

THE

AQUARIUM

AUGUST, 1969

VOL. II NO. 10

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- A BEGINNERS CICHLID
- THE FLAME TETRA
- AMBULIA — AN OLD FAVORITE





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The beauty of the blue acara can truly be appreciated in this magnificent photograph taken by THE AQUARIUM photographer, Andrey Roth. Mr. Roth used a modified Nikkormat camera with a Micro-Nikkor lens. (Additional credits appear on page 69).

THE AQUARIUM is published by PET BOOKS INCORPORATED (formerly The Aquarium Publishing Company), a division of Metroframe Corporation. Copyright: 1969 by PET BOOKS INCORPORATED. Published at 87 Route 17, Maywood, N. J. 07067. 12 issues per year. SUBSCRIPTION RATES: U.S., 1 year (12 issues) \$5.00, 2 years (24 issues) \$9.00, 3 years (36 issues) \$12.00. Canadian subscriptions add \$1.00 per year. All foreign subscriptions are \$6.50 per year. Address all correspondence to THE AQUARIUM, 87 Rt. 17, Maywood, N. J. 07067. THE AQUARIUM is not responsible for unsolicited submissions. To insure return, include self-addressed envelope. Neither contents nor illustration may be quoted or used without written permission of the publisher. Second class postage paid at Hackensack, N. J.

A BEGINNERS CICHLID

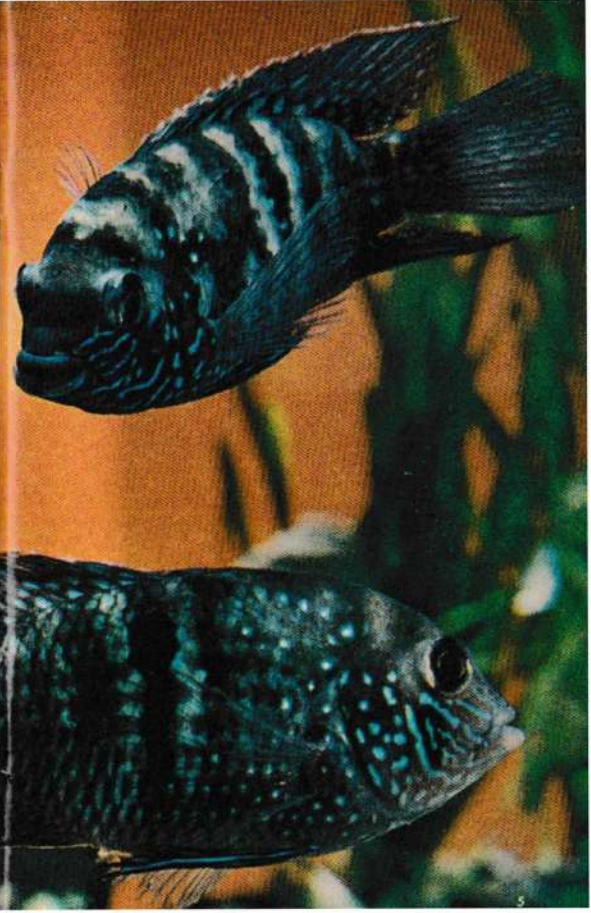
By BRAZ WALKER

THE FAMILY CICHLIDAE, although it does contain a number of "dwarf" species, is perhaps the most popular family of larger aquarium fishes. Aside from the handsome finnage and coloration of many cichlids, largely responsible for their appeal is the almost legendary parental instinct displayed by many species. The almost humanistic behavior of these intelligent creatures toward each other and toward their offspring provides the aquarist with one of fishkeeping's most rewarding experiences. There is no more "typical" cichlid which better displays the family attributes than the blue acara, *Aequidens pulcher*.

As with many cichlids, the youngsters are a rather unspectacular group, especially when viewed in a dealer's tank. Coloration consists of a grayish-green with a few iridescent flecks scattered here and there. Even so, their enthusiasm often is enough to make the sale even to those who are unaware of things to come. They are robust and perch-like, and if five or six of these ravenously hungry little fellows are purchased, the would-be breeder can be almost assured of obtaining a pair. If you are accident-prone, a real "loser" or just have a negative attitude, you may want to get a couple of extras. Ample room, good food and a few months should produce a spawning.

The marital rites of such cichlids as the blue acara are completely fascinating. In a group which has been raised to maturity together, the first indication of an approaching spawning may be that two fish may isolate themselves from the others, selecting a corner or other small territory and attempting to keep the others away from it. Perhaps at the outset, perhaps a bit later on, two prospective lovers will usually engage in a test of strength by locking jaws together — shaking, twisting, rolling and sometimes breaking temporarily. A few false charges usually leads to more jaw-wrestling, and if neither loses its courage an armistice is finally declared and the pair can usually be considered "mated".

There are a number of slight variations to this procedure, but it should be recognizable since there is also a definite color change which accompanies the love-play. The preliminaries may be tediously long or *continued on page 31*





THE FLAME TETRA

THIS BEAUTIFUL, LITTLE TETRA was first brought to Europe from Rio de Janeiro, Brazil, in 1920, and has been a staple of the aquarium hobby ever since. It is worthy of its popularity, as it has beautiful colors, is easy to keep and breed, and is an aquarium fish of the first order.

Hyphessobrycon flameus, as it is called scientifically, is a school fish, as are most tetras. An aquarium populated by a swarm of these pretty red-finned fishes presents a beautiful picture. They are always on the go, chasing, playing, staging harmless fights and wending their way in and out of plants. When fully established in a tank it will mix well with almost all other fishes of moderate disposition. It occasionally takes to picking at other fishes, but seldom with any serious consequences.

The flame tetra requires clear water, well aerated, and a temperature of 72 to 78°F (a bit higher for breeding). The sexes are easily identified, not only by the fuller body shape of the female, but also by the shape of the anal fin, the lower border of which is almost straight in the female but shows a distinct concavity in the male. The black edging on the fins is usually more pronounced on the males as well.

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AMBULIA

AN OLD FAVORITE

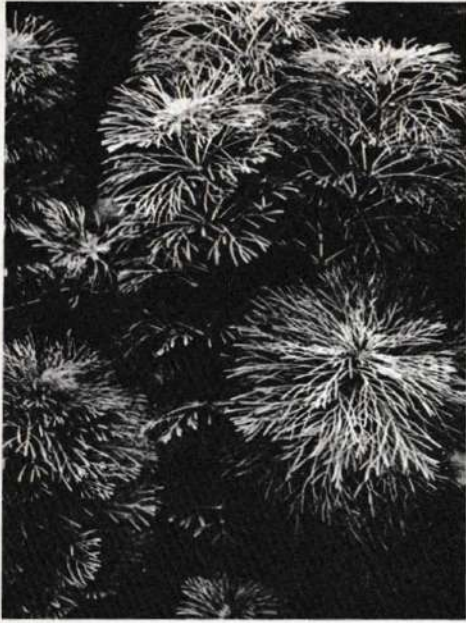
BY G. W. E. BRUNNER

AH! — TROPICAL AQUARIUM PLANTS in their natural environment! Perhaps we imagine beautiful plants in the crystal-clear waters of a jungle creek. Occasionally, such romantic pictures are true but in a great number of cases our favorite aquatics in their natural habitat are but small weeds, often fairly insignificant. For example, Ambulia, or more correctly, *Limnophila*, is a small-creeping emerged plant with short stems, growing on muddy river banks, in ditches or rice fields in its native habitat in southeast Asia.

Nevertheless, the submerged form of *Limnophila* as found in our tanks is a very decorative plant, appreciated by aquarists for nearly 50 years. As far as can be determined, all Ambulias of the trade are identical with *Limnophila sessiliflora*, a species with a widely ranging habitat in southeast Asia.

In the aquarium, *Limnophila* is used primarily for attractive contrast-planting. For example, a group of light green *Limnophila* may be placed in front of a dark green clump of *Cryptocoryne* background plants. In this way, *Limnophila* often turns out to be the real "eye-catcher" of the aquascape.

Cultivation of *Limnophila* is easy. Cuttings, for example, will root within a few days. Small bits of loam or clay mixed in the gravel will stimulate its growth, the recommended temperature being about 70 to 74°F. I have personally maintained *Limnophila* in a very good condition in water of 180 ppm of hardness and a pH of 6.5. Daylight is best, but artificial illumination will do also. Take care that your fluorescent lamps (warm white type) are as near as possible to the plants and that no other plants will shadow them. *Limnophila* with small, pale leaf segments and long, thin stems between leaf rosettes is definitely not attractive, and such a state can be caused by a light deficiency. Of course there are other causes of growth stagnation. If your plants have pale green leaf tips, termed "chlorosis", this can be a result of an iron deficiency. Iron is an important element in plant



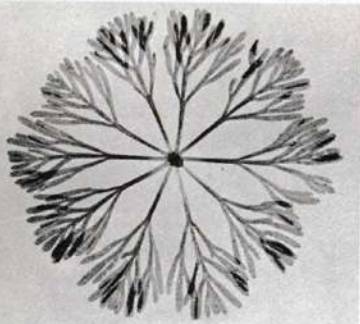
Limnophila should be planted in groups so that it will make the most dramatic impact in the aquascape.

metabolism, particularly in chlorophyll synthesis. Ordinarily, there is sufficient iron in our aquariums but sometimes it is oxidized, becoming insoluble — a form that the plant cannot use. Furthermore, copper, manganese and other important trace elements can be precipitated in the same way. Use a good aquarium plant fertilizer, and take careful notice of its directions for use. One can also add EDTA

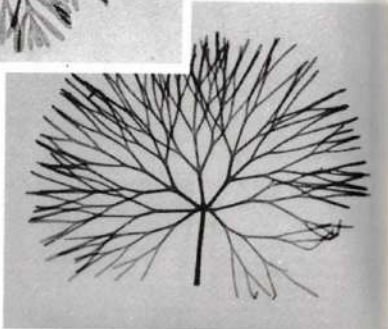


Top: This is wild *Limnophila*, growing emersed on a muddy shallow.

Right: If your *Limnophila* is in an aquarium provided with a good light, perhaps even a few hours of sunshine a day, let a few strands grow above the water's surface. In this way, you may see the pretty, pale violet flowers on the emersed stem.



Sometimes *Limnophila* is confused with *Cabomba*. There is a typical difference between the two plants. *Limnophila* (seen here), always has a whorl (i.e., an arrangement in a circle) of fine leaf segments.



The leaf blades of *Cabomba* are also made up of line segments, but they make up but a half circle on a stem. To make up a complete circle, two such structures face each other in opposite positions.

(Ethylenediamine-tetra-acetic acid) at a concentration of 1 ppm to the aquarium water. This prevents precipitation of iron and other elements. Before adding EDTA to the aquarium, dissolve it in a small amount of warm water. Use EDTA if necessary only at intervals of a few weeks. Additional periodical water changes (about one-third of the tank volume every week) contributes to holding the carbon dioxide content at a satisfactory level. This is another important factor for strong plant growth. In my opinion, these two procedures are not sufficiently known to many aquarists. In addition to light, carbon dioxide and mineral nutrients are basic requirements for all plant growth, not just for the cultivation of *Limnophila*. ●

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HOW TO RUN A FISH SHOW

by HARVEY R. CAIN

INTRODUCTION

Not too long ago the editor of this magazine chanced to show me a report about the third annual aquarium exhibition sponsored by the Greater Atlanta Aquarium Society, an event of some considerable success. Because of space limitations, and in view of the fact that announcements of winners in a fish show are generally of interest only to aquarists residing in a rather restricted locality, THE AQUARIUM does not usually devote a complete article to any one exhibition (*Editor's Note:* Certainly such societies receive their fair share of space in our *Societies At Work* column). Many clubs, however, are unaware of the really important considerations in running a fish show, and the editor's suggestion that I develop a set of guidelines to assist inexperienced show chairmen in carrying their missions to success, struck a responsive chord.

My own show activity includes over twenty aquarium exhibitions and, from the first to the last, it has proved the proverbial "liberal education". The first attempt on my part was, as I recall it, far too ambitious. Although my club was enthusiastic and I found ready volunteers, we exhausted them and their enthusiasm within a short time. The burden was too great and although by a prodigious effort we managed to meet our commitments, it nearly wrecked the society. Not only did we underestimate the work, we underestimated the costs as well. Adequate estimates of the monies needed for lumber, ribbons, cups, programs, etc., had not been made. This, then, was a lesson dearly learned—an overly ambitious exhibition can break both the spirit and the backbone of a club. It is hoped, therefore, that the following guidelines will help others in avoiding the mistakes that have been made and that unfortunately most likely will continue to be made at fish shows.

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A view, at an uncrowded moment, of the third annual aquarium show presented by the Greater Atlanta Aquarium Society. The view shows about one-third of the exhibition.



Joe Hoggard, show chairman and vice president of the club, won a silver service for this best-of-show award with his custom-built aquarium.

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PERSONNEL

The first step involves *people*. Don't expect that many members will voluntarily flock to your assistance. A few will always work hard, of course, but it is far better to define the scope of the show in terms of the quantity and quality of the people you can find who are willing to work, than what either you or your club would like to see.

Don't fool yourself, either, by loading your committee with people who you know will not work. It is not the number of committee members that is important, but what they can and are willing to do.

A common shortcoming of many show chairmen is their failure to get their people moving early. I am talking not only about meetings, but about action as well. Three months prior to show time is not an unreasonable date to start construction of stands, ordering of ribbons, etc.

ORGANIZATION

One of the show chairmen's key documents will be his *timetable*. If properly prepared, a good timetable can also serve as a checklist to ensure that nothing is overlooked, such as the early reservation of show space, or the scheduling of local newspaper publicity. A quick glance at a tentative timetable can easily uncover conflicts and possible future trouble spots.

Although entry blanks are a routine part of any fish show, the show chairman and his committee must realize that some pretty fundamental questions must be answered before the blanks can be designed. In addition to the classes of exhibits and the awards to be made, the committee must decide upon the basic purpose of the show. Is it to publicize the society and gain it new members? Is it to gain converts to the hobby? Is it to satisfy the competitive spirit of its members and exhibitors? Should the show have a theme? When these questions are answered, the committee can proceed in a logical manner in the detail work that necessarily must follow.

Some of the details that must be considered with regard to entries and entry blanks include: (1) setting a deadline for entries and (2) setting dates and hours for installation of exhibits. Once announced, the rules should be enforced. It is a good idea to fix the set-up times such that entries may be allowed to stand for as long a time as practicable before the exhibit is opened to the public (a minimum of 12 hours, and preferably a day or two), as it takes a while before a tank clears up and settles down.

A system must be devised (with everyone understanding it) to number every entry. Remember, exhibitor's names are *not* placed on their exhibits until *after* judging is completed. The system must be a helpful one. It is useless to merely number entries consecutively—judges would waste time

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Most filtering floss irritates hands, creates a lot of lint, and doesn't perform at maximum efficiency. Well, Spic & Spun is a new ball game!

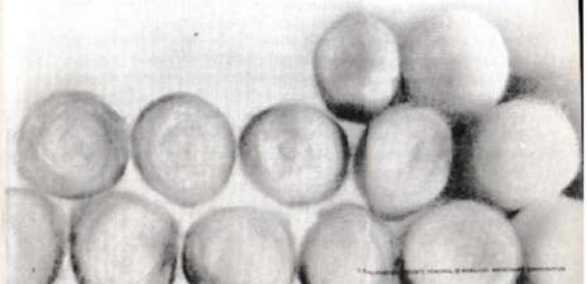
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METARAM



The Fiberglass Aquarium

by HANS J. MAYLAND

Translated by Paul J. Hoppe

ABOUT A YEAR AGO I was rather unexpectedly given the job to come up with an aquarium of special shape. My customer was a doctor who planned to use the aquarium in his waiting room as a nerve calming diversion for his patients. There were several requirements: All auxiliary equipment had to be hidden in the enclosure; the tank had to be completely self-contained and closed against accidental contamination and protected against its inadvertent use as an ashtray by thoughtless persons. At about the same time, I had become familiar with a lot of plans and literature covering the "do-it-yourself" methods in building fiberglass swimming pools and waterproofing of boat hulls using fiberglass and polyester resins. After some consideration, I decided to try my hand on this not too inexpensive method for building an aquarium which would not only meet the requirements of my doctor friend, but would also contain all mechanical equipment in a simple and meaningful way. It really took me quite some time to decide on this method, since I wanted to avoid the certain pitfalls which would be unavoidable if I rushed into this project with insufficient background.

It all started with a number of sketches detailing construction, size and shape. I decided on a tank shell built from 3/4 inch exterior plywood, properly doweled and glued. The outside faces of this "shell" were covered with wood-grained (teak) laminated plastic sheets, professionally glued and pressed for a finished appearance. These laminates have many advantages, but are rather expensive. Particular attention was given to assure a rigid front-frame assembly which would be able to adequately support the front glass. The inside edges, exposed to view, were also finished with the same teak laminate, which was allowed to protrude into the tank sufficiently to permit later application of the fiberglass inner liner. A "lid" of identical material and construction was completed; a rabbit fit at cover to tank joint assured proper assembly; this is important, to prevent light leaks later. The cover angles down towards the rear and is equipped with ventilation slots, one on each side, to provide ventilation for the lamps, and two in the back to permit air circulation around the pump.

Now the shell was finished - and nothing new had been done yet; the real work of building the fiberglass tank started. Let's first talk about

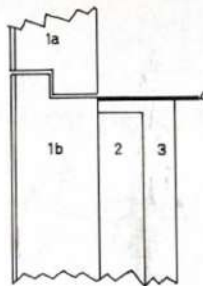


Figure 1: Cross-section through a completed wall. The prepared wooden outside shell (1a-top cover, 1b-wall) is covered with plastic laminate material at the (visible) outside faces; a cushion of styrofoam (2) is glued to the inside of the walls and in turn covered with fiberglass/polyester resin material (3). To complete the job in a workmanlike manner, the top is finished off with pre-cut matching fiberglass strips (4).

polyester resins and how to use them. As with most materials of this type, we are dealing here with two components, the resin and hardener, which are packaged separately and mixed only directly prior to use. There are a number of manufacturers and trade names available, and all have developed simplified procedures to help the do-it-yourself hobbyist; perhaps the best would be kits developed for fiberglassing boats. Consideration had to be given in the design of the finished fiberglass tank liner to permit it to expand somewhat within itself, since the plywood shell could not be made perfectly rigid, and bulging would be certainly undesirable. The method used was to line the sides and back with 3/8 - 1/2 inch thick styro-foam sheets, which later would double as insulation. One problem had to be overcome; liquid polyester resin and styro-foam don't get along too well; the resin dissolves the styro-foam. After some trial work with small pieces, I decided to use self-adhesive plastic foil to cover the styro-foam, and the problem was solved.

Actual construction of the internal fiberglass aquarium proceeded without incident; first, fiberglass mats were carefully and accurately positioned against the inside wall (with sufficient overlap at adjacent strips) and stapled to the corners at the bottom and against the inside of the front frame, (a common compression stapler, as used in the building industry, worked admirably well). The most difficult part of properly positioning the fiberglass mat came when it was stapled near the top corner; this area and corner should be as smooth as possible, and takes some patience to complete. The mat was then stretched across the top of the styro-foam and fastened down. The top edge was eventually covered and finished with a strip of a commercially available fiberglass sheet, which protruded a bit beyond the edge to the inside; the use of such strips will be discussed later on, (Figure 1). continued on page 60



Societies at Work

By

HELEN SIMKATIS

CONTACTING IN CERTAIN CICHLIDS is the title of the cover story of the April issue of *Anchor* (published by the San Francisco Aquarium Society), by David Noakes of the Department of Zoology of the University of California. It attracted our attention especially because more and more we have become aware through our mail that our readers eagerly want to understand the behavior of their aquarium subjects. "Why does my baby *Plecostomus* slide down the air tube over and over again?" "My female betta was filled with eggs but when I supplied a healthy male and placed the pair in a tank to themselves, she killed him. Why?" These represent a sample of the questions we are asked and, although it is somewhat flattering that the writers assume we are able to supply solutions to numbers of such mysteries, we feel obliged to confess that any reply we offer must in many instances be conjecture on our part. At any rate, the study of animal behavior is, Author Noakes tells us, a comparatively new branch of zoology called ethology, and as our mail indicates, there is a great deal of the ethologist in all of us or we wouldn't be in the hobby at all. Author Noakes explains that "an ethologist's approach to the study of behavior is to attempt to understand behavior in relation to the life of the animal." For example, he points out that most cichlids in the genus *Tilapia* are mouthbrooders. Why should some cichlids incubate their eggs orally while others, including some species of *Tilapia*, allow them to hatch on a rock or at the bottom of the body of water in which they live? He then suggests that the answer to this question might be that the mouthbrooders come from water that is low in oxygen content and holding the eggs in his or her mouth, the parent can supply oxygen by taking in gulps of air at the water's

surface. Other fishes have solved the problem in other ways such as *Betta splendens* which constructs a bubble nest at the surface where oxygen is easily available. The author is particularly interested in cichlids that allow their young the privilege of nibbling at their bodies for sustenance, a practice he calls "contacting." Most hobbyists know that the discus falls into this category as does *Cichlasoma labiatum* (red devils) the author has discovered in working with this species. He lists *Cichlasoma nigrofasciatum* and *Etroplus maculatus* among those species reported exhibiting the contacting behavior in some instances. He wonders about *Astronotus ocellatus*, noting that Sterba mentions the young cling to their parents but that no mention of this behavior is given in the literature he has found available on the subject. We can assure him that the Sterba report is reliable as we have spawned this species many times and have marveled at the patience shown by both parents when their youngsters sometimes lighted on their eyes and around their lips. One baby hung onto the tip of one of its mother's ventral fins for several days until she tired of this togetherness and flipped it off. Probably the most cogent question regarding this behavior is whether the young of these fishes require the nutrient they receive from the coating of slime present on their parents' bodies. This is, of course, partially answered by the fact that in some instances "contacting" is practiced by only some individuals within a species. This, added to the fact that baby discus can live without this "body food" from their parents, if they are in a situation where the water is rich with micro-organisms, indicates the body slime can be substituted. Author Noakes observes that amateur aquarists "represent a vast pool of untapped knowledge" and regrets that such knowledge seldom filters through to scientists who could do so much with it. We as aquarists, on the other hand, realize we could employ a great deal of technology scientists have developed and many of us have benefited from reading papers and treatises written by them pertinent to our hobby. Although there are lines of communication between the two groups, too often both fail to seek them out. There is a currently best seller, incidentally, entitled *The Naked Ape* by Zoologist Desmond Morris in which the author employs his knowledge concerning the behavior of primates as a tool for understanding human behavior. *Contacting in Certain Cichlids* is a thought-provoking article to say the least and we have covered very little of its scope here. If we have stimulated those particularly interested in fish behavior into reading the piece firsthand, however, we can consider the mission of this review accomplished. *Anchor* is one of the outstanding society publications, carrying a varied selection of articles and features. Single copies are 35c and information regarding it and the publishing society may be had by writing the San Francisco Aquarium Society, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118.

Herb Meyer tells *How to Spawn Silver Hatchets* . . . Maybe, in the April

issue of the *The Tropical Breeze*, published by the San Diego Tropical Fish Society. It is interesting to note the similarity between the conditions under which his fish spawned and those described by Rosemary Lowe in her studies of these species appearing in *The Journal of the Linnaean Society of London*, Vol. 45, Zoology, No. 304, Part I, pp. 103-144, April 1964. The conditions described in the Lowe studies, of course, are those in which the fish spawn in their natural state. Author Meyer's fish were well-fed on a variety of insects over a period of time. Then he was called away suddenly and left his charges in his wife's care for a month during which time they received nothing but dried food. He returned to find them in a small shallow sea of algae. The water had evaporated considerably as there had been a warm spell and the catfish which shared the tank with the hatchets had dined on the dried food, at least saving the tank from fouling. He gave them a complete change of water and the next day the hatchets spawned. Miss Lowe observed that in nature the fish spawn once a year and just before the annual event, they go through a dry period when they obtain little food. As soon as the rainy season commences, they eat well once more, enjoy fresh water, and begin to spawn. By producing the conditions under which the first spawning occurred, Author Meyer was again able to induce his fish to spawn, but in both instances the fry died as soon as their egg sacs were absorbed. Failure was due to not finding an acceptable first food. Sterba reports that Kluge (1956) found no difficulty in raising the fry and refers to *Hyphessobrycon innesi* feeding techniques, i.e., fine food in quantity, rotifers, nauplii, infusoria or microworms. Although Mr. Meyer's account is not a success story, the information he supplies fills a gap in the literature and perhaps the next time around he will find a satisfactory first food. In this same issue, Kappy Sprenger enters the GIS arena with her *GIS (Growth-Inhibiting Secretions)*. It goes without saying that any controversy in the hobby goes on ad infinitum unless controlled experiments are made in the area and here the author bases her hypothesis on the assumption that growth-inhibiting secretions exist. In her bibliography, she refers to the writings of S. Meryl Rose, Florence C. Rose, and C. C. Akin, whose findings indicate that sibling fry in a given amount of water such as in an aquarium, demonstrate an unequal growth pattern. Some of the fry grow more rapidly than others and eventually, the less precocious siblings show no growth at all. When these same fry are moved to another aquarium, growth commences and the growth pattern repeats itself. If the species of fry are mixed, it is found that the GIS of one species does not affect the growth of another species. The author's hypothesis suggest that GIS are given off by precocious siblings so that at least some of the spawn will be saved in case of a catastrophe such as a drought occurring. A few robust specimens might survive in a ditch, for instance, should the water dissipate. If all the siblings attained the same size, their equality would be their undoing and all would perish. This is an acceptable theory and Professor S. Merl Rose's article

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A HISTORY OF THE AQUARIUM HOBBY IN AMERICA PART 21

by ALBERT J. KLEE

ANOTHER ATTEMPT TO FORM a cooperative national organization of aquarium societies was made, this time in 1933 by William T. Innes, but the response was nil and the effort was abandoned. As the country was in the throes of a depression, a number of suggestions were then made to place an import duty on aquarium fishes. A flat tariff was proposed, of from 10c to 25c per fish. This would have made the cheaper fishes comparatively high-priced, these being produced in this country (platies, swordtails, danios, etc.). The rare fishes, already high-priced without a duty, would not have increased sufficiently to make their cost prohibitive. The plan was never implemented. In 1933, however, the first organization of the tropical fish industry under the National Recovery Act was established with the formation of the Eastern Tropical Fish Association under the leadership of such well-known names as John Doscher, Charles Visel, Richard Buettnier, Joseph Lingg, and Newton Capron. The immediate purpose of the organization was to secure the general acceptance of a code of fair competition which was drawn and sent to Washington. The ultimate aim was to form a permanent trade association but the effort failed when the NRA was declared unconstitutional by the Supreme Court.

In 1928, a small quantity of a tiny crustacean was brought to the Steinhart Aquarium in San Francisco, California, where the Director, Alvin Seale, took particular interest in the creatures. Seale experimented with the shrimp which, after some literature research, he found to be *Artemia salina*, and later collected its eggs in nature. Not only did Seale find them to be an excellent fish food, but he also discovered that the eggs could be dried and stored for some years, later to be hatched at will when the shrimp were desired.

It was that great aquarist, Richard Dorn, however, who suggested that Seale's club, the San Francisco Aquarium Society, market the brine shrimp eggs commercially. As Seale himself tells it (modestly referring to himself as "one of our members"): "One of our members who for some three years had been making an investigation of various fish foods, succeeded in some of his experiments even beyond his own expectations and it is all due to the



Frederick H. Stoye



C. H. Peters

vitality of the eggs of the insignificant brine shrimp. It was found these eggs would hatch in from one to two days after being dry and in a jar for at least three years. This made it appear as if the preparation and sale of these eggs might be developed into a small profitable business - in fact this was suggested by our good friend Richard Dorn who reported that in Germany it is not unusual for Aquarium Societies to lease and exploit Daphnia ponds.

"Our President, Mr. Lanier, therefore appointed our Board of Governors as a committee on Business with instructions to take such steps and make such arrangements as were necessary to carry on the work. A friend of the Aquarium Society, having agreed to advance the necessary funds for immediate needs, the committee at once went to work. All the salt Companies owning salt ponds in California and also some in Utah were approached to secure, upon proper payment, the exclusive rights to gather brine shrimp eggs from their property. Then the services of an experienced collector was secured and a large quantity of eggs were collected, washed

continued on page 49

ABOUT OUR AUTHORS



ARTHUR ENTLICH

Arthur Entlich is a fifteen-year-old junior at Bergenfield High School, New Jersey, who became interested in tropical fish about two years ago when he began to breed fancy guppies. After adding more tanks, he experimented with other livebearers such as mollies and swordtails, and today his collection includes regular and dwarf cichlids, butterfly fish, leaf fish and "oddball" catfishes.

Among his other interests, Art collects amphibians and reptiles, raises gerbils and hamsters, dabbles in horticulture, plays the guitar, collects coins, and is active in both the art and photography fields. He plans to supplement his photographic equipment so that he may take tropical fish pictures in the near future. His favorite subjects are science, English and art, and his ambition is to become a veterinarian.

PAUL J. HOPPE

Paul Hoppe was born of German parents in Landskron, Sudeten-Czechoslovakia in 1924, moved to

Vienna, Austria in 1938, fought with the German Army in Russia during the war, and ended up in a POW camp in France. After the war he finished his education in Germany and married an American girl. They migrated to the United States, after a two-year stay in Switzerland, in 1950.

Paul is an engineer by profession, employed with a large American turbine firm as Assistant Manager of Service, in which position he does a great deal of traveling here and abroad. He started with Gup-



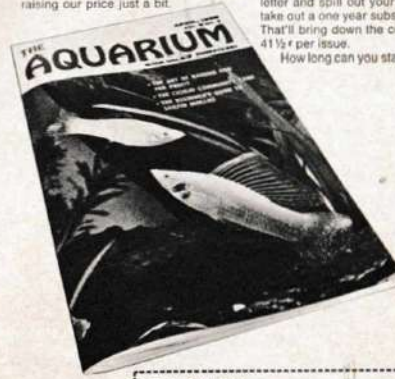
pies when he was 12, and earned his first bit of money by selling a brood of zebra danios when he was 13. The war, and moving from one place to another, interrupted his hobby often, however. Today he is in the hobby strictly for fun, and he shares it with his wife, Trudy, and his two children, Heidi and Kurt, the family currently residing in Wellesville, New York. ●

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The following articles by Glen Takeshita and Joanne Norton are presented together to give our readers a complete breakdown of the history and genetics of this fish.

THE RED CORAL ALBINO SWORDTAIL

by GLENN Y. TAKESHITA

THIS BEAUTIFUL NEW STRAIN of swordtail was developed by a talented Hawaiian breeder named Mr. Franklyn Lau. The name was given by Dr. Joanne Norton who is at present, marketing these swords under this name. The fish possesses a fiery coral red color along its entire dorsal area, broken up very abruptly below the lateral line system

by an icebox-white belly or ventral area. It was called in Hawaii by its developer, the half-and-half-albino swordtail, but under mutual agreement with Dr. Norton, Mr. Lau has decided to call his new strain, the red coral albino swordtail.

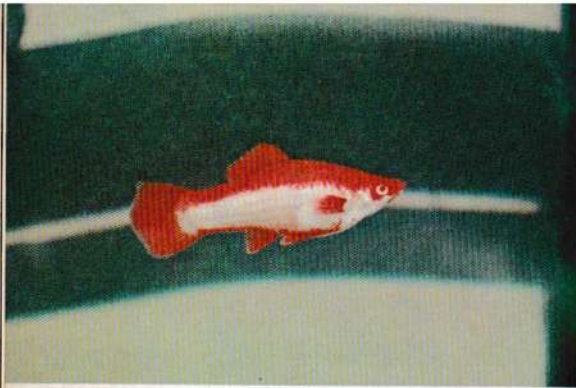
The red coral albino swordtail should not be confused with Mr. Lau's pinto albino swordtail which is also colored red-and-white. The differences between these two strains are very definite, the pinto albino having a red-and-white body pattern of no fixed sequence. The red coral albino sword has a definite red-and-white body pattern which runs hori-

zontally on the body of the sword, with the red colored area always being above the lateral line system and the white colored area below. At present Mr. Lau's red coral albinos are producing offspring of which 90% have the desired color pattern.

The story of creation of this strain is a typical story of development of a tropical fish. It was through a chance color mutation and careful selective breedings of the progeny that this strain was created.



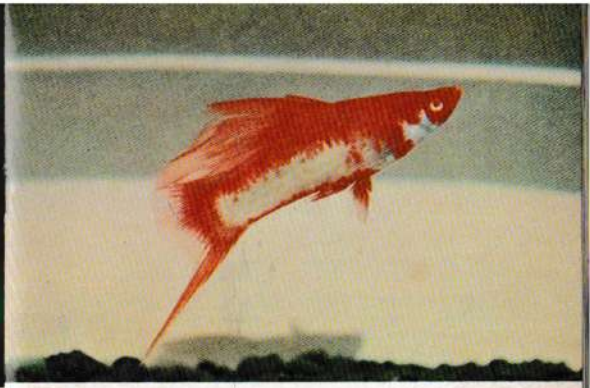
A female lyretail red coral albino swordtail.



A young lowfin red coral albino swordtail.

The story really begins about two years ago when Mr. Lau bought several low-finned red coral albino females from Mrs. Oishi, a long-time breeder in the Nuuanu district on Oahu. Mrs. Oishi had gotten these as color mutants while trying to develop the red albino swordtail. What Mr. Lau purchased from Mrs. Oishi was extremely different from the red coral albino of today. But even then, Frank saw the great potential of the fish. After having bought the young red coral albino females, he searched his talented mind to decide on the male to be used in the initial breeding. After several days of thought, he decided to use a high-finned red albino sword male. Frank happily received his first batch of young from this breeding in a month. He nursed and babied these fry for the next four months. He was quite disappointed with the results that he had gotten, however. There were no half-and-half high-fin or low-fin albinos in the whole batch of fry. At this point, most of us would have given up the project and probably sold or given the progeny to our friends, but not Frank. Yes, Frank was disappointed in not getting any red coral albinos in the F-1 generation but he also was sufficiently experienced to realize that a recessive character would not show up in the first generation, but rather in the second or third generation if careful selective reciprocal matings were carried out. Frank carefully raised these high-finned red albino males from the F-1 generation so that he might mate them back to their mother who had the desired color pattern that

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A male highfin red coral albino swordtail. The word "albino" refers to the absence of black pigment.

he wanted. It is from this mating between a high-finned red albino male (from the F-1 generation) and the low-finned half-and-half albino female (original female which gave the F-1 progeny), that the true high-finned and low-finned red coral albinos as we know them today appeared. Since the F-2 offspring with the desired color pattern appeared, Frank has inbred the young to improve the strain. Today, he has the high-finned, low-finned and lyretail characters with the half-and-half red-and-white color pattern in many swords of the new strain. All three types are quite attractive with their red-and-white contrasting body color plus other physical attributes such as the high dorsal fin and the lyre-shaped tail.

According to Mr. Lau, because of very careful selective breeding of this strain, the individuals are much larger today in overall body proportions, with a definite improvement in the size and shape of the high-dorsal fin.

There is one very important fault which has appeared in this strain, however. This fault should interest those who are working in the field of fish genetics dealing with the problem of tumorous growth in tissues in fishes. As some know, tumorous growth in fishes generally occurs on fish tissues that are highly pigmented. In the case where melanin is involved, the tumorous growth is called melanoma. Some of us are familiar with these cancerous growths for they are frequently seen on black swords, moons and variatus. *continued on page 71*

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amazingly brief. The latter situation is usually influenced by the number of other fishes present. When a large number of competitive fishes are present, the pair is often willing to forego much of this in favor of joining forces for the purpose of reproduction and defense of the forthcoming family.

In my opinion, there is no more handsome aquarium fish than the male blue acara in his breeding colors. Some species are gaudier, more brightly colored, and display a greater number of hues, but the dazzling neon blue-green which liberally disperses over body and fins, combined with vertical gray alternating with deep blue-green bands, gives an overall impression of a brilliantly blue-green piece of jewelry.

Older males are proportionately more beautiful because of the increase of finnage, the tendency to retain more color even when not breeding, and an increase of the more subtle body and fin patterns. Females are somewhat less colorful in most cases, and after the first spawning seem inclined to grow more slowly. This would probably indicate that much of the female's food intake after maturity goes to egg production, while the male continues to grow at his same rate or nearly so.

If several are purchased as previously suggested and natural selection is allowed to occur, typical cichlid breeding procedure is followed and, as a side result, the remaining blue acaras sometimes get caught in a sort of chain reaction and decide to have a bit of family life of their own. If three pairs are present, within a few days of each other three separate unions may occur, but this is likely only in a rather large aquarium where spawning sites can be selected out of each other's way.

Once the spawning site is chosen, usually a smooth, opaque object such as a large stone, the would-be parents get down to business. This consists of scrupulous cleaning of the rock which is to be the egg depository, digging and excavating holes all around the site, cooperatively chasing every intruder out of the territory regardless of size, and developing the visible ovipositors or "egg-placers" which will subsequently be used, in the case of the female, to carefully place row upon row of the large, adhesive eggs, and to be used by the male to "spray" them with his milt (in other words to fertilize them).

The parent fish take turns, the female depositing a few eggs, the male following, often one behind the other or perhaps taking turns, alternately standing guard while the other deposits or fertilizes. Depending on the size and maturity of the breeders, any number from a couple of hundred to a couple of thousand eggs may be placed, although some will be infertile. First spawnings are sometimes rather clumsy, and the percentage of infertile eggs may be higher.

Spawning may take an hour or two, and then the real work begins; fanning the eggs to oxygenate them, picking off white, infertile eggs as they appear, periodically picking the good ones up to clean them in the

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As with many cichlids, the youngsters are a rather unspectacular group, especially when viewed in a dealer's tank.

parent fish's mouth and replacing them, taking guard duty turns to keep the eggs from being eaten and keeping the previously prepared excavations in shape. Depending on temperature, the eggs hatch in about two days and shortly become a wriggling, adhesive, jellylike mass.

The helpless, non-swimming babies are soon moved by the parents to one of the excavations to be bedded down there. Some pairs perform this with amazing cooperation, picking up a mouthful of babies and quickly, neatly exchanging places with the other parent which has just taken a load to the new home. This can sometimes be accomplished in such a way that neither the remaining offspring nor those already moved are left unguarded.

A few days of nomadic hole-to-hole living and the babies absorb the impeding yolk-sacs and become free-swimming. Although several hours prior to this they are seen "leaping" rather clumsily as much as an inch or two off the bottom, there is no direction to their efforts, and the fact that three or four of them may spray off in separate directions at the same time keeps the parents rather busy making sure that they are all properly returned to the hole in the sand where they are being kept at that time.

Unless a person is unfortunate enough to have a heart of stone as far as animal "affection" is concerned, the phenomenal patience and tenderness displayed by blue acara parents toward their young is bound to be a lesson in love and responsibility which will not be soon forgotten. I have had blue acaras spawn in a 160-gallon, 74-foot long aquarium containing other cichlids, various large catfish species, and several barbs at least twice their size, and bring a number of babies to an age of three weeks or so with a combination of ingenuity, fury and bluff. Their courage, even against the hand of the aquarist, is something to see, and the discipline required of the youngsters is remarkable in itself. Human

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The sexes are not easily distinguished especially since color is not a dependable index.

parents might do well to take a few notes while watching them.

Before I am reminded that all of this is instinctive, and has nothing to do with love, affection, etc., the way we know it, the fact remains that the right rules are applied even under the toughest circumstances. There are blue acaras, as there are humans, who make lousy parents, of course!

There are generally two methods of breeding cichlids of this type which could be likened in some ways to the meat-hunter as compared to the sportsman hunter. One is hunting in order to fill his freezer, the other for pleasure.

Commercial cichlid breeders prefer removing the eggs from the parents and hatching them "artificially" in a fishless and plantless aquarium or even a gallon jar. An airstone circulating air past the eggs substitutes for the fanning of the parents, and an anti-fungus agent can be added to the water which, in an established aquarium, might either be harmful to plants or ineffective due to absorption by other matter present. After the free-swimming stage, in the closeness of a jar it is also easier to judge the amount of short-lived live food such as brine shrimp which the babies will consume. Any leftovers can be easily removed with an ordinary kitchen baster. Percentages of babies raised are higher this way, and in the case of parents which continually eat their eggs or fry, there is no alternative. If this method is used, do not leave too many babies closely confined for an extended time or you may lose them all. A few ounces of water removed and replaced daily while feeding should leave the water reasonably clear for a week, and if the replacement water is from the aquarium into which they will be moved, in a week they should be ready. At this stage, they are sensitive to abrupt temperature changes.

The other method is to let nature take its course for the most part.



This mature fish displays its beautiful iridescent blue markings.

Addition of one of the fungus-detering dyes, such as acriflavine, will greatly improve the hatch in most instances, although some of these will discolor the water. When the babies are free-swimming, they are immediately capable of swallowing live or frozen newly-hatched brine shrimp or micro (mikro) worms. An excellent substitute, especially after a few days of live food feeding, is lean beef heart which has been thoroughly blended. Since some of the juice from the blended beef heart will inevitably leach into the water, part of the water must be changed every few days to prevent an excessive chemical buildup. Three or four large mystery snails (*Ampullaria*) will help keep uneaten food to a minimum.

If you are a relative newcomer to the hobby and have never had an egglayer spawn successfully, the blue acara is an excellent first egglayer. If, on the other hand, you are an old-timer who has never spawned one of the "typical" cichlids such as the blue acara or its near relative, the port (*Aequidens portalgrensis*), you have missed the opportunity to witness one of nature's amazements. ●

EDITOR'S NOTE: There are three fishes that very closely resemble each other: *Aequidens pulcher* (originally described from Trinidad), *Aequidens coeruleopunctatus* (originally described from Panama), and *Aequidens latifrons* (originally described from Columbia). The original aquarium importation was from Columbia, hence aquarists used the name "*Aequidens latifrons*" for many years. However, ichthyologists such as Schultz and Dahl (the latter a Columbian himself) consider *A. latifrons* to be the same species as *A. pulcher*. As *A. pulcher* has priority (1858 vs. 1878), this is the correct name to use. A number of ichthyologists (e.g., Dr. Robert R. Miller) do not feel that *A. coeruleopunctatus* is identical with *A. pulcher*, but even if they were identical the correct name would still be *Aequidens pulcher* (again, because of priority, 1858 vs. 1963). AJK



This beautiful female is easily identifiable by her fuller body shape and the shape of her anal fin, the lower border of which is almost straight. Do not be fooled by color, it is not a dependable index.

continued from page 6

It is a good practice to separate the sexes before breeding them for a period of about 10 days during which time they are well fed. The water in the spawning tank can be made slightly acid (with a slight yellowish tinge to it) in the interim by adding a small amount of peat extract made by boiling garden peat (the acid variety) in a bit of water. Do not, however, overdo this.

The breeding tank should be supplied with nylon mops or other artificial spawning medium. The spawning act itself is usually preceded by a lively driving, during which time both sexes often rub against each other. The eggs are expelled where they drop into the spawning mops, somewhat protected from the hungry advances of the parents. The fry emerge after 24 to 40 hours, and the young hang like tiny commas on the mops and glass until the yolk sac has been absorbed. This takes from three to four days. Only with difficulty can the eggs be seen as they are very minute.

After the yolk sac is absorbed, the fry begin to swim freely and are ready to take their first food. This should be the finest of infusoria or



The male *Hyphessobrycon flammeus* is recognized by the shape of the anal fin which is distinctly concave and by the black edging of the fins which is usually more pronounced than the edging of the female.

liquid fry food. In a week to ten days, they can be graduated to newly-hatched brine shrimp. Their growth is not as fast as that of many other tetras, and it will be a while before you can introduce them to a tank of adult fish. The average aquarist should be able to raise about 50 fish from a normal spawning. Larger spawnings are known but they are not common, most likely due to the fact that so many die during the critical first ten days when the finest of foods (and in sufficient quantity) are demanded. Be particularly careful that you do not overfeed at any one time; otherwise it will happen that the water fouls and the entire brood dies.

Although we have mentioned that the flame tetra is, at times, rough towards other fishes and occasionally is incompatible, or even bites, such encounters always have a harmless ending. It can be recommended in every respect, for it combines with its beautiful coloration, liveliness, easy propagation and makes few demands. All these virtues, which can be expected of an ideal aquarium fish, will be apparent when it has proper temperatures, clean water which is well-aerated, and good illumination, preferably sunshine, over it. ●

Gain: continued from page 16

looking for entries and might even overlook some. A letter to identify the class and a number to identify the exhibitor (the latter can be assigned consecutively) is a simple but effective system.

It is never too early to secure the services of your judges. Good judges are hard to find, yet fish shows require several (if only to provide a balanced appraisal). Certain classes (e.g. guppies, killifishes, bettas, etc.) may need specialized judges, further increasing the total number. Plans should be formulated to select such people, provide for their fees or expenses, and to see that they are properly entertained and escorted should they come from out-of-town.

One or more members of the show committee or the society in general should be present at all times to monitor the exhibit and to answer questions. An often overlooked item is exhibit security, and provisions should be made so that the exhibition is "locked tight" for the night, and that nothing can be pilfered during the day. This applies to the matter of cups, ribbons and other awards, especially after such awards have been made. It is sometimes surprisingly easy to steal an expensive rosette which has been fastened haphazardly to a tank.

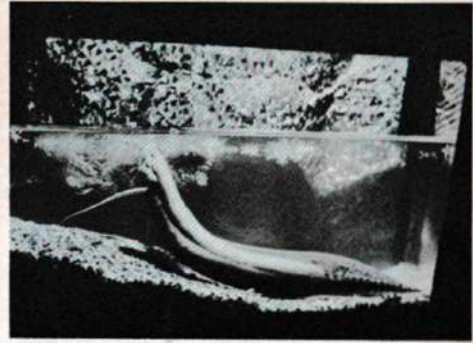
Publicity is an important item and can often make or break a fish show. In addition to local newspaper, radio and even TV publicity, posters placed in fish stores are highly effective. Indeed, societies should do more to encourage the participation of dealers over and above simple poster space and even dealer display tanks. Space should be provided so that dealers can exhibit the latest equipment, gadgets, books, etc. Under no circumstances should any dealer be treated in a cavalier fashion!

As far as magazine publicity is concerned, *THE AQUARIUM* is happy to publicize any forthcoming fish show, but such notices must be forwarded in sufficient time. Three months' notice is not too much! Anything less than two months' notice is too late. Aquarium magazines are not put to press on the same basis as are news magazines such as *Time*, and accordingly require considerable advance notice of any show event.

Finally, don't forget the matter of a show brochure to be used as a publicity item while the show is in progress. This can contain not only a history of the sponsoring club, but articles intended to whet the interest of spectators in the aquarium hobby itself. Part of the costs of the brochure can be offset by paid advertisements solicited from dealers and other interested parties.

A great deal of thought should be given to what happens *after* the show is over. Exhibitors should be told the earliest time their exhibits are to be removed and the latest. When the specified time comes, all exhibits should be removed promptly. The cleanup committee (which is a necessity but which is often overlooked) has a lot of work to do!

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Atlanta had a "rare" fish category in its show, and here is its winner — an African lung fish.

FACILITIES

All fish shows require electricity. Exhibitors in general expect electrical outlets for pumps, heaters and lights. Some shows provide air from a central system, and many are staged in well-heated facilities such that auxiliary heating is not required. In any event, exhibitors should specify their particular needs beforehand in a special section on the entry blank. The dimensions of their tanks (if they are not provided by the show committee itself) can and should be noted here also so that the show committee can make the necessary allocations of space.

Many shows provide the tanks in which the fish are exhibited, auctioning them off afterwards. Indeed, auctions of fish and tanks at the conclusion of a fish show is fast becoming the norm at speciality shows (such as guppy and killifish exhibitions). Although sturdy stands may easily be nailed together using old or used lumber (2 x 3 lumber is sufficient), some clubs may want to make more permanent staging that can be used year after year. The problem of storage then arises, of course, but someone can always be found to store such material in his or her attic or garage for a year.

In general, exhibitors have the responsibility for feeding their own fishes but some shows accept out-of-town entries in the absence of their owners, and provision will have to be made to feed them. This can also

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This electric catfish won second place in the "rare" fish class. One of the problems in using the category of "rare" fish is that there were three electric catfish entered in this show. At this rate, they certainly weren't rare!

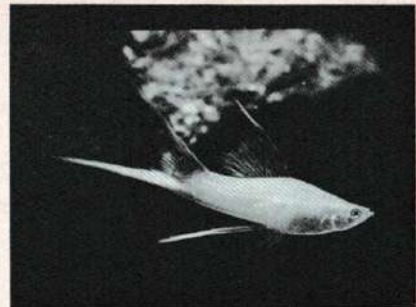
be noted on the entry blanks. A very good idea is to provide buckets of salt, acriflavine, potassium permanganate, etc., for use by exhibitors in disinfecting their nets or those provided by the show committee. A fish show is the last place where one would like to see disease.

Dead fish should be removed promptly either by the exhibitor or the show committee. If the latter, however, the corpse should be saved (rubbing alcohol will do) for subsequent examination by the exhibitor. This will prevent some nasty accusations! Finally, don't assume that every exhibitor is an experienced exhibitor. Suggest, perhaps in a leaflet, proper means of transporting fish, setting up a tank, etc., and items of equipment that they might profitably bring along (nets, siphon, extension cord, etc.).

JUDGING

Judges are usually prominent aquarists, local or otherwise, and they are faced with a most difficult task. *Make it easy for them!* Do not scatter entries, but group them by the classes in which they are to be judged. Provide each judge with a clipboard containing a set of show rules, regulations, etc. (these should also have been provided to the judges prior to the show and as early as possible), plus a floor plan showing the locations of all entries and classes. Forms should be provided for all

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Hi-fin lyretail swords took first place in the livebearer competition in Atlanta. Between six and eight thousand people viewed the show during the 55 hours it was open to the public. A new record was established for disassembly — 4 hours to restore the auditorium in which it was held to its pre-show condition.

classes, with entry numbers on them, so that the judges may record their results. Every entry listed on the form should be judged and the forms themselves should be signed by the judge who filled them out.

Judging, of course, should be completed before the show is opened to the public. Only in this manner can the judges give satisfactory attention to the exhibits. One member of the show committee (and one only) should be present with the judges to answer their legitimate queries, but the committee member should be a non-exhibitor and should neither provide nor offer information on entries themselves. He should be present only to guide the judges to the classes they are to judge, to clarify show rules, and to insure that all entries are judged.

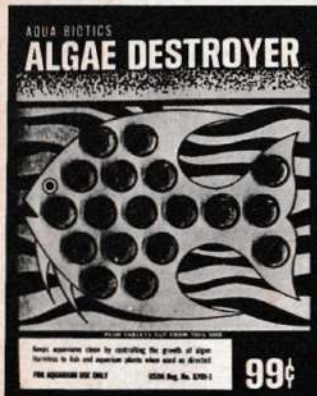
AWARDS

Exhibitors generally work hard to plan and install their entries. Setting up one or more tanks is frequently hard work, and it is not fair to stint on either classes or awards. Classes can always be coalesced if the expected number of entries do not materialize; if the printing is handled properly, ribbons and rosettes can always be used the following year—cups and the like most certainly can. In any event, ribbons are inexpensive where rosettes and cups are not.

The classes themselves differ from society to society. One club may

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emphasize the "Aquarium Beautiful" (i.e. a fully-aquascaped community tank), another may emphasize "species" (i.e. in show parlance, classes for groups of fishes such as barbs, tetras, catfish, cichlids, etc.).

Some people justifiably become upset when a "rare fish" class is suggested, for the word "rare" is both relative and imprecise. This is effectively handled by substituting an "Oddball" or an "All Other Species" class. Finally, a very nice gesture is to provide for a "Judge's Trophy". This is a trophy awarded by the judge for any special purpose as he sees fit. For example, an aquarium beautiful class may have an entry which is not good enough to rate a first prize but which does incorporate a novel idea that should not go unrewarded. Or, there may be a particularly beautiful or outstanding specimen of a fish in a community tank but because of other considerations (plants, other fish, etc.), the tank does not receive an award. In both of these cases, the judge's trophy is deeply appreciated by the judge.

CONCLUSION

It is no idle claim that the success of a fish show is dependent upon planning, both for normal operations and for contingencies. There is no set way to run a fish show, no "standard" rules or regulations. Each society must tailor their specifications to meet their own special requirements. These guidelines, however, have indicated what should at least be considered.

Finally, no matter what efforts have been made or what dedication has been delivered, the show chairman and his committee will sometimes come under criticism. But, given the frailties of human nature, Solomon himself could not escape a modicum of petty carping. The important thing to remember is that the overwhelming majority of your club will deeply appreciate your work and will recognize that your success is the success of the society as well. ●

Klee: continued from page 31

and prepared under the direction of the committee. Labels were printed and boxes and cartons ordered. Many members of the society kindly volunteered their services and packed and labeled 1000 cartons. These are now ready for market and orders have already begun to arrive. Each member of the Society upon application to the President will be presented free with one carton of eggs.

"It is hoped that all members will join in securing markets for these *Artemia* and in this way advertise our Society and add to our revenues so that we may enlarge the Aquarium Journal, build up our library and do such other good things for the good of the Society as is right and proper".

Thus, in September 1933, the aquarium hobby was introduced to brine

shrimp and its eggs. It revolutionized the hobby and made the San Francisco Aquarium Society the most prosperous aquarium society in history.

During the boom period of 1933-1935, numerous aquarium books appeared on the market. An early comer, in 1933, was *Tropical Fishes for a Private Aquarium*, authored by Christopher W. Coates of the New York Aquarium. This was an excellent book, written in a highly absorbing narrative style, so much so that even today I enjoy sitting down and re-reading it again. Except for another book to be discussed shortly, there is no other for which I can make that statement. A number of good photographs were supplied at the end but essentially, the book consisted of chapters discussing specific groups or families of fishes. It was not a catalogue of aquarium fishes in the usual sense, however. Its purpose was to arouse interest - it was not designed as a reference work by any means.

One that was, however, was C. H. Peters' *Life and Love in the Aquarium* published in 1934. Although basically a good book, it suffered from a number of deficiencies. The illustrations were by Henry Uhlig and, as excellent as they were, they could not, in a catalogue, replace photographs. Peters, who was editor of the *Home Aquarium Bulletin* at the time, developed the book in a hurry, presumably in order to arrive at publication before the Innes work, whose appearance was delayed at least two years but which was known to be in preparation. The illustrations in *Life and Love* were located some distance from the text, and many species were copied from old German aquarium works. Since many of the latter had not been available or seen for years, they were of limited value to the hobbyist. Further, short shrift was paid to correct nomenclature and identification. General aquarium management and diseases were briefly mentioned—the book, as we have noted, mainly was a catalogue of fish. On the other hand, Peters was an excellent writer with an easily read style. The book, however, was overshadowed by others that followed closely upon its heels.

Another very good book was *Tropical Fishes for the Home, Their Care and Propagation*, published in 1935 and authored by Frederick H. Stoye. Stoye was born in Saxony, Germany, emigrating to the United States in 1911 as an expert telegraph operator. An early love of Nature prompted him as a child to collect frogs, lizards, birds, etc. Over the years, however, his interests turned mainly to aquarium fishes and he contributed to magazines and newspapers on aquatic subjects. In time, he was added to the staff of the *The Aquarium* as an associate editor where he contributed many major articles, edited a monthly column, and translated material for the magazine. Stoye's book was actually first printed in Germany but a second edition was published in this country. The book was a more careful, more painstaking effort than was Peters'. It described over 400 species of fishes, 345 of which were illustrated via wash sketches. Included among these were 40 color plates. The book established Stoye's reputation as an authority, and he remained a mainstay of *The Aquarium* staff for many years afterwards.

Further, he contributed to practically every other American aquarium magazine on a frequent basis. His output was prodigious.

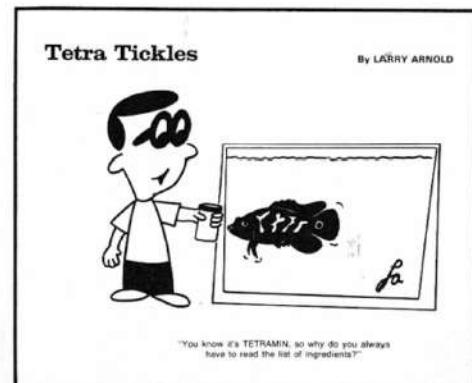
The piece de resistance, however, was William T. Innes' *Exotic Aquarium Fishes*, which appeared in May 1935. We can do no more than present a review of the book by Charles E. Tracewell, which appeared in *The Evening Star* Washington, D. C., on May 25, 1935.

"*Exotic Aquarium Fishes*, by William T. Innes of Philadelphia, is the answer to the fish fancier's dream. Mr. Innes has written it, illustrated it and published it. The result is a beautiful volume, whose excellent, sensible text is supplemented by some of the most beautiful color photographs ever taken of live fishes. Each one of these plates cost several hundred dollars. Each one of them is the personal work of the author, who has spent many years developing his skill as an amateur photographer of note. The keeping of small aquarium fishes and the photographing of them in color have been this man's hobbies. Print is his business.

"Mr. Innes worked for three years upon this book, biding his time while other works were rushed into print to catch the crest of the wave of public interest in the so-called 'tropicals' those interesting small denizens of the warmer waters of the entire world.

"The result is a work of which the entire 'fancy' may be proud, a book which will take its place as the standard work in the English language on these small 'exotic' creatures.

"Although Mr. Innes has devoted his life to love and care of fishes, beginning many



years ago with goldfish when Philadelphia was the center of that hobby, he makes no claim to be an ichthyologist, but his book is as accurate as if he were, for he has had the assistance of Dr. George S. Myers of the New National Museum, internationally known authority, and of the National Geographic Society.

"This is Mr. Innes' book from first to last, however. Over it he has spent three years of his life, based upon many prior years as amateur fish culturist and student. Only a man with this experience could put into such a work the love of it which shines through every page, every photograph, many of them in exquisite color; every detail of physical construction. This is the first time in any book that the reader, by aid of the larger maps, may accurately place the natural habitat of any of the scores of fishes treated.

"Also there are small maps for every family of fishes, showing accurately where the small creatures which swim in home aquaria really live in Nature. A feature of this book which answers the 'fish fan's' prayer, as well as makes his dream come true, is the pronunciation of every scientific name. These Latin names, so essential, yet so hard to pronounce, are here both pronounced and their meanings made plain.

"The order in which the several hundred varieties, including the so-called 'live bearers' and egg layers, are considered in the book is unique among books for the layman. Fish families are placed in the book according to the scheme of their relative places as developed creatures, from lowest to highest. Thus, for the first time, the average keeper of aquarium fishes will be introduced to ichthyology, whether he realizes it or not; he will come in time, as he studies this text and accompanying photographs, to have a far better comprehension of the real worth of these small creatures.

"In addition, 'Exotic Aquarium Fishes' will show the beginner the fishes he really can acquire, without cluttering his head with rarities which only a few persons have ever seen. It will tell him how best to care for the fishes he secures, how to manage a tank, feed its inmates in health, and treat their diseases when these occur, as they will from time to time.

"The reader will remember that this book is the outgrowth of Mr. Innes' work as editor of 'The Aquarium' magazine. He has had the benefit of thousands upon thousands of questions from readers, and knows the point of view of the home fish culturist as few persons do or can. Hence his book is peculiarly for the amateur. At the same time it carries such a stock of true lore that the experienced fancier alone can recognize it.

In nothing more than the illustrations is this shown, for the newcomer may accept these as a matter of course, whereas the experienced fish fancier will recognize them as true works of art, incorporating a loving care and interest along with the finest precision of the master photographer, working with the latest development of the art.

"Here, for the first time, he will find a genuine color photograph of a father and mother angel fish surrounded by their scores of babies.

"Here he will see, for the first time, a photograph of a blowfish held in the hand, blown up into a perfect ball. Here are shown the spawnings of the Betta and the Rasbora, and many another interesting phase in the lives of many unusual creatures.

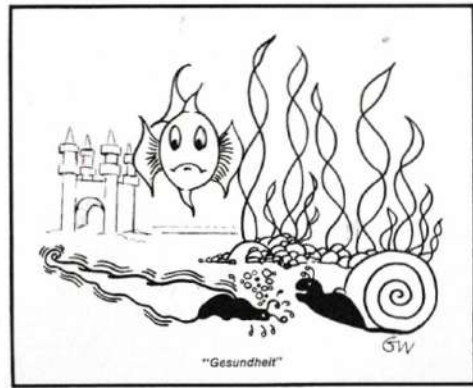
"While the illustrations are unique, they are by no means all. The text itself is completely free from that confusion which seems to beset even the most learned when

attempting to tell others about fishes. Especially is this true in detailing tank management.

"In dealing with the hundred and one points of aquarium management, as well as in discussing the different fishes themselves, Mr. Innes writes with divine common sense, so casually that the uninitiated, picking up this book, might not realize the vast experience behind each sentence.

"Exotic Aquarium Fishes is that rare thing, a specialist's book which is good reading for anybody and everybody. In physical make-up, contents, and illustrations it leaves nothing to be desired by the hobbyist. When the writer here took up his hobby, three years ago this month, there was nothing to be found except a few pamphlets. Since that date several books on the hobby have appeared, but none so rich and informative as this one. The lore of seas and nations is in the book. It is safe, to say that even Germany, which pioneered in the keeping and culture of these curious animals popularly called 'tropical fish,' possesses no popular work on the subject as worthy as *Exotic Aquarium Fishes*."

There is one last book that deserves mention in our selection of the best from the decade of the 1930's, and indeed, except for *Exotic Aquarium Fishes*, it was the best of them all. In a way the two did not compete - their concepts were vastly different and their purposes were clearly distinct. The book was called *1001 Questions Answered About Your Aquarium* and it, too, appeared in 1935. Its authors were both professional aquarists - Ida M. Mellen, author of numerous works on aquarium fishes dating from the 1920's, and former Chief Aquarist of the New York Aquarium; and Robert



"Gesundheit"

J. Lanier, former Supt. of the Steinhart Aquarium in San Francisco and the Shedd Aquarium in Chicago, and the foreman of the New York Aquarium. Both were excellent aquarists, of high qualifications. Miss Mellen, another of those important hobbyists overlooked by the aquarium world, had a keen sense of aquarium history, something not shared by any of her contemporaries.

1001 Questions is the other book I re-read year after year. As beautiful as *Exotic Aquarium Fishes* was, it did not quite match the Lanier/Mellen effort in its information content. Further, *1001 Questions* was the epitome of efficiency. If a question deserved an answer but one sentence long, then one sentence was all it received. It had its faults, to be sure. The question and answer arrangement was sometimes infuriating to work with when specific information was desired as the book is a series of couplets arranged in chapters grouping related entries. Further, it lacked adequate illustrations. The book, although pedagogical in nature, was readable and interesting. I should hate to ever lose my copy. We note with amusement that, in spite of its title, the book actually has 1074 questions!

During the 1930's a number of bitter clashes arose between Dr. George S. Myers and Walter L. Brind. In the February 1935 issue of *Aquarium News*, Brind attempted to describe a new species of knife-fish he named "*Rhamphichthys cingulatus*". In a note to the magazine, Myers pointed out a host of errors Brind committed in the attempt, finishing with the statement: "Until he describes the fish in a careful scientific manner, and places a type specimen in some scientific museum, no one will ever be able to be sure just what fish he was trying to describe".

Myers, of course, was right. Indeed, Brind did not even come close to placing the fish in the right genus. Fortunately, at the same time Brind was writing in *Aquarium News*, the ichthyologist F. R. LaMonte described the fish properly as *Gymnotus coatesi*, in a publication of the American Museum of Natural History. Brind did reply to Myers in print, trying in an ineffectual manner to point out that ichthyologists made mistakes in nomenclature also, e. g., "Many of the names given have been inappropriate - witness '*Danio albolineatus*' - the 'White Lined Danio' - a name given upon dissecting a preserved specimen in which the rose ping line had faded to white. Museum authorities changed the first name '*Danio*' to *Brachydanio*," - the first name being given in error.

The point, however, was that Brind was in the habit of naming fishes in a fantastically careless and haphazard manner. In May 1936, in an article entitled *The Absinthe Fish*, Brind wrote: "And, in spite of the fact that a tiny sip of real French absinthe accompanied my inspection as hereinafter described of this jewel among jewels of the finny world, my story now written was typed by myself on the next day after I met 'The Absinthe Fish', which I have been pleased to call *Tetra brilliantissima*, because no matter what high-falutin' appellation museum 'wise guys' may assign to it,

hereafter or, for the matter of that, may already have assigned to it, judging from some poor pickled specimen (and I am not 'pickled' when writing this), the name I have given it - both the English one and the 'scientific' one - exactly fit it better than any other names could do".

The fish Brind was describing was the neon tetra, but the ichthyological world ignored him. Ultimately, Dr. Myers described the fish in a professional manner under the name *Hypphessobrycon innesi*. At this, Brind blew his stack. In an intemperate article published in 1937 titled "*Hit Or Miss 'Scientific(?)' Nomenclature of Fishes*", Brind claimed that the neon tetra was really a *Hemigrammus*, not a *Hypphessobrycon*. In what amounted to a libelous attack, he stated: "Why let alleged 'ichthyologists' continue to bamboozle us poor aquarists?"

In the main professionals and aquarists alike ignored these wild forays by Brind into the naming of new fishes, but a few of his scientific names did stick, e. g., the firemouth cichlid, *Cichlasoma meeki* (Brind), in that at least Brind is recognized as the author of the species.

The reason for this is that in the 1930's, the International Rules of Zoological Nomenclature were more lax than they are today.

One battle (albeit a more friendly one) that George Myers did not win, occurred somewhat earlier, in 1933, in fact. In the May, June and July issues of the *Home Aquarium Bulletin*, Milton Schoenfeld engaged in expounding on "Nomenclature of Fish". In addition to explaining the whys and wherefores of scientific terminology, Schoenfeld made free with his comments on the system and Academia in general. Examples: On the International Rules of Zoological Nomenclature "... the lucidity of an Egyptian hieroglyphic. There are not five men in the country who have the necessary knowledge, skill and experience to use this code successfully. In order to use it, as applied to fish, one must be a dyed-in-the-wool fish nut, an etymologist, a genealogist, an historian, a chronologist, a Philadelphia lawyer, a controversialist, and a jig-saw puzzlist". On names: "All cases of lockjaw are not due to tetanus; ichthyologists are responsible for many,

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Have you ever noticed the enthusiasm displayed by ichthyologists when they give the five scientific names which the guppy has born? I can forgive them the first four, but the fifth! *Acanthophaeus melanzonus!* Twenty-five letters for an inch long fish! Two more letters and the alphabet would have been bankrupt." In short, by the time Schoenfeld had finished his series, aquarists were laughing until their sides split, at the expense of the scientific fraternity.

Dr. Myers, no mean slouch at humor himself, took up the gauntlet with vigor. In the August 1933 issue, Myers presented his rejoinder in which he let loose with both barrels, e. g., "No, it must have been the smoke of battle that obscured his vision and led him to emulate Don Quixote". Myers very correctly pointed out that a good deal of the nomenclatural mischief is perpetrated by aquarists themselves. He also corrected Schoenfeld on several technical points in his series, and pointed out that some of Schoenfeld's proposed solutions only led to more confusion. The general tone of Dr. Myers' reply, however, was somewhat sarcastic. As a consequence, Schoenfeld replied with a vengeance, in a two-part answer that appeared in the September and October issues of the magazine. Where Brind only sputtered and stumbled about when the wrath of Dr. Myers descended upon him, Schoenfeld actually enjoyed the whole business. As Schoenfeld was armed with an excellent education and a superb wit, he promptly hoisted Dr. Myers' hide on his own petard by liberally quoting from Myers' own publications. Myers clearly lost this one and never jousted with "Don Quixote de la Schoenfeld" again!

Looking at this most famous of all aquarium battles with a somewhat dispassionate eye, it would be fair to say that both sides were partly right and partly wrong. Aquarists and ichthyologists are human and as such, are privileged to commit human foibles and to become ridiculous at times. Dr. Myers certainly gave aquarists their "whatfore", but Milton Schoenfeld gave no less in return. Thirty-six years later, the charges and countercharges still have their point. In any event, those professional ichthyologists who have taken a keen interest in the aquarium hobby, such as Dr. Myers, Dr. Hubbs, and Dr. Gordon (and present-day Drs. Atz and Weitzman, although Dr. Myers is still very much with us!) have enriched it beyond what aquarists really deserve. For this, the hobby should be eternally grateful to them.

To be continued.

Societies: continued from page 22

entitled *How to Raise More Fish* which appeared in the October issue of *The Aquarium* (1959) will make fascinating reading for those interested in the GIS explanation as to why some siblings outgrow others in a common environment. *The Tropical Breeze* never fails to provide stimulating material and few editors or followers of society bulletins can resist turning to Guy D.

Jordan's *Scanning the Periodicals* where articles and bulletins are discussed and appraised by a reader who misses very little and spices his observations with his own Jordanian wit. Write to the San Diego Tropical Fish Society, P.O. Box 4156 North Park Station, San Diego, California 92104 for information regarding the society and its publication.

Anyone interested in swordtails will want to read Bill Ring's article *Swordtails That Carry a Flag*, appearing in the April issue of *Somthin' Fishy*, published by the Elgin Aquarium Society. The piece begins with a brief history of the Simpson Hi-Fin Swordtail and explanation of how the writer became engaged in the swordtail fancy. He then goes on to describe how he maintains his breeders, his criteria for selecting breeding stock, feeding fry, in what stages he makes his selections from his product for future breeding, and how he tells which males will show the high fin. Certainly there is a great deal here for the beginner who merely wants to raise healthy swordtails and something for the more advanced hobbyist who has set his goal for color or form, or both. Another article in this issue, written by 14-year-old Gary Ring, entitled *What is the Best Method of Handling Killifish Egg?* will fill in the novice killifish fancier on methods for handling these beautiful little species. The author describes his experiments for determining the effect of using light or darkness in hatching eggs, the length of time necessary for various species, and whether or not fungicides stunt the growth of embryos. His charts show the percentages of fertile eggs he obtained by using light, darkness, several fungicides, etc. Contrary to the usual conclusions in these areas, the writer is convinced by his results that light with no fungicides used produces faster hatches with a greater percentage of eggs showing no signs of fungus. *Somthin' Fishy* is a well established bulletin containing original material as reprints. Write to the Elgin Aquarium Society, % William Ring, Editor, 1438 Windsor Circle, Carpentersville, Illinois 60110 for information regarding the society and its publication.

Although algae are considered the crabgrass of the aquarist's world, every once in a while a writer pays the rue tribute by mentioning it is excellent forage for baby fish and that its presence in green form indicates a healthy tank. The Tidewater Aquarist Society has gone one step further in singing its dubious praises and has named its very nicely produced bulletin after it. Editor Edward C. Taylor sent us two issues of this society's publication, *Algae*, for review, along with a letter explaining that the Tidewater Aquarist Society is interested in exchanging bulletins with other associations, and is doing so now on a rather limited scale through correspondence. The March-April issue of *Algae* carries an unsigned piece on *Epiplatys annulatus*, an excellent drawing of which species appears on the cover by Cathy Taylor. A brief history of the fish is given as to its current status as an aquarium subject and we are told that its designation recently has been changed to *Pseudepiplatys annulatus*. It is known popularly as the clown

killie, the writer tells us, and gives his breeding techniques in a series of numbered sentences describing the equipment used, etc. From these we learn the species prefers a temperature in the high 70s F., and although Scheel recommends rotifers as a first food, this writer has used newly hatched brine shrimp for the fry. He points out, however, that his breeding tank was thickly planted and also contained floating plants and it is quite possible that it contained some infusoria. From the description of the species given by the author, the species should achieve popularity among hobbyists. Roughly, to paraphrase the description, the male's body is chocolate brown, girdled with yellow to white broad bands. The caudal is blue, "torched" with red horizontal markings in its widest section. This issue contains a wide variety of both original and reprinted material. Attention is given to the salt-water phase of our hobby and those interested in collecting salt-water fish will find a piece entitled *Collecting Local Salt-Water Life* (unsigned) filled with good suggestions. Write to Tidewater Aquarist Society, P. O. Box 155, Norfolk, Virginia 23501 for information regarding the club, its publication, and its exchange activity.

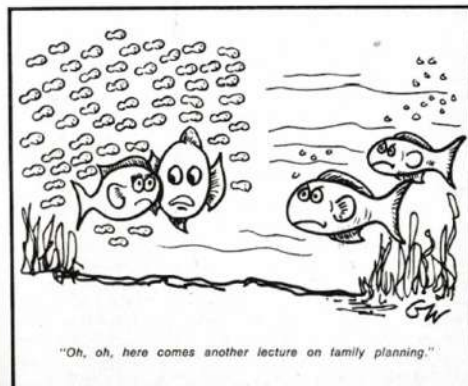
From time to time we have been receiving a *Newsletter* from Port Elizabeth, South Africa, published by the Eastern Cape Aquarist Society. It is a lively paper, and from it we gather the group is preoccupied with killies, cichlids, and many of the standard aquarium species of tropical fish. The society wishes to exchange bulletins with societies in the United States. Certainly this would be a good way of forming corresponding friendships and learning firsthand how the aquarist's hobby is carried on in South Africa. Write to the Eastern Cape Aquarist Society, P. O. Box 72, Port Elizabeth, South Africa for exchange information.

Piscophiles (fish-lovers) will have their interest broadened should they attend the 8th annual convention-auction of the American Killifish Association (AKA). This year's event will be held in California at Rickey's Hyatt House, Palo Alto, during the labor day weekend of August 29-31.

A mind-expanding experience will be guaranteed to all by the showing of the largest collection of killifish ever to be assembled under one roof. With two hundred and fifty tanks, over fifty different species will be displayed. Hobbyists will have an opportunity to see species mentioned in journals and reference books, but not often obtainable in local stores. The excitement of this show doesn't end there, however. With well-known speakers, workshops for participants which involve fish photography, innovative ideas in the area of spawning and care, and "how to" exhibits, the convention will have an added educational dimensional dimension. Besides these activities, participants will have an opportunity to meet the Fellows and the Board members of the AKA, and other interested members from all over the United States.

They all will be congregating to make this one of the most successful conventions ever held. For those coming from out of state, tours of the Steinhart Aquarium in San Francisco and the new Marine World in Belmont, Calif. will also be on the agenda. On the last day of the show, the climax and highlight will be the auctioning of the show species. For the 1969 convention details and information regarding lodging, contact Mr. Joe Ricco, Convention Chairman, 235 Copco Lane, San Jose, Calif. 95123.

The AKA has grown from its inception in 1962. With over six hundred members, the organization is now worldwide. Activities of the AKA have expanded and given impetus to this specialized area of fishes. The organization publishes two serial publications: *Journal of the AKA* and *Killie Notes*. The latter gives members up-to-date coverage of what is happening in the field and the opportunity for obtaining fish and eggs by mail. There are slide-tape programs, an Index which describes range, color, habitat, and breeding requirements for many of the killies, and publications on the care and spawning of these fish. Besides correcting the nomenclature of established species, the association has also introduced many new species of *Austrofundulus*, *Aphyoseion*, and *Epiplatys* to the Aquarium world. Interested



aquarists should write to Mr. Frank Smith, Membership Chairman, 17257 Via Chiquita, San Lorenzo, California 94580. With membership dues of \$5.00 for the remainder of the year, new members will receive the membership roster, beginner's guide and killifish exchange booklet, in addition to the Journal of the AKA and Killie Notes.

A group of hobbyists are forming a society devoted to the study of Anabantids on an international level. Anyone with more than a passing interest in labyrinth fish are invited to write to Terrence D. Sole, 77-6th Avenue, Pincourt, Ille Perrot, Quebec, Canada.

The Greater Pittsburgh Aquarium Society Annual Fish Show will be held from September 28 through October 12, 1969, at the Buhl Planetarium, West Ohio and Federal Streets, Pittsburgh, Pennsylvania. A guppy show will be held in conjunction with this show on Sunday afternoon, October 5, 1969. Interested visitors and exhibitors may write Mrs. D. S. Kuzio, Box 176, Hostetter, Pennsylvania 15638 for information.

The Louisville Tropical Fish Fanciers will hold their 10th Annual Show on The Mall, 5000 Shelbyville Road, Louisville, Kentucky. Contact Roger Price, Show Chairman, 4106 Gloucester, Louisville, Kentucky 40207 for information. ●

Mayland: continued from page 19

After completing the first layer of fiberglass matting, resin and hardener were mixed in the proper proportions and in sufficient quantities and brushed over the fiberglass, which absorbed the resin immediately and remained hardly visible when saturated. Again, of course, we will want to work as accurately and cleanly as possible. To be sure, there are solvents, such as acetone, and others, but my experience indicates that it is almost impossible to remove a spot from, let's say, a pair of trousers; the acetone will thin the resin and the whole thing will result in a larger spot than before!

After drying, and always following the manufacturer's instructions and common sense safety rules, we install another layer of fiberglass matting and resin and eventually a third one. Care should be taken to avoid any air bubbles between layers, as water may creep through between them and cause problems later on. Finally, the thickness of our finished tank walls should be close to a quarter of an inch and have a tensile strength of about 1700 psi. In our doctor's aquarium, all mechanical equipment was to be hidden within the tank itself. In planning the tank setup, I did not use the normal size relation of, say, 36 x 18 x 18 inches for a 50 gal. tank, but had added 4 inches to the depth, i. e., it was 22 inches deep. This additional area was to house all the equipment, which is usually visible in a normal

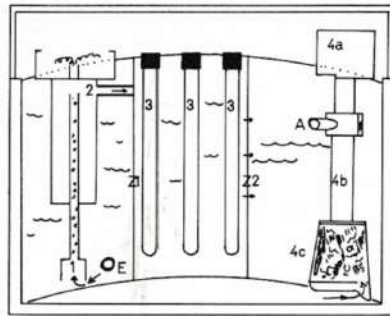


Figure 2: The background panel allows entrance of water at the lower left area (E). Here, tank water enters the compartment system, to be first treated with ozone (marine aquaria: 1-entrance, 2-exit of treated water from the reactor). Passing through wall (Z-1) at (2), the water then enters the heating compartment. The number of heating elements (3) will depend, among other things, on the velocity of the water flowing by the heaters. From here, our tankwater passes through the partially porous (perforated) wall (Z-2), is sucked into filter (4-c) and returns via return stem (4-b) and discharge (A) back to the tank proper. The pump motor, (4-a), is located above the water level and protrudes into the cover area.

aquarium, (Figure 2) and a curved background panel was designed to shield this equipment from view. By dividing the equipment "room" into various sections, the actual aquarium water could be treated as required, i.e., with ozone (salt water aquariums), heated, filtered, etc. Circulation was to be provided by a centrifugal pump, immersed in one compartment with a controllable output of 200 to 600 gal. per hour. The pump was to take suction through the filter, hence its output would also be influenced by filter density, (Figure 2).

But now to our curved background panel. Finished fiberglass sheets are available in various thicknesses, and at a fairly reasonable price, especially in the thinner sections. A thickness of 1/16 inch is sufficient for our purposes and can be cut to size with a strong pair of scissors, or preferably a pair of tin snips. After securing the pieces in place, they were permanently fastened with fiberglass tape and epoxy resin. Slowly, our aquarium took shape; there were several additional items to be taken care of: first, the front glass. I had this cut from a piece of 3/8 inch plateglass, polished at the top edge. As putty, one could use an epoxy type plastic putty (watch for possible toxic lead-oxide materials!), or, better but more expensive, we may want to use silicone-rubber. Then there are top-glass holders, which I cemented into

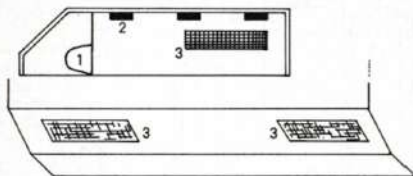


Figure 3: The tank-cover (lid) angles down toward the rear. There are four slots to provide ventilation (1). Three built-in, approx. 3/8 in. thick hardwood cleats (2) are intended for mounting light fixtures and other apparatus. The curved background wall is extended into the cover (1).

place with epoxy.

And finally, the cover. To prevent damage from moisture, I painted its

entirety at the inside with polyester resin. Similarly, the exposed edges of the tank itself, wherever fiberglass and wood joined, were treated with resin to prevent later entrance of (salt) water between fiberglass and wood, which could cause untold problems. To the inside of the top plate of my cover, I mounted three cleats of hardwood which were similarly covered with resin; they were later to be used to mount light fixtures, air pumps and possibly an ozonator (Figure 3), preferably using screws of inert material such as stainless steel. In general, regardless of the provisions described here, it would be better to mount ozonators outside the tank enclosure; the high internal humidity will cause eventual saturation of the atomization chamber, i.e., it will fill with water.

The visible inside walls were painted with colored epoxy paint and, after the paint had become tacky, were covered with fine gravel which adhered and formed a suitable background. This type of treatment is strictly a matter of individual taste and only one of several possibilities. One item should be remembered, however; use an electric epoxy-type paint which will not crack and peel off. The Sears Roebuck Inc. brand is excellent.

Concluding, and considering all the forethought I had expended on this project, I had to pay for my experience; (a) the cover should not be built from material equally as strong as the tank; (b) it must be handled for feeding and maintenance, hence should be constructed as light as possible without sacrificing stability. ●

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Adversaria: continued from page 25

pointed out by Mr. Rokosz in his letter, and this is substantiated by an article in a recent sporting magazine in which a *Clarias* fish fry is described. At least it would have helped if whatever it was that got out of Pandora's Box could have been rolled in cornmeal and deep-fried. *Braz Walker, Waco, Texas.*

The following contribution was received in reference to Robert P. L. Straughan's letter in the March 1969 Adversaria.

Gentlemen:

Mr. Klee's answer to Mr. Straughan regarding the concept of Aquarium Societies acting as a sort of "buyers club" contains some very well-taken points.

As a small businessman, besides being an avid aquarist, I know what a struggle it can be just to survive in business today and can imagine what additional problems an aquarium shop owner must face what with the hazards of maintaining delicate livestock.

However, Mr. Klee's point that "What harms the dealer, harms hobby and hobbyist also" is but one side of a very much two-sided point. It can be said conversely that what harms the hobbyist, harms the dealer also. In other words, never let us forget that the dealer depends on the hobbyist — his continued and hopefully expanding interest.

Which brings me to a point of personal experience. Like most aquarists who get bitten by the "bug", I keep adding new equip-

ment and new species. My desire for new species often in the past outstripped my facilities — mainly tanks. I would many a time wish that some local society could act in the quantity one desires—cost money.

Would such purchasing hurt our local dealer? Quite the contrary. Ask any dealer, he doesn't even stock any huge number of tanks. But, the more tanks a hobbyist sets up the more accessories and replacement parts for them plus all the stock that goes into them must be purchased and usually it is from the handy and trustworthy local dealer.

I would think, in other words, that here is at least one situation in which the dealer would stand to gain from a limited "buyers club" function of a local society. The

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chances, at least in our smaller communities, of the thing getting out of hand are slight. I too would be against a society setting up what amounted to a complete aquarium shop. I hasten to add in putting forth this viewpoint that I am not a member of such a club, know of no such club, and do not plan on starting such a club. Thus, I think that there is no hint of a vested interest involved.

But I wish someone would give it some thought. I for one don't like the fact that out of any hundred dollars sunk into the hobby, \$80.00 goes for tanks, \$19.00 goes for accessories, and \$1.00 is left for stock.

It just doesn't make sense. *Walter P. Driver, Chico, California.*

Editor's Comment: We restate once again, a point made in our March 1969 Adversaria: "On the other hand, should an aquarium organization secure an agreement with a local dealer to purchase livestock and equipment *through him* at a reduced rate, where the basis for the discount is clearly a legitimate one (such as quantity buying, special promotional activities, etc.), then this also is a legitimate function of the organization and should so be recognized". *AJK*

Problems: continued from page 29
have gathered on the bag, remove it with a small net. Repeat the process until the worms have all been caught. It is said that paradise fish will eat these worms.

From: Mrs. Gilbert N. McKee, Baltimore, Md.

I am having a problem getting rid of fish lice in one of my tanks. I have neons and glowlights in it. I have boiled the gravel and left a very strong solution of Potassium Permanganate (0.2 per cent) in the tank for three days and then cleaned the tank with a strong solution of salt but in about two or three months they are back again. I have no plants in the tank and the filter has been cleaned with the same solution used in the tank. They start out looking like pinpoints and then they look like very tiny fleas. Their adult appearance is that of lice. They are clear with black stripes and they swim in circles under a strong light. They are about as big as a pin head at full growth and seem to like to live in the charcoal in the filter and in the gravel. I would appreciate any help you can give me as I am afraid of spreading them into my other tanks.

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They do not seem to bother the fish. **Answer:** In that you have followed all the prescribed methods of ridding a tank of *Argulus foliaceus* or Ostracods (which the creatures you describe might be), we wonder if the creatures are not being re-introduced into your aquarium. If you are using *Daphnia* from a pond or some other type of live food gathered from outdoors, you might find an explanation for their re-appearance. If these creatures are Ostracods, we have known of hobbyists who claim adult guppies will eat them. At any rate, your problem is to discover how these creatures have been re-introduced into your aquarium and, of course, to be sure that the nets you use in this aquarium do not carry strays to your other aquariums. If they are not molesting your fish, you have time to approach your problem in various ways. If you take down the aquarium again, using Potassium Permanganate, as you described in

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your letter, you might discard the filter medium and start with fresh material. It may be that these creatures who like to live in your filter have bred there and your filter medium is permeated with their eggs which may be impervious to a salt solution, etc.
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by the combination of the genetic constitution of the sword species involved. I can understand his excitement for, to Dr. Gordon, it was a clue to understanding the mysteries of the malignant tumors which cause much misery and death in humans.

In the red coral albino swords, I envision a situation similar to Dr. Gordon's red jet swords. It would be an opportunity to study another type of malignant tumor which grows and thrives in unpigmented tissue. The red coral albinos could very well be the laboratory tool that the trained geneticist, histologist, pathologist, and biochemist could use in understanding and probing the mysteries of malignant tissue growth. The findings of these trained researchers *might* even indirectly unlock the door to the mysteries of human cancer and in this way, save many people from the grasp of this dreaded disease.

It is quite unfortunate that such a beautiful swordtail like the red coral albino should have such a fault. But we hobbyists should not put aside this beautiful fish because of it for generally, the malignant tumor does not manifest itself until the fish is about a year old, at which time a high percentage of this strain comes down with this malady. It is perhaps enough to behold its beauty and grace for a year, as for most of us, a whole year's exposure to the red coral albino should be enough to last a lifetime.

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GENETICS OF RED CORAL SWORDTAILS

By JOANNE NORTON

IN THE FALL OF 1967, Glenn Takeshita sent me some red coral swordtails, a strain developed by Franklyn Lau of Hawaii. These swordtails have beautiful clear red color and red eyes. Some individuals are red on the top half of the body, white on the lower half. This red and white color contrast is especially striking when the fish is lighted from the front of the tank. Red coral swordtails produce this red and white type as well as some all-white and some all-red individuals.

At first I did not understand why some red coral swordtails are white on the lower part of the body. Then I noticed that part or all of the white



A male (red and white) red coral swordtail.

area may later become gray in some individuals. One fish (illustrated in this article) even developed a large black area, later a melanoma (a black cancer which in swordtails is hereditary but not contagious). After seeing this black pigmentation in some of the red corals, then I realized that a genetic factor for a black pattern is carried in the red coral strain. Usually an albino swordtail, which has red eyes, does not get black pigment, at least in commercial strains of albino swordtails. However, it has been known for many years that an albino swordtail even may be born with black markings if that swordtail has a genetic factor for a black pattern due to large black pigment cells. The black-marked red coral swordtail illustrated here is genetically an albino, having two doses of the *r* (albino) gene. In this case, expression of the black pattern was due to modifying genes enhancing the effect of the gene for black pattern to the point that the combined influence of these genes counteracted the melanin-inhibiting effect of the genes for albinism.

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A female (red and white) hi-fin red coral swordtail.



A female (red) red coral swordtail.

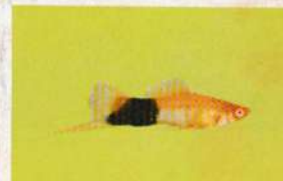
In swordtails, a black pattern on the body may be due to one of several dominant genes that cause production of large black pigment cells. To find out which black pattern is present in red coral swordtails, I put a virgin female unspotted green lyretail sword with a red coral male that was white on the lower half of his body. The offspring from these parents included about 50 percent red with no black pattern and about 50 percent not red but with a black pattern resembling that of a tuxedo swordtail. This black pattern might be due to the dominant gene *N* (*nigra*), or possibly a dominant gene that causes spotting mainly on the lower half of the body. Inheritance of *N* and the gene for spotting would be similar, in that they are alleles. Whichever the gene, it is dominant, sex-linked, and results in a wide black band on the lower part of the body of a swordtail that is not an albino. In a red and white type of red coral swordtail, this same gene causes the lower part of the body to be white. All of the red and white individuals have the dominant black-pattern gene, which for discussion I shall consider to be *N*. A red coral swordtail also has another dominant, sex-linked gene, *R*, which causes red color.

Each swordtail has two sex chromosomes, one from each parent. The red coral male that was crossed with a green female had one sex chromosome with the dominant gene, *N*, and also the recessive gene, *r* (non-red). His other sex chromosome had the recessive gene, + (no black

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A male (red and white) red coral swordtail, with some black pigment.



A red coral male with melanoma.

pattern) and also the dominant gene, *R* (red). Each of his offspring inherited one or the other of these two kinds of chromosomes. So, each one inherited from the red coral male two genes, as a unit, *either N and r*, or else + and *R*. This is the reason that there were no red offspring with the black pattern. For the same reason, there were no non-red offspring without the black pattern.

In red and white coral swordtails, the color pattern is analogous to the red and white pattern of an albino tiger barb. Look at the photo of the black-striped tiger barb. Notice that the albino tiger barb has vertical white stripes in the same places as the black stripes of the ordinary (not albino) tiger barb. In the albino tiger barb, and also in the red and white swordtail, the genetic factors causing albinism inhibit melanin formation and also interfere with red pigmentation in the pattern areas. As a result, both an albino tiger barb and the red and white type of red coral swordtail have white areas in the regions where black would occur in non-albinos. The white vertical stripes of an albino paradise fish may be caused the same way.

Red coral swordtails are not true-breeding. The reason that red and white ones produce some all-red and some all-white as well as some red and white offspring can be explained by the following diagram of the genes carried by the parents, and the possible combinations in the offspring:

75



A normally pigmented tiger barb.

$$\left\{ \begin{array}{l} \text{red and white female} \\ (R+)/(rN) \end{array} \right\} \times \left\{ \begin{array}{l} \text{red and white male} \\ (R+)/(rN) \end{array} \right\}$$

offspring: $(R+)/(R+)$ (all-red)
 $(R+)/(rN)$ (red and white)
 $(rN)/(R+)$ (red and white)
 $(rN)/(rN)$ (all-white)

From the above type of cross, involving two red and white parents, half of the offspring would be red and white, one-fourth would be all-red, and one-fourth would be all-white.

The same proportion, 50 percent red and white offspring, would be produced by a red and white swordtail crossed with an all-red one, but there would be no all-white offspring:

$$\left\{ \begin{array}{l} \text{red and white female} \\ (R+)/(rN) \end{array} \right\} \times \left\{ \begin{array}{l} \text{all-red male} \\ (R+)/(R+) \end{array} \right\}$$

offspring: $(R+)/(R+)$ (all-red), 50 percent
 $(rN)/(R+)$ (red and white), 50 percent

Two all-red parents would produce 100 percent all-red offspring. Two all-white parents would produce 100 percent all-white offspring.

It may seem surprising that 100 percent of the red and white type can be produced from a cross in which neither parent is red and white. Using individuals from the red coral strain, you can get all red and white offspring from a cross of an all-red fish with an all-white one:



An albino tiger barb.

$$\left\{ \begin{array}{l} \text{all-white female} \\ (rN)/(rN) \end{array} \right\} \times \left\{ \begin{array}{l} \text{all-red male} \\ (R+)/(R+) \end{array} \right\}$$

offspring: $(rN)/(R+)$ (red and white), 100 percent

These red and white swordtails, like red and white ones from other types of crosses such as the ones already explained, are not true-breeding.

As stated, red coral swordtails have two types of sex chromosomes, $(R+)$ and (rN) . It is known that gene transfer, by "crossover" from one sex chromosome to another sex chromosome occurs occasionally in swordtails. If this happened in a red coral, resulting in a new gene combination, (RN) or $(r+)$, then different ratios would be possible, including, for example, the following:

- 75 percent red and white, 25 percent all-red
- 75 percent red and white, 25 percent all-white
- 25 percent red and white, 50 percent all-red,
- 25 percent all-white
- 25 percent red and white, 25 percent all-red,
- 50 percent all-white

I have not seen any evidence of a crossover having occurred in my stock of red coral swordtails.

Some of the red and white and also many of the all-white individuals of the red coral strain get cancerous growths, mainly on the rear half of the body. These growths, which may or may not have black pigmentation, occur in those fish having the N gene along with modifying genes that

One of the F-1 generation obtained from a cross between a female green lyretail swordtail and a red and white, red coral swordtail male.



One of the F-1 generation obtained from a cross between a female green swordtail and a red and white coral male. This is the pattern present in red and white, red coral swordtails.

F-1 offspring from a green lyretail swordtail female and red-and-white male of a red coral strain. The same gene that causes this black pattern on the lower half of the body, also causes the white lower part of the body in a red albino swordtail. This fish also has a Guatemala crescent, a large black spot that extends into the tail.



intensify the effect of N . Red and white and all-white individuals of the red coral strain have the N gene. All-red individuals, which do not have the N gene, do not get cancerous growths. A non-albino swordtail with a black pattern due to large black pigment cells may get a melanoma, which can be recognized in its later stages as bumps, eruptions, or fin erosion in the black areas. In an albino having a gene for the same pattern, such as N , cancerous growth may occur in the pattern area even without any black pigment. Such unpigmented growths occur in some all-white or red and white fish of the red coral strain.

I think that some swordtails with red and white bodies would occur in the second generation from a cross of a red tuxedo swordtail with an albino swordtail. Therefore, red coral swordtails probably could be developed again fairly easily.

Red coral swordtails should have about the same care as other swordtails, except that they are much more likely to jump. Therefore, their tank should be completely covered.

It is not often that a new color appears in swordtails. Although the genetic factors that cause the red and white color pattern of the red coral swordtail are not new, swordtails with this color pattern are new to the hobby. The red coral swordtail is beautiful and distinctly different from other swordtails. ●



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by the combination of the genetic constitution of the sword species involved. I can understand his excitement for, to Dr. Gordon, it was a clue to understanding the mysteries of the malignant tumors which cause much misery and death in humans.

In the red coral albino swords, I envision a situation similar to Dr. Gordon's red jet swords. It would be an opportunity to study another type of malignant tumor which grows and thrives in unpigmented tissue. The red coral albinos could very well be the laboratory tool that the trained geneticist, histologist, pathologist, and biochemist could use in understanding and probing the mysteries of malignant tissue growth. The findings of these trained researchers *might* even indirectly unlock the door to the mysteries of human cancer and in this way, save many people from the grasp of this dreaded disease.

It is quite unfortunate that such a beautiful swordtail like the red coral albino should have such a fault. But we hobbyists should not put aside this beautiful fish because of it for generally, the malignant tumor does not manifest itself until the fish is about a year old, at which time a high percentage of this strain comes down with this malady. It is perhaps enough to behold its beauty and grace for a year, as for most of us, a whole year's exposure to the red coral albino should be enough to last a lifetime.

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GENETICS OF RED CORAL SWORDTAILS

By JOANNE NORTON

IN THE FALL OF 1967, Glenn Takeshita sent me some red coral swordtails, a strain developed by Franklyn Lau of Hawaii. These swordtails have beautiful clear red color and red eyes. Some individuals are red on the top half of the body, white on the lower half. This red and white color contrast is especially striking when the fish is lighted from the front of the tank. Red coral swordtails produce this red and white type as well as some all-white and some all-red individuals.

At first I did not understand why some red coral swordtails are white on the lower part of the body. Then I noticed that part or all of the white



A male (red and white) red coral swordtail.

area may later become gray in some individuals. One fish (illustrated in this article) even developed a large black area, later a melanoma (a black cancer which in swordtails is hereditary but not contagious). After seeing this black pigmentation in some of the red corals, then I realized that a genetic factor for a black pattern is carried in the red coral strain. Usually an albino swordtail, which has red eyes, does not get black pigment, at least in commercial strains of albino swordtails. However, it has been known for many years that an albino swordtail even may be born with black markings if that swordtail has a genetic factor for a black pattern due to large black pigment cells. The black-marked red coral swordtail illustrated here is genetically an albino, having two doses of the (albino) gene. In this case, expression of the black pattern was due to modifying genes enhancing the effect of the gene for black pattern to the point that the combined influence of these genes counteracted the melanin-inhibiting effect of the genes for albinism.