.Y.O.* is every month! My only criticism is that you have stopped using trade names of the products that get mentioned. No doubt your advertisers have objected. Anyway, keep up the good work. I am enclosing a copy of the HHAS Magazine which I hope you may find of interest . . ." The HHAS Magazine contains a variety of interesting articles—including one entitled 'How Bob Hyatt grows his plants.' Mr. Hyatt tells us that to grow good plants he puts John Innes compost in the bottom of the tank, and then covers it with sand.

Photograph 2 shows a pair of my angels—and gives an appropriate lead in to a letter I received from Mr. N. A. Clark, of 665 Lords Wood Lane, Walderslade, Kent. Mr. Clark writes: "A few months ago I was lucky enough to raise four angels from the egg stage to adults. I did this by isolating the breeding pair from the other members of my 60 in. × 24 in. × 18 in. all-glass tank. Alas I lost the mother whilst both parents were nursing the fry. The young soon reached maturity and took their place with three other male angels that I purchased as juveniles. They paired up with each other but I was not certain which male was with any one female. Eventually a female produced a fine clutch of eggs whilst still in the community tank. The inevitable happened that evening when the eggs were eaten by the other inhabitants. I decided to section-off part of the tank and try again.

"A few days after placing what I thought was a pair in the breeding area, eggs were laid and the male seemed to fertilize them; then for no reason they began to fight viciously. I removed the female and the male ate the eggs. I returned him to the main part of the tank next day. The following day I noticed 2 males and 1 female dead; they were followed by two other females on consecutive days. My assumption was that I had too many angels in one tank, i.e. 4 males and 3 females. My wife's conclusion was that I had broken up pairs which had mated—as angels do—for life. Can any reader help—although it seems too late now for all I am left with is males. I did manage to rescue some eggs on another occasion; I placed them in a jam jar inside the tank and treated the water with methylene blue. The eggs hatched and after one week I transferred the swimming fry into a small tank containing water etc. from the main tank; but unfortunately they all died. First food was *infusoria* in tablet and liquid forms. To bring the parents into condition they and the other fish were fed with chopped raw meat, liver sausage, sweet corn and soft cheese, all of which were eagerly accepted. This allowed quite a variation in diet."

No. 38 Mayfield Grove, Harrogate is the address of Mr. Stuart Farrar. He says: "I was very pleased to read that you would like readers' views on keeping terrapins in aquaria as this is a subject that has interested me for a long time. I do not think many people know what they are letting themselves in for when they buy one of those little terrapins, the size of a 50p piece, which one sees crowded into dealers' tanks. I fear most of them are bound for one of those plastic bowls, complete with plastic palm tree, and to be placed on the living-room table, only to suffer a very early demise. I am by no means an expert on the subject and I am open to any information which other readers would care to offer, but being quite successful in rearing red eared terrapins—*Pseudemys scripta elegans*—I would like to pass on some of my experiences so that other readers can see what they are undertaking before they are tempted.

"First of all, in my opinion, they will require a tank to themselves; this can be 18 in. × 10 in. for the first six months or so but soon they will grow out of it and nothing less than a 36 in. × 12 in. × 12 in. will suffice in a year for two terrapins—remembering of course that they are strictly tropical, requiring a water and air temperature of approximately 80°F despite what some dealers would have us believe. The tank should be 2/3 full and covered, and an island area should also be provided for sunbathing. I went to a lot of trouble to pick an active, healthy pair which were feeding readily. Feeding them whilst they are young is moderately easy, but very critical. I went to great lengths to make sure they got a 100 per cent fresh food diet of *Tubifex*, *Daphnia*, chopped liver, fish, and plenty of it. They grow quite rapidly, and so do the problems. As they grow they shed their skins regularly, in pieces, which float around the tank, looking very unsightly. The increased volume of food

going into the tank means increased volumes of excreta which cloud the water, and sediment is constantly churned up by their powerful paddling; so I had to devise a special filter as box filters are not efficient enough, and it is too difficult to change the wool every other day. Outside filters would not have worked either because of the reduced water level. In fact, the tank does not stand much of a chance of being decorative anyway as real plants do not last five minutes: they are dug up and chopped up. Even the plastic one which I tried were pushed over and moved around and usually looked awful. The heater and thermostat came in for a bit of a battering as the terrapins grew bigger and so they had to be stuck down with suction clips. They then used the heater as a platform to stand on and then burnt their feet when it came on, so the next job was to make a plastic netting cage for the heater.

"Food for them as they grow bigger becomes easier. I try and feed fresh food in summer: minnows fresh from the river, earthworms, beef etc., but frozen food has to suffice in the winter, e.g. sprats, beef heart and liver. The problem of ailing fish, which seems to crop up in your columns regularly, is easily solved: they are simply put in with the terrapins and death is very swift. After food the next most important thing is sunshine. Like all reptiles they spend hours basking in the sun; it is absolutely essential to their health. This problem has been easily solved over the past two hot summers: I just put them in a suitably protected tank in the garden and as soon as my back was turned they were sprawled out on the rocks. In winter the sunshine presents more of a problem but some of the sun's goodness can be substituted with cod liver oil. Books recommend dipping their food in it but as they only eat under water the oil all floats off making a mess of the tanks and not helping the terrapins. The best method I have found to get the oil into them is by injecting blow fly maggots with it and then feeding them to the terrapins. They are swallowed whole, as are most things, and act as a very effective cod liver oil capsule.

"Although this letter may seem as if I go to a lot of unnecessary trouble for my pets, I have had some failures in years gone by; but now I feel I have succeeded as after 1½ years my pair measure 8½ in. nose to tail and they are too strong to hold in one hand, and are capable of quite a painful nip if they get hold of your finger end as well as the piece of beef you are feeding them. Time consuming they certainly are: they take up twice as much time as my tropical fish tanks; but to my mind they provide twice as much pleasure and amusement."

Master A. Rodriguez is a 12 year old reader whose home address is 39 Gordon Close, Staines, Middlesex. He writes the following: "My subject is aqua-decor and aquatic plants—not seaweed. When I set up my 45 in. × 18 in. × 13 in. aquarium I aimed at reconstructing the bottom of a tropical lake. Previous to that I owned a smaller tank with multi-coloured gravel, skin diver, ship's wheel, mermaid, bubbling galleon, etc. Looking back I say—ugh! I prefer natural gravel, i.e. the kind found on the beach, or deep blue gravel. I have a large piece of petrified wood which, apart from attracting algae, looks quite well as a centre piece along with a clump of *N. stellata*. Also I have two pieces of Westmorland rock on either side to provide a balance.

"An aquarium without plants is like bacon without eggs—or should I say soya chunks without poly-unsaturated gravy? I am a great believer in their toxic gas absorbing properties. One plant I will not buy again though is *Hygrophila polysperma;* half-a-dozen sprigs soon took the whole tank over. The following I have grown and am growing at the moment: *Cabomba* (two species), *Elodea densa*, *Myriophyllum*, *Sagittaria natans*, *Vallisneria*, *Rotala*, *Bacopa*, parrots' feathers, *Microsorium*, Malayan sword, lizard's tail, Amazon sword, wistaria, *Acorus variegatus* and hair grass. My main suppliers are my local pet store and a very good firm in Kidderminster, both supplying plants of excellent quality. Each species is planted in a clump and positioned according to height and lighting requirements. Light is provided by a 3 ft. warm tinted tube. The filtration is done by an air-driven external power filter.

"I have not yet mentioned the fish, which are few but large: two large gouramies—blue and three spot, a sailfin molly, a firemouth cichlid and a 1½ in. oscar that must go. When I sell the oscar I will restock my tank with smaller, more attractive fish such as *Corydoras*, 'kribs,' cardinals, bleeding hearts, etc. There I stop and thank you for reading my letter." (Have you considered stocking your tank with only gouramies and *Corydoras* species? They can make a delightful collection in a fairly large tank. At last my large tank has been re-stocked with two species of *Corydoras*—a pair of which spend most of their time on the surface of a large piece of petrified wood, coming down only when enough flake food to satisfy their needs fails to fall on top of their resting area—and a pair of each of the following species of gouramies: golden, three spot, thick lip, opaline, lace, dwarf and honey.)

The last of this month's letters also comes from a junior reader—13 years old Allan Johns, of 4 Warden Close, Maidstone, Kent. Allan writes: "I have had great success with the silver angel—*Pterophyllum scalare*. My spawning pair was received quite by chance. I went into a dealer's shop and he sold me two silver angels at £1·98 each. I got them home and put them in a 24 in. × 12 in. × 15 in. tank. A week later I noticed that they had started to clean a large leaf of an Amazon sword. I spent a whole day sitting in front of the tank; the spawning started at 3.30 p.m. The female had two trial runs over the selected site

and one could see her breeding tube (photograph 3) straining to release her roe. Soon spawning started and the female commenced to lay a row of eggs. The male followed and ate them. Soon though he got the idea and followed the female fertilizing the eggs. Spawning finished at 4.00 p.m. Both sexes stood guard over the eggs and were very vicious. I had to keep the pump off as the fish went very pale when it was switched on, and I was scared they might eat the eggs. I also decided that as it was their first spawning I would leave the light on.

"The eggs hatched seven days afterwards. The fry were frequently shifted to new leaves and once even to the vertical filter air lift; but this was abandoned as the fry kept drifting off it. Sometimes when the fry were being switched they stuck to the parents' mouths. In another six days the fry were free swimming and were fed with (a popular liquid food). Three days afterwards the parents had begun to eat the babies; subsequently I lost all that spawning.

"Since then I have had two more broods and I managed to save six which I reared artificially and are still growing fast. I was introduced to the hobby by a friend who, when the time came for him to get his first tank, I had already made up my mind. My dad had always wanted a tropical fish tank, so when I told him I wanted one we agreed to get one. The first fish I bred was the red sword, and the first egglayer I bred was the silver angel. I am also puzzled by some very small animals in one of my tanks. They are like beetles and they attach themselves to the glass. I would also like to exchange notes with anyone who breeds angels and convicts."

I was very pleased to receive so many letters from young readers this month: these keen youngsters should ensure that our hobby continues to grow among the members of the younger generation. As I mentioned before, letters you send me this month will be used in the May edition when *W.Y.O* celebrates its tenth birthday. I should like to receive as many opinions as possible for that special edition—and remember, letters do not have to be very long. In particular I would like to receive a number of short letters telling me why my feature has retained its popularity for such a long period. What is its special appeal for you? What do you like and what do you dislike about it? Remember, the latter is just as important as the former. Would you like to see any changes in the format or style? Would the inclusion of more or fewer photographs improve it? Drop me a few lines and I'll try to fit in as many opinions as possible. I'll send a present of an aquarium pump to the writer of the letter that appeals most to me. How's that for an offer!

I'd be pleased also to receive your opinions on any of the following: (a) U/G filters; (b) types of aquarium lighting; (c) breeding cardinals, neons and discus; (d) unusual livebearers; (e) feeding aquatic plants; (f) the state of the coldwater side of the hobby; (g) how well tortoises have survived the winter; (h) frogs and toads kept in aquaria; (i) successes with marines; (j) the aquatic plant that grows best for you; and (k) suitable plants for growing at the edges of garden ponds. I hope there's something in the list that will prompt you to pen me a few lines. I look forward to receiving the largest batch of letters since I started this feature in 1967. Kindest regards until next month.

OUR EXPERTS' ANSWERS TO YOUR QUERIES

READERS' SERVICE
All queries MUST be accompanied by a stamped addressed envelope.

Letters should be addressed to Readers' Service, The Aquarist & Pondkeeper, The Butts, Brentford, Middlesex, TW8 8BN.

TROPICAL QUERIES

by Jack Hems

Can you advise me on the care and general requirements of the marbled hatchet fish (*Carnegiella strigata*)**?**

Maintain a temperature in the middle to upper seventies (°F) and keep the aquarium well-covered because this top-swimming species is given to making sudden leaps above water level. Live foods that float, rise or cruise near the surface are essential. Thus aphids, gnat larvae, concussed flies, small moths, spiders and the newly born young of the guppy are well-suited for inclusion in the diet. If any of the above are in short supply or not possible to obtain, then flick whiteworms onto the surface or introduce *Daphnia* from a clean source of supply. Quality of the aquarium water is not of great importance provided it is not unreasonably hard and alkaline. The marbled hatchet fish requires plenty of swimming space and, if placed in a community tank, the company of fishes that mind their own business.

Snakeskin gourami

Is the snakeskin gourami suitable for a community tank?

This anabantid (*Trichogaster pectoralis*) is peaceable but it does grow to a great length: about 10 in. Hence a roomy aquarium is desirable. Also, the sensible thing to do is to keep it with fishes not so small that the gourami might mistake them for live food.

What is a velvet cichlid?

Velvet cichlid is just another popular name for the oscar or *Astronotus ocellatus*. In books published just after the Second World War you will find *A. Ocellatus* sometimes described under the alternative popular names of marbled and peacock-eyed cichlid.

Can you give me a little more information about Malayan angel fish than I can find in my aquarium books.? I have been told that there are a number of species of *Monodactylus* **apart from** *M. argenteus*. **For more than a year, the latter species has been doing well in my freshwater aquarium.**

The popular name of Malayan angel fish for *M. argenteus* is not strictly correct. Most species of *Monodactylus* (Silver or Fingerfishes) are widely distributed around the coastal areas of tropical seas ranging from Australia to Africa. *M. argenteus* is undoubtedly the easiest species to keep for, like yourself, I have had specimens live for years without any, or hardly any, salt in the water. It must be remembered, however, that *M. argenteus* does ascend rivers and for all we know may spend most of its life in fresh water. In its natural state *M. argenteus* grows to about 8 in. *M. falciformis* which, like *M. argenteus*, inhabits the inshore waters of southern and south-east Asia to the coastal waters of east and southern Africa, grows to a length of about a foot and is more elongated horizontally than *M. argenteus*. *M. sebae* which is not, like *M. falciformis*, often on the market, frequents the coastal and estuarine waters of tropical West Africa. It is very tall, that is from back to belly and a vertical black bar extends from the top of the wing-like dorsal fin to the tip of the similar-shaped anal fin. A dark bar runs through the eye. Another dark bar extends across the base of the caudal fin. It reaches about 7 in. in the wild. *M. sebae* and *M. falciformis* flourish best in a marine tank or in a 50/50 mixture of seawater and tapwater. All species mentioned above

require a temperature in the middle to upper seventies (°F). Once recovered from the shock of being moved from one tank to another, the fish usually settle down well. *M. falciformis* is popularly known to African aquarists as the moony or Cape lady. *M. sebae* is sometimes given the inelegant common name of bat mon. Aquarists who introduce *M. argenteus* into a well-planted tank will find that as the fish increases in size it also develops a marked appetite for greenfood. Hence tender-foliaged plants such as Indian fern, species of *Aponogeton*, and nuphars are among the first to suffer.

What is the best temperature for keeping and breeding whiteworms?

A temperature ranging from the middle fifties to the middle sixties (F) is right for whiteworms.

Would red sandstone introduced into my tropical tank have any adverse effect on the plants or fish?

Red sandstone is quite all right. However, to be on the safe side it would be advisable to soak it in some changes of water before introducing it into your tank.

What is a splashing tetra?

The fish you refer to is more usually called the splashing characin or, formally speaking, *Copeina arnoldi*. The popular name is derived from the fact that the male thrashes his tail-fin about in such a way that droplets of water keep the eggs, deposited above water level, throughly wet until the fry incubate and drop back into their natural environment. *C. arnoldi* is an unusual fish in several ways. The body is very elongated for a characin and slightly compressed. The top of the head is flattened as in the typical killifishes. There is no adipose fin. Overhanging leaves or pieces of tree bark or stone are used as a spawning site, which the pairing fish reach by jumping out of the water and adhering momentarily, side-by-side, to the chosen surface.

I should like to know the best way to keep and breed the glass catfish.

If you mean the mid-water-haunting silurid known to science as *Kryptopterus bicirrhis*, then this fish may not stay alive for any length of time if it is not supplied with live foods such as gnat larvae, whiteworms sinking from the surface, guppy fry, and the like, and is kept isolated from its own kind; for it is by nature a species that lives in a group or shoal. I cannot say off-hand whether the fish has spawned in the aquarium. I believe it has but all the books I have at hand state that this interesting species has not spawned in captivity.

Please can you give me the title of a book that deals in depth with the removal of floating sediment and noxious gases through filtration, aerobic bacteria, and the like?

The best book on aquarium filtration I have ever come across is by an American authority on water management. The book is called *Fish and Invertebrate Culture: Water Management in Closed Systems* by Stephen H. Spotte (John Wiley & Son, Inc., London, 1970).

Is it true that the submerged rush sold for aquarium decoration will flourish in a permanently wet spot outdoors?

If you mean the tall or medium-sized species of *Acorus*, then the answer is yes. Plant it in a peaty bog near the pondside or just submerged and it will grow well. If provided with a good light it makes a good subject for a moist floored bottle garden.

I am interested in setting up a community tank for livebearers and, with the shelter a forest of fine-foliaged plants will afford, hope to save a goodly number of fry. Do you think the halfbeak (*Dermogenys pusillus*) would get on all right with guppies, swordtails and platies?

D. pusillus demands special conditions if it is to stay alive and breed. These include shallow water, small livefood, and no other fishes present. Even then the species is not easy to breed. I suspect you are a beginner, for if you intend to breed livebearers you will end up with a very mixed bag of fish indeed if you mix different coloured platies, swordtails and guppies together in the same tank.

Etroplus suratensis

I have just purchased some *Etroplus suratensis*. Please let me know if this species is suitable for a well-aerated and filtered tank at present stocked with Malayan angel fish, rosy barbs and spiny eels?

E. suratensis, popularly called the green chromide, is essentially a fish from brackish water and needs specialized treatment. It will live for a time in fresh

water but is not so adaptable as the much smaller orange chromide (*E. maculatus*). It would be a good plan to exchange your green chromide for some fish more suited to a freshwater aquarium.

I have a community tank at present stocked with popular tetras and barbs. The tank measures 48 in. × 15 in. × 12 in. I would like to change to cichlids and wonder whether my tank would be large enough to accommodate two oscars? Please can I have the benefit of your advice.

A 4 ft. tank would certainly make quite a satisfactory home for two oscars. I imagine you intend to keep the two oscars on their own. The tank should be furnished with lumps of granite or slate at each end, on a thick carpet of well-washed grit, to afford shelter. An efficient filtration system is called for as oscars are heart eaters and create lots of sediment.

My dealer has a number of young spanner barbs and I would like to buy a pair because I have been told they are ready-breeders. The books I have all state that it is not possible to tell the sexes apart. Is this correct?

Seemingly it is not possible to sex the spanner barb when it is small. Even when it reaches a large size (and it can attain more than 6 in.), the female is best distinguished by her heavier build for, in the main, the colours of both sexes look much alike. To make things more difficult, the spanner barb (*Barbus lateristriga*) is variable in pattern markings and coloration. In a word, the ground colour and shape and size of the stripes varies according to where the fish is found, and its range is quite wide over Malaysia and Indonesia. All the same, apart from fuller sides in a well-grown female, the red in the fins of the male is usually more intense than the red in the fins of the female.

COLDWATER QUERIES

by Arthur Boarder

I have a large tank with a number of young goldfish in it. They appear to be quite healthy but they all have a continuous stream of excreta hanging from them. I feed on a certain flake food and freeze-dried *Tubifex*. What is the reason for this?

I suspect that it is the freeze-dried food which is causing the trouble. I have been feeding a tank of fantails for three years on the same flake food as you are using, a British made food which has been on the market for years. My fish never show the slightest sign of excrement hanging from them and so it is reasonable to say that it is the dried *Tubifex* food which is causing the trouble. This is so dehydrated that young fishes cannot properly digest it and so it is voided only semi-digested. Cut out this food and use the flake food only. You will find that your fish keep perfectly healthy on it and need no live or other types of food.

I have a tank 24 × 12 × 12 inches and would like to keep Catfish in it. What sort will suit a beginner and shall I need a heater, filter and aerator?

The usual catfish kept in coldwater tanks is the North American species, *Ameiurus melas*. This fish could reach 40 cm. in length but in tanks usually not more than 30 cm. It is a carnivorous fish and may not take any but live foods, such as small fishes, garden worms, maggots and similar live foods. These fish like a soft sandy base as they may hide there during the daytime. They can be kept at room temperature and do not require heating nor aeration as long as they are not crowded. A filter should not be necessary. I have known these fish to eat Sticklebacks but they are not really a fish for the beginner owing to their fondness for live foods which may not always be available. Why not start with goldfish?

Is there any way of keeping cats away from my garden pond and taking fishes?

If the pond is of a fair size it may be possible to lower the level of the water to about a foot below the sides. A fine nylon netting can be stretched over the pond and if a green one is used it will not look unsightly. This is not possible where there are water plants growing up above the surface. It may be possible to erect a foot high fence round the pond, by using thin metal rods as uprights and stout plastic netting. This netting can be cut with scissors and if points are left on the top this will deter cats. If a cat can be approached quietly whilst it is sitting watching at the pond side, a bowl of cold water thrown over it may act as a deterent. One method I have known adopted is to lay a large slate or similar material over the edge of the pond, over-lapping somewhat; then when a cat goes on it to reach the water the slate tips up and shoots the cat into the water. Cats are good swimmers but the shock may be enough to stop them from returning in order to catch a fish. One idea might work if you knew the

owner of the cat. Inform him that your fish are worth ten pounds each and if his cat takes one you will expect its cost to be forthcoming. And before cat-lovers start writing in about the suggested treatment, may I point out that many pond fish are as much pets to their owner as many a cat and many cost far more than most cats. I wonder what the reaction would be if someone kept a tame fox and let it out every night to roam neighbours' gardens killing cats?

We have a number of fish tanks at school, some as small as 12 × 8 inches. What small fishes could we keep in them? Would Sunfish be all right?

Most Sunfish would grow too large for such tanks and even the smallest one, the Dwarf or Pigmy Sunfish is not likely to thrive in such quarters. The Golden Medaka, *Oryzias latipes* is about the smallest coldwater fish which you could use. I think that it would be better to keep the small tanks for other forms of life, such as *Daphnia*, water snails or in spring, newts eggs.

I am a beginner in fishkeeping and am very interested in keeping Sea horses. I do not see any in my local pets shops, are they scarse?

I suggest that you forget about keeping Sea horses. They are a tropical marine fish and I understand that they are not the easiest of subjects to keep, especially for a beginner. They must have special water and a fairly high temperature. I think that one would need to have some experience with some of the easier marine fishes before embarking on your particular fancy.

I keep tropical fishes and am interested in keeping and breeding either fantails or veiltails. Which variety do you think I should start with?

It is of course an individual choice. I recommend the fantail as although the veiltail is the more handsome fish, the former can be placed in an outdoor pond all the year round if needed but the veiltail has much more flowing finnage and so is not quite as hardy. The fantail is a much better fish to keep in tanks than common goldfish and when breeding them, it is very interesting to note the various shapes which can be obtained. It is only a few from a spawning which are likely to become show specimens and so when a few turn up there is much more satisfaction than there would be in breeding many tropicals which could turn out as like as peas in a pod.

Two years ago I bred some goldfish in my garden pond and none changed colour until last summer and they are not more than two inches long now. Should they have changed earlier and be larger than they are? If so where did I go wrong?

There are two distinct methods of breeding goldfish in a garden pond, controlled and uncontrolled. The former method is used by experienced breeders who wish to obtain a fair number of fish and the latter to let the fish breed indiscriminately and let the fry remain in the pond. Where a particular variety of fancy goldfish are being bred, it is essential that the eggs are removed from the pond when they are laid and hatched and reared in a safe place away from the attentions of the parent fish. This method prevents many eggs being eaten by the parent fishes or fry being eaten should they hatch in the pond.

To ensure that the eggs are laid in such a position to be collected, it is necessary to ensure that there are not too many water plants with fine leaves all over the pond. In such a case it would not be possible to collect the eggs, except perhaps for a few. The better method is to supply bunches of fine-leaved water plants in which the fish will spawn and then enable the bunches to be removed once a fair number of eggs are seen. One of the best water plants for the purpose is Hornwort, *Ceratophyllum demersum*. As the eggs are laid in the dense foliage, they stick to the leaves and so can be removed easily with the bunch of plants.

Most spawnings in the pond will take place from late April through the late spring and summer. It is possible for the fish to spawn every month until September, and in some seasons even later than that. The bunches of plants to act as nests should be in position by the end of March or the beginning of April. Every few days the bunches should be washed up and down in the water to remove any fine silt which may have accumulated there. This is important as if the plants were covered with silt the eggs would not be likely to stick to the leaves.

Spawning usually takes place in the early morning and can go on for a few hours. It is generally on a fine morning when the fish spawn and even a beginner should have no doubt when it is taking place. The males chase and nudge the females vigorously through the plants. Spawning is not likely to take place if the water is not well oxygenated and if the fish fail to spawn by the end of May, they may be encouraged to do so by removing some of the pond water and spraying fresh cold water on the pond with a hose.

To obtain the best results the hatching tanks should be warmed up to 70°-75° F., as this will give a quick hatch and enable to fry to start to feed far more quickly than if the water had been cold. With an early hatch and the necessary warmth the young fish could be three inches long over all by the autumn. It is quite probable that fish reared with extra warmth will be at least twice as large as any which may have survived in the pond after an uncontrolled spawning. Also, fish reared with the warm treatment can change colour well within the year of spawning. If a special

Continued on page 475

PLANT QUERIES

by Vivian De Thabrew

Concerning the *Aponogeton* species: "a beautiful plant when growing, but I have not yet read anywhere that it dies away. I have been told that if I remove the bulb from the aquarium and place in the fridge for a short time then return the bulb to the aquarium it will grow again. Is this right?"

It is true that Aponogetons die back after they flower. This is only one stage in the life-cycle of the plant. In their natural habitat all aquatic plants go through their life-cycle, first flowering, then dying back and then regenerating and growing. Once the plant dies back it remains dormant until the time is ripe for re-growth. Then the bulb re-sprouts and develops into another healthy plant. Therefore I would strongly recommend you to keep the bulbs in the tank, when you will find that they will grow to beautiful plants a few months later. There is no scientific reason for keeping bulbs in a fridge and then planting at a later date. It is purely accidental that the bulbs sprouted after being taken out of the fridge. It is obvious that the bulbs had reached that stage of their life-cycle when they were due to re-sprout.

"I am, I consider, a keen aquarist, but plants have me beaten. Could you please help me to select a good variety of plants that will last, grow thickly and which I can be proud to look at? I have to furnish 4 ft. × 15 in. × 15 in. and 30 in. × 12 in. × 12 in. tanks. I considered putting Amazon Sword along the back intergrouped with *Sag. natans*. In front of this *Aponogeton crispus*, *undulatum*, Java fern, *Barclaya longifolia*. The last two I have never seen but have been told are beautiful plants."

You can certainly plant Amazon Sword, *Sagittaria natans* and *Aponogeton* species together. All the above-mentioned species will live together at a temperature range of, say, 68°-75° F. But I am afraid *Barclaya longifolia* lily will not thrive at that temperature range. It really requires a very high temperature, about 78°-80° F. Therefore I suggest you drop *Barclaya* and concentrate on the first three types. You can also try some of the *Cryptocoryne* species, especially the shorter and medium growing ones. Java fern or Java moss is quite pretty, but in actual fact it really is not suitable for aquaria. There are many other plant species which do better and look prettier than Java fern.

"I have had an incurable unknown disease in two of my tanks which contained about ten pounds worth of plants. How can one effect a total sterilization of my relatively valuable plant collection in readiness for a new stock of fish?"

Do I gather from your letter that at present you have no fish at all but well-established plants? If this is the case the solution is fairly simple: empty half the quantity of water and dilute some aquarium salt in it. 2 oz. of salt should be sufficient for 10 gallons of water. Let this water remain for about four hours. Then totally drain off and fill the tank with new water. If you are introducing new plants, then the safest method of sterilizing these plants would be as follows: Make up a stock solution of copper sulphate by dissolving 300 milligrams of copper sulphate crystals in 10 fluid ounces of water. You can ask your local chemist to prepare this for you. Now, using a plastic container, mix ½ teaspoonful of this solution in 2 gallons of water. Immerse the new plants in this solution for about four hours. Then rinse well and plant in the aquarium. Plants such as *Myriophyllum*, *Ceratophyllum*, *Blyxa* and *Vallisneria* should only be immersed for a short period, say for about an hour.

READERS' SERVICE

May we remind readers that all queries MUST be accompanied by a stamped addressed envelope. The service is free but, regrettably, postal charges are not.

You should find this treatment effective, but if you still find trouble please do not hesitate to contact me.

"I have some dwarf tropical lily bulbs growing in one of my tanks but I have been unable to obtain any information concerning their cultural requirements, propagation or storage after the bulbs have finished flowering."

Regarding your dwarf tropical lily bulbs, you do not say which species they are. However, as a thumb rule, you should not remove them once they have flowered. In their natural habitat they go through their life-cycle without being disturbed. If you leave it in your tank the leaves will fall off and the plants will remain dormant until its new growing period, which should be in about six months' time.

In early spring if you see sprouts emerging from the bulbs, allow these to grow to about an inch. Then, using a sharp knife, cut the bulb into sections, so that a sprout remains on each piece. Be careful not to damage them. Now dust these with charcoal dust and then peat or loam and plant in a shallow tank. The water level should preferably be not more than six inches. As the plants develop increase the water level and later transplant. However, if you know, please let me know which type your lilies are, so that I may give you exact instructions and information.

"My problem is maintaining healthy plant growth in the aquarium. I have been trying for two years many different ideas which include varying amounts of filtration with undergravel filter, part water changes, varying depths of gravel, temperature variation and different types and amounts of lighting. Planting in individual pots with different gravel has also been tried. I have tried *hygrophylla*, **water sprite,** *vallis.*, *ludwigia*, *cabomba*, **amazon sword and crypts. A few days after planting they lose their original leaves and eventually die back or sprout new shoots but take on a stunted dwarfed appearance and very rarely exceed ½ of the height of the aquarium. The tank is sited in a recess shading it from direct sunlight. The water remains clear and the fish healthy."**

From what you say I think you are giving the plants sufficient light. However, the fact that the plants lose their leaves and eventually put forth new shoots but remain stunted could be attributed to several factors. It could be any of these, or a combination of these:

a) poor planting medium
b) incorrect pH
c) incorrect temperature range
d) incompatible ecological environment

Try planting in a medium consisting of unwashed river sand and peat at the ratio of 4:1. This medium can be covered with aquarium gravel to a depth of about three inches. Maintain the pH level at around 6·7 or 6·8, and the temperature between 70 -74 F. You are right not to subject your plants to direct sunlight, as all the plants you grow do prefer subdued light.

Perhaps the most important consideration you should give concerns the compatibility of so many species growing together. Ideally *Cabomba* should be grown alone or further away from any other plant. It does not thrive with most *Cryptocoryne* species. *Hygrophylla*, *Ceraptoris* and *Cryptocoryne* will live together, but Amazon Sword is quite intolerant. *Ludwigia* is really not a true aquatic, it is a bog plant, and hence should not be considered for a heated aquarium. Therefore it would be a good idea for you to experiment with this aspect of plant growing, as I can assure you that, giving due consideration to the ecological behaviour of your plants, you will find success with most of them.

"I have seen in your magazine and elsewhere photos of aquaria thick with plant life and flourishing. I cannot understand this. *Vallis.*— **If planted at the suggested depth will not anchor, its runners do not grow in the gravel but on top. Amazon Sword—Once again will not anchor if put in at required depth. Leaves brown and die back.** *Cabomba*—**Die away and do not flourish.** *Wisteria*—**Will not grow. These are the main plants I have tried. Plants that require lead weights die away from the lead down. I don't think I am applying the lead too tightly. I have 2 tanks 4 feet and two feet. Lighting is fluorescent which on average is on for 10 hours."**

As far as I can assess the quantity of light you provide for your plants is quite adequate. The first consideration you should give is a suitable planting medium. *Vallisneria*, *Cabomba* and Amazon Sword require a good, mulmy bottom, as in their natural habitat these species grow in mud enriched by humus. Therefore try growing this in a mixture of clay and peat or coarse sand and peat or finely sifted leaf compost. Give a depth, including your aquarium gravel, of about four inches. Subdued lighting for, say, six to eight hours a day should suffice. Try varying your temperature between 70 -74 F. Maintain the pH at around 6·7-6·9. However, Wisteria (*Synnema triflorum*) is essentially a bog plant, adopting an amphibious nature in its natural habitat. All plants have their own plant preferences and make their choice as to their preferred neighbours. This is in actual fact what we learn in plant ecology. *Wisteria* will only tolerate a few species of the aquarium plants known to the aquarist. It will grow with most *Cryptocoryne*, *Hygrophylla*, *Ceratopteris* and *Limnophila* species. But with others it will soon die away. Occasionally, however, you should find success in growing it with other species, provided it is rooted deeper than and further away from them.

OUR READERS WRITE

Redhump *Geophagus?*

Dear Sir,

I am sending to you an account of the breeding of *Geophagus pellegrini*. As literature on these species of fish is, to my knowledge, limited I thought that this may be of interest to your readers.

To begin with I was very lucky to acquire a young pair which had already successfully bred. They were acquired at the size of approximately 2½ inches from my local aquarists shop. The fish were housed in a 24 in. × 15 in. × 12 in. tank which also contained a pair of Angels, a pair of Kribensis and some very young Malawi Cichlids.

The pair were very placid and took no interest in any of the other fish, but constantly bullied each other, the male slightly more. They ceaselessly sift through the gravel filtering the particles through their gills, in search of food, which is in the form of freeze-dried *Tubifex* and pond pellets, which they relish.

The breeding procedure took place on top of a rock which stuck out from the gravel about 4 in. and is about 4 in. long and 2 in. across. The egg laying was typical of Malawi Cichlids, the site was not cleaned or prepared in any way. The fish circled each other, the eggs being deposited by the female which then passed on as the male swam over the eggs, the female then came round again picking up the eggs as she passed and then deposited more. This went on for approximately one hour, after which the female retired to a corner of the tank, her mouth bulging with eggs. I decided to separate the pair by a tank divider after removing the Angels and the Kribensis which left the young Malawis and the male in one side of the tank. The female brooded the young for a period of 16 days before the young were released which were about 25 in all and about ¼ in. in length. During this time she took no food at all, although during the previous spawning she fed during the brooding period. The refusal of food was probably due to the larger amount of young as the last breeding only produced seven fry.

The exact qualities of the water is not known but is approximately 18DH° and alkaline, temperature 80° F., the gravel is 50 per cent coral sand and 50 per cent gravel.

These fish are extremely tame and rise to the surface immediately when the tank is approached, eagerly looking for food. Even the female showed no signs of timidness during her brooding period although she would take the young into her mouth if one got too close to the tank.

I hope that this maybe of interest to you.

Yours Sincerely,
M. R. ALLPORT,
5 Huntingdon Gdns,
Colley Lane,
Halesowen,
West Midlands.

Fish Stamps

I have only just noticed the letter from John Kettle in your October edition which refers to my article on "Fishes and Stamps." Mr. Kettle says that he disagreed with two points in the article.

He says that two British stamps depict fish. I cannot accept that he is right. The two stamps to which he refers were issued between 1911 and 1926 but in fact quite apart from numerous shade and watermark varieties there were three distinct stamps. These were a ½d green with full profile portrait; a ½d green with three quarters profile portrait; and a 1½d brown will full profile portrait. However the stamps depict dolphins and dolphins are not fish. In any case it requires a rather careful study of the stamp to distinguish a rather stylised animal from the remainder of the ornamental scrollwork.

With regard to Mr. Kettle's other criticism of my article I did not say that dealers would be prepared to break up sets and I do not know why he should think I did. I personally prefer mint stamps but that is beside the point and the illustrated stamps were, in fact, postmarked.

Yours faithfully,
ROGER T. CHAMBERS,
3 The Alders,
Romsley,
Halesowen,
West Midlands.

Exhibition Tableaux

I refer to Mr. Phillips' letter in the January issue re the Brussels manner of Exhibiting and in which he states "as his opinion" that it is a more attractive Show! Mr. Phillips, with whom I am on most friendly terms, however, is apparently a comparative newcomer or he would know that a quarter of a century and more ago WE did Exhibit as per the Brussels Show.

That method became unpopular and, indeed, became impossible at major shows. I think that proof of this is in the fact that all other Federations copied the Northern Federation's "Tableaux" Scheme to remain viable.

Our Hobby now has to compete with other interests for its members' time and money, e.g., more holidays, clubs of all types, cars, clothing, games, etc.; and so for years there have been but a very small "handful" of honorary volunteers whereas in the days before the Society staged exhibits or tableaux, for instance, I had some 150 people all willing to work almost day and night if necessary to do the work of preparation and dismantling and storage and maintenance. I have no doubt that if there is a popular insistence of a pre B.A.F. 1953-type show—rows of tanks neatly arranged for fish and furnished tanks in class order and presented with decor *and at the same time adequate honorary volunteers* to stage same, to dismantle and to store and maintain the necessary equipment, then someone will try to revert to that type of exhibition.

Yours truly,
GEORGE W. COOKE,
British Aquarists Festival
Organiser.

FISHES EXCLUDED

In reply to a query raised by one of your correspondents in the December issue, the Dangerous Wild Animals Act, 1976 requires the licensing of keepers of certain large mammals, Old World monkeys, poisonous snakes, and a mixed bag of other reptiles, including crocodilians. The conditions under which the animals are kept are subject to annual veterinary inspection and the local authority is entitled to charge a licence fee which will cover the costs.

The bureaucratic net, therefore, does not extend to fish owners and piranhas, scorpion fish, electric rays, and other well-meaning species have no reason to fear the local government worm.

Yours faithfully,
J. P. HARROLD,
78 Lansbury Road,
Enfield, Middlesex.

COLDWATER QUERIES

Continued from page 471

fancy variety of goldfish is being bred it is most important that the controlled method is adopted or very few, if any, good specimens could be obtained.

I have been told that I cannot have too many plants in my coldwater tank. Is this correct?

It certainly is not correct. Strange as it may seem to the beginner, if too many plants are in a tank and no aeration is being supplied at night, the fish can die from lack of oxygen. Although the water plants are giving off oxygen during the daylight, they give off carbon di-oxide during the hours of darkness. I have known fish to die overnight when placed in a heavily planted tank. Usually it is the larger fishes which die as they require more oxygen than smaller ones. A balance should be struck as to the number of plants, and not more than half the tank space should be occupied by plants. A sure sign of over-planting is when small bubbles are seen on the surface of the water in the mornings. This indicates that the fishes have been mouthing at the top for oxygen during the night.

A sure sign of a healthy tank is when the fishes are at the bottom of the tank in the morning before the lamp is switched on. They will probably move up later as the upper layer of water warms up, but this is only to be expected as they like to get into slightly warmer water.

B.K.K.S. COMING EVENTS

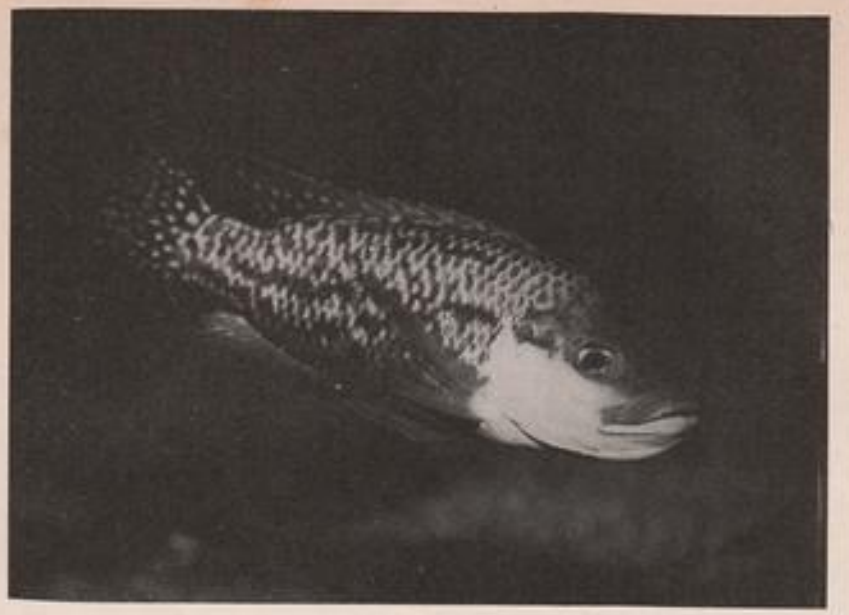
15th May BKKS AGM/SEMINAR

11 a.m.	New films and slides on Koi.
12-1 p.m.	Lecture by Dr. Ford on food and feeding Koi.
	Lunch break.
2-3.30 p.m.	A.G.M.
3.30-4.30 p.m.	Fish equipment Auction.

4.30 . . . onwards—Brains Trust—Panel of Experts —then further Koi films and slides.

4th September "KOI 77." After the knockout success of "Koi 76" with over 500 people turning up to see over 200 entries, "Koi 77," is to be held at the Botanical Gardens, Edgbaston, where 2,000-3,000 can be accommodated, many more vats of Koi, professional catering and masses of parking space. Dr. Kuroki will be flying from Japan especially to judge at the show. A must for all fish enthusiasts.

23rd October—8th November "KOI QUEST TO JAPAN." Another fabulous itinerary concentrating on fish rather than sightseeing. Details from Roland Seal, 7 Highlands Road, Offerton, Stockport, Cheshire SK2 5HU.



Tilapia mossambica

by B. Fry

Tilapia mossambica is a most accommodating mouth-brooding cichlid. It flourishes equally well in fresh, brackish and salt water. Indeed, many years' ago a small shoal of *T. mossambica* living in the Freshwater Hall of the London Zoo were transferred to a marine tank where they settled down well and bred. According to the distinguished fisheries expert, C. F. Hickling, *T. mossambica* can stand more salt in the water than is normally found in the sea. Mr. Hickling does point out, however, in his interesting book titled *Fish Culture* (Faber and Faber, London, 1971), that growth in excessively salt water is slowed and breeding may not take place.

T. mossambica is found in the natural state in East Africa where it reaches a length of a little over a foot. Because the species has fat sides, grows rapidly, breeds freely and makes good eating it is cultivated in many parts of the tropical and sub-tropical world as human food. The southern half of Taiwan, the more climatically favoured parts of Japan, the West Indies, Fiji, Java, and so on, know it well.

It fattens up in next to no time on a mixed diet of greenfood, table scraps, the usual live food found in rivers, lakes and ponds, soya bean meal and rice.

In general appearance, the fish is not very colourful. The female is a sort of washed-out grey to pale brownish yellow, with a few dark blotches that come and go on the sides. Out of the breeding season, the male is much the same in coloration, but the preliminaries to spawning are heralded by his assuming a blackish to black hue, with dorsal and caudal fins sporting a splendid red border. His mouth become enlarged and his lips thicker. The upper lip turns blue. The pectoral fins become red.

As will be readily realised, what the fish requires in captivity—and youngsters are often offered for sale by

dealers—is space to grow and some space to call its own; for a male likes to lord it over a chosen piece of territory. Plants are a waste of time, for the fish is a bottom-grubber and a greenfood eater (as mentioned above). A good depth of well-washed grit is recommended for a floor covering and some rocks such as granite placed towards each rear end of the tank to afford shelter for a bullied female and an appreciated playground.

When spawning time is nigh, the male digs a pit in the grit. In point of fact, he may dig several pits before he is pleased with the result of his efforts. A completed pit may measure some 9 in. to 12 in. across and up to 4 in. deep. A female in the right frame of mind will soon join the male in the pit and there the couple will pair. In short, the female will deposit eggs and the male will spray them with his fertilizing milt. Then the female will take them into her mouth where they hatch after about a week. The fry do not leave the mouth of the female until they have used up all the nourishment contained in the yolk sac. Then they are ready to fend for themselves in the outside world. The mother fish does not take food until the incubation of the eggs is complete and the fry are free to leave the protection of her mouth. Free-swimming fry (in the aquarium) do not require microscopic food but tuck in for all their worth on mossy algae, crushed flake food, brine shrimps, tiny live *Daphnia*, Grindal worms, and the like, and grow noticeably every day. If a sudden vibration, unaccustomed shadow or movement in the tank, frightens them they loss no time in rushing to their mother. She opens her mouth and babies that can manage it squeeze in.

Young, that is small, *T. mossambica*, get on well with other fishes in a community tank. It must be realised, however, that they soon outgrow a small tank and in their larger sizes become bullies and, through their frequent digging, create very hazy water. That is unless the tank they are living in is provided with an efficient filter. Temperature is not very important. The species will stand a range of from about the fifties to the nineties (°F). Either extreme is only tolerated for rather short periods, though naturally water a trifle too warm is better than water that is rather cold. For general maintenance, a temperature of about 75°F (24°C) is best. A rise to the upper seventies or low eighties (°F) is suitable for spawning.

THE FANCY GUPPY ASSOCIATION

THE Fancy Guppy Association is now entering its eighteenth year, having been formed in 1960 to promote the breeding and development of the fancy guppy. Membership is open to anyone interested in keeping guppies. Wherever possible members join through local sections who meet monthly to learn more about guppies and exchange breeding stock.

Members breed most of the twenty-two standard F.G.A. shapes from deltas to doubleswords to exotic pintails. Some members have bred strains of guppies for over thirty years or more.

The highlight of 1977 will be the annual National Show to be held in Birmingham on Sunday, 22 May. Last year 600 fish were exhibited by members from all over the country. This year it is hoped that exhibits will exceed this number. The show incorporates the F.G.A. British Open Guppy Championship, a class of five matched males and five matched females. Unfortunately, freight charges have reduced the number of overseas entries but it is hoped that one or two clubs may participate this year.

A lecture is being arranged to entertain visitors whilst fish are being judged.

Subscription for 1977 are: £2 for adults; £1.20 for juniors (under 18); £1 for additional adult to first adult; 60p for each additional junior. Subscriptions may be sent to the Association Treasurer who will put a new member in touch with his nearest section. If there is no section in his area then a member is able to keep in touch through the Journal which is published monthly. He can also obtain breeding stock through the Association Stock Control Officer.

A short explanatory leaflet is available from the Association Hon. Sec. (please send S.A.E.).

The Association will be attending some of the major aquatic shows to be held in the country this year and invite anyone interested in guppies to visit our stand. An invitation is given to all Scottish guppy keepers to chat to Jeff Hutchings at the S.A.F. show in Motherwell at the end of March.

Hon. Sec., Mr. S. Croft, 85 Planks Lane, Wombourne, Staffs.

Hon. Treasurer, Mr. T. Manning, 14 Tynemouth Drive, Enfield, Middx.

CORRECTION

The photograph by Ray Hanson which appeared on page 408 of the January *Aquarist & Pondkeeper* was incorrectly captioned and actually showed a *Taisho-sanki* koi owned by Mr. Hanson and which was supreme champion at the B.K.K.S. National Koi Show held in Birmingham in September, 1976.

IDENTIFYING *"OL' BLUE EYES"*

by Barry Durham

THERE are occasions when correctly identifying fishes can prove very difficult, even when they are obtained from a reliable source. This was the case with four young *Girardinus metallicus* I obtained recently. They are one of the more difficult livebearers to get hold of and I was very pleased to have finally tracked some down.

There was a definite pair and two young fry which have since turned out to be another pair. The first male was just sexing out at ¾ in. while the female was 1 in. long. Even the fry displayed the transverse metallic bands which are characteristic of this species, but they also all had blue eyes. It was this latter phenomenon which threw me completely.

The ground colour of the fish was a pale gold which showed off the silvery bands to their best advantage; the top of the bands, however, from the lateral line upwards, were distinctly brighter than the lower part. This produced the effect of a broken bright silvery longitudinal stripe as well. The dorsal fin, which is set fairly well back, has a black spot at the base and the female's anal fin has a faintly greyish one.

The male's gonopodium is edged in black along the lower edge and there is a black spot above it where it joins the body. This becomes more apparent when he swings it forwards. The organ is very long, reaching almost to the caudal peduncle and has at least one small, but distinctly noticeable, hook on the end. There is also a faintly greenish irridescent patch on, and just behind, the gill cover.

Being informed that the species was *Girardinus metallicus*, I was quite happy to accept the fact for a while, until I started wondering about those blue eyes. On reading up about the fish I could find no reference to them. Indeed, for a while I only became frustrated and confused as descriptions, scientific names and even the occasionally postulated popular name, differed from source to source.

Innes in "Exotic Aquarium Fishes" makes no reference to the ground or eye colour, limiting the description to the metallic bands and the dark spot on the dorsal fin.

In "A Guide to Freshwater Fishes" by George F. Harvey and Jack Hems the *Glaridicthys metallicus* or Yellow Belly, has the correct overall coloration, but the eyes are said to be yellow. The size is also described as 2 in. for the male and 3 in. for the female whereas my fish, although they may be young yet, seem to have stopped growing at 1½ in. (male) and 2 in. (female). It is possible they have been stunted, but I doubt this as they have shared a 48 in. community tank with other species of livebearers since I obtained them.

Derek McInery's "Tropical Fish" describes a *Glaridicthys falcates* as pale gold with a bright blue iris encircling the pupil of the eye. He gives its popular name as "Blue Eyes" and the size as males growing to 1 in. and females to 1½ in.

Even consulting the livebearing fishkeeper's "bible" —Jacob's "Livebearing Aquarium Fishes" only helped minimally, at first.

Here the body colour of *Girardinus metallicus* was described as variable (yellowish grey to greenish brown). The metallic bars were there but once again the eyes were supposed to be yellow. The dorsal fin should have dark streaks and a broad dark band on the upper edge with a narrow pale border.

As with most of the other descriptions this seemed to fit half the fishes' characteristics and it was only when I turned back a page that I finally reached the conclusion that had been slowly dawning on me for some time about these little enigmas in my tank.

Jacobs describes the *Girardinus falcates* as the Yellow Belly, giving the colour as yellowish olive with the back darker and belly lighter. He points out a longitudinal silvery stripe, a black stripe on the gonopodium and green eyes.

It would seem that there is only one answer—the fish are a cross between *G. metallicus* and *G. falcates* as they display just about all the characteristics of both species. (The blue eyes are a turquoise-green colour in certain lights).

The two species do both come from Cuba, but whether they are a natural or an aquarium cross I doubt if I'll ever know.

They are a good community fish and are very attractive as the cross seems to have combined two

sets of reasonable colour characteristics to produce one good one.

The blue or green eye, depending on the light, looks most striking against the gold and silver background, and as the fish darts about there is that additional flash of irridescent green from the gill area.

They are active fishes and like algae and other green food in their diet. If this is missing, or they are limited to flake food only for a while instead of a variety including live food, they seem to develop digestive trouble which can lead to swim-bladder problems. This starts with the fish swimming head down and can progress into an excessive loss of balance where the fish tries to swim normally but ends up spirallying through the water.

It does not seem to be fatal, however, and the reintroduction of live and/or green food into the diet does the trick and the fish returns to normal again after a few days.

So far the fish have not bred but as they are now around three months old it seems likely that there will be a brood in the near future. It will be interesting to see what the fry are like because I have no idea if the cross has been fixed or not.

PRESS RELEASE: REVOLUTIONARY NEW FILTER

THE new "ES-ES Surge Filter" is the product of the very latest scientific developments in the field of "aquaculture"—or fish farming. Scientists in a large research institution had developed high protein feeding diets, but they needed a more modern and efficient water filtration system than any currently on the market. This need triggered the development of the ES-ES Surge Filter, now being marketed by Armitages.

The Surge Filter is quiet in operation, and moves water through the biological gravel bed of an aquarium at high velocity. It is very simple in construction, with no complex assembly of various parts required. It can be placed anywhere in an aquarium which gives flexibility to the aquarist in building up an attractive tank set-up. It can be moved and cleaned without disturbing the gravel bed.

The product is designed to provide the proper air-bubble movement to help remove potentially toxic gases, such as ammonia, from the aquarium water. It has a ring of air holes in its base which provides an upward air movement of negatively charged air bubbles spiralling and meeting in the air-lift tube. It is these bubbles which lift toxic gases out of the water and release them in the air out of the aquarium.

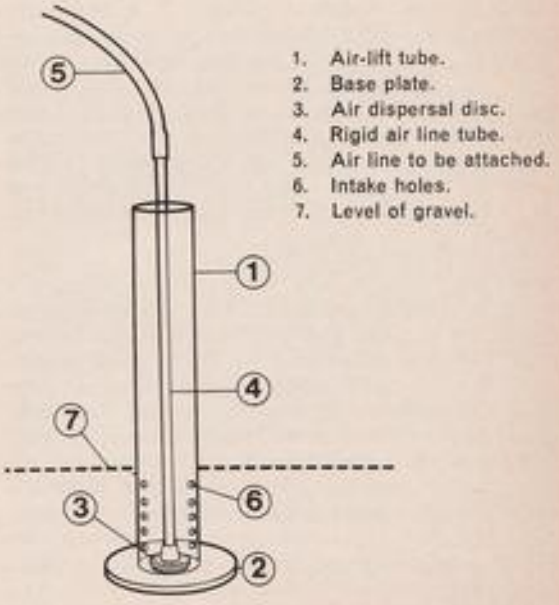
Technical details

1. Air-lift tube.
2. Base plate.
3. Air dispersal disc.
4. Rigid air line tube.
5. Air line to be attached.
6. Intake holes.
7. Level of gravel.

The Surge Filter consists of an air-lift tube, 1 in. in diameter and 6 in. long, attached to a base plate to give it stability in a gravel bed. The lower end is drilled with a series of 1/10 in. diameter holes extending up the tube to a height of 1 in. These holes are covered by the gravel to a depth of at least ½ in.—requiring a total gravel bed depth of 1½ in. Air is injected into the Surge Filter's air-lift tube through the air dispersal disc attached to the base plate. A rigid air line tube passes through the outer air-lift tube and is connected to the air dispersal disc in the centre. The disc is formed with a ring of holes on its upper surface, designed to deliver air which will form medium-sized bubbles. These bubbles are of a size to transport the maximum amount of water through the air-lift tube, discharging the air/water mixture well below the aquarium's water surface.

This product is a precision instrument capable of moving water through 1-1½ square feet of gravel bed at the rate of 1½-2 gallons per minute. This will supply adequate amounts of oxygen to the bed for the cultivation of the micro-organisms that reduce the nitrates to molecular nitrogen, thus completing the nitrogen cycle.

The "ES-ES Surge Filter" will retail at around £1·75.



From a Naturalist's Notebook

by Eric Hardy

WHAT preys upon crayfish, those fascinating little crustaceans in the hard, limestone waters of England? Huxley's classic book on this animal mentions only man. More recent works mention invading parasites, trout and kingfisher. I was very interested to learn that increasing winter visits of eiders to Cannock Chase Water, in Staffordshire, also feed upon crayfish there at a time of year when Huxley suggested they were hidden in crevices in the banks but not exactly hibernating.

The introduction of alien fish or birds into our country ultimately introduces some of their parasites. For example, black bass subject in the US to attack by a tapeworm which passes to the fish via the North American heron and a freshwater snail, have been established in several English waters. This American trematode was subsequently found here too. Much depends upon how specific are their hosts. Various fish are secondary hosts of trematode worms which parasitise poultry, domestic and wild duck, gulls, herons, kingfishers, pelicans, cats, dogs, even some hawks, mice and snakes, according to G. L. Hoffman's 1960 treatise on the life histories of *Strigeoidea* trematodes. A remarkable incident recorded in the American *Journal of Parasitology* describes a boy with his eye irritated by an attached *Argulus*, the well-known copepod fish "louse." He acquired it when swimming open-eyed in a river whose toadfish were heavily infested. The broad tapeworm of man has been found in a Windermere pike, and a Lancashire woman.

The Welsh Water Authority has a £50 fine, £100 for second offence, and is probably instituting a £100 information reward, to check the introduction of barbel from the Midlands into the Dee and the Usk. These fish growing to 18 lb have already reached a population explosion in the Severn, where their introduction in 1957 upset the ecosystem. Barbel are not native to the Atlantic rivers of the west. They evolved in the Rhine-North Sea system of the east of our country. It is feared that these too could introduce new fish-parasites to the Dee. However, the N.W. Water Authority recently used 90 barbel from the Seven to build up their fish-stocks at Worthington reservoirs' main lake.

I shouldn't have thought that the raft-spider, our largest native spider, was so rare as proclaimed when Redgrove Fen was declared a reserve for it recently, on the Suffolk-Norfolk border. It is locally rare. This splendid, semi-aquatic, hairy brown raft-spider also inhabits north Shropshire's Whixall Moss, though its main haunts are the sluggish streams of East Anglian fens.

After the British Herpetological Society bull-dozed new breeding pools for Merseyside's (ex-Lancashire) natterjack toads, to spawn on Birkdale (Southport) dunes, I saw the Nature Conservancy import a mechanical excavator and make two large pools 3 to 4 feet deep, one with an island, on their reserve's Freshfield (Formby) dunes at the beginning of the winter. This is practical conservation at its best; but what a pity that this could not all have been done without the personal animosities which characterised last August's conference of naturalists in Ainsdale. The B.H.S. is now opposing a holiday camp's extension plans at Shore Road, Ainsdale dunes.

A new haunt of the little mussel-breeding bitterling, whose British distribution is mainly in the Northwest where I first proved it to be an established breeder, is the Lancaster Canal near Forton. A St Helens angler who keeps an aquarium to provide his livebait caught a shoal even in December, by laying a hand-net on the canal-bed and ground-baiting with bread until sufficient collected to lift them. Bitterling breed in the St Helens area from Eccleston Mere to the industrial dams at Lugmore Lane, Sidcup Lane and Rainford.

Most people remember Konrad Lorenz only for his popular book *King Solomon's Ring*, and his colonies of jackdaws and geese, with which he lived, talked to them, and "imprinted" himself. But as Alec Nisbett notes in his new book *Konrad Lorenz* (Dent £5·95), the world's leading animal-watcher and father of present-day controversial behaviour studies learned much from observing fish in his aquarium, and finding the reason for their extravagant tropical diversity of colours and forms.

It was his early observations of the long drawn-out ritualistic fights of cichlids which inspired his famous studies of aggressiveness, from animals to humans.

It was on cichlid fish that he wrote his thesis for his 1940 doctorate. As with his later work on jewel-fish and other species, it was the attraction which brought male and female together, overcoming the innate aggressiveness of territorial defence, which he sought. He and his students tested male fish with models to see which feature had most influence in making them fight or flee—special patterns, or colours, or special motion like the jewel-fish presenting itself sideways in order to demonstrate the side beat of its tail, like a challenging stag standing sideways to show its thick neck-mane to its rival.

The responses, it was found, varied with the fish's previous fighting experience. A male threatened during a peaceful period would attack almost immediately, but one weary from recent fights needed much more stimulating—building up its instinct. In species where male and female were alike, recognition was by behaviour: the male mixing agressive behaviour towards the female with courtship, the female flight with sexuality. Separated by a plate of glass, two males in the same aquarium threatened each other; but these challenges declined in proportion to the growth of green algae interferring with their view, until finally they turned to their females.

He found that in a tank of young cichlids, one became dominant and then changed its stripes to spots by a quick effect in the flesh beneath its scales, and had a red diagonal bar across the eye, to warn off others. When this was transferred to another tank, a second fish would dominate, and change to spots. Two such dominants set to fight would circle each other to show their spots, and if neither retreated by changing back to stripes like an immature fish they grasped each other by the mouth and pulled in tug-of-war, not to cause damage, but to exhaust one another, until the weaker changed its pattern to stripes which no longer stimulated aggression.

He went to America to spend several years studying Florida tropical fish in a tank, with their brilliant poster pattern colours to warn others to keep clear or fight when on their territory. He showed that their success in territorial contests was closely related to distance from the boundary of their territory, as with birds. An intruder gives in soonest; but if chased right to his home water he may regain courage and put the former victor to flight. His crescent-shaped Moorish idols defended their own corner of the tank when kept as individuals, but in free water they would shoal and assume rank or peck order, like the cichlids. But brilliant coral-fish patterns are also linked with warning colours by poisonous or harmful fish.

Like his disciple, Tinbergen, he worked also with three-spined sticklebacks and their response to model fish, bringing out most response to models emphasizing some signal-pattern rather than perfection over all.

Brightly-coloured to warn off trespassing rivals, the red-banded butterfly fish of South Australia and the Great Barrier Reef is known also as Old Wife. To science it is *Enoplosus armatus* and is small and reputed edible.

Lorenz had a large tropical fish-tank set in the wall of his study at Seewiesen, and he built a new aquarium when he went home to Altenberg. Freudian and biological critics of his theories of imprinting and ethology (not ethnology) find an arrogant and assertive Lorenz pontificating on theories which sometimes lack sufficient experiment, exaggerate, or over generalise. This has led to misunderstandings. He has suffered some mistranslations and his theories aren't always right. But he is still a giant, shaking up accepted ideas in a way that truth eventually emerges.

Nisbett's book is also an apologia for Lorenz's brown past, voicing Nazi racial theories of genetic inferiority among humans when they were winning the war, then regretted when they lost. Born into comfortable, academic Austrian life, Lorenz in his 70s is still thinking and writing in the sunshine of his memories. Man, he thinks, has made life too easy, and is overpopulated, bringing a genetic decline which got him into his present mess; he thinks he has the way out of it before the apocalypse. So do many others!

Junior Aquarist

DRAGONS OF WATER AND AIR

Written & illustrated by Bill Simms

Fig. 2 Emperor Dragonfly

THE AQUARIST who uses wild plants from a pond (or the pondkeeper) will often have noticed the ugly crawling creatures—from half to one and a half inches long—that seem to be present at all times of the year. Sometimes they cling to plants, but mostly they crawl along the bottom.

These can be the early stages of beetles, alder flies, mayflies, damselflies, or dragonflies. The largest are either beetle or dragonfly larvae. The dragonfly larvae are often the most interesting, for they are equipped with a folding device that can be shot forward to grasp their prey—often twice their size.

Illus. 1 shows such a dragonfly larva with its 'mask' half extended. When at rest this creature folds its mask back so that it lies just below the head and thorax. It remains like that until the larva has crawled within striking distance of its prey, and then the mask is shot forward to grip the victim. If it struggles, as most fishes do, it is held at a distance until quiet, and then is inexorably drawn back to the mouth parts.

Fig. 1 Dragonfly larva and mask

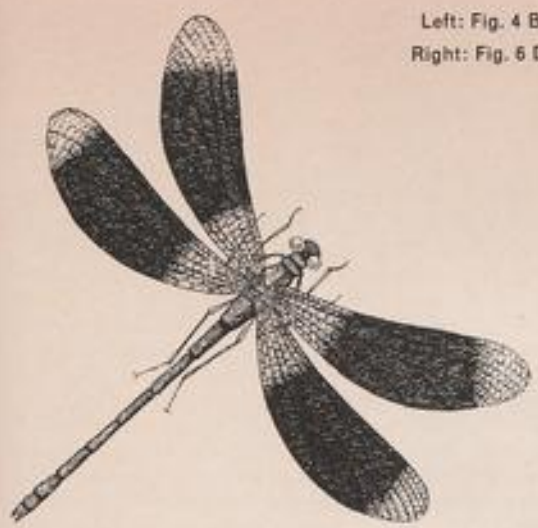
I have seen a large larva grip and hold a stickleback—which itself is a fierce killer—and draw it back to be eaten within one minute of the strike. The fierceness and remorseless character of dragonfly larvae may explain why the name 'dragonfly' should be in two parts: dragon for the larva, and fly for the adult. The other viewpoint is that a dragonfly catching its prey in flight is a dragon among flies.

Dragonflies and their larvae (often called nymphs) are both carnivorous, the adults chasing and catching insects on the wing, and the larva slowly crawling after its prey in the water. The Emperor dragonfly, shown here at 2, is one of our largest insects, being about 3¼ in. long with a wing span of nearly 4 in., and can be seen cruising well away from water as well as over ponds. On a quiet day the noise of the impact as it strikes a large insect in flight is audible for many yards. Female's body colour is green, the males having blue eyes and blue abdomens.

The larva has a medium stout body with a basic green tinge mottled with brown, and on its back can be

Fig. 3 Dorsal view of larva

Left: Fig. 4 Banded Agrion Dragonfly
Right: Fig. 6 Downy Emerald Dragonfly



seen the embryo wings that in later life will carry it in the air. When fully grown it is about 2½ in. long. It originates from an egg laid by the parent from June to September (their usual period of flight) and is at first camouflaged with black and white bands to avoid being eaten by a larger relative. It goes through ten to fifteen stages of development, at each of which it casts its outer skin and emerges slightly modified. Usually it takes on the colour of its surroundings at each change, and may be yellowish, brown, or green.

After two years of growth it is ready to become an adult, so it stops feeding, and crawls up a plant stem into the air—leaving its tail end in the water at first to effect a change from rectal breathing in water to an intake of air through the spiracles at its thorax. When this is achieved the larva crawls higher up, usually in the morning, and fastens itself so tightly to the stem that the skin is left attached when it emerges as an adult.

While taking in air to breath a layer of air builds up between the larval skin and the mature insect inside, and soon this pressure causes the skin to split along the back. It is out of this split that the adult dragonfly emerges, taking between one and two hours to pull free of the discarded skin, and a further two hours for the wings and body to harden sufficiently for the insect to fly. It will be seen from this that there is no chrysalis stage.

Damselflies, such as the Banded Agrion, illus. 4, are smaller and more delicate looking than dragonflies, though fundamentally similar. When at rest the adult insects usually remain poised with their wings closed, whereas dragonflies rest with wings spread. As with most dragonflies, there is a difference in colour between male and female damselflies.

The male Banded Agrion has a bright green body, and on the wings are deep blue patches. The female

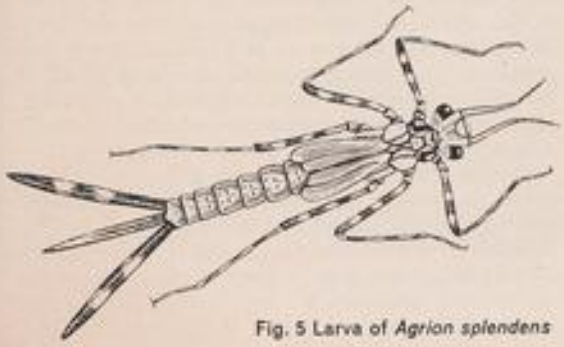


Fig. 5 Larva of *Agrion splendens*

Fig. 7 Larva of Downy Emerald Dragonfly

has less green on the body, and there is no blue on the wings; instead these are transparent with vivid green veins. In general both sexes frequent still waters and slow running streams, usually with a muddy bottom, which is preferred by their larvae.

As befits the more delicate Agrion, its larva also is slender, as shown in illus. 5. Normally it lives among the roots of water plants on muddy sections, and may be coloured chestnut-brown, green, or any shade between these two. The three plumes at its tail end are caudal gills, and it is through these that oxygen is absorbed from the water during its two years in the larval state.

The Downy Emerald dragonfly, although almost as small as the Agrion, is not a damselfly. Its body is emerald green, and its wings are transparent. Normally its body is about 2 in. long, and its wing span is 2¼ in. It will be seen by illus. 6 that there is a club-like bulge towards the rear of its body.

A look at illus. 7 will show that the abdomen of the larval stage of this dragonfly also bulges—quite a lot. In addition its legs are longer than those of other larvae. It frequents muddy stretches of water, and crawls on the bottom there. All dragonfly larvae have another means of propulsion that can move them faster. Water is taken into the anal passage and then expelled violently by muscular contraction so that for a short distance the creature is jet propelled.

There are 43 kinds of dragonfly to be found in Britain, although a few are rare. Some of the larval stages resemble each other closely, and to identify some kinds will require a careful study of a good book on dragonflies. The aquarist who wishes to keep some in captivity to watch their development should remember one point: they are all carnivorous, and will eat any living thing of their own size or smaller—including their own brethen. Supplying them with sufficient food is a hard task, so think about your source of supply first. Otherwise they are simple to keep, requiring only a mud and stone bottom, some plants, and a means of reaching the open air when ready to mature.

PRODUCT REVIEW

Super Maxamatic Mk. II Combined Heater/Thermostat, manufactured in England by Interpet, Dorking, Surrey. Retail price, including VAT—75W, 100W, 125W: £4·95; 150W, 200W: £5·25.

Extra trouble combined with first rate technical know-how has obviously been taken in the design and construction of this well-finished piece of completely submersible apparatus for heating the tropical aquarium. The working parts are double-insulated and protected against water penetration inside a plastic lined and efficiently sealed strong glass tube. There is, therefore, no danger of metal corrosion or leakage of lethal metallic salts into the aquarium. Equally important double insulation makes an earthing wire unnecessary and in every other respect meets with the requirements of the new electrical safety standards now in force.

The heating element itself is enclosed in a sheath of aluminium packed with mineral filling to give added strength and above-average life. Dispersion of heat is not inhibited. The no-nonsense thermostat is housed above the heating element and just below a tight-fitting flexible cap. Part of the top of this cap is moulded into a ribbed cylindrical protrusion through which a movable rod can be felt by exploratory fingers. Tightening the fingers on this rod inside its covering the mechanism of the thermostat can be adjusted to give an alteration of temperature. A one-eighth turn clockwise or anti-clockwise increases or decreases the temperature. An indicator is present with the symbols + N − clearly marked. Hence no-one should experience any difficulty in altering the setting of the thermostat to their own requirements. A complete understanding of the aquarist's needs, apart from safe and reliable performance, is exemplified in the length of water-resistant connecting cable provided—more than 6 ft. (If only some other manufacturers of electrical aids to aquarium care showed such generosity or thought or both).

The instruction leaflet accompanying the Super Maxamatic heater/thermostat is immensely useful. It includes cautionary notes, directions relevant to temperature control, and line drawings indicating the right way and the wrong way to position the instrument in the aquarium. Most valuable are the two tables that enable the aquarist to ascertain without mental exhaustion or paper and pencil the wattage required for different sized tanks and the capacity of a very wide range of tanks (height, width and length) in Imperial gallons or litres.

During a stringent test extending over a week this heater/thermostat gave every satisfaction. Finally, breakage of the glass tube does not mean that the instrument is a write-off. Its plastic undersleeving acts as a barrier against water causing mechanical failure and replacement tubes for all models are purchasable.

JACK HEMS.

Coldwater Fishkeeping

THE HOT DRY SUMMER OF 1976

by Arthur Boarder

THE very dry and warm summer of '76 has had a marked effect on the fish life, especially in rivers. In many small ponds it may have been disastrous as they could have dried up completely and so killed all the inhabitants. However, for larger ponds, lakes and rivers the absence of rain could have meant an enormous increase in the number of young fishes which could have increased the fish population by many thousands.

The major benefit of the dry spell was to be noticed mainly in the rivers, especially the faster flowing ones which contained many of the coarse fishes. Many such rivers have to be carefully watched during the spring to prevent them from becoming partially choked by water weeds. Enormous amounts of the weed have to be cut to increase the flow and so prevent flooding during rainy periods. The loss of these weeds means that the fishes have little natural protection for their eggs and fry. Most coarse fishes such as:—Roach, Rudd, Dace, Chub, Tench and Carp always spawn in shallow water among dense weeds and the denser the better. Shallow water is always preferred because the eggs will be safer there than in other parts of the pond or river.

During the spawning excitement fishes will swim in very shallow water and would never go there in normal times. It is often seen that fishes, when spawning, will swim into water where it is not deep enough to cover half their backs and so the eggs are left in comparative safety from other fishes. If there is no or little shallow water available and a shortage of weeds at the sides, eggs may be laid in such positions that they are open to be eaten by fishes, including those which have been spawning.

With the shallow water and the abundance of weeds, thousands of eggs will be safe not only from fishes but also from water fowl, which have more difficulty in getting into the dense mass of weed. However, this is not the only danger to eggs; there are many other creatures which are always ready to make a meal of them, such as water snails, water lice, water shrimps, leeches and many larvae of various insects. The losses from the latter can be greatly reduced if the eggs hatch out quickly. The hot weather meant that the eggs could hatch in three or four days, instead of perhaps a week in normal conditions. It would be reasonable to state that for every day extra taken for the eggs to hatch more than half could have been eaten or destroyed by the various predators.

We therefore have a greatly increased hatch, but this is not the end of the story. Whilst the fry are still attached to the weeds they are still in some danger but the warmth of the water means that the food sac is used up far more quickly than it would have been in cooler times. The fry are free-swimming once this food sac is used up. So the fry are able to become active and so escape many of their enemies.

Once free-swimming they are well protected by the dense weed and they are able to find plenty of *infusoria* and other small live foods which have also increased greatly in numbers because of the warm water. The extra supply of food encourages growth and so the fry are soon able to move to other parts of the water where they are not so crowded. The slower flow of the water has meant that the fry were able to remain in the safety of the weeds instead of being swept downriver where they would have been prey to larger fishes.

From the several reasons stated, I suspect that the numbers of young coarse fishes which have been bred this season will have increased a hundredfold and so should please anglers all over the country, for not only will there be more fishes but they will be much larger than they might have been in a cooler summer. This also means that the larger they are before winter the more are likely to survive throughout the cold weather.

News from AQUARISTS' SOCIETIES

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

THE **East London Aquarist & Pondkeepers Association** have held some very interesting meetings recently with talks on ponds, breeding discus, Malawi cichlids, and a quiz. The remainder of the club's programme for the year is both varied and interesting. Each month a table show is held for various classes. The club also has a very active social programme with socials, a dinner and dance and coach outings. New members are made most welcome at E.L.A.P.A. The society meets every first and third Friday in each month at Ripple Road School, Ripple Road, Barking, Essex.

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EARLY in January **Malvern and District A.S.** held their annual general meeting when the officers elected were: chairman, D. Franklin; vice-chairman, J. Walton; secretary, G. Roan; treasurer, D. Williams. Edgar Davis, of Severn Aquatics, Worcester, was made president of the society. It is hoped that this year will be full of interest with slide shows, lectures, film shows and auctions, not forgetting the open show which will be held on 3rd April.

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AT the annual general meeting of the **Thorne A.S.** held in November, new officials were as follow: secretary and show secretary, B. Banks, 75 Marshland Road, Moorends, Doncaster, South Yorkshire DN8 4SY, tel. Thorne 813276. Chairman, D. Barret; treasurer, W. O. Hunt. The society will be holding a number of bring and buys of tropical fish, plants, etc., on the following dates: 25th March, 20th May, 29th July, 23rd September and 18th November. All these to be held at the "Winning Post," Public House, Marshland Road, Moorends, Doncaster, at 7.30 p.m. on Friday evenings.

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TABLE show results at the January meeting of the **Llantwit Major A.S.** were as follow: Class C: 1, 2, 3 and 4, G. Fry. Ko: 1, E. A. Hillman; 2, 3 and 4, G. Lewis. During the judging members watched a slide show on the subject of aquarium equipment which was most informative.

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RECENTLY elected members on the committee of **Blackpool and Fylde A.S.** are: president, F. Willmin; chairman, R. Haigh; vice-chairman, B. Kenyon; treasurer, K. Walker; secretary, Mrs. K. Smith; assistant secretary, Mrs. M. McLeod; publicity, Mrs. W. Kenyon. Other members of the committee include T. Wildman, Mrs. M. Willmin and S. Barnes.

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THE first January meeting of the **Walthamstow and District A.S.** was to discuss the future of the club. During 1976 a lot of members moved house, interest and fish houses were temporarily lost but all members have pledged their full support for this year. Tape-slides and lecturers are planned and ideas put forward for a new drive for membership. The second January meeting was the annual general meeting. There was a good turn out for this and the newly elected officers are as follow: chairman, D. Goodbody; treasurer, A. Chandler; vice-chairman, W. Moore; show secretary, W. Wiegold; committee, B. Cook, Mrs. E. Smith; secretary, G. Smith. The club meet on the first Friday and third Wednesday in each month and cater for both tropical and cold water. New members are always welcome. Details from the secretary, Gerry Smith—527 6303.

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CHANGES within the **Bath A.S.** administration are: chairman, D. Phippen; secretary, C. Russell, 27 Haycombe Drive, Whiteway; show secretary, R. Clarke, 110 Haycombe Drive, Whiteway; treasurer, B. Webb. The open show is on the 18th June.

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THE **Corby and District A.S.** were fortunate enough to obtain the services of Mr. Copeland of Nene College at their January meeting. He gave an interesting talk on the collection and research of marines following his work in the Caribbean. The table show was judged by S. Tite and the results were as follow: Guppies: 1, R. Elliott; 2, D. McAllister; 3, S. Elliott. Corydoras: 1, A. Giles; 2, R. Elliott; 3, C. McAllister.

Meetings are held on the first Wednesday of every month at the Shire Horse, Willowbrook Road, Corby, and plans are well under way to celebrate the society's silver jubilee at their open show on 29th May.

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OFFICERS elected at **Skegness and District A.S.** annual general meeting for the ensuing year were as follow: president J. Yeadon; chairman, M. Butler; vice-chariman, A. Dales; secretary, G. Butler, St. Michaels Lodge, St. Michaels Lane, Wainfleet, Lincs; treasurer, G. Seal; show secretary, J. Upsall; subscripsion secretary, J. Grant; press officer, L. Upsall. Meetings are held on the first Wednesday in the month at the Arcadia Arts Centre, Skegness, at 7.30 p.m., and anyone will be welcome.

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RESULTS of the last table show in the **Clwyd A.S.** present year, held in January, were as follows: 1, I. Kelsey (junior member); 2, R. Jones; joint 3, P. Kehrans and J. Davies. The table show was judged by K. Taylor, assisted by J. Smith. While the judging was in progress, society members took part in a quiz, which was won by D. Martin.

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RECENTLY **Southampton A.S.** held their annual general meeting when the following officers were elected: chairman, A. Batty; secretary, D. Mills; treasurer, N. Griffiths; show secretary, P. Brown; committee, Mrs. C. Griffiths, E. Middleditch, Mr. and Mrs. M. Woods. There has been considerable difficulty in obtaining a meeting place over the past twelve months, but now that a room has been found, the club will be able to settle to plan its activities for the future.

Meetings are held on the first Thursday of each month at the Robin Hood, South East Road, Sholing, Southampton, at 8 p.m. Anyone interested in the hobby will be sure of a warm welcome there, or contact the secretary, 30 Ferndene Way, Bitterne Park, Southampton.

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THE following officers were elected at the **Slough and District A.S.** annual general meeting; chairman, M. Coleraze; vice-chairman, A. Appleton; secretary, R. Knight, 52 Aldin Avenue South, Slough, Berks.; treasurer, B. Withers; committee, Shirley Withers, J. Pilkington and A. Geavett.

The society meets on the third Wednesday of every month at the Friends Meeting House, Ragstone Road, Slough, and all fishkeepers are welcome to attend the meetings. The meeting on 16th March will be a special beginners evening when demonstrations of the setting up of tanks will be given. Further details can be obtained from the secretary at the above address.

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CHANGES in committee of the **Great Yarmouth and District A.S.**, are as follow: chairman, A. Kirby; vice-chairman, R. Andrews; secretary, P. Watson; treasurer, D. Lacey; P.R.O., R. Stearne; show secretary, J. Durrant; social secretary, C. Rumsby. Other committee members: G. Drury, P. Jacobs, M. Weekly, B. Durrant; Junior: C. Durrant.

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DESPITE a blizzard on the evening of this months meeting, members of the **King's Lynn A.S.**, who did brave the weather spent a very enjoyable evening watching a slide show on Cichlids. This provided plenty of useful information as Cichlids are very popular with many club members. The meeting was rounded off with a question and answer time and general discussion on fish keeping.

Anyone interested in any type of fish are welcome to come along and join in at the meetings which are held at 8 p.m. the second Thursday each month, at the Victoria, Loke Road, King's Lynn. The secretary is D. Mackay. Tel: Downham 3010.

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IN January the annual general meeting of the **North Wilts A.S.** was held when the following officers were elected: chairman, I. McGinley; vice-chairman, T. Monks; secretary, P. Taylor; Asst. secretary, N. Curtis; treasurer, M. Hooking; committee, T. Gardener, G. Palmer, N. Taylor, Mrs. Curtis, Mrs. McGinley. Meetings are held on the first and third Tuesday. New members welcomed. More information can be obtained from the chairman, 9 Dunbar Road, Wroughton, Swindon, tel. 812133 or the secretary, 7 Ridgeway Road, Stratton, Nr. Swindon, tel. 4114.

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CHANGES of officers and committee of the **Macclesfield A.S.** are as follow: chairman, B. Goddard; vice-chairman, B. Campbell; treasurer, Miss S. Goddard; secretary, Mrs. C. Campbell, 3 Pool Street, Macclesfield; show secretary, J. Sutherland, 4 Lincoln Walk, Upton Priory, Macclesfield; committee, Mr. and Mrs. W. Tomlinson, A. Wittaker, A. Walker, T. Wittaker.

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DETAILS of the officers elected at the annual general meeting of the **Billingham Half Moon A.S.** in January are as follow: chairman, J. Page; secretary, K. Greenley, 50 Edward Street, Stockton, Cleveland; treasurer, D. Jolly; show secretary, C. W. Buck, 22 Danby Grove, Thornaby, Cleveland, tel. Stockton 65284.; members of the committee, M. Moreland, D. Neal, B. Trendall, K. Monoghan, Hilery Monoghan and Kath Monoghan. Meetings are held in the Oxbridge Hotel, Stockton, fortnightly on a Monday. Old and new members are most welcome.

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A LIVELY and well attended meeting in January was held by the **New Forest A.S.** at their regular venue, The Community Centre, Lymington, Hants. The main item of the evening was a colour slide lecture, produced by the F.B.A.S. entitled Anabantids, and all members present agreed that this was one of the best slide shows that they had seen.

Table show results:—Catfish: 1, T. Jefferies; 2, P. Wheeler. Gouramies: 1, 2, 3 and 4, P. Norup. Guppy: 1, B. Down; 2 and 3, P. Norup; 4, R. Travers. Mollies: 1, N. Gallear. Members were reminded that the home furnished aquaria competition will take place on the last Sunday in March.

The secretary would be pleased to supply details of the society to new members, please contact, R. Travers. 6 Auckland Avenue, Brockenhurst, Hants SO4 7RS.

OFFICERS elected at the annual general meeting of the **Bristol A.S.** were: president, S. Lloyd; vice-president, E. N. Bowden; treasurer, C. Lloyd; secretary, V. Cole, 10 Hardwick Close, Bristol BS4 4NL. The secretary's report showed an increased membership, a very successful open show and close working with Severnside A.A. and Associated Goldfish Societies. Points awards for table shows throughout 1976 were: 1, Miss H. Morgan; 2, V. Cole. The meeting ended with a slide show given by Messrs. P. and D. Spence of fish exhibited at various local shows.

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AT the recent annual general meeting of **Ealing and District A.S.**, the following officers were elected: chairman, J. Healey; vice-chairman, R. Mills; secretary, J. Myrtle, 8 Wentworth Road, Southall, Middlesex; show secretary, R. Sellers; treasurer, R. Scrace.

A full programme has already been planned for the society's twice-monthly meetings (first and third Tuesdays, 8 p.m.) at the Northfields Community Centre, Northcroft Road, W.13. New members are most welcome.

The first meeting in the new season featured an F.B.A.S. AquaTalk on A.O.S. Livebearers by Adrian Blake and was well received by the members.

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LAST October a new committee was elected at the annual general meeting of the **Thanet A.S.** The officers are as follow: chairman, J. Edwards; vice-chairman, E. Galbraith; secretary, C. Ledger; treasurer, S. Bax; show secretary, L. Randall; committee, J. Smith. Meetings are held every third Tuesday of the month at The Britania Inn, Font Hill, Margate, Kent and new members are most welcome. Results of table show for November: A.O.V. Catfish: 1, J. Edwards; 2, Mrs. C. Ledger; 3, E. Galbraith. Breeders: 1, E. Galbraith; 2 and 3, J. Edwards.

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OFFICERS this year of the **Bexleyheath and District A.S.** are: president, W. Woodward; chairman, C. Fry; deputy chairman, R. Liddiard; secretary, Mrs. A. Greenhalf, 149A Broadway, Bexleyheath, Kent, tel. 01-304 3396; treasurer, M. Martin; P.R.O., M. Balcombe; librarian, J. Wallace; show secretary, G. Greenhalf; asst. show secretary, J. Amos; committee members, Mrs. B. Fry, P. Fairhead.

The club meets on the second and fourth Friday in each month at: Committee Room, Christ Church, Broadway, Bexleyheath, Kent. Further details may be obtained from the secretary.

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RECENTLY the **Whitby and District A.S.** held their first annual general meeting and their committee numbers were dropped to five as the number of club members had dropped. The officials are now: chairman, K. Lofthouse; secretary, Mrs. E. Lofthouse, 41 Derwent Road, Whitby, tel. Whitby 4299; treasurer, S. Burgess; show secretary, D. Forbes; committee member, B. Brown.

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CHANGES of officers of the **Kingston and District A.S.** are: chairman, D. Ellis; secretary, Mrs. V. Richmond, 59 Downs Road, Belmont, Surrey; treasurer, Mrs. J. Ellis; show secretary, E. Lough. Meetings: first and third Thursdays in the month at St. Luke's School, Elm Road, Kingston-on-Thames.

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ANNUAL general meeting details of the **Doncaster and District A.S.** were as follow: chairman, L. Fletcher; secretary, A. Feasey; assistant secretary, B. Roberts; treasurer and assistant treasurer, Mr. and Mrs. S. Copley; show secretary, K. Lancashire.

In view of the large membership of the society six committee members were elected to make a full committee of seventeen and this includes two junior representatives. All aquarists, beginners and those thinking of keeping fish are cordially invited to visit the society's meetings. These are held at the "Corporation Taps," on the first and third Thursday of each month, commencing at 8 p.m.

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DETAILS of the annual general meeting of the **Stretford and District A.S.** are: chairman, B. Davies; secretary, A. Wilcox; treasurer, I. Gibson; show secretary, I. Brown; assistant show secretary, Master B. Davies. The club meets at the Melville Hotel, Barton Lane, Stretford, Manchester, every other Thursday.

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IN December the annual general meeting of the **Blackburn Aquarist Waterlife Society** was held and the new officers are: chairman, L. Newton; vice-chairman, D. Wolstenholme; secretary, Mrs. J. Wolstenholme; show secretary, P. Walsh; treasurer, B. Walsh; ladies chairman, Mrs. S. Newton; members' secretary, P. Oldcorn; publicity officer, K. Dugdale.

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NEW officers and committee of the **Bridgewater A.S.** are: chairman, L. Free; secretary, B. Mason; treasurer, D. Mason; show secretary, D. Hilton; librarian, W. Chapman; committee members, G. Dann, D. Bold, W. Edwards and N. Daley.

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THE main committee of the **Weymouth A.S.** now is: chairman, J. Fancy; vice-chairman, D. Lee; treasurer, P. Hardy; secretary, Mrs. J. Dowell, 37 Sussex Road, Weymouth DT4 0PL.

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A TALK was given at the January meeting of the **Dorchester and District A.S.** by Mr. **Hagg** of "Atlantis" Aquarium, Winton, on setting up and maintaining a tropical marine aquarium. This proved to be a very interesting subject as several members are considering this aspect of the hobby. The table show results were: Juniors: Danio: 1 and 3, M. and S. Ackerman; 2, G. Moorcroft.

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THE **Morley A.S.** will hold an auction of fish, plants and equipment, at St. Michaels Church Hall, Cherry Tree Walk, East Ardsley, nr Wakefield. Doors open 7 p.m., auction starts 7.45 p.m. The society now meets at the Wesleyan Chapel, Wesley Street, Morley, on the first Monday of every month. Information, Morley 533019.

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OFFICERS elected at the **Taunton and District A.S.** annual general meeting were as follows: hon. president, E. Du-Cann; chairman, D. Fox-Spencer; vice-chairman, V. Welsh; secretary, A. Marlborough, 92 St. Augustine Street, Taunton; treasuerer, M. Cable; show and trophy secretary, M. Tratt; p.r.o., Mrs. H. Bray; social secretary, D. Curry; club judge and show manager, M. Bray; committee members, E. Pallant, S. Beale. Meetings are held at the Railway Club Hall on the third Tuesday of each month. New members are always welcome.

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OFFICIALS elected at the annual general meeting of the **Havant and District A.S.** were as follow: chairman, H. Armitage; secretary, P. Goodhew, 23 Fernhurst Close, Hayling Island, Hants., tel: Hayling Island 66182; treasurer, F. Pink; show manager, K. Dowell; show secretary, H. Armitage, 74 **Parkhouse** Farm Way, Havant, Hants., tel: Havant 73192.

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THE **North Staffs A.S.** meetings are held on the first and third Tuesday in the month at 8 p.m. at the Arts Centre, Brampton, Newcastle, Staffs. The secretary is J. C. Ankers, 555 Etruria Road, Basford, Stoke-on-Trent, Staffs.

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THERE was a full programme of events arranged for members of the **Sandgrounders A.S.** during December. The society held another table show and auction which were both very well supported. At the invitation of the newly formed Atlantis Fishkeeping Society on Merseyside, fifteen members travelled to Aintree to take part in a quiz night and auction. The guest question master was Fred Mulla, chairman of Merseyside A.S. The following evening, a Christmas Social was held which comprised a disco, supper, and draw for the Christmas raffle. Approximately 70 members and friends attended and the evening was enjoyed by all. On the 23ed December, back at the Society's headquarters, a Christmas Party was held for the junior members.

Meetings are held on alternate Thursday evenings at 8 p.m., upstairs in the Mount Pleasant Hotel, Manchester Road, Southport. The Sandgrounders A.S. welcomes all fishkeepers to join them at their next meeting. Further details may be had from the general secretary, Steve Hooton, 81 Radnor Drive, Southport, Merseyside. Tel. Southport (0704) 24745.

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COMMITTEE members appointed at the **Sheaf Valley A.S.** annual general meeting were: chairman, J. Dick; vice-chairman, F. Toyne; secretary, Mrs. P. E. Ipakchi; treasurer, H. Darley; show secretary, B. Moore; social secretary, R. Winkle; editor, Mrs. P. Dick; eighth committee member, T. Cope.

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THE chairman of the **Mid-Sussex A.S.**, N. Short, repoeted that the waste paper collection last year had raised in excess of £60 for club funds and is to be continued this year. Two open doors, where members may visit the home of other members, have been arranged as follows: 12th March, E. and T. Tester, 19 Cyprus Road, Burgess Hill, and 17th April, B. Slade, Sandown, Bolney Road, Anstye. During the evening a table show was judged by D. Soper, and the results were: Guppies (male): 1 and 3, E. and T. Tester; 2, M. Franklyn. Guppies (female): 1, S. Frost; 2 and 3, E. and T. Tester. Guppies (pairs): 1, 2 and 3, E. and T. Tester. Further information may be obtained from the secretary, B. Slade, Sandown, Bolney Road, Anstye (H. Heath 53747).

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OFFICERS elected at the annual general meeting of the **Chesterfield and District A.S.** were: B. Boyden, chairman; P. Young, secretary; V. Lee, treasurer; C. Lee, show secretary.

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THE **Village Bar A.S.** would like to clarify the position about how often and where they meet. They now have two beanches which meet every week. The Birmingham Branch meets at the Village Bar, Edgbaston, on a selected weekday posted on the notice board. The Quinton Branch meets on Sundays, usually at the Bass House, but only the Birmingham Branch holds regular table shows. The society has over fifty members who come from an area covering Birmingham, Dudley, Sandwell, Solihull and Walsall, and to meet demand meetings are held in each of the five districts mentioned.

The main reason for this sudden increase in membership would appear to be the Harlequin racing section. The idea of racing fish started out as an extra attraction for the open show, but has now really grown in the Midlands. In the South Brighton and Southern A.S. have agreed to co-operate when Village Bar A.S. hold the World Championships in Brighton on 6th June.

Local rivals, Oxley A.S., are holding an Aquarist's convention and Harlequin racing will be included, and a further event is being staged in Cardiff in the future.

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THE January meeting of the **Macclesfield A.S.** went down very well, commencing the new year with a table show. Judging was done by B. Goddard and T. Whittaker, and the results were as follow: Catfish, Loach, Shark: 1, D. Sutherland; 2 and 3, A. Whittaker. Cichlid: 1, Mr. and Mrs. Campbell; 2, P. Tomlinson; 3, J. Sutherland. Livebearer: 1, 2 and 3, Mr. and Mrs. Campbell. Barbs: 1, R. Morton; 2 S. Goddard; 3, D. Sutherland. Characins: 1, S. Goddard; 2, A. Whittaker; 3, J. Sutherland. Rasbora, Danio, Minnow: 1, S. Goddard; 2, Mr. Campbell; 3, Mr. and Mrs. Campbell. Anabantid: 1, R. Leonard; 2, S. Goddard; 3, J. Sutherland. Fighter: 1, 2 and 3, Mr. and Mrs. Campbell. Killies: 1, R. Mclean. Pairs: 1, Mr. Morton; 2, Mr. Campbell; 3, A. Whittaker. A.O.V.: 1, A. Whittaker. Best

fish in show: Miss S. Goddard. While the judging was taking place members took part in a quiz which was won by A. Whittaker.

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THERE was a good attendance at the quarterly show of the **Swillington A.S.** which was held early in February. The judging was done by Mr. D. Jones who also gave a small quiz which was enjoyed by all. The results were: Swordtails: 1, S. Hall; 2, Mr. and Mrs. Greenwood; 3, D. and P. Birdsall. Platies: 1 and 2, C. Goulthorpe; 3, P. Campling. Guppies: 1, Miss H. Birdsall; 2, D. and P. Birdsall. Plants: 1, D. and P. Birdsall; 2, P. Campling. New members are welcome and for further information are invited to contact D. and P. Birdsall, 6 Burley Wood Lane, Leeds LS4 2SU. Tel: Leeds 780437.

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THE South London Section of the **Fancy Guppy Association** held their annual general meeting in January, and the chairman in his report summed up the past year as being a great success competitively and socially as a result of the members being personally involved and interested in the running of the section. The section has won many first cards in open shows, also has an average of thirty entries each table show. The main achievement of the section was, of course, the winning of the International Trophy "The Calgary Cup" for the second year running.

The section meets on the third Sunday of each month at the Bede Centre at 3.00 p.m., and further information can be obtained from Mr. H. Vinall, 12 Bursland Road, Enfield, Middlesex.

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MEMBERS of the **David Brown A.S.** were entertained by a most interesting lecture on setting up and running a marine tank. The lecturer was Mr. J. Gilpin of M.J. Tropicals, Cleckheaton, and he used a number of visual aids including a small tank and filter system. Mr. Gilpin went on to give a slide show, showing quite a number of slides of his own past and present fish. Mr. B. Foden also held a discussion on aquatic plants, with members being able to relate their own experiences to those of Mr. Foden.

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A TALK and tape/slide show on Aquaria International, given by Dr. Ford, was greatly appreciated by members of the **Hastings and St. Leonards A.S.** in January. Also in January the society held their annual auction where members were able to pick up some really good bargains.

Anyone wishing to join or visit the club should contact Mr. P. Martin, 20 Silverlands Road, St. Leonards-on-Sea, Sussex.

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OFFICERS elected at the annual general meeting of the **Bradford and District A.S.** were as follow: president, K. Avison; vice-president, D. Sugden; secretary, A. D. Fisher, 2 Sherborne Road, Idle, Bradford; treasurer, A. Daughtery; editor/P.R.O., R. Hainsworth; show secretary, J. Cornforth, 15 Weymouth Avenue, Allerton, Bradford. The committee members are: J. Barford, P. Clapham, L. Gatenby, A. Hall and R. Stansfield.

The annual trophies with the society were awarded as follow: Thornley Memorial: 1, L. Gatenby; 2, J. Cornforth; 3, D. Sugden. A.O.V. Trophy: 1, A. Fisher; 2, D. Sugden; 3, P. and D. Fisher. Show Shield: 1, D. Sugden; 2, L. Gatenby; 3, J. Cornforth.

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TWO lively talks were enjoyed by the **Bracknell A.S.** at their two January club meetings. The first, given by D. Crisp, was on the construction of home made all glass aquaria and "do it yourself" undergravel and air lift systems. The second talk consisted of an F.B.A.S. tape and slide show on Dwarfs, and explained the size, colour and breeding habits of both the Dwarf Gourami and Pelmatochromis kribensis fish.

Table shows for specialist classes were Guppies and Labeos for both evenings and were won by L. Jones, who goes into the Champion of Champions Class show to be held in September. D. Crisp has donated an impressive trophy for this to encourage more fish on the bench. New members both adult and junior, are welcome to join and for more information should telephone Winkfield Row 4596.

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MEMBERS of the **Aberdare A.S.** have now completed three of their matches in the C.N.A.A. league, resulting in wins over Port Talbot A.S. by 36 pts. to 6 pts. and Blaenau Gwent A.S. by 33 pts. to 9 pts. and a drew with Llantwit Major A.S., 21 pts. each. The society would like to thank Port Talbot A.S. for their hospitality and Llantwit Major A.S. and Blaenau Gwent A.S. for an excellent turn out.

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AT the January meeting of the **Norwich and District A.S.** the following officers were elected: chairman, D. Cooper; secretary, N. Newby, 125 Witard Road, Heartsease Est. Norwich NR7 9XG; treasurer, R. Read; committee members, T. Cook, R. Watts, T. Driver, C. Fernly, K. Appleton, A. Hudson, N. Keeler. To represent the junior members, A. Cooper. In future meetings will be held in rooms above the Marlborough Arms Public House.

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CHANGES in officers of the **Sudbury A.S.** are: chairman, R. Walsh; secretary, J. Bayly, 20 Queensbury Road, Wembley, Middx. The meetings are held every Wednesday at Barham Old Court Reception Rooms, Barham Park, Wembley, and new members are assured of a warm welcome.

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THE **Brighton and Southern A.S.** held their annual general meeting in January, and the new secretary is T. Ramshaw, 26 Wilmot Road, Shoreham, Tel. Shoreham-by-Sea 62630. Also, for any details on bookings of tape, slides and lectures, please contact T. Martin, Flat 4, 16 Grand Parade, Brighton.

The results of the Fish of the Year held in December are as follow: 1, Mr. and Mrs. Houghton; 2, Mr. and Mrs. Sayers; 3, Mr. and Mrs. Ramshaw; 4, Mr. and Mrs. Sayers.

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COMMITTEE members of the **Hull A.S.** returned for the next 12 months at the annual general meeting were: president, R. Willerton; vice-president, I. Bellard; chairman, T. Douglas; vice-chairman, E. Morton; secretary, M. Leason; assistant secretary, Mrs. B. Batch; show secretary, G. Andrews; assistant show secretary, K. Taylor; treasurer, G. Batch; publicity officer, A. Frisby; librarian, Mrs. G. Frisby; committee members, J. Porter, R. Myers.

A glass-cutting demonstration was given to the members by Mr. Fletcher assisted by Mr. R. Willerton, who showed how to construct an all-glass tank. At the same meeting a judging competition was won by T. Walker, Master D. Frisby being second and D. Wells, third.

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NEW SOCIETIES

A NEW society has been formed in Sunderland and is called the **Sunderland A.S.** Meetings are held every fortnight on Monday, at 8 p.m. the venue being the Willow Pond Public House, upstairs room, Hylton Road, Sunderland. All fishkeepers are welcome and should contact Sunderland 280267, Mr. Laydon.

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A NEW society recently formed and called the **Ashmore Park and District A.S.** meet every other Tuesday evening at 7.30 p.m. at Dansefield School, Ashmore Park, Wednesfield, nr. Wolverhampton. The next meeting being on 15th March. Mrs. B. Westwood, secretary, 46 Parker Road, Ashmore Park, Wednesfield, nr. Wolverhampton, Staffs.

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CHANGE OF ADDRESS

THE new address of Mrs. J. Renton, secretary of the **Newcastle Guppy and Livebearer Society** is 146 Chillingham Road, Heaton, Newcastle upon Tyne NE6 5DU.

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SHOW SECRETARY CHANGES

Aireborough and District A.S.: G. Cuff, 31 Oakdale Drive, Bradford.

Merseyside A.S.: Mrs. B. Faux, 33 Melbury Road, Liverpool 14. Tel: 051-489 8467.

North Staffs A.S.: R. Diamond, 218 Ferins Avenue, Bradwell, Newcastle, Staffs.

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SECRETARY CHANGES

Gt. Yarmouth and District A.S.: P. Watson, "Petnne," Common Road, Hemsby, Gt. Yarmouth, Norfolk.

Leicester A.S.: S. J. Poynton, 35 Briar Road, Thurnby Lodge Estate, Leicester LE5 2HB. Tel: Leicester 412859.

Weymouth A.S.: Mrs. J. Dowell, 37 Sussex Road, Weymouth DT4 0PL.

Kingston and District A.S.: Mrs. V. Richmond, 59 Downs Road, Belmont, Surrey.

North Staffs A.S.: J. Ankers, 555 Etruria Road, Basford, Stoke-on-Trent, Staffs.

Chesterfield and District A.S.: P. Young, 26 Deerpath Crescent, Wingerworth, Chesterfield, Derbys. S42 6XF.

St. Helens A.S.: M. Collins, 26 Vicarage Drive, Haydock, St. Helens, Merseyside WA11 0UG. Tel: St. Helens 22522.

Sheaf A.S.: Mrs. P. E. Ipakchi, 481 Crookesmoor Road, Sheffield S10 1BG.

Taunton and District A.S.: A. Marlborough, 92 St. Augustine Street, Taunton, Somerset.

Cheltenham Tropical Fish Club: R. P. Coote, 6 Byron Road, St. Marks, Cheltenham. Tel: Cheltenham 35371.

Brighton and Southern A.S.: T. Ramshaw, 26 Wilmot Road, Shoreham. Tel: Shoreham-by-Sea 62630.

Sudbury A.S.: J. Bayly, 20 Queensbury Road, Wembley, Middx.

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AQUARIST CALENDAR

3rd March: Goldfish Society of Great Britain, Annual General Meeting, 2 p.m., Small Hall, Conway Hall, Red Lion Square, Holborn, London WC2.

6th March: Keighley A.S. Annual Open Show at Victoria Hall, Keighley. Benching will be from 12 noon to 2 p.m. Attractions include auction of fish and plants, raffle, pick straw stall and refreshments.

13th March: Don Valley A.S. will be holding their Annual Open Show at the new venue, Foxhill Community Centre, Keats Road, Foxhill, Sheffield 6. Details from show secretary, Mr. C. Broomhead, 5 Broomfield Road, Stocksbridge, Sheffield.

19th March: British Aquarists' Study Society first Spring Meeting at the Meeting Rooms, The London Zoological Society, Regents Park, London, N.W.1. "The Blind Cave Fishes of Persia and the World." An Illustrated talk by Dr. P. H. Greenwood, of the British Museum, Natural History. Tickets £1 from the Treasurer, W. Goodwin, 14, Dawlish Drive, Devon Park, Bedford.

20th March: Retford and District A.S. Open Show to be held in the Town Hall, Market Square, Retford. Secretary: Mrs. M. White, 19 Strawberry Road, Retford, Notts. DN22 7EL.

26th 27th March: Scottish Aquarists' Festival, Civic Centre, Motherwell. Details and Schedules from—D. Fotheringham, Esq., 23 Royal Park, Terrace, Edinburgh EH8.

27th March: Heywood and District A.S. Open Show at the Civic Hall, Heywood, Lancashire. Schedules available from J. W. Ridley, Show Secretary, 53 Miller Street, Heywood, Lancs.

27th March: Reading and District A.S. Open Show at St. Mary Magdalene Church Hall, Rodway Road, Tilehurst, Reading (just off main Oxford Road). Further details and schedules from Show Secretary, P. Rushbrooke, 34 Melrose Gardens, Arborfield Cross, Berks. Tel: Arborfield Cross 760303.

27th March: Worksop Aquarist and Z.S. Open Show, at the Lady Margaret Hall, Holbeck, Nr. Worksop, Notts. Details from D. Lacey, 17 Jubilee Gardens, Bakestone Moor, Whitwell, Nr. Worksop, Notts.

2nd April: Catfish Association of G.B. Annual Open Show at St. Saviours Church Hall, Cobbold Road, London, W.12. Schedules and further details from show secretary, Mr. D. Lambourne, 7 Wheeler Court, Plough Road, London, S.W.11. Tel: 01-223 2630.

2-3rd April: Aberdeen A.S. Open Show, Music Hall, Union Street, Aberdeen. Full details and Entry form from J. Gibson, 35 Redmoss Road, Aberdeen.

3rd April: Scunthorpe Museum Society Open Show at Charter Hall, Corporation Road, Scunthorpe. Schedules available from Show Secretary, D. Caldow, 5 St. Martins Road, Scawby, Brigg, South Humberside DN20 9BG.

3rd April: Malvern and District A.S. Fourth Open Show at Barnards Green Cricket Club, Northend Lane, Malvern. Note new date and more classes. Schedules from Show Secretary, Mr. G. W. Roan, 6 Chester Place, Malvern, Worcs. Tel: Malvern 64386.

3rd April: Malvern and District A.S. Open Show. Details from G. W. Roan, 6 Chester Place, Malvern, Worcs.

10th April: Stockton-on-Tees A.S. are staging their Annual Open Show at Kiora Hall Community Centre, Stockton-on-Tees. Schedules can be obtained from R. Wood, 67 Victor Way, Thornaby-on-Tees, Cleveland. Tel: Stockton 615394.

10th April: Easter Monday Southampton A.S. Open Show at The Avenue Hall, The Avenue, Southampton. Details from Show Secretary, Mrs. J. Vincent, 38 Rossington Avenue, Bitterne, Southampton.

10th April: Stockton-on-Tees A.S. will hold their Annual Show at Kiora Hall, Roseworth, Stockton-on-Tees at 2 p.m. Benching 11 till 1.45. Schedule available from R. Wood, 67 Victor Way, Thornaby. Tel: Stockton 762297. (Please note new telephone number).

10th April: (Easter Sunday): Hyde A.S. Annual Open Show will be held at Hattersley Community Centre, Hattersley Road East, Hattersley, Hyde, Cheshire. All aquarists are invited to enter their exhibits in the competitive sections. Eight F.N.A.S. judges. Show schedules and further details from the show secretary, L. Haycocks, 34 Fountain Street, Godley, Hyde, Cheshire. Tel: 061-366 0777.

16th April: Yate and D.A.S. Eleventh Open Show will be held at Christ Church Hall Downend, Bristol, Avon. Schedules (available from 1st March 1977) from Mr. R. A. Bennett, 22 Kents Green Kingswood Bristol, Avon.

17th April: Nelson A.S. Annual Open Show at the Civic Centre, Stanley Street, Nelson. Details from R. McKenna, 52 Bath Street, Nelson, Lancs BB9 0NP.

17th April: Taunton and District A.S. Open Show will be held at Corfield Hall, Taunton, Somerset. Schedules available from show manager, M. Bray, 11 Whitehall, Taunton, Somerset TA1 1PG.

17th April: Coventry P. and A.S. Annual Open Show at Templars Junior School, Tile Hill Lane (left from A45 at Godiva Cinema), Coventry. Tropical, coldwater and koi classes. Schedules from show secretary, T. Emms, 79 Edward Road, Coventry. Tel: Coventry 413252.

17th April: Walthamstow and District A.S. Open Show. Details from show secretary, W. Wiegold, 5 Nelson Road, Bishops Stortford, Herts. Tel: 0279 56843.

17th April: Half Moon A.S. Open Show will be held in the Co-op Hall, Belasis Lane, Billingham, Cleveland. Details from show secretary, C. W. Buck, 22 Danby Grove, Thornaby, Cleveland TS17 8BX. Tel: Stockton 65284.

19th April: Aireborough and District A.S. Spring Mini Show at Greenacres Hall, New Road Side, Rawdon, Nr. Leeds. Schedules from G. E. Cuff, 31 Oakdale Drive, Bradford, W. Yorks. BD10 0JF. Tel: Bradford 632424.

24th April: Blakeborough A.S. Open Show: Further details later.

24th April: Gosport and District A.S. Annual Open Show at Stubbington Community Centre, Stubbington, Hants. Show Secretary—M. Pirie, 15 Wakefield Avenue, Fareham, Hants. Tel: Fareham 5169.

24th April: Mount Pleasant A.S., intended Open Show, venue to be fixed. Schedules later from R. Kickup, 8 Broadway, Sheriff Hill, Gateshead NE9 5PX.

24th April: Reigate and Redhill A.S. Open Show at Bletchingly Village Hall. Schedules: M. Sandford, 5 Victoria Road, Redhill. Tel: Redhill 69339.

24th April: The Yeovil and District A.S. will hold their annual open show at the Village Hall, Martock, Somerset.

24th April: York and District A.S. Open Show at Livestock Centre, Murton, York. Benching 12 noon to 2 p.m. Details from Show Secretary, A. Sykes, 59 London Street, Pocklington, York YO4 2JW.

30th April: Bristol Tropical Fish Club Open Show at the Congregational Church Hall, Newton Street, Stapleton Road, Bristol. Tropical and Coldwater Classes (Including Koi), Schedules and further details obtainable from the Show Secretary, Mrs. B. Pedersen, 22 Vincent Close, Lawrence Weston, Bristol. Phone Avonmouth, Bristol 82-8062.

1st May: Open Show Blind Institute Beverley Road, Hull.

1st May: Havant and District A.S. 7th Open Show to be held at The Horndean Community Centre, Merchistoun Hall, Portsmouth Road, Horndean. Schedules: H. Armitage, 74 Park House Farm Way, Leigh Park, Havant, Hants. Tel: Havant 73192.

1st May: Ostram A.S. Open Show at the Ostram Social Club Hall, Refuge Street, Shaw, Oldham.

1st May: Newcastle Guppy and Livebearer Society International Livebearer Show, Cruddas Park Community Centre, Newcastle 4. For further details of the show please contact Mrs. J. Renton, 146 Chillingham Road, Heaton.

7th May: The Port Talbot A.S. "Open Show" will be held at "The Taibach County Youth Centre," Margam Road, Port Talbot, West Glam. Ample parking space is available, Trophies, Plaques and Cards for all Classes. Postal Entries 5p, per entry, on Show day 10p per entry. Show Secretary, A. E. B. Fourscre, 3 Cross Street, Velindre, Port Talbot, West, Glam, SA13 1J 1AE.

8th May: Bolton Gunners A.S. First Annual Open Show.

8th May: Bournemouth A.S. Annual Open Show to be held at Kinson Community Centre, Pelhams Park, Kinson, Bournemouth. Show Schedules and further information from J. V. Jeffery, 30 Braemar Avenue, Bournemouth, BH6 4JF, Dorset, Tel: Bournemouth 47523.

8th May: Warrington A.S. Annual Open Show. The venue will be the Parr Hall, Palmyra Square South, Warrington. G. Millman, show secretary, 101 Loushers Lane, Warrington, Cheshire WA4 2RF.

8th May: Aireborough and District A.S. Open Show, Menston Civic Centre, Main Street, Menston, Nr. Leeds, W. Yorks. Schedules from G. E. Cuff, show secretary, 31 Oakdale Drive, Bradford, W. Yorks. BD10 0JF. Tel: Bradford 632424.

14th May: Southend, Leigh and District A.S. Open Show at St. Clement's Hall, Leigh-on-Sea, Essex. Further details will be available in due course from A. Smith, 39 Willow Walk, Hadleigh, Essex. Tel: Southenend 555540.

15th May: Goole and District A.S. Annual Open Show. Details from Miss M. Coates, 8 Hull Road, Howden, Goole, N. Humberside DN14 7AH.

15th May: Gloucester A.S. Open Show will be held at the Chequers Bridge Leisure Centre, Barton Street, Gloucester. There will be 32 classes in all. Trophies for 1st and 2nd, prizes for 3rd and 4th, plus award cards. Schedules will be available from March onwards from Mr. D. Parry, Secretary, 49, Oxstalls Way, Longlevens, Gloucester.

15th May: Trowbridge and District A. and P.S. Annual Open Show will be held at the Bradford-on-Avon Rowing Club. Judging will be to F.B.A.S. standards. Show schedules can be obtained from April onwards from S. J. Bowery, show secretary, 13 Dean Close, Melksham, Wilts. SN12 7EZ.

22nd May: Rotherham and District A.S. Open Show at the Town Hall Assembly Rooms, Rotherham. Benching 12.00 noon till 2.00 p.m. Details from show secretary, J. Stanton, 26 Gerard Road, Rotherham, South Yorkshire, S60 2QF. Tel: Rotherham 66716 or 70569.

22nd May: Fancy Guppy Association Annual National Open Guppy Show to be held at the Glebe Farm Community Centre, Glebe Farm, Stechford, Birmingham. 37 guppy classes including F.G.A. British Open Championship. Lecture, exhibits, refreshments. Show schedules from C. Beer, 6 Pedmore Close, Woodrow South, Redditch.

28th May: Cheltenham Open Show at St. Marks Community Centre, Brooklyn Road, Cheltenham. Show schedules from M. Jenkins, 3 Marlborough Place, Princes Street, Cheltenham.

28th May: British Aquarists' Study Society Second Spring meeting at 2 p.m. in the Meeting Rooms of the London Zoological Society, Regents Park, London, N.W.1. "Catfishes," a series of talks illustrated with colour slides. Tickets £1 from the Treasurer, W. Goodwin, 14 Dawlish Drive, Devon Park, Bedford.

29th May: Middleton and District A.S. 6th Open Show. Two shows in one! Tropical Section: 34 Classes. Coldwater Section 11 Classes. At the Civic Hall, Middleton (M.62—Exit 19).

29th May: Corby A.D.A.S. Silver Jubilee. Open Show 30 classes. Civic Centre Corby. Show secretary, D. A. Page, Nutcracker Cottage, 14 Meeting Lane, Burton Latimer, Northamptonshire, NN15 5CS.

29th May: Redcar's Fifth Annual Open Show held again at Coatham Bowl, Redcar. Details Redcar 74599.

29th May: Bridlington and District A.S. Annual Open Show, at the Hilderthorpe Junior School, Bridlington. Show schedules available from M. Jordan, 86 Matson Road, West Hill Estate, Bridlington, N. Humberside.

29th May: Corby and District A.S. Open Show at Corby Civic Centre, George Street, Corby, to celebrate our Silver Jubilee. We offer engraved trophies in each class in a comprehensive schedule, plus many other perpetual trophies. S.A.E. for schedules to: D. Page, 14 Meeting Lane, Burton Latimer, Kettering, Northants.

4th June: Weymouth A.S. Open Show at St. Aldhelms Church Hall, Radipole. Secretary Mrs. J. Dowell, 37 Sussex Road, Weymouth DT4 0PL.

5th June: Loughborough and District A.S. Open Show.

5th June: Thorne A.S. Open Show at the Fieldside Junior School, Fieldside, Thorne, Doncaster. For further details please contact the show secretary, B. Banks, 75 Marshland Road, Moorends, S. Yorks. DN8 4SY.

11th June: Llantwit Major A.S. Open Show. Schedules available April onwards from J. J. Edwards, "Glanafon," Mill Park, Llanblethian, Cowbridge, South Glam. CF7 7BG.

12th June: Newcastle Tropical F.S. Open Show will be held at Cruddas Park Community Centre Westmoorland Road, Newcastle upon Tyne. Further details of the show can be obtained from the Show Secretary T. Marshall, 488 Elswick Road, Newcastle upon Tyne.

12th June: Salisbury and District A.S. Annual Open Show. Further details and show schedules from R. F. Adams, 26 Empire Road, Salisbury, Wilts.

12th June: Boston A.S. Open Show, Kirtwood Girls School, Robinhoods Walk, Boston. Schedules from secretary, Mrs. M. Sands, 20 Argyle Street, Boston, Lincs. PE21 8PH.

12th June: Sudbury A.S. Open Show at the Wasps Rugby Ground, Repton Avenue, Wembley. Schedules from L. J. Brazier, 66 Ormesby Way, Kenton, Middlesex.

18th June: Bath A.S. Open Show at Pitmans Press, Bath.

19th June: Redditch Open Aquatic Show. Incorporating the International Herpetological Society Show. Its a knock-out (Redditch Firms), Fair, Bar and Catering. Organised by Delson A/S at the Abby Sports Stadium, Birmingham Road, Redditch, Worcs. Details: Mr. P. J. Binsley, 25 Flyford Close, Lodge Park, Redditch. Tel: Redditch 26568 Evenings Only.

19th June: Swillington A.S. Open Show. Schedules available from P. Campling, 4 Edinburgh Place, Garforth, nr. Leeds. Tel: 88605. Mini-Show on the 15th March.

19th June: Whiteway and District F.S. Fifth Open Show at Whiteway Community Centre,

Kelston View, Whiteway, Bath. Schedules available after 30th April from Show Secretary, Mrs. E. Daniels, 21 Haycombe Drive, Whiteway, Bath BA2 1PG, Avon.

19th June: North West Lancs./Manchester Sixth Annual Show, 36 Guppy Classes: Venue and further details from B. Morris (Show Secretary) 4 Irwell St. Burnley Lancs.

25th June: Newport A.S. Open Show at St. Johns Hall, Victoria Avenue, Maindee, Newport, Gwent. Details from show secretary, B. Webster, Glenview, Mount Pleasant, Pontnewynydd, Pontypool.

26th June: Alfreton and District A.S. Annual Open Show at Alfreton Hall. Details and Show Schedules available later. P. W. Bonsor, 10 George Street, Riddings, Derbyshire DE5 4GF.

3rd July: Chard and District A.S. third Annual Open Show at Furnham School, Chard, Somerset. Details from A. Griffin, 50 Fairway Rise, Chard, Somerset, TA20 1NT. Show schedules available end of April.

9th-10th July: Romford and Beacontree A.S. Open Show, Dagenham Town Show, Central Park, Dagenham. For Show schedules (April), Show secretary, R. Jones, 87 Wood Lane, Elm Park, Essex. Tel: 49 56947.

10th July: Lytham A.S. Show Lytham Baths, Dicconson Terrace, Lytham, Lancashire (Same venue as last year). Show Schedules from Show Secretary, Mr. P. Ham, 1 Wyndene Grove, Freckleton, Preston, Lancashire, PR4 1DE, Tel: Freckleton 633182.

16th July: Goldfish Society of Great Britain General Meeting, 2 p.m., Small Hall, Conway Hall, Red Lion Square, Holborn, London WC2.

17th July: Scarborough and District A.S. Open Show. Further details later. Show secretary J. F. Richardson, 5 Keld Garth, Pickering, N. Yorks YO18 8DG.

17th July: Sandgrounders A.S. Annual Open Show at Meols Cop School, Meols Cop Road, Southport.

7th August: Koi East Anglia Open Show, Waveney Fish Farm, Diss, Norfolk. Viewing from 1.30 p.m. Further details from G. Wright, 98 Lower Cliff Road, Gorleston-on-Sea. Tel: 0493-68440.

14th August: Grimsby and Cleethorpes A.S. Sixth Open Show at the Memorial Hall, Cleethorpes. Benching from 12 noon to 2 p.m. Details and show schedules available from the Show Secretary, L. Curtis, 4 Swaby Drive, Cleethorpes, South Humberside DN35 9PB.

21st August: Stroud and District A.S. Annual Open Show at the Subscription Rooms, Stroud. Full tropical classes plus twelve classes for Coldwater. Schedules later from Mr. J. Cole, 13, The Hill, Randwick, Stroud, Glos. 4504.

21st August: Macclesfield A.S. Open Show. Details to follow.

27th-29th August: Tyne Tees Association of Aquarist Societies second exhibition of fishkeeping at Lambton Pleasure Park, Chester-le-Street. The Three Rivers Championship will be included in the programme. Further details available at an early date.

28th August: Long Eaton A.S. Open Show—Details to follow.

1st September: Goldfish Society of Great Britain, General Meeting, 2 p.m., Small Hall, Conway Hall, Red Lion Square, Holborn, W.C2.

4th September: Bridgwater A.S. Second Open Show will be held at St. Georges Community Centre. Details from Show Secretary, D. Hilton, 31 Portland Road, Worsley. Tel: 061-790 8106.

4th September: Wellingborough Open Show (F.B.A.S.). Venue: Weavers Sport Centre. Show Secretary, A. J. Crew, 67 Swinburne Road, Wellingborough, Northants. Tel: Wellingborough 77131.

4th September: Hoylake A.S. Open Show Venue to be announced later. Secretary, G. Robinson, 24 Heathmoor Road, Moreton, Wirral, Merseyside L46 7UN.

11th September: Longridge and District A.S. first Open Show at Longridge Civic Hall, Willows Park Lane, Longridge, Preston, Lancs. (15 minutes from the M6). Details available later.

17th September: Bristol A.S. Open Coldwater Show at Bishopston Parish Hall, Gloucester Road. Schedules from Show Secretary, E. N. Bowden, 15 Inns Court Green, Bristol BS4 1TX.

18th September: Whitby and District A.S. Annual Open Show at the Spar Pavilion, Whitby. More details at a later date.

18th September: Barnsley Tropical Fish Society Open Show. Mapplewell and Staincross Village Hall, Darton Lane, Mapplewell, nr. Barnsley. Further details from T. Rosfield, 31 Coniston Road, Barnsley S71 1BL.

20th September: Aireborough and District A.S. Autumn Mini Show at Greenacres Hall, New Road Side, Rawdon, Nr. Leeds. Schedules from G. E. Cuff, 31 Oakdale Drive, Bradford, W. Yorks. BD10 0JF. Tel: Bradford 632424.

25th September: Atlantis Fishkeeping Society First Open Show at the Aintree Institute, Black Bull, Aintree, Liverpool. Schedules will be available later.

25th September: Chesterfield and District A.S. Annual Open Show will be held at Clay Cross Social Centre.

2nd October: Ealing and District A.S. Open Show. Venue to be announced.

2nd October: Newbury and District A.S. Open Show to be held at the Corn Exchange, Newbury, Berkshire. Show Secretary, Mrs. Shirley Canning, 6 South End, Cold Ash, Newbury, Berkshire. Tel: Thatcham (0635) 64254.

15th October: East London Aquarist & Pondkeepers Association Annual Open Breeders Show, at Ripple Road School, Ripple Road, Barking, Essex. Schedules available from T. Waller, 1 Sparsholt Road, Barking, Essex.

3rd November: Goldfish Society of Great Britain, General Meeting, 2 p.m., Small Hall, Conway Hall, Red Lion Square, Holborn, London, WC2.

6th November: Halifax A.S. Open Show at the Forest Cottage Community Centre Cousin Lane, Illingworth, Halifax. Schedules sent only on request. S.A.E. to: D. Shields "Cobblestones" Gainest, King Cross, Halifax, HX2 7DT. or Ring for details Halifax, 60116.

6th November: Village Bar A.S. Details from G. Corum, 81 Barston Road, Oldbury, West Midlands B68.

6th November: Blackburn Aquarist Waterlife Society Open Show. Venue at a later date. Secretary, Mrs. Jean Wolstenholme, 39 George Street, Great Harwood, nr. Blackburn BB6 7JE.