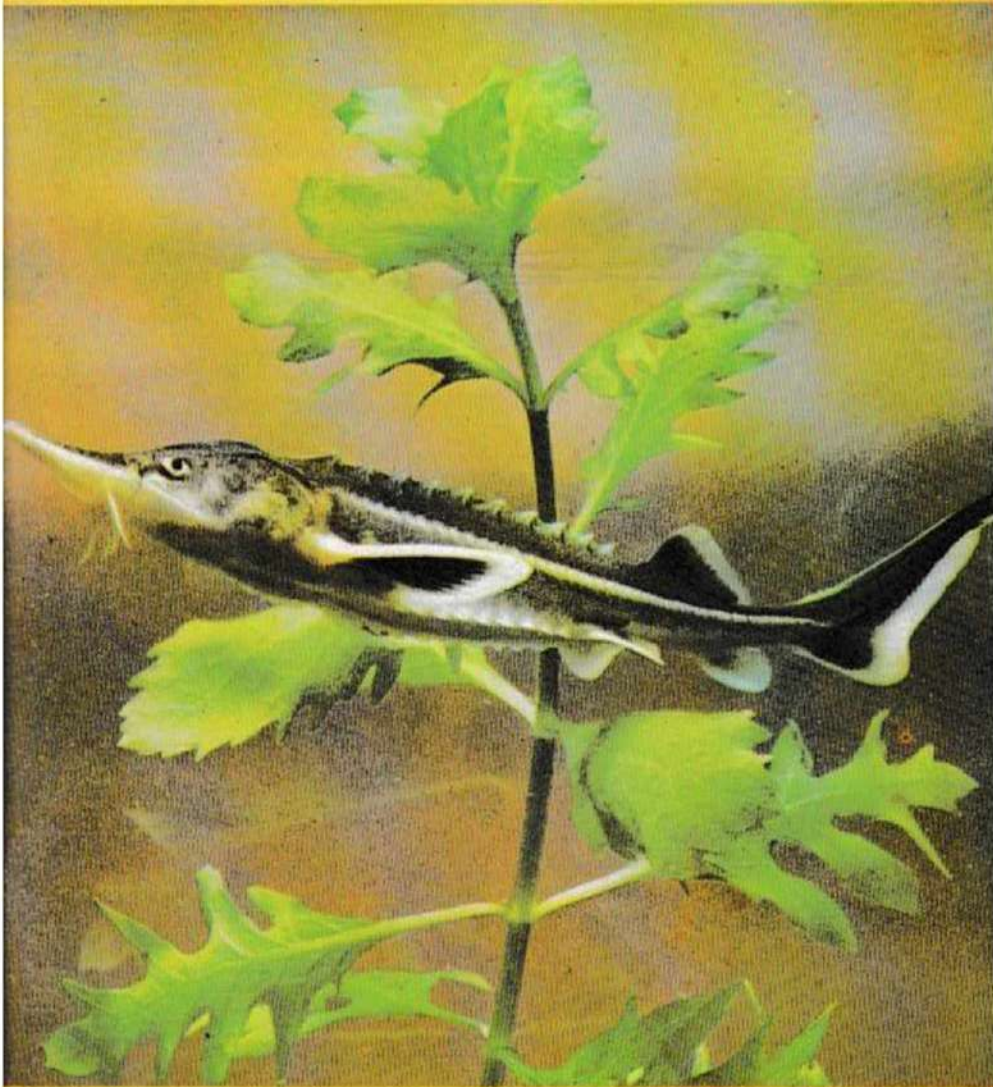


July, 1969

tropical fish hobbyist

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**Hormones and Color Changes
in the Pearl Gourami**

tropical fish hobbyist

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COVER

Dangerous-looking because of its resemblance to the sharks but in reality completely inoffensive is our cover subject for this month, *Acipenser ruthenus*, known to European hobbyists as the sterlet. It's not a good community fish; it's not very colorful, it's almost impossible to obtain a young live specimen (and you wouldn't want to obtain a mature live specimen, since it might be a yard long) . . . but it's also one of the most interesting species in a very interesting family. Read Frederick J. Kerr's article beginning on page 36 and learn why a group usually noted for providing table delicacies can give pleasure in other areas, too. Cover photo by Ieno Kassanyi.

EXOTIC TROPICAL FISHES SUPPLEMENTS

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editorial

I can't think of any other truly popular "hobby" activity that comes even close to the tropical fish hobby in its power to educate. Anyone who becomes interested in tropicals to the degree that his enthusiasm carries him into that happy state of mind wherein he wants . . . almost hungers . . . to know more about fishes and their ways is on a collision course with knowledge. And that knowledge is a real mixed bag of facts and theories covering quite a few seemingly unrelated disciplines.

We probably don't take as much pride as we should in the hobby's power to give valuable lessons in zoology and geography and chemistry and languages . . . and even a little history, among other things. Maybe it's because we, having learned from it ourselves, take the hobby's capacity to teach too much for granted.

Anyway, the tropical fish hobbyist who applies himself to learning about his fishes and their proper husbandry learns a lot more besides . . . so his satisfaction is double, whether he realizes it or not. He may not ever be called upon to use his broadened fund of information, and chances are he'll never be able to translate it into anything concrete in terms of possessions, but it's his, and he has every right to be proud of it.

But perhaps the best part of all is that it's so painlessly acquired; there's no drudgery in learning when you're finding things out because you want to, not because you have to.

Neal Pronek

You wouldn't believe it to look at this marine beauty, but the favorite locale of *Pomacanthus annularis* in its Ceylonese homeland is among the piled-up rubble at the bottom of Colombo harbor.



Pomacanthus annularis. Charlottenlund Aquarium photo.

THE BLUE-STRIPED BEAUTY OF THE INDIAN OCEAN

By Rodney Jonklaas

Ceylon



Two blue kings glance from their cave-like home among the rocky crevices off the coast of Ceylon. Always wary, adult *P. annularis* quickly retreat into inaccessible holes in rocks and coral as soon as they see a collector approaching. Photo by Rodney Jonklaas.

Diving fearfully in the green, murky depths off Ratnagini, south of Bombay on the west coast of India, and expecting the worst, my fears were soon swept away by the sight of familiar spade-shaped, blue-striped beauties, the well-known *Pomacanthus annularis*. The first thing you see is the conspicuous white tail, even in the murkiest water, for these lovely fishes often, or rather, most often, are found in water unsuitable for diving. No other fish boasts such a tail (perhaps it is a come-hither signal to its mate, for the baby *P. annularis* do not have it in their juvenile stages).

Back in Bombay, I saw the export tanks of my friend S. R. Sané, teeming with tiny blue rings, as they are called there (in Ceylon and Singapore they are called blue kings). Sané told me the local fishermen collect dozens in tide-pools and bring them to him—but only the tiny ones from 1/2" to 1" and seldom larger. At this stage they are exquisitely marked in blue over a black



The Koran angel fish, *Pomacanthus semicirculatus*, is another Ceylonese beauty eagerly sought after by collectors. The color and pattern of markings of adults of this species contrast greatly with those of young specimens. Photo by H. Hansen.

background, with no white whatever. Unfortunately, they are also very delicate, and many casualties result.

Once while I was diving on a photographic assignment off Trengganu, on the South China Sea coast of Malaysia, I swam out to a rather bleak rocky islet close to the lovely guest-house on the beach, and the first fishes I saw in the not-too-clear water were these same blue-striped beauties. In fact, the first fish I collected in this part of the world was a blue king. I got him by hand, a 7-inch beauty in adult coloration, skin-diving in only 15 feet of water off this same island.

Off Ceylon, the blue king is very abundant, but more so on the west coast, especially near Colombo and Negombo, which is very close to where

I live. The blue king is most plentiful in relatively shallow, murky water close to shore in coral or rock reefs and on wrecks. One place which teems with them is the fringing sandstone reef alongside Colombo's marine drive. The Colombo harbor too, is full of them, but mostly monsters in the 2-pound to 4-pound class.

I have also seen blue kings off Mahabalipanam, near Madras, when I swam out in March 1968 to inspect what was said to be the remains of a sunken temple out at sea but turned out to be a teeming reef full of blue kings. Off Kovalam, in Kerala State in southwest India, they are also quite numerous. I saw many in the hubbling, teeming, wooden fish containers of the famous Singapore exporter Harris Teo, of Teo Way Yong and Sons, in Singapore, collected there.

This gorgeous fish is widespread and hardy, for few fishes can survive in the kind of water they live in. It is also quarrelsome in its adult condition and does not tolerate an outsider in its domain. In the deeper, cleaner water

An adult *Pomacanthus semicirculatus*; the markings of the adult Koran angel and juvenile emperor angel, *Pomacanthus imperator*, are very similar, and this has led to much confusion in the identification of these species. Photo by Rodney Jonklaas.



Tropical Fish Hobbyist

off Trincomalee, on the east coast of Ceylon, I find only large mated pairs of blue kings; juveniles are relatively scarce in these parts and are replaced by emperor angels (*Pomacanthus imperator*) and Korans (*Pomacanthus semicirculatus*) which seem to prefer cleaner waters.

The blue king is a curious fish but clever, and in its more suitable sizes (5-7 inches) is most difficult to capture even with the latest ingenious methods. Blue kings of suitable size for collection and export seem to sense their desirability and inhabit the most labyrinthine reefs imaginable so they can rush into caves, crevices, corridors, holes, tunnels . . . anything to avoid an eager collector!

The very tiny ones are found, but never in large numbers, early in the year, on the reefs off Colombo, where daytime net-wielding skindivers often collect them. One memorable year, I think it was 1964, there was an unprecedented crop of baby blue kings and Korans off Colombo reef, Korans in greater proportion as usual. The blue kings were so evident you didn't need to dive under caves and ledges to spot them. They were flitting about on the open reef in hollows and crevices in among sea-urchins, fortunately the non-poisonous species one can safely hold by hand.

The diving-collectors swept in on this bonanza and I remember clearly that season the price of baby Korans did a steep nose-dive! Later on, I had to raise the price myself and the European and American buyers didn't like it one bit. The baby blue kings were collected at the rate of 10-15 per morning by even the novice breath-holding collectors, and Korans were captured at the rate of 50-60 per day! One week I had a stock of 175 Korans and 48 blue kings for shipment to an astounded and delighted Frankfurt customer who has never again had it so good.

The demand is, of course, for small blue kings in adult coloration—the most difficult of all to get. The only surefire collecting area is Colombo harbor and at night, in not-too-clear water and in amongst junk and debris of not very pleasant nature. Oddly enough, this is also a splendid spot to collect that very delicate beauty, the Moorish idol. How the Moorish idol thrives in these conditions yet proves to be about the most delicate of marine fishes in the fussed-over and expensive conditions of an aquarium baffles me.

At night the baby blue kings in the 4-inch to 8-inch size lurk in among clams, barnacles and boulders along the breakwater. Using a waterproof flashlight, I dive for them on dark nights (in bright moonlight they are watchful and dash away, like most other diurnal fishes), and even on a really good night I can not get more than six. By day they are much too fast and nippy, and I find it a sheer waste of time, energy and precious compressed air (using SCUBA) to collect blue kings.

The blue kings go into tanks of suitable size, one per tank. Tankmates can be triggers, groupers, lionfish, *Dascyllus* or *Amphiprion* species, but



An adult *Pomacanthus imperator* in its rocky fortress home. Photo by Rodney Jonklaas.

never any other angelfish or *Chaetodon*, *Heniocetus* or even batfish. I prefer to keep a blue king in solitary until he is shipped. He speedily gets tame and eats almost anything, not being finicky like the idols or butterflies. In fact, I have seen many a blue king on the market slab for being too fond of an angler's preferred bait. The blue king can be eaten and many people here do eat it, but only a cad would deliberately kill one, much less spear it for the pot!

One thing's for sure; the blue king is going to be with us, in the tropical marine aquarium world, for many, many years to come. There are no signs of any diminution in their ranks off Ceylon, whereas the once-plentiful emperor is now getting scarcer by virtue of its being so much easier to catch and not so prolific and adaptable to spartan conditions as the blue king.



Bettaphile

Frederick J. Kerr

Community Aquarium

Q. I have a male betta which always stays on the surface among the plants. He never comes out except to eat. He is in a 10-gallon community aquarium.

Joseph Brophy,
West New York, New Jersey

A. Male bettas are not good community aquarium fish. Nearly any collection will include species which either find the betta's fins delectable or species which have fins which the betta considers edible. If the betta's fins have been nipped by tetras or barbs, he might take to the top plants to keep away from his tormentors. Full-grown male bettas additionally tend to be slower than other fish and to miss out on their fair share of food.

Swim Bladder Trouble

Q. I have a purple betta. Whenever he tries to swim to the bottom of the aquarium, he struggles about halfway down and then pops to the surface like a cork. What is wrong?

David Teegarden,
Kansas City, Missouri

A. Your betta has an over-inflated air bladder. This, as well as an under-inflated air bladder, is most often caused by chilling. I don't know of a cure, but putting the fish in a very shallow container with just enough water to cover the fish for several days will sometimes do the trick.

Iridescent Cambodias

Q. I once had a female betta that was almost white or flesh colored, but whose fins and tail shone with a very faint blue when the light shone on them from the right angle. I am interested in this particular strain and I would appreciate it if you could put me in contact with some of your readers who might raise them.

Melvin D. Meek,
400 N. 37th Avenue,
Hattiesburg, Mississippi 39401

A. Your description sounds very much like a female of a strain which Gulf Fish Farms calls the violet Cambodia. The males are much more darkly colored than the females, appearing almost robin's egg blue. Your article is being published so that any breeders of this strain might contact you.

Betta Deaths

Q. My problem is keeping male bettas for more than three to ten weeks. I have just lost a beautiful lavender male, the seventh to die. I obtained my bettas from various sources, so the problem must be me. They lose their appetite, get sluggish, the fins become ragged and then they die. I have eleven tanks and over 700 fish, but the bettas are the only ones that give me this problem. I have tried them in individual bowls at room temperature, in community aquariums at 73 to 83 degrees. I feed very lightly 6 to 8 times a day.

Mrs. Rudolph T. Ott,
Downey, California

A. In individual bowls at room temperature, your bettas would be too cold. The community aquarium is never a good place for a male betta. Try individual



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Tropical Fish Hobbyist

3-gallon aquariums, perhaps partitioned to keep two males or a pair, with a temperature of 80 to 88 degrees.

Tail Rot

Q. I recently purchased a male betta from a shop in my area. I built my own betta tank of all glass and he was the best entry. After he was in the tank for three days he developed what I think was tail rot or a deficiency. I fed him nothing but frozen brine shrimp. That didn't help. He got worse and died. I am going to purchase six bettas for my new tank; how can I prevent this from happening again?

Rick Willis,
Plymouth, Michigan

A. Sterilize your aquarium with a strong salt solution or rubbing alcohol. Buy your fish only from reliable dealers. Brine shrimp is a food, not a medication. Formaldehyde and quinine sulfate are both effective against certain kinds of fin rot.

Split Tail

Q. We have a betta whose tail fin is split quite badly; his anal fin has two small holes and is split as well. My neighbor says there is a disease called split tail. Is there any way of curing this disease?

Mr. and Mrs. Jack Kienholz,
Libby, Missouri

A. In the first place you should be sure you have a disease before you attempt to cure it. Some strains of bettas have deeply indented fins and even holes. One of these bettas is used to illustrate the cover of Exotic Tropical Fishes. If the splits are the result of injury, they will heal in a few days. Guppy breeders are sometimes troubled with split fins, and they attribute it to everything from genetics to pH and crowding.

Female Nests

Q. My female betta was placed in a 5-gallon aquarium alone after an unsuccessful spawning attempt. The next day I found a bubble nest in the

aquarium. Have you ever known a female to blow a bubble nest?

Elliot R. Storm,
Bronx, New York

A. You do not mention the size of the nest. I have seen females produce very small nests the size of a dime. There is really very little difference between the behavior of the female betta and the behavior of the male betta. The difference is always one of degree, not of kind. Females simply fight less and build smaller nests than males. They are also less efficient at gathering eggs and tending nests, but they do these things too. There are even records of two females spawning and putting the eggs in the nest.

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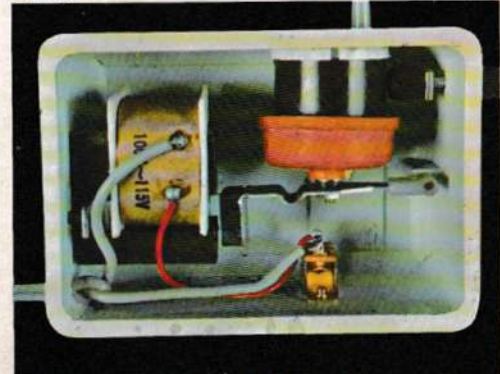
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Hormones and Color Changes in the Pearl Gourami*

BY DARRELL D. HALL

When one considers the fact that breeding habits are well-known or partially documented for only about 300 of approximately 20,000 living species of fishes, it becomes readily apparent that there is an enormous void in our knowledge of reproduction in fishes. Much of the information that is available has been provided by aquarists and fish-culturists, and most of the information deals with breeding habits of common aquarium fishes such as characins, cyprinids, poeciliids, cichlids, and anabantids. After embarking on this research about five years ago it soon became obvious that some members of even these popular and colorful groups have been poorly studied.

The anabantids are favorites of many aquarists, ichthyologists, and ethologists (students of animal behavior) because of their small size, hardiness, and ability to breed in small aquaria. These air-breathing natives of Southeast Asia, Africa, and China also show remarkable color, body-marking, and morphological changes with the onset of the breeding season. Many species are brilliantly colored, which enhances their appeal for fish fanciers. Add to this their vigorous courtship displays, construction of a bubble-nest (by most anabantid species), and utilization of a "nuptial embrace" or spawning clasp and one has a group that is ideally suited for many purposes.

The pearl gourami, *Trichogaster leeri* (Bleeker), is one of the most popular, most colorful, and most readily available anabantids, hence its selection for this study. Both sexes show pronounced color, body-marking, morphological, and behavioral changes during the breeding season. Various workers have examined, reported, and speculated on some of the possible biological implications of these changes, but the functions of many of them are still poorly understood. They are, however, useful guides in determining reproductive condition and motivational states of the sexual partners. The major changes in color patterns, morphology, and body-markings in the pearl gourami are shown in Fig. 1. The following numbers correspond to numbers in Fig. 1.

*This study was supported by a grant from the TFH fund administered by the Smithsonian Institution.



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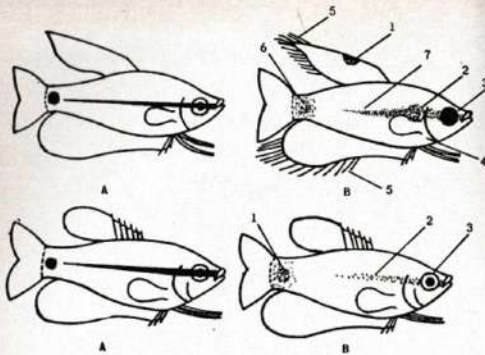


Figure 1. Structural, color, and body marking changes in *T. leeri*, male (top) and female (below). A: non-breeding; B: breeding.

Male

1. Dorsal Fin Spot. Some, but not all, breeding males develop a small orange spot (or spots) in the posterior soft-rayed portion of the dorsal fin. The functional significance of this characteristic has not been determined.

2. Post-Opercular Spot. The formation of a dark post-opercular spot is characteristic of breeding males. It is not a remnant of the horizontal band, because the horizontal band is still present, although somewhat diffuse. Also, the diameter of the spot is usually greater than the width of the original band. The functional significance of this body marking is unknown. The spot does not appear to serve as a target for the repetitive female courtship butting, as some have reported.

3. Eye Color. The eye of a breeding male becomes uniformly dark at the time of spawning, in contrast to the gray eye, traversed by a dark horizontal band, observed in nonbreeding males. This is one of the most reliable indicators of spawning readiness in males of this species, yet is not present in all.

4. Ventral Coloration. Most breeding males acquire a deep yellow or orange coloration on the ventral surface, especially on the throat, breast,

and pelvic fins. The intensity of coloration, however, varies in and among individuals.

5. Dorsal and Anal Fin Extensions. Filamentous extensions of the soft rays of the dorsal and anal fins are characteristic of breeding males. These extensions become broken and disappear at or near the end of the spawning season. The growth of these extensions is presumably related to the general increase in rate of mitosis (cell division) associated with increased male hormone levels during the breeding season.

6. Caudal Spot. The caudal spot also changes in form and intensity at the time of spawning, but these are less marked than most other changes. The well-defined somewhat circular caudal spot of non-breeding males blends with the melanophore network of the caudal peduncle and becomes diffuse and much less distinct.

7. Horizontal Band. In breeding males the horizontal band blends with the network formed by the body melanophore system and usually becomes diffuse and somewhat shortened. Instead of extending almost to the caudal spot it may extend only one-half to two-thirds the original length. The horizontal band does not appear to serve as a target for female courtship butting. Most female courtship butts in this species are directed at the base of the male's anal fin, sides, and the base of the dorsal fin.

Female

Non-breeding pearl gourami females are marked much like non-breeding males (Fig. 2). Breeding females may acquire some yellow coloration ventrally, but usually not the intense gold and reddish-orange colors characteristic of breeding males.

1. Caudal Spot. Diffusion of the caudal spot is usually more pronounced in breeding females than in breeding males, and in some cases no remnant can be seen. This marking usually disappears during or shortly before the onset of a spawning sequence but it normally begins to reappear at or near the end of the sequence and remains quite distinct until the onset of the next spawning sequence. Loss of the caudal spot is one of the best indicators of female readiness to spawn.

2. Horizontal Band. The horizontal band usually disappears completely during spawning and reappears at or near the end of the spawning sequence. The body color usually becomes uniformly pale, with vague reticulations.

3. Eye Color. One of the most striking color changes in females is the change in eye color associated with spawning. With few exceptions, the female's eye becomes uniformly light, with no trace of the original horizontal band, whereas the eye of the male becomes uniformly dark.



Figure 2



Figure 3



Figure 4

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Discussion

Contrary to reports by other workers, observations made during this study strongly suggest that body-markings, color, and body configuration are all highly important stimulus sources for sex and species recognition in the pearl gourami. Coloration in fishes is influenced by a number of factors such as: diet, neural and hormonal factors, water temperature, water quality, genetic differences, etc. It cannot be assumed, therefore, that the changes described herein will be observed in all populations or all individuals of *T. leeri*, but in general this report provides a basis for determining the degree of variation from the norm.

In an attempt to discover the factor (or factors) which "turn-on" and "turn-off" these changes in both sexes, we have initiated a research program in our laboratory utilizing hormone injections and other treatments to determine possible methods for controlling reproduction and/or color changes in the pearl gourami and other fishes.

To establish the norm and set the stage for the results of some of our studies let us examine normal, untreated sexually mature pearl gouramis. A pair of sexually mature but non-breeding individuals is shown in Fig. 2. They show the typical non-breeding coloration and body marking pattern of this species. A marked difference can be seen in comparison of the male in Fig. 2 with the male of Fig. 3. Fig. 4 shows a male in a somewhat intermediate reproductive condition; i.e., he shows dorsal and anal fin extensions, an orange spot in the dorsal fin, and an almost completely dark eye, but the deep orange ventral coloration and dark post-opercular spot (both typical of breeding males) are lacking. The female in Fig. 4 is almost completely hidden from view by the exaggerated lateral spread display of the male.

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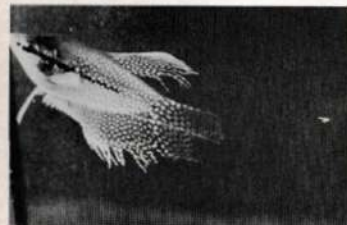


Figure 5

EXPERIMENTAL RESULTS

Methyl Testosterone. A group of 11 sub-adult pearl gouramis containing members of both sexes was treated with .006 parts per 1000 methyl testosterone (a male sex hormone) suspended in aquarium water. Dorsal and anal fin extensions appeared in 5 fish within 60 hours. All showed well-developed fin extensions within 7 days. Much to our surprise, after 4 weeks in the tank all 11 fish developed deeply forked caudal fins with filamentous extensions projecting from both the upper and lower lobes (Fig. 5). The presence of elongate caudal fin extensions heretofore has not been reported for untreated breeding pearl gourami males or females. Whereas fin extensions, characteristic of untreated breeding males, usually begin to break off after approximately 4 weeks, methyl testosterone-treated fish had well-developed fin extensions after 3 months in the methyl testosterone aquarium water.

This phase of our research indicates that female pearl gouramis have a latent capacity for growth of fin extensions. Presumably, fin extensions do not normally appear in females because of the suppressing effect of ovarian



Figure 6

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hormones or other control mechanisms. The appearance of a "spiked" caudal fin was completely unexpected. Examination of normal males in Figs. 2, 3, and 4 shows that none have caudal fin "spikes." Apparently, the ability to form caudal fin "spikes" is also a latent capability of both males and females of this species.

A word of caution should be added for those contemplating use of methyl testosterone for similar studies with fish: groups treated with .01 parts per 1000 and .02 parts per 1000 methyl testosterone in aquarium water either died or were in distress within 4 hours. The suspension of hormone in the water may have clogged the gills, thus preventing adequate respiration. Of the few survivors that were removed and placed in normal aerated water, all quickly recovered.

Testosterone Propionate. Sexually mature but non-breeding male and female pearl gouramis were given intraperitoneal injections of 12 µg testosterone propionate in .05 ml sesame oil (an inert hormone-carrier). By the third day after the initial injection, 7 of the 11 fish in this group showed short dorsal and anal fin extensions. After 10 days all fish in this group showed well-developed dorsal and anal fin extensions as well as "caudal spikes." These fin extensions persisted 4 weeks. After 6 weeks only 6 fish retained ragged and poorly-formed fin extensions. This phase of our research indicates that either external application (via aquarium water) or injections of male sex hormone can induce the development of fin extensions in both sexes in *T. leeri*.

Workers have found that in the swordtail, *Xiphophorus helleri*, elongation of the caudal fin and pointed pelvic fins is dependent on testosterone. Castration results in degeneration of these structures. Moreover, a female of this species given doses of testosterone will develop the elongate caudal fin and pointed pelvic fins. The adult male of a minnow (*Hyborhynchus* sp.) develops nuptial tubercles on the head during breeding season. Testosterone propionate injections induce the formation of tubercles in nonbreeding males and females. These studies agree well with our observations on the effects of male hormone on the secondary sex characteristics of the pearl gourami.

Sodium Chloride (NaCl). One of the most surprising discoveries during this study was purely accidental. While treating a small group of diseased pearl gouramis with sodium chloride (as a fungicidal-bactericidal agent) fin extensions were formed. Of a second group of 11 non-diseased fish treated with sodium chloride, at a concentration of 4 parts per 1000 dissolved in aquarium water, 6 developed short fin extensions within 3 days. All fish in this group showed fin extensions within 7 days. These extensions were not as long as those of methyl testosterone-treated or testosterone propionate-treated fish. Fin extensions began to break off after 3-4 weeks of treatment. Sodium chloride at 2 parts/1000 did not cause fin extension growth. Several

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"explanations" are possible for this phenomenon. Sodium chloride may have stimulated the mitotically-active cells of the fins, thus causing growth, or perhaps the increased salinity created an internal stress situation to which the adrenal glands reacted by secreting male hormones. It has been known for some time that the adrenals secrete sizable quantities of both male and female sex hormones. Furthermore, if fin growth is not male sex hormone-specific, corticosteroid hormones (chemically similar and also produced by the adrenals) may have caused fin growth.

Adrenalin. Adrenalin chloride at a concentration of 1:1000 was used on a mixed group of 10 large juvenile and adult pearl gouramis. Extreme paling was noted within 3 minutes following injection. A very definite pattern of paling was evident, with the dark horizontal lateral band quickly disappearing, followed by progressive paling upward and downward on the sides. The head region was affected last. The eyes eventually became very light, with no trace of the dark band through the eye (Fig. 6). Adrenalin injection thus produces a pale color pattern characteristic of breeding females (see Fig. 1). Lower concentrations of adrenalin did not cause paling.

In summary, our studies have shown that testosterone propionate, methyl testosterone, and sodium chloride can induce growth of filamentous fin extensions in non-breeding male and female pearl gouramis. Females are potentially capable of forming fin extensions, but this response is apparently normally suppressed by ovarian hormones or lack of sufficient male hormone. Males apparently produce sufficient hormone during breeding season to maintain secondary sex characteristics, but at no other time of year. This is evidenced by the absence of fin extensions in non-breeding males. Adrenalin injection produces a color pattern comparable to that observed in untreated breeding females, thus suggesting that in "excited" breeding females adrenalin may be at least partially responsible for paling.

The foregoing report has been a somewhat brief and sketchy review of one facet of our research. Other studies which have revealed other hormone effects in the pearl gourami have been completed or are in progress. Controls were used for all of the work reported herein, and we feel that the results are quite significant. We feel that we are fast approaching the point where we can "turn on" and "turn off" some of the color, bodymarking, and morphological changes in the pearl gourami.

Read it next month in TROPICAL FISH HOBBYIST . . .

The Amazon Molly, *Poecilia formosa*, and Its Peculiar Mode of Reproduction

BY KLAUS D. KALLMAN

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A Pike in the Community Tank?

All of the members of the pike family (Esocidae) have well-toothed jaws capable of grasping and holding their prey firmly; the jaws themselves open very wide, allowing the esocids to swallow food that at first glance would appear too large for their mouths. For many unfortunate fishes and amphibians, the glare of that baleful eye is the last thing they ever see. Photo by Gerhard Marcuse.

by R. Bruce Gebhardt

The pike family contains some of America's leading game fish: the muskellunge, the northern pike and the eastern chain pickerel. This last is our subject, but the others would probably behave similarly in an aquarium, as other pickerel species do. In nature, and probably in the aquarium, the pikes require more oxygen and cooler, cleaner water.

Esox niger, the eastern chain pickerel, is found primarily in weed beds in quiet waters from eastern Canada around the seaboard states and tributary systems, all the way to Texas. Regional variations occur, and pickerel have been introduced elsewhere. Individual pickerel may like acid water, but as a species they are not particular. Deep lakes promote their best growth, and angling records, around 2½-3 feet and 10 lbs., come from Maine, southern New Jersey and Georgia. Because this fish is virtually a muscle-coated alimentary tube, a pickerel of respectable length may weigh less than a panfish.

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Its pattern is giraffe-like reticulations; green blotches in a light-colored "chain" matrix, shading to light on the belly. The back is brown with light cross-bars, giving the fish the appearance of a floating log when seen from above. Sometimes there is an attractive yellow flush on larger specimens, probably a seasonal sexual distinction.

E. niger is quite elongated, with the dorsal fin set far back over the anal. The tail is large and very powerful. The pectorals are constantly fanning ominously when the fish is at rest. The fins are clear with maroon margins. The head is alligator-like, with bulbous, protruding, amber eyes. The mouth is amazingly expandable, to a greater diameter than that of the fish itself.

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Colorful and super-streamlined, the eastern chain pickerel is striking in a display tank. And if the piranha is kept for its sinister effect, the pickerel is certainly worth considering.

When swamps and low meadows are flooded after the snow melts, spawning occurs. One female may produce 50,000 eggs or more. Many fry never emerge, and others are trapped by receding waters.

If it survives this far, the fingernail-sized fry begins stuffing itself with small crustaceans and the like and hiding in dense weeds at the margins. Growth is remarkably swift, 5 to 9 inches in the first year; tank specimens are not far behind. But in nature, during this year, insects and small fish take a huge toll. There is probably some cannibalism. I should know this, but whenever I had specimens of divergent sizes, I was too absorbed in raising them. Pike, however, are known to be cannibals. Since they are preyed on, and compete for food with other species, pickerel are seldom really numerous. Eventually, pickerel pay back sunfish and perch for their depredations by eating them in turn, along with frogs, swimming rodents, and low-flying swallows!

Pickerel aren't very active. They hide in weeds and dart out at passing fish with incredible speed. This style of life suits them defensively as well. Hard to see, they freeze until the last moment when approached. Once, in fact, after wading half-heartedly towards one without a net, I was able to simply pick it up gently in both hands. I had expected it to shoot away rapidly.

Capturing them is likely to be restricted by state laws. However, several species never reach game size: point this out to your friendly neighborhood warden.

Once this is taken care of, pushing a minnow seine through dense weeds may be successful. Pickerel may be hunted down on sight, too, and a partner and a seine net are best for this. Just angling is okay, but beware of legal minima.

They do not carry well, so use roomy containers if possible. Plants pacify them somewhat and minimize their thrashing about.

Where do you put them? Despite the growth rate cited above, their life-style is similar to the panchax family, to which they are supposedly related. And, just as panchax seem comfortable in small containers, the pickerel's demands do not seem excessive. I kept two 9-inchers in a 20-gallon-low tank; babies take to a panchax tank. Still, pickerel never seem to get the hang of stopping before they hit the glass (with a resounding slap sufficient to wake the sleeper, if not the dead). Watch out for mouth fungus as a result. Perhaps this habit of theirs argues for a bigger tank, but I doubt it. I've seen the fungus problem develop with much smaller *Belonesox* and other pike-like tropicals. The basic problem with pickerel is that they're

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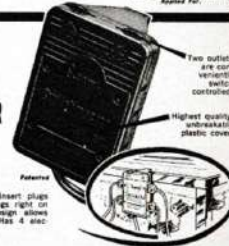
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The Sterlet

by Frederick J. Kerr

There is always an active interest in cold-water fishes in the aquarium hobby. European aquarists are perhaps more interested in native fishes than are American aquarists, and one of the fishes they prize highly is the sterlet, *Acipenser ruthenus*.

The sterlet is a member of the primitive family Acipenseridae, commonly called the sturgeons. It is in many ways a remarkable group of fishes. They have been a recognizable group for more than 200 million years. At present there are about 25 species found in North America, which has nine species, and Europe. Anatomically, the sturgeons are unusual and striking fishes. Although the sterlet grows only to about three feet in length, as a group the sturgeons tend to be much larger. The largest North American species is *Acipenser transmontanus*, which may attain weights over 1200 pounds. Even this is small compared to *Huso huso* of the Caspian and Black Seas, which reaches reported lengths over 25 feet and weights approaching 2900 pounds.

Size is not the only thing that makes the sturgeons notable. Their skin is naked except for three or five rows of large bony scutes found along the back and sides. The snout of the sturgeon is long and pointed, with the mouth located on the underside. The mouth is protrusible to a remarkable degree, forming an impressive tube-like structure when it is extended. In front of the mouth are four barbels which in some species, including *Acipenser ruthenus*, are fringed. These sensitive organs are used by the fish to locate snails and crustaceans on the bottom.

Internally the sturgeons are just as remarkable. There are two features which are especially interesting. The backbone does not have complete vertebrae, as is found in more highly evolved fishes. It also continues into the upper lobe of the tail fin, forming the upper edge of that lobe. In nearly all cases the upper lobe of the sturgeon's tail is significantly longer than the lower, giving the fish a shark-like appearance. The other internal feature which is remarkable is the spiral valve which extends the length of the



Odd but graceful, the sturgeons are among the most primitive of all fresh-water fishes. Photo by Jeno Kassanyi.



Young sterlet, *Acipenser ruthenus*. Photo by Jenő Kassanyi.

intestine, increasing the absorptive surface. The sturgeon shares this feature with the sharks, paddlefishes and bichirs.

Although adult sturgeon of even the smallest species are not suitable for the home aquarium, young specimens may be kept. European aquarists prize the sterlet for the extreme grace of its never-ceasing movements. The fish is modestly colored brownish to grayish above and whitish to yellowish below. Young fish are fed tubifex, snails and small crustaceans. The aquarium is prepared with soft, fine sand rather than gravel, as gravel tends to injure the sensitive mouth.

American aquarists may be able to acquire small sturgeon of various species in local rivers and lakes. Aquarists living along the Pacific coast might consider *Acipenser medirostris*, which reaches a length of less than three feet. Aquarists near the Atlantic coast are most likely to be successful with *A. brevirostris*, which generally does not exceed two feet in length. Aquarists near the Great Lakes might try *A. fulvescens*, although adult lengths of over seven feet have been reported for this species. In all cases the temperature of the aquarium should not be allowed to exceed 65 degrees.



The sturgeon's whiskers are very useful in locating the food, mostly small bottom-dwelling animals that it lives on, since its eyesight is very poor. As soon as the whiskers locate food the mouth shoots down and sucks up whatever has been found. Photo by Jenő Kassanyi.



Daphnia is one of the natural foods which fishes eat in nature. Sometimes live daphnia is available from your pet shop. Most of the time it isn't, for the daphnia season is usually a short one. Frozen daphnia is usually 95% water and 5% daphnia. **MIRACLE FREEZE-DRIED DAPHNIA** is just the opposite. It's 5% water and 95% daphnia. We freeze-dried it so gently by our patented process (U.S. patent numbers 3,361,114 and 3,361,566) that many of our test customers told us the eggs in the daphnia hatched and they found live daphnia in their tanks. Fishes not only attack this food ravenously, but it brings on their color and spawning habits. **MIRACLE FREEZE-DRIED DAPHNIA** is guaranteed to be parasite-free because it is sterilized. There are copies of this food on the market; but they are just copies. Available at pet shops only for 69¢ per plastic vial.

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A photographic record of the spawning of

Nannostomus beckfordi aripirangensis

By Rudolf Zukal



The vividly colored male chases the female through the heavily planted spawning tank. All photos by the author.

On the island of Aripiranga and in the lower Amazon region there is a very colorful small tetra, known as the Aripiranga tetra or Aripiranga pencil fish, which likes to swim in large schools. This is *Nannostomus*



beckfordi aripirangensis; bodily it resembles *N.b. anomalus*, except that it is a bit more robust. It is a lovely sight to see a swarm of these fish, with here and there two males staging a harmless battle.

Although Aripiranga pencil fish are small, only about an inch and a half long, they should not be kept in a too-small tank. They do best in a medium-sized well-planted tank which is heated to 72°F. Water should be clear and not hard. A variety of small, living foods is

Above and facing: closely pursued by the male, the female has exhibited her willingness to spawn and has entered the plant thickets in which the eggs will be deposited. The female's golden longitudinal band is most clearly evident at this time.

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After one spawning clinch during which eggs were released, the male again takes up the chase and pursues the female. Periodic chases and clinches follow until the female is depleted of eggs. The species is not very prolific.

what they require. They are gregarious and peaceful, but very sensitive to temperature changes. It is perhaps best to keep them by themselves in a small school. They have a unique, interesting quivering manner of swimming.

To breed them it is best to use a small or medium-sized tank of 2½ to 5 gallons capacity, 79°F. and a not-too-high water depth, soft water (pH 6.0-6.5). It is very important to maintain a precise



The male drives the female and keeps as close to her as he can during all stages of the chase. Here, fins spread, he quivers beside her.

cleanliness if good results are desired. Spawning is performed in fine-leaved plants. Eggs are laid at intervals, always between one and five at a time. When spawned in single pairs the number of eggs never exceeds 10. Despite the fact that they are not as diligent egg-hunters as *Nannostomus marginatus*, parent *N.b. aripirangensis* should be

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The male guides and directs the female with gentle butts in the mid-section; these nudges seem to play an important part in obtaining her acquiescence to the spawning act.

removed as soon as they have finished spawning. The eggs are sensitive to light, and for this reason the breeding tank should be darkened. After six days the brood becomes free-swimming. They are very small and shy, and look for the darkest places in the tank. Only very fine living foods are accepted at first.

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by paul hahnel

GUPPY corner

Premature babies

Q. I recently bought one female and two male guppies. Within a week after the purchase the female gave birth to five premature babies. Two were born dead and the rest died an hour later. What is the explanation for this?

Doris Meyer,
Mt. Pocono, Pennsylvania

A. Pregnant female guppies will often experience premature birth as a result of being moved from one environment to another, as in the instance of purchasing. I would also advise that when you buy a trio it should be made up of one male and two females rather than the way you outline above.

Hormones

Q. I have Dr. Myron Gordon's book on guppies. In it he suggests the use of

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methyl testosterone to heighten color in female guppies. This is said to make choosing a breeding pair easier. Is this a safe method of selection, and if so where do I get a supply?

Karl Schwarz,
Ozone Park, New York

A. Your druggist might mix you a bottle of methyl testosterone if you show him Dr. Gordon's book and explain what you want it for. A word of caution though:

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Tropical Fish Hobbyist

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Big females

Q. Among my guppies are some females that are 2 1/2" long. I am surprised because none of the others in the strain have ever gotten that big. I started with a normal strain and none of my fish ever measured more than 1 1/2". Are these large females very unusual?

Carol Murphy,
Boston, Massachusetts

A. Your females are not abnormal. They are mirroring the good care you are giving them. Dr. Leon Whitney has described female guppies in Mexico that measured more than three inches.

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Q. Some of my recently purchased fish show a peculiar swimming pattern. They move around with rapid, irregular motions but get nowhere. What causes this and what can I do about it?

Arthur Powers,
Torrance, California

A. Your water may not be properly conditioned or may be very different from what the fish were accustomed to before you got them. It is possible that they are suffering from a chill. It would be best to separate them from your healthy guppies. Raise their water temperature two degrees and await developments.

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salts FROM THE seven seas

BY **ALFRED A. SCHULTZ**



Q. Is it possible to keep other fishes with dwarf sea horses?

Alfred Bushinski, Rockford, Ill.

A. I don't recommend keeping any other fishes with dwarf sea horses, but if you insist, young pipe fishes, Syngnathus thoriidae, can be kept in the same tank. These two fishes are close relatives and their feeding habits are alike.

Q. I understand that the species of clownfishes can live safely among the stinging cells of the sea anemones and that other fishes swimming into these poisonous tentacles would soon be stung to death. Is the reason for this known?

Herbert Levin, Lubbock, Texas

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July, 1969

A. There must certainly be a reason for this strange relationship, but as far as I know it has never been explained. In nature the clown fishes (Amphiprion species) swim in and out of the anemone tentacles, thereby attracting other fish who in turn chase the clown right into the tentacles, where they are promptly poisoned and fed upon by the anemone.

Q. I will be in Florida shortly for a vacation, and I expect to catch some of the small native fishes for my aquarium. I will be flying back to New York. What is the best method of transporting these fishes back home safely?

Mark Redfern, Brooklyn, N.Y.

A. I have taken fishes home by the following method. First I took a number of small plastic bags and into each bag I placed one fish. I carried these bags with me on the plane in two flight bags, which I kept under the seat. While in flight I opened the bags one at a time and resealed them after letting in more air. I opened each bag approximately three times on the 2 1/2-hour flight from Florida to New York. The fishes all arrived safely home with me.

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Tropical Fish Hobbyist

Q. I have kept marine tropical for three years and your column is one of the first things I read every month when I get my issue of the Hobbyist. Would you please answer some questions for me?

1. How do you control water temperature during the warm months? Summers are usually very hot in this section.

2. Should scavengers be used in a marine tank, and if so what kinds are recommended?

**Debbie Pearsall
Ravenna, Ohio**

A. 1. Keeping your tank in an air conditioned room is one way to handle the problem. If this means is not available to you, try increasing the aeration to cool the surface of the water.

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2. The best marine scavenger is the hermit crab. Try getting a small specimen. They make very interesting additions to a tank and will pick up any uneaten food that the fish may have left over.

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MAIL CALL

If you have an aquarium question that you would like answered, send it to MAIL CALL. Each month the most interesting questions received and their answers will be published in this column. Letters containing questions cannot be acknowledged or answered personally. Address all questions to: MAIL CALL, T.F.H. Publications, Inc., 245 Cornelison Avenue, Jersey City, N. J. 07302.

Two Spot Gourami
Q. For graduation this year I received a 10-gallon aquarium. I am handicapped and cannot take care of it myself. My mother has taken on the job of cleaning the filter and feeding the fish faithfully every day. I have a fish that I cannot identify. I have looked through the Encyclopedia of Tropical Fishes and my fish looks most like the three spot gourami, but instead of having two body spots mine has one. Can you tell me what it is?

**Diane Haines,
Camillus, New York**

A. You have found an excellent hobby. One of the foremost authorities on tropical fishes and fish photography is also handicapped. His name is Braz Walker. Your fish is no doubt a three-spot gourami that was short changed. Some strains of this fish have no spots at all.

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Angel Fry
Q. After following all the instructions in an article on breeding angels which appeared in TFH, I have had five spawnings. After putting the free-swimming fry in a large aquarium with water of the same composition as the breeding tank, half of the fry die within a few days. What am I doing wrong?

**Clifford Huebner,
Beloit, Wisconsin**

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A. Putting the fry into a "large tank" is probably the problem. Put the fry into one or more five-gallon aquariums. In a large aquarium the fry find it difficult to locate enough food. This is much easier to provide in a small aquarium than in a large one.

Molly Eggs

Q. My female marble molly had four fry and then she had five yellow objects which I believed to be eggs. They were much larger than egg-layer eggs and grew larger within five minutes. Could you please explain this strange occurrence?

Kim Erickson, Jamestown, New York

A. You are correct in thinking that these are eggs. It could be that they were not fertilized and as a result did not develop. It is not uncommon to find these eggs aboried by livebearers, especially mollies. They will never hatch.

Blue Gularis

Q. I have spawned a pair of blue gularis which had been separated for approximately one year. At the end of ten hours in the spawning tank the pair had dropped approximately 100 eggs, many of which had adhered to each other in clumps of up to twelve eggs.

1. Does the tacky, adhesive substance which forms the outer layer of the eggs provide any protective functions? 2. Would the egg clumps be best left as such when using the pear moss incubation method?

A. L. Betancourt, Oak Harbor, Washington

A. 1. The adhesive substance is in fact composed of large numbers of tiny hairs which catch on anything they come into contact with. This may have some protective value in keeping the egg attached to the substrate.

2. There is no particular value to separating the clumps, but if you wish to, a pair of tweezers would be just the thing. The eggs are comparatively hard-shelled and withstand handling very well.

Tilapia Mossambica

Q. Is there any information you can give me on the care of Haplochromis mossambicus? We were told that it is a mouth-breeder, but I can find no information about it. We have what I believe are two females and a male in a 10-gallon aquarium, and somewhere along the line

we have acquired one baby which is almost half inch long when first noticed. They are the most interesting fish we have. The male looks very black and has a bright red tail several hours daily, and he must move at least seven pounds of gravel every day.

Mrs. Erwin Altmeier, Oshkosh, Wisconsin

A. Part of the reason you cannot find information is that you have the wrong scientific name. The Mozambique mouth-breeder is properly called Tilapia mossambica. Although this fish reaches a



Tilapia mossambica

length of 14 inches, it spawns at about 4 inches, and aquarium specimens generally don't get larger than eight inches. It seems likely that they will soon outgrow your 10-gallon aquarium!

Marine Mosquito Fish

Q. Two years ago while on vacation in North Carolina I found some mosquito fish in a tide pool on a sandy beach. When I came back three days later the pool was filled with sand. Last year I went back to the same spot and again found a pool full of mosquito fish.

1. Where did the fish come from in the first place? 2. How did they get back into the pool after it was filled in?

Truman Eyles, Jr., Gettysburg, Pennsylvania

A. 1. You do not indicate whether the fish were Heterandria formosa or a



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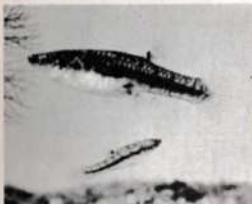
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Heterandria formosa

species of Gambusia, which are both popularly called mosquito fishes. It is also possible that you are referring to a species of Pandulox. In any case the fish doubtlessly came from the sea. All three of these fishes are adaptable to brackish water.

Gambusia affinis



Compliments?

Q. I have purchased Exotic Tropical Fishes in the looseleaf edition. I think you have a very fine book. The pictures and the literature on each fish seems quite interesting, but I feel the book has one serious shortcoming. I feel that the fishes should have been grouped by family. In many cases in the article about a given fish you mention the names of related fishes, but often you do not. This makes it difficult to locate a fish for which the aquarist has no name. I also feel that the index is very inadequate.

Lavonne Ludian, Stateline, Nevada

A. Every fish book, including Exotic, has limitations. When ETF was designed the publishers hoped to overcome one of the great disadvantages of other books in the field. That disadvantage is, of course, that nearly all fish books become obsolete because they obviously cannot include new importations and varieties. But because of its format, Exotic never becomes outdated. Also because of the format, it was necessary to select an arrangement of the fishes which would make it easy to add new pages. It was decided that an alphabetical arrangement by scientific name was the most reasonable solution. Because the index, which uses the common names, cannot be revised each time a supplement comes out, it quickly goes out of date. This



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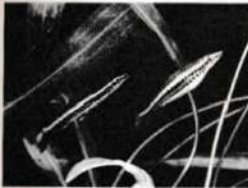
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has not proven to be a great burden to most of our readers who are sufficiently advanced to know the scientific names of the fishes they are looking for.

Poecilibrycon Eques

Q. Recently I acquired three fish which were sold as one-line pencil fish, but upon examining the pictures in the *Encyclopedia of Tropical Fish* I find they are *Poecilibrycon eques*.

1. What size tank should three of these be kept in?



Poecilibrycon eques, pair, female at right.

2. How are the sexes distinguished?
3. What water conditions should they have?

Ed Williams,
Kenosha, Wisconsin

A. 1. At least a five-gallon. In any case, the aquarium should be well planted.

2. The males are noticeably slimmer.

3. If you are not interested in breeding, any water which is suitable for other tropicals is acceptable. If you wish to breed them, soft water (less than 100 ppm) and a temperature of about 75 degrees; pH will take care of itself.

Emerald Shiners

Q. I have been keeping a school of twelve emerald shiners, *Notropis atherinoides*, for about four months. Up to this point they have done very well, but lately I have discovered several dead fish, and several of the rest have blood-red blotches on their fins. They also have a pink bruise within their caudal peduncle. Can you tell me what this disease is and how to cure it?

Howard B. Eichenbaum
Baldwin Harbor, New York

A. The disease sounds most like furunculosis. It is caused by the bacterium *Bacterium salmonicida* and is contagious. The infection starts in the intestines and, if the fish survives, spreads to the musculature. There is no known cure, but the bacterium grows best between 50 and 60 degrees, so a higher temperature combined with antibiotics may be of help. It is best to destroy infected fishes.

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Panchax Temperament

Q. I am interested in obtaining some *Pachypanchax playfairi*, but I have heard that they are very aggressive. Is this true?

Duke Smith,
Chicago Heights, Illinois

A. *Playfairi*'s panchax is not adverse to swallowing small fishes whole, nor is it

above battling rival males and running females ragged. The key to success with this species, as well as *P. homalonotus*, is an aquarium of at least ten-gallons which is well planted. Into this aquarium should be placed three or more pairs. Fewer than this results in the largest male (he may reach three and a half inches) making life miserable for the others. With a larger number to pick on, life is easier for them all.

Electrical Shock

Q. I have noticed when I stick my hand in the water of my aquarium I get a mean shock. I know it does not bother the fishes, but it is killing me. How can I get rid of it?

Rich Richter
Mt. Prospect, Illinois

A. You have a potentially very dangerous situation. It is possible that a wire in your reflector is touching the metal. This should be repaired at once.



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Tadpoles

Q. It is safe to feed tadpoles to fish like cichlids? I recently got some from a nearby pond. My angels love them.

John Sabo,
Riverhead, New York

A. Tadpoles are an excellent live food when they are small. Be careful not to introduce the eggs of aquatic insects or other parasites when you are feeding.

Newly hatched tadpoles.



Sexing Rasboras

Q. I have in my tank five harlequin rasboras, *Rasbora heteromorpha*. I am at the moment unable to sex them. I would greatly appreciate it if you would tell me how this is done without referring to the shape of the triangle.

Jordan Yasgur
Whitestone, New York

A. When the fish are mature the females are easily distinguished by their plumpness. Males also tend to be more highly colored.

Vandellia Cirrhosa

Q. I read some place that there is a small South American fish which will enter the urethra of a human being. This was said to be very painful and required surgery to remove the fish. My husband works with a few hobbyists and when he told them about this fish, they didn't believe him. Where can we find some information about this fish?

Betty L. Rolich,
Anaheim, California

A. The fish you mention is *Vandellia cirrhosa*. This small catfish (and some of its near relatives) is parasitic on much larger fishes and feeds by entering their gill cavities, where it opens wounds and feeds on blood. Entering the urethra of a human being is not intentional and is



Vandellia cirrhosa attempting to enter gill opening of goldfish.

probably extremely rare. *Vandellia* stories are at least as exaggerated as piranha stories. The loonleaf snout, #14 for Exotic Tropical Fishes dealt with this species.

Cichlid Identification

Q. Recently I purchased two members of the cichlid family. The dealer had no idea as to what they were. One fish has a heavy compressed body and short fins. The basic color is gray with green gold dots on the body and fins. There is a large black spot at the center of the body and also a smaller spot at the upper

caudal base. A dark vertical line extends from the eyes to the throat. There is a second line slanting from the gill cover to a point between the caudal and dorsal fins. It is three inches long and still growing.

The other fish is one and one half inches long. There is a black spot at the center of the body and one at the caudal base. A faint line extends from the eye through the center spot and to the caudal base. There is a curved black line from the eyes to the throat. The ventral fins are black and the first two rays of the dorsal fin are black. I would greatly appreciate an identification of these fishes and some basic data on each.

Paul Shuleski
Scranton, Pennsylvania

A. Your descriptions are excellent, and it seems probable that the first fish described is *Aequidens itanyi*, the dolphin cichlid. This species is from French

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Goiama and grows to about five and one half inches. It has a reputation for being a "digger."

Your second fish could be a number of things, but it would most like *Apistogramma otmanni*. This is one of the more available dwarf cichlids. The breeding of both these species is described and illustrated in *Breeding Aquarium Fishes*.

Rams

Q. I am interested in *Apistogramma ramirezi*. Please give me the following information:

1. How should the tank be arranged?
2. What are the correct water conditions?
3. What are some good foods for them?
4. How should the eggs be treated after spawning?

Jupiter Figuera
Lawrence, Kansas

A. 1. A standard aquarium arrangement is fine, but many breeders treat these cichlids like angelfish: the tank is maintained with no gravel, and any plants used are placed in pots. A 10-gallon tank is a good size for a pair.

2. Temperature should be maintained at about 85 degrees for spawning, 80 degrees for non-spawning periods. Water should be soft, less than 100 ppm, and the pH maintained at about neutral through weekly changes of about one fourth of the aquarium water. Where possible a few minutes of direct sunlight daily seems beneficial.

3. Wild imports are difficult to acclimate to dried foods and generally require tubifex, white worms or live adult brine shrimp. They seem more willing to accept frozen foods than dried.

4. A. *ramirezi* is one of the more difficult members of the genus to spawn successfully, although domestically raised

as is the practice with angels, does not seem to be as effective. The fry hatch in 60 to 72 hours. First food should be newly hatched brine shrimp.

Hushy-nosed Plecostomus

Q. My plecostomus is about five inches long and has growths on its nose which look like antlers on a deer. Are these growths common on plecostomus or don't they show in photography?

Terry Darnell,
Nobelsville, Indiana

A. Your fish is not a plecostomus (*Hyponotus plecostomus*) but a related fish probably of either the genus *Ancistrus*

A. The characteristics you have mentioned are useful in distinguishing the sexes of mature angels. There have been shipments of wild angels, however, in which every fish has the dip you speak of. It seems unlikely that all these fish are males.

Shark Mates

Q. I am preparing to set up a ten-gallon aquarium in which I will keep red-tailed and red-finned sharks. What are some other fish that would live in the tank in harmony?

Joe Schneider,
Wyandotte, Michigan

A. It will not take very many sharks long to grow to a size which will crowd your ten-gallon tank. Danios and barbs do well with sharks.

Fin Rot

Q. My aquarium has been invaded by fin rot. I have tried salt, but it doesn't seem to cure my fish.

1. Is there a cure for this disease?

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Tampa, Fla. 33601



Ram guarding rock on which eggs were laid.

rams are easier than wild ones. They are unfortunately less colorful as well. If the pair proves itself unsuitable to care for the eggs, it is possible to hatch the eggs artificially. To do this it is necessary to provide a flow of fresh water over the eggs. This is best done by placing the eggs in the flow from a filter tube. Using an air stone,



Close-up of the mouth of *Xenocara dolichocheira*, showing bristly extensions.

or *Xenocara*. Since the tentacles are branched, yours is probably a male. *Xenocara dolichocheira* is one of the most common of these hushy-nosed catfish and has been spawned several times.

Sexing Angels

Q. On certain angelfish I have noticed that there is a straight forehead from their dorsal fin down to their mouth, whereas other angelfish have a dip beginning at the eye and ending at the mouth. Does this peculiarity denote sex or does it occur in only a few fish?

Glenn Wylie
Jefferson City, Missouri

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2. Should the victims be quarantined?
3. How long should treatment last?
4. How can I tell when the fishes are cured?

Darrel Kimble
Limon, Colorado

A. Fin rot is not so much a disease as a symptom. There are a number of organisms which cause fin rot, including bacteria and ciliate protozoa. The cure depends a great deal on what type of parasite is causing the problem. If the disease is bacterial in nature, just the edges of the fin are usually involved. In this case 15,000 units of penicillin per gallon of water should give a cure in 4-5 days. When rather extensive area of the fin is rotting, protozoa may be suspected. In this case wide-spectrum antibiotics may be used. 100 milligrams of aureomycin or tetracycline is usually effective.

2. All the fish in the tank should be quarantined and treated. This disease is propagated by crowded conditions.

3 and 4. Until the fins show signs of regeneration.

Pen Pal

I am a New Zealand aquarist interested in corresponding with other aquarists with similar interests and aquarium backgrounds. I started the hobby with a gift of goldfish eggs. This aspect of my hobby grew to the point that I now have 30 outdoor ponds. My daughter was given a few guppies and this aspect of the hobby has grown to

the point where we have 12 large aquariums and many breeding aquariums. We also have three large marine aquariums.

Colin Farrell
32 Abbottsford Street,
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YOUR FISHES' HEALTH

DINOFLAGELLATES

By
Roger
Lee Herman

Dinoflagellates are very interesting organisms. As a group, they have characteristics of both animals and plants, which has led to argument about their place in the classification of organisms. Zoologists point to the dinoflagellates' animal characteristics—flagella, no cell wall in some species—and claim them as animals. Botanists point to cell walls in other species and the presence of chlorophyll and say they are plants. Today dinoflagellates are generally considered to be one-celled plants similar to algae.

Several species of dinoflagellates produce poisons which can kill fish. The "red tide" frequently seen around Florida is a "bloom" of dinoflagellates—*Gymnodinium*. Blooms of other types also cause irritation to swimmers along the ocean beaches.

Of more interest to aquarists are the dinoflagellates which are actually

parasitic on fish. *Amyloodinium* (*Oodinium*) species are relatively common parasites on both freshwater and marine fishes. They are the cause of "velvet disease." The life cycles of the several species in fresh and saltwater are similar.

The swarmer (infective stage) swim about by means of their flagella (hair-like appendages) until they locate a fish. Any species apparently will do. If they do not find a host within 24 hours, they die.

When a fish is located, the parasite settles on the skin or gills. The flagella are lost and pseudopods, extensions of the parasite protoplasm, penetrate into the outer

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layer of the fish's skin. The pseudopods act as anchors and as a pathway for food for the parasite. The bugs usually remain in the same spot until mature. Their growth depends on the temperature, but even at the best temperature (68-77° F.), growth is relatively slow. Thus, the disease progresses slowly.

The parasites drop off the fish when they have reached full size (up to 100 microns). They are barely visible to the unaided eye at this size. They drop to the bottom and form cysts. Within the cyst, the parasite divides to form new swarmerers. At 77° F., over 200 swarmerers may be formed in three days. The cyst ruptures and a multitude of swarmerers are released to repeat the cycle.

The first indication of the disease may be flashing of the fish in response to the irritation. Later the skin may appear to bear granules having a yellowish or brownish tint. When the light reflects properly, these granules give the fish the

"velvet" appearance. In severe cases, spots caused by large numbers of parasites may resemble "ich" infestations, but the spots formed by the velvet disease are smaller than mature "ich." Gills may show thickening and hemorrhages.

Several treatments have been recommended for the treatment of velvet. Many aquarium shops have a stock of treatments with instructions. If these are used, follow the instructions exactly. If you prefer to mix your own, here are some of the recommended chemicals.

Copper—a copper kitchen scraper is placed in the tank.

Malachite green—1 drop/gal. of a 0.75% solution/day until disease is gone.

Methylene blue—2-3 drops/gal. of a 5% solution/day until disease is gone.

Acriflavine—10 ppm left for 5 days, change water and repeat after 3 days.

Tanks should be cleaned and disinfected.

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Tropical Fish Down Under

The frisky little atherinids known collectively as Australian rainbow fishes are still the most commonly exported native Australian fish, but don't be surprised to discover one day that swordtails, originally native to Mexican waters, have become as common Australian exports as mutton and good tennis players.

BY R. CARSON GOLD



Nemato-centrus (Meianotaenia) maculochi. Photo by H. Hansen.

Cam Gold and his son Darrell netting swordtails from a creek near Cam's home in Queensland. Swordtails are now so well established in certain Australian waterways that they can be collected commercially. Photo by the author.



It was a typical late winter Queensland morning, warm in the sun, and all blue and gold, still with some dew from the night before hanging diamond droplets on the bush lining the freshwater creek in Enoggera, just outside Brisbane, when we pushed through to make the first net scoop of the day for local tropical fish.

Cam Gold, dedicated fish hobbyist of Wavell Heights, was hunting swordtails to fill a big order for a friend just starting in this fascinating hobby.

We made the first scoop under an overhang shaded by drooping shrubbery and took three swords and two spotted gudgeons, *Mogurnia mogurnia alpersus*.

The second pass was blank, so we moved upstream, making regular passes into patches of grass and under the continuing overhang, where the fish dived for shelter as we waded the shallow stream, driving them before us.

Gudgeons were plentiful, and we passed a lot by for some other time. As boys, we used to catch gudgeons on a fly-hook with a cotton line, baited with chopped meat or crushed freshwater mussel. We called them "smelly cod" then, and they took baits well.

Tropical Fish Hobbyist

Passes into a bunch of weed brought more swords, Cam taking only the adults and returning the small fry, like a good conservationist.

This time there were some blue eyes, *Pseudomugil signifer*, and one rainbow, *Melanotaenia nigra*, hiding at the bottom of the net.

The net was Cam's own design, round in shape (some are straight on the front to slide along the bank). It was made from a 5 foot length of $\frac{1}{2}$ -inch tempered steel bar bent in a circle, with some 4 to 6 inches of each end countersunk into a broomstick-type handle, 4 to 5 foot long, bound in place with strong twine and painted over with shellac for greater strength. A powerful man himself, Cam also builds for strength.



Rhadinocentrus ornatus is very rarely exported from Australia and thus seldom finds its way into tanks outside its homeland, but it is a good aquarium fish that deserves greater exposure among hobbyists. Photo by Dr. Herbert R. Axelrod.

The net itself was made from Australian Army green mosquito net, with a two-foot drop. It was a good, strong net that would take plenty of work.

Red, green, and wagtail swords are a popular fish with Cam, principally because they can be had for the taking in the freshwater creeks only nine miles from his home. Swordtails are now so easily netted in two branches of Brisbane's Enoggera Creek, one of them only a few feet wide, that they can be collected commercially in quantity. Commercial collectors need a license, but hobbyists don't.

Imported fish, they and other non-indigenous tropicals reached Queensland streams over a number of years when well-meaning hobbyists, tiring of fish-keeping, simply emptied their tanks into the nearest stream. Natural reproduction did the rest.

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The purple gudgeon, *Mogurnda mogurnda*, is one of the most colorful of the gobies but has never been exported from Australia in large quantities. Photo by H. Hansen.

Other imports to become established in this way in Queensland are the angel fish and guppies, reputedly around Strathpine, just outside Brisbane. Goldfish have also been released. Even Siamese fighting fish have been noted in watercourses farther up the Queensland coast, in the Bundaberg district.

Gambusia, tough little fellows, were introduced to destroy the larvae of the mosquito, a problem in summer months in Brisbane, but now there are some misgivings on this move, for it is believed they attack and kill the small fry of Queensland native fish; as there has been no noticeable diminution of mosquitoes, gambusia have fallen somewhat from grace.

Some fish fanciers are perturbed that the voracious and deadly little South American piranha could breed in Queensland watercourses if introduced in this way, and it is an offense to import these fish into Australia.

Our morning's catch gave Cam his quota of swords, plus blue eyes, some rainbows, several orange smelts, *Retropinna semoni*, four olive perchlets, *Ambassis agassizii*, and one freshwater mullet, *Trachystoma petardi*, about six inches long.

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Tropical Fish Hobbyist

These were transferred from a plastic collecting bag to a lidded bucket of water for the trip home.

Cam Gold became interested in tropical fish some fifteen years ago as a project for his children, but he rapidly became hooked on the hobby himself. His first attempt ended in disaster when his small daughters, keen on showing the children from next door the qualities of a foaming detergent, tried it in Cam's fish tanks. Cam came home to plenty of froth and bubble, but no fish—well, not alive!

At the moment he has five 24' x 12' x 12' tanks, holding approximately 12½ gallons each, with sand and plants a little less, two breeding tanks, 18' x 12' x 12', 9 gallons, one 12' x 10' x 10', around 4 gallons, and one larger tank, 30' x 18' x 12', around 23 gallons.

Cam has also, in the past, when he was raising tropicals more extensively than he does now, pressed into service the inside of a refrigerator, and an old enamel bath. Even two compartments of a set of concrete tubs come in handy.

In fact, the Australian enthusiast will use anything suitable if he has to. Australians are well known as great improvisors, as anyone who fought alongside the Rats of Tobruk in World War II will tell you.

Native Queensland tropicals may not be particularly well known outside Australia, so a description of the more popular ones may not go amiss.

Most popular, I suppose, especially for export, is the rainbow, which has a variety of colors. It can be bred rather easily and is one of Australia's principal tropicals to be exported in any number.

- The orange, or Australian smelt, is a long fish, with the dorsal fin set far back. Its colors are rose, gold, and silver.

- The blue eye, of course, is as its name suggests, with the eye itself big. Far north of Brisbane this fish features lengthier fin spines. It is found most frequently in tidal freshwater. It likes some live food, particularly mosquito larvae, or "wrigglers".

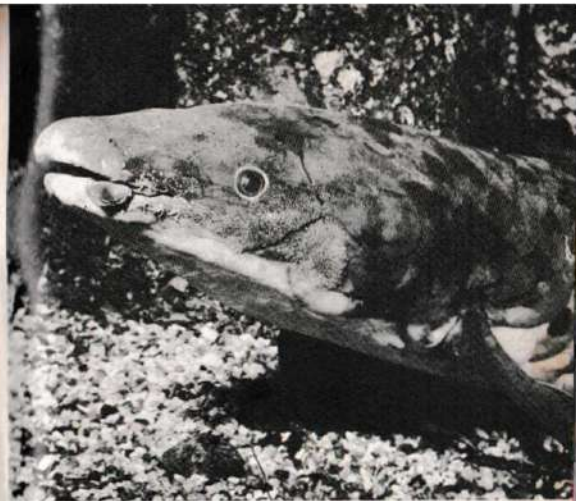
- The olive perchlet has almost a transparent body, colored yellow, with black-tipped fins. Its colors vary with breeding conditions.

- The spotted gudgeon is spotted red and white, with an interrupted body band and radiating bands on cheek, purplish-red.

- The carp gudgeon, *Carassiops compressus*, is shaped rather deeply, with the male fish having black, white, and red bands on fins. Female's fins are spotted, brownish color.

- Queensland's Moreton Island sunfish, *Rhadinocentrus ornatus*, features a line of red scales along the crest, with a line of blue scales below, with a lengthy anal fin. These fish can be collected in the Glasshouse Mountains, peaks named by Captain Cook on his voyage up the Queensland coast in 1770. The creeks principally concerned are Tibrogargan and Coochin.

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Heavy penalties exacted by the Australian government against those who capture specimens of the Australian lungfish, *Neoceratodus forsteri*, without authorization have helped to keep the population of this bizarre species near its former numbers. Photo by Gerhard Budleth.

- In the fire-tailed gudgeon, *Carassiops galii*, two varieties are featured, the deeper one being thought the male. The tail is reddish.

- Glassfish, *Austrochanda*, inhabit freshwater rivers in Queensland but in the sister state, over the southern border in New South Wales, can be found in brackish inlets. If you can change this type to freshwater, it generally fares well.

- The silver scat, *Prenes ornatus*, is a flat, circular fish, with the basic color silver and black stripes on the body. There is also a red scat.

- One very unusual freshwater fish in Queensland is the Ceratodus, or Queensland lungfish, *Neoceratodus forsteri*. He's a big, thickset fellow around two feet long, regarded as one of our living fossils. (The other two are the echidna, or spiny ant-eater, and the platypus). Lungfish are totally protected, and it's an offense to take or keep one. If caught inadvertently, they must be returned immediately to the water.

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