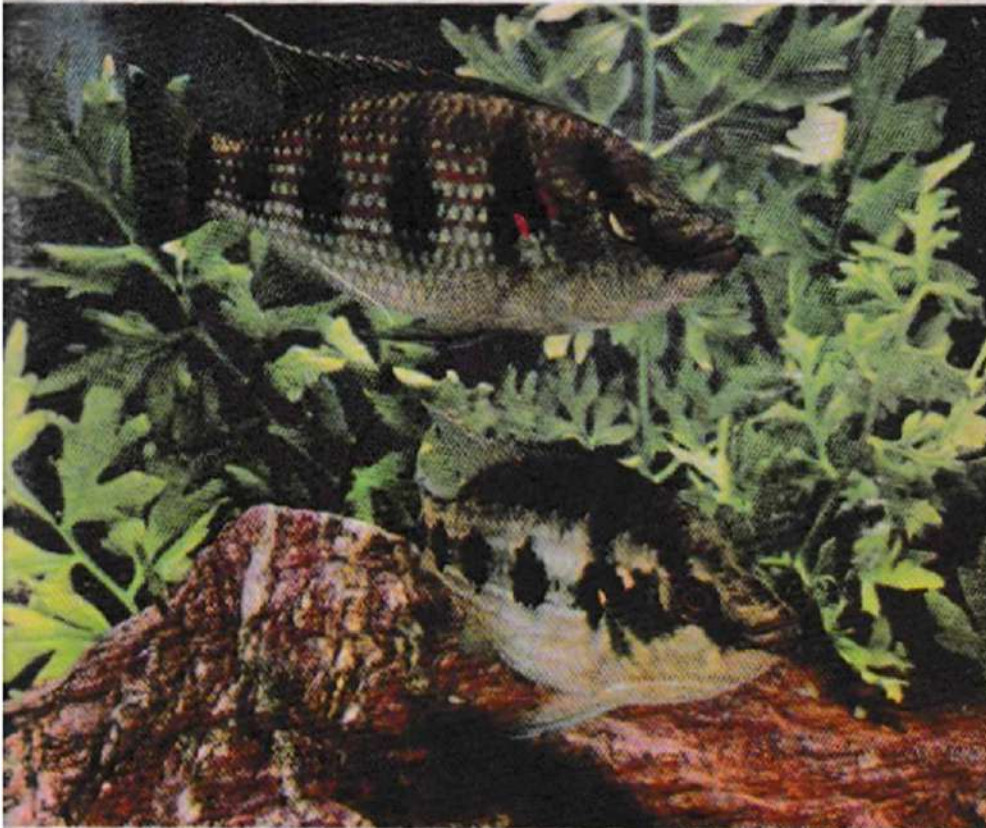


JANUARY, 1968  
VOL. 1 NO. 3

# THE AQUARIUM

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- CABOMBA
- SILVER DOLLARS
- THE CLUTTERGUP
- THE BEAUTIFUL DEVIL



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# THE AQUARIUM

## Contents

SILVER DOLLARS .....	4
THE BEAUTIFUL DEVIL .....	6
CABOMBA .....	8
EDITOR'S LETTER .....	10
SOCIETIES AT WORK .....	14
THIS IS MY PROBLEM .....	20
ADVERSARIA .....	24
ABOUT OUR AUTHORS .....	28
CONDITIONING FISH .....	30
THE CLUTTERGUP .....	38
THE INDIFFERENT EXPLORER .....	42
A HISTORY OF THE AQUARIUM HOBBY IN AMERICA — PART II .....	44

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## On The Cover

This month's cover features Andrey Roth's sparkling photograph of the banded jewel fish, *Hemichromis fasciatus*. For picture-taking aquarists, the photo was taken with a 35mm Nikon F at f18, 1/60th second, using Kodachrome II film. Lens used was Micro-Nikkor Auto 1:3.5 f=55mm.

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# SILVER

# DOLLARS

by BRAZ WALKER



The so-called "SILVER DOLLARS" of the South American characid subfamily, *Serrasalminae* (or *Myliinae*, according to some authorities), could hardly be considered ideal aquarium fishes. They have, however, maintained a quite respectable popularity over the years, in spite of their large size and appetite for aquatic plants. Although there is some controversy over whether they should be considered as a subfamily separate from their ill-reputed relatives, the

"pirayas" or "piranhas", there is a close resemblance and the likeness is more than superficial. The basic difference between the two possible subdivisions is attributable to their respective ways of life and the necessary specialization which developed from similar equipment in order for them to go their separate ways. • It is somewhat of a rarity to find, in fishes, teeth of such individual characteristics that the position formerly occupied in the jaw of the fish

continued on page 31

# The Beautiful Devil

by JERRY CURRIER  
& MARTY SMITH



6



From the 1850's to the 1860's a new and fashionable "fad" was rampant amongst the people of Europe. Although goldfish and certain other cold water species had been maintained in home aquariums for a number of years, this period marked the first real attempts to keep the so-called "tropical" fishes in the home. Because of the general lack of adequate information, and no doubt because the entire thing was a fad, the new "hobby" became a thing of the past. It is now survived only by a few books, most of questionable value in the view of modern knowledge.

That period in history is notable, however, in that it introduced a new and beautiful fish from the Far East to the European and American fancier. In an era that saw the goldfish achieve its maximum popularity, in the west this new arrival was not welcomed, primarily because it had a nasty disposition; the long, flowing fins of the goldfish usually fell victim to the sharp teeth of the stranger. Still, after the decline of general public interest in fishes around 1870, the new fish had its adherents and a few continued on page 72

7



CABOMBA  
CABOMBA  
CABOMBA  
CABOMBA  
CABOMBA  
CABOMBA

By WILLIAM A. TOMEY

For years now, many different species of Cabomba have been cultivated by aquarists. The species usually seen in home aquaria, however, include *Cabomba carolineana* and *Cabomba aquatica*, the former characterized by rather coarsely-divided leaves, the latter by finely-divided leaves. Several years ago a new species of Cabomba was imported into Europe for the first time — the red-colored *Cabomba piahyensis*. This plant has a fairly wide range and generally may be thought of as originating from South America and the West Indies.

*Cabomba piahyensis* is a graceful plant, having much more slender stems than other members of the genus. The color of its leaves varies from bright-green to a light, reddish-brown, and its flowers are of a deep mauve color. The plant does have floating leaves at times and these are lineal, sharply pointed at the ends.

Photographs by the author

continued on page 78



**A THOUGHT FOR THE HOLIDAY**

December is a drab month at best and as though it were a scheme to brighten up the scene, the holidays are slipped in with all their color, gaiety, music, and good fellowship. It is a time set aside for giving and receiving, commercializing and philosophizing, dramatizing and socializing, and once in a while one tries to sort out a meaning from all the jolly confusion. There are a good many words for it like "goodwill", "loving", "giving", and "sharing", but after the bright papers and tinsel are thrown away, and the tree is taken down, these, too, very often are put away for another year.

The word "sharing", incidentally, is often neglected, although when we share, it is allowing some one the use, the enjoyment, or the interest of something we cannot, for one reason or another, completely give away. So "sharing" in a way is "giving" more than actual "giving" is. Very often it is giving of one's self. Dedicated teachers do this every day.

Aquarists have a great deal to share because they have discovered a bright new facet of living that many people know little or nothing about. This is something that can be shared with individuals and groups alike. Almost every day opportunities turn up for this kind of sharing if we are willing to acknowledge and grasp them.

The child next door who wants to know if your guppies have had their babies yet is letting you know that she is interested in the matter you call your hobby. You could open a new door for her as important as any she may have in her whole life. The program chairman who tells you that he is at his wit's end trying to find a speaker for his Golden Age Group is offering you an invitation to share the adventure you enjoy by fishkeeping with a number of people, many of whom may be ripe for a new interest. The hospital or retention home with an empty space in the lobby is an appeal for an object of interest that you and your aquarium society might well supply and maintain.

These, and many more, are invitations for sharing our hobby and if we heed them we can keep the essence of the meaning of the holidays with us, all year round.

H. S.

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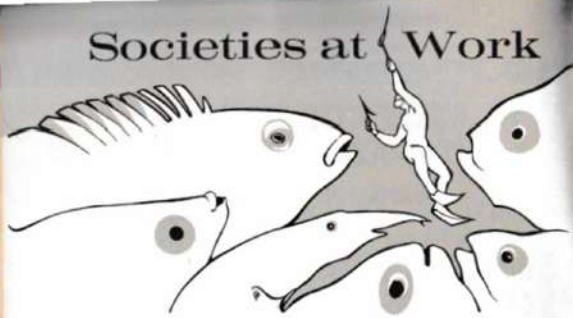
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## Societies at Work



By  
Helen Simkatis

The Winnipeg Aquarium Society held its annual show in conjunction with The Red River Exhibition 1967 in the fall and was received so well that it may well become a fixture to that exhibition which is an annually highlighted event in Winnipeg, Manitoba, Canada. There were 26 tanks from 10 to 75-gallon capacity on display containing the widest variety of species ever seen in this area at one time. The show was judged by members of the Winnipeg Zoological Society, Dr. Anita G. Voss, Dr. R. W. Nero, and Mr. W. B. Tadman. Many new members were added to the Winnipeg Aquarium Society roster as result of the effort.

Reports have come in on the first annual convention of the International Beta Congress (IBC) and indicate the Congress is well on the way to becoming a stimulating and exciting force in the betta fancy. The convention was held during the Labor Day weekend in Waukesha, a suburban town of Milwaukee, Wisconsin, at the Avalon Hotel. The features of the event comprised a show, banquet, two workshop sessions (one presided by George Landis on his fishkeeping methods, the other held by Gene Lucas and Walt Maurus on genetics), a business meeting, and an auction. Gene Lucas, Walt Maurus, and Sharon Chappell judged approximately 175 Bettas. The eight classes were designated Red, Blue, Green, Black, Cambodia, Mixed colors, Solid colors (any), and Females. Many out-of-town fish were shown and interesting enough, one John Gallagher of New York showed up with two specimens as entries and captured two class trophies and a "best of show" trophy. A hospitality room, provided by the Avalon Hotel did much to bring the Betta buffs together to compare notes and make new friends. Stan Smith of Columbus, Ohio, was elected president for the coming year and the next convention will be held in June of 1968 in Columbus, Ohio. Write to Gene A. Lucas, Department of Biology, Drake University, Des Moines, Iowa for information regarding the International Beta Congress. The society is young but it already boasts members from Wisconsin, Texas, Michigan, Ohio, Min-

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nesota, New York, New Jersey, Tennessee, Illinois, Kansas, California, and England and Scotland.

Renford Taylor tells about *Our Beach At Home* in the September issue of *Aqua Focus*, published by the Aquatic Researchers of San Antonio and edited by Leona V. Bradley. Both Author Taylor and his wife are reluctant to leave the beach when their vacation comes to an end and they have discovered three novel ways of capturing the charm of the shore and taking it home with them. First, they maintain a salt-water aquarium which contains a variety of marine animals such as anemones, mollusks, snails, etc. Their second souvenir is a bag or two of sand. The sand is collected where dredging has been going on. When spread on paper and peered at through a microscope, minute shells of every description and color appear. The Taylors recognize some of them as the juveniles of familiar shells and with tweezers they pick out the ones they want to keep and place them in tiny plastic bottles. Last, they bring home the shore with them via their camera and view their favorite haunts, remembering what they found there. This is a charming article and we thank the author for sharing his pleasant days at the shore with us. *Aqua Focus* is published by the Aquatic Researchers of San Antonio and information regarding the bulletin and the society can be had by writing Mrs. Leona V. Bradley, Editor, 301 Blanco Road, San Antonio, Texas 78212.

There is a delightful article in the September issue of *Aqua Jewels* (published by the Aquarium Society of Broward County) by Tina Mann entitled *Eureka, I've Found It*. This is a travelogue piece on Albert Greenberg's Eureka Springs, a gentleman famous for supplying aquatic plants for aquariums as well as fish. Certainly Eureka Springs has been the subject of many an article in aquarium literature before, but Author Mann has caught the essence of the natural beauty of the acreage where Mr. Greenberg carries on his wizardry with plants and fish. She points out the cypress and live oaks garbed in Spanish moss as she takes us through this majestic rain forest and fills us in on the exotic plants Mr. Greenberg has picked up during his wanderings all over the world. We not only see and feel the unusual botanical collection but occasionally we are allowed to taste them, too. Volumes of books could be written on Eureka Springs which is the home of Mr. Greenberg's commercially known Everglades Aquatic Nurseries, but in a short article Tina Mann successfully transports us there. Eureka Springs is on the outskirts of Tampa, Florida, but once in the secluded jungle garden, it is difficult to realize that only a few miles away a thriving city goes about its business with all the urban clamor that is generally associated with a sprawling, thriving seaport. We had the pleasure of visiting Eureka Springs long ago and this piece served as a return ticket. *Aqua Jewels* is published by the Aquarium Society of Broward County and is edited by Tina Mann. Information regarding the publication and the publishing society may be had by writing Aquarium Society of Broward County, P.O. Box 4332, Sunrise Station, Fort Lauderdale, Florida 33304.

The Fancy Guppy Correspond Club was neglected in our November issue through circumstances beyond our control and too complex to go into here. The club has all the indications, however, of serving the guppy fancier in a unique and individual way. Its reason for being, according to George B. McCroskey, Editor of the bulletin the club publishes, and author of many fine articles on guppies, "is to try to make a better understanding between the widely separated specializing fancy guppy hobbyists in and around the

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modern world. We propose to do this by a system of correspondence by letter, recording tapes, and occasional visits when the opportunity arises. We recommend that members take advantage of this widening group to create a better understanding of the problems of breeding and raising better fancy guppies among members. Also, we urge members to attempt to exchange guppy breeding stock by a system of mutual agreement for exchange by the use of the United States Postal Service." On written request and with the enclosure of a self-addressed, stamped envelope, printed instructions on how this may be accomplished may be obtained by writing George B. McCroskey, 1627 Mahala Street, Oregon, Ohio 43616. Those wishing to join The Fancy Guppy Correspond Club should write to Mr. McCroskey also. Dues are \$3 per year and include a list of the current members and a year's subscription to the Newsletter the club publishes bearing the same designation as the club.

Gene Lucas recommends the use of rabbit pellets (a commercially processed food for rabbits) for feeding infusoria in his *An Easier Method of Maintaining and Feeding Infusoria*, appearing in the September issue of *Fish Tales*, published by the Greater Iowa Aquarium Association. This is not only an easy food to handle, he tells us, but it works. He points out that a good infusoria culture does not smell particularly bad and the water to which the protozoa live is usually fairly clear. Holding a culture jar to the light will show clouds of the tiny creatures as small as the dust particles we sometimes see in a shaft of light in a room. He works with quart jars and pours two-thirds of a quart of infusoria into a tank of newly hatched egg-layers such as bettas and finds that about a quart of infusoria a day will keep the babies well fed, and sometimes two quarts are required, depending, of course on the size of the hatch. The commercially processed pellets or rabbit food are composed of vegetable matter that has been crushed and dehydrated. After two-thirds of the water has been poured into the aquarium, the jar is again filled with water and a rabbit pellet or two should be added. Resting cultures can be maintained by removing part of the water from time to time and adding fresh water plus a rabbit pellet. *Fish Tales* is published by the Greater Iowa Aquarium Association and is edited by Larry Arnold. Information regarding the society and its publication may be had by writing Editor Arnold at 1910 60th Street, Des Moines, Iowa 50322.

The November issue of *The Wet Thumb* (published by the Cleveland Aquarium Society) offers a collection of fish food formulae which should be notebook material for those hobbyists who like to prepare their own fare for their specimens. Many novel ingredients are suggested and the originator of the recipes seemed to have in mind the value of protein and vegetation when he created the formulae. Bonnie Ruggles, Historian of the Cleveland Aquarium Society, collected the recipes and gives credit to Herb Platt as the author of them. She tells us that these formulae have been used successfully by various members of C.A.S. Write to Jim Martin, Editor, *The Wet Thumb*, 36158 Hillcrest Drive, Eastlake, Ohio 44094 for information regarding this society and its publication. Single copies of *The Wet Thumb* can be had for 25¢.

A new aquarium association has formed in Gainesville, Texas, called the North Texas Amateur Aquarists. Those interested in obtaining information regarding this new group should write to Fred W. Mosher, President, North Texas Amateur Aquarists. Those interested in securing informa-

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METAFRAME



## THIS IS MY PROBLEM

by HELEN SIMKATIS

From: John Cory, Albany, Georgia  
I am making a report on tropical fish for my biology class. I would appreciate some information or answers to the following questions for my report: (1) Are tropical fish color-blind? (2) Do different water colors affect the behavior of tropical fish? (3) Does a change in temperature affect the behavior and growth of fish? (4) Does a change in the number of plants, rocks, or other fish affect the established fish in an aquarium?

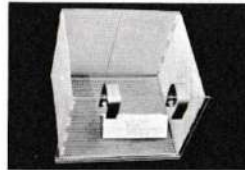
Answer: (1) It has not been proved whether or not tropical fish or any kind of fish are color-blind or at least scientists have not conclusively agreed one way or other. The structure of a fish's eye, from papers we have read on the subject, indicate that fish do see in color. A very large industry is based on the premise that they do. We refer here, of course, to the sporting goods industry which encompasses the manufacture of colorful lures for the use of anglers. Whether the colors are prevalent to attract the fisherman or the fish is another and not unreasonable question. (2) When you ask if different water colors affect the behavior of tropical fish, we assume you mean the color of the water in which they are living. If water is

not clear but shows a tinge of brown, or green, or some other shade, we know that it contains suspended matter of some kind. The nature of the matter may be toxic to fish, or offensive in some way to them, and if either is the case the behavior of the fish will be affected. On the other hand, the suspended matter may be something the fish swimming in it might not mind at all. For instance, goldfish often thrive in water that shows a tinge of green, caused by suspended algae, and, of course, their behavior in such water is quite normal. Some fish live in water that never is exposed to light. These fish must depend on means other than their eyes to find their food. The successful species in such conditions behave normally because darkness is a normal condition to them. A sudden change of color or density does not change the behavior of fish if the cause of the change is something that is not particularly offensive to them. Fish in captivity very often are subjected to water that has been tinted by a dye used as a medication. As these fish are not able to escape the sudden change of density and because it does not particularly offend them, they manage quite well. (3) A change in temperature certainly will affect the behavior



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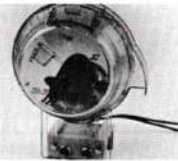
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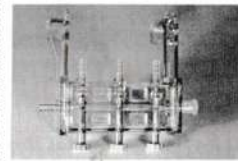
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21



ADVERSARIA is a column of controversy, dedicated to the uninhibited exchange of relevant opinion. Contributions to ADVERSARIA from readers is encouraged. "When a thing ceases to be a subject of controversy, it ceases to be a subject of interest". William Hazlitt.

DURING THE SPRING/SUMMER of 1967, Mr. Frank Dayes of the SAN DIEGO TROPICAL FISH SOCIETY, writing in that organization's official publication, *THE TROPICAL BREEZE*, engaged in a spiritedly debate with the Editor of this magazine. The subject was the genetics of the delta-tail guppy and, in particular, an article on this subject published in *THE AQUARIUM* some years ago (see Klee, Albert J., "The Genetics of the Delta-tail Guppy", November 1964, pgs. 11-14) which was reconsidered in a recently published booklet on guppies. The article in question concerned itself with the mechanism of the predominant genes affecting the production of broad-tailed guppies such as delta-tail strains. In short, the article stated that the basic structure of delta-tail inheritance involved two genes: one X-linked, the other Y-linked (*Cp* and *Ds*, respectively). Mr. Dayes' preliminary objections were stated as follows:

"It's all so very simple in the articles published on delta-tail guppy genetics—no testing in any depth—just obtain a male with the *Cp-Ds* genetic makeup, cross with a *Ch-Cp* and AWAY YOU GO, cranking out choice delta-tail gups (no sweat!). After beating my brains out for the last few years to try to come up with

a strain that would throw a fair percentage of choice delta-tails, it is rather deflating to read how simple it really is.

Just what is *Ds*—where did it come from? What proof exists that a delta-tail guppy must be derived from a double sword? I have never had a double sword or even a single one in any of the several strains I have worked with. Is there even one good double sword strain in this country? If so, how did this blood line get spread out to result in the delta-tail guppies? What does *Cp* mean?; merely that color exists in a guppy's tail. Now that sure is a big deal as about every improved strain of guppy carries some color in its tail.

What I don't understand, for example, is the positive statement that "there are no genes for delta-tails". How can this be stated in the limited tests and strains examined? Admittedly, many genes are involved in the production of delta-tail guppies. Who can possibly make the absolute statement that a particular characteristic is a recessive or a dominant in all the trains of guppies in the world? Whenever a mutation occurs there is then the possibility of its being a recessive or a dominant in that strain or, for example, another strain crossed with it.



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24

In no way do I want to imply that I feel that work on genetics is not important. I agree that it is the practical approach to a breeding program. I do object, however, to positive conclusions based on limited tests.

It would seem to me that the trend is to rather oversimplify the genetic makeup of a deltatail guppy. In comparison with other species of fish the man-made fancy guppy is much more complex. In our striving to obtain certain standards, we add complication after complication. Breeders of other species of fish are more or less satisfied to produce a good-looking specimen of the same shape and color—but not the guppyist. Oh, no! We are concerned with body size, carriage, and on and on and on. The list is flabbergasting.

My uneducated guess is that this makes a genetic nightmare and while more or less simple rules of genetics apply, we just cannot assume that the various strains of guppy genes will react in the identical manner. Nor can we be certain what genes are blocked by other genes and consequently do not show up with a given mating with another guppy strain."

Mr. Dayes continued his critique in the form of a number of specific questions:

- 1) How do you justify your postulate that a deltatail guppy is genetically  $XCp-YDs$ ? Would you please explain why a DTG (deltatail guppy) must carry the double sword gene? Your saying so is hardly convincing proof. Mr. Hahnel has, for many years in his writings, mentioned that when any type of swordtail showed up in a strain it was immediately discarded. Undoubtedly many of the English deltatail guppies have double sword blood but I cannot see how that must apply to all of our American strains.
- 2) Can you cite an American deltatail breeder who has purposely used a double swordtail in his strain?
- 3) If it is not classified top secret,

why did you not describe the female strain mated to the Paul Hahnel male?  $XCh-XCh$  is hardly an explanatory description for those who do not have the divine guidance or a crystal ball.

4) Why did you elect to use the  $XCh-XCh$  female in your original cross? Obviously this female strain must have been from a swordtail one as it would be preposterous for a well-established strain such as Mr. Hahnel's to throw the reported number of swordtails. Perhaps the most remarkable fact in your test is that you obtained either double swords or deltatail males. Amazingly, you never obtained any single swords, narrow veiltails, wide veiltails, or broadtails—only deltas. How can this possibly be explained as I doubt that even the original male was a deltatail?

5) You state the male guppy was Mr. Hahnel's strain. Does that mean that the male was obtained from Mr. Hahnel or was it obtained from a breeder who supposedly had Mr. Hahnel's strain?

6) If, as you say,  $XCp-XCp$  is of such great importance, how do you explain your omission of a test cross of  $XCp-YDs$  crossed to a female  $XCp-XCp$ ?

7) Just how did your very limited test prove that, and I quote: "THERE ARE NO GENES FOR DELTATAILS"? Do you consider Mr. Hahnel's strain representative of all the deltatail guppy strains in the world? Perhaps your conclusions might have made some sense if you had admitted that due to the limited scope of your tests, the broadtail and deltatail characteristics were dependent on recessive genes which you were unable to identify, but you make the unequivocal statement that there are no genes for deltatail in the guppy. That seems to be a very positive statement, Mr. Klee. Are you not taking the stand that because one

continued on page 67

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## ABOUT OUR AUTHORS



GERALD F. CURRIER

Born 30 years ago in Wyoming, Jerry Currier moved to Oklahoma at the age of seven. This was only the beginning of his travels since he has since lived in Florida, Mississippi, Louisiana, Texas, New Mexico, Kansas, Nebraska, North Dakota, Utah and now California! Trained as a photographer in the Air Force, Jerry worked in that profession for several years. In 1963 he quit the photography field to become buyer and inventory controller for a large ship's chandler in San Francisco.

Together with Marty Smith (see below), he keeps more than 50 aquariums and is particularly interested in the more difficult to spawn characins. Jerry has co-authored with Marty Smith articles which have appeared in *THE AQUARIUM*, *AQUARIUM JOURNAL* and other aquarium magazines. He is presently Executive Editor of *ANCHOR*, the journal of the SAN FRANCISCO AQUARIUM SOCIETY, a club publication which he helped to found. Further, he serves as an ex-officio member of that organization's Board of Directors. Aside from his interest in fishes, he also enjoys woodworking, photography and gardening.



CLEVELAND M. SMITH

Marty, as his friends call him, was born in Utah in 1936, and attended business college in Salt Lake City where he majored in accounting and stenography. After graduation he became manager for a chain of restaurants, and taught dancing in his own studio. After service in the U.S. Army and some further experience with his dance studio, Marty moved to San Francisco where he took his present position as accountant with a construction company where he is presently employed.

His principal interest is in breeding bettas and other egglayers, principally characins. He maintains, with Jerry Currier, over 50 aquariums. Elected to the SAN FRANCISCO AQUARIUM SOCIETY Board of Directors in 1966, he holds positions on various committees. He is Managing Editor of *ANCHOR*, the publication he helped start with Mr. Currier, and has published articles extensively in the aquarium literature.

The winner of many awards for his fishes, Marty can display some 50 or more trophies and ribbons that he has won in various competitions. His other pastimes include gardening and cooking. He particularly enjoys

"exotic" recipes and quite often surprises guests with his new food ideas.



ROY VAIL

Born about 30 years ago in Columbus, Indiana, Roy Vail was a bona fide "Hoosier" for many years until he became interested in cactus plants. In 1954 he talked his family into a vacation in Arizona and New Mexico, and after his freshman year in Earlham College (where he majored in biology) he returned to

Phoenix to work the summer at the Desert Botanical Garden. During his school years he wrote for cactus hobby publications as well. After graduation he came to New Mexico to do graduate work in biology at the New Mexico Highlands University in Las Vegas. Presently he teaches biology in Las Cruces High School where he is now in his sixth year.

While at New Mexico Highlands University, Roy met his wife-to-be, Mrs. Vail had an aquarium and to add to that, Roy became interested in the high school's own aquaria. Need we say more? About four years ago, finding that the local sources of fishes and equipment were inadequate, he opened a fish store as a sort of second hobby. Since then it has grown to over 2,300 gallons aquarium capacity, but it remains a hobby. It seems that although Roy Vail started with cacti, it was fish he finally became "stuck" on!

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# CONDITIONING FISH

by ROY VAIL

THERE IS VERY MUCH incomplete advice given about conditioning fish. The most common is, unfortunately, printed on nearly every brand of plastic bag available to dealers. Because of this, better dealers will take the time to explain proper conditioning methods to each customer who buys fish. If the customer does not receive advice from his dealer, or on the plastic bag, he is apt to read one of the typical beginner's booklets which usually gives the same sermon that might have been on the plastic bag, i.e., to float the bag with the fish in it in his aquarium a certain number of minutes, then dump the fish out, or let them swim out into the aquarium.

When you change fish from one aquarium to another, you are asking them to do at least two things. The first is to adjust to new aquarium surroundings, which you hope they can do on their own. The second is to adjust to a different water, which you must help them do. In order to do this you must have an understanding of what the differences in the waters may be. Generally there are four things that may differ: temperature, hardness, pH, and assorted unknowns.

Temperature is obvious and can be easily measured but hardness, pH, and assorted unknowns are not as easy. Hardness is mostly the amount of calcium and magnesium in the water. Soft water has little and forms soap suds easily. Hard water has more and requires much soap to form suds. The pH is a measurement of the number of hydrogen ions. It can range from alkaline, with few hydrogen ions (like an Alka-seltzer), to acid with many hydrogen ions (like vinegar or battery acid). Assorted unknowns are various other things which cause one aquarium's water to be different from another (such as iron). Many of these can be measured but few people bother to do so.

When transferring fish from one aquarium to another, the prime concern should be to put them into the aquarium water and surroundings that will be best for them. This requires that you *know your fish before you buy them*, rather than buying on impulse and finding out about them the hard way. Knowing what is best may not be possible with all fish, since one finds there is as much bad advice given in this area as there is in the area of conditioning. But you can try. If nothing is found, you may duplicate the water conditions they are already in, if they are doing well; otherwise you must proceed at your own risk.

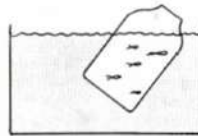
Now to the problem of conditioning fish to new water. If you take the plastic bag the fish are in and float it in the new aquarium for a period of time, this gradually changes the temperature of the water the

30

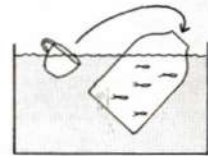
fish are in to the temperature of the aquarium water should there be any difference. However, any differences there are in hardness, pH, and assorted unknowns, are still there. Obviously, the only method which can allow the fish to adjust to *all* the differences in the waters, is to gradually mix the water they are in with water from the aquarium into which they are going.

This can be done in a variety of ways. Float the plastic bag, as advised before, but in addition, occasionally add small amounts of water from the aquarium until the fish are in mostly the new aquarium water before releasing them. This requires opening the bag but it will still float if the open end is draped over the edge of the aquarium. Or, put the fish into a separate container and gradually add the new water to it. In either case, the object is the same.

How much time should this type of conditioning require? This depends upon how much difference you think there is between the two waters. The more difference, the longer it should take. If you condition for a long period of time you may have to aerate the conditioning container. You will also find that if the water the fish are already in is fouled, the best thing to do is aerate, condition normally, and then net the fish and put them into the aquarium without any of their old water. Normally, the old water would be added.



A



B

The procedure in "A" minimizes thermal shock to the fish but not chemical shock, i.e., sudden changes in pH, hardness, conductivity, etc. Procedure "B", wherein small amounts of tank water are added to the floating container over a period of 20 to 30 minutes, minimizes not only thermal shock but chemical shock as well. Procedure "B" is recommended for all delicate fishes.

31

The ironical thing about dealers who allow their customers to follow the conditioning advice which advises only to float the bag the fish are in is that few of them use that method themselves. Without conditioning his newly-received fish by mixing their water gradually with his own, the dealer's losses are too great. The dealer also finds that in order to avoid trouble with disease, he should keep newly-received fish for an acclimation period of about three weeks. Ten days is often mentioned as the ideal acclimation period but experience shows that it takes about ten days for ick to develop if the fish were subjected to a chill or some other sudden change just before they were received. To the customer this means that if he cannot find out how long his dealer has had the fish he wants, he had better wait and buy them when he is sure they are well acclimated.

About two years ago, I had some angelfish in a forty-gallon aquarium that belonged to my wife. The aquarium was well planted, had an under-gravel filter, and the angelfish had reached a nice size in it. But when I got my own forty-five gallon aquarium, I was told in no uncertain terms to move my angelfish into it! Late one evening, when the pressure for me to get my angelfish moved was rather high, I just took them out and plopped them into the new aquarium without any conditioning. My aquarium was not yet planted but had aged water in it and several inside box filters. Despite all that I could do, the angelfish all died within twenty-four hours. Since then, I condition fish carefully, even when moving them from my own aquaria.

There are, occasionally, exceptions to the rule. In the fall of 1966 I obtained a new room to use for my fish. After eight weeks of work, I was ready to do the moving. My problem was to move nearly all the fish stock I had into a new room with new aquaria. I chose to move both the fish and their water, doing so by personally carrying about three-fourths of each aquarium's water to the new aquarium, then catching the fish, carrying them to the new aquarium, and filling the old aquarium with raw water from the hose. Now and then a fish would be left behind in one of the old aquaria, get the raw water put in on them, and remain there. The raw water was chlorinated and so cold that it caused condensation on the outside of the aquaria. Not one fish that received such a treatment died! There were, however, only three platys and one albino *Pristella*.

Generally, do what the good dealers do. Know your fish before you buy them and be ready for their arrival. Buy only fish that have been fully acclimated. Condition fish carefully upon arrival by gradually mixing their water with that in the aquarium where they are to live. Condition also when moving fish among your own aquaria. Do not put fouled water into your aquaria, but condition fish that arrive in it. Give your fish every chance you can to *live!*

32



A young piranha, probably of the genus *Serrasalminus*.

## WALKER

from page 5

can often be determined from a single tooth. Such individualistic dentition is found in the silver dollars and their relatives, although closely similar species have such nearly identical bridgework that species identification from a tooth is almost impossible in most cases.

Few aquarists have at least acquainted with verbal descriptions of the formidable jaws of piranhas, whose teeth can clip flesh from a living creature with the same ease that our own bite through a piece of angel-food cake. The non-piranha group, which are considered by some to be a separate subfamily (the Mylinae), on the other hand, have teeth which are certainly as specialized in their own fashion but for dining instead on algae, aquatic plants and even on fruit which occasionally falls into the water. These fishes are not necessarily strict vegetarians; they are simply equipped in most cases to lead an omnivorous existence with a leaning toward tender vegetation, while their piranha cousins lead lives of ruthless and destructive predation.

Many aquarists have a habit of leaping before looking and since the first reasonably popular "silver dollars" were *Metynnis* species, the name stuck and is still being hung by some dealers and hobbyists on every disc-shaped, silvery fish which doesn't possess a wicked set of dentures. Falling from time to time into this unfortunate category are the beautiful and increasingly available *Myloplus* (included as *Myleus* by some authorities) species. Popularly, several of these are known as "redhook *Metynnis*" or, simply as "redhook" which is more appropriate. In the redhooks, the anal fin is greatly prolonged and is sickle-shaped in females and usually bilobed in the case of males.

*Myloplus rubripinnis* seems to be the exception to the rule, since

33





*Mylossoma argenteum.* (Fish by courtesy of Dade County Fisheries)



*Metynnis schreimulleri.* (Fish by courtesy of Dade County Fisheries)



*Mylossoma stethaprion.* Photo by Wolfsheimer



*Metynnis schreimulleri.*  
(Fish courtesy of Dade County Fisheries)

*Mylossoma dariventris.*  
Photo by Wolfsheimer



The redhook metynnis,  
*Myloplus rubripinnis.*



photograph by the author.

(Right) *Rooseveltiella nattereri*, the red or Natterer's piranha. (Wolfsheimer)



(Below) *Serrasalmus rhombus*, the white or spotted piranha. Upper photo shows the deadly teeth common to all piranhas.



male and female alike have the sickle-shaped anal. As the name would indicate, the hook-like fin is bright-red in color (*rubripinnis*—"red fin") and is trimmed with a narrow black border. The tiny scales give this fish the appearance of polished sterling from the proper angle, and the dorsal is long-based and rather large. There seems scarcely room for the little adipose between the caudal (tail) and the last ray of the dorsal fin.

Several fishes in this group, including this one, seem to use their oversize dorsal and anal fins as a sort of propulsive system in a manner similar to the scats and puffers but with less efficiency. The posterior edges of the fins are moved from side to side in a paddling motion and the fish will, at times, be seen gliding across the aquarium while apparently making little effort to do so.

As with the more common *Metynnis* and *Mylossoma* species, redhooks will eat almost any of the ordinary fish staples including brine shrimp, beef heart, dried foods or oatmeal-based foods. Because of their at least partially-vegetarian nature, celery tops, carrot tops, spinach or other vegetable foods such as alfalfa should be used also.

*Myloplus rubripinnis* has somewhat more depth of body than length when the caudal fin and head are excluded. While some species can be rather easily sexed when mature by the bilobed anal fin of the male and sickle-shaped anal of the female, Eigenmann states that in all specimens of *M. rubripinnis* that he examined, the anal was invariably falcate (i.e., sickle-shaped).

Although care of *Myloplus* species is not difficult, they seem less sturdy than *Metynnis* and *Mylossoma*. Like many silvery, small-scaled species, they are more susceptible to Ich than some fishes. Water that has taken on a yellowish or brownish tinge and which not so long ago was considered ideal for most rain-forest fishes, seems to retard the appetites of redhooks as well as a number of others. In my experience, frequent partial changes of water are desirable for most fishes, especially if they become listless and do not eat with the enthusiasm they once had.

South America's seemingly endless parade of characoid fishes has something to offer almost every aquarium enthusiast for, somewhere between the diminutive delicacy of *Nannostomus marginatus* and bulky gluttons like *Colossoma*, there is a fish of outstanding beauty which will enhance any aquarium. For those equipped to handle larger species, perhaps *Myloplus rubripinnis* is that fish.

AUTHOR'S NOTE: The words "characoid" and "characid" refer respectively to the Suborder Characoidei which includes several families, and the Family Characidae which includes those fishes commonly referred to as "characins". There are differences of opinion among authorities as to whether the "piranhas" and "non-piranhas" should constitute two separate subfamilies, Serrasalminae and Mylinae, or whether both should be included under the single subfamily, Serrasalminae.



FISH CHARTERIST — RAINBOW CLUPE

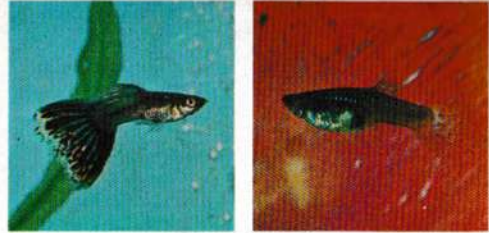
## THE CLUTTERGUP

by JIM KELLY

**I**S YOUR FISH HOUSE CLUTTERED UP with equipment you don't need, or claptrap that will be fixed the minute you get the chance? Then brother, you are just like thousands of us "others" but that isn't what I mean by "Cluttered up." He is the guppy breeder that needs oodles of equipment, endless rows of tanks and a bank balance comparable to Henry Ford before he can even contemplate the business of producing good gups.

In pre-hysterical times, our ancestors lived by hunting and fishing; they dressed their wives in furs and their belongings were the sum total of what they could carry. To-day we, their modern counterparts, work like mad most of the year just so we can spend a few weeks "rest" or vacation, hunting and fishing and, if we work hard enough, we just might get our wives a fur coat. In the attempt to keep up with the Jones's, our lives have become cluttered with possessions.

This tendency towards personal ownership has rubbed off onto our hobby, and guppymanship in some parts of the globe is actually measured by the number of tanks a man owns. The beginner to the hobby, introduced to fishkeeping at a show, is lulled into a false sense of security—he sees the guppies displayed in simple drum bowls and convinces himself



Male and female gups, not of the "Cluttergup" variety.

he won't need much for a start. Then, at the end of the day's activities, he listens to the dollars and cents being made in the auction and his mind boggles at the thought. He is gripped by the "fever."

Being a sensible sort of chap (and what guppy breeder isn't?), he decides to visit a few set-ups and chat with a few of the more experienced showmen before starting. As the Immortal Bard so aptly put it: "Aye, there's the rub!" Just to breed one strain he needs this, that and the other, and the friend's glib assurances that it is all a good investment does ease his twinging conscience or his pocket book. He comes away from their wonderful set-ups feeling as comfortable as you would be after a drive down five miles of bad Irish country road!

But seriously, this need for tons of equipment is a load of old rubbish and I defy the pundits to prove me wrong. Despite the critics, one can produce good fish in limited quantity with just the simplest of equipment and I intend to show how.

Shortly after the last war I found myself in Germany with the R.A.F. in charge of a camp concert. It seems the C.O. had found out I had done some amateur theatricals in my blissful civvy street days and visualizing me as Gütersloh's answer to Noel Coward, ordered me to entertain. What happened at that show was a riot and would make a book in itself; sufficient for this story that the backcloth on the make-shift stage was painted in cartoon fashion by one of my "Volunteers." He had done his work so well that everybody from the C.O. down to the bod who swept up, wanted a photograph of it.

We had a military photographer with us at the time and he descended upon us with equipment galore; photo meters, floodlights, cameras by the dozen, all to take one picture of one tiny backcloth. During this very professional performance, a friend of mine from the Squadron walked to the front of the stage and with no more to-do than

continued on page 62  
39



Photo by Wolfshiemer

## THE INDIFFERENT EXPLORER

by RICHARD C. HARRISON

**M**ANY AQUARIUM FISHES SEEM TO DELIGHT in providing surprises for their observers. We hope our highly individualistic *Leporinus* doesn't have too many more tricks to reveal. The latest? An hour after being transferred to a twenty-gallon tank, it jumped through a tight aluminum foil cover, tearing a hole a foot long in it before sliding back into the water, looking for all the world as if it hadn't really wanted to go for a walk at all.

Though I'm not positive of the identification or the sex of this fish, it corresponds closely to descriptions of *Leporinus frederici* and I will use this since it evokes an image of the fish in the minds of many hobbyists. This fish has been circulating in our "spare" tanks for nearly two years and has had no special attention. Neither has it been observed very closely until the last few weeks. The reason for the apparent neglect is simple. We keep a number of rough fish in these tanks with little in the way of quarantine for the "monsters." The *Leporinus* was culled from a batch of nondescript tetras transhipped by way of Florida, and its chances of survival were slim under the given conditions.

At first, seen among dozens of silvery fish, it seemed to be more rotund and to prefer a head-down trim. As many fish people would do, we simply tucked it away to see what, if anything, it might grow up to be. It was a lucky catch!

A couple of weeks ago the fish was moved to a large tank in the

living room, and thus came under close daily observation. We now know that we have another monster on our hands. Live plants were quickly uprooted and shredded, but not eaten, by this fast-moving torpedo. Though fed on high-protein vegetable diets it showed no desire to eat the plants. It simply objected to their presence. Well-anchored artificial plants and small stones were rearranged to suit the whim of the fish. Of course, he has grown from 1.25 inches to just under seven inches, with a body depth of more than 1.5 inches.

The scales are large and domed, reflecting a brassy-gray hue, each clearly outlined in grayish-black. The color is more pronounced above the midline. A black line at the midline begins below the fourth or fifth dorsal ray and reaches within one scale of the caudal fin. The pupil is purplish-black with no other color at the eye. All of the fins show bright-yellow at the body, fading but extending to the tips. The dorsal is quite high and the fins are well-formed in the classic *Leporinus* pattern.

Referring to diet again, this *Leporinus* is quite content with a prepared vegetable food. This is a green pellet food fortified with vitamins and minerals, and is sold as a supplement for foals and ponies. The pellets sink immediately, and although a few of the fish eat them whole, the *Leporinus* waits until they are softened and it is the last to feed. It has a small, hard, subterminal mouth and seems to be well adapted to foraging over stones and driftwood. It has long since abandoned its headstanding attitude.

His tankmates are large *Mylossoma* and six-inch *Ictalurus melas*. Since the fish were moved to their present tank, all but the *Leporinus* show signs of battle, even the young bullhead cats. Our fish is plainly a bully. Most of its rugged conduct could be traced to mixed company and minimal care in captivity. This isn't meant to imply that ours is an unpleasant fish to keep. One must simply be prepared to install it in a tank complete with filter, gravel, and ornaments, and let it arrange things to its own satisfaction. Once the fish and its people are adjusted to this strange aquatic discipline, the large *Leporinus* makes itself at home and puts on a very entertaining show. As a result of our experience in moving "The Explorer," we heartily recommend a cover which is both heavy and tight.

EDITOR'S NOTE: This article was written while Dick Harrison was Curator of the Aquarium of the San Antonio Zoo. The techniques described, therefore, are those usually used by the public aquaria. A reasonable pronunciation for *Leporinus frederici* is LEP-OH-RYE'-NUS FRED'-DER-RICK-EYE (we agree with his identification). The *Ictalurus melas* referred to by Mr. Harrison is none other than the black bullhead, a domestic catfish reaching a length of about 18 inches, found from New York and North Dakota to Texas. In general, aquarists

continued on page 66

PART II  
**A HISTORY OF THE  
 AQUARIUM HOBBY  
 IN AMERICA**

By ALBERT J. KLEE

**T**HE MOST ACCOMPLISHED AQUARIUM writer of the early days in our hobby was Robert A. West, of Georgetown, later of New York City. Damon himself said of West that he was: "... the most devoted lover of aquarial science that I have ever met. On his practical wisdom and counsel I could always rely."

West was probably the first one to correctly describe the spawning of sticklebacks in the aquarium. Further, he was the first aquarist, English or American, to write much in detail concerning freshwater aquaria. Due to the interesting habits and bizarre forms of the marine invertebrates, the marine tank was far more fascinating to the public than was the freshwater tank.

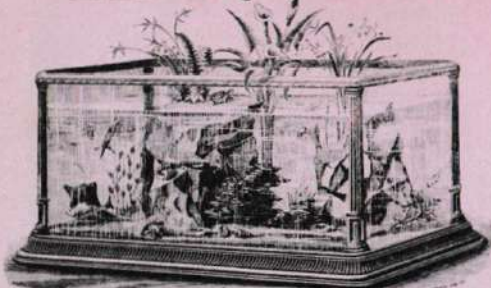
The early 1860's were the days when an aquarist was not an aquarist but an "aquarianist". A typical commercial tank (a number of fabricators of iron went into the aquarium business) was 24 inches long, 18 inches wide and 14 inches deep. The base was of slate as often were the ends. Such a tank was held together by torsion bars, pressing the glass against the slate in a matrix of aquarium cement. However, all sorts of glass containers were utilized for aquaria including bell-glasses, confectioner's jars, tumblers and goblets. The aquarium equipment of the day was simple and there wasn't much of it; a length of rubber tubing for siphoning, a length of glass tubing used as a rudimentary dip tube, a pair of wooden forceps, a sponge stick for cleaning, a syringe for aerating the water by hand, and a few nets made from mosquito netting. If the water in a tank went bad, a frequently-used remedy was to put the water (including its fishes) into shallow pans for 2 or 3 days, thus allowing the water to purify itself via natural oxygenation. About this time also, Boston's Cutting invented and patented an aerator made of glass and rubber tubing. The principle was similar to the gasometer or old-fashioned gas storage tanks of some years ago. Suppose, for example, that you invert a tumbler over a pot of water. The air inside is, of course, trapped but if a hole were drilled in the end of the tumbler and a piece of tubing inserted to lead the air off into an aquarium, gravity would force the air out of the tumbler to the aquarium. This, then, was the principle of Cutting's aerator.

With regard to the fishes kept in the aquarium of 1864, we quote West directly: "In stocking a 'river garden' with fishes, two things *must* be borne in mind—they must not be too large, and they must not be too numerous. The losing sight of these two facts, or either of them is fatal to the success of the aquarium, especially with regard to size. Large



A very popular aquarium of the 1870's was the fountain-pedestal type. The fish were actually kept in running water in this type of aquarium.

**A GALLERY OF  
 EARLY AQUARIUMS**

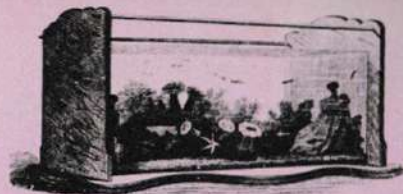


Window Aquaria, about 1875.

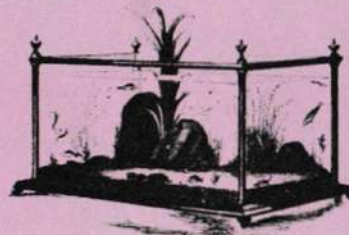
Arched Aquarium, about 1875.



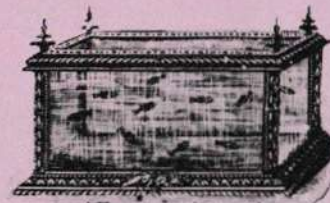
Table Aquarium, about 1875.



A marine tank of the 1860's. Marine tanks of the day mostly housed invertebrates. They were of greater interest than the drab cold water marine fish then accessible to the hobbyist.



A freshwater tank of the 1860's. The native plants were often allowed to grow above the water's surface. Note the ornate treatment of the tank corners and the built-in legs.



A rectangular tank of the 1870's. Note the spires on the corners, and the ornate, curved base.

fishes consume more oxygen than this artificial pond can supply. Three inches should be the extreme length of any admitted into a moderately sized aquarium. Small goldfish, from their capacity to bear a high temperature, and no less for their beauty and the variety of their markings, will be the first choice of an aquarist. But they grow rapidly, if healthy and properly fed, and must, therefore, sooner or later be parted with—a grievous trial when one has loved and petted them. The minnow (*Fundulus heteroclitus*), lively and full of frolic, yet easily tamed; the common shiner (*Notemigonus crysoleucas*), a very handsome fish; the yellow perch (*Perca flavescens*) when, and only when, quite small; the sun fish (*Lepomis gibbosus*), also only when quite small for when well grown he will worry and torment to death the smaller fish; the pigmy dace (*Umbra pygmaea*), a beautiful little fish, not more than an inch and a half long; the black-nosed dace (*Rhinichthys atratulus*), a beautiful little fish common to all our brooks, and distinguished by a black band running from the nose down each side and dividing very definitely the silvery abdomen from the olive brown back, as happy in the aquarium as a fish can be anywhere; the common sucker (*Catostomus commersonii*), when quite small; and the tessellated darter (*Percina copelandi*), may all, or some of them, according to the size of the tank, be brought together in peace and harmony, and will afford a sufficient variety of animated nature." (Editor's Note: The preceding is verbatim except that the scientific names have been corrected to present-day usage; the popular names that West uses have not, however, been corrected.)

In the spring of 1860, West procured some sticklebacks (*Gasterosteus*), placing a pair into an aquarium. The male, using bits of hair algae and stems of *Nitella*, constructed a nest. As West relates: "The madam now acted with proverbial female coquetry and waywardness, and led her imperious spouse a chase, a dozen or twenty times around the aquarium, avoiding the nest as obstinately as she had before eagerly sought it". The fish consequently bred and West obtained about 200 fry. Prior to this, the several references to the breeding of sticklebacks alluded to the care of the fry by the "female" fish. Even the noted English aquarist, Dr. Lankester, fell into this error, publishing with his endorsement, a communication from a correspondent who describes "the mother fish" as "continuing her attendance at the nest as long as any of the young fry were left". With perhaps tongue in cheek West remarked, "As the correspondent was a woman, the mistake was a natural one". We should point out, however, that women figured very prominently in the early days of the hobby for it was they who took the painstaking care and who had the patience necessary for the keeping of fish. On more than one occasion, male "experts" referred for practical details to the experiences of women aquarists.

Because of the ready availability of strange and curious marine invertebrates along our eastern shores, the marine aquarium was far more popu-

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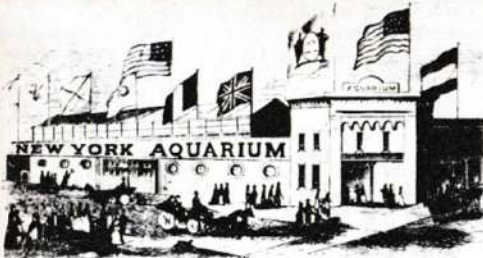
If you care to own and train small SHARKS OR MORAY EELS, we have those also. By the way, they make excellent pets and are easy to keep.

Oops—We nearly forgot to mention our long list of invertebrates.

Won't you drop us a line? We shall be looking forward to hearing from you.

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An artist's sketch of the New York Aquarium, located at the corner of 35th Street and Broadway, as it looked in 1876.

lar than the freshwater aquarium, as we have already suggested. Oddly enough, artificial sea water was frequently used as it was free of undesirable materials. The following formula of Gosse's was widely used:

Common table salt	81 parts
Epsom salts	7 parts
Chloride of magnesium	10 parts
Chloride of potassium	2 parts

When enough water was added to bring the specific gravity between 1.026 and 1.028, one pound of this formula made almost 3 gallons of sea water.

Sea lettuce (*Ulva*) was a staple in such tanks. As for animals, these included anemones of all sorts (up to 10 or so species of *Actina* alone), *Serpula*, hermit crabs (3 species), fiddler and other crabs, and molluscs of all sorts. As for fishes, we hesitate to alienate marine aquarists, but here is what West had to say: "It is unnecessary to enumerate the fishes suitable for a marine aquarium, since they are quite secondary to the many other curious and interesting objects which the sea supplies. If these are desired, however, and the tank be large enough to admit of their being added to the stock of zoophytes, crustacea, etc., nothing can well be more ornamental than the stickleback, which lives and breeds full as well in salt water as in fresh; but they, or indeed, any fish, will drive the shrimps into hiding places, annoy to some extent the anemones, and make havoc with the molluscs. A harmless and exceedingly beautiful fish for the marine aquarium is the sand-smelt (*Menidia menidia*—Editor's note: Name corrected as previously mentioned), having burnished silver scales, and a longitudinal bar of silver on each side of its semi-

transparent body. It is exceedingly delicate, however, and he who would even safely transport it from its place of capture must

"Take it up tenderly,  
Lift it with care!"

West remarks that the seahorse was a worthwhile curiosity but although Damon managed to keep them with some success, he could not. With his characteristic humor he remarks: "After repeated trials and failures, I have succeeded in keeping one for a year and half by transferring it from the tank to a phial of alcohol!"

IN 1872, A NEW YORK businessman with a bent for natural history, Mr. W. C. Coup, traveled to Europe where his interest was aroused by the number of great public aquaria he saw there. Resolving to establish a public aquarium in New York City, he examined these foreign aquaria in some detail and consulted with those charged with their maintenance. Returning to New York, Coup proposed to the City that he construct an aquarium in Central Park, defraying all expenses but claiming the privilege of retaining for a given period, such profit as might be obtained from a small fee for admission. After being compensated for this outlay, Coup proposed to give the aquarium to the City as a gift. However, there was a question of certain legal restraints forbidding the use of public lands under these conditions, so the Park Commission was forced to decline the offer.

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## KELLY

a by-your-leave, pressed the shutter on his box camera.


Yes, you've guessed it. It was his pic that everyone wanted! Now I am not suggesting that professionalism is wrong, merely that on some occasions it can pay to be simple and I maintain guppy breeding can be one of those occasions.

A few years ago a friend was privileged to be taken round the guppy set-up at University College, London, England. Here, guppies were used for the study of Gerontology (old age), and the College fish room contained hundreds of fish of all ages and sizes. The room was centrally heated, a large fan ensuring air circulation, but most of the tanks containing the *Poecilia* were small; in some cases guppies were housed in the glass-type milk bottle holding just a pint of water.

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tables were also exhibited, and these contained the smaller exhibits, both fresh and salt water. For example, one such tank contained pickercel; another contained skate eggs. Finally, a rockery and pool designed to hold sea lions completed the Aquarium.

A most interesting feature of the Aquarium was its fish-hatching department. On one such occasion, 60,000 eggs of the California salmon were received and we report verbatim the following delightful account by Mr. Mather (who, by the way, was to author a book in 1900, titled, *Modern Fish Culture in Fresh and Salt Water*). "Of these eggs, 8,200 died, or were killed before hatching; and I will here say we had a difficulty to contend with that is not met with in an ordinary hatching house, viz., handling eggs by visitors. In the State and other establishments there are no more people than the attendants can watch; but in the crowds at the Aquarium, it has been a common thing to find that while talking to one party another by your side has a handful of eggs going off to the window to examine them, and which were invariably killed". Thus were the liberties permitted visitors to the New York Aquarium!

At the opening of the Aquarium, the principle address was given by the Honorable Robert B. Roosevelt, Chairman of the New York State Fish Commission. From this point on, the Aquarium was a curious mixture of science and business. Even Joseph Henry, Secretary of the Smithsonian Institution, took an interest in its activities. Yet, as we have noted, admission was charged and as was the custom of the day, even a concert was included in the admission price. However, of prime interest to us now is another of the Aquarium's activities, that of the first aquarium magazine published in this country! Indeed, this was the very first aquarium magazine published in the world, predating even the earliest of the German periodicals. The name of this publication was the *"NEW YORK AQUARIUM JOURNAL"*, perhaps surprising those who might have thought that the name *"AQUARIUM JOURNAL"* was original with the SAN FRANCISCO AQUARIUM SOCIETY.

The *NEW YORK AQUARIUM JOURNAL* originally started life as a semi-monthly with a subscription rate of 50¢ per year. This was changed shortly afterwards to a monthly at \$1.00 per year. The first issue appeared in October, 1876, the last (issue number 10) in May of 1877. Each issue contained from 8 to 10 pages, featured illustrations in the form of woodcuts and also ran advertisements. In form it was a 3-column, newspaper tabloid type of publication, ably edited by the erudite Mr. Ward.

The *JOURNAL* was an excellent magazine for its day; indeed, a good portion of it was far superior than some of the drivel appearing in aquarium magazines published today. There were feature articles, news notes, columns and editorials. One column especially, "For Our

*Young Folks—told by Uncle Octopus*", was a delight. Among other things, "Uncle Octopus" conducted contests for children, offering prizes for the best essays on aquatic subjects. Of the feature articles in the *JOURNAL*, both salt and freshwater subjects were included. Of interest to freshwater aquarists is the fact that the subject of the first article ever to appear in an aquarium magazine (November 1876) concerning a tropical fish was the climbing perch, *Anabas testudineus*! This article was titled, appropriately, "Fish Out of Water". And to prove our point about the quality of the writing, we quote merely the opening sentence: "The conceit of a 'fish out of water' is sufficiently incongruous to have given to this phrase a proverbial significance; and yet what is inconsistent with our ideas of the fitness of things is, it appears, not wholly out of nature's power or plan to accomplish".

Another item of interest to aquarists is the very first article to appear in an aquarium magazine about a goldfish (*NEW YORK AQUARIUM JOURNAL*, December 6, 1876). The article was entitled, "Japanese Kingyo", and in view of its historical significance to the hobby, we herewith reproduce its major portion.

"The presence in the Aquarium of this wonderfully beautiful, and strangely grotesque fish, should be a cause for special congratulation. The specimen exhibited in table tank p, of the fresh water series, was brought from Japan

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A woodcut of the King-gi-yo displayed at the New York Aquarium in 1876. This fish was in the very first shipment of fancy goldfish imported into the United States (in 1875).



A view of the fish hatching facilities at the New York Aquarium. The eggs were hatched in long troughs, fed by running water.

by a gentleman who has furnished the following interesting facts regarding it: Starting from Japan with eighty-eight, he arrived in Baltimore with but seven, all of which are now alive and in good health. The captain of the steamer taking great interest in his efforts to introduce the fish to America, built a tank on the steamer to accommodate them, and took in a supply of river water; but it was soon found that the motion of the ship dashed the fish against the sides of the tank and many were lost. To obviate this a smaller tank was built and suspended like a compass, which counteracted the motion of the ship; but notwithstanding all the care bestowed on them only fifteen arrived in San Francisco, all in a very weak condition. Of these eight subsequently died.

The Japanese claim that the brilliant colors displayed in this fish, and the wonderful development of its triple tail, is the result of many years careful breeding. This one is an unusually fine specimen. In Baltimore great care was taken of the seven survivors, and during the summer they spawned, the result being about fifty young fry, which exhibit all the peculiarities of the originals. It is the intention of the owner when he has a sufficient stock, to donate them among persons who will take an interest in them and carefully raise them.

For the benefit of any of our readers who have not as yet been able to visit the Aquarium, we would state that in outline and general appearance the above illustration, drawn from life by Mr. Vance, is exact and truthful in every particular. The body is red in color, similar to that of a brilliantly-hued gold fish; the tail, however, is a pearly white, and as it rests in the water presents the appearance of a fine, silken fabric, terminating in a delicate fringe. In addition to the peculiar attraction which the form of the fish is to the general observer, the naturalist will find in its very existence and the tradition regarding its origin theme for thoughtful study."

The gentleman referred to as the importer of the Kin-gi-yo was Mr. M. Gillet Gill of the tea importing house of Martin Gillet and Co. of Baltimore. Since he is the first to import fancy goldfish to the United States, we shall return to his story in a later episode.

Although the *NEW YORK AQUARIUM JOURNAL* was discon-

tinued in 1877, the Aquarium itself survived for several years afterwards. As with the Aquarium at the American (Barnum's) Museum, it served to further interest in the hobby. Many visitors were so converted, including one Eugene Smith, who first saw the inside of the Aquarium during his teen years. Smith was later to become one of the five great American aquarists of all time.

The 1870's were the days when soap was 8¢ a cake, coffee 18¢ a pound, and Hennessy brandy \$4 a gallon. It was the time of great ostentation and ornamentation which was reflected also in the home aquaria of the day. By this time, many iron and zinc works had gone into the manufacture of tanks, a notable example being the J. W. Fiske firm of New York City. Rectangular tanks from 14 inches to 4 feet long were manufactured by this company, although the ornate bases and corner spires might make them unrecognizable as such today! Especially popular were octagonal aquaria; these were available in sizes of from 2 feet to 5½ feet in diameter, and on either short bases or tall pedestals. However, smaller octagonal tanks were available without pedestals or bases. It was customary to bronze such tanks and it was also usual to furnish fountain sprays which sat in the middle of such aquaria. Even the rectangular tanks could be supplied with such fountains.

To be continued.

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worms. Should I try to give him raw meat? Is there any law that forbids the keeping of game fish such as trout? If not, what size tank, food, and water conditions would they require? My Porthole cat and Aeneas cat have been spawning lately. Should I try to save the eggs? Have you heard of anything like this ever happening before? I've gone through all of my fish books, and none of them mention anything about two species of catfish crossing.

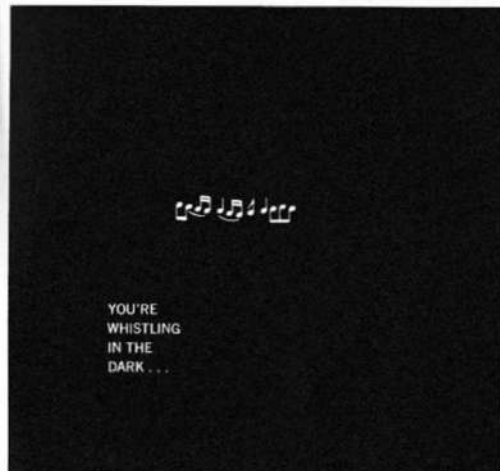
**Answer:** There is no reason why you shouldn't keep your male *Cichlasoma spilatum* in your community tank if he seems, to get along well with the other fish in your aquarium. The books that you have read on the subject of Cichlids advising hobbyists to keep Cichlids to themselves were dealing in a generality. Very often certain Cichlids do well enough in community tanks and only become bad tankmates when a pair begin to think about spawning. Again, this is a generality but just happens to apply to the subject species, *Cichlasoma spilatum*. We might mention that the June 1966 issue of *The Aquarium Magazine* contains an excellent article on this species by Paul Loistelle. You should feed your specimen a variety of foods and raw meat (lean beef) minced in tiny pieces might be offered. Clean live tubifex worms or the dry fast-frozen tubifex might be accepted. Regarding your question as to whether game fish can be kept in aquariums, we suggest you check the laws of your state. The State Fish and Wildlife Service in your area would be most happy to give you the information. Some states have laws prohibiting the capture of game fish. We have not heard of the crossing you mention in your letter between your Aeneas and Porthole

catfish but it is very possible it has happened before. Closely related species do cross and when they do, and the young are raised successfully, the degree of close relationship between the species becomes established. You might well try to save some of the eggs and give us a report on your success in raising the fry along with a photograph of the hybrids.

From: Edward A. Trezcinski, East Paterson, New Jersey

I have two tanks, one 10 and one 5-gallon. In the 10-gallon tank I keep some mollies, guppies, platies, and some tetras. One of the guppies, which had been gravid when I acquired her, had three babies. I netted these and the mother and placed them in the 5-gallon tank, the mother in a small breeding trap. One of the babies died, but the mother had two more, one of which also died. Two weeks later she had 8 babies. By this time the original three babies which had survived were large enough to place in the 10-gallon tank. Soon after I put them there, they outsize the older male guppies in the tank. At this time I acquired a green lyretail molly, born about the same time as the baby guppies and about the same size. They have matched each other's rate of growth, which surprised me as to my knowledge a molly grows faster and larger than a guppy. The guppies (the original babies) have turned almost pure white and developed black spots all over their bodies as well as on their fins and mouth. Today they are one month and 4 days old and do not resemble guppies in any way. My dealer tells me there is a slight possibility they might be a cross between a molly and a guppy. Being a novice, I decided to write you about it. The tank in which the fish

continued on page 71



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Contributed by the Publisher

**KELLY**

From page 39

a by-your-leave, pressed the shutter on his box camera.


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available.

Guppies, in keeping with most tropicals, need water at a certain temperature. How to heat the water is dependent on many things but if your home is centrally heated then you have the problem solved. The modern trend is to keep the temperatures in the 80's, making the guppies eat more and also increasing their metabolism. This is claimed to give quicker growth rate; it also shortens their life span, so be warned! I suggest temperatures round the 75 mark for a start. There is plenty of time to experiment when your fish are doing well and bringing in some small returns.

Without plants, lighting isn't all that important. We have kept guppies successfully for years in a basement that receives no natural light whatsoever; the artificial light (from bulbs) varies from zero to six hours in twenty-four, and no appreciable difference has been observed in their progress. Use whatever light source is available with an attempt to keep costs down. Don't despise the do-it-yourself project to supply light but do make sure everything is safe!

*Poecilia reticulata* didn't get the nickname "millions fish" for nothing and when it comes to the showdown, rabbits wouldn't even get an honorable mention, so it is essential to practice rigorous selection. Not possessing large numbers of tanks in which to grow fry to adulthood means that the few you do keep will have to be good; cull vigorously.

In any brood of gups the oddball shows itself from time to time and though not the variety you are aiming at, the temptation is to keep it just to see how it makes out. Adam himself was never so sorely tempted. This practice is fine with containers unlimited but for a start, get rid of the oddballs! You have made up your mind to try and breed just one strain and if you cannot resist the temptation then simple set-ups are not for you.

Much literature already exists on how to sex fry and it is not my intention to repeat it. A chat with any experienced breeder will soon give you the hang of it. Whatever method you decide upon, remember that we are all human and likely to make mistakes. So, be like the Boy Scout and be prepared to examine your fry many times in the course of their growth in case you have missed out. Virgin guppies don't remain virgins for long!

Some males develop coloration long after their brood brothers. These late-developing males usually grow into whoppers so watch out for them, particularly in your tank of females.

Risking banishment to Siberia's Salt Mines I am going to discourse on feeding. Despite all the arguments this will cause, I still maintain that the two important factors, no matter what you feed, are seeing that they receive a nutritionally balanced diet, and seeing that they get it often. I don't give a hoot whether that includes live, dried, frozen or even

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As lasting proof that keeping it simple can succeed, this year's British F.G.A. "Breeder of the Year Trophy" was presented to a comparative newcomer who had just a few tanks under the stairs in his home and who admitted he had spent very little in capital on his hobby. Presenting that award gave me a great deal of satisfaction. Just a glance at the magnificent specimens he had helped to breed would show a gleam in their eyes that seemed to say—

WE TOLD YOU SO!

HARRISON

from page 43

should watch all species of *Leporinus* in an aquarium of mixed fishes. They are often rough, troublemakers. Their great beauty and interesting shape make them well worthwhile for the specialist. AJK



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cannot identify something, it does not exist?

8) As your original cross was two unrelated strains, how can you possibly rely on the results with just two individual guppies? The results may well have been totally different with another pair from the same strains. Even in an inbred strain the young vary with different individual matings. Could it be, Mr. Klee, that you have not raised any guppies prior to the above-mentioned test?

My answers to Mr. Dayes' questions are as follows:

1), 7) and 8): In all of these questions Mr. Dayes casts doubt on the inductive process, a process which is the foundation of modern science as we know it today. He wants to know how the XCP-YDs postulate is justified—how these tests "prove" the statement that there are no genes for deltetails, and how one can rely upon the results obtained from but a relatively few specimens. It has been

from page 26

said that in this world, nothing is certain but death and taxes. Although frivolous, the real import of this statement is that we live in a world of uncertainty. Scientists, no less than any others, accept this fact. Science is based upon induction, i.e., the process by which one reasons from particular facts or individual cases to a general conclusion. We accept theories only if they do not contradict the facts; if additional observations are obtained or if our measuring instruments are developed to refine old observations that now contradict the theory, then the old theory is either modified or discarded. This is what happened to Newton's theory of gravitation. It could jolly well happen to the deltetail theory also but if we were to reject everything because of uncertainty, then we would accept nothing. The deltetail investigation was scientific, thorough and valid in the light of our knowledge of today. Mr. Dayes has admittedly

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raised many "ifs" but to recall Lord Kelvin's maxim: "Unless you have measured it, you don't know what you are talking about".

1) and 2): Among other things, these questions concern double sword guppies. Let me state that it is an error to talk about the double sword gene for there is more than one genetical structure known for the production of double sword guppies. The usual double sword guppy of the British, for example, is a consequence of (at least) two genes, *elongatus* and *aureus* (X and Y-linked, respectively). The so-called "Vienna" double sword is a consequence of the presence of the *Ds* gene. By the same token, then, one can argue with some validity that there might be different types of deltetails, at least with regard to genetic structure. Indeed, this is precisely what Mr. Dayes argues. Because of the scarcity of "hard" experimentation with deltetails, we presently have no knowledge of the

existence of alternative deltetail systems, however. We are with Mr. Dayes on this one but he has to come up with more than just speculation.

Because any deltetail system must be a complicated polygenic system, no deltetail breeder would seriously consider starting from double swords. It would make more sense to start with veiltails. It is well documented, however, that deltetails (indeed, all broadtailed guppies) and swordtails (double or single) are genetically related.

3) and 4): The female strain (basically XCh-XCh) mated to the Hahnel strain male was from a strain of emerald Y-iridescens. This strain is described as follows: Body grey-colored; females with clear caudals. The male is of a gleaming, greenish-iridescent color; his caudal fin is also clear but there are a number of reddish, black-bordered flecks near its base. A more detailed description of the female cannot be given since the

female of this strain is a rather nondescript animal. The important thing is that, when mated to males carrying the *Ds* gene, these females produce a kind of swordtail. This strain was elected to prove the postulated deltetail structure—it was simply a necessary element of the experimental design. Many other females carry the *Cb* gene, however (such females have clear caudals). It is by no means uncommon.

4) The experiment did not produce either pure double swords or pure deltetails. As Mr. Dayes suggests, many intermediary forms were obtained as a result of breedings in the studies. In the investigation, "deltetail" is a characterization of the epitome of broadtails; similarly, the use of the term "double sword" was so intended. Since the purpose of the study was to identify the predominant structure, a ragged veiltail was considered equivalent to a perfect deltetail. However, all of this was clearly brought out in the paragraph preceding the conclusions of the article in question and Figure 3 of the article shows the tail shapes of the males as being quite ragged.

5) The male guppy was obtained from a German aquarist who received his strain from Mr. Hahnel.

6) The XCP-XCP × XCP-YDs cross was already established in the maintenance of the Hahnel strain. As most people would assume that the word "strain" implied this, this fact was not thought worthy of mention.

The basic stumbling block in this debate over the deltetail guppy genetics article is the mistaken impression that these studies were concerned with the tail shape of that large class of guppies we might generally term "broadtails". If this were true then it would mean that these investigations would form the basis for a blueprint for deltetail guppy production. Nothing could be further from the truth or the intent of the article.

The deltetail system is polygenic (i.e., "many genes") and unfortunately, science is not yet able to analyze such systems in any meaningful detail. Consequently, when faced with such mechanisms scientists generally select but a portion of the total system to study, a portion which might be termed "Mendelian" in its simplicity, allowing for the fact that the type of inheritance we are talking about was not known to Mendel during his lifetime.

Let us discuss an example. One of the earliest (1919) Y-linked (the Y is the male chromosome) gene discovered was the *maculatus* gene. It obtained its name from the fact that its most apparent characteristic is the presence of a large black spot in the dorsal fin (of the male). But other features characterize the appearance of the *maculatus* gene, notably a large red body spot below the front of the dorsal fin. Indeed, upon occasion a large blue spot is present above the

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anus as is a smaller black spot. These are not always present, however. No one is really certain what other influences the *maculatus* gene may exert, even though it has been known to science for forty-eight years. In 1938, for example, Winge and Ditlevsen discovered a recessive gene, linked to the dominant *maculatus* gene, which is lethal.

Now one can study the *maculatus* gene (or more properly, its effects) for itself alone, or one can use it to study some rather remarkable types of inheritance. Historically, the *maculatus* gene took the scientific world by storm because it represented a then new type of inheritance, i.e., father-to-son. What was of importance here was not in cataloging the visual results of the presence of the *maculatus* gene in the male guppy, but in studying how it was inherited, generation to generation. One could, of course, attempt to do this but it would be very difficult as what a fish looks like is not determined by its genes alone. After all, anyone can produce a gonopodium on a female guppy by treating her with the proper hormones, yet she does not carry the male chromosome.

In the studies of broadtail guppies, the aim was to discover the mechanism of the *predominant* genes affecting the production of such varieties as the deltatail. As it turned out, there is evidence for two such genes; one X-linked, the other Y-linked (*Cp* and *Ds* respectively). The experiments

proved the mechanism of the inheritance of these two predominant genes but they in no way concerned themselves with how one produces "choice deltatails", as Frank Dayes so aptly puts it.

Yet, the results are interesting for the *Cp* gene manifests itself in caudal pigmentation (in both male and female) and the *Ds* gene manifests itself in a double swordtail (in the male). It helps to explain Larry König's remark that "... many of the breeders claimed that swordtail females had to have clear caudal fins, because their own swordtail females had this color characteristic". We produced swordtails from Hahnel stock by mating to *Ch* females. The outstanding characteristic of a *Ch* female is that her tail is hyaline, i.e., "clear"!

In short then, to produce a deltatail one needs a basic structure. Without this basic structure one cannot get to first base with deltatails. With the structure, there is no guarantee that one will reach second base. If, in the future, evidence is produced that there are other deltatail mechanisms (as there are for swordtails), then no one should be apologetic for the theories of today based upon bona fide investigation. What the guppy fraternity really needs is more "hard fact" material on guppies; what is available today is mostly myth, a mass of disorganized thinking and contradictory statements. The evidence for the *Cp-Ds* deltatail



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from page 7

of these fish were usually available. One thing that made this possible was the ease with which it was spawned and raised. It would even survive mild winters in outdoor ponds and a few pairs in such ponds would produce offspring quite readily.

Possibly because of the ease in breeding it, this fish has not been considered rare and few people keep it. Part of this lack of popularity is no doubt due to the previously mentioned bad temper. Still, it is one of the most beautiful fishes around and rivals many of the killifish in its coloration. What are we talking about? Some sort of fresh water shark? Maybe a piranha? Nope! The beautiful devil in question is the "paradise fish" (*Macropodus opercularis*). With gorgeous bands of blue-green and brilliant carmine-red on its flanks, its red fins, the dorsal and anal bordered with white, and bright-red ventrals with white tips, the paradise makes one of the most magnificent pictures in the freshwater aquarium; that is, if one can find room to keep him by himself. Turning him loose in a community tank will result in the sort of havoc one would expect of a minor tornado, i.e., fishes with torn fins, fishes dead, the rest in mortal fear. If kept with other paradise fish, the resulting battles will frequently end in ruined fins and general terror. The same is true of a pair kept together. The male will pick on the female mercilessly.

Around 1933 an albino version of the paradise was introduced from Europe. This fish has pink eyes, a white to pale-cream body with transverse red or orange bars. In this fish most of the ill temper seems to have been bred out. While not the perfect community tank fish, the white paradise offers much to the aquarist. Aside from the striking and attractive coloration, this fish is easy to keep, even in unheated aquariums, and will eat most dry and live foods. Further, it is an easy breeder.

The white paradise is an anabantid. In other words, it belongs to the family of fishes that possess a labyrinth. This marvelous organ allows the fish to supplement the oxygen supplied by the gills with atmospheric oxygen taken through the mouth at the water's surface. It is, of course, related to the ever popular Siamese fighting fish (*Betta splendens*).

The sexes are easily distinguished in mature fish. The male is the more colorful and usually the larger fish. His fins, especially the dorsal, ventral and caudal, are large and flowing. He is usually larger and more robust in appearance. The bands on the sides are predominant. The female, who will show a bulging belly when ready to spawn, is smaller, more blunt in body and fins, and less colorful.

As with most fishes, breeding is dependent upon good health and conditioning. We have found that proper conditioning in the white paradise is easily accomplished through liberal quantities of live food, such as brine shrimp and tubifex worms. This diet should be supplemented with a good dry food. The sexes may be kept together, although it is wise to allow a few hiding places for the more timid fish should their

71

mechanism should be reviewed carefully (it is available in the article in great detail, even down to stating the numbers of each type of fish obtained in different crossings, and presenting statistical measures for evaluating the significance of the results), and the conclusions compared with the facts. As of this moment, there are no contradictions,

from page 58  
were born contained two gravid female guppies and 3 male mollies. No female mollies or other females were in the tank. Could these be hybrid molly-guppies? If so, are they common or rare? Can you tell me how I could make a positive identification? If they are, I feel as a novice and amateur, there are other fish fanciers who would like to own these fish more than I do. How do I contact these people? How much are my hybrids worth or what would be the proper price to ask for them? Will they be sterile or fertile?

Answer: Mollies and Guppies have crossed and it may be the gravid guppy you acquired crossed with a molly male before you owned her. At any rate this cross has been accomplished before and aside from being of biological interest, I do not believe the fish are of particular value. It may be that if you locate an aquarium association in your area, some hobbyist might want to acquire the fish from you. The price arrangement, however, would have to be made between you and the buyer. As for a positive identification, we would at least have to see a photograph of the fish and then all we could do would be compare it with other guppy-molly hybrids. There is no way to predict whether or not these fish will be fertile. It may be that none of them will be, and it may be that some fertile specimens will result.

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tank mates become a bit aggressive. This is especially so where a male is ready to spawn and the female is not.

The breeding aquarium is very simple to arrange. We have found that a bare, five-gallon tank is ideal. We do not use gravel, live plants or other decoration as these only lead to possible enemies of the tiny fry being introduced. Contrary to the method of shallow water used with breeding bettas, we fill the spawning tank to within 1 inch of the top. This leaves space to observe the surface of water and allows more growing room without adding water later on. Since the eggs of the white paradise float, there is no need for shallow water anyway. The only items placed in the spawning tank are one or two leaves from a broad-leaf plastic plant which is floated on the surface, and possibly some bushy plastic plants weighted to the bottom. The floating leaves offer a place for the male to anchor the bubble nest he constructs, and the bushy plant gives the female a retreat in case the male gets too rambunctious. Plastic plants are used as they are easily sterilized and can be used over and over again.

We feel that too much emphasis is placed on separating the sexes prior to spawning. A properly conditioned pair of fish will usually spawn if the water conditions (temperature, pH, DH, etc.) are right. For the white paradise, practically any water will suffice... they are very adaptable. Nor do they require high temperatures to induce the spawning urge. A temperature of 70 to 75 degrees F is adequate as opposed to the betta which does best at 80 degrees F.

We place the male and female together in the spawning aquarium in the evening. (This is due to our working hours, rather than any preference of the fish. The morning would do just as well.) If the pair is ready to spawn, and most paradise fish usually are, the male will immediately start his bubble nest. (This nest is similar to that of the betta but not as compact or sturdy.) In between bubble blowing bouts, the male will parade in front of the female, his fins spread and the bars on his side an intense, vibrant color. He may chase her a bit as well. She, in turn, is either haughty or coy in the usual female manner and whatever fits her mood. Although both fish may occasionally suffer torn fins, the damage is always slight and mends in a few days.

After the male has constructed a nest to meet his satisfaction, he will start driving the female with more fervor. There are wild chases and short spats until he manages to coax her to an area in the general vicinity of the nest. Then, with fantastic displays of fins and colors, they proceed to mate. The spawning embrace is similar to that of the betta. The male wraps his body in a "U" around the female, and milt and eggs are released. The eggs float to the surface while the female, apparently in a state of induced shock, sinks towards the bottom. The male gathers the eggs in his mouth and transfers them to the bubble nest. When the female

73

## NORMAL PARADISE



The male Paradise, above, is most easily distinguished from the female, below, by its noticeably greater fin development.



74

## ALBINO PARADISE



The Albino Paradise differs from the normal only in its total lack of pigment. Sexual differences are exactly those found in the normal Paradise. (Above) male, (below) female.



75

recovers from her trance she may start a search for eggs and eat as many as she can although, in one instance, we can recall seeing the female assist the male in placing eggs in the nest.

The spawning activities continue in this manner until the female is depleted, or the male tires and drives her away. He will normally drive her to a corner farthest from the nest. On some occasions he merely ignores her unless she comes too close to his brood. He rarely picks on her steadily but it is best to remove her when spawning is completed as she serves no useful purpose.

The male tends the nest and keeps the eggs together until they hatch. This takes about two days at 78 to 80 degrees F. Some males are disinterested fathers, however, and do very little to control the eggs or fry. Because both eggs and fry float, parental attention is of no great importance.

The fry become free swimming in about four days. The male may then be removed and feeding of the fry should be started. We feed a liquid fry food at the outset. This is allowed to flow down the flat side of the blade of a kitchen knife so that it can spread over the surface of the water. About two drops twice a day is sufficient. Within a day or two, small quantities of newly-hatched brine shrimp are fed as well. A few mystery snails (*Ampullaria cuprina*) are also introduced to clean up the excess food. The fry grow rapidly and reach maturity in four to six months, provided liberal quantities of live foods, such as brine shrimp and tubifex worms are present.

Because paradise fish are anabantids and the labyrinth must develop at an early age, the aquarium must be kept covered for the first month to six weeks. If air that is cooler than the surrounding water gets into the aquarium, the baby fish may develop a form of pneumonia in the labyrinth and die. A small hand towel draped over the hood and hanging down over the sides of the tank will do the trick. By the time the baby paradise are two months old they should be large enough to move to larger quarters. This will promote faster growth. Since the average spawn is two to three hundred eggs, plenty of growing room should be provided. As they near this age, most of the fry will begin to accept adult brine shrimp and will stuff themselves to the bursting point.

Although growth is rapid in the first two months, once they start on the larger foods they really go! By the end of the third month most of the babies will be an inch to two inches long. A further aid to growth is to sort the fry into groups based on size. This way the smaller fish do not have to compete with their larger brothers and sisters. Consequently, they get more to eat and growth is enhanced.

By the end of the fourth month you'll have a lot of paradise fish. After that you're on your own. What you do with two or three hundred of them is going to be the hardest part of the entire experiment!

76



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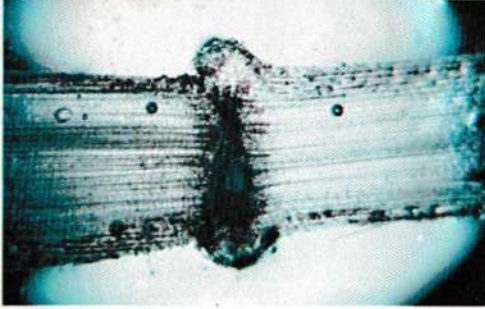
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Proof that any *Cabomba piathyensis* you may see is not artificially colored. Note the red-pigmented cells in this longitudinal section of a stem.

There are still secrets about this plant—a bit of mystery because it does come in different forms and colors, perhaps depending upon the circumstances surrounding its cultivation. The plant doesn't grow in every aquarium with equal success but why this is so is not known presently. If it does grow satisfactorily it may produce a flower, usually preceded by one or more floating leaves which, as we have noted, are of a different form than the submerged leaves. This phenomenon is known as "dimorphy". The floating leaves serve as support for the flower, the latter usually staying just above the surface of the water.

If we examine a cross-section of *Cabomba piathyensis* through the microscope, we observe the presence of ducts used for the transport of oxygen to the roots in the soil. There are a number of hobbyists who actually believe that this plant has been artificially colored red, but this is assuredly not the case! If we take a very thin longitudinal section of the stem and examine it under the microscope, the reddish cells are readily seen. This red color (called "antocyaan") works much like a filter; it serves to protect the plant against too much illumination.

If *Cabomba piathyensis* is located properly in the aquarium, between other aquatic plants of a different form and color, it is possible to achieve rather unique effects in the aquascaping. This beautiful aquarium plant grows best on a loose bottom substrate of coarse river sand (with a little bit of soil, perhaps in a pot under the gravel) at a temperature of from 68 to 75° F. Although a unique and appealing plant, it is not recommended for beginners. Unanswered still is the question of why it will grow for some, and not for others.

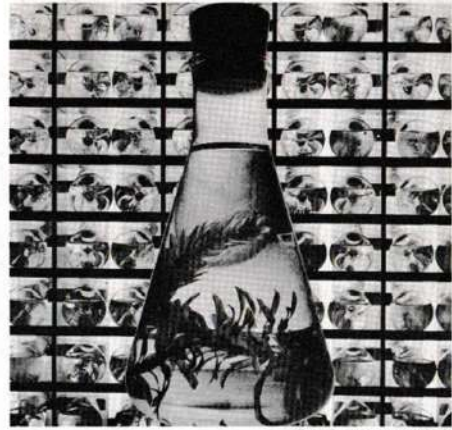


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