1911~ 2012
101 Years of Educating Aquarists

AQUATICA

THE JOURNAL OF THE BROOKLYN AQUARIUM SOCIETY
VOL XXVI MARCH ~ APRIL 2012 No. 4

101 Years of Educating Aquarists

AQUATICA

VOL. XXVI MARCH~APRIL 2012 NO.4

CONTENTS

AQUATICA STAFF

Note: The Editor takes full responsibility for misspellings and punctuation errors.

ALL CORRESPONDENCE CONCERNING THIS PUBLICATION SHOULD BE SENT TO:

- Editor: **John Todaro, 247 Middletown Road, S. Londonderry VT, 05155 Home: 802 824-3743 Fax: Same**
  Please submit all articles to the Editor by mail, fax, or E-mail JTODDYBAS@AOL.COM.
- Exchange Editor: **Stu Hershkowitz,** P.O. Box 290610, Bklyn, NY 11229-0111 **Phone: 718 837-4455**
- Membership: **Christna Cingari,** P.O. Box 290610, Bklyn, NY 11229-0111 **Phone: 718 837-4455**

The **Brooklyn Aquarium Society Inc.** is a non-profit organization 501(c) (3) for people interested in the aquarium hobby and the study of aquatic life. The Society meets the 2nd Friday of each month except July and August at the Education Hall of the New York Aquarium at Coney Island, Surf Avenue at West 8th St., at 7:30 PM. Meetings are open to visitors. Refreshments are served. Membership is $25 per year family/$20 individual/$15 for students under 14. Send inquiries or membership checks payable to: **Brooklyn Aquarium Society,** c/o Membership Chairperson, P.O. Box 290610, Brooklyn, NY 11229-0011.

BROOKLYN AQUARIUM SOCIETY
CALENDAR OF EVENTS ~ 2012 - 2013

101 Years of Educating Aquarists

MAR 9 **Tony Vargas ~ Successful Reef Aquariums from Around the World and How They Got There** ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
APR 13 **Larry Jinks ~ Creating My Fish Room** ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
MAY 11 **Giant Spring Auction** ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods, including a 55 gal. tank & stand.
JUN 8 **Todd Gardner ~ Getting Started in Marine Aquaculture** ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.

JULY/AUGUST ~ NO MEETINGS

SEPT 14 **Mike Hellwig ~ Fish Breeding Contest with Ted Judy** ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
OCT 12 **Giant Fall Auction** ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods, including a 55 gal. tank & stand.
NOV 9 **Gene Ritter ~ Reef Diving** ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
DEC 14 **Holiday Party** ~ Members, their families and friends, all you can eat sit-down dinner • Fish Bingo & Prizes • BAS Awards presentations.

2013

JAN 11 TBA
FEB 8 **Kathy Cardineau - Ponds the Easy Way** ~ Marine fish, aqua-cultured corals, freshwater fish, plants & dry goods auction.
MAR 8 Kevin Kohen - Salt
APR 12 **Mark Denaro - Where Rare Species are Common**
MAY 10 **Giant Spring Auction** ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods, including a 55 gal. tank & stand.
JUN 14 TBA

JULY/AUGUST ~ NO MEETINGS

SEPT 13 TBA
OCT 11 Giant Fall Auction ~ Freshwater fish, plants, marine fish, aqua-cultured corals & dry goods, including a 55 gal. tank & stand.
NOV 8 TBA
DEC 13 Holiday Party ~ Members, their families and friends, all you can eat sit-down dinner • Fish Bingo & Prizes • BAS Awards presentations.

The Brooklyn Aquarium Society Inc. is a non-profit organization 501(C) (3) for people interested in the aquarium hobby and the study of aquatic life. The Society meets the 2nd Friday of each month except July and August at the Educational Hall of the N.Y. Aquarium at Coney Island, Surf Ave. at West 8th St., at 7:30 PM. Meetings are open to visitors. Membership is $25 per year family, $20 individual, $15 for students under 14. Send inquires or membership checks to Brooklyn Aquarium Society, c/o Membership Chairperson, P.O. Box 290610, Brooklyn, NY 11229-0011.

Izzy Zwerin ~ BAS

EDITORS NOTE: Members with questions about aquatic plants or setting up a planted tank can contact **Isidore (Izzy) Zwerin,** our plant editor. You can call him at **(646) 269-5926** between 7pm to 10pm, Monday to Friday.

The Practical Plant

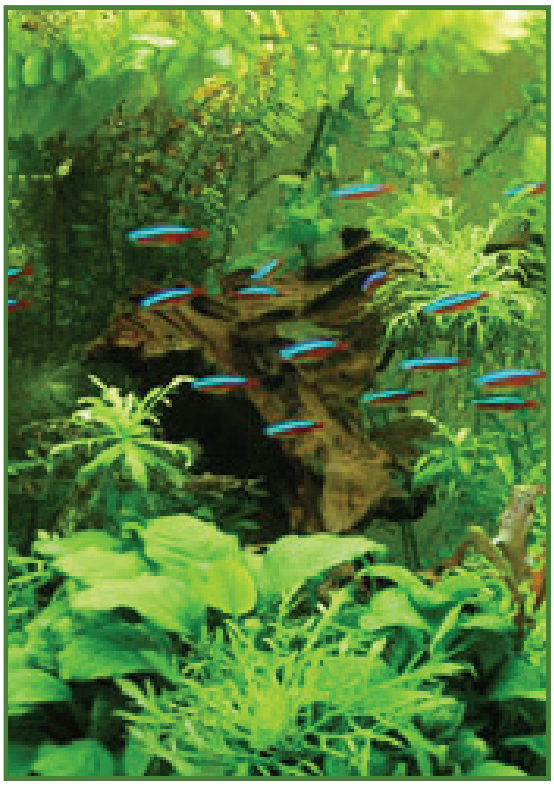
Chapter 2

Welcome back BAS. In this article we are going to tackle the hardware requirements for a successful planted aquarium. Obviously the first thing you need is a fish tank. Almost any size shape tank will do. I personally like my tanks to be deep so I can include some taller background plants in my arrangements, but if you stick to smaller plants you can have a fantastic five gallon tank. I think a good starter setup would be a 25 or 37 gallon tank. They are tall enough to allow for a good selection of plants to choose from, have a footprint large enough to let you get creative, and not so large as to become an overwhelming task.

After you choose a tank you are happy with you need to decide if you are going to cover your tank. There are two schools of thought here. Some people prefer not to cover their tank. This approach has its advantages. Not having a cover will allow more light into your tank, always a good thing. It will also allow plants that are so inclined to grow right out of the water. This is also a good thing, because plants allowed to grow this way have better access to CO^2 and most plants can only flower this way. The down side of not covering your tank is excess evaporation, allowing dust and dirt (and cats) to fall into the tank, and of course the escape of livestock. So like choosing a tank, a cover is a personal preference. I use a glass cover because I've had a few too many escapees with open tanks.

If you plan on keeping only plants and no fish you will not require a heater. I doubt any of you allow your home to get too cold for plants

unless you like it in the low 60's. If you plan on keeping fish in with the plants just select a heater providing 4-5 watts per gallon if using a heater, of course you will want a thermometer If you are using a canister filter or in-line system there are external heaters that get spliced into your return line. These are really great since you don't have to see them and you will never have cold spots in your aquarium.You also won't break them during maintenance. The only down side is they cost about twice the price of a conventional heater.



Now we need to discuss filters. If your fish stocking density is extremely low you will not need a filter at all just use a tiny powerhead or circulation pump to provide water movement. Otherwise you will need a filter of some sort. You can use almost any type filter, but what works best is a canister filter or an inline system using a submerged spray bar for the water return. The problem with most filter systems is that they create surface agitation. In a fish only system this is an advantage because it aerates the water. In the planted aquarium the plants aerate the water by producing pure oxygen during photosynthesis. Surface agitation will cause CO_2 to dissipate out of the tank. Plants require the CO_2 to photosynthesize. By placing the spray bar under water, you eliminate the surface agitation. I place the spray bar vertically down a corner where it is easily hidden by the plants. I also recommend that you drill some extra holes in your spray bar. This will cut down on strong currents. Although plants require water movement to bring their food to them, strong currents will stress the plants and cause them to grow slower. With the growing popularity of "nano" systems, small inexpensive canister filters are now available. I've recently seen one small enough to hang on the side of the tank like a power filter. As for filter media, I only use mechanical and biological. I avoid carbon and resins because I don't want to filter out the fertilizers I'm adding to feed the plants. I have been using a Fluval canister filter and I have no complaints with it.

A really handy item to have is a long pair of tweezers. This is going to save you a lot of effort and frustration when planting stem plants. With the growing popularity of planted tanks, these are now readily available in 8-10" lengths. While you are at it, pick up a pair of matching scissors also 8-10". You will need these to trim the plants. These are made of stainless steel and look like surgical scissors. Another item that I can't say is required, but will make your job easier is a graduated cylinder about 10ml in size. This will allow you to measure supplements accurately.

You are also going to need an air pump and airstone. You may be scratching your head at this point since just one paragraph ago I said you don't need to aerate the water and you will lose your CO_2 by doing so. At night, plants switch from photosynthesis to respiration. During the night plants will consume oxygen and exhale CO_2 just as your fish do. This is when you need the added air. So to go along with your air pump, you will need an alternating timer which has day/night cycles. The day cycle will control your lighting, and the night cycle controls the air. Set it up so that when the lights go off, the air comes on, and visa versa.

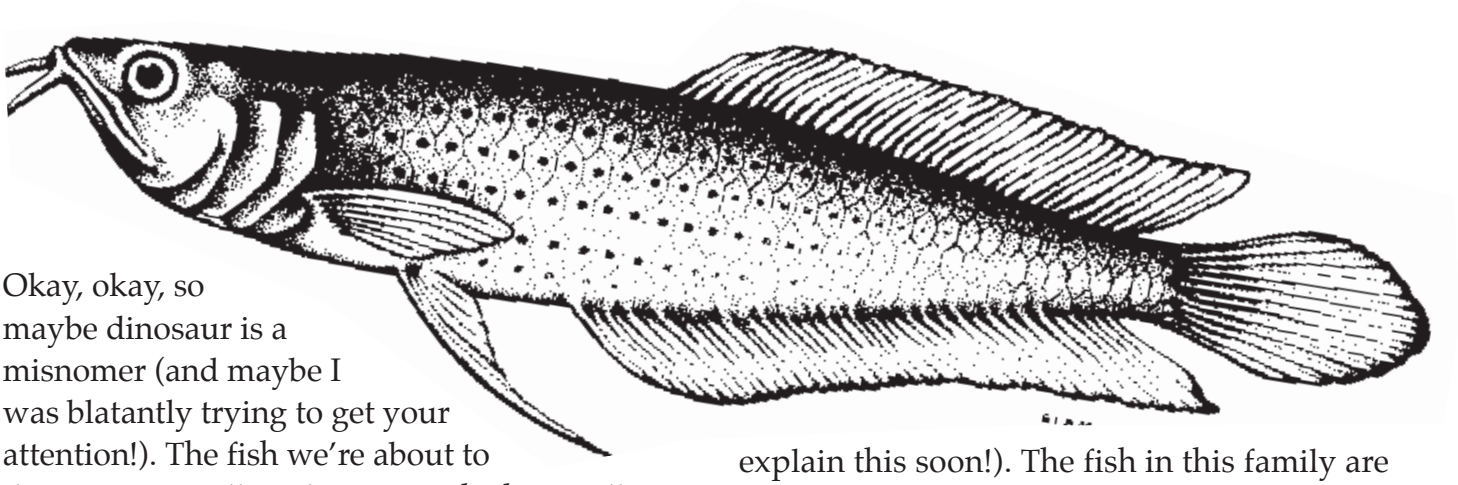
The only hardware issue we haven't covered yet is lighting. Because lighting is a much larger, complicated and important topic, that will be the focus of my next article. See you then.

Arnaldo Lopez Jr. ~ BAS

A DINOSAUR IN YOUR TANK

Back in the day (or way back, depending on when you were born) Mobil, now Exxon, used to advertise its product by encouraging consumers to "Put a Tiger in your Tank!"

Well, I'm sure that there are plenty of us hobbyists, breeders, fanciers, etc. that would proudly boast about the "tigers" we have in our tanks, but there are also quite a few of us that may have reached a little farther back into the primordial waters and placed a DINOSAUR in our tank.



Okay, okay, so maybe dinosaur is a misnomer (and maybe I was blatantly trying to get your attention!). The fish we're about to discuss isn't really a dinosaur, which actually means "Terrible or Monstrous Lizard," but since its ancestry dates back to the Jurassic Period (yeah, that Jurassic Period!) it's a pretty safe bet that it swam with and probably even preyed on dinosaurs!

The fish I am referring to is the Arowana, also known as the Aruana, Baramundi, Dragon Fish, Saratoga, or Kelesa. The Arowana, as we'll refer to it in this article, can be found in the tropical and sub-tropical fresh waters of South America, Africa, Asia and Australia.

Its body type is the streamlined, sleek, almost eel-like body of a consummate underwater predator. And a predator is exactly what it is! Arowanas are carnivorous surface feeders and can often be observed moving smoothly just below the water's surface, using its signature mandibular barbels or whiskers to sense the movement of possible prey on the water's surface.

It feeds primarily on other fish, worms, and insects, although there are reports (many of them verifiable) of Arowanas attacking and feeding on snakes, lizards, and even small mammals such as rabbits and monkeys that stray too close to its hunting area. And, c'mon, these long and powerful fish have even been known to leap over six-feet in the air to catch birds or bats in mid-flight!

Getting back to the Arowana's prehistoric past, they belong to the family *Osteoglossidae*, also known as the bonytongues (don't worry, I'll explain this soon!). The fish in this family are distinguished by having a bony head, an elongated body with dorsal and anal fins that stretch the length of the body, and large, heavy scales. They're called "bonytongues" because of a bone on the floor of the mouth (the so-called "tongue") that's covered in jagged, toothlike formations. When the Arowana captures its prey, escape proves impossible for the hapless critter when the Arowana's "bony tongue" bites against the teeth on the roof of its mouth. In fact, the open mouth of an Arowana resembles little more than a yawning aperture lined with razor-sharp teeth.

The Arowana in your aquarium...

Arowanas are large, often aggressive fish with the potential for quickly outgrowing their aquarium home. Remember, it's a long, muscular predator that can reach 24" to 48" in captivity. As we mentioned earlier, the Arowana is a surface feeding fish, so it will spend most of its time gliding back and forth the length of its enclosure. Therefore, width or length, as far as the tank goes, should take precedence over height or depth. However you should also try to keep the width of the tank equal to or even greater than the length of the fish in order to allow more freedom of movement, which will help in keeping your fish healthy. For an immature Arowana, a regular 20 gallon long will be adequate for a couple of months (three if you're lucky!), but as your fish

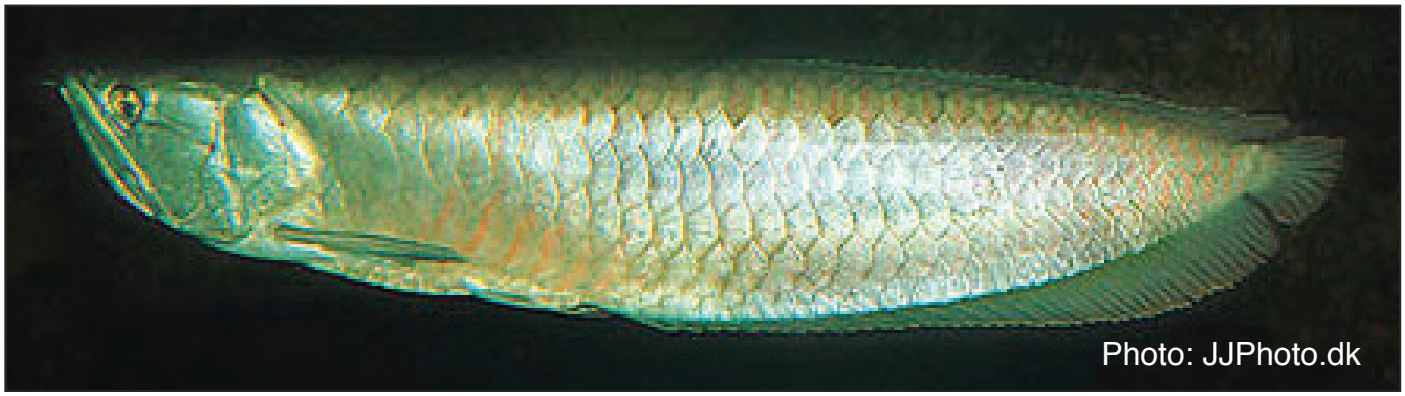
grows, you better start shopping for a series of larger tanks, culminating with a hefty 175 gallons or more for a full-grown fish! Like most primitive fish, Arowanas can "breathe" oxygen from the air by gulping it into their swim bladder. So don't be too alarmed if you notice your fish gulping air at the top strata of their enclosure. They are very sensitive to nitrites so you'll definitely want to keep an eye out for that. In captivity, young Arowana can be fed small live fish, shrimp, and soft-bodied insects 2-3 times daily. Adult fish can be fed larger fare as long as you're sure that the prey can't turn the tables on the predator! Adult Arowanas can be fed live fish, thawed out frozen fish chunks, shrimp or insects. Nowadays there's Arowana food available in pellet form, although school's still out as to whether the pellets are actually better than the more-or-less fresh/live food that is the traditional fare offered to captive Arowanas.

When feeding your Arowana, remember that its preferred method to capture prey is to attack, usually from underneath, by bending its powerful body and then suddenly springing forward in an almost snakelike strike. It's a good idea therefore to always keep its tank covered as it is, as mentioned earlier, also a prodigious jumper.

These are tropical/sub-tropical fish and should be kept in water that ranges in temperature from 75° F. to 82° F. Seeing as how most of you are seasoned hobbyists, etc., I don't have to tell you that consistent water temps, along with proper filtration, pH levels and water quality will go a lo-o-ong way to maintaining your Arowana's health and well being… and don't forget those critical water changes! Change about 25% - 50% of your fish's water weekly to prevent those nitrate build-ups.

Because of their large size and aggressive behavior, Arowanas are best kept by themselves… but if you insist on "friends" for your fish, then make sure that they're not small enough to be eaten, swallowed, harassed or hounded. They should also not be surface feeders like your Arowana as this will cut down on any territorial aggression on both fish's parts. Arowanas usually get along with (or at least tolerate!) most bottom feeders.

Well, that's about it. With proper care, your prehistoric fish should survive about 10 years in captivity. Now you can enjoy your very own piece of Jurassic… well, you know… and I hope to bring you more info about primitive fish in future issues! Ciao!



Joseph Ferdenzi ~ GCAS
Reprinted from Modern Aquarium, November 2011

Nostalgia Notes:
New York's Fabled
AQUARIUM STOCK COMPANY

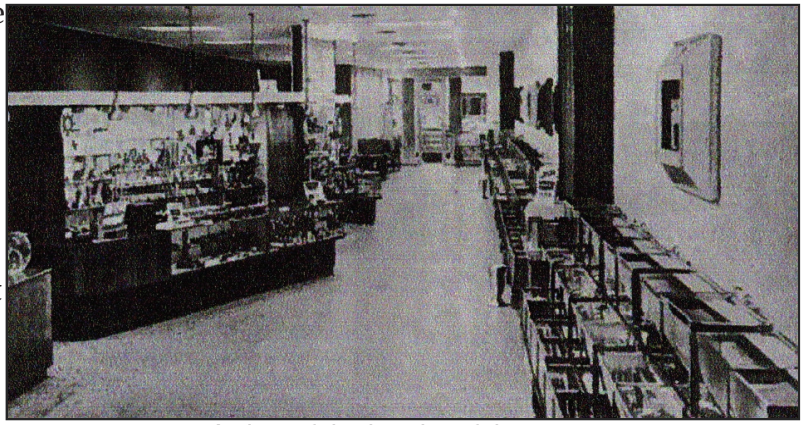
The main entrance, on Warren Street.

As we fast approach the 90th anniversary of the Greater City Aquarium Society, it occurs to me that many of the members are relatively new to the hobby and are probably unaware of the great role New York City played in the development of the aquarium hobby in America. Not surprisingly for a city of its size, that role included being home to some of the most important aquarium stores in the country, not the least of which was the world-famous Aquarium Stock Company.

New York's Fabled
Aquarium Stock Company

Those of you who have been in the hobby as long as I have (dating back to the mid 1960s) or longer will undoubtedly remember it. The rest of you may be saying you never heard of it, much less experienced it. I remember it well, and I'm sure that anyone who visited it would never forget it.

The store began sometime around 1910, and lasted well into the 1980s. Therefore, at the time of its demise, it was undoubtedly the oldest continuously operating aquarium store in the country. It was always located in Manhattan, though not always at the same address.



A view of the interior of the store.
looking south from the Warren Street entrance

Its longest-used and most well-known address was 31 Warren Street, just a block from City Hall, and to the east of Church Street. Although its official address was on Warren Street, the store ran the entire length of the block and had an entrance on Murray Street, which is south of Warren Street. Even though the main entrance was on Warren Street, I recall frequently entering the store on the Murray Street side. I especially remember a large, rectangular sign that dangled over the sidewalk on Warren Street; it was painted red, and featured an angelfish in neon lights. I often wonder whatever happened to that sign - I know it continued to hang over the sidewalk for several years after the store had gone out of business.

Anyone walking into that store could not help but be impressed. Let's see if I can re-create the image for you.

If you walked in through the main entrance, the first impressive thing that would strike you was the block-long wall of tanks on the right-hand side. If I recall correctly, this consisted of three tiers of tanks set against the wall. What you have to visualize is that this was an entire city block long! Especially if you were a young person, like myself when I first saw it, you just couldn't help but be mesmerized! There it was - tank after tank of exotic fish (almost all freshwater). The variety was tremendous; it was the place I saw live killifish for the first time, including the most exotic "king of the killifish," the blue gularis (now known scientifically as *Fundulopanchax sjoestedti*). You could easily spend an hour just looking at all the fish along this wall.

On the left-hand side of the store, the scene was more disjointed. At the front of the store were some racks with tanks that housed, if my memory is not failing me, mostly marine fish. But after that came the nerve center of the whole operation, the sales counter. The store carried just about everything a hobbyist could need or want. All the major manufacturers of the day were represented, but the store also carried many products carrying the imprint of the store. Its distinctive logo featured another famous killifish, the beautiful lyretail, *Aphyosemion australe*. In fact, the fame and reputation of the store were such that other pet shops carried their line of products. Like all aquarium stores in the 1960s, it sold an array of live foods mostly unavailable in fish stores today. When is the last time you've seen live daphnia, glass worms, or bloodworms for sale in a store?

Past the counter area, which was more or less in the center, came the decorated tank displays. Here, tanks of various sizes were outfitted with decorations meant to convey images of what could be achieved in your home or office. Some of these displays were in roped-off areas. As a youngster, these decorated tanks did not attract my attention for very long, because they were way out of my ability to buy or find room for in

The cover of the 1965 Aquarium Stock Company's catalog.

my parents' small, city apartment. (If you entered from Murray Street, these display tanks were the first thing you'd see on your right-hand side).

Whenever we had the time and a few extra dollars, I and my friends and fellow tropical fish hobbyist Mike Giaziano would take the subway from Corona (Queens) to lower Manhattan, emerging from an underground stop that, unbeknownst to me at the time, was going to be the site of the World Trade Center. After our visit to Aquarium Stock, we would also stop at a store a few blocks away on Nassau Street (to the east of

An Ad from the back cover of the Nov/Dec 1960 issue of The Aquarium magazine. Note the "Aqua Stock" brand, and the use of a celebrity aquarist, Paul Hahnel, who was a member of Greater City (look for his name on our Roll of Honor in our December issue).

NYLON DAPHNIA NETS (Extra Fine Mesh)

6356 3" x 5", 12½" long ..... Price 20c
6357 4" x 4", 14" long ..... Price 30c
6358 5" x 4", 12½" long ..... Price 35c
6359 8" x 5", 18" long ..... Price 60c

NYLON FISH NETS

All nets are made of fine quality nylon mesh stitched with long wearing nylon thread. They have strong wire handles.

For efficient netting of your fish, use two nets at a time.

Where you have more than one aquarium, there should either be separate sets of nets for each, or nets should be thoroughly dried or cleansed before use in each tank.

Following this procedure will greatly help prevent the spread of infectious diseases from one tank to the next.

6361 2½" Nylon ..... Price 20c
6362 3" across x 2½" wide. Overall length 12½" ... Price 25c
6363 4" across x 3" wide. Overall length 12½" ..... Price 35c
6364 5" across x 4" wide. Overall length 12½" ..... Price 45c
6365 5" across x 4" wide. Overall length 18" ..... Price 55c
6366 6" across x 5" wide. Overall length 18" ..... Price 69c
6367 8" across x 5" wide. Overall length 18" ..... Price 98c
6368 10" across x 7½" wide. Overall length 18" ..... Price 1.75

THERMOMETERS

6316 S.S. Thermometer clips. 15c.
6317 Plastic Hanging Thermometer. 79c.
6319 Aqua-Stock Stainless Steel Thermometer. Very accurate temperature readings. Red-filled with clearly defined markings. Hangs on frame of tank. Price $1.00.
6322 Standing Thermometer. Accurate within 2 degrees, red filling, 5" long. Price 75c.
6324 Standing Thermometer. Red filling, 4½" long. 35c.
6326 Floating Thermometer. Red filling, floats upright at aquarium surface. 5" long. Price 35c.
6330 Rubber Suction Cups. Used to fasten accessories to sides of aquarium. Rustproof, stainless steel. 10c each, 3 for 25c.
6331 Double Suction Cup. Keeps thermostat and heater tubes vertical. 25c each.

PLANTING TONGS, SNIPS AND SCRAPERS

6275 Planting Tongs. For easy planting, these economical tongs are the answer. Wetting of hands is avoided. Stainless steel, rustproof handles, 19" long. Price $1.25.
6276 Planting Snips. Trim dead leaves easily and quickly without hurting plants or wetting hands. Stainless steel, rustproof handles, 19" long. Price $1.25.
6280 Wood Handle Scraper with Rubber Squeegee. One side has a rubber squeegee and the other a razor blade for removing algae. Not rustproof, 20" long. Price 50c.
6281 Plastic Scraper. Wood handle. 50c.
6283 Scraper. Chrome plated, rustproof with squeegee. Price 98c.
6285 All Plastic Scraper. 3-way tool. Pruner, scraper and planter. 20" long. Price 60c.
6286 Quik-Silk. Plastic sponge aquarium cleaner on handle. Price 25c.

56

MOLDED OUTSIDE PLASTIC FILTERS

These well-constructed plastic filters are designed for maximum service and efficiency at lowest cost. Made of molded plastic, they are furnished *complete* with 2 stems, (intake and return). An Aqua-Stock Product.

8001 Jr. Plastic Outside Filter. A fine performer suitable for aquariums up to 10 gallons. Completely equipped, ready for filter action. 6" high, 5" long, 3" wide. Price $2.75 with coal and wool.

8033 Eureka-LoBorn Natural Flow Outside Filter. Automatically starting high volume filter. Has single stem from tank into filter box. Natural overflow return. Works at any water level. Price $2.98.

8033

HI-SPEED FILTERS

Preferred by experienced hobbyists. Very rapid volume and even temperature circulation affected by the placement of the return and intake stems on opposite ends of the aquarium. Complete with charcoal & glass wool.

8031 Outside Hi-Speed Lucite Filter. Syphons 25 to 50 gallons an hour to keep aquarium water clean and free of sediment. Recommended for tanks 10 gallons and up. Price $4.50.

8034

8034 SUPREME AQUA-MASTER POWER FILTER. A turbo-action unit capable of filtering 140 gallons of water per hour. Designed for large aquariums, this rugged filter-pump combination fits all aquarium frames up to 1". Attaches to the outside of the aquarium. The guaranteed motor is mounted well above the water line. All internal filter parts are molded lucite and styrene rust resistant and saltwater corrosive resistant plastics, making the Aqua-Master ideally suited for marine aquaria.

8034 Molded Plastic filter box. 12"x4"x8". 1/150 hp motor $27.95
8034A Molded Plastic filter box. 9"x3⅜"x7". 1/150 hp motor $25.95
8035 King size Aqua-Stock Powermaster. S.S. and glass filter box, 12¼"x5"x12¼". SELF-OILING 1/70 hp motor $38.95

INSIDE PLASTIC FILTERS

For those preferring inside type filters, here's a group of automatic units that require no fuss or bother. Usual maintenance of intake and return stems is eliminated. Merely attach hose from pump or valve to single stem and filter begins operation. An Aqua-Stock Product.

8029 Deluxe Bottom Filter and Aerator. A small, but powerful filter for all types of air pumps. Completely disassembles for quick, easy cleaning. 5" long, 2¾" wide, 3½" high. Price ..... .98

8030 Bottom Filter and Aerator. Sloping top-surface with angled vents eliminates dirt collecting nuisance. Has removable charcoal tray for easy changing and rinsing. Angled back fits snugly into corner. May be buried in sand or gravel and operate at top efficiency. 4¼" across front, 3¼" wide, 4¼" high. Price $2.50

8029

8030

Aquarium Stock Company Inc. • New York

A page from the 1965 catalog, depicting various aquarium gadgets

As this page from the same catalog illustrates, filters were few and primitive compared to what is on the market today.

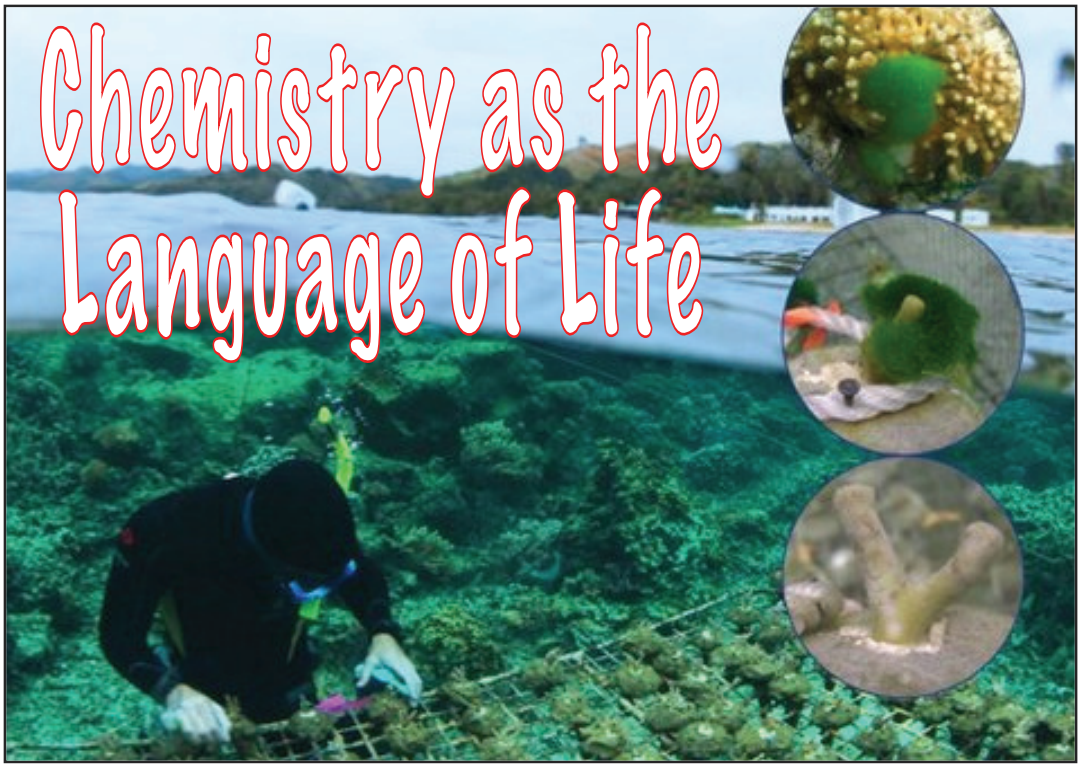
Broadway), appropriately named Nassau Street Pet Shop. This was a small hole-in-the-wall kind of place, featuring tanks filled with fish at very cheap prices. For those who remember the store, its claim to fame was that one of its sidewalk windows featured a community tank (about 10 or 15 gallons in size) of plants and fish, with a sign proclaiming that the tank had been set up in some long-ago year and had never had a water change! You see, back in the day, the concept of the "balanced aquarium" held sway, and the idea that you could maintain a healthy fish population for years without water changes was considered something to brag about. Anyway, this store also went out of business around the same time, or maybe a little earlier, as the Aquarium Stock Company.

In its day, Aquarium Stock published beautiful catalogs intended for their mail-order customers (yes, they had mail-order back then for people who weren't lucky enough to be able to visit the store in person). These catalogs are now like time capsules that display what was available to mainstream hobbyists of the day, and have become cherished collectors' items. (As a footnote, I'll mention that they eventually opened a branch of the store in Los Angeles, and this location operated well into the 1990s.)

I only wish that the store was still around today. Nostalgia has a wonderful effect, and I enjoy sharing memories of the place, but the pool of people who can share those memories is ever shrinking. And I wish newcomers to the hobby could have experienced it, so that one day, they too could say they were there and remember.

MARK HAY
Mark Hay, a biology professor at Georgia Tech, writes from Fiji, where he is investigating coral-seaweed competition in the coral reefs.
Thursday, Oct. 13, 2011 NYT

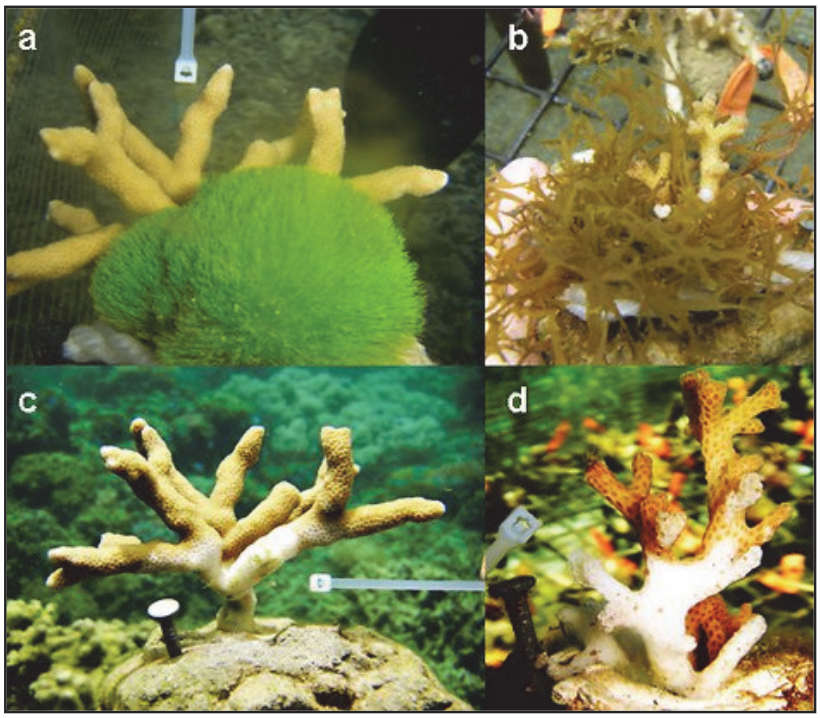
Chemistry as the Language of Life



Mark Hay; inset photos by Douglas Rasher
A coral rack on the reef at Votua Village with a diver monitoring the corals. Insets show (top to bottom): the green seaweed Chlorodesmis in contact with a coral on the reef, the seaweed on our experimental rack, and the effects on the coral (bleached and dead tissue) after 20 days of exposure to the seaweed.

Functioning largely by sight and sound, humans are poorly equipped to understand the importance of chemical signals among organisms. We pay to go to museums and concerts where we see and hear; we rarely pay to go to "displays" of smell. In contrast, most organisms have neither eyes nor ears; their world is governed by chemical senses. Chemical cues and signals determine whether they eat, run from or mate with the thing next to them. These chemicals constitute much of the language in which the instructions of ecology, and life in general, are written. We are "chemical linguists" trying to translate these chemical signals to better understand how nature works, to conserve it, restore it and use its products for our benefit.

Seaweeds, and invertebrates like sponges, for example, that are attached to the bottom of the sea, produce toxic compounds to keep from being eaten by fishes. However, these chemically noxious prey then become evolutionary opportunities for small consumers (think insects, but in the sea they are usually small shrimplike organisms, crabs or snails) that can gain protection from their own enemies by living on and eating these toxic prey that are not visited by fishes. Several species of snails (sea slugs) eat nothing but these toxic seaweeds, sequestering the seaweed toxins and becoming well defended from their own predators. These snails no longer make



The green alga Chlorodesmis, top left, and the brown alga Dictyota, top right, in contact with corals. The bleaching of corals, bottom, can be seen after 20 days when the seaweeds are removed.
Photo Douglas Rasher

shells (their sequestered toxins protect them, so why carry the heavy shell?) and several even sequester the photosynthetic machinery from their algal hosts, gaining much of their energy from stolen chloroplasts instead of from eating the seaweed. They have been described as "leaves that crawl."

Males of some marine species also smell and follow trails of females for mating. The females, in turn, can assess males by smell, detecting via chemical cues those males that are larger or stronger, or even those males that have more sperm to fertilize all of the female's eggs.

Some fire corals (corals that sting when touched) use the skeletons of inferior competitors to get up into the water column instead of investing in their own skeletons. These corals chemically sense that the inferior competitor is nearby, selectively grow toward that species and overgrow it.

Thus, chemical signals and cues play a large role in determining who eats whom, who mates with whom and who wins in competitive interactions.

In Fiji, we are assessing how seaweeds use toxins to damage and suppress corals. To assess how different seaweeds affect common corals, we transplant coral fragments into small experimen-

tal cones, grow these corals on metal racks on the reef, and then transplant seaweeds against these to measure their effects on the corals over hours, days and weeks. To evaluate the possible effects of shading and abrasion (as opposed to chemical effects), we included a "fake seaweed" that mimics the physical presence of a seaweed, but not its chemical effect (these are the white "seaweeds" in the photos). Some seaweeds strongly affected corals (causing bleaching and death); the artificial seaweed did not. For those seaweeds that affect corals, almost all effects were restricted to areas of direct contact; this suggested that a compound rubbed from seaweed surfaces was affecting the coral. When we used organic solvents to dissolve oil-like compounds from seaweed surfaces and incorporated these into gel strips made on plastic window screens and placed on corals, strips made with extracts from damaging seaweeds harmed corals. Those containing extracts from seaweeds that did not damage corals had no detectable effects.

The effects were initially measured as visible coral bleaching, but to prevent possible bias on our part, we moved to using an underwater pulse amplitude modulated fluorometer (a PAM meter) that measures the photosynthetic potential of the coral as a proxy for coral health. This machine produced a more quantifiable measure of coral well-being. To date we have tested eight species of seaweeds against four species of corals. In general, some seaweeds are very damaging to all corals, and some are not. The corals that are most easily damaged are among the species that have shown the greatest declines in recent decades. In a few cases, we have been able to separate, purify and identify the specific seaweed chemicals that are damaging corals.

We have also been evaluating which fishes consume the different seaweeds by outplanting seaweeds onto the reef and videoing fish responses to each seaweed. Data are still being processed, but it appears that the most damaging seaweeds are consumed by only a very few species of fish, suggesting that limiting the harvest of these particular fishes might be helpful in preventing seaweed replacement of corals on tropical reefs.

Photo: Joe Graffagnino

STACEY ALTHERR
Stacey.altherr@newsday.com
www.newsday.com NEWSDAY, FRIDAY, JANUARY 20, 2012
Photo **GORDON M. GRANT**

REELING IT IN

Southampton students complete state-of-the-art marine lab

Southampton High science teacher Greg Metzger checks on a tank in the school's new marine science lab

LAB FACTS

SIZE
2,600 square feet
TANKS
More than 100, ranging from 15 gallons to 1,200 gallons
MUST-SEES |
• 925-gallon coral reef display
• Two 300-gallon tanks, one for freshwater fish and another for saltwater fish.

Just days ago, there was much left to do to get Southampton High School's new state-of-the-art marine lab ready for its ribbon-cutting today. Dozens of water filters buzzed in the background as the students who helped build the lab filled up some of the more than 100 fish tanks, cleaned the glass on others and spruced up the lab. "When we come back in 20 years, we can know we built it," said **Victoria Wisner**, as she and some of her classmates cleaned up the lab's greenhouse. "I wish now I was a sophomore." She and seven fellow seniors — **Sanpwe Tarrant, Ashley Oliver, Malcolm Williams, Collin Mc- Namara, Christian Sanchez, Travis Steidle** and **Vincent Gulli** — were primarily responsible for erecting the 2,600-squarefoot lab in time, along with science teacher **Greg Metzger**, the lab's chief architect. On Wednesday, Metzger dumped two white-spotted bamboo sharks into the "touch tank," a 1,200-gallon concrete open basin that will house students' local catches. It will eventually have water movement that mimics the tide's ebb and flow. In the back of the lab is a 900-gallon glass enclosure that will house quite the

opposite of local catch; live coral grown in an artificial climate designed to replicate an Indonesian island. In the marine greenhouse, which holds two large openwater tanks, local eelgrass will grow, giving students a place to test the effect of brown tide algae on the species. Among the lab's first projects has been hatching clown fish, one of the more colorful fish sold in pet stores. "This experience in high school will allow them to walk into any hatchery" and get a job, Metzger said. The construction of the lab, which began in earnest in the beginning of the school year, in the high school's new wing, was a small part of a $53.4 million bond approved by voters in 2007. Metzger, who got his bachelor's in marine science at the former Southampton campus of Long Island University, said he was told by administrators to "design your dream classroom" for use with the marine science courses at the high school. So, he went to the Long Island Aquarium and Exhibition Center in Riverhead, East Hampton Shellfish Hatchery and the Southampton campus of Stony Brook University to get advice on building the perfect teaching science lab, he said. Aquaculture, one of the courses, will focus on the breeding and raising of fish that will be sold to pet shops to help offset the costs of running the lab, such as food, pumps and other equipment. Metzger also hopes to breed Bangaii Cardinal fish and sea horses, as well as the coral, for sale. Wisner and Oliver agree that working on the lab and studying marine life have given them a better appreciation of their unique East End environment.

"It's good to see the changes, from what it was to now," Oliver said of the lab. Sanchez said he's not sure if he wants to work in marine environmental studies or criminal justice, but he knows that the lab project was invaluable. "It's a great story to tell, you know?"

Dan Hagan runs TheShrimp Farm.com.
The place to go for dwarf freshwater shrimp.
Shrimp are the perfect aquatic inhabitants for your under water planted garden.
If you're interested in keeping dwarf freshwater shrimp or have a question about them, go to Dan's blog site and ask your question. It's a great site with reliable and accurate information on dwarf shrimp.

Orange Eyed Blue Tiger Shrimp

Blue Tiger Shrimp History

The Blue Tiger Shrimp with orange eyes has not been around the shrimp keeping hobby for long. The wild type of these shrimp originates from South East Asia, and has been bred into these vibrant blue colors with orange eyes.

Blue Tiger Shrimp Care

These shrimp are relativly easy to take care of. They can even be kept in water with high pH, but these are not ideal circumstances for them! As with all shrimp, it is recommended to keep a sponge filter in the aquarium to prevent potential baby shrimp from being sucked into it. These shrimp like very clean water, so no issues with this extra filtration!

Blue Tiger Shrimp Diet

The Blue tiger shrimp will eat algae, but it is recommended to also feed some food pellets to keep them fed. Feeding is only required once per day, especially once there are baby shrimp in the tank.

Blue Tiger Shrimp Breeding

The blue tiger shrimp does not breed true. Its offspring will of course have the blue coloration but not all. They will all however have the orange eyes!

Scientific Name:
Caridina cf. cantonensis
Other Scientific Names: N/A
Common Name:
Blue Tiger Shrimp
Other Common Names:
Orange eyed blue tiger shrimp
Origin: South East Asia
Found in the wild: No

pH Range: 6.2 - 7.2 Ideal pH 6.2
Temperature Range: 68˚ - 75˚ F
Ideal Temperature: 72˚F
Hardness Range: -2.-10 dkh
Ideal Hardness: 3 dkh
Life Span: 1 - 2 years
Size: 1 - 1.5 inches
Gestation Period: 30 days
Diet: Omnivore

Special Notes

As with all aquatic invertebrates, it is important to make sure copper does not get into the aquarium. Copper is toxic to all Dwarf Shrimp. Many medications contain elevated levels of copper, so it is recommended not to medicate an aquarium with Dwarf Shrimp in it.

DOUGLAS QUENQUA
New York Times 12/27/11

An Idyllic Picture of Serenity, but Only if You're Not Inside-Tropical fish hobbyists will tell you their tanks are a source of relaxation, but recent research suggests the fish might disagree.

Nearly 13 million American households contain a fish tank, and the average tank size is less than 10 gallons. Yet a study comparing the behavior of common freshwater fish in a variety of habitats found that those kept in such small tanks were considerably more aggressive than those in larger ones — more likely to fight, flare their gills and guard whatever tiny alcoves they could find.

"In larger tanks, the fish were not in continuous eyesight of each other, and were swimming around checking everything out rather than beating the heck out of each other," said the study's author, **Ronald G. Oldfield**, a professor of biology at Case Western Reserve University.

The fish in question were Midas, or "red devil" cichlids, a species popular among hobbyists for their brilliant colors and active swimming habits. Dr. Oldfield used only very young fish to eliminate aggressive behaviors associated with mating.

Dr. Oldfield concedes that the emotional well-being of fish may not tug many heartstrings. "It's probably not the end of the world," he said in a telephone interview. Even the Humane Society, which routinely has commercials featuring slow-motion video of abused pets, does not offer guidelines for the treatment of pet fish.

"We work on almost every animal issue under the sun," a spokesman said by e-mail, "but I don't think this is one of them."Still, Dr. Oldfield noted that the average household tank was only one-tenth the size of the smallest tank in the study to yield docile fish. "If people kept dogs in these conditions, they'd be put in prison," he said. "It's something we should think about."

The study consisted of two experiments conducted side by side. In one, Dr. Oldfield tested the effects of overcrowding by keeping

tank size constant while increasing the number of fish. In the other, he tested environment by placing three fish in consistently larger and more complex tanks. He then recorded their behavior at least two hours after feeding, to eliminate competitive behaviors related to food.

While aggression seemed to remain constant regardless of the number of fish in a tank, Dr. Oldfield observed that it dropped off considerably once the fish were placed in a 100-gallon tank with several plants and rocks to form alcoves.

The findings confirmed what he found when observing Midas cichlids in the wild. "If you go out and observe these fish swimming in a river," he said, "they're not aggressive at all, really."

This is not the first study to suggest that water-dwelling creatures can become aggressive in small tanks. Biologists at the University of Alabama, Birmingham, recently found that sea urchins turned to cannibalism when kept in small, overcrowded tanks. The researchers were trying to recreate typical farming conditions for sea urchin, a delicacy in Japanese cuisine.

Nor is the idea news to **Justin Muir,** the owner of City Aquarium, a luxury fish tank business in Brooklyn.

"It just goes back to behavioral exercises," said Mr. Muir, who has designed tanks for the Yankees pitcher **C. C. Sabathia** and the Dream Hotel in Manhattan. "More volume of water is always the better bet. It basically keeps the fish healthier, and the tank is more stable." In that way, he said, fish are like any other pet kept in a small enclosure. But a major difference between fish and, say, Rottweilers is that aggressive behavior in small swimmy things can be entertaining, at least to humans.

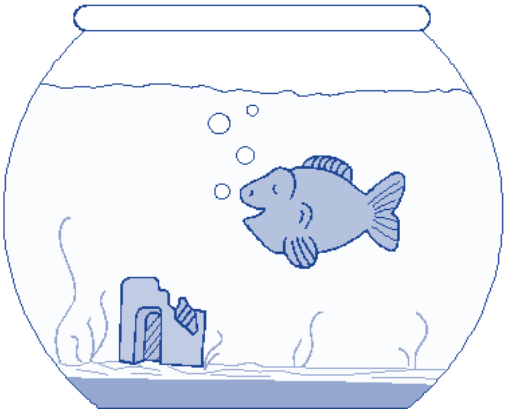
"That's why these fish sell," Mr. Muir said, "because people like the way they act."

Indeed, hobbyists who probably don't view themselves as diabolical gleefully exchange online tales of clashing cichlids. Describing a case of "road rage" between two of her fish, a visitor to Fishchannel.com wrote:

"The two would stand in front of the other twitching their lower fins as in sign language, yelling at the other with 'You almost hit me you blind fool. Didn't you see me coming? I had the right of way!' "

Overcrowding has also become an issue on fish farms, where salmon or trout are sometimes packed into high-density pens, just as chickens or pigs are on industrial farms. The danger there is less about the happiness of the fish than about their health, said **Alan Duckworth**, a research scientist with the Blue Ocean Institute in Cold Spring Harbor on Long Island. "Some species do better at high densities," he said, "but the majority of species could be affected by overcrowding. It likely would stress them out, which could increase the amount of disease."

One frequently cited problem with farmed fish, particularly salmon, is sea lice, whose spread has become such a problem in Scotland that the government is considering a ban on coastal fish farms. For Dr. Oldfield, the welfare of fish is a concern that dates to when he was 6 years old and won a goldfish in a small bowl at a county fair. He says he understands that a 100-gallon tank is beyond the means of the typical tropical fish hobbyist, but people who love their fish should be aware of the damage they may be doing by keeping them in small, bland environments

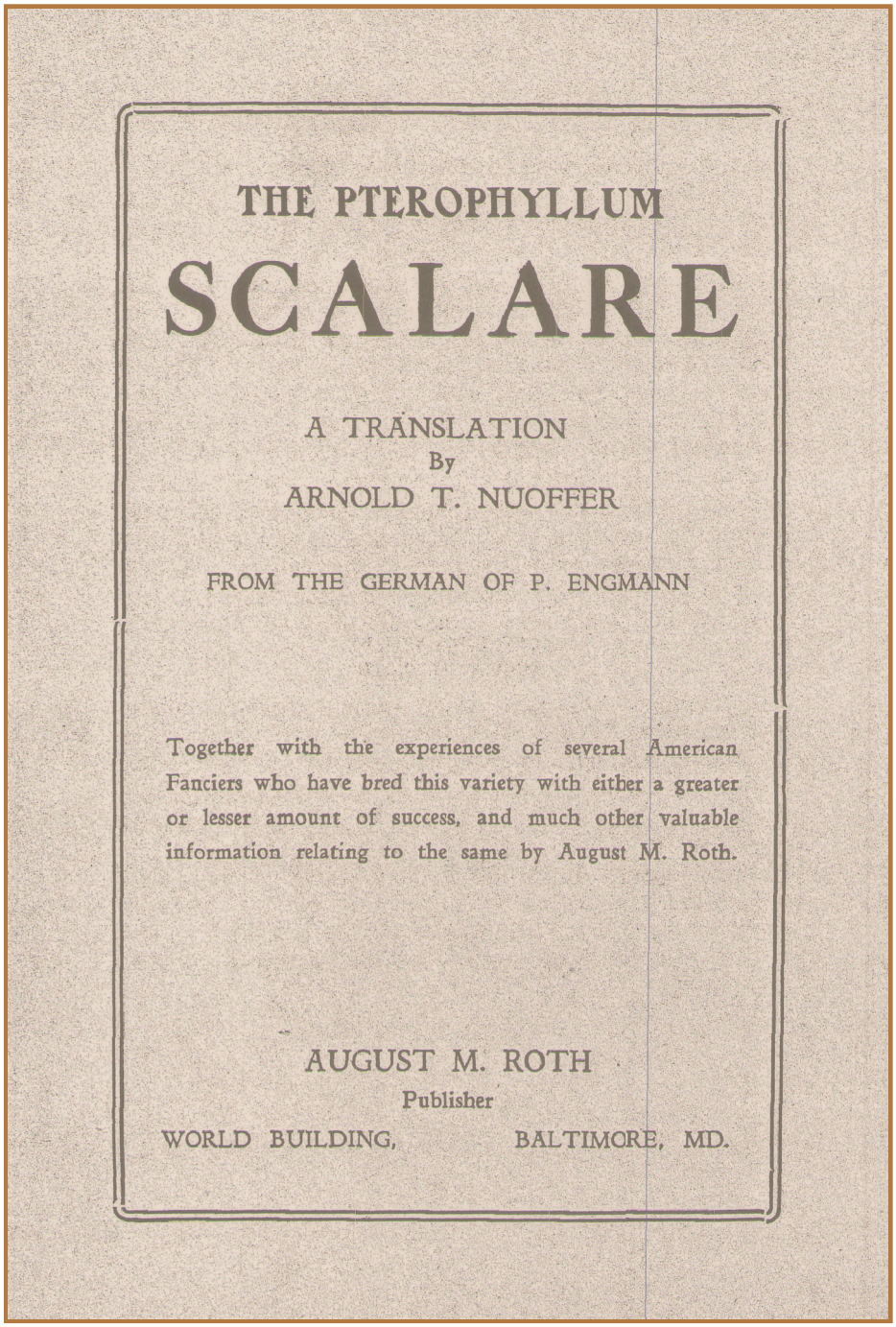


"I'm not saying people need to stop keeping fish as pets," he said, "but they do need to look at the ecology of animal aggression."

As for goldfish won at carnivals, he said, "they should never, ever be kept in those bowls."

A Rare Historical 1925 Book on Anglefish by P. Engmann Translated by Arnold T. Nuoffer

Reprinted in Full



THE PTEROPHYLLUM

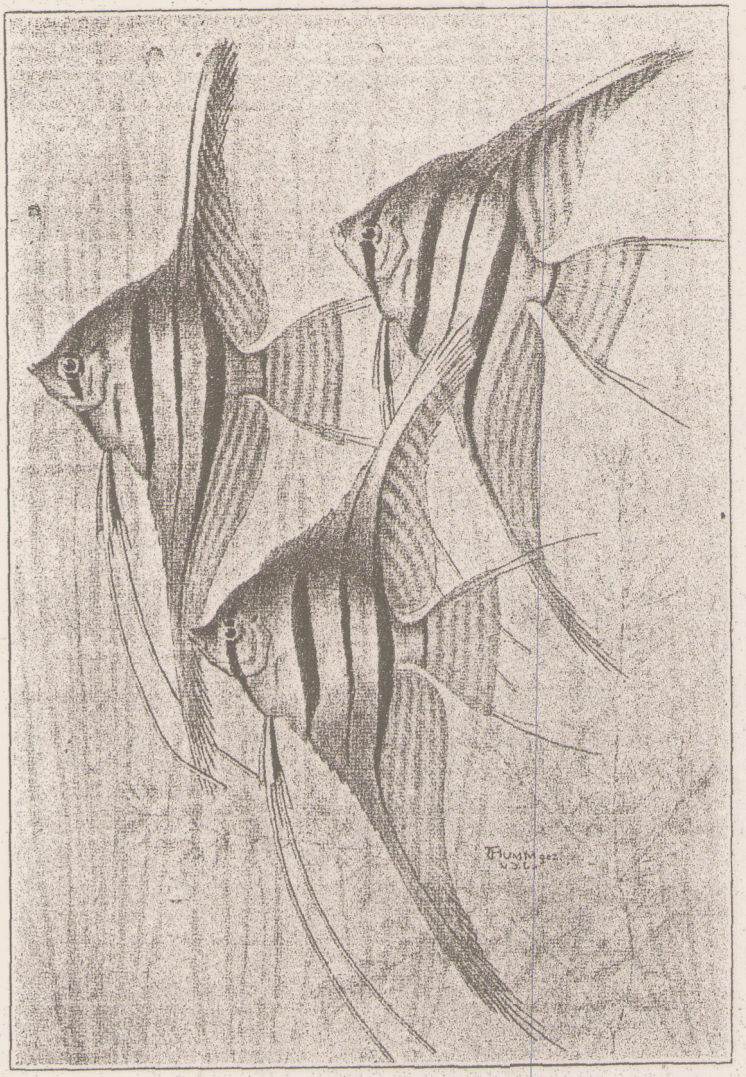
SCALARE

A TRANSLATION
By
ARNOLD T. NUOFFER

FROM THE GERMAN OF P. ENGMANN

Together with the experiences of several American Fanciers who have bred this variety with either a greater or lesser amount of success, and much other valuable information relating to the same by August M. Roth.

AUGUST M. ROTH
Publisher
WORLD BUILDING, BALTIMORE, MD.



Pterophyllum scalare.

(Cuv. et Val.)

The Pterophyllum Scalare by P. Engmann translated by Arnold T. Nuoffer documents the introduction of the Herman Rabenau, members of the Brooklyn Aquarium Society. It also documents the fascinating history of the early failures and successes breeding Angelfish in the country. It has been 87 years since this book was first published in 1925.

We hope that as the publisher wrote in his Forward:

"If the information contained herein will be the means of overcoming even a small percentage of the troubles which beset the average beginner in the keeping and breeding of the Scalare, I shall feel well repaid for the great expense attached to the publishing of even this small book."

August M. Roth

PUBLISHER'S FOREWORD.

The keeping and breeding of the many varieties of Tropical Fish here in America has in late years gradually increased. With it has also come a constant demand, from both beginners and experienced fish fanciers, for information covering one or more of the many varieties which are to be had and which are adaptable for keeping in aquaria. This information was seldom or not at all to be had from literature pertaining to the subject, and at times not to be had by word of mouth. When from literature, the information was contained only in the columns of AQUATIC LIFE. At times this method has proved to be totally inadequate because the article covered the experiences of but a single fancier. Sometimes lack of space was a hindrance for, owing to the paper's small following and therefore limited resources, it was out of the question to publish a lengthy article on any particular variety. Even though unlimited space could be used, the youth of the fancy here in America would make it almost impossible to obtain from any one fancier, subject matter that would be complete or that would cover all species. This caused me to publish this translation, from the original work of P. Engmann, of Germany. To it I have added much valuable information obtained from American Fanciers who have bred or kept the Scalare.

If the information contained herein will be the means of overcoming even a small percentage of the troubles which beset the average beginner in the keeping and breeding of the Scalare, I shall feel well repaid for the great expense attached to the publishing of even this small book.

AUGUST M. ROTH.

THE PTEROPHYLLUM SCALARE

IF any of the fishes kept in aquaria deserves mention, it certainly is Pterophyllum scalare, a "Cichlid."

This fish has been able since its introduction to keep the attention of both the raisers of fish for the aquarium and the laity.

This fish, the Pterophyllum scalare,—fin-leaf, wing-leaf, moonfish, sunfish, sailfish, leaf-fish,—was not introduced accidentally, as was the case with many other fishes for the aquarium. The work was carefully planned, under the direction of J. P. Arnold of Hamburg. He directed the attention of importers to this fish, and asked them to introduce it into Germany. Quite a few difficulties were encountered during the voyage. The fish were kept in narrow, dark rooms, and were not fed as they should be. Fresh water was not easily obtained. Coming, as they did, from the tropics, the temperature, winds, and climate generally did not seem to agree with them any too well. However, the importers managed, and the first consignment was landed safely. Were it not for the difficulties mentioned, nearly twice the amount could be imported. The catchers were not skilled, and had to learn to distinguish between the different varieties. Both the shippers and catchers (fishermen) learned as time went on, and now, nearly every ship which lands has with it a consignment of fishes for the aquarium. Quite often, some of the

fishes die on the way. In late years the sailors have conserved the bodies of these fishes in a solution of formaldehyde, and these are used for observation purposes, to determine which kinds of fishes are profitably imported, and which should not be imported.

In this way the Pterophyllum scalare found its way to Germany and into America through the various German exporters, also at times it was brought by fanciers on their return from said country, a recent shipment by this method being personally attended to by Mr. J. J. Halterbeck, New York City, on his return from an extensive tour of Germany. Some of the finest specimens ever imported into America were in this shipment. Though it may appear improbable, it is, nevertheless, a fact that few if any of this variety are imported into America direct from their native home in South America. Arnold received some specimens in the formaldehyde solution as early as 1909. Not until two years later did he receive the live fishes; twenty-six were in the first consignment.

See note 1

From the little information possible to obtain, we learn the Scalare first appeared in the United States about 1913. O. C. Beldt says, "Scalare were first imported from Germany in 1913 by members of the Brooklyn Aquarium Society, and Wm. L. Paullin was the first to successfuly breed them, later Julius Riewe. Bausman tells us that Wm. H. Heimbach was one of the first to have Scalares and they were also bred by Paullin from stock obtained from Heimbach. Wm. J. Wright also informs us Paullin was the first to breed them. In 1913 six pairs were imported from Hamburg by Halterbeck, the Peerless aquarium manufacturer. These arrived on July 3rd. In March, 1914, Halterbeck sent his

See note 2

1] J. J. Halterbeck was a founding memberof the Brooklyn Aquarium Society and made the first commercial aquarium in 1912 called the "Peerless" aquarium and in 1915 manufactured a one-piece aluminum framed tank.

2] Scalare were first imported from Germany in 1912 by Herman Rabenau, one of America's first importers of tropical fish, who was also a founding member of the Brooklyn Aquarium Society. In March of 1914, J. J. Halterbeck sent collector P. Gnadt to the Amazon to import the first wild caught angelfish to America. These fish were exhibited at BAS's second annual exhibition, creating quite a sensation. Brooklyn Aquarium Society members were among the first to breed angelfish.

collector, Mr. P. Gnadt, owner of a bird store in New York City, to South America. Gnadt visited the Amazon River and Rio Negleo. He succeeded in bringing fourteen pair back with him. Halterbeck also gave Paullin credit for being the first to breed them in America.

As Paullin and Riewe appear to have been the first to breed them in America, it is from them we sought information. Riewe says, "In 1917 I received four Scalares from a New York fancier. These I judged to be about one year old. I placed them in a large tank, feeding them nothing but live food. The following spring I selected what appeared to be a pair, placing them in another tank. For several days the fish swam restlessly about the tank, then both male and female started in to clean a well-developed sagittaria leaf. Shortly thereafter the spawning took place, the female placing the eggs in vertical rows upon the leaf, those which dropped to the bottom of the tank being picked up by her and again placed upon the leaf. The process of spawning consumed about one and one-half hours, then both fish began taking care of the eggs. This lasted for one day when they started to fight. This caused me to remove them to another tank. Then I put into play an aireator, directing its action in the vicinity of the under side of the leaf, keeping the temperature continually near 80 degrees F. In from forty to forty-eight hours the spawn hatched, and the young fish appeared suspended by thin threads from the leaf. This was only for a short time, however, as they then fell to the bottom of the tank, where they remained for five days. In exactly one week after the spawning, the young fish began to swim. For the first two weeks I fed them infusoria, afterward finely sieved daphniae. At the age of three weeks the youngsters had so developed

See note 2

as to resemble the parents. When first hatched they appear-like minute tadpoles. When three months old they were as large as a quarter. I am only able to distinguish the sexes when the female is heavy with spawn. A nest of youngsters usually numbers somewhere near forty, although there are usually about 500 eggs to each spawning.

I still have the original pair, which are now seven years old, being about two years of age when they first spawned, and each year they give me a nice lot of young."

As Mr Paullin, of Pennsylvania, was credited by many with being the first to breed the Scalare in the United States, we made an especial effort to locate him, if possible, and learn from him his methods of breeding them and what success he had met with. From him we learned the following:

"My first Scalares, one pair, were received from Mr. Heimbach, of Allentown, Penna., in the latter part of 1913. These were about the size of a silver dollar. I began feeding them all the large size insects I found in the daphniae which I collected from various ponds. These insects consisted of water boatsmen, tigers, etc., which the fish showed evidence of relishing . These, I found, made the fish grow very fast and it was not long ere they were as large as one's hand. In fact, I have yet to see a pair as large as they were. Why they grew to such large proportions, I am unable to state, if it were not due to the insect food.

"I kept this pair in a 125-gallon tank, well planted with Sagittaria, and kept the water at a temperature of 80 degrees F., which was made possible by the use of a large oil stove kept burning directly beneath the aquarium.

"They first spawned in the summer of 1915, deposit-

ing the spawn on the under side of a blade of sagittaria. By watching them closely I found that directly after they had finished spawning they kept the water in constant circulation with their fins and tails, and in two and one-half days the spawn had hatched, the little fish being fastened to the plants with a thread-like filiament on their heads. This permitted them to swim about and within an area of one-half inch radius. About twice each day the parent fish would move the young fish to a new plant, all the time keeping up the fanning process. It took about seven days before the little fish were able to swim about freely, but at this time I lost them all.

"This pair spawned four times in 1916 and each time I had nothing to show for it. This was most unpleasant, and caused me to seek the cause of this great loss. After taking everything into consideration, I came to the conclusion that a constant supply of fresh water was what was most needed; hence in 1917 I made a gas hot-water heater. This permitted me to have a constant flow of water and at any desired temperature.

"At the next spawning I placed the spawn in five-gallon glass jars, keeping the same supplied with a constant flow of water at 85 degrees. This constant flow of water kept the grass constantly in motion; the spawn hatched in regular time and at seven days were swimming free. At this period I found it necessary to watch them very closely, as they take the swimming notion very quickly. At this period I cut off the running water, as I found they would be in danger of being washed over the tops of the jars, and I took no chances of losing them.

"In 1917 I raised about 250 and 300 in 1918; these I sent to various parts of the country. I have not raised any since

then, as I have not had the proper place to keep fish since removing from the city of Philadelphia."

New importations arrive every five or six weeks—Bausman, Halterbeck, Beldt, Wright, Rabenau and others import them, and from these they may be obtained most all months of the year.

Pterophyllum scalare, wingleaf, belongs to the colored perches. It is a native of the Amazon region. This region covers a vast area. The length of the Amazon is 6,400 km. After the waters of this river have passed the Cordilleras, the water begins to spread over the low and flat country, many tributaries feeding it from either side. The area covered by this vast expanse of water is about five million sq. km., or about one-half of the entire area of Europe. The trade winds unload vast masses of water in the region east of the Andes, and for miles the plains, covered with the thick vegetation of the tropics, are one great plain of water. The difference between the high and low water mark in these regions is about 17 meters. It is but natural that under these conditions the tributaries are compelled to overflow, and thus an enormous lake is created, second to none. When the waters recede, the lagoons, which are thus formed, contain and retain vast numbers of smaller and larger aquatic animals. Among the fishes, turtles, and alligators, our little friend the Scalare, the king of aquarium fishes, is to be found. He lives near the shore, and it is here that the naturalists have caught him and transported him to Europe and America.

A Mr. B. Sagratzki made several exploring trips to the Amazon and he noted the following: The Scalare is found in great numbers at Manaos, at the mouth of the Rio

See note 3

3] These gentlemen were members of the Brooklyn Aquarium Society.

Negro, and especially in the short and narrow bays along the river. Of these he likes the ones which are near the high and rocky shore, overhanging with shrubbery and protected by sea-plants. Strange as it may seem, he is not found in the current, but only in places above described. In one place, so situated, Mr. Sagratzki has caught as many as fifty young fishes in one draught. This must have been the spawning place, for most of them were only 1.5 cm. in length. The temperature of the water at this place is 32 degrees C. and the surface extremely calm at all times. Sagratzki keeps the fishes in his aquarium in Manaos. He states that the first five days are the most particular and critical. After the Pterophyllum have been kept for five days successfully, little danger is in store for them. On board the ship the fishes are kept in aquaria, which are supplied with water taken with him from Europe. They seem to be comfortable at a temperature of 25 degrees C.

Pterophyllum scalare belongs to the species of perch which are flat as a disk. They are natives of the tropics. The body is flat, and if measured, including the dorsal and ventral fin, from top to bottom, they higher than they are long. They may be compared with a triangle shape as follows. The color of this fish is rather simple, but the simplicity of the coloring makes it all the more attractive. The large fins help to make the colors attractive. Arnold says of his first view of these fishes: The color is not varied, but attractive. The ground color of the body, which is high and very much compressed, is an olive gray. This darkens toward the top, and if a bright light shines upon it, it resembles a silver color, slightly tinted with blue. Sometimes this gives way to a brassy

Negro, and especially in the short and narrow bays along the river. Of these he likes the ones which are near the high and rocky shore, overhanging with shrubbery and protected by sea-plants. Strange as it may seem, he is not found in the current, but only in places above described. In one place, so situated, Mr. Sagratzki has caught as many as fifty young fishes in one draught. This must have been the spawning place, for most of them were only 1.5 cm. in length. The temperature of the water at this place is 32 degrees C. and the surface extremely calm at all times. Sagratzki keeps the fishes in his aquarium in Manaos. He states that the first five days are the most particular and critical. After the Pterophyllum have been kept for five days successfully, little danger is in store for them. On board the ship the fishes are kept in aquaria, which are supplied with water taken with him from Europe. They seem to be comfortable at a temperature of 25 degrees C.

Pterophyllum scalare belongs to the species of perch which are flat as a disk. They are natives of the tropics. The body is flat, and if measured, including the dorsal and ventral fin, from top to bottom, they higher than they are long. They may be compared with a triangle shape as follows. The color of this fish is rather simple, but the simplicity of the coloring makes it all the more attractive. The large fins help to make the colors attractive. Arnold says of his first view of these fishes: The color is not varied, but attractive. The ground color of the body, which is high and very much compressed, is an olive gray. This darkens toward the top, and if a bright light shines upon it, it resembles a silver color, slightly tinted with blue. Sometimes this gives way to a brassy

white color. On the body of the young fishes are seen five dark-brown stripes, which are almost black. As the fish gets older, it loses these stripes, somewhat like the Heros spurous Heck. The temperament of the fish seems to act upon these stripes, and if scared or subjected to a strong light, the stripes grow dimmer, and at times are almost extinct. Only three of these stripes are to be seen in older fishes. The one runs from the sixth ray of the dorsal fin to the lower part of the body. Another, which is wider, is located in the back part of the body, and reaches the tips of the dorsal and anal fins. The third is dark, and in the form of a half moon, ranging from the neck through the eye nearly to the base of the ventral fin. Another small stripe is to be found at the base of the caudal fin. The profile of the head in the older fishes curves very much to the upper part of the eye, but shows a gradual upward curve toward the sixth and seventh ray of the dorsal fin in the younger fishes. The base of the caudal fin, the lower part of the dorsal fin, and the base of the anal fin are thickly covered with scales. The scales of the body are small. The fish carries the dorsal and anal fins erect, and these fins are, like the caudal fin, in the male only (this is but a supposition), crossed with rows of black stripes. The long, sabre-like ventral fins of the fish are a special ornament.

Remarkable as it may seem, it is nevertheless a fact, that even though the Scalare is found almost at our very doors, they are always obtained from German exporters in Germany and not direct from their native home. The Germans have made the importing of tropicals a study and business, for which they must be given credit.

Thus Arnold tells in part of the wonderful color of the fins, which are natural to this particular fish. The dorsal and anal fins run out into a long string, which the fish carries toward the back. The upper and lower rays of the caudal fin are likewise ending in a long string, consisting of one or more threads.

Although the fish is a "Cichlid," his mouth is small, and not built to pick up the food from the bottom of the sea. He likes it best if he can pick it up while he is swimming. The pointed mouth of the fish is exactly in line with the center of the triangle which is formed by the body of the fish.

This symmetry, together with the large fins, which are carried like large sails, give an imposing appearance to the fish. The appearance is also strengthened by the color scheme,—silvery white with dark stripes.

The size of the fish varies somewhat. One fancier estimated the length at about 5¾ inches, which would be about 14 cm. However, this is not the full grown fish. The latter measures from 15-16 cm. total length. This includes the caudal fin, but not the threads at the end of the fins.

The fish feeds on live matter on account of its mouth, which is shaped so that it is very difficult for him to get to the bottom in order to pick up his food. In case he wants to do this, he must take a vertical position, head down. He will occasionally pick up larvae from the ground, but it seems to cause some discomfort for him. The food to be recommended, therefore, would be daphnia, white grubs or larvæ, Enchytræ, small rain worms, and red larvæ. Mr. Carl M. Meyer of Leipzig called my attention to the fact that the Pterophyllum likes the boat-fly. This

insect has the habit of darting through the water. Generally, if one should happen to get into the water together with other food, the fish fancier will try to take it out as soon as possible. Mr. Meyer owns five very fine specimens of Pterophyllum, and, although they move about the water in a majestic way, they surely dart to and fro in order to catch every boat-fly that happens to be in the water, no matter how many zig-zag movements these use to escape the fishes. Mr. Meyer confided to me that he knew of a pool where the boat-fly lives in large numbers and thus he is able to supply his pets with the food they like so well.

Arnold writes that the basin should be as long as possible. It should not have too many plants, and should have ample space for the swimming of the fishes. It should be planted with vallisneria and long-leaved Sagittaria natans. However, a part of the basin should be thickly planted in order to give the fish an opportunity to retreat and rest unseen by the spectator.

Mr. Meyer has a basin built especially for the Pterophyllum scalare. Both on the right and on the left side are two well-developed Iris pseudacorus for decorating purposes, and toward the center he uses vallisneria, well leaved, cabomba and long elodea vines. On the sides he has some more plants and thus the whole is enclosed very effectively. The basin is 160-170 cm. in length, and 60 cm. square. Since there are not too many plants in this basin, and it is placed at a window on the south side, the light shines full into the basin, and the five large fishes together with the plants make a very attractive picture for the spectator. The basin is open, although it is filled with water. Two

bunsen burners, unseen to the spectator, keep the water at a temperature of 23-25 degrees C.

This brings up another point for consideration. The home of this fish is only a few degrees south of the equator. The Amazon River, where this fish is found, flows nearly parallel with the equator in about 2-5 degrees South Latitude. The whole region is one of the hottest on earth, and vegetation abounds here. The climate is nearly unbearable for the American or European, especially near the coast. The annual mean temperature is about 26 degrees C. If we advise, therefore, from 23-25 degrees C. for the aquarium, this is not too high. It is not said that this fish will not be able to live at a lower temperature, but it would not be advisable to try this for any length of time, since the fish should be kept at about the same temperature which is found in his native waters. After several generations of this fish have been bred, and these have become accustomed to our colder climate, it will perhaps be possible to get the fish to breed even if the water is not as warm as was mentioned. This has been the experience with the Macropodus, the fighting fish, and two species of Guorami which hail from the same latitudes as the Pterophyllum Scalare.

There is nothing positive about distinguishing the sex of the Pterophyllum Scalare. Just as with the flat (disc) perch nearly every one thinks he has discovered some signs, which can be relied upon, but upon closer examination, these signs prove to be unreliable. With the Pterophyllum Scalare some think that the color is a sure sign. But it was found that this is only temperamental. Others seem to distinguish by means of the length of the fins and fin

bunsen burners, unseen to the spectator, keep the water at a temperature of 23-25 degrees C.

This brings up another point for consideration. The home of this fish is only a few degrees south of the equator. The Amazon River, where this fish is found, flows nearly parallel with the equator in about 2-5 degrees South Latitude. The whole region is one of the hottest on earth, and vegetation abounds here. The climate is nearly unbearable for the American or European, especially near the coast. The annual mean temperature is about 26 degrees C. If we advise, therefore, from 23-25 degrees C. for the aquarium, this is not too high. It is not said that this fish will not be able to live at a lower temperature, but it would not be advisable to try this for any length of time, since the fish should be kept at about the same temperature which is found in his native waters. After several generations of this fish have been bred, and these have become accustomed to our colder climate, it will perhaps be possible to get the fish to breed even if the water is not as warm as was mentioned. This has been the experience with the Macropodus, the fighting fish, and two species of Guorami which hail from the same latitudes as the Pterophyllum Scalare.

There is nothing positive about distinguishing the sex of the Pterophyllum Scalare. Just as with the flat (disc) perch nearly every one thinks he has discovered some signs, which can be relied upon, but upon closer examination, these signs prove to be unreliable. With the Pterophyllum Scalare some think that the color is a sure sign. But it was found that this is only temperamental. Others seem to distinguish by means of the length of the fins and fin

threads. These signs have failed. There are no signs by which one can distinguish this fish.

It is very difficult, therefore, to mate these fishes. If any one should happen to have a pair that is mated, it would be well worth while to watch them closely in order to determine whether there are any signs by which they can be distinguished.

You have read in the above paragraph that at the present time there is no way of distinguishing the sexes. The following is an extract of a letter received but recently from Mr. W. J. Wright of Jersey City, New Jersey.

"I have found the true way to tell the fish apart. I use a five hundred Watt light. By shining it upon the fish, one can see what appears to be a hole right through the center of the stomach. That of the male is round, while the female's is pear shaped. You can tell black banded sunfish the same way. This information is new. I have so far disclosed it to but two people. However, I shall not keep it a secret any longer."

Since Mr. Wright's information was thought to be of value to the readers of this book, we are here inserting it even though we are obliged to do so in a somewhat awkward fashion, as one section of the book had already been printed when the information was received.

Mr. Wright who has been a fancier and dealer of tropical fish for many years, will surely be hailed as a discoverer in light of the originality of his helpful information.

Mr. J. Cvancer of Hamburg succeeded in mating a pair and he writes as follows:"I had 18 half grown fishes in 1913. One of them had a somewhat larger dorsal fin than

the rest, and I decided this was the male. This fish had no spawning habit. I found another fish which had this duct, and I decided that this must be the female. These were the only signs which I could notice, but they were the signs which I have used with other Cichlides for some time. I was the first one who succeeded in mating a pair of these fishes.

When I tried to mate them in 1914, I noticed that the female spawned, but that both fishes devoured the eggs. Later I noticed that the female began to develop spawn again, and I planted Vallisneria in the basin, which measured 140 x 60 x 40 cm. The fish were about half-grown when they were bought and at the time of spawning perhaps 15 months old. On March 3rd, the female spawned in the Vallisneria, but the male did not seem to heed this performance and the spawn was not fertilized. Very likely the male was not matured. For, when the spawning took place and immediately after, the male bit around the spawning duct, which protruded about 4 mm. Both animals devoured the spawn. On the 25th of April both fishes cleaned a Sagittaria most carefully. The species of Sagittaria, whether S. natans or some species which had a stiff stalk, was not mentioned. But one will be safe in assuming it to be a Sagittaria with a stiff stalk. The pair spawned again. The fishes began to bite each other again. I think the reason for this was, that the female was worried about the spawn, and did not want the male to fertilize it. I parted them, and the spawn was watched by the female. After two days the spawn had spoiled, and the second spawning came to naught. On the afternoon of June 2, the female spawned again. This time both fishes watched the

spawn. All eggs spoiled again, excepting five. These hatched in three days. Fearing that the little fishes would be eaten, I put them into an aquarium, which swam in the larger basin. After six days the fishes still hung to the plants, but they showed signs of life excepting one, which had choked in the sea weeds. The temperature of the water at the time of spawning was from 30-32 degrees C. The color of the female at this time was a wonderful silver, the stripes were dark black, and it had a black spot on the upper gill-lid. The male had the same color, excepting the spot on the gill-lid; besides, its back was of a clay yellow color, and a rose red spot showed on each side of the back. The outer eye rings are wonderfully colored, the back part being vermilion, and the front a golden color.

I raised only one of the fishes of the first brood, but this one developed rapidly. After 8 days it measured 1 cm., after 14 days it was 2½ cm. in length, and after 4 weeks 4 cm. were reached. It resembled the older fishes in shape.

In the meantime I changed my basin. I made a wall of stone on the one side. For this purpose I used a smooth stone. In the early part of July the old pair cleaned this stone carefully. On the afternoon of the 4th of July they spawned again, and again my hopes were shattered. But my patience had not ended. After 14 days the female showed signs of spawning again, and spawned for the fifth time late one afternoon. This time a water fern was selected as the place to lay the eggs. Most likely it was an Acrostichum aureum; d. V. The plant stood in the center of the basin and this time I could watch the performance. I had some companion fish in the basin, Girardinus guppyi (Lebistes

reticulatus). The male watched these very closely, and as soon as one of them would come near the spawning place, it was chased by the pterophyllum scalare. The spawn was carefully placed onto the leaves of this fern. The older fishes changed off in watching the eggs. They fanned the eggs very diligently and removed every particle of dirt, which happened to lodge near them. During the time of spawning I noticed that when the female had deposited a portion of the spawn, the male brushed over it with his genital duct, thus fertilizing the spawn. I therefore had good hopes that this time the endeavor would be successful, and I was not to be disappointed. After three days the young hatched and hung to the stalk of the fern. The male now dug a hole into the sand, about 20 cm. in diameter. I was anxious to see what would happen. The old fishes took the young and placed them into this hole. Since the young could not swim, the old watched carefully lest one of the younger ones should stray from this hole, and become a prey to the Guppyi; for these tried repeatedly to snatch one of the young, but they were warded off every time by the older fishes. Seven days after the day of spawning the young were able to swim fairly well. I had removed the Girardinus guppyi from the aquarium on the fourth day, since these became too bold. The male of the Scalare almost jumped into my face, since it feared that I would harm its brood. For the first few days the young came back to the hole in the sand and stayed there huddled together in a bunch.

If the proper food is provided, the young will grow rapidly and splendidly. After four weeks they measured 4 cm. and I had to transfer them to a larger basin. In the

meantime I had success with two more hatchings and could figure on about 500 Pterophyllum Scalare. I hardly had any failure and loss after this. Anything that hatched was raised rapidly. The young resemble the young disk (flat) perch at first. After about eight days they look very much like the young Helleri, so much so, that older fanciers and breeders maintained they were Helleri. It took several visits to my aquarium to convince these fanciers that I had succeeded in raising young Scalare, and then their interest was keen. After 14 days the young resembled a species of Ambassis, and only after four weeks could I tell whether they were really Scalare or not. After five weeks they had the form of the old fishes."

Certainly an interesting account! And it is all the more remarkable, if one considers that Cvancar had to exercise such wonderful patience, and has not since had such wonderful success.

We have a few more accounts of successful breedings, but they are as yet rare. Hagenbeck reported the same year, 1915. Although there is some danger of monotony another instance should be recorded.

Otto Ritschl of Wiesbaden writes: "The Pterophyllum Scalare does not like to expose himself to the direct rays of the sun. He would rather allow food to drop to the bottom of the aquarium and then pick it up. At night he sails majestically through the water, spreading his fins like great sails. If the moon shines into the water, or an electric light is used to lighten the basin, the fish looks like an odd piece of Japanese fancy work in silver and black silk. Like a glowing streak of light the fish dives into the thickets, especially if it notices that it is watched. After it has settled,

it will resume its slow sailing through the water. Indeed, it glides in such a stately manner that one cannot notice any movements at all. On the other hand, the fish are very sociable, playful and at times given to fighting, so that the water will spurt and the sand whirl from their lusty movements. During the time the fish play they produce a peculiar sound, something like the sound of two billiard balls touching. Since the body moves forward in jerks, I am led to believe that the sound is produced by compressing the muscles of the body against the bladder (air). The fish also utters this sound, when it is scared suddenly. I keep Danios, Red Fins, Haplochilus, Latipes, and two small Trichogasters, about 2 cm. in length, in the basin with the larger fishes. They get along very well. The only way one may have success is when the fishes are mated. This, in fact, is a rule with all fishes which lay their eggs. Two or three days before they begin to spawn one may notice the spawning duct of the female, which gradually enlarges. This sign is the arsis and the only reliable sign of the female. When spawning, the Pterophyllum assumes his usual attitude, seems listless, and takes this thing as a matter of course. One must look sharply to see the inner restlessness of the fish. The fish always spawned late in the forenoon, using the leaves of the Sagittaria japon. Many of the eggs dropped to the ground, most likely because the basin was too small. I therefore changed the plants. I tried to get the fishes to spawn nearer the sides by using stones. But this proved futile. They used a very thin-leaved sagittaria. The female ejected the eggs in bunches, whenever the spawning duct seemed the least bit irritated or excited. The spawn was eaten, or if some remained, it

spoiled. After two days the eggs which had been attached to the plants were gone. This happened at three different times during that one summer. In October the female spawned once more, laying the eggs together in one corner on the sand in a pile about the size of a thimble. I felt that my hopes were shattered. I kept the fishes in a basin 100 x 40 x 40 cm. The thermometer always registered about 28 degrees C. Food was kept before them as much as needed, and a change of food was also used. Still the fishes would not propagate. Since the female had spawned so late in October, I judged that the spawning season would perhaps open later with them this year, and I was not mistaken. In June I noticed the first signs of spawning, namely, the spots back of the eyes, and one day I noticed that there were about 250 eggs on a leaf of the Sagittaria. Quite a number of them were in the mulch at the bottom. After two days, nothing more was to be seen. Near the end of July the pair spawned again, this time using the front wall of the aquarium. More than 400 eggs were laid. I watched the performance with a magnifying glass.

The spawning duct resembles a dull ten-pin, about 8 mm. in length and 6-8 mm. in height. It seems to be provided with a number of muscles and nerves, which makes it very sensitive. The opening is toward the front. To the back there is a small protrusion, which consists of the prolongation of two muscles. They form a trough between them. When the female began to spawn it touched the wall of the aquarium, and now and then an egg would fall from the duct, which was swept cautiously and nervously along the wall. The little protrusion now pressed the egg closely to the wall. Then there followed a regular moving up and

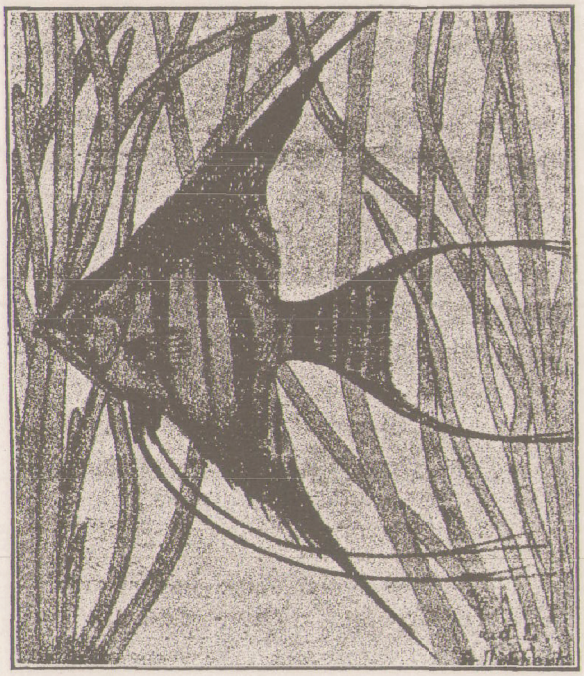
down along the wall, each time emitting from 6-10 eggs, which were placed against the wall. Between the first eggs there was a space of about 1 cm. But the female seemed to stay at about the same place, and everytime, when a free place was reached, she would lay another egg. In this way the spawn was laid in a space about the size of a silver dollar. Since the spawning duct, which is very sensitive, felt every little space which was not filled, the eggs were laid very compactly, and only a few were farther away. The eggs were laid closely enough to the top to enable the fishes to touch the top of the water with their fins. The male fertilized the eggs during the short intervals in which the female rested. Sometimes the fishes swept over the eggs together. The genital duct of the male is very small, and hardly noticeable. The eggs which fell to the ground were eaten by the pair."

"On the second day the eggs were very loose, and were fanned to the floor by the female. Here they died. I thought that perhaps the wall was too smooth, and planted sea weed along the sides. But this did not prove successful. The thin threads of the sea weeds tore, and the eggs dropped nevertheless. The female grabbed the eggs and tried to fasten them against the side of the basin, until she found that all efforts were in vain. The female watched the spawn alone and if the male came near she would chase him.

The eggs are irregular and round, about the size of a turnip seed, glassy and of a yellowish wine color. If viewed under a microscope, one may see a non-transparent, yellowish substance behind the outer skin, which consists of several cells. It looks like a pearl of wine. Between this substance and the outside skin the egg had a small free place,

something like the air space in the egg of a bird. Does this contain breathing water? Since the egg was not transparent, the process of development could not be watched, as may be done with most carps.

I kept the water at a temperature of 30 degrees C. On the second day the eggs were very loose. Later I discovered that this is the rule. At that time I was very much disturbed



PTEROPHYLLUM SCALARE.

to see the female instinctively brushing the eggs to the ground with its ventral fins. I quickly took a glass and placed it about ½ cm. away from the rest of the spawn, which was not numerous, in such a manner that the water, if fanned by the female, had to pass the spawn on the glass.

The female did not like this treatment, but had to bear it.

The next morning I found a part of the eggs hatched. The tiny fishes wiggled in the water. It was almost incredible. I tried to see whether these fishes would take care of their brood. I therefore took the glass which I used to protect the eggs carefully out of the water. Hardly had I done this when the male shot like like an arrow out of its corner and devoured the greater part of my hopes. I chased him back into the corner, but the damage had been done. The female did not take to the little ones, and nothing was left for me to do but to try to raise these fishes artificially. I dipped about a dozen of the wiggling eggs into a water glass, and kept the water moving. At noon I found that these little things had settled onto a flake of sea-weed, clinging to it with little threads, like the Polycentrus. With a fine glass tube I hung them separately onto a little chandelier (most likely a water fort) and I had luck! After four days they began to swim. There were seven in all. Only a few, but I could watch them develop. At the time of writing, these seven are half grown. But before I say more about them, I wish to state a few more things about the old fishes.

A week later, to the hour, the pair spawned again. Although a number of eggs were lost, 300 remained. This time both fishes watched the brood, and fanned the water. At one time a fly happened to light on the outside of the glass. The female darted toward it. The male, fearing something was to happen, darted after the female. The latter did not trust him, left the fly, and attacked the male. They had a terrible fight. If I had not been right there

to stop them, one or the other would have been killed. They settled down for a few days. In the evening I saw the spawn and hoped that everything would be all right. A half hour later I looked again, and—every egg had been devoured by these marauders.

A week later, on the hour, there were from 400-500 eggs. The female ate half of them the same day. Of the rest some hatched. Again a week later the parents spawned laying about the same number of eggs. Everything went along smoothly, and I dipped out about 60 young fishes, not trusting the old fishes, and kept them in a water glass. They hung on a bundle of sea-weed. The sea-weed was much gnarled, and was taken from a cold water basin; therefore it wilted rapidly in the warmer water. This consumed too much oxygen, and my little friends lay dead at the bottom of the glass the next morning.

I decided not to try any more spawning for the year, and placed several older and younger Pterophyllum, Latipes, and Red Fins into the basin. But the pair spawned again. This time they did it on the quiet, and I did not notice anything until I saw the little ones wiggle in the water. The water was only at a temperature of 25 degrees C. It would seem to me that this was better than 30 degrees, since I saw very few eggs spoiled, and they clung better to the objects on which they were laid. I fenced them off, and I soon had a bunch of 60-70 small fishes, which I raised. I think that the constant fear of having the eggs eaten by other fishes prevented the old from eating them themselves. The female made signs of spawning again, so I lowered the temperature in order to keep them from it, thus saving the fishes. The spawning duct disappeared

when the temperature had reached 23 degrees C.

Now something about the young fishes! At a temperature of 30 degrees C., after 42 hours, the tails break through the skin of the eggs. At a temperature of 25 degrees this takes 54 hours. I supplied a small amount of oxygen at a temperature of 30 degrees, but found that this is not necessary. The little fishes wiggle for about an hour, and then drop out of the egg entirely. The old fishes now snap them up and spit them against the plants, where they hang. Some of them were slung against the glass, and remained there. When I examined them with a microscope, I found a little wart on the head, and I concluded that this emits some kind of glue, which holds the fishes to the glass. Whether this gluelike substance draws out into a thread or whether the thread grows later, I could not determine. At any rate the little fishes hang on such a thread which is about 4-6 mm. in length. They hang in a vertical position, are extremely lively, and wiggle all the time. At first one can distinguish only a bit of yolk with a little tail. The fishes grow rapidly and one can discern the eyes, mouth and the caudal fins at the end of the third day without the aid of a microscope. Gradually they assume a horizontal position, and on the fourth day some will fall to the ground, but on the fifth day all will be seen at the bottom, watched by the parents. Most of the little ones drag the thread along with them like a stocking cap, and often find themselves attached to the plants without wanting to do so. The old take them into their mouths and spit them out again, and it looks to me as though they are bathing them in this manner, besides protecting them from small parasites. The rapid growth of these fishes calls for an extraordinary

amount of oxygen, which has to supplied often. I once saw a picture showing the different stages of the first three days. They look rather wiggly when they first start to swim. I took some of them who did not learn to swim and examined them under the microscope; with every one I found that the body was bloated, and the heart had sunk into the bag which had been formed. They did not survive. But they are exceedingly tenacious. I noticed one of them in particular, which had already turned white. It had been lying on the observation plate for about one-half hour, and I thought it dead. However, when I looked through the glass again, I found that its heart was still beating normally, although the vertebrae of the caudal fin were broken.

If the basin is placed in the sun, and the water supplied with Infusoria, the young float helplessly on the top, unable to swim. Under the microscope I found gas bladders of about 1 mm. diameter. After I shaded the basin they recovered rapidly, and also those which I had examined under the microscope did not perish.

During the first few days the young feed on Infusoria. They cling together, sometimes in one bunch, then again in two, are very quick and remind one of a dancing swarm of bugs. If they are able to eat sifted Daphnia, and Cyclops, then the worst time is past. They prefer larvae of bugs from 3 to 5 cm. in length, and sometimes they fight with Tubifex. They are like the young disc perch. They are tranparent, of a yellowish color, and have vertical stripes like their parents. The dorsal and caudal fins are rose red in the middle, and have a black border. After about three weeks, they resemble the older fishes, only in a so-called vest-

pocket edition. At that time I transferred them to the basin in which the older ones were kept. They did not bother about their brood at this time any more. On the contrary, if the little ones united in fighting for their food, the old would give way to them. The rate of growth is irregular. The largest specimen measured 12 cm. in height after seven weeks, the smallest only 6 cm. The last brood, hatched in September, was slower.

According to my experience, the following table for the propagation of the Pterophyllum Scalare was obtained:

The basin should contain at least 100 liter and in this the water should be 35-40 cm. deep. Temperature only 27 degrees without ventilation; sun is of advantage. After forty-eight hours the young hatch, and are placed by the old against plants, where they hang. After five days they swim. Give them plenty of Infusoria. The mouths are very small, and they need smaller food. Much oxygen is needed by the young.

How long the young may be left with the old fishes, I do not know. I would not trust mine for a minute. After the young have grown to the size of a penny, they must be placed in the same basin with the old. If this is done, a picture will be seen that is not known to the lovers of fancy fish. The young, who may justly be qualified by the term bold, swim around the older fishes and delight the heart of the fish fancier. I have seen the old ready to grab for larvæ, when one of the younger brats came shooting through the long threads of the older one, grabbing the bite from before him. Then he would try to swallow the thing and swim at the same time—verily a sight which is worth while. I have spent hours before my aquarium and forgot-

ten all the labor and trouble which was caused by the Pterophyllum Scalare. Once more, at the close of this description, let me state that no one should be discouraged on account of the many trials which must be endured in the breeding of this fish. The joy which will be experienced far outweighs all the trouble."

This clear and concise description of the breeding of the Scalare is worthy of imitation! Ritschl certainly has given an interesting and unbiased account of his experiences, his failures, and his success, which should be of value to those interested in fishes. The fancier should learn from the mistakes of others. I should like to call attention to the fact that one cannot simply follow a certain table. What may be the right thing in one case, may be absolutely wrong in the other. One thing is certain, that it takes much patience and care to propagate a pair successfully. They naturally like to eat their own spawn, thus hindering the breeding of young fishes. Perhaps the close quarters in the aquarium, no matter how large, has something to do with this.

Special care should be taken in fitting out the basin. According to the reports of these two men, robust plants should be used, viz: Iris, sweet rushes, etc., which will offer resistance to the fish while spawning, lest any eggs be lost. A swerving Vallisneria or Sagittaria is not to be recommended, for they will give, if the fishes try to place the spawning duct against them, as Ritschl has noticed. The eggs cannot adhere to such plants and will naturally fall to the ground. The fishes will attach their eggs to plants in their native waters, since in the slowly rolling movements of the waters no stones will remain for any length of time.

They do not seem to spawn near the bottom, but near the top of the surface, so that the stones would have to be in a slanting position near the surface, somewhat like Cvancar used in his basin. Ritschl also used stones, but the fishes did not seem to take any notice of them.

Perhaps an old, strong branch, which has lain in the water for some time, with bark removed, would be suitable according to experiences I have had with those fishes in their native waters. Of course, this must be anchored safely in the basin, so that it has no opportunity to slip. But the fancier will find that he has much lee-way in this. Argchenhold of Chemnitz took a glass tube, 1.5 cm. in diameter which with great care he had roughened with emery paper, and put it in his basin. His basin was 80 x 50 x 50 m. Buelk of Hamburg had some fishes and they spawned on a Sagittaria chinensis. Both fanciers complained of the cannibalism of the older fishes. Archenbold transferred the male first; then he transferred the female on the third day, when he noticed that she also began to eat the young. He now laid the glass tube on the bottom in the sand and had the good luck of saving about 130 of the young fishes, after he had lowered the water level to 20 cm. The old soon began to show signs of spawning again.

Buelk of Hamburg has also given us some of his experiences in the raising of the young Pterophyllum. He had the same luck which so many other fanciers have-no results. He did even worse. He did not realize that the young, after they have left the plants and walls, will fall to the ground and stay there for a few days before they begin to swim. He drew out all the mulch from the bottom of the basin and, of course, all the little fishes. Even though there

had not been any fishes in the mulch, this is very valuable, because it contains many Infusoria, which are most useful in raising the fishes. This mulch is found in the native waters, and should therefore not be removed. The clear sand which is generally placed in the bottom of an aquarium, does not contain any infusoria, and is therefore not valuable for the raising of little fishes.

As luck would have it, Buelk raised four fishes, which happened to be two pairs, out of all his broods, and these furnished him with enough brood for the next year. They spawned on a strong sweet rush, and the fancier took both and placed them into a different basin, which was well ventilated, and after 40 hours the young hatched. He says that the fish grow rapidly. He feeds them with rotatories, Brachionus urceolaris Muell., to which he adds Nauplia and the smallest Cyclops. After three weeks they could be fed larger Daphniae and the larvae of the Corethra plumicornis were fed to them after another eight days.

No more charming picture of fish life can be found than a group of young Scalare all headed in one direction when attracted by the fancier with some food.

Nature has provided that, although the older fishes like to devour their spawn, they lay enough to make up for it, and if extreme care is exercised, one will succeed in raising a brood nevertheless. There is a two-fold reason for not obtaining a larger brood. Firstly, the uncertain heating conditions induce the fancier not to procure the fishes. Then while in the summer the temperature may be reached, in winter it is quite an undertaking to heat a basin of 100-200 liter to a temperature of at least 23 degrees C.

*2½ cm. equals 1 in. 25 mm. equals 1 in. 1m. equals 39.37 in. Liter (litre) equal about .9 qt. C. equals Centigrade. Km. equals 3,280.8 ft. or nearly ⅝ of mile.

SUPPORT OUR SPONSORS. THEY SUPPORT US. WE MUST SUPPORT THEM!

Absolutely Fish's staff is knowledgeable and can help you solve your aquatic problems. **They offer a 15% discount on select fish, marine life & supplies with current BAS membership card.** A really great aquatic shop. Well worth the trip.
Absolutely Fish 1080 Route 46 W. Clifton, NJ 07013
Ph: **1 (973) 365-0200**
Open 7 days a week: Mon-Fri 12-9 Sat 12-8 Sun 12-5

Aquatic Wildlife, features 11,000 gal. of freshwater fish, plants & marine life. **Discount with current membership card.**
Aquatic Wildlife, 179D Demming St., Manchester, CT 06040 (In Panera Plaza) Ph: **1 (860) 648-1166**
www.aquaticwildlifecompany.com

Brooklyn Zoo & Aquarium Inc. A classic pet shop with a full line of aquarium supplies, freshwater, marine fish and corals. **BAS members get a 10% discount with a current membership card.** Some restrictions apply.
Brooklyn Zoo & Aquarium Inc.
2377 Ralph Ave., Bklyn, NY • Ph: **1 (718) 251-7389** Hrs: Sat - Sun 10am - 6pm & Mon - Fri 10am - 8pm

"C" The Jungle Pet Store In the heart of Brooklyn carries a full line of pet supplies, tropical fish, birds, and small animals. They offer a **10% discount to BAS members with a current membership card.**
"C" The Jungle Pet Store
247 New Lots Ave., Bklyn NY 11207 Ph: **1 (718) 649-2536**
Hrs: Tue-Sat 10am-8pm • Sun 10am-6pm

Petland Discounts, the complete pet store, carries a full line of pet supplies for fish, dogs, cats, birds, reptiles and small animals. Also a variety of fish, birds, small animals and reptiles. Open 7 days a week. Locations in New York, New Jersey & Connecticut. Over 15 stores in Brooklyn. Shop on line at: See the white pages, for a store near you.
www.petlanddiscounts.com.

Pet Shanty. Family owned & operated; 3 rooms of freshwater fish & 1 of marine fish & corals. They stock a vast list of fish, posted on line at http://petshanty.com. They also carry other pets and pet supplies. Check them out; they probably have what you want. **Members get a 10% discount.**
Pet Shanty
2507 U.S. Hway 22, Scotch Plains, NJ 07076
Ph: **1 (908) 889-8262** • Fax: **1 (908) 889-0803**
Mon-Fri: 10am-9pm • Sat: 10am-7pm • Sun 10am-5pm

Fauna is Manhattan's largest exotic pet boutique and a new sponsor of the BAS. **Dan offers a 10% discount to members.** They keep over 2,300 gallons stocked with freshwater, marine fish and corals. They also carry small animals, birds and reptiles. Make a point to visit and tell them you saw their ad in the *BAS Bulletin* and *Aquatica*. This store will blow you away!
FAUNA 265 West 87th St.
between Bway & West End Ave., NY, NY
Ph: **212-877-2473**
Hrs: M-W-T-F 11am- 7pm • Closed Tues.
Sat 11am-7pm • Sun 11am-6pm

Mark's Discus: over 4,000 gallons of hormone free Brooklyn bred discus & angelfish. Mark stands behind his quality fish with a live delivery guarantee. Feel free to contact him with your questions. **10% discount for BAS members with current membership card.**
MARKSDISCUS.COM
You're welcome to visit their hatchery by appointment only. Call for directions.
Ph: **917-202-7699**
Open 7 days and all Holidays • 9am -11pm

Manhattan Aquarium has one of the largest Selections of Marine Fish & Corals on the East Coast. Located conveniently at 522 West 37th St. in Manhattan. You should check them out for all your Marine Fish & Coral needs.
Manhattan Aquarium
522 West 37th Street, NYC, NY 10018
Ph: 212 594-2271 • Fax: 212 594-2271
www.ManhattanAquarium.Com
www.UniqueCorals.Com

Nassau Discus has different varieties of Discus available at various times. All fish are quarantined before they are sold. **Members get a 10% discount with a current membership card.** To learn what's in stock Email Nassau Discus at morgansfin@aol.com or NassauDiscus@aol.com To make an appointment
Call Mark Rubanow Ph: 516 939-0257
205 8th Street, Hicksville, NY 11801

Royal Aqua World Inc. Over 100 tanks of marine fish, hard & soft corals, freshwater fish, goldfish & koi imported from Japan, plus plants and pond supplies. **BAS members get a 10% discount on all purchases with a current membership card.** Open 7 days a week.
Royal Aqua World Inc., 815 65th St., Bklyn, NY 11220
Ph: **1 (718) 238-0918** Hrs: 7 days a week 10:30am-8pm

Pacific Aquarium & Pet Inc., in Manhattan's Chinatown, carries ornamental goldfish, koi, freshwater fish, & aquatic plants. **BAS members get 10% discount with current card** (Discounts not to be combined with other specials). They have a full line of aquarium supplies. You can order custom size tanks.
Pacific Aquarium & Pet Inc.
46 Delancy St., NY, NY 10002 • Ph: **1 (212) 995-5895**
Open 7 days a week and all holidays 10am to 7:30pm

Membership & Renewal Application Brooklyn Aquarium Society

Mail This Form Or A Copy And Your Check Payable to Brooklyn Aquarium Society to
BROOKLYN AQUARIUM SOCIETY, ATT: MEMBERSHIP CHAIRPERSON
P.O. BOX 290610, BROOKLYN, NEW YORK 11229-0011

Please check your address label to see when your membership expires

Meetings are held at the NY Aquarium Education Hall on the 2nd Friday of the month at 7:30pm. Knowledgeable speakers on fish care and culture, door prizes, raffles, and fish auctions. All meetings are free to members. Visit us on line:
WWW.BROOKLYNAQUARIUMSOCIETY.ORG

NAME_____OCCUPATION_____

ADDRESS_____CITY_____STATE____ZIP_____

PHONE (DAY) _____(EVE)_____(FAX)_____

E-mail Address_____

TYPE & LENGTH of MEMBERSHIP: (CHECK ONE)

INDIVIDUAL				FAMILY				[ ] $15 STUDENT 1YEAR
1yr. $20	2yr. $36	3yr. $51	4yr. $68	1yr. $25	2yr. $45	3yr. $63	4yr. $85	(UNDER 18 YEARS)

*If family membership, please list all family members. **Only first two listed will have voting rights.**

1_____ 2_____ 3_____

4_____ 5_____ 6_____

Number of tanks [ ] marine [ ] freshwater [ ] Do you breed fish? [yes] [no]

If yes, what types do you breed:_____

_____

Special interest (if any)_____

_____

How did you hear about BAS [friend] [dealer] [flyer] [*Aquatica*] [mag ad] [online] **other**_____

To volunteer check [yes] [no] A board member will contact you if you check yes.

On occasion, the Brooklyn Aquarium Society uses its mailing list to send notices of interest to our members.
If you **DO NOT** wish to receive these mailings please check here [ ]

Official use

Member number:_____ Type of membership [F] [I] [S] Date paid:_____ Board approved date _____
Amount paid:_____ Renewal/member since_____