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cover photograph

Albino Cynolebias whitei, an albino recently found in the tanks of the Whamo Corporation. See the October, 1963 issue of The Journal for more information about this fish by the photographer of this month's cover, Gene Wolfsheimer, F.A.I.





World's largest marine life show center
features everything from dolphins to gobies!

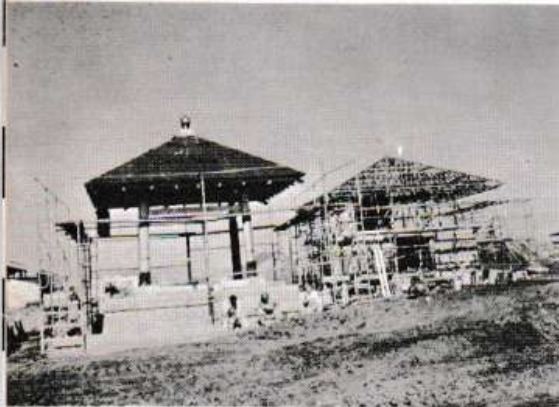
San Diego "Sea World"

AS ONE TRAVELS toward San Diego, California from any direction, one's eye is likely to notice frequent signboards, each bearing a large, boisterous whale. This grinning whale apparently is saying, "Swim!" By the time the sec-

Diane Schofield
Burbank, California

Photo: Progress of Sea World is shown in this aerial photo taken before completion in March. Exhibits include stadium-lagoon (1), underwater theater (2),

Polynesian-style lounge building (3), pearl diving display (4), public "patio" area (5) and four-tank reef building (6).



and such sign rolled past my car, I felt an uncontrollable compulsion to slow down and see what the small asterisk indicating a foot-note could mean. At the bottom of the sign is the explanation: "Swim!" loosely translated, came out "Sea World Is More Fun!"

As of March, 1964, that whale became dead right too, because this was the date that the largest marine park in the world opened. During recent months on 22 acres of land in the beautiful Perez Cove of Mission Bay, workmen have been building and landscaping to prepare this aquatic entertainment center at the edge of the Pacific Ocean.

The architecture is patterned after the Oriental style with the addition of South Sea Island sections. The architecture has the sweeping lines of Japan. The many buildings have Japanese clay tile and copper shingles and some of the other buildings that house the pearl diving exhibits have gold foil exterior trim and are of Japanese Kinoki wood. To bring in the South Sea Island theme, there is a Hawaiian pavilion overlooking the bay. Here in the pavilion one can be refreshed with tropical drinks. The area between all of the exhibition buildings and show arenas is landscaped in Japanese and South Sea planting arrangements.

The building that dominates the sea world scene is a large four-sided affair rising 54 feet, with a sweeping Oriental roof low to the ground on all sides. Inside of this building is a tank containing 160,000 gallons of filtered sea water. This tank is a true underwater stage

Photos: (Top) Stadium will hold 1,100 dolphin and whale watchers. (2nd) Buildings under construction. (3rd) Pearl diving exhibition buildings were first built in Japan, then shipped and reassembled in San Diego. The gold-knobbed structure to the left will hold the huge brass bell mentioned in the article. (4th) A section of the 4-tank reef building. All photos in article by Diane Schofield.

AQUARIUM JOURNAL



for there is a 20-minute 3-act "play" for five slipper porpoises performed within this tank. Stage props and scenery are lowered from the ceiling into this 45-foot square tank and the porpoises will swim in on cue from an auxiliary tank. The audience sits on bleachers on all four sides of the tank and observes the "actors and actresses." The glass separating performers and audiences is 2½ inches thick.

A second showcase is the 4-tank Reef Building. Each of the tanks in this building is 44 feet long and will have tropical fishes in one, California fishes in another, and the others will contain seals, porpoises and turtles.

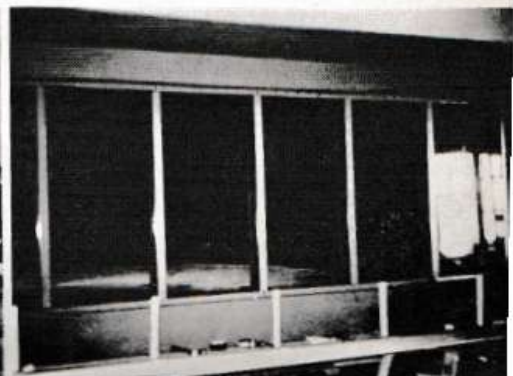
All of the interest is not beneath the water at Sea World. There is a top-side performance by porpoises and whales in a marine area that could fit neatly on the top of a football field since it is 90 x 260 feet, and required the removal of some 30,000 yards of soil. This large marine life arena is an arm of the sea itself with only a "sea gate," a net, to prevent escape of the actors and to keep non-scheduled performers out.

To catch the actors, Seaworld has a

Photos: (Top, left) The Hawaiian pavilion where one can relax. (Right) One of the three-part dolphin training tanks. They are kept separated by divisions in the tank. (Below) Assembling nets for decorative and utilitarian purposes.



Photos: (Below, left) The 54-foot high building which contains the "Porpoise Playhouse" — the tank where a three-act play for porpoises will be staged. (Right) Windows where audience will watch porpoises play, from all four sides of tank.

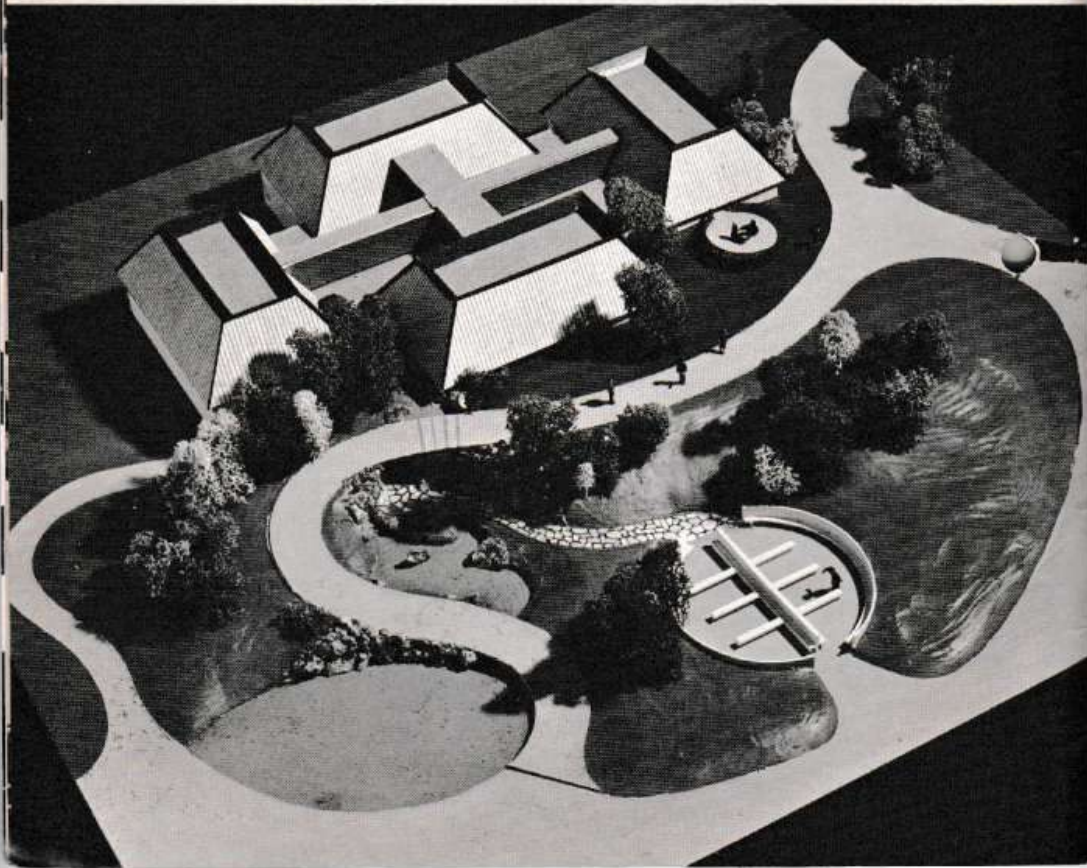


51-foot trawler with a 63-year-old captain. Homer Howard Moore is in charge of obtaining the whales and porpoises.

The cast for the Sea World show has been recruited by Mr. Moore from a number of spots. Three porpoises were caught by nets in the surf at Torrey Pines, two in the Gulf of Baja California, four in the ocean off San Quentin Bay, Baja California — to name but a few of the spots. One of the whales was captured off San Clemente Island and another off the shore of Catalina Island. The whales have a large amount of curiosity and they are attracted to the trawler. They are caught by nets. The porpoises are hard to catch and catching them often entails a chase in speedboat, before a net can be tossed over their unwilling heads. Ultimately there will probably be approximately 16-18 porpoises and a couple of whales in the Sea-world collection.

The captured animals are trained in both the huge lagoon, as well as in small 30-foot multi-colored circular tanks. Ralph Penner, recently with Marineland of the Pacific and now head trainer with Seaworld, works constantly with these animals, together with four other trainers. The training staff teach the porpoises to jump through hoops, tow skiffs, play ball, etc. Ruth Haugen, research psychologist once connected with the porpoises experimental program of Lockheed Aircraft Corporation, is thoroughly convinced that they discuss the training program with each other. "When I'm in the boat I can feel the high-frequency whistles through the bottom of the boat and I'm sure one porpoise is talking over his tricks with another." There's little question about

Photo: Four-tank complex known as the "reef building." Each of the tanks will accommodate various types of marine organisms, that is, one for tropical fishes, one for Pacific fishes, etc.





the intelligence of the porpoise, they are smart. Miss Haugen says that they are emotional too. There's one thing to keep uppermost in mind if you ever come face to face with an upset porpoise — a sign of irritation is a clapping of its jaws.

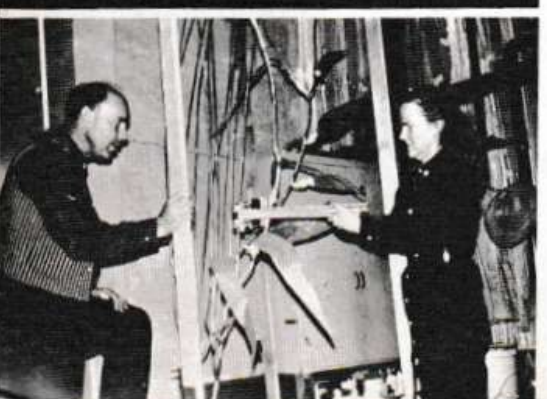
The public is able to view the end results of months of training and loving care from a concrete stadium that will seat 1000 spectators. Beneath this stadium is housed a collection of exhibition aquariums. One of these tanks

will contain chilled water for the comfort of octopi. In these aquaria, as well as in other aquaria throughout Sea World, there will be ultimately many species of fish exhibited, including Japanese and California moray eels, fishes from Mission Bay, pikes, blennies, Catalina gobies, rockfishes and other fishes from California, fishes from Mexico, Florida, Hawaii, Fiji and the Philippines.

Along with having the largest marine outdoor amphitheater in the world, Sea-world also has another "first." Within

Sketches: (Above) Overall view of the Sea World when completed. (Right) Japanese village and pearl beds: Tall building in background is a tea-house. Small structure at lower right houses the 1,500 lb. bell which is struck with a log.



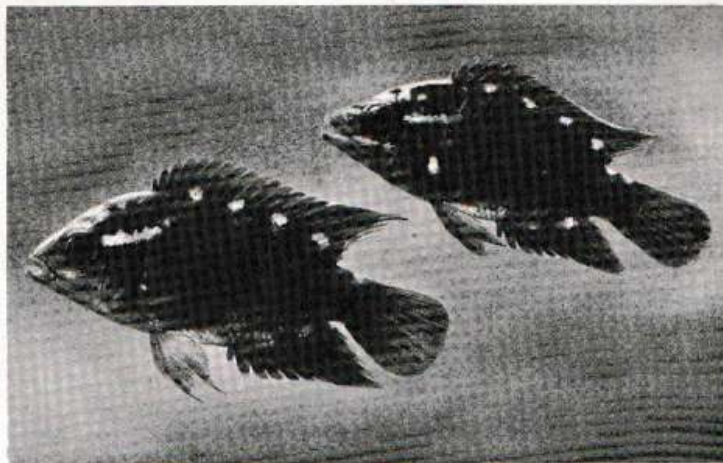


the confines of one of the loveliest of all possible Japanese settings, there is the first Japanese pearl beds ever seen outside of Japan. There in the Murata Pearl Company's Japanese Village is a 72 x 42 foot tank, 24 feet deep and in which there will be six Japanese girls diving for oysters. Spectators can watch these young women at their work either from a gallery above the half-acre lake in which the tank will be set or they may walk through tunnels below the level of the water and peer through large glass windows. If one feels especially expansive at the time, it will be possible to point out a specific oyster and say, "Gimme that one!" on the off chance that when the diver brings it up that it will contain a large pearl.

All of the buildings that surround the lake were built in Japan, disassembled, shipped here and reassembled. During January it was properly dedicated by a Shinto priest who conducted the ceremony. Many of the performers and the attendants will wear native Japanese costumes and indeed many of them will be native Japanese. At the teahouse one can have tea and cakes.

Would the fishes, porpoises and whales be so adverse to being caught if they knew they were going to be blocked in such surroundings? Surely, there must be a lot of humans who wouldn't mind living in a luxurious atmosphere as this. Remember after March this four million dollar establishment will have opened its Oriental gates to all comers. ◀

Photos: (Top) Casting pool for game fish as shown from the outside. (2nd) One of the porpoise "pupils" going through the paces with its ball. (3rd) Casting pool for game fish shown on the inside. (4th) Sam Hinton, Museum Curator at the Scripps Institution of Oceanography located a few coves up the coast from Sea World, is shown with Mrs. Hinton making realistic habitat displays (fishes and plants) for the Museum. For more on the Hinton's project, read Diane Schofield's "Pinny Folks" on Page 198.



In its lifetime *Cichlasoma coryphaenoides*
goes through many unusual color variations

Chocolate Cichlid

DURING the summer of 1959 six unidentified specimens of a cichlid arrived at one of the Winnipeg department stores. A friend of mine associated with the manager of the pet department contacted me and I identified the fish for him as chocolate cichlids. My friend was able to acquire all 6 of them at a reasonable price. These fish which were then about 1½ inches long were for a long time the only ones in Winnipeg. Judging by their rapid growth in the first year we assumed their age at date of purchase to be about 9 months. The fish grew to a size of 3 inches within a year. They were kept at my friend's home in 80-gallon tanks, two to a tank. During the early months of 1960 he offered me 2 of them in trade for a large swordplant I had grown. I placed them

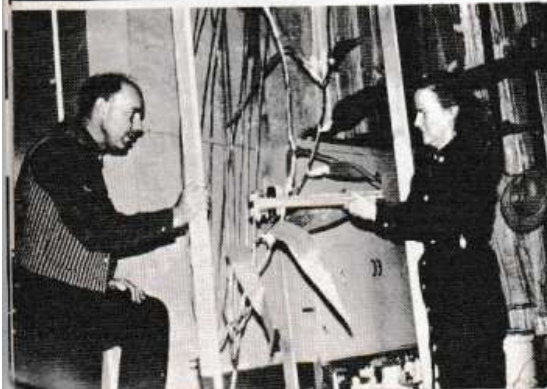
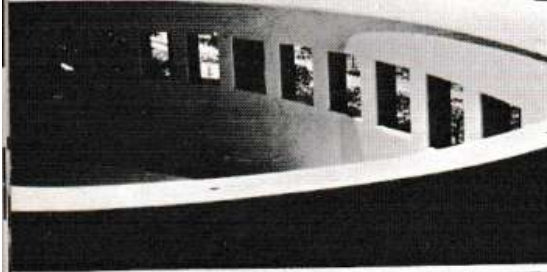
Herb Brock

Winnipeg, Manitoba

in a 30-gallon tank together with some *Cichlasoma severum*, oscars and jack dempseys.

Ever since I saw the chocolate cichlid I have been fascinated by them and since they had not been spawned, there was actually little known about them. I therefore decided that here was a good project for study. I have now 7 of them at various ages in my tanks and have bought them from anybody who is willing to sell them. From the original 6 there are 3 in my possession, the others having died while in the possession of

Photo: A pair of Chocolate cichlids, by Innes



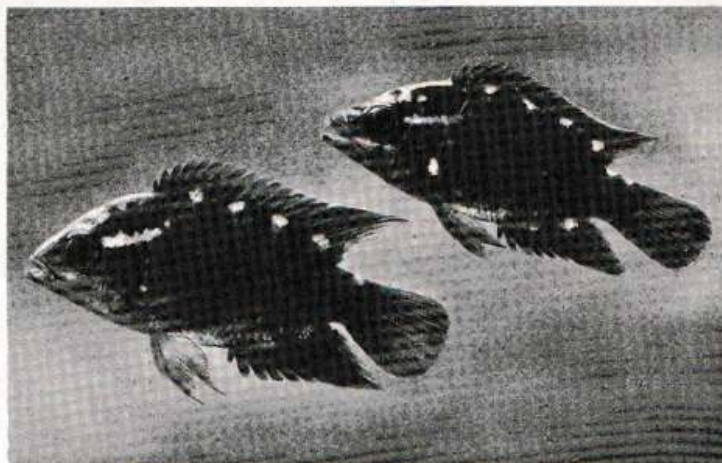
the confines of one of the loveliest of all possible Japanese settings, there is the first Japanese pearl beds ever seen outside of Japan. There in the Murata Pearl Company's Japanese Village is a 72 x 42 foot tank, 24 feet deep and in which there will be six Japanese girls diving for oysters. Spectators can watch these young women at their work either from a gallery above the half-acre lake in which the tank will be set or they may walk through tunnels below the level of the water and peer through large glass windows. If one feels especially expansive at the time, it will be possible to point out a specific oyster and say, "Gimme *that* one!" on the off chance that when the diver brings it up that it will contain a large pearl.

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Photo: A pair of Chocolate cichlids, by Innes.

others. They are now about 5 years old if our original assumption about age was right.

From the references in my possession Dr. Innes' description is the most correct. As for his comments that marbled *Cichlasoma* would be a better name, I can say now that it is a temporary color and disappears with age. As for Mr. H. Frey's description, I do not think that the fish is plain dull or insignificant but rather that it represents one of our more beautiful cichlids. The name "large head cichlid" found in the German edition of his book is, of course, more appropriate.

It may be interesting to note, that this cichlid in its lifetime goes through a range of color changes more unusual than for any cichlid known to me. Their color in their very early age varies from

★ IDEAS ★

BY HOBBYISTS

The Journal will pay \$5.00 for original ideas published. Keep less than 200 words. Send your idea today!

Brine Shrimp Eggs

Even when you have excellent hatches from your brine shrimp eggs, you will be surprised at the harvest from a second hatching. After you believe you have gotten all of the baby shrimp from a hatching, simply collect the "egg shells" in your regular baby brine net, dry them, re Hatch and get the surprise of your life. The "second hatch" may almost equal the first hatch. — *Lee Shenk, Oakland, California*

4 FOUR COLOR POSTCARDS *aquatic life*
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light mocha to deep brown, as they get a little bigger, a marbled pattern appears and the brown acquires a reddish appearance. The red color becomes more and more apparent as they mature and turns to a purplish brown. Areas of green very much like the green of old copper roofs appear on the males' gill covers and sides of the body. This green color and the purple brown of the body complement each other very nicely. The fins become darker with age and are now almost black. The colors are very intense in the males. The females have the purplish brown as the dominant factor.

Another most interesting fact is their change of shape in the course of growing and aging. One who possessed any young fishes might almost think, that he has a different species, when viewing others at an age of 4 to 5 years. This is especially true when comparing a male to youngsters. At a length from 1 to 2 inches, they look in shape like a fire mouth, with a rather elongate body and pointed head. As they grow older, the upper part of the body grows faster in proportion to the lower part and now after 4 years they have a distinct bulldog appearance. This change in appearance is especially apparent in the male. In addition to this, the male's forehead grows a bump, like the jack dempsey, only larger in proportion to the head size. This development, however, starts quite late in life.

After about 3 years the sexes are almost non-distinguishable in body shape. The females remain and acquire only about 2/3 of the length of the males. My two males measure now about 6½ to 7 inches from snout tip to the end of the tail. The female is good 1½ inches shorter. The males now can be recognized easily at a glance.

The third interesting fact is the different types of behavior during stages of their life. At a size from 1 to 1½ inches,

the smallest so far familiar to me, they are sly during the day and hide much, coming out only occasionally to see if there is some food. At feeding time however they become dynamite in the tank and no other comparable sized fish has a chance. At a length from about 2 to 3½ inches they are out all day occupying themselves playfully and make an excellent community tank fish with species of their same size. At feeding time they are still quite rough but not as much as earlier in their life. Kept by themselves they went through all sorts of procedures, making one who is familiar with cichlids think, that they want to spawn all the time. They clean flower-pots or rocks and dig a hole once in a while. As the sexes were not then distinguishable, I tried to match them by interchanging.

I tried all sorts of water combinations and temperatures but without results. Except for spawning experiments they always have been kept in a cichlid community tank without trouble. However, they have a tendency to be scrappy to their own kind, but never seriously until about an age of 3½ to 4 years.

At this age, both fish which are now known to be males began to attack the female and each other so that it became impossible, to keep them together. With a single pair, the male would beat the female so fiercely that it took me about six months to revive her from her injuries. I kept her then for the whole

summer outside in a plastic pool. She was there until the middle of September and in this way I found out that this species can stand low temperatures also. During some of the cool September nights the low was 55° F. During the winter I had to keep them separate in a 30-gallon tank divided into two compartments by walls of rock since I had no other free tanks available.

At this time it was impossible to keep them with other species too. They became pugnacious at feeding time, and any fish that attempted to feed was injured. During their isolation the males started to grow rapidly and developed in the next 6 months all their male characteristics. I then acquired a 50-gallon tank and tried again to put them together. For the female this was impossible and I did not want her injured again. The two males I managed to keep at peace by placing a large 5-year old *severum* male with them. The two male *coryphaenoides* then displayed the typical cichlid jawlocking procedure until it was established who was the

(Continued on Page 180)

★ IDEAS ★
BY HOBBYISTS

The Journal will pay \$5.00 for original ideas published. Keep less than 200 words. Send your idea today!

The Cone-Shaped Hatchers

I have found that the cone-shaped plastic brine shrimp hatchers also serve to hatch infusoria and keep tubifex worms alive. When using the hatcher for infusoria and worms, use just plain water to remove any salt water from the inside of the cone. Aeration must be given for tubifex and brine shrimp. If slow aeration is given for infusoria the culture will be greatly increased.—John Press, member of Rochester Aquarium Society

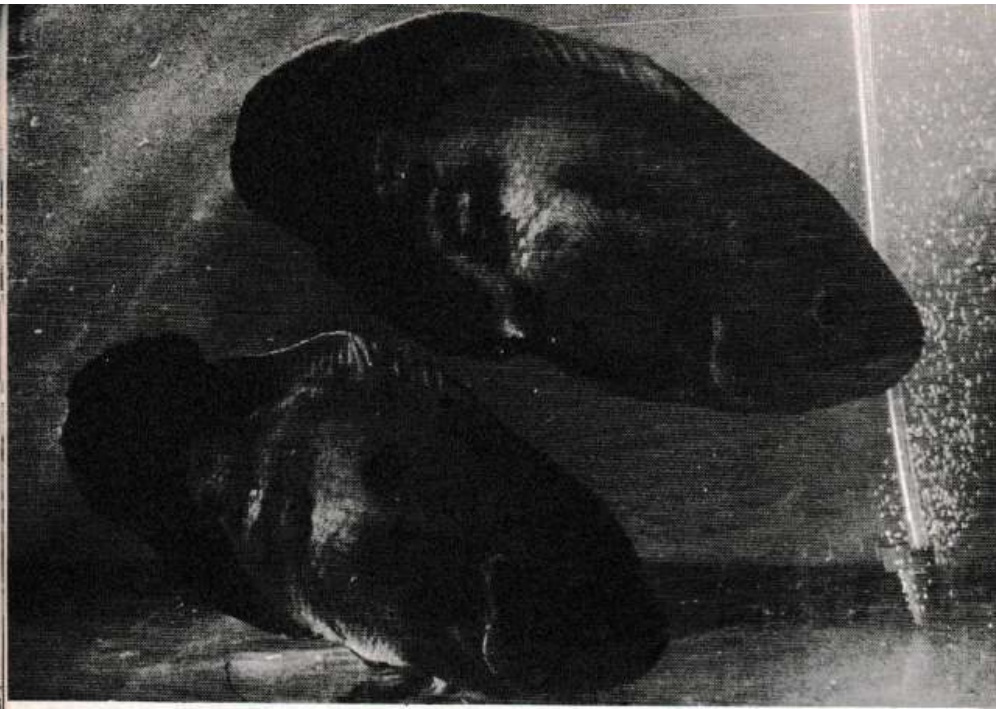
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Before moving up to the "big fish class"
read this biography of an "Oscar" named:

"Gort" the Monster

PART I

SOME FISHES are trouble to raise. They may have exacting water requirements, like many killifishes; they may require live food, like the leaf fish; or they may be timid or disease-prone. In any case, the aquarist who keeps them goes to the extra trouble because of certain desirable attributes of the fishes. *Astronotus ocellatus*, or "Oscar" doesn't come with trouble, he manufactures it.

I bought two of these robust cichlids when they were little bigger than platies. At the time, they were still something of a novelty in the shops. I kept them in a 50-gallon tank along with some other immature cichlids. After months of a cold war among them which now and

William S. Service, Jr.

Durham, North Carolina

then got hot (see *Strife in the Community*, Part I, 8/62 issue) I removed all survivors save the one *Astronotus*, whom I named Gort after the robot-monster in some forgotten science-fiction movie.

A little trouble

I have never seen an *Astronotus* that looked completely suited to his aquarium (100 gallons just might do the trick) and mine was no exception. From four
(Continued on Page 190)

Photo: Two pet "Oscars" owned and photographed by Gene Wollsheimer, F.R.I.

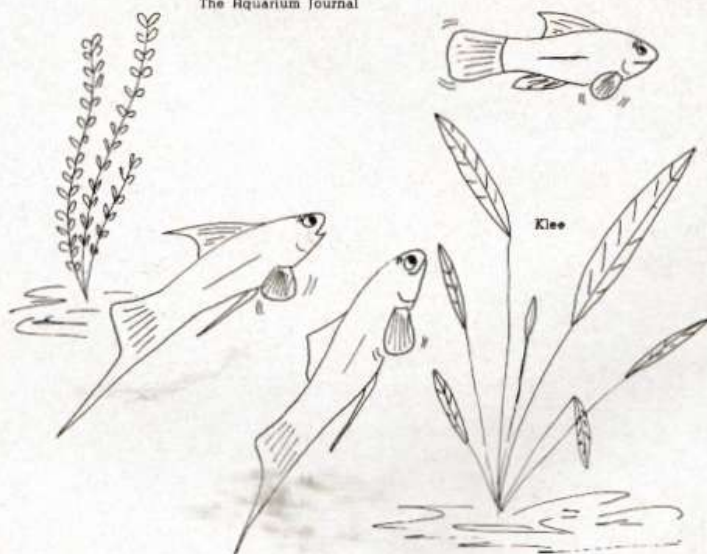
TO THE FISH BREEDER, it would be a valuable achievement to be able to predict the optimum breeding periods for selected species of aquarium fishes. Such an ability would enable the hobbyist to schedule his time and resources so as to obtain the maximum number of fry from a given number of species to be bred. It would, in addition, prevent

ability, it seems clear that we must know whether or not a regulated egg cycle exists within a given species. For some species we do have limited knowledge. For example, *Xiphophorus* and *Lebistes* produce fry at intervals of about 30 days and *Heterandia* at about 5 days. *Oryzias latipes* lays its eggs on a daily basis but many species are known in

Albert J. Klee
looks

• Under the Cover Glass

The Aquarium Journal



"All systems are go!"

him from wasting his efforts on unsuccessful breeding attempts. A few years ago, I discussed this very same problem in the Swedish aquarium magazine, *Akvariet*, but to my knowledge, it has not been treated in the American aquarium literature.

Now as a prelude to such a predicting

which periodicity occurs, dependent upon hormones which are similar to those of higher vertebrates. However, experiments have been conducted at the Department of Biological Sciences, Loyola University, to learn whether or not an egg cycle is present in the zebrafish, *Danio (Brachydanio) rerio*.

The investigators (K. K. Hisaoka and C. F. Firlit) had had over 13 year's experience with the zebrafish and observed that they spawned almost always in the early morning, the eggs being laid within 15 to 30 minutes after day-break. In order to learn something about the minimum recovery time for spawning in this species, female zebras were paired with males by placing a single female into a breeding trap with 3 males during the late afternoon. The bottom of the trap was examined for eggs twice daily (morning and afternoon). The females were separated from their males at certain intervals, depending upon whether or not they had spawned. The results of this particular investigation demonstrated that eggs were never laid on the first, second, third, or fourth day after a previous spawning. However, eggs were laid in large batches every fifth day with marked precision (see Table I).

TABLE I
Spawning in the zebrafish, *Danio (Brachydanio rerio)*, when the temperature is maintained at 79° F

Days since last spawning	Number of cases	Spawned?
1	0	no
2	0	no
3	0	no
4	4	no
5	14	yes

In order to learn something about the probability of zebrafishes spawning after longer isolation intervals, these experiments were repeated using random isolation times of from 1 to 86 days (see Table II).

TABLE II
Egg production in the zebrafish at 79° F

Days since last spawning	Number of eggs laid	Number of Dead eggs
5	600	0
6	300	0
7	200	0
8	343	0
12	512	0
13	851	0
13	1109	213
13	100	0
15	200	50
15	528	105
17	867	0
30	405	107
30	559	119
30	507	124
42	259	0
32	none	0
33	336	23
34	none	0
35	406	86
45	450	0
72	none	0
86	none	0

Although a minimum of 5 days be-

tween spawnings (at 79° F.) was still found to be required, eggs were laid within a period of 5 to 45 days following the previous spawning. After 45 days, spawning upon first contact was almost impossible. Interestingly enough, the optimum breeding period during which viable eggs were obtained was from 5 to 10 days after the previous spawning. During this period, the fertilized eggs exhibited little or no mortality. However, both the number of mortalities and abnormalities increased when the eggs were laid after a rest period of 15 days.

The temperature effect upon the egg production cycle was also interesting. When the temperature was raised to 84° F, the minimum time between spawnings decreased to 3 days; at 86° F, this time was only 2 days (see Table III). A number of pairings were also attempted at 72.5° F but even at isolation intervals of up to 36 days, spawning was not observed.

TABLE III
Effect of temperature upon the spawning of the zebrafish

Temperature ° F	Duration in days since last spawning	Number of cases	Spawned?
84	3	2	yes
84	3	2	yes
84	5	1	yes
86	1	1	no
86	2	4	yes
86	4	1	no
86	5	2	yes
86	6	1	yes

The conclusions are clear enough. Zebrafish are capable of laying eggs at successive intervals of 5 days when maintained at 79° F. In addition, they

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are also capable of laying eggs upon first contact with males at intervals ranging from 5 to 45 days after the previous spawning (at this temperature). Longer intervals of time between spawnings contribute to increased mortality of the eggs, probably due to overripening of the eggs. The length of this egg cycle is quite dependent upon temperature, decreasing at higher temperatures and increasing at lower temperatures (egg production ceasing below 72.5° F entirely). These statements, of course, hold only for the conditions under which the fish were kept.

While it is not uncommon to have 1000 fertilized eggs laid at one time by a single female, many zebrafish lay only 100 to 200 eggs at one time. The egg-laying potential of this fish is, however, enormous, evidenced by the fact that one female in the study laid a total of 5530 eggs in a period of 5 months! In contrast, the medaka (*Oryzias latipes*) lays but 300 eggs in an entire breeding season. ◀

Brock

(Continued from Page 174)

stronger. The *severum* has shown them who is boss right from the start and so they all got along fine. The female meanwhile had company in a number of fish of her own kind, which I had purchased from all over the city. There was no

fighting between these and they were considerably younger.

During the spring of 1963 I acquired a 90-gallon tank along with 3 fully grown oscars. I decided then to try spawning two oscars in the 50-gallon tank and put the third oscar, the *severum* and all the chocolate cichlids together into the 90-gallon tank. All went well except for the first few ruffles over some territory. The oscar won and took over one side of the tank and the *severum* decided to play king over the chocolates in the other half. Between them there was no fighting any more. At feeding time the big ones got mad and when the little chocolate cichlids tried to feed before the big boys had filled themselves. As a rule the oscar was fed on the left side and the *severum* in the center of the tank, while all the chocolates fed on the right of the tank. Everybody received a diet of beef heart and dog food and some earthworms when these were available.

About two months ago I began to notice, that the one assumed to be a female, made advances to the male, which at an earlier occasion had proved to be the stronger. Some attempt was then made by the other male to enter the mating act but he was driven into a tunnel where he now remains most of the time. Rapid motion of the fins, "body nudges" and wiggle motions continued with this pair for some time. Eventually they got down to business.

While the male started to swim around and protect the area, the female started to prepare the nest.

Between the outside rockpillars of two tunnels she went into action. She beat the gravel to make a hole, a deep hole between the rocks. Then she moved a piece of slate which was originally leaning against the glass of the tank, over the nest, so that it covered the nest partially and leaned at an angle against one of the tunnel walls. We noticed then,

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that she came out and nudged the male and "shivered" against him. But the day before the discovery of the eggs, he did not seem to take much notice.

On Sunday August 25 1963 however my wife noticed, that the female always remained in the nest and that the male tried to keep other fishes away. The small chocolates, however, sometimes sneaked by, rushed under the slate, and reappeared eating something. My wife decided then to take a look and discov-

ered a batch of eggs which were eaten partially away. Since I was at work she phoned me for instructions on what to do, and I decided then that we would try to raise them artificially. So she siphoned some water from the tank into a battery jar and placed the slate with the eggs into it and installed a heater and airstone. As I got home a while later, I added some acriflavin and took a good look. In the tank the adults were still excitedly looking for the eggs. I

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think that I will take the other fish out of the tank, so that these two may raise a new family in peace.

The eggs of the present brood are fairly large, semitransparent and have a amber hue to them. On August 27, some of the eggs were fungused. The others have a tiny protrusion sticking out like a tail, but show no movement. On August 29, the first ones started wiggling. By August 30, all were hatched, hanging

on to the egg shell by a thread or on to each other, in clusters. They are light brown and the white yolksac is easily visible. They are about 3/16 of an inch long now. On the evening of September third, first one tried to swim; by September fourth, all were swimming and I gave them hatched brine shrimps. they are now about one-quarter inch long. ◀

Author-aquarist describes in detail the flowering process of a popular plant

Cryptocoryne beckettii

(Translated from the Dutch by
Albert J. Klee)

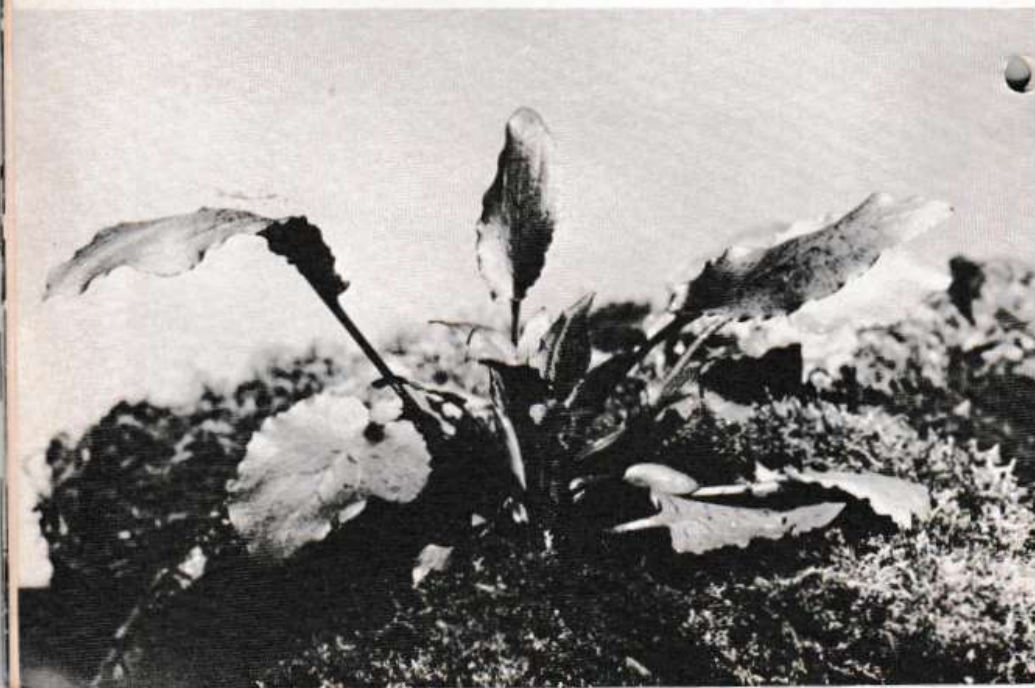
A universal *Cryptocoryne*, one which often appears in our aquaria, is *Cryptocoryne beckettii*. It is a species of moderate size and one which attracts a great deal of attention by virtue of its leaf coloration. The undersides of its leaves varies from a pale-to-deep

A. v. d. Nieuwenhuizen

Heemstede, Holland

brownish-red or lilac-red, while the top-sides typically are colored a greenish-bronze. Historically, the plant was named after its collector, T. W. N. Beck-

Figure 1: *C. beckettii* planted in very deep soil composed of a mixture of unwashed sand, peat and mud. All photos by the author.



ett, who discovered it in Ceylon. Subsequently, it was described by Trimen on the basis of notes supplied by Twaites.

Cryptocoryne beckettii is, to date, known only from Ceylon. In his "Flora of Ceylon," Trimen defines its habitat as, "rocky crevices," and its period of bloom as, "January and February." In general, we as aquarists cultivate *Cryptocoryne* species entirely under water and in so doing, deviate considerably from natural habitat conditions. These facts are well-known, however, and consequently will not form the substance of this article. Rather, using photographs we hope to be able to describe the flowering process of this plant. It is evident, of course, that to bring *Cryptocoryne beckettii* to bloom it is necessary to cultivate it in what might be called a "bog tank," or paludarium, i.e., we partially permit the plant to grow emersed leaves (as opposed to submerged leaves).

For two years now I have successfully kept a paludarium containing principally *C. nevillii* and *C. beckettii*. The *C. beckettii* was planted on a steeply-sloping bank which ended about 2½ inches below the surface of the water. The lighting consisted of a fluorescent lamp, and the bottom covering was a mixture of peat moss and unwashed sand. After a period of 2 to 3 months, the *C. nevillii* formed enormous thickets. The *C. beckettii*, however, did nowhere near as well. I had a bad moment when I discovered growths from which the *beckettii* were suffering badly, and I resolved to transfer them over to a tank in my fishroom. Here they were exposed to daylight. Four weeks later, I regretted this action deeply as the *C. nevillii*, with stems up to 8 inches long all died and of the *beckettii*, practically nothing re-

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Figure 2: (Above) New bloom that developed in six days.

Figure 3: (Below) The tip of the bloom is slit, after which it quickly rotted.

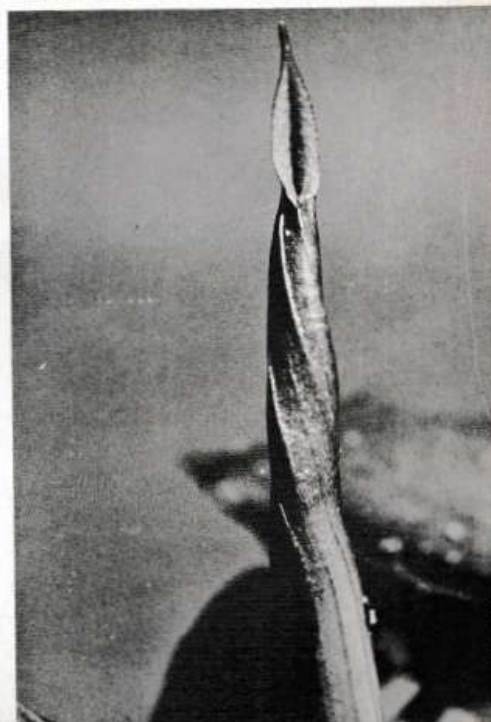




Figure 4: (Left) Photo taken when spathe unfolded, but before it "raised its flag."

Figure 5: (Below) One bloom is still closed, while the other is open.

mained either. Although new leaves were formed, they continually were being overcome by the growths so that I finally concluded the experiment. It, however, certainly kept me occupied!

When I later received another *Cryptocoryne beckettii* from the Agricultural University in Wageningen, I was quite enthusiastic as the plant, which had been cultivated emersed, had already started blooming. The plant had come from very dry soil, viz., a mixture of unwashed sand, peat and Aalsmeer mud

(Aalsmeer is the center of a region, famous for the cultivation of flowers and plants). I set the plant in the very same substrate (see figure 1), although in a very humid atmosphere. Then the pot containing the plant was placed in an aquarium of dimensions 12" x 10" x 10" with a water depth of 1½ inches. All sides were then covered. This served as a screen against full illumination, without impeding toplight. Due to the sunlight, the temperatures were very high, 95° F during the day, to 75° F during the night.

In approximately 2 weeks, the bloom had developed, the spathe unfolded and two days later, had withered. Due to certain circumstances, I did not have an opportunity to take any pictures. This wasn't a catastrophe, however, for two weeks later a new bloom developed that in six days, reached a length of 1½ inches (see figure 2). On the ninth day after its appearance, the spathe opened. The tip of it slit (figure 3) after which the whole quickly rotted. The entire process proceeded much more quickly than the first time. Later on, it was established that the speed of development was regulated by the temperature with the intensity of the lighting also a factor. When the spathe unfolded (but before it raised its "flag"), I took a photograph of the entire plant (figure 4). From



this, one can see how vigorously the plant had developed in this short period of time.

In order to take these pictures, the pot had to be removed from the tank. This tank was covered with a piece of glass so that the humidity within was rather high. Then I took the plant to a room in the house where it was significantly cooler and dryer. After 20 minutes, I set the plant back again in its tank with the intention of later taking a new photograph, as the tip of the spathe had completely raised. But to my great astonishment, it had lowered again! The following day the spathe fell away and subsequently, the leaves themselves began disintegrating in the manner that is so familiar to aquarists when the plant is kept under water.

When I later obtained another specimen ready to bloom, I again prepared to continue with the series. This time, I was fortunate enough to obtain, shortly afterwards, two blooms. In the photograph (figure 5), one is still closed while the other is open. I noticed that in the previous bloom, the heart of the spathe tip near the entrance to the shaft was colored a dark brown. This was also the case now but after two days, this color changed to red. At that time, I had two spathe with differently-colored flags (figure 6). At lower temperatures, the bloom lasts approximately 5 days.



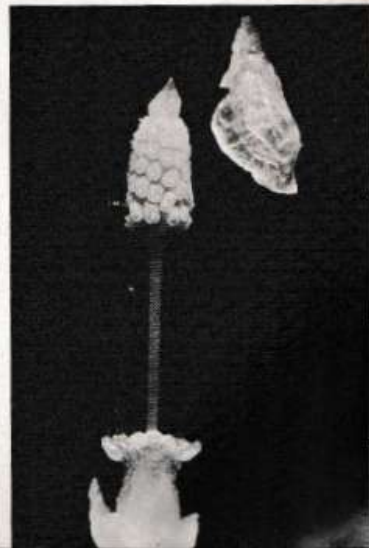
Its ultimate color is a bright, light-red, the rest of the tip being a light, yellow-brown.

Carefully, I opened the sheath. Naturally, the least careless motion could have damaged the flower. Yes, "flower" it is for the real flower of *Cryptocoryne* species lies inside the spathe where one finds both male and female parts. Figure 7 shows the open spathe and on the right side, a part of the spathe wall to

Figure 6: (Above) Two spathe with differently-colored flags.

Figure 7: (Right) Opened spathe, and on the right side a part of the spathe wall to which a flap is connected above the male portion.

Figure 8: (Far Right) Remainder of the spathe has been removed as well as the cover of the male flower.



which a flap is connected above the male portion. One reads in the literature about such flaps, and drawings of them certainly do resemble flaps. However, it is better to speak of "covers" since it includes almost all of the male parts.

The male flower rises up from the heart of the female flower. All around the female portion lies the pistils. The total length of the bloom is about 4 inches. The male flower is yellow-white when still not completely ripened. This occurs when an insect enters the open spathe and moves from flower to flower. In a well-ripened bloom, the color is a dark, ochra-yellow, the stamens being completely developed. In figure 8 the remainder of the spathe has been removed as well as the cover of the male flower. The stamens had not yet developed. A cap, covered with a powdery residue, sits on the male flower and is connected to the cover but is not visible

in the photograph. The fine structure of the very thin cover is easy to see, however.

After I had had the plant in my possession for three months (reckoned from the time of the first bloom), I counted about 50 leaves. Initially, it was only 9! In this time, it had bloomed 14 times. A few weeks later, still another bloom was produced after which it became dormant and entered a resting period.

I hope by this article to have interested you in aquarium plants and further, to have made clear what difficulties can be encountered in their flowering process. Of course, some species are easier than others and with proper treatment, a good day may bring a bloom into view. Moreover, it is even possible to obtain seeds. In subsequent articles I hope to return to a discussion of some of these other species. ◀

Nigerian Lampeye

PART II

As far as I know, *normanni* has not been introduced as an aquarium fish to date. The reason for this may be that the savanna forms often do not reach the coast and therefore, are not so easily caught by collectors of aquarium fishes. I found this fish to be a little more hardy than the *macrophthalmus* species, but in rainwater tanks even with peat,

Col. Joergen Scheel, F.A.I.

Copenhagen, Denmark

velvet disease (*Oodinium*) and sometimes even tuberculosis, may be a problem. If not kept for breeding purposes, one should not keep the western lampeyes in the "natural" water type but in rather hard and alkaline water, as this seems to control the severe diseases. During breeding, however, slightly acid, peat-loaded water will be the best solution and you will get a much higher percentage of fertile eggs.

Spawning takes place among fine plants or roots, and eggs are deposited at all levels . . . near the surface and near the bottom. The eggs of this species are rather large as compared to the size of the fish; they measure 1.4 to 1.5

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mm. The egg membrane is provided with rather long, slimy filaments which are used to anchor the eggs to the plants. The membrane pattern differs from all other species of lampeyes hitherto inspected as they have very many, evenly distributed, very short and stiff "hairs" (1/100 mm long). This membrane pattern may be a derivative of the type seen on eggs from the Asian *Oryzias*, or the African *Nothobranchius*. About three weeks after spawning, the eggs will be ready to hatch and one may have to force the fry out by using dry food or one of the other methods used in such situations. In slightly acid water, hatching will take place normally but the hatching has to be controlled as some or all eggs sometimes will not hatch in the natural way. The fry are rather large and stay very close to the surface of

the water, as all lampeye fry do. They differ from all other lampeyes studied so far in their weaker coloration. The typical saturated-black line along the back, so characteristic of the fry of other *Micropanchax*, *Aplocheilichthys* and *Procatopus*, is very weakly-developed. The body of the fry is more reddish than seen on other lampeye fry and the behavior is also different. Normally, any small fry of lampeyes and *Oryzias* swim around in the open areas of the water's surface at a distance of about 1 mm from this surface. Such swimming is "eel-like" and they never stop swimming when there are no other fishes in the tank. The fry of *normanni* sometime swim in this manner but mostly they stay, without much movement, in the surface in *Riccia* and behave like fry of *Epiplatys* and surface-living *Aphyosemion*. These differences in coloration and behavior may result from differences in ecology but fry from the east African savanna forms which I had, did not differ from the west African rainforest species in these respects.

As with all other fry from lampeye and *Oryzias*, I found it rather difficult to raise them to adult size. This feature perhaps, is not only a result of the very active behavior of such fry (high activity = plenty of food needed for swimming energy) but seems to be rather characteristic for this isolated group of killies. For raising them, I used brine shrimp, rotifers and dry foods (pow-



Potted Plants in Aquarium

I have recently discovered a new way to plant such plants as *Cryptocorynes*, *Spatterdock*, etc. in pots. I had just bought a Round Leaf *Spatterdock* and was looking around for something to pot it in when I noticed one of those white Styrofoam cups (Hot & Cold cups) sitting next to the aquarium. I washed it and cut it down to a height of about 3 inches. My gravel in my aquarium was quite deep so that very little of the cup showed. Normally the cup would float but with the gravel inside they sank very rapidly. They don't seem to decompose or hurt the fish at all and they are very inexpensive (100 cups for \$1.00) when bought in packages. — Jim L. Froland, Napa, California

CLUB NEWS

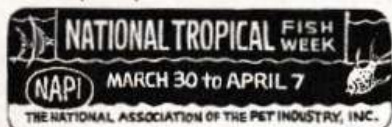
Southern California Guppy Association (Long Beach, California)

The S.C.G.A. will hold their Third Annual Open Competition Guppy Show on May 7 to 10, at the Long Beach Hobby Show, Civic Auditorium, Long Beach, California, according to Jack Beigle, secretary, 165 Via Monte L'Oro, Redondo Beach, California.

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dered). This species is a typical shoaling fish and the tiny fry like to shoal within a few weeks.

I found *normanni* to be less shy than my different stocks of *macrophthalmus* but they were very shy after each moving to a new tank. The more individuals kept together in the tank, the less shyness. This species takes live foods as well as dry foods. There is no particular temperature requirement, my specimens being active down to 65° F. Finally, just as it was with *Epiplatys senegalensis*, the Volta form of *normanni* was more colorful than the Tchad form. ◀

Service

(Continued from Page 176)

inches and up, he gave the impression he was packing all that food away just to get enough size and heft so he could break out of that little vase and get back to the Amazon River. A prodigious (and sloppy) eater like that is a management problem. Whatever he ate, particles of it would billow out his gills and sink to the bottom. I have always insisted on low maintenance set-ups in which scavengers and plants have important functions — what to do for a scavenger? Snails he munched like crackers. Even the thick-shelled cornucopia snail, which spends much of the time under the sand, was not “food proof.” Gort would cock

one mobile, protuberant eye at the faintest movement of the gravel, then scoop out the luckless mollusc and grind patiently away until he got to him . . . and the stores charged outrageous prices for those snails (and still do). Any *Ampullaria* too big to get in his mouth he harried to death or would seize and tear from its shell with dog-like shakes of his head. Once, with more voracity than aim, he snapped at a large mystery snail and split his lower jaw more than a quarter inch deep on the sharp edge of the shell. This injury did nothing to his appetite for snails. He sulked for a while afterwards, then forgot all about it. The bony lip mended quickly but unevenly, detracting from a face rather unpleasant at the start. While the spines of a large *Corydoras* might offer some protection, I did not want to risk one nor see one stuck in Gort's gullet.

By chance one day I came across a crawfish. I took it home, kept it for a while by itself in a small tank. It acclimated well to the still water and higher temperature, proved to be of good

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CLUB NEWS

The Peninsula Aquarium Society (Redwood City, California)

The P.A.S. held their March meeting Wednesday March 25, at the Pioneer Investor Savings, 1615 Woodside Road, Redwood City, Calif., at 8:30 p.m., according to Alice Williams, Secretary. Speaker of the evening was Gene Wolfsheimer, who showed slides of winners of the last fish show in Los Angeles.

New Home for Bettas

As a Betta enthusiast, I naturally hated the idea of cleaning the jars that were their homes. Wanting to keep the best of the young I bred, I purchased plastic baby savers. These hook over any tank and have open slots on the bottoms. They not only show off my pretty charges better, but eliminate any cleaning. The bettas in my guppy tanks enjoy the few strays that find their way in, and seem to grow faster. — Mrs. M. Robertson, North Billerica, Mass.

appetite, strong pinch, and quick temper — just the scavenger and companion. The crawfish soon molted, so I had to keep it separate still longer until the new bluish armor should harden and turn dark again. Finally, when it seemed well-armed as ever, and presumably one size larger, I put it in with Gort. It is hard to say how well a crawfish sees: sometimes it appears able to make out objects, other times it seems almost blind, though very sensitive in regard to water disturbances, touch, and smell or taste. In this case, it seemed to see Gort well enough, keeping both claws aimed his way as it backed uneasily away. Gort made a few interested half-circles, but kept his distance. After a while I judged it a safe standoff, and my attention wandered. Then there was a sudden movement, and the next registered fact was that Gort had bitten off the front half of the crawfish. How he managed the claws I have no idea, nor how he was able to cut the crawfish in two — *Astronotus* has tiny, sharp, true teeth but no cutting (incisor) teeth up front. He has a series of powerful grinding teeth in the gullet on bony pharyngeal arches. It has no real shearing teeth. Still, Gort accomplished the grisly deed and went on at leisure to crack the meat free of the shell, which last he disgorged, leaving me the distasteful job of picking up the shattered armor afterwards.

At long last the right man for the job volunteered. I was dismantling a 20-gallon community tank and tried to put a *Plecostomus*, which had long outgrown the arrangement, into a gallon jar. It spread its spiky pectoral and dorsal fins and blocked the mouth of the jar. I let the catfish balance there on its uneven tripod until its stubbornness gave way to anoxia; meanwhile I arranged for its transfer by feeding the *Astronotus* very full. From the first they largely ignored

(Continued on Page 196)

APRIL, 1964

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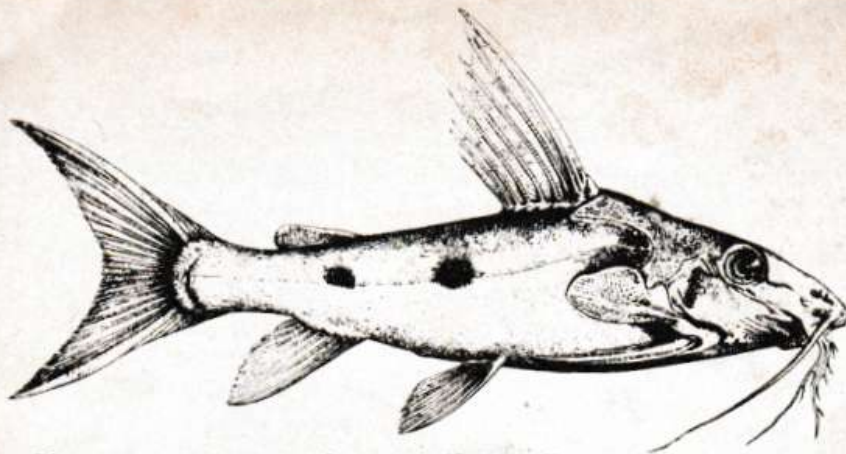
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Clearing up some confusion in "spotty" identification of *Syndontis* catfish

A "Spot-Check"?

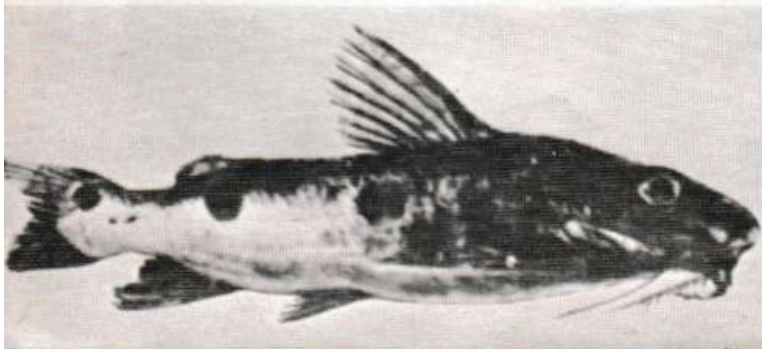
IN A PREVIOUS issue of the *Aquarium Journal*¹, one of the authors (Walker) discussed his difficulties in properly identifying a certain mochokid catfish of the genus *Syndontis*, family Mochokidae.

To *Syndontis*, pronounced, sign-oh-don'tis, belongs the familiar upside-down catfishes from Africa. It appeared that for the catfish in question, names such as "*Syndontis notatus*" (notatus=spotted), "*Syndontis binotatus*" (binotatus=two spotted), "*Syndontis trinotatus*" (trinotatus=three spotted) etc., were arbitrarily assigned by dealers and hobbyists alike without regard to scientific nomenclature, according as to the number of body spots possessed by a particular specimen. Furthermore, it was observed by that author that such catfishes in his care added to the total number of body spots with time. The

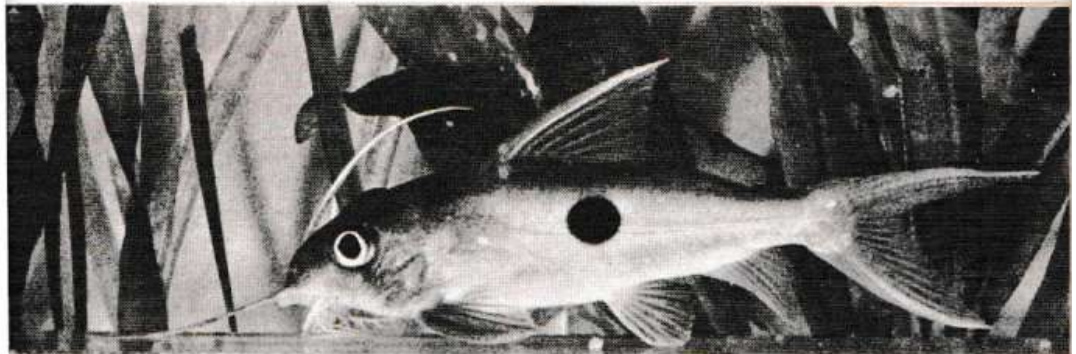
Braz Walker and
Albert J. Klee

purpose of this brief note is to clear up the questions caused by too many spots!

Figures 1 and 2 illustrate our "spot problem" very nicely. The first figure depicts the typical appearance of our fish when young, while the second reflects the increased number of body spots attained after the fish had grown some. Thanks to our friend and authority on African fishes, Jacques Lambert of Belgium, we can now identify the fish in figure 2 as *Syndontis notatus ocellatus*². The common or "garden" form of this species is *Syndontis notatus notatus* and bears only a single black spot on each side (figure 1). However, some populations of this species do bear more spots and it is very likely that these sup-



Sketches: (Fig. 3—top) *Syndontis notatus binotatus* (after Pellegrin). (Fig. 4—left) *Syndontis notatus ocellatus* (type). After Poll.



plementary spots only appear at a given size and/or age. Multiplication of the number of spots with size and age has been observed in many fishes and among them some other *Synodontis* also, e.g., *Synodontis longirostris*.

Actually, in addition to the type species, two subspecies of *Synodontis notatus* have been described^{3, 4}. The original *notatus* was described from the upper reaches of the Congo River but the first subspecies, *S. notatus binotatus*, was described somewhat southeast of that location, by Pellegrin in 1928 (see figure 3). The next subspecies, *S. notatus ocellatus*, was discovered in Katanga (and described by Poll in 1938, along with another fish of interest to aquarists, viz., *Nothobranchius brienii*), southeast of the location of the type

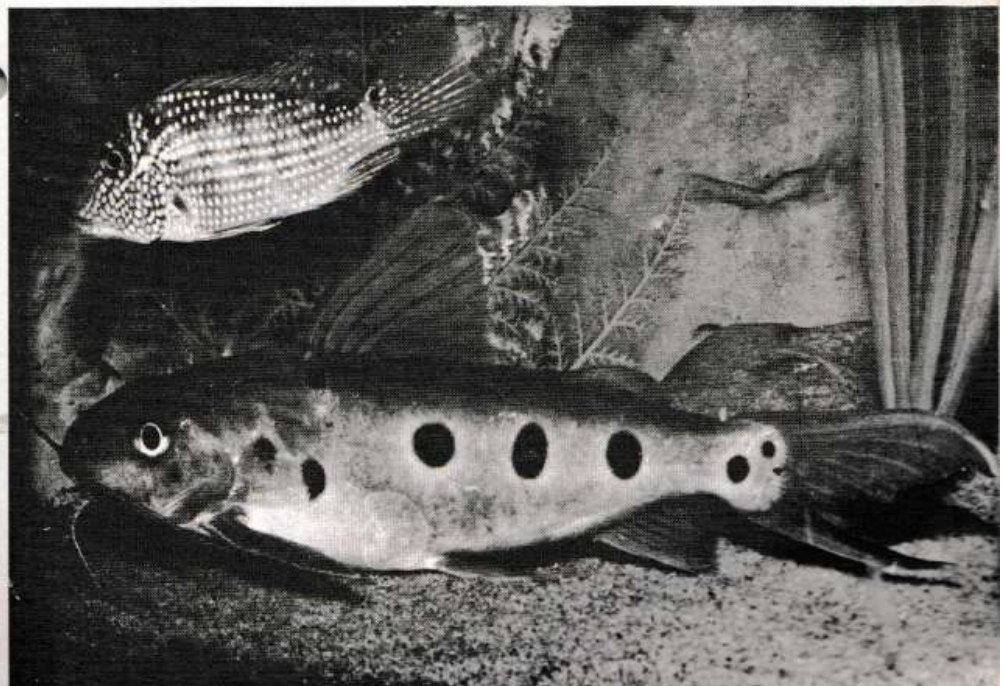
species (see figure 4). Thus, there are distinct geographical locations associated with each of these subspecies.

Although leopards may never change their spots, this is decidedly not the case with *Synodontis notatus ocellatus*, and aquarists need not necessarily swear off John Barleycorn should an informal inventory of said spots show an increase with time!

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- 1—Walker, B. "Synodontid Catfishes," *Aquarium Journal*, Vol. XXXIV, No. 8, pg. 351, August 1963.
- 2—Lambert, J., Personal Communication to Albert J. Klee, October 13, 1963.
- 3—Pellegrin, J., "Poissons du Chiloango et du Congo recueillis par l'expédition du Dr. H. Schouteden," *Ann. Mus. Congo Belge*, Zool., Ser. I, T. III, Fasc. I, Pag. 30, 1928.
- 4—Poll, M., "Poissons du Katanga (bassin du Congo) recueillis par le professeur Paul Brien," *Rev. Zool. Bot. Afr.*, XXX, Pg. 405, 1938.

Photos: (Fig. 1—(top) *Synodontis notatus ocellatus* (young fish). Photo by Albert J. Klee. (Fig. 2—below) *Synodontis notatus ocellatus* (adult fish). Photo by Braz Walker.



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Service

(Continued from Page 193)

each other. Every once in a great while, over-excited by live food or a change of water or something, the catfish would swim up off the bottom and try to rake his tank mate with his barbed pectorals; or, less rarely, Gort would make a short, prudent run-and-shove at the catfish's forehead, just to establish dominance. No real trouble occurred, and so that problem was solved.

A difference of opinion

I prefer, as a general rule, a thickly-planted aquarium. Most large cichlids do not. As soon as he got his size, Gort removed one by one every plant except for a large Amazon sword and a kind of water lily. (The aquarium stood in a sunny window; the backglass was papered while the top was shaded by the lily pads, which incidentally got enough sun to bloom now and then — a satisfactory arrangement in every way.) I was always trying to establish some other, usually smaller, plants. It was amusing (now that I look back on it) the way Gort would give these a few moments of concentrated study, after which he might pull them up right away, or he might get my hopes up by waiting a few days. I never could figure out what survival value this behavior had. If it was originally geared to the removal of possible enemy hiding places, why leave the two large plants and pull the small? I guessed finally that the *Astronotus* considered anything smaller than a "tree" to be effeminate. I knew I was up against some kind of obsession, and let him have his way.

"Eat, child, eat!"

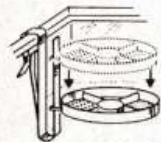
My parents equate health and well-being with the total mass of food (with secondary attention to variety) the child will consume in a day. I strongly recommend that such parents take the pressure off their children and re-channel it to-

AQUARIUM JOURNAL

ward the more receptive *Astronotus*. All parties will benefit.

If it was animal protein, Gort gobbled it: hamburger, dog food, snails, insects, live fish, with chunks of raw liver the special favorite. Tubifex and daphnia, however, were soon outgrown. Summer nights I would open a window behind the tank, place a 100-watt lamp over the water, and let the free meals come in. Moths and beetles would keep hitting the bulb until, battered, they fell to the water and disappeared with a loud pop. In a minor display of technique, Gort would draw a bead on the silhouette of any insect walking across a lily pad and take it, leaving a hole in the pad where the insect had been. Not being a vegetable-eater, the *Astronotus* would then spit out the disc from the leaf (one persnickitiness the frustrated parents mentioned above will have to get used to).

(To Be Continued)



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Readers and societies are invited to submit ideas to The Journal for Aquarium Society meeting programs, including lectures, slides, films, demonstrations, etc. There is no charge for these listings.

"Saltwater Aquarium in the Home," a new 16mm film in color. Running time, 25 min. Rental: \$15. For information: Coral Reef Exhibits, P.O. Box 59-2214 Miami 59, Florida.

"Story of the Brine Shrimp," a 30-min. color and sound 16 mm film that also covers the tropical fish hobby. Rental: \$10. For information: San Francisco Aquarium Society, California Academy of Sciences, San Francisco 18, Calif.

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"Killifishes," a slide-tape program created by Al Klee, Franz Werner, Richard Blanc and George Maier. The program is available for aquarium societies on the West Coast by contacting Alan Markis, 2607 Bryant St., Palo Alto, Calif. Midwestern and East Coast societies may obtain it from George Maier, 802 Belmont Ave., Chicago, Ill.

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AFTER A HARD session of ich, fungus or one of the other diseases that offset your fishes, is there a soul who hasn't muttered to himself, "I wish they'd come out with a fish do-it-yourself kit so fishes could be made that wouldn't die or get sick!" Now this is a thought with some merit. Recently during a visit to the T. Wayland Vaughan Aquarium-Museum, a part of Scripps Institution

FINNY FOLKS

By Diane Schofield

of Oceanography at La Jolla, California, I saw Sam Hinton, who was working on such a project. (See photo, Page 170) There in his hand was a fish that appeared alive. Mr. Hinton (the folk singing museum curator, whose account appears more fully in the August, 1963 issue, also see the October 1963 issue), explained that he and his wife were making a habitat display and when he was finished with it, all of the fishes would be swimming contentedly and most realistically in air!

A note of sadness came through the mail shortly after arriving home from my trip down to La Jolla, in the form of a letter from Frieda Meserve. Frieda, together with her husband, have been the motivating force behind "The Boston Aquarium News," the bulletin of The Boston Aquarium Society for approximately 15 years. A couple of years ago these lively grandparents decided that it was not possible for them to continue as they had been doing, so they started publishing their bulletin at an every other month interval. Rather than giving up altogether or having someone take over who was inept, it seemed like a much better plan to put out half as many issues but still keep the quality up. "The Boston Aquarium News" had dignity. Its approximately twenty pages were packed with much original ma-

terial, clearly and artistically done. Now, unfortunately the Meserves feel that they can no longer continue on any basis and must pass the torch to some one else. The Meserves are going to be a mighty "hard act to follow."

It seems to be true with many of the bulletins that are ranked in quality. A high percentage of them have as their guiding light someone who has had the job of editor back to almost "prehistoric" times. Their names have grown to be almost synonymous with their bulletins. To list but a few, there is Leona V. Bradley, editor of "Aquafocus," the publication of The Aquatic Researchers of San Antonio; Hazel Hall, the editor of "Angel Notes," the bulletin of The Alamo Aquarium Society; Marie McCann, edited "The Scalare" for The Dallas Aquarium Society. And lest you think Texas has a monopoly on these dedicated souls, jump to California and note Alice Heizenbuttel, who has put

out "The Fish Lore" for The Eden Aquarium Society, for many years. In Denver, Colorado Carol Honnold has been doing the same time consuming job for the Colorado Aquarium Society in editing "The Colorado Aquarist."

After some comments in February in this column about the unusual meeting places of the Los Angeles Aquarium Society, Dick Larson, who writes "Circling the Tank" for "Aqua News," the publication of The Minnesota Aquarium Society, wrote that they meet in the Bryant Police Station, right next to the cells. During the proceedings, Dick says, "Every once in a while they bring in some character which rather adds spice to the meetings!"

Note: The photograph of *Moenkhausia oligolepis* in an article of the same name on Page 123 of the March 1964 issue, was taken by the author, Diane Schotfield.

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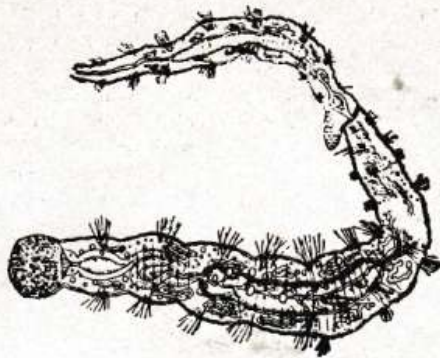
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Bristleworms

OF THE VARIOUS groups of animals utilized by aquarists for the purpose of feeding tropical fishes, the Oligochaetes, or bristleworms, undoubtedly supply a great variety of popular items and too, it is possible in this group that some new items can be found.

From the group of insects called Diptera (flies) we get such items as 1. the wingless form of the fruit fly (*Drosophila*), and 2. mosquito larvae. Insects also provide 3. meal worms (Coleoptera), 4. glass worms, and 5. bloodworms are also dipterans. Among the Crustacea we can use 1. brine shrimp and fairy shrimp, 2. *Daphnia*, 3. *Cyclops*, and 4. *Gammarus*. From the Protozoa we get the "infusoria" for young fishes. 1. *Paramecium* and 2. *Euglena* (sometimes called "green water"—for fry). The Nematoda (round worms) gives us a fine food for young growing fishes, i.e. microworms. From the Rotatoria, we get rotifers (several species). Finally from the

Charles O. Masters

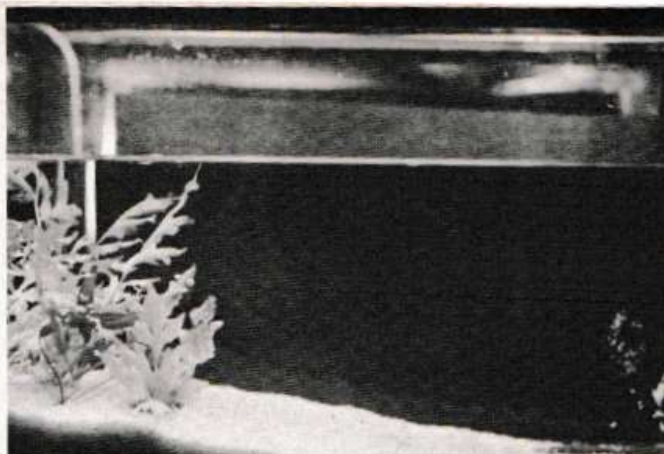
Walhonding, Ohio

group Annelida, our present subject, the segmented worms, we get 1. earthworms, 2. white worms, and 3. *Tubifex*, all Oligochaetes.

There are several others which possibly could be collected and cultured easily so that they could be fed generously to tropicals. First of all the Annelida are divided into three classes: 1. Polychaeta, practically all are marine worms which in practice do not lend themselves well for use as fish food. 2. Hirudinea, leeches, and 3. Oligochaeta, the earthworms and aquatic earthworms which, although smaller, behave in water as do the common earthworms on land. Oligochaetes are also called bristleworms.

(Continued on Page 204)

Photos: (Right) Patches of *Corydoras aeneus* eggs on the glass and underneath the broad leaves of water sprite. Other eggs on the ends of the tank cannot be seen. Photo by the author. (Below) A pair of *Corydoras acutatus*, a close relative of *C. aeneus*. Photo by Cas Van Os.



● *Corydoras aeneus* is hardy, peaceable long-lived — and works hard, too!

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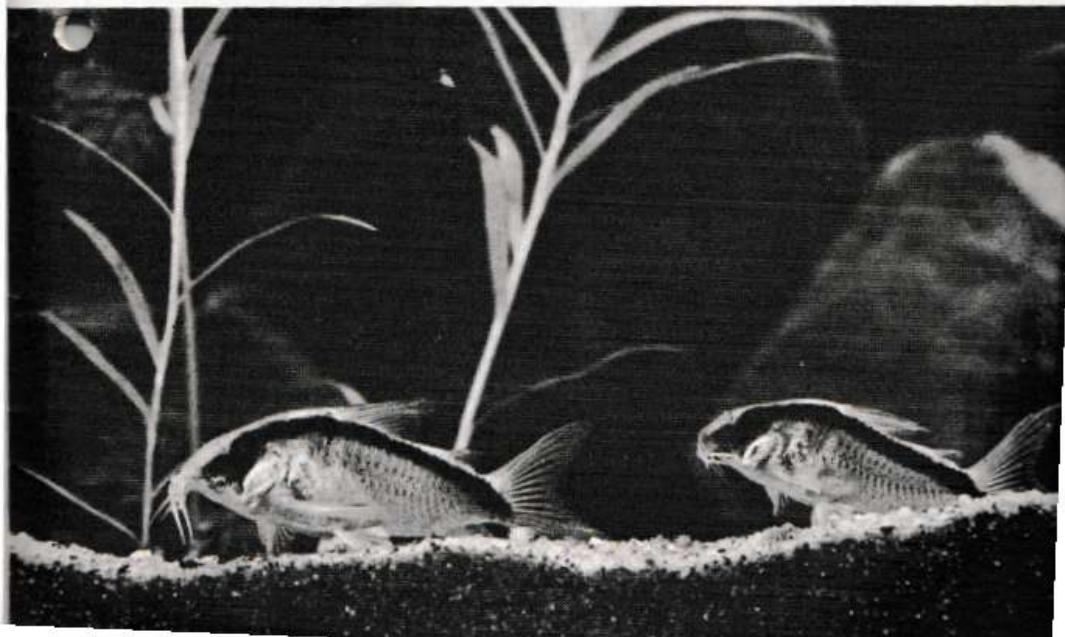
Corydoras aeneus is a nice little catfish to have around — not as pretty as some, perhaps, but one of the best when it comes to cleaning out a tank. He is hardy, peaceable and long-lived, and almost any water condition will suit him except very acid water which, if left uncorrected, will surely kill him. He will settle for any food that is left lying

Dorothy O'Quinn

East Point, Georgia

around on the bottom of the tank, but really thrives on live foods if given the opportunity.

For some time I had kept a number



of *aeneus* scattered around among my tanks as scavengers, but I didn't try to keep one in every tank. I just moved them around from one place to another when the sand seemed to be getting crusty and needed to be loosened up. I had never seriously thought about trying to breed them until one day a big fat female who had been contentedly keeping the emperor tetras' tank clean decided to lay big patches of eggs around on the glass. Needless to say, I was astounded to see those large eggs there, and it took me a few minutes to realize what had happened.

Well, far be it from me to deny any fish the privilege of raising a family if she wants one that badly, so I lost no time gathering up all the likely looking males and selecting one for her mate. I cleaned a tank and put it in a good location for observation. Next I filled it

with good aged water from a tank that was clear and healthy and made sure the water pH was neutral. After adding some pieces of broad leaf water sprite and a few drops of "flavine," I put the pair of catfish in and kept my fingers crossed. They made themselves right at home in their nice clean tank and happily munched away on the ample supply of frozen brine shrimp and white worms with which they were favored.

A few days later they started spawning early in the morning and spawned for about three hours. Eggs were

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CLUB NEWS

Stanislaus Aquarium Society
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The Fourth Annual Tropical fish show to be sponsored by the S.A.S. will be held June 13 and 14, at the Ed J. Lyng warehouse, one-quarter mile north of Modesto, California on Highway 99, according to Jack Ford, show chairman. Arrangements are being made to handle 22 classes and over 100 tanks are expected to be entered in the show.

Beautiful Background

A neat and beautiful background can be made very easily. All that is needed is some black or dark gray tissue paper found at most shoe stores. First of all, crush the paper into a ball and then gently pull the paper back into its original form, only leave the wrinkles and humps in it. By simply cutting the paper to the shape of the aquarium back and taping it on you will have a beautiful, neutral background to help beautify any aquarium. — *Ed Browkowski, Lima, Ohio*

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pressed on the glass on all four sides of the tank and up and down the filter stem. Leaves of water sprite were weighted down with eggs and some of the plants that had been uprooted were also laden and floating around on the surface of the water. I removed the breeders when they seemed to have lost interest in each other and began rooting around on the sand as if they were hungry.

Three days later the eggs began to hatch and the little fish looked like they were made of glass. Another two days, and they were eating their brine shrimp like real troupers, turning a deep rosy pink in the process. The tank bottom was literally covered with busy little fish and you can imagine what a lively sight it was, for they were hardly ever still.

Aside from the pleasure we have had watching these young *aeneus*, raising them has been very helpful in the operation of our fish room. For instance, it is almost impossible to keep from over-feeding a baby tank and the accumulation of leftover brine shrimp or other fry food on the bottom can become a problem. As one must be sure to have plenty of food available for the tiny fishes, an excess is bound to be put in the tank at least part of the time, and it cannot be syphoned out without the danger of getting some of the fry. If a catfish is any size at all, it may be too rambunctious in the tank and keep the little fishes disturbed. This is where my baby *aeneus* have become a real asset, for when they are one-quarter to one-half inch in length I can put a few in each tank that has the very smallest fry in it and they will go right to work cleaning up all the brine shrimp that has been left over. Yet, they are too small to bother the other little fishes.

But the advantage doesn't stop there. You should see how those little catfishes grow when they are spread around in



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Rose

Green



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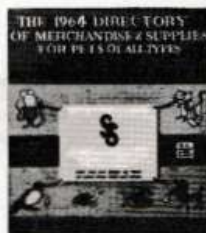
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all those baby tanks. It's amazing! They grow so fast they are soon ready for the market, and then I'm ready to put the *aeneus* back in the spawning tank to start another family.

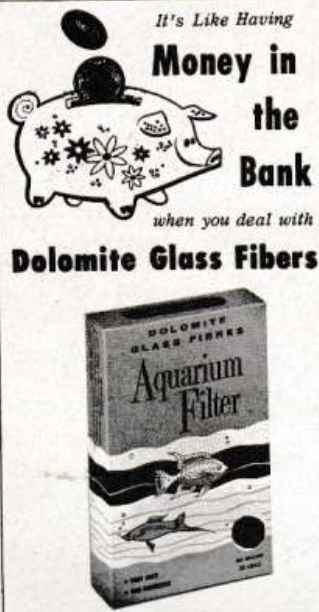
And so the cycle begins all over again: the bettas are spawning; the tetras are hatching; the cichlids are free-swimming, and there will be new little TANK CLEANERS ready to help with the chores. Three cheers for CORYDORAS AENEUS! ◀

Masters

(Continued from Page 200)

The *Oligochaetes* of the United States are divided into ten families as follows:

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Purely aquatic, 1. Aeolosomatidae, the spotted worms. 2. Naididae, the naids. 3. Tubificidae, *Tubifex*. 4. Branchiobdellidae, crayfish worms, and 5. Lumbriculidae, small red or brown worms which live in very wet mud. Semi-aquatic, 6. Haplotaxidae, thread annelids, and 7. Enchytraeidae, white worms. Terrestrial, 8. Glossoscolecidae, from tropical and perhaps subtropical zones. 9. Megascolecidae, both of these two families are large, thick-bodied earthworms from warmer climates, and 10. Lumbricidae, the common earthworms from temperate zones.

Of the ten families, the first two purely aquatic ones include some very interesting species which might be of value to aquarists. Among the Naididae are *Nais*, *Stylaria*, and *Dero*. The family Aeolosomatidae has one genus *Aeolosoma*. All of these worms are quite small being about a tenth of an inch in length but are soft and very frequently eaten by fishes. Their numbers make up any deficiency they might have because of size. The worms, as they become more numerous in such places, serve as agents for cleaning up the unwanted or unsightly vegetable "rubbish."

Because of the fact that the body wall of the worms is so thin and so very well supplied with capillaries, an exchange of respiratory gases takes place through the integument. Some of the species can stand quite a deficiency in dissolved oxygen.

Movement is usually accomplished by means of muscular contractions of the body wall and those having bristles use them. To help with this movement worms of the genus *Aeolosoma* are very delicately constructed and have fewer segments than do the others. The globules of pigment which give the worms their interesting bright colors and the internal organs which can be clearly seen through the skin help in this identification if desired. *Aeolosoma* Ehren-

berg is the only North American genus.

Identification of the species is relatively easy based on construction of internal organs, presence or absence of pigmented globules, color of the globules, and presence or absence of certain hairs. There is much work to be done in this particular field where study has been scanty and sporadic in spite of the fact that the species are cosmopolitan and are found in large numbers the world over.

Collecting out-of-doors can be accomplished by gathering mats of algae or clumps of decaying pond vegetation and rinsing them in a dish of clear water. If the plant material is allowed to ferment for a few days in a container, the worms, in large numbers, can sometimes be collected at the surface and about the margins of the decaying plants. A camels-hair brush serves to transfer the worms to the clear water or a medicine dropper can also be used. All that is needed is a dozen quart fruit jars and covers, a good handful of clean, dry, fresh, timothy hay (stems only) stored in a wide mouth gallon jar, and a source of unpolluted pond water. Since this is the item that is most apt to vary, it might be a good idea to experiment with water from several different sources until

a good one is established.

Step number one is to start with four of the jars to each of which is added about forty-one inch pieces of previously boiled timothy hay. Add enough heated pond water to fill each jar about 4/5 full and cover. The pond water should not

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be boiled, just heated enough to kill any protozoa etc. which might be present.

About fifty *Aeolosomus* should then be added to each jar as soon as the water has cooled to room temperature. These can be collected out-of-doors as described previously or obtained from biological supply houses. Within two weeks at a temperature of about 75 F. the cultures should be teeming with the worms but daily inspections should be made so that more worms can be added if they are needed.

By passing the culture through a fine mesh kitchen screen, the living worms in clear water can be separated from the hay and poured into fish tanks. If necessary, the worms can be concentrated by means of filtering through a fine-mesh cloth.

Other species of *Oligochaetes* can be grown in the same manner and should make an excellent source of living food for tropicals. New cultures, four at a time, should be started every two weeks in order to keep a good supply on hand at all times. ◀

CLUB NEWS

The Fireside Aquarium Society

(Brockton, Mass)

Newly elected officers are shown in photograph, from left to right: William



Heeley, installing officer; Virginia Parker, clerk; Roy Kennan, vice president; Theodore Roberts, president; Helen Converse, treasurer and Norma Roberts, secretary.

CLUB NEWS

London Aquaria Society

(London, Ontario, Canada)

The Canadian Association of Aquarium Clubs is holding its annual convention in London, Ontario on Saturday and Sunday, May 9 and 10, with the London Aquarium Society acting as host club. Speakers include Neal Foster of Cornell University and Prof. Helen I. Battle of the University of Western Ontario. A banquet and fish show competitions are also included in the two-day activities. One special feature in the competition is that all-glass aquariums and reflectors will be used, according to Murray R. Marshall, Programme Convener.

S.F.A.S. Holds 1964

Spring Fish Show

All fish hobbyists, dealers and breeders are invited to enter the Spring 1964 Fish Show sponsored by the San Francisco Aquarium Society, Inc., scheduled for Saturday, May 23 through Monday, May 25, according to Ray Cabrera, 1964 Fish Show Chairman.

A fish show entry blank and general rules for the show will appear in a special 4-page removable insert in the next issue (May) of the *Journal*.

There will not be any entry fee for members of the S.F.A.S., or for dealers who enter only in Dealers Display class. There will be an entry fee of 50 cents for non-members of the society. An entry fee of 25 cents will be charged for Juniors under 18 years who enter in the Junior Community Tank class.

Exhibits must be set up on Thursday, May 21, between 10 a.m. and 9 p.m., or Friday, May 22, between 10 a.m. and 9 p.m. No entries will be accepted after this time. No exhibit can be removed before 5 p.m. Monday, May 25. After setup time, fish or plants cannot be removed or exchanged, except sick or dead fish may be removed at the option of the Show Chairman, Cabrera said.

★ IDEAS ★

BY HOBBYISTS

The Journal will pay \$5.00 for original ideas published. Keep less than 200 words. Send your idea today!

Potato Bags

The potato bag is a very handy item when one decides to hunt for native plants. The bag, which is made of strong netting and consequently porous, can be used to carry the plants as well as keeping them wet by dragging the bag in the water. This eliminates the use of the heavy buckets and pails when the actual searching is performed. — *Terrence Walther, Sheboygan, Wisconsin*

CLUB NEWS

San Francisco Aquarium Society, Inc.

The next regular meeting of the SFAS will be held at Steinhart Aquarium, Golden Gate Park, Thursday, April 2, 1964, at 8:00 p.m., according to Robert P. Dempster, president.

Program for the evening includes a show of old pumps; a talk about pumps and vibrators; a special clinic for those with fish problems; wonderful door prizes — and "Swap Night," when members may bring fishes, plants, tanks, heaters, in fact, anything to do with tropical fishes, to trade with other members at this meeting, according to Frank Tufo, emcee and program chairman. A talk will be given by president *emeritus* Charles P. Bange.

Fish of the Month for the April meeting: (1) swordtails, (2) barbs, and (3) loaches, labeos, and similar kinds, according to Mr. Bange, chairman.

Members are urged to make more use of the society library, according to Ray Cabrera, librarian, particularly in the area of returning borrowed books on

time. Please return books when due. The library is open for a half hour before each meeting. ◀

PRODUCT NEWS

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IDEAS

Algae Cleaner

When troubled with the stringy or hairy algae, I use a round stick with a few short nails pounded in at the bottom. The length of the stick should depend on the depth of the aquarium or aquaria cleaned by it. The nails should then be put near the algae area and the stick rotated by hand. The stringy fibers will soon be caught by the nails. By doing this there will be less disturbance in the other parts of the tank. — *Terrence Walther, Sheboygan, Wisconsin*

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*From: Ronald C. Forsyth
Rochester, New York*

I have 14 young discus in two 20-gallon tanks. They are doing very well, however, there are a couple of things which puzzle me. 1) At all times several of them have small white spots on the tail or pectoral fins, never elsewhere on the body. The spots which number from 1 to 5 disappear after a week or so, then show up elsewhere. They are about the size of ick, but are not as white, nor are they as cloudy-white as tail-rot. They appear only on the fin rays, never between them, and there is no fin damage. 2) Several of the fish also show small brown spots on their body. These are chocolate brown and vary from the size of a grain of salt to that of a pinhead. I am quite sure it is only expanded pigment cells, as I have seen similar black spots on angels, and such gray ones on firemouths (*C. meeki*). They seem not to trouble but distract from the fishes looks. Are they abnormal pigment spots, and what causes them?

REPLY: Your two problems puzzle me too, especially the first one. I have seen the white spots on the fins of angelfish from time to time, and have never known what they are. However, they never seem to do any harm. The pigment spots too are common in angelfishes. I am not so familiar with the discus but apparently they have them too. I don't believe they are abnormal and in any case, as long as the fish seem in good health, I would not worry.

*From: Gary Gruber
Long Island, New York*

I was told by my friend, Klaus Kallman, a friend of the late Dr. Gordon, to contact you. I would like it if you could send me some free information on guppy and platy genetics. I am trying to raise and study platies and guppies. I will appreciate anything you can do for me.

REPLY: We do not have any free information, however Dr. Gordon wrote some excellent articles on genetics of guppies and platies. These are as follows: guppies, May and June issue of the Journal for 1953; platies and sword-tails November 1952, December 1952,

remained.

I am having much trouble with raising swordtails.

I have, or rather, had four swords in a five-gallon tank along with two pristella. The pH is 7.4, and the temperature is 80° F. I don't have a hardness test

Letters to The Journal

January, February, and August 1953. These issues of the Journal are available at 40 cents a piece..

From: Carl E. Beck
Lexington, Kentucky

Is it necessary to add salt (sodium chloride) to my aquaria? I was advised to add a teaspoonful of salt per gallon of water to my tanks. Especially to those with guppies and mollies. But it sure plays heck with the plant-life in the tanks. So far out of three tanks with assorted plants, only good old "Val" has

kit. The swords will last in my tank from two weeks to a month, then begin to get a hollow-chested look, assume a crescent shape and then die. As far as I can tell, there is no sudden change in temperature.

REPLY: The advice you received is very poor. Water in different areas differs in salt content. If your water supply provides water close to distilled water in its mineral content, a level teaspoonful of salt per gallon would do no harm. However, in other areas where the nat-

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ural salt content may already be rather high, the addition of that much salt may raise the salt content to a lethal concentration for some fresh-water plants.

I cannot tell what is causing your trouble with the swordtails, but a five-gallon tank is too small for swordtails in any case. Place a single large robust pair in a ten-gallon tank with no other fishes and feed them at least twice a day; once on dry food and once on live food. I hope this will help.

From: Richard Mazurkiewicz
APO 328, San Francisco, Calif.

At what age and size will angelfish breed? Will veiltail and black angels interbreed? What are the optimum water conditions? How soft is "soft" water for angels? I've seen many articles on their breeding, but nowhere is the hardness of the water noted. Is there a sure method of sexing them?

I read someplace that they will use the leaves of an Amazon sword plant for breeding, and that water good for the plants is, or should be good for the fish. My two plants are growing beautifully. I have roughly, twenty-three small plants growing from runners, with no signs of stopping. Should I stop this growth? The runners are running all over the tank, and they seem to split indiscriminately into additional runners and every few inches for a new plant. If I break the runner from the parent plant, will the "first born" carry on, or is the parent necessary for further growth?

REPLY: Angelfish will start to breed at eight to ten months of age and will continue for three to four years or more if well cared for. They should be about four to five inches high (measured vertically). Yes, veiltail and black angels will cross. They are "sports" of the same species. Optimum pH is probably about 6.5 to 7.2 but they will breed in water of at least 6.0 to 8.0. They can also tolerate hard water, at least up to 400 ppm total

hardness but for breeding should probably be kept in fairly soft water, 50 ppm total hardness. I have seen several articles on sexual dimorphism in angelfish but none of the differences seem reliable to me. Yes, angelfish will spawn on Amazon sword plants. In my experience Amazon sword plants will grow well in conditions suitable for spawning angels; however, in addition they will also grow very well in conditions not optimum for angels. Yes, the "first born" plants will carry on, but at a much slower rate. If you remove the young plants, the parent plant will grow faster and larger. ◀

Lime Deposits

If you have problems when it is time for your annual aquarium cleaning, try this. Use a scratch pad — "Golden Fleece" is one type — and pour salt on it. Make sure it is wet, and then rub the glass with this. It is very effective for lime deposits in corners. — T. Harding Jones, Middletown, Ohio



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