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The Magazine Aquarists Believe In

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Synodontis davidi, *as photographed by Dr. Herbert R. Axelrod.*

The spawning migrations of fishes.

Tales of Piracema

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

Fish migrations! The times when fish wander upstream in dense schools to spawn! Even the noise made by these migrations is really something. This is how a dictionary of Brazilian terms defines the word "Piracema." "*This melodious term for the well-known phenomenon of fish migrations comes from the language of the Tupi Indians, who have enriched the Portuguese spoken in Brazil with many words, especially those that deal with things in respect to nature.*"

Fish migrations are no rarity; they occur all over the world. One of the best known of them is the wandering of spawn-filled eels into the ocean, or the return of eel larvae to the same streams from which their parents came. Another is the upstream migrations of great numbers of fat salmon into the rivers of Alaska, Canada, Sweden, and other countries. Unfortunately many such streams have now been spoiled by industrial wastes.

These migrations lead to millions of fish being caught, which is the inspiration for pictures showing a big salmon jumping from the water or being caught and eaten by a bear. And in the newspapers one reads how nations argue about the fishing rights covering the capture of billions of herring, which form huge schools, surely for the same reason.

Most people, however, are unaware of the fact that outside of herring, salmon, and eels there are many other fish species (all over the world) which form close, tremendous schools which overcome all obstacles to the journey toward spawning places. Such journeys can last for weeks and sometimes cover considerable distances. And not always do the fish wander from the sea into freshwater streams and lakes which empty into it, or *vice versa*. Frequently such fish migrations take place in one large body of water, the entire cycle, from beginning to end, taking place here.

In the Brazilian Amazon the phenomenon of Piracema is well known to young and old. All Brazil's people look forward to it, for the appearance of the fishes is connected with a plentitude of food for their frequently very sparse menu. The word "Piracema" has taken on a wider meaning, to cover not only a plentitude of fish but of many other products of nature, be it fruits or the thousands of turtles that come every year to the same sandbank to bury their eggs. Piracema—today plenty! Tomorrow, perhaps nothing!

Under a thatch-roof hut of the Karaja Indians, we sat at night, listening to Indian tales about spirits and ancestors. The Araguaia River stretched almost a mile wide before us.

The end of one summer found me sitting in the open beside a Karajá Indian hut, on one of the great sandbanks in the Araguaia River in Central Brazil. I was swapping legends with the Indians; I told them the tales of other races and they told of their own heroes, of ghosts, and of the world of long ago. About 200 yards away the silver ribbon of the river shimmered as it wound through the dark of the hot night. Here on the Central Brazil highlands the stream is about three-quarters of a mile wide. They are big, these Brazilian rivers! The night noises filled the outdoors, and there were many. The drawn-out, melodic sound of the whippoorwills is heard. The bird is known here as Mãe-da-Luna—Mother of the Moon. Its call has so much in common with the human voice, sounding like a heartbreaking lament. It is said to be the love song of a dying Indian maiden. Her lament was so moving that the heavens opened and the sickle of a new moon became visible—Mother of the Moon! Little ground owls gave their short, sharp calls. Gulls screeched interminably, curlews and snipe peeped and from far away the yowl of a hunting jaguar . . . and everywhere the chirps of crickets, all night long. From the water we heard an unusual sound. It was as if sand was falling into the water, as if a part of the steep sandy banks were sliding down and splashing into the water.

The Indians seemed to be listening only to the conversation. They are, naturally, all accustomed to the night noises. Again and again sand kept

slipping into the water. "A sandy bank is letting go!" I said softly. Nobody paid any attention to my words, and it was unimportant in any case. It was only chatter, to show that I knew what was going on. Then, there it was again! "There is sand dropping into the water!" I said again. This time it sounded a little nearer than before.

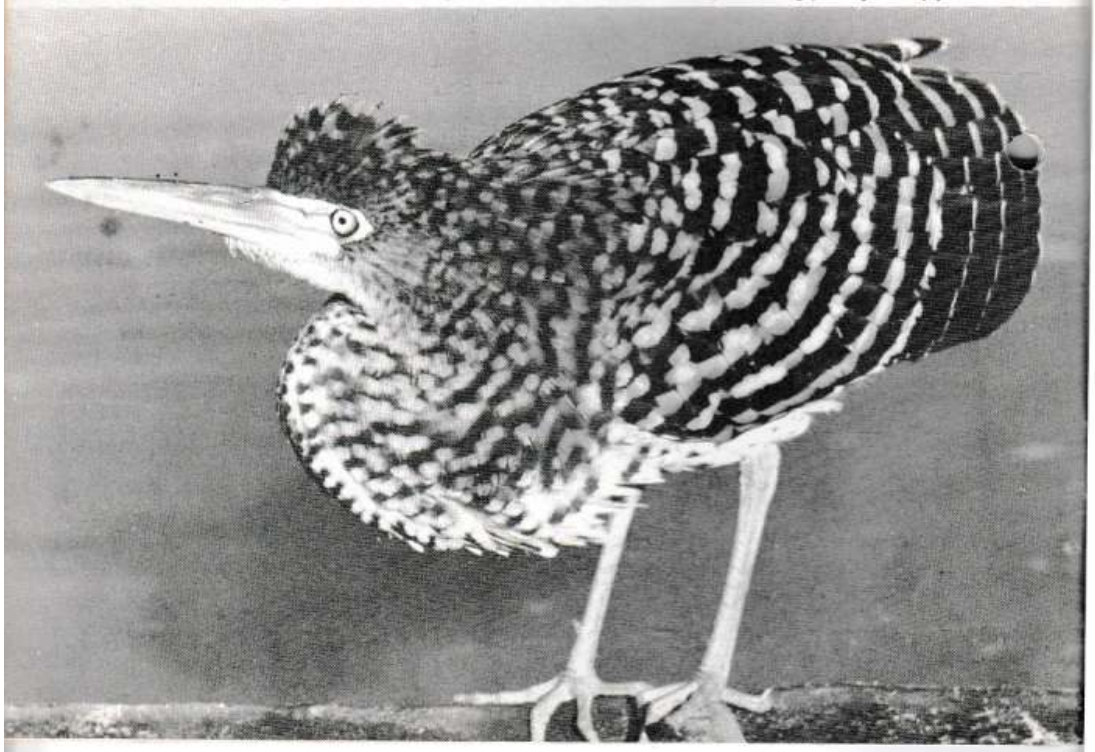
"No, they're fish!" says a voice. And then a moment later: "Come on, let's catch some!"

We paddled off in three dugouts across the dark waters. The starry skies were so bright, however, that the far-off sandbanks and the choppy waters looked like lace. One of the boats was staked across the current. The other closed the channel from above, forming a blind alley. In the third boat the two men paddled downstream and beat on the surface of the water with long poles, making the water fly. Thousands upon thousands of fish crowded into the shallow water along the banks. When frightened hundreds jumped into the air, to fall back into the water. This was the source of the noise that my untrained ears took to be the sound of sand falling into the water! The fish which were frightened by the beating of the poles fled into the blind alley formed by the two boats and tried to jump over them, flopping into the boats. They had underslung mouths, identifying them as plant-eaters and bottom-grubbers. They are excellent food fish—Corimbatá (*Prochilodus corimbata*), and all of them seemed to belong to the same species. The women took them out of the boats at the shore. With the fishes' entrails they fed the tame marsh birds that sat on the boat edges and on the shore near the water.

Men crossed the river in a wooden dugout. It was night.

The Indian women cleaned the fishes on the shore. Two Banded Tiger Herons waited for a piece of fish. They are Indian pets.

This Banded Tiger Heron is sitting on an Indian canoe, as always, waiting for a piece of fish.



This is Koobereua, with whom I fished. His hair is black and long. In his pierced underlip he wears a carved fish bone. His necklaces are made from glass beads traded with Brazilians.

Nature is generous with those of her children she loves! But one must have grown up with her and know her secrets, all the sounds in the night. If not, one easily becomes hungry!

Once I sailed in a narrow boat, about 30 feet long, from Itacotiara in Lower Amazonas, up the mighty stream to Manaus, the capital of the state. It was an 11-hour journey. My lone boat was driven by a slow, but very powerful and dependable outboard motor. It was night, and I had to be very careful not to ram one of the numerous floating logs. These lie half under water and even in broad daylight are difficult to detect in many cases. The thin hull would be easily crushed in, and I had no desire to find myself suddenly treading water. There might be an eddy from which escape could be difficult. The least that could happen would be that the pin would shear off of the propeller. Then it would be a case of paddling the heavy boat to the nearest shore and standing in the water to remount the propeller.

It is a creepy feeling, being alone in the middle of the night on the broad Amazon. There have been too many tales told by fishermen of how people have been dragged into deep water by giant fish; octupuses with big, long tentacles; giant alligators (These, at least, are no fables!); and the mighty, super-giant snakes with gleaming eyes as big as saucers . . . snakes, so long that they can span across a good-sized stream. The snake is the famous "cobra grande." I have met some credible gentlemen who claimed to have seen it. In the dark one refuses to think of such things. One can only whistle!

The water gleams like liquid silver in the light of the full moon. The bow of the boat makes a silvery mustache with its wake. And now both sides of the boat seem to be passing through a fireworks display! Huge schools containing millions of *Metynnis* are so closely packed in the water that in places I can plainly see how their backs are pushed out of the water. Frightened by the noise of the motor they leap in a high arc, hundreds, no, thousands at the same moment! They sparkle brightly in the moonlight and then splash back into the crowded water. For over an hour I push through the dense masses of fish . . . alone in the immense stretches of the Amazon. Fish migrations! Today, too many. Tomorrow perhaps nothing!

It was in the upper reaches of the Purus, a big tributary of the Amazon that came up from the south, like most of the larger Amazon tributaries. My wife and I were in a heavy dugout about 30 feet long, equipped with a straw roof to keep off the sun, and we were many days on the journey. Finally we found ourselves at the Peruvian border, at the city of Santa Rosa. On the other side of the river were the Peruvian Border Police. They did not let us in, because all scientific expeditions were under suspicion from the start. They telegraphed to Lima, the capital, and many days later the answer came: we were to leave Peru and not to return. But while we were waiting we were comfortably put up in a straw hut, where, of course, we were permitted to do our own cooking.

From the river we occasionally heard an unusual noise that resembled claps of thunder that slowly faded away. Actually it sounded more like a shotgun blast, but the "echo" lasted much too long. There it was again! The same thunder and slowly receding din.

"What was that?" my wife asked. "I never heard anything like it!" And then the answer came quickly. Men shouted. Children ran to the river to gape. Fishermen grabbed their nets, which had been laid in the sun to dry. They jumped into their boats, pushed off and paddled madly to the other side.

"Piracema! Many fish! Catfish! They are coming upstream!" Today there will be plenty for all. Tomorrow there may not be a fish to be caught. The Purus does not have many fish. Only those who have the luck to live at a lake can get fish to eat every day. With a sweeping gesture the men throw out their nets. They open wide as they fly and splatter when they hit the surface and sink rapidly. The biggest of these nets measure about 10 square yards. They close and trap all fish on which they have fallen. When used for catfish which travel along the bottom, a little caution is necessary when retrieving the net and it must be carefully held closed so that the fish will not escape at the last moment.

Every throw-net that came up was amply filled with catfish that had become entangled in their meshes with their sharp spines. They had to be removed carefully; a small cut could prove to be very painful.

A Piracema has appeared in the river. Millions of fishes are traveling upriver. Fishermen in canoes throw their nets.

The nets are pulled on board carefully. They are kept close to the canoe in order to avoid losing any of the catch. Catfish swim near the bottom, and nets containing them must be closed carefully before pulling them aboard.

"Where does the noise come from?" my wife asked me. "It sounds like the rumble of thunder!"

I could give her only this explanation: The catfish have to come up to the surface to get a breath of air. Thousands do this at the same time, releasing the used-up air and taking in a gulp of fresh air to replace it. This results in a tiny sound. When many thousands do this at the same time, this small sound is amplified until it sounds like the blast of a shotgun. In constant waves the millions of catfish ascend to get air, adding the "rumbling" echoing sound to the original blast. It was quite easy to establish the range over which this Piracema extended, by just listening for the blast and the receding echoes. And one could watch the fish as they swam by and ascertain the size of the run. They formed a parade about 100 feet wide in a dense school which was about 1½ miles long and took about 3 hours to go past a given point! Think how many fish this migration must comprise!

Surely all the mature females and males undergo a deep desire to mate. This is probably evoked by some hormone, but could also come from a chemical change in the water. At this time they come out of all river mouths, brooks, and lakes. They travel upstream until they feel they have reached their goal and then, perhaps, spread out to spawn.

Every time a net has been used it must be repaired carefully. Catfish have sharp dorsal spines which not only can inflict painful wounds to the careless, but can also make holes in the meshes which must be repaired immediately.

Piracema — always a time of plenty . . . often the feast before a famine.

On the Madeira River, I saw some years ago how thousands of fishes of all kinds tried to get past a large waterfall by taking huge leaps. In Brazil there are many such places, where fish are held back by waterfalls and rapids. There are a few cities whose names are of an Indian origin and indicate that there are many fish to be found when the migrations are underway. (One of these is Pirassunga, which translates to "a place through which fish cannot travel," which assures that a good catch can be made here.) In old times there were Indian settlements in such places, but later these gave way to modern cities.

At the foot of Teotonio Falls, migrating fishes swim in deep pools. They try with tremendous leaps to attain the waters above and continue their hectic journey for spawning. In the middle of their leaps they seem to hover in the air. Not all succeed; many give up after numerous tries. One of the fishermen told me, "Those that don't make it, die!" He was able to supply the city of Porto Velho with a constant flow of fresh fish by capturing these. "When a fish misses after several tries, he lies stunned in the water. The predators wait here to eat him." This is the big test of migrating fishes' lives: propagate or die.

The brilliantly colored Nothobranchius guentheri *male is truly an aquarium beauty. Photo by Van Raam.*

Nothobranchius guentheri Here Today, Gone Tomorrow

BY DIANE SCHOFIELD

Shelley, who in writing his "Mutability", said, "The flower that smiles today, tomorrow dies", and then ended this stanza with "Brief even as bright", could just as well have had *Nothobranchius guentheri* in mind. Admittedly, *N. guentheri* isn't much on smiling, but he does whisk through his all-too-brief little life blandishing his brilliant multi-hued raiment as if to cram a lot of living into the span that has been allotted him.

As if to make up for the fact that he won't be around long, it does seem as though *N. guentheri* does put a great deal of effort into sporting brilliant colors. Never yet have I seen a photograph that can do them justice. Truly, a

male *N. guentheri* in optimum condition is one of the most gorgeous tropical fish familiar to aquarists. Just watching them is a joy. The predominant color is a carmine red—this color is most prominent in the caudal, but it is also found in a delicate edging of the scales, as well as in the dorsal and anal fins. This redness is worked into a delightful tracery of color over a very pale bluish-gray background. There is a deep maroon-brown border on the caudal and on the dorsal fins. The most striking thing about this fish, however, are the lovely pectoral fins. These are much larger than one would expect to find in a fish of this size, and the little fish flaps and floats them around much as a society matron waving a chiffon handkerchief at an afternoon tea. Surely one would not be at all surprised to find out that they are really made of chiffon and not fish flesh at all, as *N. guentheri* waves them around grandly. Each one is a pale blue with a creamy yellow border—this edging matches his underportion and indeed this yellow cream is suffused for a distance up his sides. His "ensemble" is accented by a light but bright blue eye.

The poor female, on the other hand, looks as if the color supplying department had just run out of colors before she got up to the counter. She looks as different as day from night as far as her colorful mate is concerned. The only color left in stock apparently was a greenish brown with a little color variation in her abdominal region—that of a yellowish white. Her fins are all equally drab. She is so different that the aquarist might be pardoned if he were to think that she is an entirely different species of fish altogether.

Happily, *N. guentheri's* disposition isn't in keeping with that of some of his relatives within the family Cyprinodontidae. Although I've seen the admonition "best kept by themselves", I'm afraid that I can't go along with this entirely. I've kept *N. guentheri* in with other fish in a community tank now for some time and I've yet to see the slightest bit of aggression on their part. True, none of the other fish are very much smaller than *N. guentheri*, but then that doesn't always stop a fish if he gets his jollies out of taking an occasional nip out of his neighbors. When they are first put into a community tank they are a bit shy for about the first two days, but after that they take a back seat to no one when food comes drifting down through the water, nor are they inclined to skulk behind rocks, as do some of their relatives. The hobbyist normally has no trouble in peering happily at his *N. guentheri*, because they are always right out in peering position.

When food is served, the *N. guentheri* make short, quick little jabs toward it with their rather large mouths, catching it on the fly. Although they will eat any of the frozen foods, such as brine shrimp and *Daphnia*, they leave no doubt in your mind when you see them eating food "on the hoof," so to speak,

that they do prefer foods that move. They will nibble rather disdainfully on dry food, but it's plain to see that their fishy little hearts aren't in it at all.

The water in my *guentheri* tank is quite old and the temperature is habitually kept in the vicinity of 78°. Both conditions seem to be much to the liking of the fish, for they have thrived under them. There is also quite a heavy planting of Water Wisteria into which the *guentheri* occasionally retreat, as they don't favor too much light, undoubtedly because their native waters are shaded pools.

N. guentheri is an annual fish, one of the many African and South American species whose breeding patterns have been remarkably adapted to the vagaries of a homeland which for a good part of the year is subject to a long, searing hot spell during which small bodies of water are completely dried up or at least reduced to a point at which they can no longer support fish life. Before they die, the annual fishes in these waters lay their eggs into the soft mud bottoms and sides of their homes; when the rains come again, the fry hatch from the little round prisons in which they have been locked for weeks or even months. They are ready to begin a life governed by the same inclemencies that killed their short-lived forebears, and they go at it with a will, eating ravenously to attain their growth before the rainy season ends and the death-dealing drought returns.

One of the reasons for the scarcity and high price of the annual species, *N. guentheri* included, is that it's a little difficult to imitate in a tank the conditions under which the eggs are laid and hatched in the wild. To begin with, one must find some sort of spawning medium into which the fish can lay its eggs. Of course, it should be soft and offer little resistance to the breeders. A soft silt-like mud or sand approximates what they are used to, but this offers some drawbacks in a home aquarium. Since they seem to accept well-boiled peat moss just as well, this is much neater and easier to work with as far as the aquarist is concerned.

As with some of the other members of this family, only a rather small tank need be used for spawning *N. guentheri*, one of 3 gallons doing nicely. A male and female are left to their own devices, one of which the aquarist hopes will be spawning, for about ten days. Of course, as in spawning so many other fish, it helps things immensely if the girls have been separated from the boys for some time immediately preceding the time when you hope that they will want to propagate their kind.

A number of eggs should be laid each day; fortunately, the parents aren't likely to make a meal of them. The water in this spawning tank should be one part of sea or salt water to 4 parts of old aquarium water, with the temperature in the high seventies. Their little bower should be shaded. At the end of 10

roundings they have, the better. (Except for the gravel, in my opinion.) Petrified wood, rocks, and healthy plants should be enough to decorate your aquarium. (If you are using sword plants, and want them to appear very full, bunch two or three of them together, and plant them as one.) Be sure there are no dead, ragged, or holey leaves on your plants, and that the plants are not so thick that your fish are hidden.

If your showing catfish, or fish that are prone to hide, you are better off decorating with just petrified wood and rocks in such a way that the fish cannot hide. (Naturally, before you use wood be sure its FULLY cured!)

Keep your background simple. It should not detract from the fish. Natural bamboo is excellent, but whatever you use, *do* use a background!

Quite a few experts like natural gravel, but I have yet to see the fish that is complimented by dull, colorless, natural gravel. If you are showing an albino clarias, try black gravel. If it's a ruby scat, try a soft yellow. For black catfish, try a light red gravel. Velvet red swords look good with a powder blue gravel. Don't forget to wash your gravel *well* so that it cannot cloud the water. Your setup won't have time to settle as it does in your home.

While your tank is set up at the show, do not overfeed your wet pets. They won't starve, and its better if they are a little hungry; they'll be more active, and there won't be any danger of clouding your tank.

Enough cannot be said about individuals who go buy a fish 2 days before a show just to display it. It's not fair to honest hobbyists some of whom have waited a year or more to show their fish in peak condition. And besides—how can a trophy or ribbon be really enjoyed when it is for a fish you have just purchased? Where could the satisfaction lie? Certainly the pride you feel for a specimen you have babied, and raised to the point where it wins a trophy cannot be duplicated!

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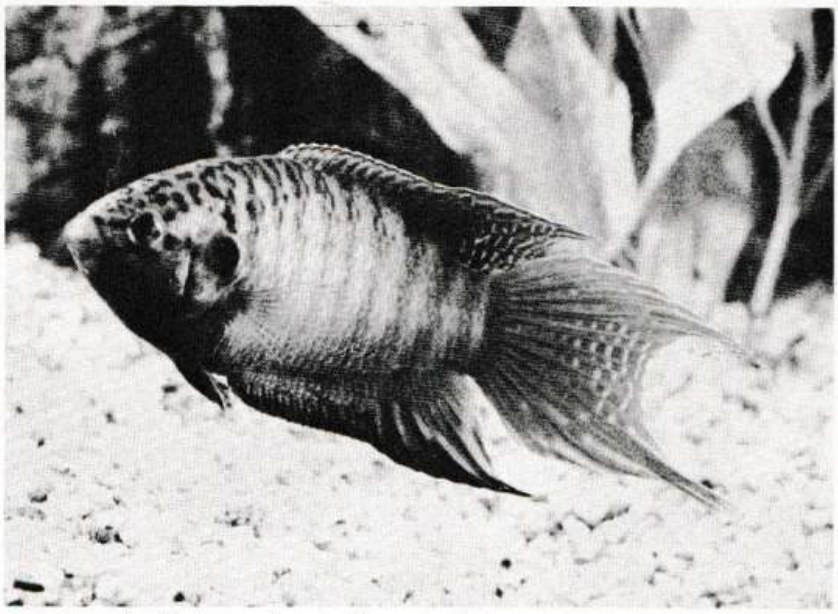


A male paradise fish in spawning condition.

The grand daddy of all aquarium-bred fish.

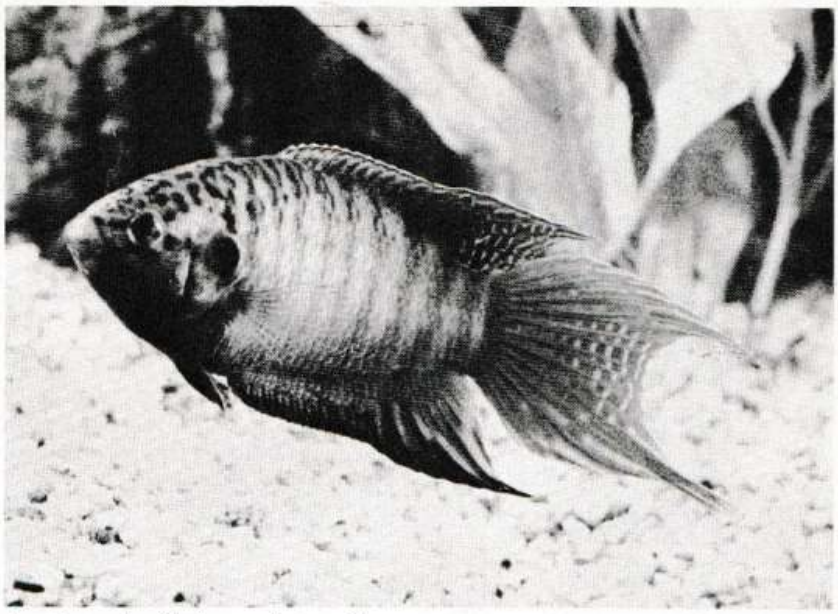
The Paradise Fish *Macropodus opercularis*

Rudolf Zukal

Brno, Czechoslovakia

Photos by the author

OUR SUBJECTS are certainly one of the best known of all aquarium fishes. As far back as the year 1869 they were brought into Paris and there bred by the French aquarist Carbonnier. English-speaking hobbyists have usually referred to them as "paradise fish." Germans call it "Grossflossler" (big fins). This name seems to be the most accurate. When a male assumes a threatening pose and spreads his fins, any other fish in the aquarium is likely to cower in fear. The



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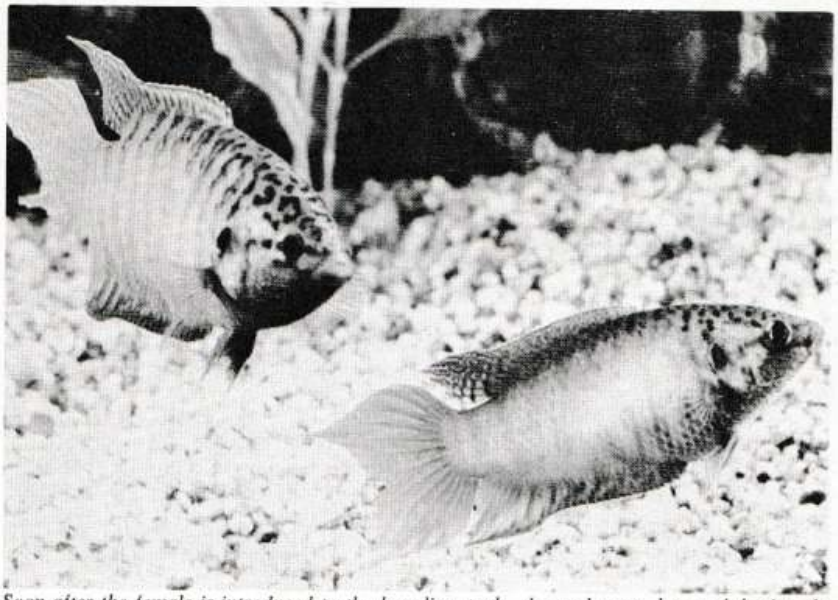
fish attains a size of slightly more than 3 inches in the aquarium and exceeds this in its native waters, which include Korea, Southern China, South Vietnam, and the island of Taiwan. I will spare the reader a full description of this well known fish, because I do not think that there is any experienced hobbyist who has not at some time or other owned this fish.

My paradise fish are kept in a medium-sized tank which is not too heavily planted and has a few floating plants at the surface. Normal tap water is used. The temperature is about 65° F., even a bit lower at times. It is advisable not to keep these fish in community with other fishes, because they are usually very pugnacious, biting and attacking smaller tankmates and frequently eating them. The males battle each other much like bettas. Otherwise these fish are very undemanding and can take a great deal of punishment. They have one very distinct advantage: if there is no other nourishment, they clean up any planarians and hydras present in an aquarium.

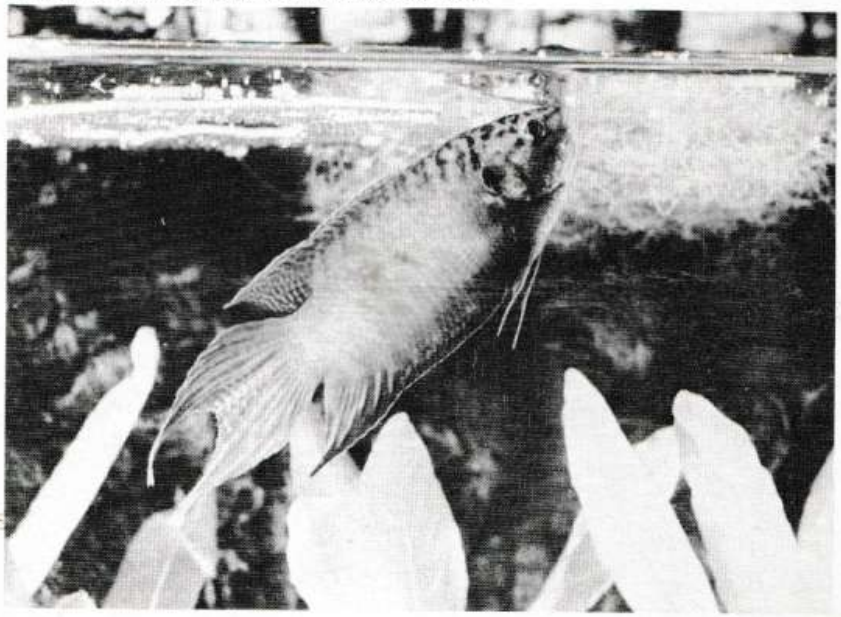
For breeding I use a tank of about 6 gallons in capacity, ordinary tap water heated to about 75° F., some floating plants, and a place where the female can hide. Spawning is almost identical to that of the betta, with minor differences. When the female is put in, the male spreads his fins and gill covers. A short time after that, the female is chased and sometimes badly bitten and torn. The female does her best to get away from the male. After hiding a few times, the female swims up to him turned on her side, and then the nest-building commences. Paradise fish seldom build a nest painstakingly, as do dwarf gouramis. At best, the surface of the water is spewed with a great many bubbles.

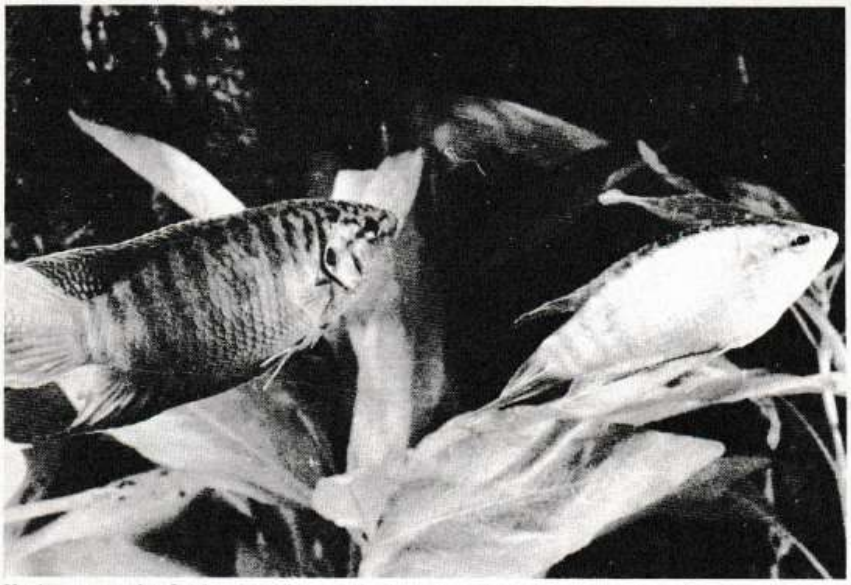
Again and again the female is coaxed into position under the nest. The female now swims with folded fins. This has a meaning: the folded fins indicate a defeat attitude. If the female wants to go up for air (after all, these are labyrinth fish), the male approaches as if to attack her.



Soon after the female is introduced to the breeding tank, the male sees her and begins the chase.

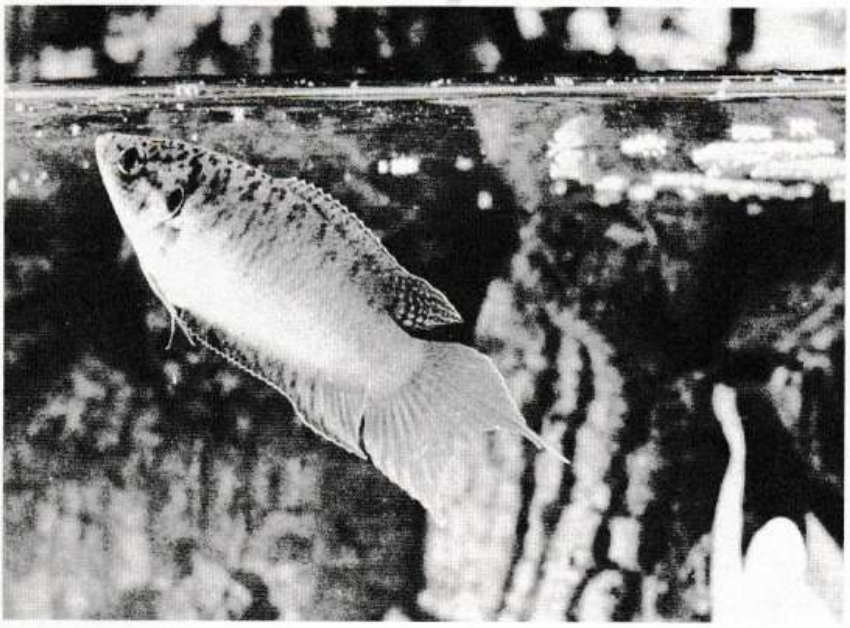
In less than a half-hour, the male has begun his nest.

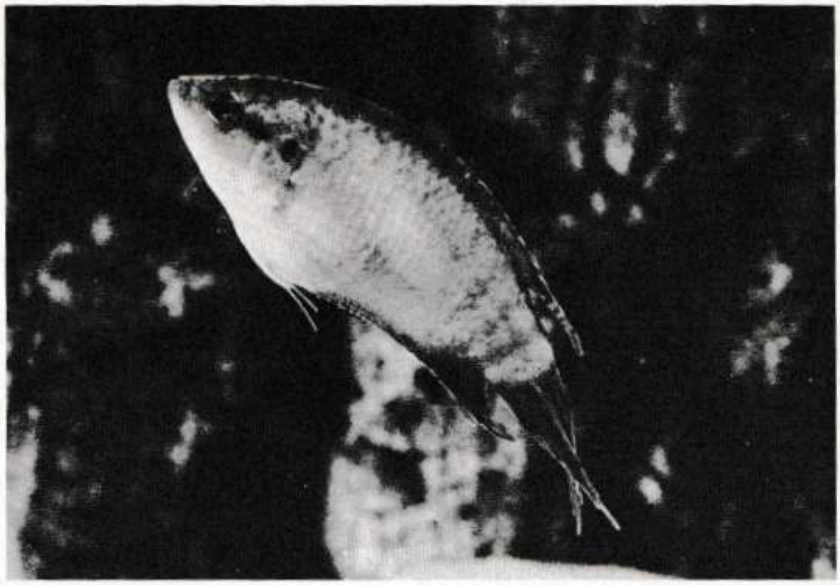




He interrupts the finishing touches on the nest several times and makes an effort to drive the female under it.

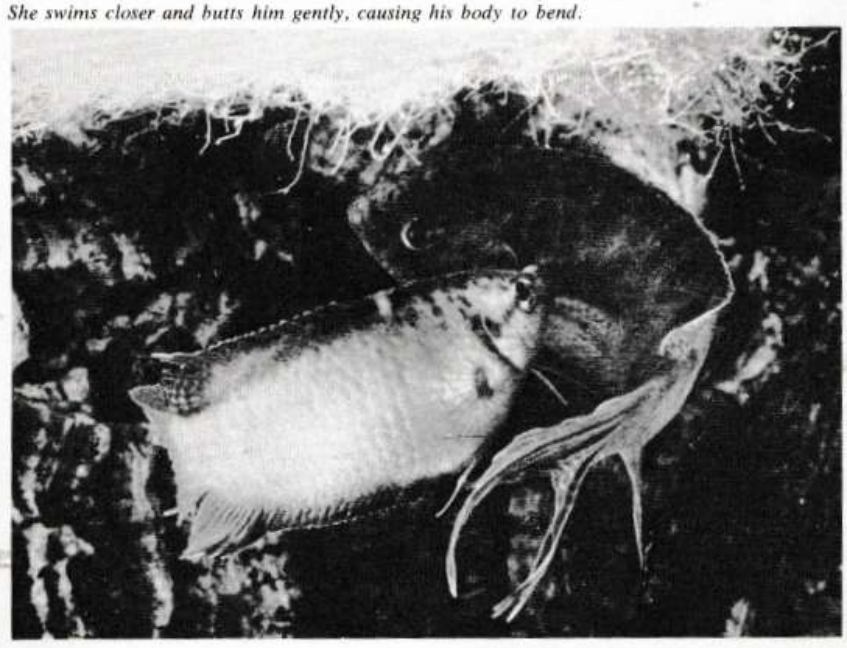
This is the female, under the fringe of the bubblenest with her fins spread normally.





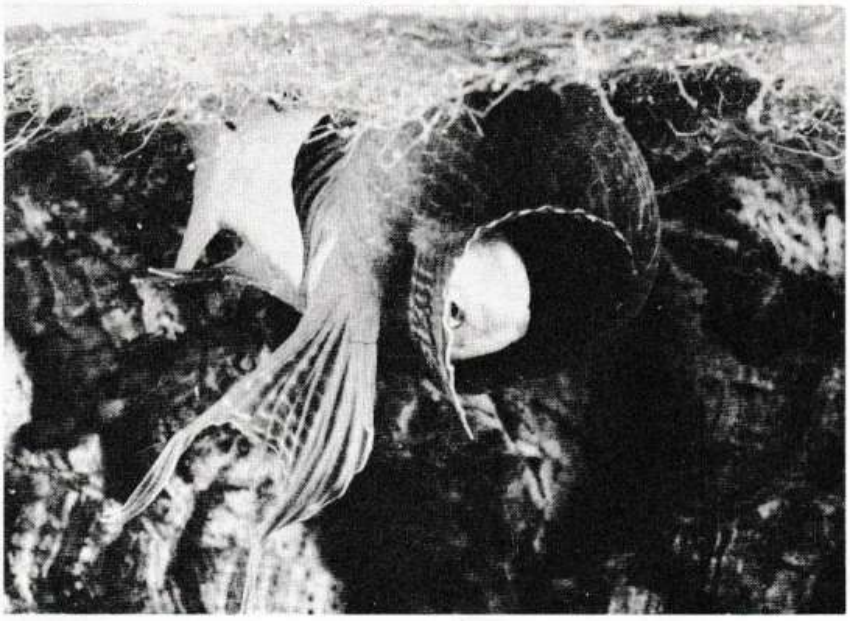
When the female folds her fins and begins swaying her body back and forth, she is in the "submissive" attitude which tells the male she is ready to spawn.

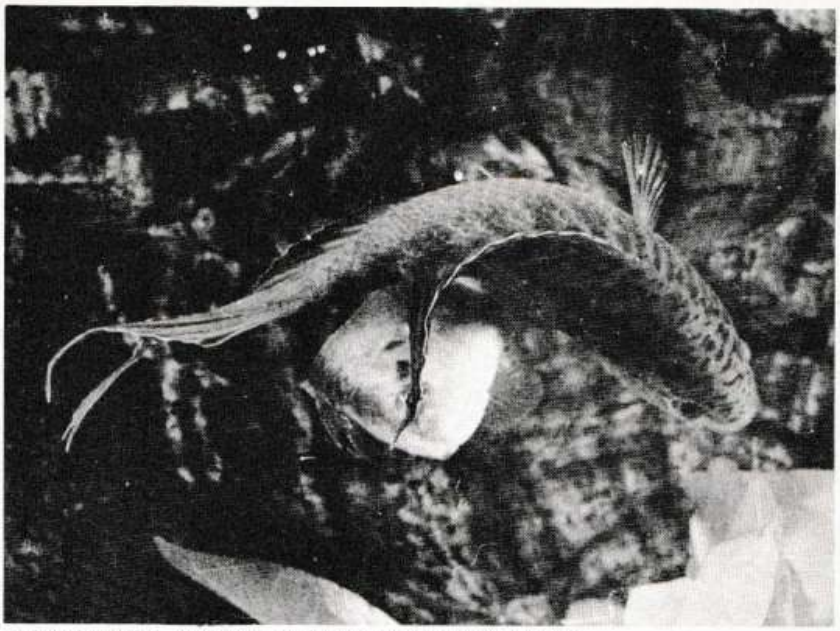
She swims closer and butts him gently, causing his body to bend.



The male wraps his body around the female in the first embrace.

He turns her upside down so that the eggs will stream upward toward the nest above.





As he releases her, some eggs can be seen rising toward the nest.

The male quickly regains his balance and cares for the eggs and nest.

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She must be completely his slave during the mating. She poses with her head up and tail down, shaking her body like the pendulum of a clock. The male then stops attacking, recognizing her readiness to lay eggs. Hesitantly the female takes her place under the bubblenest and butts the male. He bends his body and false matings begin. The fish spin around, but the male is not always the master of the situation and must stop to repair his nest. At last he can complete his embrace, and the female gets turned over on her back. Immediately some eggs float up to the water's surface. Both fish then fall exhausted to the bottom. This procedure is repeated frequently and can last several hours. Several hundred eggs are produced, the exact number depending on the capacity of the female.

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With spawning over, the male takes over the care of the eggs and keeps replenishing the nest with fresh bubbles. The female is no longer permitted to approach the nest. As there is no point in keeping her in the breeding tank any longer, and she steals eggs and eats them occasionally, the female should be removed.

The fry hatch after 24 to 36 hours and after 3 days become freeswimming, at which time they should be immediately provided with tiny live food. Before they become freeswimming, I also remove the male. With good feeding, the youngsters grow to maturity after 6 months.

Can you name them all?

Knowing Your Catfishes —The Metae Group

Dr. Joachim Knaack
Drawings by the author

SINCE THE last scientific work on the Callichthyidae by Gosline (1940) there have been many new species captured, most of which have found their way into Europe. Unfortunately, however, as with other fish groups (especially in the genus *Corydoras* of this family) there has been considerable taxonomic confusion, and we always find that even experienced import firms bring in armored catfishes with incorrect names, some of which would give trouble even to experienced taxonomists. Such errors are detrimental to the hobby in general, because frequently there are no corrections, accurate drawings, or photographs, and incorrect names are repeated when a description of a successful spawning is published. At the present time there are about 70 known species of *Corydoras*, which in some cases have a shaky identity. The treatment so far of these fishes by size, colors, body proportions, skull bones, and finnage is insufficient if one wants to take a fully scientific stance. However, there is a key available which can be used by experienced aquarists and leads to an easy identification of species, although in many cases slight differences within a species cannot be very adequately covered with such a key.

The family Callichthyidae (which contains the *Corydoras*), is being systematically studied. Since these analyses are going to continue a while longer, it seems to be settled that separate groups be treated separately, and such proposals for their grouping and identification be published.

Doubtless the aquarist prefers to recognize a fish principally by its body shape and coloration. When one sees the known species of the *Corydoras* genus and notes their color peculiarities, four species can be distinguished by their longitudinal black stripe as well as the dorsal profile and put into one group—the Metae Group.

1. *Corydoras metae*. This armored catfish was first collected by Eigenmann (1914) in the Rio Meta, Colombia. He named them after their habitat. In the past few years, a number of them have been shipped to the U.S., and Axelrod (1961) gave an account in TROPICAL FISH HOBBYIST of their spawning and the raising of their fry. *C. metae* attains a length of up to 2¼ inches.

2. *Corydoras melini*. This species was described by Lönnberg and Rendahl in

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1930. They gave as the place where they were found, Januaret, in the joining of Rio Papuri with the Rio Uaupes. As with *C. metae* this species has a quite short body, high and laterally compressed. The dorsal profile is at its greatest height at just about the start of the dorsal fin. The length (without the caudal fin) of the specimens chosen for identification was between 32 and 44.5 mm; the snout is also relatively long. Lönnberg and Rendahl compare this species with *C. melanistius* and *C. potaroensis* because of the mask-like black vertical bar through the eye, but it is not compared to *C. metae*, which had been described by Eigenmann. Whether this species had until then found its way alive into Europe is not known. This species was named for Dr. Mellin, who brought along five preserved specimens from the

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3. *Corydoras arcuatus*. This catfish, known to many American hobbyists as the skunk catfish, has achieved great popularity with its unusual black line. The species was first described by Elwin in 1939, giving as the place found Teffé. The author has had success breeding this species. The egglaying act takes place in the same manner described for some of the other *Corydoras* species. One female, depending on her size and nourishment, delivers from 30 to 150 eggs which measure 1.8 to 2.0 mm in diameter, attaching them to plants and root clusters. The skunk catfish is very shy and sensitive to any noise. The standard length of the type is about 1¾ inches, but females can exceed this size. In his identifying work, Elwin refers to their relationship with *C. melini* and separates them according to their differences.

4. *Corydoras myersi*. This species was described by Miranda Ribeiro in 1942. Since then many have been brought into Europe. Pinter (1955) and Frey (1957) have pointed out that *C. myersi* is a syno-

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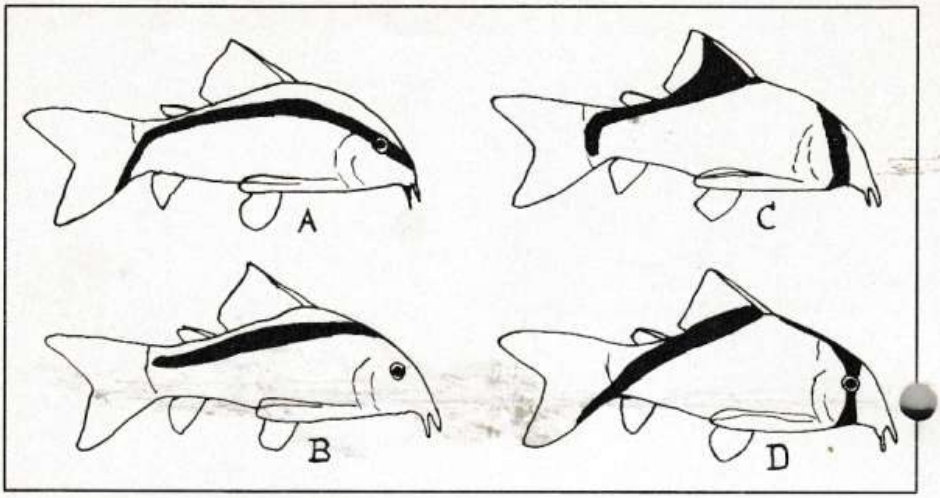


Metae group: *A*-Corydoras arcuatus, *B*-C. myersi, *C*-C. metae, *D*-C. melini.

nym for *C. rabauti* La Monte, but Axelrod and Schultz (1955) have taken drawings of the paratypes and pointed out that there are two species. Sterba (1959) also cites a frequent confusion between the two species. This species attains a length of 2⅜ inches overall. The fish were found in small flowing waters entering the Amazon above the Rio Negro mouth. According to Innes, citing Frey in 1957, there are supposed to be several differences in their breeding habits in comparison to those of *Corydoras paleatus:*

"During their spawning act the male rides on the female's head, after which the pair lie side by side on the bottom; this is evidently when the fertilization of the eggs takes place."

Apart from the ethological differences of this species, I could observe no particular differences from *C. paleatus*, although the pursuing and driving phase is more strongly marked.

Referring to the accompanying sketches should make it easy to distinguish the four species from each other by observing the greatly simplified differences.

Body quite short, high, and laterally compressed. Dorsal fin almost black. The black horizontal stripe runs toward the tail to a point behind the adipose fin and then bends downward along the caudal base. A black bar comes down somewhat diagonally through the eye, not quite extending upward to the dorsal fin . . . *C. metae.*

Only the base of the dorsal fin is marked by the black longitudinal stripe, which does not touch the adipose fin, but turns down steeply to the lower caudal lobe. A black bar sinks almost vertically through the eye . . . *C. melini.*

A streamlined stripe extends under the dorsal line of the body as far as the lower caudal lobe. This stripe begins at the snout and ends in the caudal fin . . . *C. arcuatus.*

An almost straight longitudinal line extends under the dorsal line of the body approximately from the end of the head to the caudal base . . . *C. myersi.*

The species *C. myersi* by no means has a close relationship to the other three species in the Metae Group. Ethological and serological tests as well as hybridizations with members of the Aeneus Group have proven that *C. myersi* is closer, for instance, to *C. eques* than to *C. arcuatus.*

The Banded Knife Fish, Gymnotus carapo

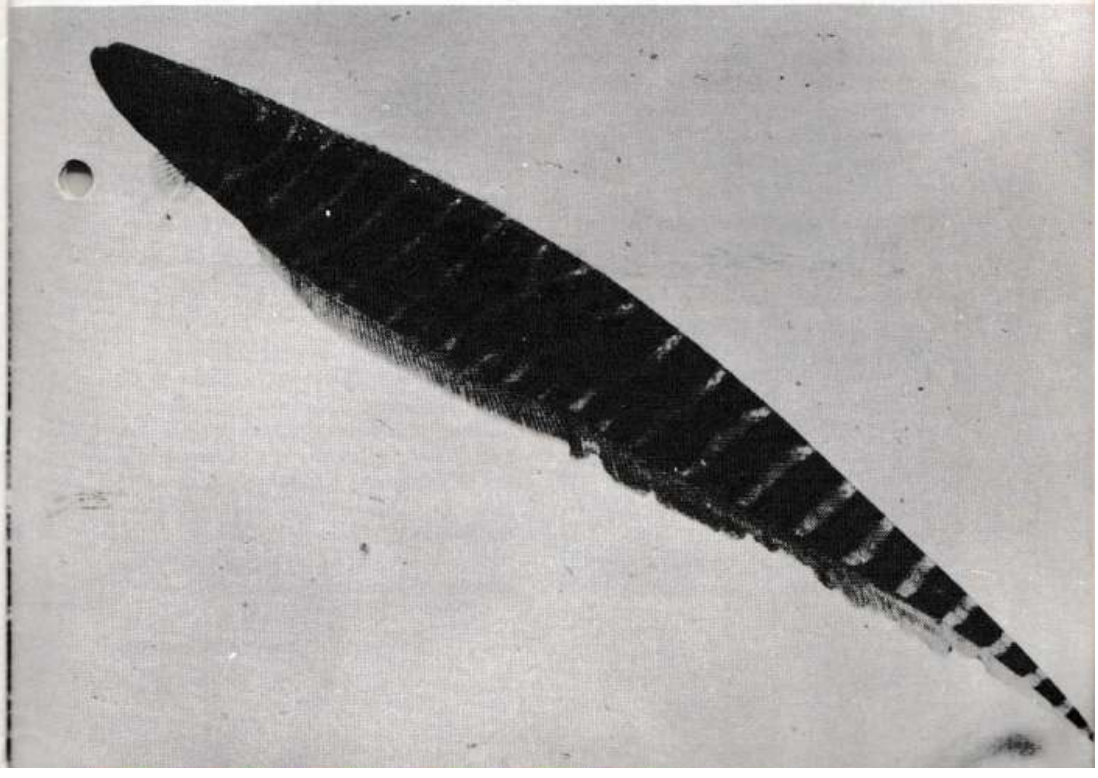
By Braz Walker

WE HAVE A tendency to classify as remarkable things which are unfamiliar to us and those which we cannot understand. With regard to "creatures," this includes those with shapes strange to us and especially those with physical and physiological capabilities so different from ours that we have little in our own experience to compare with them. P. T. Barnum, the greatest showman who ever lived, made a fortune off the fascination which results from the strange and the unusual.

To aquarists there are few groups of fishes possessing all the "odd-ball" characteristics of the group known as the gymnotoid eels. Their long eel-like appearance is deceptive and they are really not eels at all. Their closest relatives are the characins, a group which includes all of our popular tetras as well as the deadly man-eating piranhas. Unlike the characins, gymnotoids are found only in South and Central America, where they inhabit quiet and often muddy waters.

The banded knife fish, *Gymnotus carapo*, was recorded by Linnaeus over 200 years ago. This makes *carapo* one of the first fishes with an "established" scientific name since Linnaeus was the father of our present day system of naming fishes scientifically. This close relative of the famous electric "eel" is no newcomer to

The banded knife fish is an unusual and interesting fish to keep. Photo by Harald Schultz.



the aquarium either having been kept as a pet at least since the early part of the century. The form of the banded knife fish so closely resembles that of a dagger that you feel almost as if you could grip the "handle" (head-end) and either slice a roast with the "blade" (anal fin) or stick him tail first up to the hilt in a mortal enemy. With this streamlined shape and powerfully rippling anal fin the banded knife fish can take off equally well in either direction.

The fact that he can take off head first or tail first and never miss his mark is no accident. The usefulness of the beady little eyes is at best limited and the fact that this creature can navigate through muddy and often weed-choked waters at night and never so much as bump into a stone or an underwater tree root is due to a "radar" system which is probably several million years old and still the envy of modern scientists. As a matter of fact, the U. S. Navy is involved in research concerning some of the members of this family which use similar systems. Not only is the research concerned with how the signal is transmitted but also how it is utilized when received by other electrical fishes or even by the sender (receiving "cebos" of his own signals), and turned into useful information. Amazingly an individual is able to tell his own electrical signals from those of fish even of the same species.

The banded knife fish is one of those tropicals which may be kept in an aquarium that would be much too small for most fishes of his size, since he has an accessory breathing organ and is able to breathe atmospheric air just as the Siamese fighting fish. Feeding this fish is no problem. However, ordinary dried foods are too small even for a small sized specimen. The mouth contains strong teeth and the fact that a 90 mm. (about 3½ inches) *carapo* was found in the stomach of one only 300 mm. (about 12 inches) long indicates that the banded knife fish is capable and willing to swallow a good sized bite. In the stomachs of wild specimens were found several varieties of shrimps and crustaceans and a few fishes but by far the bulk of the food was made up of various types of insect larvae. In captivity large specimens will eat chunks of meat or fish which they can swallow as well as paste foods. Smaller ones prefer brine shrimp or chopped worms but this soon becomes an economic problem when their size increases. However, the fact that they are unparticular and will eat almost anything should not be an excuse to deny them of a diet which is high in protein.

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Let's Take A Trip

By Donald G. Hewitt

"Let's go!" I yelled to the family. "We will never get to Denver if you don't get moving."

Trying to get everything and everybody ready all at one time was quite a chore. I had been transferred to Denver and the object at hand was to load the car up with: three children, one wife, a multitude of clothes, including diapers and last but by no means least, eight gallon jars of tropical fishes!

We all pitched in, in getting ready. While the wife gathered and packed the clothes, I sorted the fishes into groups, putting the ones more hospitable to each other, together in the same group.

Finishing that chore, I gathered up the jars and packed them into a wooden box. Water but no sand was put in the jars, and although I hated to do it too soon ahead of time, I started to add the fishes.

While the wife fixed the lunches, I busily unhooked the air lines to the regular tanks and arranged a pump and a multiple hook-up to eight air-stones in the jugs.

Now it would be a simple matter to move the box of fishes to any location, make one hose connection to the piston pump and plug in the pump. Although the fishes would not have air circulation while we were driving, they would get it when we stopped.

This work went pretty smoothly but I was interrupted occasionally to glare at the kids. The wife was having a little difficulty in getting them dressed.

However, I now had the facilities to pump air to the jars and with the fishes already in them, I now added a small nylon spawning mop to each jar. The mop would give the fishes a little protection from each other, and the shyer fishes would be able to hide.

I gathered up all the other odds and ends I thought I might need, like nets, thermometer, food, etc., while the wife dragged the bags out to the car. I cleaned up, changed clothes quickly and

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put the fishes in the car. I was forced to install them in the trunk as the front was just too crowded.

I had a lid on each jar with the air hose going through it. The hose fit loosely through the hole, so while the water would not splash out, there was still room for some air circulation.

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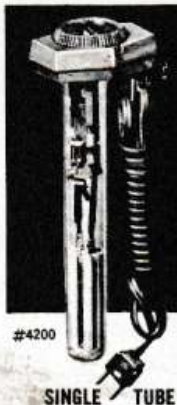
I was hoping for the best, as the jars were obviously overcrowded . . . from two adult firemouths in one jar, to a jar full of assorted babies. I had not fed them the day before and did not intend to feed any except the young on the whole trip. This I hoped would reduce water contamination.

After packing paper around the jars to prevent any chill, and covering the whole works with old clothes, I was ready to go. Of course we had to wait a bit until the wife got dressed. Like a woman, she is always slow about those things and we all had to wait for her.

It was well after midnight when we left, but we finally got going. As I was feeling a little tired, I let the wife drive the first part of the trip.

The trip was nice enough the first day, with little trouble. We would have made better time but made an occasional stop. I figure we made 54 rest-room stops in 18 hours, four refueling stops (rest-rooms weren't used then), 13 stops for: "Dad, let's stop and look at that," and once I stopped just for the heck of it.

The trunk was opened and the fishes checked 72 times!



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We were slightly tired as we pulled up to a motel for the night. Actually, we searched through several of them before I found a motel that had rooms furnished properly so I could set the fish on a table and plug in the air pump. The heat distribution in the room was very important as I didn't want the fishes chilled during the night.

It was an easy matter to move the fishes inside and connect everything up. While the wife unloaded the car and got the kids ready for bed, I adjusted the air valves and checked each jar.

The fishes were doing just fine. After a thoughtful moment I decided to feed the baby fishes and sparingly sprinkled a little dry food on the surface. They took it fine. After fixing a lamp so they could have a little light, I gulped down a hamburger that the wife had ran out and got, then jumped into bed. I was tired!

It took us several days to reach our destination but things went about like the first day. It did get a little tiresome hauling the fishes in and out of motels, but I did it anyway . . . it was just too heavy for the wife.

We didn't lose a fish during the whole trip and it wasn't until we were in Denver that we had a terrible tragedy. Because of the smallness of the temporary quarters, one day I erred in placing the pump next to the jar containing the firemouths.

The heat from the motor warmed the water in that jar to the lethal point and the firemouths died. I was very upset to come home and find out what had happened.

However, other than that, all the other fishes lived, and some are still living today. I guess I didn't mind the loss of the firemouths too much, as I did my best.

After all, a man just can't do everything!

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