

965 • 50 CENTS



aquarium | journal



A Magazine for Beginner or Expert.

**The most complete magazine of
Tropical Fish and Aquariums
published in America.**

The Magazine Aquarists Believe In.

Twelve issues per year for \$5.00.

Read Many Informative Hobby Articles

Published by the
San Francisco Aquarium
Society, Inc.

Editor-In-Chief
Dr. Herbert R. Axelrod

Executive Editor
James W. Crawford

Editor
Mike Reed

Office Manager
Jeanne Heim

Consulting Editors
Earl S. Herald, Ph.D.
James W. Atz, Ph.D.
James N. Adams, Ph.D.
W. I. Follett

Associate Editors
Dr. Martin Brittan
Gene Wolfsheimer, F.A.I.
Arthur S. Campbell, Ph.D.
Frederick H. Stoye
Kirk Strawn, Ph.D.

OFFICERS OF THE SAN FRANCISCO
AQUARIUM SOCIETY FOR 1965
President emeritus: Charles P. Bange
President: Frank Tufa
Vice-Presidents: Joseph Zins
Secretary: Treva Bell
Treasurer: Theodore Steinhauer
Librarian: Gary Meltzer
BOARD OF DIRECTORS FOR 1965
Charles Bange, Percy Bell,
Treva Bell, James Crawford,
Robert Dempster, Velma Echeverria,
Lee Heise, Fred Jenne,
Sigmund Ketterer, Gary Meltzer,
Theodore Steinhauer,
Frank Tufa, Joseph Zins,
Earl Herald*,
Maurice Rakowicz*
*ex-officio

Published monthly by San Francisco Aquarium
Society, Inc., Steinhart Aquarium, Golden
Gate Park, San Francisco 18, California. Tele-
phone BAyview 1-0054. Subscription rates:
\$5.00 yearly in U.S., Canada, and Latin
America, elsewhere \$5.50. Copyright 1965 by
San Francisco Aquarium Society, Inc. Contents
of the Aquarium Journal may not be used or
quoted without permission of the Society.
Authors alone are responsible for statements
made and opinions expressed in their respec-
tive articles.

Second class postage paid at San Francisco,
California and Jersey City, N. J.



aquarium journal

Volume XXXVI

Number 10

October 1965

The Magazine Aquarists Believe In

contents

New Future Outlined for Journal Mike Reed	466
New Clownshrimp Live Inside Sea Anemones Robert P. L. Straughan	467
Professor Cliff Emmens Diane Schofield	470
The Spiketail Paradise Fish Paul Loiselle	478
A Beautiful Dead Fish! Harald Schultz	486
Collecting Cynolebias wolterstorffi — A Story of Jinx and Spunk Dr. Viggo Schultz	494
The Aquarium Hobby in Latvia Edmund Janson	504
The Great Pond Snails Charles O. Masters	508

cover photograph

This tang, Paracanthurus lamhdurus, was photographed by Earl Kennedy. Mr. Kennedy's fish photos have appeared in some of the best-known magazines and books on tropicals.





New Clownshrimp Live Inside Sea Anemones

A BEAUTIFUL orange and white "clown shrimp" has been collected off the Florida coast in a large sunflowerlike stinging anemone. It is strange and interesting that the little shrimp is colored orange and white like the clownfish of the Indo-Pacific regions. But this is just another one of those many wonders of the sea.

The wet world is full of surprises. Nearly every time I go diving, I learn something new about our fascinating underwater kingdom. I always examine anemones closely when I am out collecting, particularly in relatively deep water for I always hope that someday I might find an Atlantic clownfish in one of them even though my ichthyological friends doubt that I will. Imagine my excite-

Robert P. L. Straughan

Miami, Fla.

ment one trip, when I saw a tiny orange and white creature darting in and out of an anemone and for a few moments I thought I certainly had discovered a Florida clownfish! I surfaced quickly and drew several good breaths so I could stay down a long while, and then slowly descended upon the anemones which were in about fifteen feet of water. There were about a dozen or more anemones of the flat, sunflower type, similar in appearance to the type the Pacific clownfish

Photo: Sea anemone and several shrimp including the clownshrimp.

inhabits. As I drew closer, I removed a glove so I could work my fingers into the anemone without damaging it. Much to my surprise, it stung quite noticeably even under water and I paused briefly to examine them more closely.

Then I saw the shrimp as they emerged from within the tentacles. There were seven or eight of them and there appeared to be at least three different species. One was almost completely transparent with faint blue and white outlines. I was familiar with this species. We call it a "ghost shrimp" due to its paleness. The other shrimp was very colorful, with blue, red and brown markings and he walked with ease right across the stinging tentacles. His legs seemed to have special power for this purpose for he had no difficulty climbing over the sticky anemone. In fact, the anemone seemed to withdraw its tentacles directly beneath the shrimp so as to give it room to walk. The little shrimp would work on the tentacles as though cleaning them and perhaps extracted tiny particles of food which fulfilled his relationship with the creature.

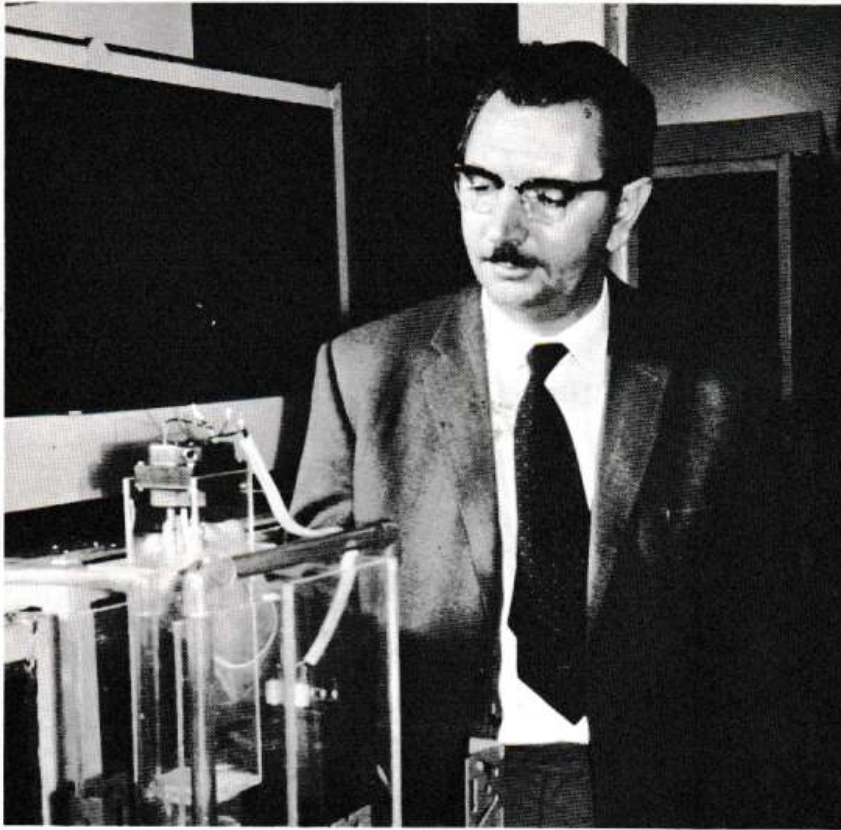
I chased several of the colorful shrimp into my net and I finally saw the orange and white creature that had first drawn my attention. It was the strangest little shrimp I have ever seen. It was a startling orange and white just like the Pacific clownfish, *Amphiprion percula*. It acted in a peculiar manner. It would hold its tail straight up and then move its tail back and forth in a weaving fashion very much like the weaving motion of the clownfish. Then it would dart away head first, right into the center of the anemone. I had to have that odd little creature so once more I removed my glove and gently worked my fingers into the anemone. The sting wasn't too bad as the skin on the hands is tough but the anemone would cling fast making it difficult to let go of the creature. I thought I had lost the little fellow when he shot out directly into the net and I hurried to the surface

jubilant over my new discovery.

I put him in a collecting bucket along with the other anemone shrimp and then went down for an anemone. This was not so easy. The anemones were tightly fastened to a large coral head and due to the structure of the coral, it was most difficult to extract the anemone. It took many dives and quite a few stings before I could finally work an anemone loose from the formation. But I finally made it, and now I have several anemone shrimp, three clownfish, one sunflower anemone, and one special orange and white clownshrimp all living contentedly in an aquarium.

It seems as though there is always something new in salt water. The new anemone shrimp is a fascinating find. As is the new stinging anemone. It opens a new field for the marine aquarist for I would not doubt that there are many different species of anemone shrimp on the various reefs of the world. I know that the keeping of colorful shrimp has barely been done by aquarists and we know little about it. In my years of collecting, I have come across quite a few oddities in the aquatic world. Just this year, I caught a huge triggerfish of orange and blue colors that certainly didn't belong in our waters. Also I caught a brilliant gold neon goby, not the yellow headed Bahama type, but a species that was shiny gold instead of the blue of regular neon gobies. I have caught strange "bumble bee shrimp" that are yellow and black banded, and also a bright red "scorpion shrimp" which appears to be extremely rare.

There just seems to be no end to unusual creatures in the sea and aquarists have just begun to find them. Who knows what fantastic creatures we will eventually get from deeper waters. Only time will tell. But one thing is certain, the salt water aquarist is in for a lot of surprises. The little clownshrimp is only a beginning. ◀



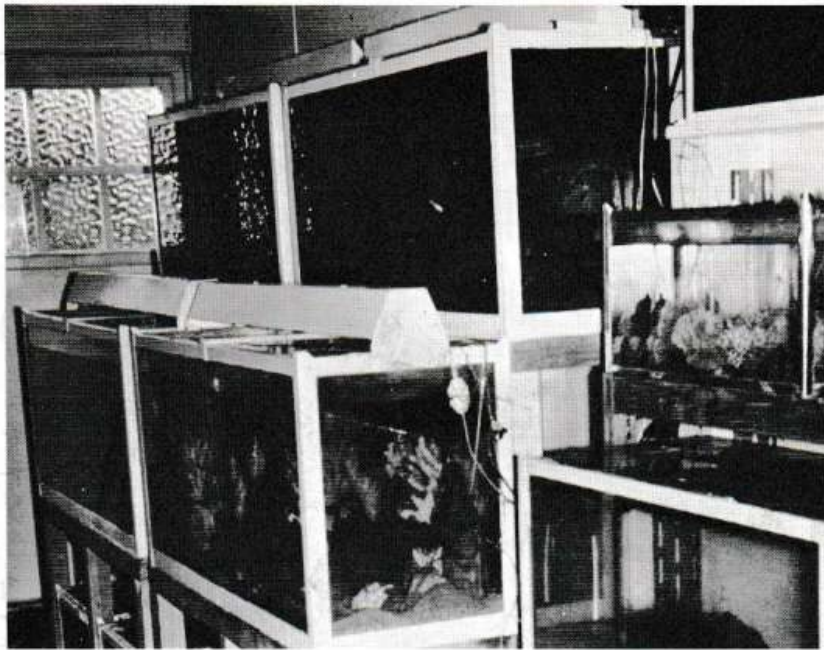
Professor Cliff Emmens

BY DIANE SCHOFIELD

In my itchy-footed wanderings I always try to contact someone in the hobby before I arrive in any given country. One of the most fascinating things about the tropical fish hobby, I find, is to talk to hobbyists in other parts of the globe and compare problems and joys and contrast them with those that we encounter "Stateside."

As soon as I had booked passage for Australia, I began to make inquiries as to who would make the most likely "victim" there. The general theme of every answer turned out to be, "Why, the best one would be Professor Emmens, of course!"

Photo: Professor Emmens looks over some special aquarium equipment in his fish room. Photo by Diane Schofield.



Professor Cliff Emmens was no stranger to me. I was familiar with his work through various of his articles as well as his book, *How to Keep and Breed Tropical Fish*. Then, too, I had met him a number of years ago (while he was on a trip to the States) at a get-together of aquarists at the home of the late Alan Davies, a gentleman whose collection of rare fishes rivaled that of a good many public aquariums. Naturally I was sure that the professor couldn't possibly remember me, because gatherings like this have habit of making all the faces present run into one great big blob in the memory afterwards.

Happily, however, Professor Emmens claimed that he recalled me with some clarity. Moreover he kindly offered to not only meet me, but to take me on the "Grand Tour" of some of the outstanding shops of Sydney as well as to show me his own home and fish room.

Professor Emmens' lovely home is on the very edge of the Middle Harbor of Sydney. A few dozen yards from his home, he often sees the dorsal fins of sharks cutting through the water! (This fact would make any swimming out there a rather interesting proposition, I should imagine.) He shares this home with his perfectly charming wife, Muriel and his three children, Jane (20), Harriet (18), and Lyle (10).

Photo: A view of a small part of Professor Emmens' fish room. Photo by Diane Schofield.

Professor Emmens' fish room is situated underneath his house, in a room that would have been underground had the home not been built on a hill. As soon as I entered his rather large and most precisely kept fish room, it was like coming home. No matter where in the world one goes, all fish rooms smell the same! This is not to cast a slur on the odor of Professor Emmens' establishment, bear in mind, because this odor isn't unpleasant in the least. To all that have smelled it, it needs no description, and to all that haven't, it really defies description. It's the blend of odors of living things, both plant and animal, that are thriving beneath the surface of the water; the pungent aromas of their food; and the humid, damp smell of many tanks, all bubbling and percolating in unison. No aquarist can feel like an alien in a foreign land if he or she can just find a well-kept fish room to step into. Professor Emmens' predilection toward egg-laying tooth carps is quite obvious when one sees the fishes in his various tanks. Through the years he has spawned such fish as *Cynolebias bellottii* (Argentine pearl fish), various annuals such as the *Nothobranchius* species, *Pterolebias longipinnis*, *Aphyosemion cognatum*, *Aphyosemion filamentosum* and many, many other egg-laying tooth carps. He goes about coaxing these, often rather reticent, little fish to spawn by using the precise scientific mind that befits him as a college professor.

But Professor Emmens is not content to merely keep and spawn these little freshwater fish. Approximately 14 years ago, at the same time that the freshwater fish-keeping bug bit him, he developed an interest in marine fishes as well. His fish room sports several marine tanks that are well above average in capacity, as well as beauty. Varying with various collecting trips (both his own and his friends'), his tanks are likely to contain such little dazzlers as the blue angelfish (*Pomacanthus semicirculatus*), *Heniochus acuminatus*, various clowns and butterflies, and both the blue damsel and the three spot damsel. Fortunately, obtaining seawater is no problem for him; he gets it directly in front of his own home.

Professor Emmens' interest in marine fishes was instrumental in his forming a marine aquarium society so that any people so inclined in Sydney could meet and exchange information. All the better to further the saltwater aspect of the tropical fish hobby. This club has a rather imposing name, "Sydney Marine Aquarists Research Club," and it meets once a month at Professor Emmens' home.

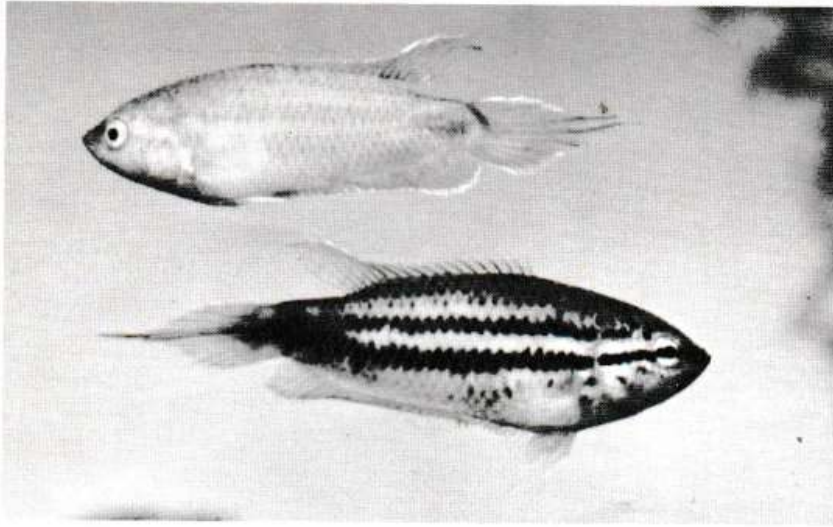
It's really odd how often people who are avidly interested in tropical fish really don't remember exactly when they became so involved. Almost always it started sometime in their early youth and has continued all their lives. It isn't at all strange that Professor Emmens should like fishes, since his whole life has been tied up with living things. After graduating from the University College at London, England, he went to the Medical Research Council.



Fourteen years ago, he came to Australia as the head of the department of Veterinary Physiology, a post he still holds.

With such an imposing scholastic and scientific background, it isn't at all surprising to learn that Professor Emmens has had well over 100 scientific papers published. Two of his most extensive works are *Principles of Biological Assay* (vitamins and hormones), published in 1948 and *Hormones Assay*, published in 1950, subjects more in keeping with his work in veterinary physiology than in fish keeping. His shining work in the fish field is, of course, *How to Keep and Breed Tropical Fish* which has recently come out in a new larger and more up-to-date edition. In addition to this book, Professor Emmens has also written a portion of the authoritative *Exotic Tropical Fishes*.

Photo: *Pterolebias longipinnis*, one of the many annuals that Professor Emmens has spawned. Photo by Gunter Senft.



The Spiketail Paradise Fish

THE LABYRINTH or anabantoid fishes constitute a respectable percentage of the perennial "best sellers" among aquarium fishes, in this country and abroad. What aquarist has not kept or bred at one time or another either bettas, various gouramies, or that patriarch of all aquarium fishes, the red paradise, *Macropodus opercularis*? But for most hobbyists, the story ends here. While there are many other highly desirable species in this group of fishes, none to this date has caught the public's eye, or more importantly, unlimbered its pocketbook sufficiently to encourage either commercial breeding or large scale importations. It is my contention that this unfortunate unpopularity arises from an unwonted ignorance of these fishes and their habits. I would like to present here my experiences with one such member of the "Unbeloveds," *Macropodus cupanus dayi*, the spiketail paradise fish.

Paul Loiselle

La Mirada, Calif.

Macropodus dayi begins being something different simply by sporting the name that it does. The third unit of the technical name designates, under the current system of taxonomic nomenclature, that the animal in question is a subspecies of a previously known form. The species to which *dayi* belongs is *Macropodus opercularis* and the other subspecies is *Macropodus cupanus cupanus*, a paradise fish of India and Ceylon found in several habitats, but most especially in somewhat brackish waters near the coastline. Colorwise the subspecies *cupanus* is a good deal less favored than the other subspecies, which accounts for

Photo: *Macropodus cupanus dayi*, a pair. Photo by Gunter Senfft.

the fact that the modestly popular *dayi* overtops the almost non-existent demand for *cupanus*. The subspecies *dayi* disports itself over a range that extends from India to Thailand, and if the conclusions that can be drawn from its breeding habits are valid, there is good reason to believe that this subspecies enjoys considerable ecological as well as geographical isolation from the earlier described form (i.e. *cupanus* preferring bodies of water with a somewhat more pronounced current).

The spiketail paradise is no newcomer to the aquarium scene. Introduced into Europe fairly early (earlier than 1909) in the history of the hobby, it was warmly spoken of by several of the early European aquaristic writers, and its importation to the United States soon followed.

From the start, however, confusion in nomenclature followed in this fish's wake. The fish was described by a German Koller in 1909 and placed in the genus *Polyacanthas*. It was later found to be related to *Macropodus* and properly placed in that genus. During the course of time, its earlier name has been further abbreviated to "Polydayi." The fish's true nature as a paradise fish has at times been cast off as excess baggage, and this has led to some highly diverting speculation as to exactly what kind of fish this might be. *Dayi* has been, at various times, billed as a nandid, a guess that is several miles wide of the mark, or, more interesting yet, as a cichlid.

It must be conceded that *dayi* has its share of some rather striking personal eccentricities. No other paradise fish sports a pointed tail or vivid neon blue trimming on all of its vertical fins, and certainly no other paradise fish displays such a fondness for raising a family in caves and similar enclosed environs. Whatever this blue-bordered odd ball was, these dealers must have felt, it certainly wasn't any paradise fish, and as likely as not, no bubble-nester either.

Things are often not as they seem, and *dayi*, peculiarities to the contrary, is most assuredly a paradise fish in good standing of the genus *Macropodus*. And if the reader has already concluded that the spiketail paradise must be something else again to have caused such a fuss, then I congratulate him and join my views to his own. The spike-tailed paradise is somewhat more elongated, in proportion to its two and a half inch length than its more popular cousin, the red paradise fish, and its fins are proportionately somewhat shorter as well. The caudal of both sexes sports a distinctive elongation of the central rays, producing a coffer-tail effect that is accentuated by the black coloration of these rays and the ruddy-orange or henna ground color of the rest of the caudal. Both the upper and lower edges of the caudal are edged in a metallic "electric" blue. The dorsal and anal repeat this color scheme of dusky red or orange edged in black and bordered with a vivid blue band. The dorsal of both sexes is drawn out to a fine point that extends, in a healthy fish, a good deal beyond a comparable elongation of the anal. This is a normal characteristic of the species, although a buyer unfamiliar with the species might be led to suspect damaged goods. The ventrals are a most vivid red-orange, their leading edge bordered in blue, as are the other fins. The body color is quite simple, a warm reddish-buff shading to red ocher on the back and tan on the abdomen, crossed by two horizontal stripes of a more or less distinct character. The throat, lower opercular region and breast are the same vivid red as the ventrals, especially in the male, although the intensity of this coloration is subject to considerable individual and seasonal variation. The small but lively eyes are a warm gold, with black pupils and red markings on the iris. Sexual distinctions are not numerous but are striking. The caudal extensions of the male are longer and

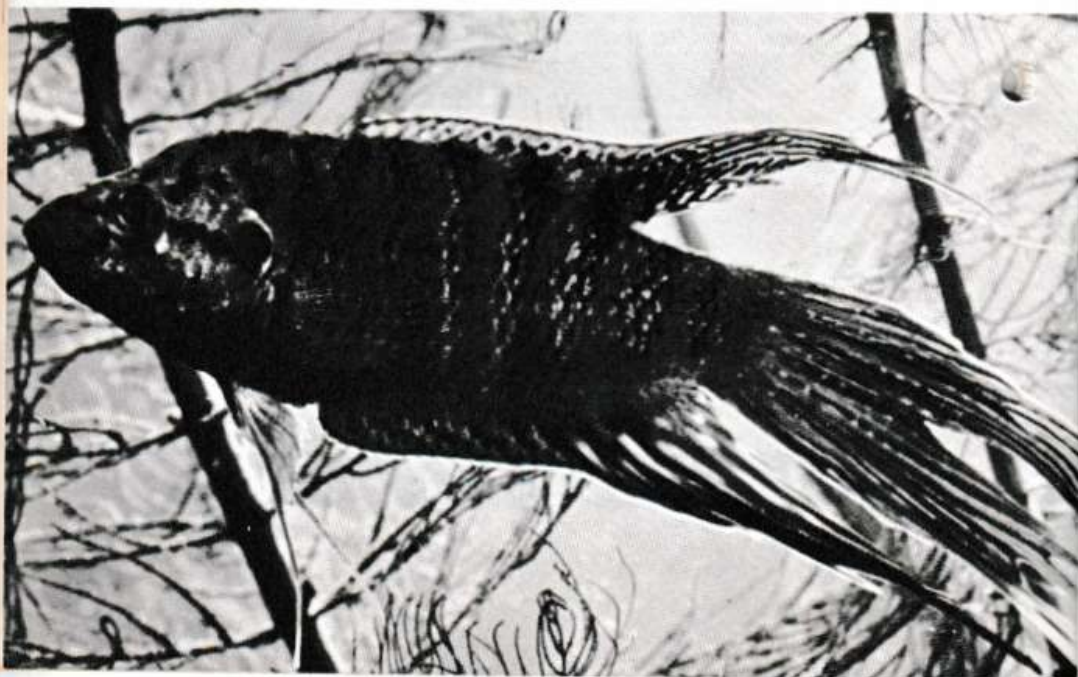
darker than those of his mate, and his breast and throat coloration is brighter, especially in breeding season. However, the surest criterion of sex lies in the male's noticeably larger lips, which give his mouth a "puffier" appearance than his mate's. This particular characteristic may have more than recognition value, since the male alone indulges in nest building and the thicker labial structure may be of decided assistance in blowing and manipulating bubbles.

The anti-social traits that would bar *dayi* from the community tank are conspicuous by their absence, a statement that cannot be made for either the red paradise or its albino variety. My original pair lives a good deal of the time in a fifteen gallon aquarium stocked with *Apistogramma cacatuoides*. After their initial introduction, they were more noticeable by their absence from the more frequented regions of the tank than for any other characteristic. The dense planting and ample rockwork, along with a few short, sharp disputations with the callow cichlids soon resulted in the two paradise making a somewhat more positive contribution to the finny pageant of this tank. Their initial timidity

replaced by a serene self-confidence, they were much given to contemplation, hugging the underside of a large sword-plant leaf, breaking their reverie only to dash up to the surface, in one-two succession, for a gulp of fresh air. In all candor, I must admit that this disinclination for any sort of superfluous motion is one of the spiketail's biggest weaknesses. Although possessed of a marvelous coloration, this fish's behavior is hardly calculated to show it off. Clamped fins and pensive stare vanished at feeding time, and little timidity was displayed by my finny mystics as they jostled the young cichlids for their share of brine shrimp. A most surprising characteristic of these fishes was the total lack of aggressiveness displayed by the male towards his mate.

The temperature range of *dayi* is quite broad, and it makes few demands in this respect. It will live happily at temperatures ranging from 60° F. to 90° F. although the mid portion of this range is best. The fishes are equally undemanding about the chemical makeup

Photo: The red paradise fish, *Macropodus opercularis* is the most-often-kept and best known species in its genus. Photo by Klaus Payson.



of their water, although they do demand "old water" in the classical sense of the term (i.e. well used) if they are to display their best colors.

The reproductive behavior of this species has been the subject of controversy on a moderate scale almost since its introduction. One group of partisans maintains long and loudly that the spiketail paradise spawns like any other bubble-nester, constructing a firm, high nest of bubbles at the surface, as often as not in the open. Another school argues as long, and quite as loudly, that *dayi* is an aberrant bubble-nester that constructs a fairly loose nest under an overhang of rock, in a cave or in some other enclosed space. While the many reports seem to indicate that the matter of nest-building is subject to a good deal of individual variation, a friend and I, working with 2 pairs of this species, have established what we feel to be a viable explanation of these conflicting reports. We found that a male spiketail will build his nest in the best paradise manner at the surface in the open if neither suitable cover or a sub-surface location is provided. Should some manner of floating cover be present, the male will construct a fairly tight nest beneath this. And should some enclosed site beneath the surface be present, a rather loose nest will be built there by the male, in preference to any other site. This preference for enclosed, sheltered nesting sites is quite in keeping with a fish that dwells in running water, where the current might sweep away a surface nest. And since plasticity in the matter of nest sites is certainly an advantage to the species, we have these cases of conflicting reports. Necessity knows no law but success, and the strength of the drives that result in nest building are strong enough to prompt quite a bit of variation should a less than ideal environment be offered to the fish.

The matter of nest-building came to my notice one late spring afternoon

when I observed the male paradise making purposeful trips to the surface for air, and then nipping into the uppermost cave in a large piece of drilled red tuffa rock that constituted the most conspicuous feature of my fifteen gallon tank. My curiosity piqued, I shone a flashlight beam into the tiny grotto, and lo and behold — a recognizable bubble nest! Spawning followed soon after and was a total and abject failure on all counts. I was unable to record any observations of the fish's spawning behavior because of the almost total enclosure of the nest, and once the eggs were all in place, the newly-kindled aggressiveness of the male sparked a conjugate flare-up of the territoriality among the male cockatoos, who, under normal circumstances, would not have been caught dead so near the surface of the water. The next day, the male paradise had a large piece of tail missing, and the cave was occupied by a self-satisfied and very smug looking male cockatoo. Round one to the forces of ignorance!

Determined that the second round would go to the forces of enlightenment — me — I promptly set up a five gallon tank for my pair. To about four gallons of hard (232 ppm). Los Angeles tap water was added, a thermostatic heater, an anchored polyethylene ice cream cap that floated serenely at the surface, a trilion arrangement of flat sandstone slabs, a pot of bushy water wisteria, well pruned for the event, and a cup of peat extract. Just enough gravel to cover the bottom completely rounded off the bridal suite. The set-up was allowed to age for five days, at the temperature of 76° F. The pair was then added, permitted to get their bearings, after which I raised the temperature to 82° F., and departed for my second semester at Santa Clara, leaving instructions to my long-suffering mother to watch the pair carefully, relay any and all details relating to spawning to me by mail, and remove the female once

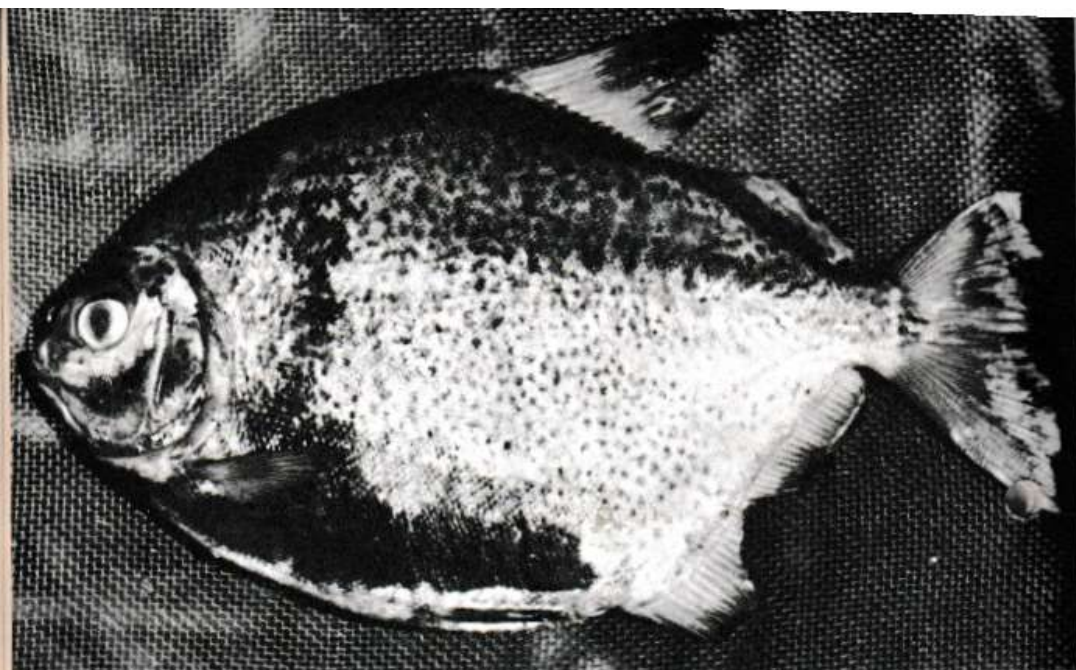
spawning was finished. When queried about how to determine when the pair was finished, I breezily replied that one could always tell by the aggressive conduct of the male towards his mate. The pair spawned to order — with one little hitch. The male steadfastly refused to touch the female after spawning was over, and my mother, unaware that the female's presence was no longer called for, failed to remove her. I do hope that the female enjoyed eating her offspring as they became free-swimming. Round two to the forces of darkness and ignorance!

When I arrived for the summer, the third round was about to begin. The male had built a large nest under the sandstone arch, and indulged in a complex, circling dance to draw the female beneath the nest. For her part, the female was anything but unwilling, and when the male broke off this courtship ceremony to add a few more bubbles to his edifice, he was most unceremoniously bumped in the side by his impatient mate. Spawning was in true paradise style, the male grasping his mate in a close embrace to trigger the release of the ova. Surprisingly enough, this activity, broken off by the male to place the buoyant eggs in place, was reinitiated by the female. After five embraces, the pair broke off, the male assuming a defensive role beneath the nest, and the female busying herself with other concerns. As the eggs were quite a bit lighter than water, the nest probably finds its true function in anchoring the eggs in a sheltered spot. Three days later, there were forty tiny tails hanging from the nest, and the female, who had been left with her mate to keep him honest, was removed to her former home in the fifteen gallon tank. In another three days, a full score and ten tiny slivers of ocellated glass were clinging to the glass. Since I had reason to suspect that the former doting father had relegated the missing fry to the interior,

he was reunited to his mate, who greeted him with fulsome enthusiasm. The fry graduated from infusoria to brine shrimp and another four days after they became free-swimming. They are at present down to twenty in number, just a shade over three-quarters of an inch in length at the age of two weeks, and already showing blushes of color in their fins. Round three to enlightenment.

One may well ask why such an attractive and undemanding fish, not to say an unusual one, is so seldom seen in dealers' tanks. The answers, I feel, are fairly apparent. First of all, due to the mix-up in names, the spiketail paradise never had a chance to compete on even terms with the other labyrinth fishes. With the mix-up in names went a mix-up in identity, hardly calculated to bolster the fish's popularity. Nandids, and sad to say, cichlids, have never attracted the attention of most aquarists. Then the brave few who did purchase pairs could hardly have been aided in their breeding attempts by the fertile speculations that surrounded fish's identity and nature. The spiketail paradise is a willing but far from prolific breeder, which might explain why commercial breeders avoided it.

Finally, there is the inescapable fact that the spiketail paradise is not an active fish, and spreads its attractive fins less often than it might. Any dealer will confirm that a perky manner impresses the customer far more than brilliant color, and the meditative manner of the spiketail might well be interpreted by a prospective customer as being a sign of disease. With all these circumstances set against it, the wonder is not that the spiketail paradise is rarely seen, but rather that it is seen at all. Until this distinctive labyrinth fish is given the publicity it deserves, it will remain in the province of those aquarists, who having grown tired of the usual bettas and gouramis, are in search of "something different." ◀



A Beautiful Dead Fish!

BY HARALD SCHULTZ
Museu Paulista, São Paulo, Brazil
Photos by the author

When the dry season comes again and the white, fleecy clouds draw across the always-blue sky, something happens to me! I long for the freedom that only the mighty forests and savannahs, broad rivers and lakes, crystal-clear brooks, and enchanted ponds can offer me. Central Brazil. The immeasurably great Amazon. Northern Brazil with its mountain ranges. Everywhere there is virgin territory for the fish hobbyist . . . if he has enough experience to know exactly where to look!

Is it just imagination, or perhaps a youthful curiosity on my part? My thoughts race far ahead of reality. They conjure up colors and shapes of new, bizarre and beautiful fishes which could never be. Or is it not these same highly colored dreams which call us out into the open and spur us on to new deeds? However, no human powers of the imagination could ever approach the actual beauties of nature. It takes little—a gleaming spot on an exceptionally long dorsal fin—to change a fish to a startlingly new species never before seen by human eyes and lovelier than any which our powers of imagination could dream up. Let us take for example the blue discus (*Sym-*

Photo: The beautiful red-bellied *Metynnis* of the Botovi River.

physodon aequifasciata haraldi), or the green discus (*Symphysodon aequifasciata aequifasciata*), or even the cardinal tetra (*Cheirodon axelrodi*) with its deep blood-red and gleaming neon-like green colors which cover the entire body. And I am leaving out altogether the endless unbelievable forms and colors of the ever-growing number of species of marine fishes!

Last summer saw me again in the well-watered region of the Upper Xingu in Central Brazil. I have said on many occasions that it is not my profession to discover new, beautiful fish species. For the past 25 years I have made a study of the little-known Indian races of Brazil. This takes me to places where new fishes are found. What professional collector could afford to travel as far and for as many months as I do for the sole purpose of catching a few little fishes? The expense would be too high!

The Indians here are friendly people. They go fishing almost every day, fish being almost their sole nourishment, served with manioc cakes. Vegetable salt and pepper are used for seasoning. Yesterday, today, tomorrow, and the day after . . . do they never get tired of this fare?

It was still early in the morning. The night was bitter cold. I had to wear two summer suits over my pyjamas and crawl under three blankets, and still I was cold. How do the Indians stand such temperatures in their straw huts? This is an easy question to answer. The huts are tightly shut, and the families keep a constant wood fire going, about which they hang their hammocks at night. During the night father or mother must sometimes get up to put a log on the fire, to spread warmth over the naked Indian bodies.

Before the first rays of dawn the fishermen came into my hut. "Come on, let's catch some fish!" I jumped out of my hammock, put on a warm wool jacket, drank a cup of coffee, put on my short trousers, packed my camera, and was ready to go. We took off in tiny, narrow, and sometimes-leaky dugouts into the river.

These Indians fished with poison, picking hundreds of silvery fish bodies off of the water surface. Another system is to place a pair of nets on the bottom of the lake. These nets are attached to long poles. Boys in the bow beat the water. The fish usually hide under water hyacinth leaves, and when frightened by the uproar they flee to the bottom and frequently into the nets. Other Indians shoot the fish with bows and arrows, which fly faster than a fish can swim.

Every day there were new shapes among the old, well-known ones. The Indians had no hesitation to catch the pretty, harmless water snakes, which were numerous at this time of year, for food.

At this time, summer, many of the fish species were still in their juvenile stage. Some of them were hatched during the rainy season just past. There were, however, many fully grown and very pretty *Aequidens* species with long

dorsal and anal fins which looked like waving flags. The sides of these lovely cichlids were gleaming green with yellow, arched stripes. A new species? Who knows out here? This is a ticklish job, one for an ichthyologist in his laboratory.

Now and then the Indians catch big *Acestorhynchus* with such tremendous, sharp-pointed teeth that they stick out of holes in the opposite side of their upper jaws. These teeth are attached by the Indians to the end of sticks, and a child that has been very disobedient is punished by being jabbed!

The big predators *Cichla ocellaris*, known throughout Brazil as "Tucunaré," are very numerous. They are an excellent food fish, which I ate every day, roasted on a grid over a slow fire. Their bright colors, olive-green, yellow, and an ocellated spot in the upper part of the caudal base, would make them a true showpiece for any public aquarium. These, however, are among the worst predators in Brazilian waters. They are always ready to eat, always hungry. When a spoon such as is used for bass or pickerel is cast into the water, in many cases a number of these beautifully colored predators rush to grab it. They even seem to fight for the privilege of swallowing what looks to them like a strange little fish. In any large body of water it is not difficult to catch a number of these delicious fish in a very short time.

Photo: Indians scare fish by beating the shallow lake surface. The fish try to jump over the fence and land in the net. Thousands of fish were caught in this fashion.





When in the course of a summer the waters of the upper Xingu evaporate, becoming constantly shallower until the water level is very low, these ever-hungry cichlids gorge themselves to such an extent that the males grow a large lump of fat on the top of their heads. And when the first rains have begun to fall, pairs spawn in shallow pools, preferring places where there is little current. The eggs are laid on a submerged log, and both eggs and fry are lovingly cared for, cichlid-fashion, by the parents. Woe betide an enemy that dares approach them!

Even the traira, *Hoplias malabaricus*, which get to be a yard long and have a mouth big enough to accommodate a man's both fists, are successfully driven away. Incidentally, these trairas belong to the true characins, a group that includes some of the fishes with the most beautiful colors and interesting shapes. The characins have given us the loveliest of the small fishes as well as some of the most interesting—neon tetras, fiery *Pyrrhulina* species, the small *Nannostomus* and *Poecilobrycon* species, and the *Characidium* species that move slowly over the bottom. These *Characidium* are interesting fishes, without charm or color. Still they find their ways into fish shipments and are bought by hobbyists who are looking for "something special." Most of the fish species in the larger or smaller streams in Brazil and Africa belong to the characin group. They are caught by the tons. Even the highly respected piranhas belong to this group.

Photo: Indian youngsters shoot fish with bows and arrows when they try to go around the net and to the other side of the fence, which is made of poles.



The *Metynnis* species, which are still quite small toward the end of the dry summer, grow so quickly when the rainy season begins that their growth can be noticed from day to day. At this time their colors begin to change. A uniform silver becomes silvery blue, and numerous black spots show up all over the body.

One day my Indian friends called to me: "Come see a wonderfully beautiful fish! Come quickly to this boat, Kukoi." (This is what they called me here). I plopped overboard and splashed through the water, my feet sinking into the mud. It was a hand-sized *Metynnis*. The body was entirely silvery blue, peppered with countless black dots. At the edge of the body there was a pencil-wide, blood-red stripe, about 3 inches long and gleaming red. In the dorsal and anal fin this stripe was repeated.

At this time this fish species suddenly became numerous. Every day the Indians brought in more of them. The females, as is usual with fishes (and not, unfortunately, with humans), are less attractively marked and colored. What could I do with this precious fish? I was figuring on spending another month with my friends. I could not keep a single fish alive for this length of time. I found that I could not even get the newly caught fish back into the village. This fault, however, lay mostly with the Indians. Wanting to please me, they filled the metal cans, in which I had put one or at most two *Metynnis*, with fish. Then when I came into the village—the containers had to be carried about 500 yards through the heat of the sun—the fish had long since died and only a few could be shipped, these dead and in formalin.

This is how things went with me, but then again, this same thing happened when I discovered the famous blue discus. The discoverer gets the renown, the collector gets the honor — and the dealer gets the profit! To each his own.

Photo: Along the river banks one often sees *Tejús teguixim*, a giant lizard that measures 1½ yards from its mouth to the end of its tail. Its powerful jaws are able to inflict serious wounds on anything or anybody that annoys it.

Collecting *Cynolebias wolterstorffi* —A Story of Jinx and Spunk

Dr. Viggo Schultz

Porto Alegre, Brazil

"Daddy, they are all dead again." That was Dieter, my ten-year-old little boy and fishing companion, bringing me the news that all the laboriously collected *Cynolebias wolterstorffi* I had stored in our garden pool to ship them that day to Los Angeles had once more succumbed to the usual fate.

Cynolebias wolterstorffi is not exactly an ideal aquarium pet, but no one can deny that it is an interesting fish. The body is elongated, of oval section, with rounded fins, the large terminal mouth equipped with the fierce teeth of a predator; the over-all length of full-grown specimens is about 6 inches. The females are a mottled dirt-brown, but the males show a beautiful dark greenish-blue base with tiny mother-of-pearl dots sprinkled all over the body. Quite a nice-looking fish, but, considering the size of its mouth and the fact that it eats only live food, not exactly one you will want to keep in a community tank.

The fish moves and looks a little like a jumbo-sized Siamese Fighting Fish, but with more subdued colors and with the fins a little shorter.

Reproduction takes place in the way that is usual for the genus, meaning that the parent fish deposit the fertilized eggs in the mud at the bottom of the rain pools and swamps where they live. When the dry season comes around, the heat kills the parents, and the waters dry up. In nature the fry hatch only the next year, when the winter rains duplicate the previous period's favorable conditions. In the aquarium one may use peat moss or very carefully washed extremely fine sand to spawn the fish.

C. wolterstorffi should be considered a cold water fish, for its native waters go down nearly to the freezing point, but reach warmths of up to 80°F. at the end of their vital cycle. The pH and hardness do not seem to be of any great influence, for, despite the fact that most specimens are collected in swamps with fairly soft and acid water, I have also caught some of these annuals in brackish swamps in Rio Grande county, very near the ocean.

But to come back to our story: It had been hard work, over two whole months of it, and the shipment was scheduled to go out that day, and all fish were dead.

The whole thing had started in 1961, when one day I had received a letter from Prof. Roy L. Walford, M.D., of the University of California's Medical Center at Los Angeles, inquiring into large-sized annual fishes needed for his

Then word came that in the Rio Grande-Pelotas area Mr. Boaventura Barcellos, head of the Oceanic Research Center there, not only knew where one could catch our annuals, but even had some in his own tanks. My brother Alarich (Prof. Dr. Alarich R. Schultz, botanist, Director of the Institute of Natural History of the University of Rio Grande do Sul, and with a long string of letters after his name) is the immediate boss ahead of Mr. Barcellos, and a letter of introduction from him was easily secured.

So off we went to Rio Grande by plane, sure that now at least our *Cynolebias* would be forthcoming.

But fate had decreed otherwise. The day we arrived in Rio Grande was the same day Boaventura Barcellos and his main assistant, João Grafulha, had decided to come to Porto Alegre on business. And the research center there is only a two-man show . . .

So now we were stranded in Rio Grande, a quaint old sea port on the southern coast of Brazil, once more without a car and without the man who was supposed to provide both for transportation and our fish.

Fortunately I had lived two years in Rio Grande myself, and still knew some aquarists there. I got hold of one of them who had a car, and we went out to the places where he "thought" the fish was to be found.

**WE
BUY
TROPICAL
FISH**

. . . independent fish farm Gulf Fish Farms, the largest in the world, is constantly looking for sources of tank-bred fish of all species . . . especially the rare varieties. If you can supply quantities of any fish, please write, giving number of fish available and their price and size, to:

Gulf Fish Farms

P. O. BOX 817
PALMETTO, FLA. 33561

We caught a lot of interesting specimens: the Seven-Spot, for instance, and two other kinds of live-bearing tooth carps which so far I have not been able to identify (one with a distinctly violet hue, the other rather similar to *Jenynsia lineata*), and a very shiny little silvery fish with two distinct dorsals which in the aquarium seems all the time to be "shimmying" without being ill, and which in my opinion probably is some kind of *Austrorhamphus*. But no *Cynolebias wolterstorffi* . . .

Unfortunately Roy and Bill were also scheduled for a jaunt to Buenos Aires province, in the Argentine, in quest of *C. elongatus* and *C. bellottii*.

So they left Porto Alegre empty-handed, and I felt embarrassed. After all, one should not seem to lightly invite people to take a costly trip of several thousand miles and then be unable to deliver.

I had made up my mind to help the project further, so one month later I set out to do so. Once more I went to Rio Grande, this time together with Boaventura Barcellos and João Grafulha, in the station wagon of their Institute.

The weather was freezing cold, and we had to seine with swamp water up to our stomachs. It was here that João Grafulha in particular showed his worth, for he was untiring as long as I kept him "fueled-up" on chocolate for caloric content and brandy for quick body heat. He even disdained the use of waders or rubber boots and went into the ice-cold water in swimming trunks and bare feet.

Soon we had collected the required number of fish, and I came back to Porto Alegre in order to ship them to São Paulo for consolidation with another shipment of large annuals from Porto Príncipe in Central Brazil. The man in charge in S. Paulo was Mr. Carl Stegemann, of Aquario Tropical, a man with quite some experience in handling newly caught fish.

Now I could finally rest on my laurels. My "contribution to science" had been given, and it was only a question of time to await the results of modern research into aging and (possibly and hopefully) *how to stop it*.

That is what YOU think. I thought so too.

A week later the bell of my home telephone gave forth that characteristic "long distance" ring. "This is Stegemann, São Paulo. I want to talk to Prof. Schultz." "Right here, Carl. What can I do for you? This is Viggo," I said—"All the *Cynolebias wolterstorffi* are dead. Can you get me more?" he asked—"Can do. I'll ship them."

Once more I went to Rio Grande, and once more the whole business had to be done over again . . .

Two weeks later Carl Stegemann suddenly showed up here in Porto Alegre, driving his station wagon and bringing along a boy, his hired helper for fishing.

"The fish are dead again, and I have to get some more. Let's go out after them, okay?" This did not fit any too well into my work schedule—after all I have a teaching job to hold down—but by now for me it was a matter of not giving in to fate and of showing the old Schultz stamina. Since renewed attempts around Porto Alegre yielded negative results, another trip to Rio Grande was started, this time made up of a caravan of two station wagons, for Julio Morandi, that faithful friend and aquarist who had already befriended the visiting scientists in such a gentlemanly manner, decided to toddle along in his own car.

In Rio Grande itself the harvest of fish was rather lean, but we had seen literally thousands of promising water holes and swamps along the highway, especially on the stretch between Rio Grande and Pelotas, a neighboring town of about one hundred thousand inhabitants. It was there that we finally found annuals in sufficient numbers to make the catching worth while, and we caught not only the number required to make my friends in Los Angeles happy, but another 1500 specimens for Stegemann's fish business.

Another interesting animal we found was the "Pitú," a fresh water crustacean that looks like a miniature lobster. It grows to a size of 4 to 6 inches and looks quite fierce with its big claws. Depending on the color of its background the Pitú is either greenish or brown in color. I would not know exactly in what genus to place this crayfish, but, according to the illustrations



engineered for long life... silent power...

MEGATON AIR PUMPS

THE MEGATON SUPER

1" cylinder . . . 1/70 H.P. . . . **\$18.95***
325 cu. in. (will service 6 tanks)

also available: **THE MEGATON**

¾" cylinder . . . 1/100 H.P. . . . **\$15.95***
200 cu. in. (will service 3 tanks)

ALL MEGATON PUMPS feature sturdy one-piece frame construction . . . have heavy duty shafts and bearings for longer wear. All moving parts precision machined for ultimate accuracy and efficiency. Material and workmanship *Guaranteed for one-full year.*

* freight charges additional outside of Metropolitan N. Y. area.

A must for the Tropical Fish enthusiast!
our 64-page Tropical Fish HANDBOOK CATALOG! Send 50¢.
At your local dealer or order direct from:



AQUARIUM STOCK COMPANY, Inc.

31 WARREN ST., NEW YORK, N. Y. • 8070 DEVERLY BLVD., L.A. 48, CALIF.

found in the books on aquaristics I have to hand, it could be either an *Astacus* or a *Cambarus*. The Pitú not only makes a delicious dish when properly cooked, but it also is an interesting and useful aquarium pet. Despite its ferocious-looking claws it never attacks a live fish. To the contrary: I have seen Blue Gouramis take food away from Pitús, with the latter beating a cowardly retreat. And I have not ever had a better scavenger in any of my tanks . . .

Now it seemed that my long and laborious quest was over. Or was it? You guessed it. A week later I received news from Mr. Stegemann: "The *Cynolebias* are all dead. What now?"

I decided to act on my own. I had meanwhile met a man who was in a position to help. He was not only a lodge brother of mine, but, what was more important, an airplane pilot on the regular run between Porto Alegre and Los Angeles. Knowing that the package he was to carry to Los Angeles was intended for scientific purposes, the management of his company did not create any obstacles to his taking it there, giving him special permission to take the shipment of fish among his personal belongings.

Wearily I prepared to spend another week-end in Pelotas. A nephew of my wife, on furlough from the Brazilian Army where he is a sergeant, decided to come along in order to help me drag the seine and carry the containers. The first difficulty we met on arriving in Pelotas was locating hotel space for us. When we arrived the town was full of visitors: a doctors' convention, a teachers' seminar, and a cattle exhibition had filled all hotels and boarding houses to capacity. Finally we were able to get a small room in the dingiest of inns.

Since the fishing location could not be reached on foot, I had to secure the services of a taxi and driver for two days (rent-a-car service is a novelty in Brazil, and so far only found in the state capitals). By Sunday afternoon we had once more caught our full complement of annuals, storing them in plastic bags with tranquilizer and oxygen tablets.

Monday morning we took a bus back to Porto Alegre, with all our paraphernalia, including the fish, in the luggage compartment. My pilot friend was scheduled to leave on Wednesday.

On Monday afternoon the fish were dead again . . .

No caution had been spared in handling them, for I am not inexperienced in such things. No fish had been touched with our hands whenever that could be avoided, and transferring them from the net to the containers had been done by me personally with a spoon in order not to hurt them; reasonably

clean water had been taken from the swamps and ditches they came from; and any kind of commotion that might have scared them was strictly taboo.

I was indeed ready to throw in the towel. Should I really give up? Not on your life! Especially not after all the trouble I had gone to so far!

"It's no use going back to Pelotas," I told the nephew. "Better look for the fish around Porto Alegre. By now they should be available right here."

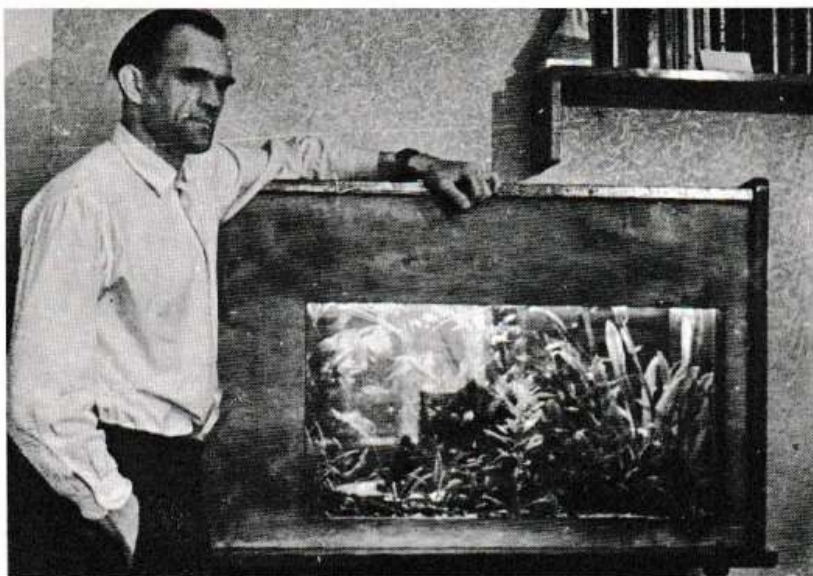
And indeed they were . . . Not too far from Porto Alegre, in the neighboring county of Canoas, I found roadside ditches teeming with *Cynolebias* of all three local species. In one afternoon I caught everything needed, and finally, FINALLY, the shipment could be put under way.

Soon thereafter I received word from Los Angeles that everything had arrived well and that research had started with promising results. Interesting by-products were a couple of articles by Drs. Walford and Hildemann, advising health authorities in countries with mosquito problems to make use of annuals as controlling agents in preference to chemical means. It stands to reason that a fish that eats the larvae, and that is permanently present when in the rainy season the water is there, is a better solution than polluting the waters with oil or even poisons, only to have them inseminated with mosquito eggs again by the airborne pests next season when their natural enemies, fish, Cladocera, etc. have been killed by the previous year's treatment . . .

This year Roy Walford wrote me another letter. "My breeding stock of *C. wolterstorffi* was infected with a disease by some other wild fish we brought in, and now they are all dead. Can you send me some more?" ("They are all dead," seems to be the leading refrain of this story). Of course I agreed.

When the regular *Cynolebias* season arrived, the whole state of Rio Grande do Sul was afflicted with an extended drought, so I could not catch any at all. "It never rains but it pours" seems to be quite a meaningful adage, for after the drought came a flood that displaced thousands of homes, just in the *Cynolebias* region. Another delay. Then the whole rigmarole of catching fish and having them die was repeated during a period that extended over two months, to the point that, when shipping day came around two weeks ago, my son Dieter, as told at the outset, gave me the news that the latest batch too had died. And that right after I had phoned through a cable to Roy Walford, telling him the number of the flight the fish would be on. So another week was spent collecting specimens for the next week's flight.

Well, the final batch of fish arrived at its destination, and ever since I've been wondering to myself why it was that all of the efforts to provide Professors Walford and Hildemann with fish had been so badly jinxed.



The Aquarium Hobby in Latvia

Ing. Chem. Edmund Janson

Riga, Latvia

BEFORE I GO into the development of the aquarium hobby in Riga, the capital of the Latvian State, allow me to devote a few lines to describe the position of the hobby before World War II. During these years, aquaria were a rarity in Riga; only the wealthy could own one. The price of a 30-gallon aquarium was about as much as a worker earned in a month. A pair of paradise fish were so expensive that an entire family could be fed for a week on what they cost. The aquarium hobby first began to really develop in the year 1948.

With the exception of a few goldfish strains, there were brought in from Moscow and Leningrad several of the anabantids such as bettas, three-spot and blue gouramis, pearl gouramis, paradise fish, and dwarf gouramis.

Almost from the beginning we saw in Riga such cichlids as the angelfish, chanchito, and blue acara. The Riga aquarium hobbyists have no great regard for the

Photo: The author and one of his display tanks. In Latvia, aquarists frame their tanks with screens to give them a larger appearance.

cichlids other than angelfish, because they do not always behave well. For this reason, we in Riga seldom keep them. At times, however, we also see the Jack Dempsey, the firemouth and the congo cichlid. Finally we can mention the jewel cichlid (*bimaculatus*), which has all but disappeared; the Zoo has one old pair.

There were some egg-laying toothcarps brought in from Moscow in 1955, and *Epiplatys chaperi*, *Aplocheilus lineatus* and *Rivulus cylindraceus* were successfully bred.

In 1956-57 we first saw pristella and gold barbs, as well as *Aphyosemion australe* (which we were able to spawn in 1960). 1957 also marked the appearance of serpaes and neon tetras. We also saw our first Australian rainbow fish that year, but at first they would not spawn, and it was not until 1962 that the first spawnings were attained. For a short time, in 1958, there were some nandids to be had, namely *Badis badis* and *Polycentrus schomburgki*. Nobody in Riga could get them to spawn.

A great wave of enthusiasm for the aquarium hobby was begun when the Riga Petshop opened in 1958. Besides the fishes already named, in 1962 we saw Costello tetras, glowlight tetras, bloodfins, rasboras, arulius barbs, cherry barbs, ramirezi, and opaline gouramis. The greatest part of these fishes were spawned more or less successfully by the Riga hobbyists.

The Cyprinidae are now represented frequently by rosy barbs, tiger barbs, pearl danios, zebra danios, giant danios, and white clouds. Livebearers are represented by the guppy, the caudo, several strains of swordtails, the sphenops molly, and the sailfin molly. The most popular of the characins are the flame tetra, the black tetra and the tetra from Buenos Aires. Catfishes are highly prized here in Riga. At the time we have only one member of the family, *Corydoras paleatus*, only in the Zoo are they able to breed this fish every year. Very rarely we get to see splash tetras, diamond tetras, callistus tetras, Griem's tetras, as well as angelfish and discus.



**GREATER
MIAMI
FISHERIES**

3475 N.W. 187th St.
Opa-Locka, Florida

- ★ LIVE BEARERS
- ★ EGG LAYERS
- ★ IMPORTS

Open 24 Hrs. — Phone NA 1-8508

SATISFACTION GUARANTEED

Wholesale Only

Write for Price List

**MIAMI'S LARGEST
TROPICAL FISH
BREEDERS**

Telephone: NAational 1-8508
or NAational 1-0762

1965 — 15th Anniversary
in the United States

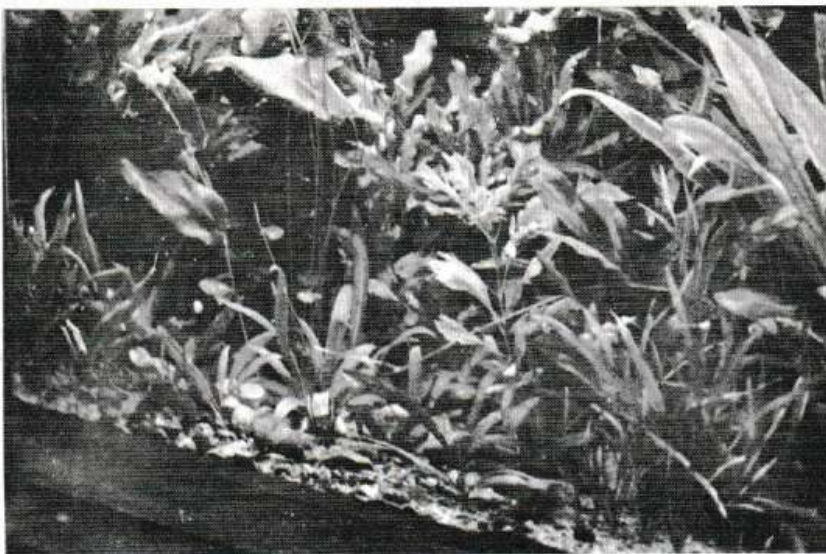
**THE INVISIBLE FRENCH
FILTER & AERATOR**

Still Unique with Sandlike Body

A highly efficient aquarium conditioner, achieving a natural balance. Originally conceived to be buried under sand, to work without cleaning, out of sight. Bacteria-activated porous member can be used with any grade of gravel, or even in the bare tank, and still work biologically. Does not hinder plant growth but stimulates it by natural fertilization. Sets without dismantling tank. Maximum aeration, ideal for breeding. (Patented).

Originated by

M. & A. VANSTEENKISTE
149-54 114th PLACE
SOUTH OZONE PARK 20, L.I., N.Y.



Of native water plants, many hobbyists cultivate the large pond lily, which grows all year in its dwarf form. The warm-water plants are represented by *Elodea densa*, *Myriophyllum* species, corkscrew vallisneria, cabombã, *Cryptocoryne beckettii*, *Ludwigia alternifolia*, sagittaria, riccia, and salvinia. Highly valued by hobbyists, is water sprite. Not all hobbyists cultivate them, however, because they require a great deal of light. Occasionally we see *Echinodorus intermedius*, *E. brevipedicellatus*, *E. radicans*, and *E. rostratus* as well as *Synnema triflorum* and *Nomaphila stricta*.

As for food, dried daphnia and gammarus are mostly used. The hobbyists culture their own paramecium and vinegar eels, as well as white worms. Not far from the city there are to be found ponds where the hobbyists can net daphnia, cyclops, and rotifers. Bloodworms find a ready market, being sent in regularly from Moscow and Leningrad. However, we are not acquainted with tubifex or grindal worms.

A considerable number of hobbyists have large aquaria (50 to 60 gallons) in their houses. Lighting is combined as a

rule, with incandescent and fluorescent mixed.

In the winter months, hobbyists use electric heaters with thermostats. For aeration, piston as well as diaphragm pumps are used. Beginners get most of their information in the petshop from experienced aquarists who run them and patronize them.

Fishes are also sold by the Zoo, and the best information on them is available from the scientific assistant, O. Sterne, a

Photo: They may have had luck spawning some fish species in Riga, but they certainly do well with plants.

NOW AVAILABLE

Hard-to-get Back Issues of
The Aquarium Journal

Back issues of the Journal are valuable and are in constant demand at 40c each. However, we are overstocked on some issues and to move them we offer 12 back issues (our selection, all different) for \$1.75, or 24 issues (all different) for \$2.95.

THE AQUARIUM JOURNAL
Steinhart Aquarium

San Francisco 18

California

woman who is in charge of the aquarium division of the Zoo. The Riga Museum of Natural History also gives help and advice and maintains several aquaria with both native and tropical fishes.

In Riga there are about 100 deeply interested hobbyists who are members of the Organization for Natural Conservation and work with the Section of Zoology. In addition there are a few thousand unorganized hobbyists.

Several of the businesses and factories have Naturalists' Circles which occupy themselves with the fish hobby. There is also a group of young naturalists organized in connection with the Zoo. In addition aquaria are placed as decorations in the show windows of many stores in the city, and almost all of the schools use aquaria in connection with their biology classes.

The aquarium hobby has been growing more and more in the last few years in Riga.

DEALERS — Get our Wholesale tropical fish and rare plant list. We grow over 100 kinds of water plants. We operate the largest tropical fish hatchery north of Florida.



We manufacture the famous "Wild Life" Natures Best brand of fish foods and remedies.

FANCIERS - We issue a special list of collectors items. Rare and hard to get tropicals.

BELDT'S AQUARIUM, Inc.
Box 146, Hazelwood 15, Missouri

E
V
E
R
F
I
N
D
O
U
T
F
R
O
M
E
V
E
R
G
L
A
D
E
S

What **FINE TROPICAL FISH AND AQUARIUM PLANTS** are.

PET SHOPS AND AQUARIUMS

Write for our **Special Lists** issued regularly. Your name will then be placed on our Mailing List.

WHOLESALE ONLY!!

Everglades Aquatic Nurseries, Inc.
P.O. Box 587, Tampa, Fla. 33601

PANAGRA
AQUARIUM



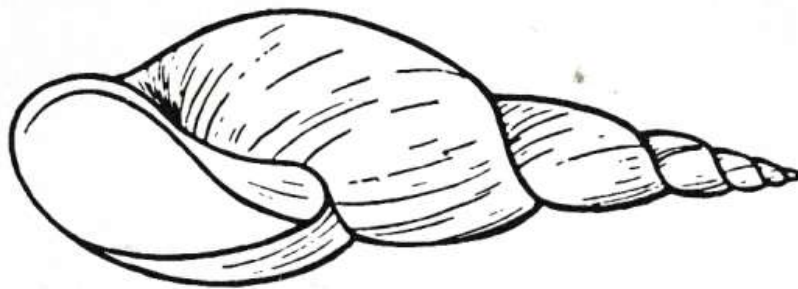
FOR QUALITY
SERVICE • DEPENDABILITY

**Tropical & Salt
Water Fish and
Plants**

Price list gladly sent upon request
on business letterhead only.

PANAGRA AQUARIUM-Rt1 BOX 577A
POMPANO BEACH, FLORIDA

Phone: FRanklin 4-2451
Mgr., Vince Rudy



The Great Pond Snails

Charles O. Masters

Walhonding, Ohio

THE AUTHOR remembers, many years ago, gathering dozens of the large and very handsome pond snails from a cattail swamp where sticklebacks and mudminnows lived in abundance. He would polish their mahogany shells until they were free of all attached filaments of algae and were truly prized specimens. Even today they are considered gems in any aquarium.

The snails belong to the phylum, Mollusca, class, Gastropoda, order, Basommatophora (Pulmonata), family, Lymnaeidae, sub-family, Lymnaeinae, genus, *Lymnaea*. There are several different kinds of closely related snails belonging to this group which keep showing up in fish tanks throughout United States but most of them are classified under about six sub-genera. In fact this article is limited to only two of these common snails, Sub-genus: *Lymnaea*, species, *L. stagnalis appressa* Say, the great pond or Niagara Snail and Sub-genus: *Stagnicola*, species, *Lymnaea palustris* Mull., the march or bog snail.

Lymnaea palustris is the smaller of the two snails, being only a little over an inch in total length whereas the species *L. stagnalis appressa* is well over

two inches in length. For the sake of becoming not too technical it is well to consider the two species as being quite similar in appearance and in habits.

They are both rather widely distributed, and in many places, the most common snail. Where the brown coating of the shell is not corroded by the action of carbonic acid in the water, it is beautifully horn-colored. The shiny shell has a long spire, wide opening "mouth" and is quite thin. It has a right-handed coil.

Air-breathing snails such as these which come to the surface at intervals have the advantage of being able to live in most any habitat, including those chock full of decaying vegetation where the oxygen content of the water may be low enough to exclude other snails. In places such as there where the food supply is rich, the snail thrives.

Usually they are found in shallow water such as that of ponds, swamps and smaller streams, but the snails have also been found in Michigan lakes at depths of 80 feet. Records show that other closely related members of the

Drawing: The author's illustration, showing the form of the Great Pond Snails.

genus have been found in temporary woodland pools which dry up in the summertime, in acid water peat bogs, creeping along the underside of the icy crust of a brook in winter, in Iceland's hot sulfur springs, 800 feet below the surface of Lake Geneva, in the icy streams of Tibet at an altitude of 14,000 feet and creeping along ice fields of northern Asia where things are frozen ten months of every year.

Around the Great Lakes area the snails are very abundant but are hardly represented among the snails crawling about the ponds close to the Gulf of Mexico and in Mexico. Both of the species named above range over the northern United States sometimes confusing naturalists by assuming different morphological forms in response to the different ecological conditions of localities from which they come.

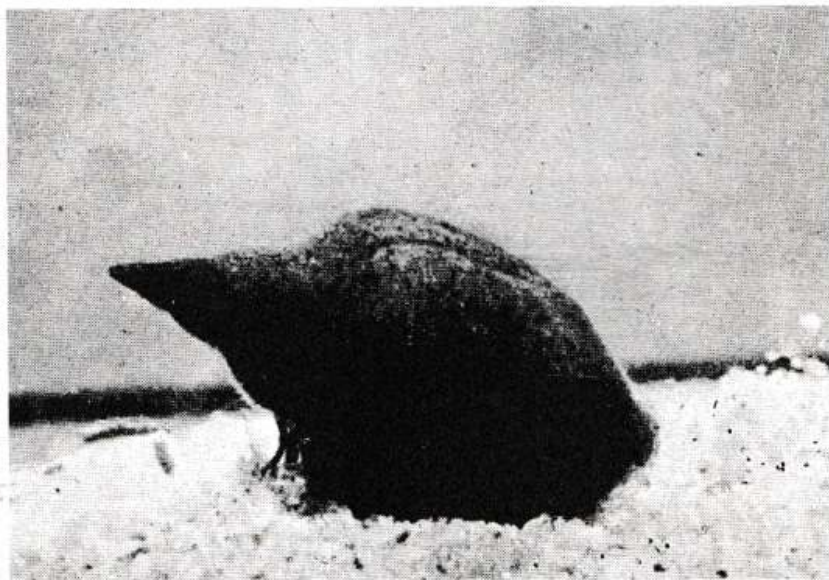
Although the snails are air breathers, they adapt themselves to skin respiration at times and can live a complete life cycle under water if the situation demands it. In such cases, however,

growth is retarded and their life span is shortened. Care must be taken to keep aquaria with pond snails well covered lest they crawl away from the water.

At times the author has found snails on the floor below his tanks where they have obviously been laying for many hours and even days and has been amazed to see them snap back to life after being dropped into the water. In a situation such as this, snails, enclosed in a shell and a mucous coat, are really in a condition of reduced metabolic rate and can live for a long time. Experiments have demonstrated that, because of this property, the snails can be sent in dry postal packages for great distances.

In 1926, Russian biologists discovered that *Lymnaea palustris* found living in temporary flood pools could endure up to 300 days in the soil after the water dried up. The weight of the snail is decreased to about two thirds of what it

Photo: *Lymnaea stagnalis*, another species in the *Lymnaea* genus. Photo by Knaack.



was originally but regains its weight in full a few hours after it is placed in clear water.

As winter approaches, the Great Pond Snails migrate downward into deep water and mud, gradually reducing their rate of metabolism so that they can live successfully far below the frozen surface.

When kept in aquaria, the Great Pond Snails almost invariably lay eggs by February or shortly before in irregular banana-shaped or sometimes completely circular masses or clear jelly fastened to most any object under the water's surface. *L. palustris* lays anywhere from sixty to eighty eggs at a time whereas *L. stagnalis appressa*, which is larger, will lay as many as a hundred and fifty. Certain individual snails will lay eggs more often than others, and when they do, the number of eggs per mass is less but a larger proportion of them develop and emerge.

There seems to be some preference shown by the snail to lay its egg masses on a horizontal plane and if such a surface is available, considerable use will be made of it. Records show that a single individual in 22 days laid 2,094 eggs. The developing embryos within their clear capsules can be easily seen turning about, which makes a very interesting project for the student of biology.

Egg production in this group of snails can be actually doubled by adding certain items to the diet. Certainly head lettuce alone is not sufficient for satisfactory propagation. Other items of food are as follows: Dried leaves of common woodland trees such as maples and poplars, filamentous algae, aquatic plants such as *Elodea*, thinly sliced apple, cooked wheat cereal, and some dried shrimp or fish.

The dried leaves are especially important. They should be gathered in the

early fall, soaked in pond water for about three days and then dried and stored for winter use. The smaller more tender leaves are best for the younger snails and the larger ones should be kept for the snails after they grow older. The leaves should be removed from the tank and replaced by a fresh supply as soon as they become skeletonized. Snails have been seen feeding on paper dropped into ponds and also on the surface scum of organically rich pools. In 1931, a biologist observed the snails, in Colorado, feeding on the early larvae of mosquitoes, enough so that they can be considered a natural enemy of the insects. Certainly too, abundant food will accelerate sexual maturity of the snail and the quantity of eggs produced.

Get your copy of the booklet

THE BRINE SHRIMP

and how to hatch its eggs

An 8-page booklet prepared by The San Francisco Aquarium Society. It describes the Brine Shrimp, the Eggs; equipment needed for hatching; 3 requirements for a good hatch; how to hatch eggs; large scale hatching for commercial users; reason for a poor hatch; storing eggs; raising brine shrimp to maturity.

For your copy, mail 25 cents to:

SAN FRANCISCO AQUARIUM SOCIETY
Steinhart Aquarium
San Francisco 18, Calif.

It is actually possible to rear three generations of pond snails in one year by paying careful attention to their requirements. Ample water is necessary but it should be kept shallow. Two or three inches is better than ten or twelve although *L. stagnalis appressa* doesn't always respond definitely to this. Glass sides in a tank permit the more rapid growth of plants so that green food would be more readily available to snails. The presence of calcium carbonate is essential. It should not be in the form of crushed lime rock or precipitated chalk but rather powdered. The snail has a true gizzard for the breaking up of plant tissue so that a