A Dealer's Guide to Tropical Freshwater Aquarium Fishes

Part 1

by Edward C. Taylor

If you are the average petshop owner, you probably feel underpaid and overworked. The last thing you need is someone telling you that in order to increase sales of tropical fishes you have to do some reading. I'll make it easy for you, however, by offering only a few pages each month for the rest of 1985. By the end of the year, you will have a complete collection of articles that cover in detail the vast majority of tropical freshwater aquarium fishes.

It is my contention that dealers with a working knowledge of fishes are going to sell more fishes. You need to understand the interrelationships of freshwater aquarium fishes, as well as possess information about specific groups or species. The best way to learn this type of material is in what scientists call phylogenetic order. Phylogeny is the study of the history of the lines of evolution in a group of organisms - in this case - tropical freshwater aquarium fishes. Just like all other groups of animals, fishes evolved from primitive to advanced forms over millions of years. Many of the early types of fishes have modern representatives that you will recognize.
In this series of articles, I will cover the vast array of freshwater aquarium fishes starting with the most primitive and progressing to the most advanced. Although there are a number of native and other cold-water fishes that find their way into the aquarium trade, I am not going to discuss these in this series. Since they do not come from warm waters, and they are different from legitimate tropicals in many ways, I have reserved a special, but separate article for them. This will be presented at a later time.

Now I know many of you are saying, I'm a businessman not a scientist, why do I need to know this type of technical information? It's an unfortunate fact that a lot of long Latin names are associated with this material. But each and every group of fish I will discuss has a common name that will be familiar to most of you. If you can remember both the scientific and the common names it will be to your benefit. Don't feel it is a necessity, however, since you will rarely be called upon to recite them. What you do need to remember are the requirements of the different groups of fishes. You should become familiar with the general maintenance techniques and implement them in your store. If you display fishes to their best advantage, sales will increase. When customers see how certain types of fishes can be kept successfully, they will be much less hesitant to purchase them. So - this series of articles will be valuable in two ways. First, it will explain the interrelationships of tropical freshwater fishes. Second, it will offer recommendations as to how you should merchandise various groups or types of fishes.
There are a few scientific concepts that you should be familiar with in order to better understand the phylogeny of fishes. Living organisms are ranked in a hierarchy of taxonomic categories. The seven basic categories are well known to anyone who took high school biology. These are, from most inclusive, to most specific, as follows: kingdom, phylum, class, order, family, genus, and species. As the number of described species has grown, it was necessary to create additional categories. These are, of course, mixed in among the seven already mentioned. Many of these use one of the basic categories with the prefixes super or sub. As I cover the various groups, these terms will be used to show their interrelationships.

The most useful taxonomic category for grouping related fishes is the family. It is usually simple to distinguish one family of fishes from another. There are exceptions to this statement, but, in general, families are quite distinct. The phylogeny of tropical freshwater aquarium fishes that I will present relies heavily on the family. Secondarily, the "order" category will play an important part. Discussions will progress from one order or family to the next.
In order to squeeze this story of aquarium fishes into just 11 parts, I will only rarely mention individual species. This does not free you from the need to understand the concept of binomial nomenclature. This is the use of both a generic and specific name to designate each unique organism. The combination of the two categories is known as the scientific name. Every aquarium fish has one, unless it is a hybrid produced by crossing two (or more) species. The generic name is always capitalized, the specific name is always lower case, e.g., *Poecilia reticulata*, the guppy. While the generic and specific names can be virtually anything, some higher taxonomic categories use standardized endings. This practice will permit you to equate certain names with a given level of classification. Examples are as follows:

Orders end in  -iformes
   such as  Characiformes

Suborders end in  -oides
   such as  Characoidei

Families end in  -idae
   such as  Characidae

Higher taxonomic categories are always capitalized, but only genus and species names are italicized (or underlined). Now, let's move on to some general information about fishes.
How many different species of fishes are there? This has been debated back and forth for many years, but it is obviously impossible to give more than an educated guess. Most scientists put the number of species between 18,000 and 30,000. Remember that there are many fishes not yet discovered or described. I prefer to select a figure in the 24,000 range. Of these, at least 8,000 can be classified as freshwater.

There are three distinct groupings of freshwater fishes based on their ability to tolerate salt water. It is important that you are able to classify a given family of fishes into one of these groups. They are (1) primary, (2) secondary, and (3) peripheral. Primary division fishes are those which have little or no tolerance for salt. They are confined strictly to fresh waters. Secondary division fishes have some tolerance of salt water and they may have expanded their distribution across marine barriers. Basically, however, they are found in fresh waters. Peripheral fishes may lead a dual existence spending some time in fresh water and some in salt water. Other examples from this group may live most of their life in one environment or the other. For the most part, the species in the peripheral group are what we commonly call brackish water fishes. They are derived from marine fishes and their primary areas of distribution have been the oceans. If you know to which one of these groups a certain fish belongs, you will immediately know a great deal about the water conditions necessary to maintain the species in question.
How many families of freshwater fishes are there? The exact number is debatable but well over 150 families have at least one or more freshwater representative. A fair number of these are comprised of native fishes or non-tropical species. After careful study, I have been able to document approximately 100 families containing tropical freshwater fishes that are represented in the aquarium hobby. In this series, I will cover most of these families and give a thumbnail sketch of the relevant types of fishes contained in each.

I'm going to start this phylogeny of tropical freshwater aquarium fishes with the most primitive representative of all aquarium fishes. It is the only member of the Class Chondrichthyes, commonly known as cartilaginous fishes. These fishes possess a skeleton composed of cartilage rather than bone, a condition considered quite primitive in nature. Members of this class include such familiar names as sharks, skates, rays, and sawfishes. There is a single family with freshwater species that are sold in the aquarium trade. This is the family Potamotrygonidae which contains the so-called river stingrays. All species that you will encounter are native to the South American river systems of the Amazon, Orinoco, Magdalena, and the Parana. There are 16-20 species of these, primarily in the genus *Potamotrygon*. You should have no problem identifying the freshwater stingray since it possesses a typical disc-shaped body with a long tail. Even though it has a tail, there is no caudal fin (or dorsal for that matter), but the spine is every bit as dangerous as that of its marine relatives.
The freshwater stingray is a relatively expensive item that only a few of your customers will wish to purchase. It is not a simple fish to care for and you will want to restrict its sale to hobbyists you consider knowledgeable and responsible. Always maintain this fish in an aquarium devoted exclusively to its use. One to a tank is best. Since the fish is usually imported at a size of 6-8 inches, you should use at least a 20-gallon tank. Cover half the substrate with a fine sand-like gravel into which the animal may bury without hurting itself. The other half should remain bare and here you can place any food. Items such as earthworms, tubifex worms, bloodworms, and frozen beefheart are preferred. It is not necessary to use any salt in the water even though this is a peripheral family. These fishes come from far up rivers where there is little salt water intrusion. Maintain a temperature of 78° - 82° F and employ subdued lighting. The beautiful color patterns and unusual behavior of many freshwater stingrays will draw a great deal of attention to the fish. Carry this item on an occasional basis as an oddity. Be sure to explain the potential danger to any customers interested in buying it.

Next month, I will cover a wide variety of primitive fishes many of which are little understood and poorly merchandised by most petshops.
A Dealer's Guide to Tropical Freshwater Aquarium Fishes

Part 2

by Edward C. Taylor

Hopefully, last month you read the introduction to this series and you are anxious to plunge headlong into the main body of the information. To recap briefly, I have already discussed the importance of having a working knowledge of the interrelationships of tropical freshwater aquarium fishes. This will allow you to maintain them properly in your shop and pass along information to your customers pertinent to the fishes survival. If the only comment you can offer a customer is, "It's a rare fish. I don't know anything about its identity or its preferred living conditions," you are not doing a very good job of merchandising.

The only fish I covered in the first installment was the freshwater stingray. This primitive animal possesses a cartilaginous skeleton rather than a bony one. From here on out, all fishes will be members of the class Osteichthys, commonly known as bony fishes. The most primitive bony fishes are lungfishes (primary division). They are represented by two orders. The Australian lungfish, Neoceratodus forsteri, is an endangered species and unique enough to rate its own order (Ceratodiformes) and family (Ceratodidae). It is not available in the aquarium trade.
The order Lepidosireniformes contains two families of lungfishes both of which are commonly offered for sale. In the family Lepidosirenidae, there is the single species of South American lungfish, *Lepidosiren paradoxa*. This is typically a dark fish, black to charcoal gray, with a few yellow spots scattered about the head. The tail fin is circumcaudal and the pectoral and pelvic fins are thin, ribbon-like and quite short. Distinguishing this from the African lungfishes is quite simple. In the family Protopterygidae, there are 4-6 species of lungfishes (all in the genus *Protopterus*) from Africa. They have much longer and thicker paired fins and the caudal is slightly larger than their South American relative. Also, the body is normally light brown to light gray in color.

In your shop, keep lungfish one to a tank. They are sneaky for you may go all day without seeing one harass another. Damage seems to occur overnight. Keep the water level down considerably from the surface so the fish cannot crawl out, and it is easy for it to take gulps of air. These fish must be able to reach the surface or they will die. Lungfishes are relatively expensive and certainly come under the heading of oddballs. They prefer live or frozen foods although a few individuals will take pelleted food that sinks.
Occasionally, lungfishes will be available at very small sizes of less than four inches. These young fish can be kept together for quite a while. At 2-3 inches even the African species are black in color and the bright-red external gills will be obvious. Small live worms seem to be the food of choice at this size. Every lungfish has the potential of becoming a pet fish for they develop individual personalities. More than a few petshops have a lungfish as a permanent resident to stimulate customer's interest. I recommend them without reservation.

Most of the primitive fishes covered in this article are native to Africa. This shows that it was an important evolutionary center for freshwater fishes. Many groups originated in tropical Africa and spread out from there. In the cases noted here, the families are generally small with only a few species. They are considered relics because they are all that remains of groups that at one time were much larger.

The next order is Polypteriformes and there are two distinct body forms offered in this taxon even thought its members belong to the same family - Polypteridae. You know these fishes as bichirs (Polypterus) and ropefish. The long, snake-like ropefish, Erpetoichthys calabaricus, is merely an unusual form of bichir. All representatives of the family can be identified by a series of dorsal finlets (rather than a dorsal fin) and a circumcaudal tail. They have the ability to utilize air as a source for oxygen, and, in fact, must do so in order to survive. Ropefish are adept at climbing or slithering out of tanks, so
keep the water level low and a tight top on the aquarium. You can keep a number of ropefish together (6 or more) but avoid 2 or 3.

In the case of Polypterus, it is best to keep a single fish to a tank for they will fight unless given plenty of space. Mixed with other fishes (too small to eat), two Polypterus can be kept in a 40-gallon tank. There are about 12 species of these substrate-dwelling African oddities, and some of them are quite costly. The number of dorsal finlets varies from species to species. Since ropefish are a semi-staple item and relatively inexpensive, you may want to have a few on hand most of the time. Polypterus, on the other hand, should be sold as specialty items available on an irregular basis. Always maintain members of this family with gravel and subdued lighting. They require hiding places or they will not feed well. Frozen foods are preferred and the fish may be picky eaters until well settled in. Since they are primary division fishes, water requirements are strictly freshwater, but, in fact, they can tolerate a wide range of conditions.

The order Osteoglossiformes contains three families which have familiar aquarium species. First, in the family Notopteridae there are the featherfin knifefishes from Africa and Asia. These are not related to the South American knifefishes, and they can be distinguished from them by the presence of a dorsal fin. The only exception to this rule is the solid black Xenomystus nigri from Africa. Papyrocranus afer is a beautiful species, also from Africa, that has a black groundcolor covered with many large
white blotches. In the genus *Notopterus*, the very popular clown knifefish (*N. chitala*) is one of the most important large fishes you can stock in your store. Since it is easy to keep and grows quite large, customers buying it will require a large tank and plenty of feeder-fish. Up to about 6-8 inches, clown knifefish can be displayed together, after that, it's a risk. Featherfins are primary division fishes that even an inexperienced hobbyist can maintain. Be sure that anyone buying one of these fish has been told how large they will grow and that feeding live fishes is recommended. They make great pet fish.

Circumtropical in its distribution, the family Osteoglossidae has representatives in South America, Africa, Southeast Asia, and Australia. These fishes grow quite large and are very primitive in appearance. Most of them are known as arowanas, but the largest of all, *Arapaima gigas*, is called simply pirarucu. It is one of the largest freshwater fishes in the world and routinely reaches 10 feet in length. It is rarely available to the aquarium trade and you should probably not offer it for sale. Aside from decreasing numbers in the wild, it is just not a good aquarium fish. It either lays on the substrate or frantically swims up and down the glass looking for a way to escape.
The two species of arowanas from South America, the silver (Osteoglossum bicirrosum) and the black (O. ferreirai), are very popular and make excellent pets for people with large tanks. Never keep two specimens together once they have reached 5-6 inches in length. It's usually a fight to the death or until one jumps out. If at all possible avoid buying and selling arowanas with yolk sacs. These are difficult to coax through the transitional stage. Better to purchase larger fish and pay a bit more for both your benefit and your customer's. The arowanas from Southeast Asia (Scleropages formosus) and Australia (S. leichardti) are now protected species in many countries and should be sold only to competent aquarists. They bring a premium price.

The most unusual arowana of all is Heterotis niloticus from western Africa. Although it gets quite large, it is not a fish-eater, but instead gains all its food by filtering through substrate material. Be prepared to offer it vast quantities of tubifex or blood worms, and juveniles will take brine shrimp nauplii. It is a really difficult species to keep in the home aquarium. All in all, the two South American arowanas are the only ones I recommend that you carry. The others are curious oddities that are best kept in public aquaria.
Everyone knows the butterflyfish, *Pantodon buchholzi* from western Africa. Believe it or not, its closest relatives are the arowanas. It is in the same order (Osteoglossiformes) and belongs to the monotypic family Pantodontidae. This very unusual fish is sort of an arowana gone wild. Look at the large gaping mouth and you can see the similarity. Although it reaches only 4 1/2 inches in length, it is a voracious eater of small fishes. There's no doubt about it, the butterflyfish needs small live foods and this usually means lots of feeder-guppies. In the wild, it prefers to snap insect larvae from the surface where it spends most of its time. Butterflyfishes can be kept in large aggregations but 6-12 to a long, low tank is best. Sell these fast so you don't lose money on the cost of feeding them. They should be kept with larger non-aggressive species since the surface-dwelling nature of the fish makes it vulnerable to attacks from below. As with all fish in the order Osteoglossiformes, it is a primary division species which needs strictly fresh water.

The final group I will cover in this installment is the order Mormyriformes. There are two families, one of which contains the truly exotic *Gymnarchus niloticus* from Africa. Again, this is another monotypic family (Gymnarchidae) with a strange species that looks like an upside-down knifefish. Instead of a long-based anal fin, typical of most knifefishes, *Gymnarchus* has a long-based dorsal fin. Like all members of the order, this fish possesses the ability to transmit and detect weak electrical charges. These are used to locate food items and move through turbid water without running into things. By reversing the motion
of the dorsal fin, *Gymnarchus* can move forward or backward equally well without flexing its long slender body. The abba, as it is known in Africa, reaches five feet in length, but will do well in a 100-gallon tank or larger. It feeds on live or frozen foods and becomes active only at night. Keep a single specimen in a darkened tank with room to turn. One or two a year should meet consumer demands, but you may wish to maintain one as a show fish.

The family Mormyridae is much larger than most dealers realize. It contains over a 100 species in 12 or more genera. There are a variety of common names available for fishes in this family depending on their physical appearance. In general, the term mormyrid is most acceptable, with elephant-noses a poor second choice. The snout region is extremely variable in these fishes. Some have a long proboscis-like snout, others have only the lower jaw elongated (various lengths), while some have a totally rounded face. Most mormyrids come to us from Nigeria and the Congo River. They are not easy fish to maintain since they prefer live worms. Some specimens will accept frozen foods but this usually happens after they are well settled in - not in the retail shop environment. Rules for displaying mormyrids are rather precise. They should either be well-crowded or kept alone. A few together will fight incessantly. When kept in a large group, say 20 fish in a 30-gallon tank, they may cluster together for protection. It will look like a lop-sided ball with all noses pointing out. These fishes require subdued light and places to hide. Cover only half the substrate with gravel and feed over the
bare area. Some of the familiar genera include Gnathonemus (which contains the common elephant-nose, G. petersi), Camplyomormyrus (which contains the second most common nosed-mormyrid, C. tamandua), Mormyrus (commonly referred to as freshwater dolphins), Marcusenius (half-beaked or bearded mormyrids), and Petrocephalus (which are known by the totally disgusting name - baby whales). For this last genus, I prefer the names "no-nose elephant-noses" or "round-head mormyrids".

At any rate, to sum up the family Mormyridae as succinctly as I can - they are territorially aggressive fishes that do not compete well for food. In other words, they rarely survive long in the home aquarium unless great care is given to balancing their environment. Water conditions are not critical for these primary division fishes. You should always have one, two, or three species of mormyrids on hand for your customers.

Next month, my entire presentation will be devoted to the Order Characiformes (tetras and all characoids). Don't miss it.
Captions for Fish Drawings
Drawings by Cathy B. Taylor

1. Family Potamotrygonidae - River Stingrays
2. Family Lepidosirenidae - South American Lungfish
3. Family Protopterusidae - African Lungfishes
4. Family Polypterusidae - Ropefish
   Species: Erpetoichthys calabaricus
5. Family Polypterusidae - Bichirs or Polypterus
   Species: Polypterus weekly
6. Family Polypterusidae - Bichirs or Polypterus
   Species: Polypterus palmus
7. Family Notopteridae - Featherfin Knifefishes
8. Family Osteoglossidae - Arowanas
   Species: Osteoglossum bicirrosum
9. Family Pantodontidae - Butterflyfish
10. Family Gymnarchidae - Gymnarchus
11. Family Mormyridae - Mormyrids
    Species: Gnathonemus petersi
12. Family Mormyridae - Mormyrids
    Species: Mormyrus rumbe
13. Family Mormyridae - Mormyrids
    Species: Marcusenius sp.
14. Family Mormyridae - Mormyrids
    Species: Petrocephalus sp.
A Dealer's Guide to Tropical Freshwater Aquarium Fishes

Part 3

by Edward C. Taylor

The superorder Ostariophysii contains a vast number of aquarium fishes. In fact, it encompasses over 25% of all known fish species (up to 6,000) and accounts for almost 75% of all freshwater fishes. Representatives of this important group possess a structure known as the Weberian apparatus. It consists of a modification of the anterior-most four (or more) vertebrae. These connect the swim bladder to the inner ear and greatly enhance sound transmission. Another characteristic of the Ostariophysii is the ability to release a chemical which causes a fright reaction in conspecifics (fish of the same species). Should the skin be injured, individuals in the same aquarium (or in the wild, those fishes in the same school) may exhibit behavior that we would describe as "going into shock". One or two injured fish in a tank may precipitate a chain reaction that results in massive losses. It is best to cull all damaged fish as soon as possible.

There are three orders of consequence in the superorder Ostariopysii. All three contain many fishes that are familiar aquarium inhabitants. In fact, there is no doubt that the total number of species in this category make up well over half of the species of tropical freshwater fishes in the aquarium trade. The orders and their representatives are as follows:
(1) Order Characiformes

Suborder Characoidei - 16 families, including such fishes as tetras, piranhas, headstanders, pencilfishes, hatchetfishes, Anostomus, Leporinus, Distichodus, etc.

Suborder Gymnotoidei - 4 families of Neotropical knifefishes, including such fishes as the electric eel, marbled knife, glass knife, black ghost, trumpet-nosed knife, etc.

(2) Order Cypriniformes

Suborder Cyprinoidei - 1 family with 3 subfamilies, including such fishes as barbs, rasboras, danios, sharks, some minnows, etc.

Suborder Cobitoidei - 4 families, including such fishes as kuhlii loaches, Botia loaches, weather loaches, algae-eaters, hillstream loaches, etc.

(3) Order Siluriformes - 31 families, including all fishes commonly known as catfishes.

Over the next three installments of this article, I will try and do justice to the Ostariophysi. The subject this month will be the order Characiformes (in part). At one time or another, representatives from all 16 families of characoid fishes (suborder Characoidei) have been offered for sale. Some families are quite rarely encountered, others have representatives in every petshop in the U.S.
The family Characidae is the base group (type taxon for the suborder and order) for all the characoids, and it contains all the familiar tetras. There are many large and predatory species in this family, but the majority are small, colorful, schooling fishes that are omnivorous in nature. Tetras are available from the wild, but many species are raised commercially on fish farms. Prices of these fishes range from a few pennies to a dollar or more per fish. In general, however, these are low-priced fishes that every shop carries as staple items in their inventory. All the rage in the 30's and 40's, tetras have declined somewhat in popularity.

Tetras should be maintained in schools. Water quality needs to be good and frequent water changes are recommended. Keep the pH in the range of 6.8 to 7.2, and if your water is over 140 ppm in hardness, you may experience problems in keeping the fish healthy. Feed these small fishes at least twice a day with a high quality flake food and a frozen food of your choice. Diet is important and a week of improper feeding or poor foods may weaken the fish greatly. Tetras look and act their best in well-lit tanks with live plants. You can mix them with a few substrate species like Labeos and Corydoras. There are perhaps 20 species of tetras that can be classified as essential items and another 20 species that should be thought of as important.
The vast majority of tetras in the family Characidae have an adipose fin on the dorsal surface between the dorsal and caudal fins. This makes them easy to distinguish from barbs and rasboras. In those states where piranhas can legally be sold, they are quite popular items. Keep large specimens in isolation, but juveniles (2 1/2 inches or less) can be kept in small schools. Silver dollars (many species in several genera) are basically vegetarians, and they benefit from feedings of leaf lettuce or zucchini. Fin eaters like the bucktooth tetra (*Exodon paradoxus*) should be advertised as problem fishes. It's really impossible to cover tetras in depth in this article, but they should be featured in your shop since they are perfect fishes for the average fishkeeper with one or two community tanks.

The other families in the suborder Characoidei are not as well known as Characidae, but there are many that you will recognize immediately. In the family Anostomidae, there are the genera *Anostomus*, *Leporinus*, and *Abramites*. Numerous species of *Leporinus* are available from South American importers. These torpedo-shaped fishes are rather aggressive and mix well with larger fishes. They may pick on one another if only a few are kept together. You may split them up or maintain six or more in a single tank. No live plants with these fishes - they will eat them. *Anostomus* species are frequently referred to as headstanders due to their habit of swimming in a head-down position. This is the manner in which they feed. *Abramites* (marbled headstanders) also perform in the same manner. All members of the family Anostomidae are best kept one to a tank by
the home aquarist. More than this and you may have customers bringing back the troublemakers. A separate family (Chilodontidae) has been erected for the spotted headstander, *Chilodus punctatus*. It is considerably different from the *Abramites* species and can be kept in pairs (or small numbers) without threat of aggression.

The family Lebiasinidae contains the pencilfishes and splash tetras so popular with hobbyists who prefer small fishes. Many of these little beauties do not have an adipose fin but they are still easy to identify. They demand a good deal of care and feel secure only in a school. Keep them in groups of 20 or more and recommend to interested parties that they purchase at least six fish. They mix well with small tetras, rasboras, and *Corydoras*. Pencilfishes are easily lost if not fed properly and kept with non-aggressive species. Another group of fishes that do well with pencilfishes are the hatchetfishes. These belong to the family Gasteropelecidae. They spend most of their time at the water's surface and will literally fly from the water if left uncovered. Most hatchetfishes last only a few weeks after they reach the home aquarium. Unfortunately, they prefer small, live foods. Selling live foods in your shop is one sure way to bring customers back on a frequent basis. It also shows them that you really care if their fish survive. In the shop, keep hatchetfishes in tall tanks with other peaceful fishes that prefer mid-water or the substrate environment.
Perfect for the large community tank are fishes in the family Prochilodontidae. The most popular representative of this group is the flag-tailed prochilodus (Semaprochilodus taeniurus). All prochilodids reach a healthy size (8-16 inches), but they are quite placid considering this characteristic. Keep them in large tanks (40 gallons on up) with fishes such as angels, discus, or Labeos.

The family Hemiodontidae contains fishes in the genera Hemiodus and Hemiodopsis. These have no common name and are referred to simply as Hemiodus. They are very distinctive as a group, having a long slender body with a forked or scissor tail. In most species, the lower caudal lobe has a band of color. These fishes are not easy to maintain. They prefer clean, swiftly-moving water and are active swimmers that love to jump. Keep only a few of these at any one time. They mix well with Prochilodus and other non-aggressive species. Unfortunately, they go into shock quite easily and may do so for no reason other than being moved or having their water changed. Only your more experienced customers should be steered toward hemiodids.

The seven families covered thus far are all native to Central and South America with the exception of Characidae which also has representatives in Africa. African tetras are quite popular but a good deal more expensive than their Neotropical counterparts. They also grow larger for the most part, and a nice display of adult Congo tetras (Phenacogrammus interruptus) can be a real drawing card for your fish display.
There are four families of characoid fishes remaining that come from Africa. Two of these contain predatory fishes. In the family Hepsetidae, there is a single pike-like fish, *Hepsetus odoe*. This fish-eating species is rarely seen in the aquarium trade, and its large size and nasty disposition make it a poor choice for captive life.

Fishes in the family Ichthyboridae are primarily fin-eaters, and although they are not fishes for everyone, you may have a few customers who find them interesting. They rarely exceed eight inches in length and will do quite well on small feeder fishes such as guppies or platies. Obviously, you must keep them separated from fishes you do not wish damaged. These African fin-eaters are pike-like fishes with scissor-like jaws, and many species have distinctive markings such as spots or stripes on the body or stripes on the tail.

Two closely related families are Distichodontidae and Citharinidae. Most of you will be familiar with *Distichodus sexfasciatus*, the beautifully marked characoid that would sell by the millions if more were available and the cost was a bit lower. Even at the hefty price they command, this species of *Distichodus* will sell on a regular basis to hobbyists with a yearning for the exotic. All large *Distichodus* mix well with African rift lake cichlids and most of the larger tetras. There are a few miniature species in the genera *Neolebias* and *Nannaethiops*, and these go well with small tetras, rasboras, barbs, etc.
Although rarely seen there are three species in the genus Citharinus (family Citharinidae) that resemble silver dollar-shaped Distichodus. These round silver fishes are highly prized, and priced to match, but they do resemble typical silver dollars in the family Characidae so substitutions are readily available. Fishes from both African families (Distichodontidae and Citharinidae) are primarily vegetarians and should be fed accordingly.

I should point out at this time that the entire suborder Characoidei consists of primary division fishes. They tolerate little or no salt in the water and their ancestors came strictly from the freshwater environment. The remaining families of characoids are all found in South America. Three of these are so infrequently imported that it would be useless to discuss them. The other two families are both highly predatory and the fishes are suited only as pet fish – one to a tank. A fish that is probably too prevalent in the trade is Hoplias malabaricus, a member of the family Erythrinidae. It is known as the trahira or wolffish and is usually sold at 3-5 inches in length. While this fish is easy enough to feed (goldfish being the food of choice), there are few people who will be attracted to it since it is drab in color, grows to well over a foot in length, and spends most of the time laying on the substrate. Carry only one of these at a time on an infrequent basis. Other members of the family are equally difficult to sell.
Pike characins in the family Ctenoluciidae are fish-eating machines that you might easily mistake for gars or pikes. The adipose fin is proof positive that these fishes are characoids. There are four species in two genera (Ctenolucius and Boulengerella) and all of them must be kept alone or with fishes they cannot eat. Only in the past few years have these fishes really been available on a consistent basis. They are best handled as specialty items that will sell in limited quantities.

Well, that's a quick and dirty look at characoids. Next month, I will complete my discussion of the order Characiformes by covering knifefishes. Then I will move on to the order Cypriniformes with its popular barbs, rasboras, and danios.
Captions for Fish Drawings

Drawings by Cathy B. Taylor

1. Family Characidae - Tetras
2. Family Characidae - Silver Dollars
3. Family Characidae - Piranhas
4. Family Anostomidae - Leporinus sp.
5. Family Lebiasinidae - Pencilfishes, Splash Tetra
   Sp: Nannostomus beckfordi
6. Family Prochilodontidae - Prochilodus
   Sp: Semiprochilodus taeniurus
7. Family Hemiodontidae - Hemiodus
   Sp: Hemiodopsis quadrimaculatus
8. Family Ichthyboridae - African Fin-eaters
9. Family Distichodontidae - Distichodus
   Sp: Distichodus sexfasciatus
10. Family Gasteropelecidae - Hatchetfishes
11. Family Erythrinidae - Wolfishes
12. Family Ctenoluciidae - Pike Characins
    Sp: Ctenolucius hujeta
A Dealer's Guide to Tropical Freshwater Aquarium Fishes

Part 4

by Edward C. Taylor

This month I will begin our phylogentic ramble through the world of tropical freshwater aquarium fishes with the suborder Gymnotoidei (order Characiformes) - the South American knifefishes. There are four families of these very distinctive fishes but two of them contain the majority of species seen in the aquarium trade. Remember - you can distinguish these knifefishes from their Old World counterparts because they lack a dorsal fin.

The most easily recognized species of Neotropical knifefish is the electric eel, *Electrophorus electricus*. It belongs to the monotypic family Electrophoridae. These fish are potentially quite dangerous since they can produce an electrical charge strong enough to knock you down or back from a tank several feet. Although they may reach eight feet in length, most specimens are imported between 18-24 inches. Even at this size, they are capable of inducing a severe shock. For all intents and purposes, these fish are best handled as display items only, and certainly should be sold strictly to those hobbyists capable of maintaining such an exotic pet.
The family Gymnotidae contains only three species, all in the genus Gymnotus with G. carapo being the fish most likely to be offered for sale. It is commonly known as the banded knifefish. This fish grows to 15 inches and it is not to be trusted with small fishes. In fact, most species of knifefishes will eat any fish small enough to swallow. The family Rhamphichthyidae contains several species that you may encounter including the glass knife, Eigenmannia virescens and Rhamphichthys sp. (trumpet-nosed knives). Most of these reach a considerable size so they are best kept in large aquaria. In the family Apteronotidae, there are 10 genera, but the most popular species are in the genus Apteronotus. A. albifrons and A. schotti (the black ghost and the brown ghost, respectively) are excellent choices for most aquarists. Although they may exceed a foot in length, they are slow growers and only eat very small fishes.

In your shop, it is best to keep knifefishes either one to a tank or in large groups. Two or three fish left together will frequently fight until considerable damage is done. The ghosts are good sellers and you should try to have a few on hand at all times. Glass knives are readily available but not big sellers due to their lack of color. Other knifefishes are recommended only for large community tanks or as pet fishes. Be sure to provide hiding places since these fishes are mainly nocturnal.
The order Cypriniformes has two suborders of interest to the aquarium trade. In the suborder Cyprinoidei, there is but a single family, gigantic in size, and highly diverse in its fish types. This is the family Cyprinidae which contains over 10 subfamilies represented by such well-known fishes as barbs, rasboras, danios, sharks, minnows, goldfish, and koi. There are well over 1,600 species in this family, and it is a melting pot of fishes that needs considerable revision before the interrelationships can be understood. Suffice it to say that this is a very important family for the aquarium trade. Let's look at the two subfamilies containing most of the tropical species.

The subfamily Cyprininae contains all the barbs and many of the sharks that are staple items for your shop. These are best characterized by the presence of barbels near the mouth. They are, for the most part, schooling species that swim in mid-water or near the substrate. They are good consumers of plant material so keeping them with soft-leafed plants is not recommended. At least 10 species of Barbus should be stocked consistently and another 10 species can be offered on a rotating basis. These are inexpensive fishes and are best sold in groups of four or more. Display them, one species to a tank, in large aquaria.
Cyprinids are native to Africa and Southeast Asia, but most of the species in the trade come from Asia. They lack jaw teeth but are quite capable of chewing plants and cropping algae from a variety of surfaces. Many of the shark species have ventrally-directed mouths, useful for grubbing in the substrate and harvesting algae. Only a few cyprinids, with big mouths, are predators, and these are rarely offered for sale. A majority of the barbs available are raised in Florida or Southeast Asia on commercial fish farms. This is not the case with most other cyprinids, especially sharks.

The so-called sharks come from a number of genera including Labeo, Morulius, Balantiocheilus, Osteocheilus, Barbichthys, and Labeobarbus, and they are real fighters when kept in pairs or small groups. They are not nearly so aggressive in large schools. Except for a few items, such as red-tailed sharks, rainbow sharks, black sharks, and tricolor sharks most of these fishes should be stocked in small numbers. So - space them out in different tanks.

I think it is important to identify these "sharks" as to species since your customers are entitled to as much information about the fishes they buy as possible. You may find it necessary to query your wholesaler or the importer to get this data. For the most part, sharks are good scavengers and every community tank should have one. They are relatively unaggressive as far as other fishes are concerned, a little fin-nipping is usually the extent of damages.
Flying foxes (Epalzeorhynchos) are members of the family Cyprinidae, and they can be displayed in any combination. I recommend them over algae-eaters for reasons I will go into later.

The subfamily Rasborinae contains what I like to call the perfect aquarium fishes. Rasboras and Danios are graceful swimmers that prefer to live in schools of six or more. They are surface dwellers that mix well with all other schooling fishes such as tetras, barbs, and rainbows. Display them in large schools and recommend them to all your customers with community tanks. Rasboras are easily recognized by their long and slender shape and lack of barbels. There are several deep-bodied species, however, including the most popular of all, R. heteromorpha, the harlequin rasbora. You should carry a number of Rasbora species at all times. Some species are available only wild-caught and these are offered sporadically.

The jewel of the breeder's art is the danio. Although there are only three species commonly seen, the two smaller ones, Brachydanio rerio (zebra danio) and B. albolineatus (pearl danio) are available in a large number of varieties. These are extremely low-priced items that should be sold in groups of six or more. The giant danio, Danio malabaricus, grows to well over three inches so it is best for larger tanks. Danios have barbels, unlike Rasboras, but their long, sleek shape is different from most barbs, so they cannot easily be confused. Keep Rasboras and
Danios in large schools in long, low tanks, a single species or variety to each aquarium. A few non-aggressive scavengers can be mixed in.

There are several rasborine genera containing larger species often sold as sharks. Perhaps, most deceiving is the so-called pink-tailed rasbora, Leptobarbus hoeveni. It is available at 1 1/2 - 2 inches in length, but grows to well over 18 inches. At that size, it is a bit of a nuisance. Apollo sharks in the genus Luciosoma are always well behaved, even at 10 inches, but be sure their tank is well covered for they love to fly out of the water. Perhaps the strangest rasbora relatives of all are the Asian hatchetfishes in the genus Laubuca. Compared to the South American hatchetfishes, they are much more colorful and quite easy to maintain. Unfortunately, they are available all too infrequently. A final member of this subfamily is the flying danio, Esomus danrica, with long, flowing barbels reaching over half the body length. It is usually available from Sri Lanka or Singapore and should be treated like a regular danio species.

Carrying the unusual or oddball species of cyprinids is important to your business. It will create enthusiasm on the part of your customers and build your reputation as a purveyor of exotic fishes. After all, there's more to fish selling than bread and butter items.
There are a number of cold-water cyprinids that you will be selling in your shop, but these will be covered in another article. Just to mention them, however, so you will be aware of their relationship, they include white clouds, bitterlings, orfs, rudds, goldfish, koi, and several native minnows.

The suborder Cobitoidei (order Cypriniformes) has four families - all with representatives in the aquarium hobby. We know most of these fishes as loaches, but they are quite diverse in their physical appearance and behavior. All tropical loaches are native to Southeast Asia, but both Europe and Japan have cold-water species commonly known as stone loaches and weather loaches, respectively.

There are three families of loach-like fishes that are found primarily in streams with moderate to fast-moving currents. These are commonly referred to as the hillstream loaches. Their mouths are modified into disc-like structures used to cling to rocks in the streams. The families Homalopteridae and Gastromyzontidae contain numerous species, few of which reach the trade. When handling these fishes be very careful removing them from objects to which they are clinging since their mouth parts are quite soft and easily damaged. They are hard to feed, eating only live algae, and require very clean water with a high oxygen content. Carry them only as oddities for experienced aquarists.
A third family of hillstream fishes (Gyrinocheilidae) contains the very popular algae-eater (Gyrinocheilus aymonieri). This unusual fish has a special adaptation for living in fast-moving streams. Since it's mouth must be firmly attached to the substrate, there are two openings instead of one for the gills. Through the upper opening, water is taken in. Then it passes over the gills and is expelled through the normal gill openings. This modification proves that algae-eaters are best suited to the type of environment that is difficult to provide in the home aquarium. Algae-eaters frequently refuse to eat anything but algae. Only a small percentage of specimens learn to accept other foods. For these reasons, flying foxes, which in many ways are quite similar to algae-eaters, are preferable sales items. Carry both on a regular basis and see which your customers prefer.

The family Cobitidae consists of three subfamilies. Each has a very distinctive shape and peculiar characteristics. Fighting loaches in the genus Noemacheilus (subfamily Noemacheilinae) are small species with a body shape somewhat between the Botia species and the kuhlii loaches. They are not particularly aggressive even though the name implies otherwise. Lacking the eye spine typical of other loaches, the best they can manage is a few split fins.
The subfamily Cobitinae contains the kuhlii loaches, weather loaches, and long-nosed loaches. These are notorious for burying under the gravel and getting trapped in uplift tubes and under undergravel filter plates. Display them in tanks without gravel and use sponge filters for filtration. Place a few ceramic ornaments strategically since they need cover of some type. There is nothing more frustrating than to walk up to a tank full of these loaches and not see any fish. Your customers must be able to see them, and you must be able to catch them.

The subfamily Botiinae contains the familiar loaches in the genus *Botia*. All of them possess an eye spine located just below each eye. These are used in the wild primarily for defense but in captivity they can inflict serious damage to unsuspecting tankmates. They mix well with catfishes, but large conspecifics should not be kept together since they tend to fight a great deal. A school of small specimens is recommended for species such as *B. macrathantha* (clown loach), *B. horae* (skunk loach), *B. modesta* (yellow-fin loach), *B. sidthimunki* (pygmy loach), and *B. hymenophysa* (banded loach). You will want to offer 2-3 species of *Botia* loaches at all times. These are excellent sellers and act as scavengers in a community tank.

Next month, I will begin to cover the order Siluriformes, or, as we know them - catfishes. This is one of the most little understood groups of aquarium fishes as far as commercial sales are concerned.
A Retailer's Guide to Tropical Freshwater Aquarium Fishes

Part 5

by Edward C. Taylor

The number of families of catfishes varies depending on which expert you consult. I prefer to recognize 31 families - in the single order Siluriformes. Many of these families have representatives in the aquarium hobby. There are well over 2,000 species of catfishes, so it would be rather difficult to go into detail in the next two installments.

What can be said in general about catfishes? Virtually all of them possess barbels - those feeler-like structures around the mouth used in a variety of ways. Many catfishes have an adipose fin revealing their relationship to the characid fishes. Scales are totally absent, but several families have representatives with bony plates. In the aquarium, catfishes are thought of as scavengers, living near the substrate, and subsisting on whatever nourishment they can root from the gravel. While this statement is partially true, there are many catfishes that spend most of their time in mid-water. Also, in order to prosper, they need to receive food items directed specifically toward them.
Catfishes are perhaps the single largest untapped resource in the vast array of tropical freshwater aquarium fishes. Most dealers treat these fishes with a great deal of disdain. They are usually recommended to clean algae from tank surfaces and eat excess food. If handled properly, catfishes can be a major source of revenue and entire aquarium communities can be built around them. In order to merchandise them as major sales items, you must display them properly and provide accurate identification. Hobbyists who collect catfishes like some people collect stamps, search for the rare and unusual species that frequently bring a premium price. These customers want to know the scientific name of each fish, where it comes from, and how to maintain it. Expensive catfishes (over $10.00 retail) should be given their own aquaria (appropriate to their size) and recommended to interested parties as showcase items that will be the focal point of their tank. In other words, catfishes can be kept in specialty tanks just like African rift lake cichlids. A catfish community tank is a viable option for many of your customers. You may want to create a "catfish section" in your fish display to encourage sales of these Siluriformes.

There is such a great diversity of catfishes that feeding and maintaining them can be somewhat complicated. The following discussion of the major groups should be of some help.
In Asia, there are four closely related families of catfishes whose representatives all inhabit swift-moving streams in mountainous regions. These are collectively known as hillstream catfishes (much like hillstream loaches), and they belong to the families Amblycipitidae, Akysidae, Sisoridae, and Olyridae. The only genus from these families commonly seen in the trade is Glyptothorax (family Sisoridae), and these fishes are referred to as buffalo cats or mustached cats because of their thick maxillary barbels which resemble a handle-bar mustache. Keep them in clean water, well-oxygenated with a fine substrate material. They prefer frozen foods and don't survive long on commercially prepared dry foods.

The Siluriformes offer the only fish banned from importation and sale in the United States by the Federal Government. This is the albino clarias, Clarias batrachus, popularly known as the walking catfish. At one time, this fish was a good seller but the problems it was causing in Florida were significant, and it is a fish the trade has learned to do without. Unfortunately, like most federal laws this one fails to cover numerous other species of Clarias which are, therefore, technically legal to sell. If you elect to offer such fishes, be prepared to prove to uneducated authorities that the species you are carrying are legal. The family Clariidae also includes some eel-like species from Africa in the genera Gymnallaben and Channallaben.
A very close relative of the clariid catfishes is in the family Heteropneustidae. *Heteropneustes fossilis* is known as the stinging catfish, and for good reason, since it is probably the most venomous freshwater fish in the world. It comes from India and Sri Lanka and can deliver a sting that is excruciatingly painful and may cause a serious infection and slight nerve damage. These fishes resemble *Clarias* except they possess a small dorsal fin set well forward on the body. Sell these only to advanced hobbyists who are responsible enough to safely handle the fish. Never - place your hand in a tank with this fish and never hold your hand near a net when this fish is inside. *H. fossilis* is sometimes sold as an eel catfish or midnight catfish (in reference to its solid dark brown color).

There are two families of catfishes that inhabit primarily marine waters with a few species being found in brackish or even fresh water. The family Plotosidae contains the true eel catfishes. Its most common representative is *Plotosus lineatus*, the coral catfish, which is a totally marine species well known for its venomous nature. All freshwater species of plotosids come from Australia and they can be recognized by their tadpole-shaped body with the circumcaudal tail that is actually a fin formed by joining the second dorsal, caudal, and anal fins. Fishes in the genera *Neosilurus* and *Tandanus* will be available infrequently but should sell well as oddballs or specialty items. They must be kept as brackish water fishes and be sure to advise potential customers of their stinging ability.
The family Ariidae contains the sea catfishes but many species enter brackish or fresh water. From South America, the silver-tipped or shark catfish, *Arius jordani*, has become a popular import. It prefers brackish water and can grow to well over a foot in length. Once again, this fish can deliver a painful wound. It is an excellent species for a Neotropical community tank with large fishes. No special feeding is necessary since it's a true scavenger. Keep a few of these on hand at all times.

A very small but popular family of catfishes is Malapteruridae, containing the two species of electric cats from Africa. These are capable of producing a strong electric current and should be considered dangerous when exceeding eight inches in length. They are second only to the electric eel in their current-generating ability - so handle them with care. Always use a wooden-handle net with a frame coated in plastic or resin when netting them. Be sure you are wearing shoes with rubber soles. Actually, the electric catfish only rarely discharges, and it is relatively harmless except for its fish-eating nature. Keep it one to a tank as a specialty item, and try to get a few in every year.

Even though the last few families of catfishes might lead one to believe that most species are dangerous in one way or another, nothing could be further from the truth. Before I discuss the common catfishes, however, there are still a few oddballs to mention.
The family Trichomycteridae contains the so-called parasitic catfishes. While only a few of the species are parasitic in nature, they color the picture for the remaining representatives. Fishes in the genus Branchioica and Vandellia feed on blood and live in the gill cavities of other fishes. They are quite small and imported only as incidentals. The only fishes regularly available from the family Trichomycteridae are in the genus Pygidium. They are sold as kuhlii cats or worm catfishes. Actually, they most closely resemble weather loaches in the genus Misgurnus although they tend to be a bit more colorful. Keep these fishes in bare tanks with sponge filters. They do best when kept in small groups, and they prefer live worms or frozen foods.

The family Chacidae contains two species from Southeast Asia. They are so distinctive that they are immediately recognizable. Frequently called frog-mouthed catfishes, Chaca chaca and C. bankensis have a wide, flattened head with a monstrous mouth. They eat only live fishes which they suck into their huge mouths when an unsuspecting victim swims by. Most of their time is spent laying on the substrate virtually motionless. Needless to say, they are great oddities that should be given their own aquarium.
There are several small families of rather large South American catfishes. These are imported occasionally and should be sold strictly to catfish lovers. The family Ageneiosidae contains the only catfishes without barbels. All species (in the genus Ageneiosus) exceed a foot in length, and they are crepuscular feeders that lurk in the shadows awaiting smaller fishes. They are commonly referred to as gaff-top, shark, or sailfin catfishes due to the large dorsal spine. The eyes are small and set far down on the head.

Hypophthalmus edentatus has its eyes even lower on the head than the Ageneiosus species. It belongs to the monotypic family Hypopthalmidae and the common name is obviously low-eyed catfish. The ageneiosid catfishes are also referred to as low-eyed cats on occasion.

Another monotypic family is Helogeneidae containing the driftwood catfish, Heleogenes marmoratus. It is reminiscent of fishes in the family Auchenipteridae, but the dorsal fin is set farther back on the body and no lateral line is present. Driftwood cats like to hide, so provide sufficient cover to make them secure but not difficult to observe.
Whale catfishes are relatively new items that are just starting to be imported on a regular basis. They have a smooth, round head and naked body and prefer a clean, well-aerated tank with a fine gravel. They are members of the family Cetopsidae (South America) which has four genera with about 12 species. It remains to be seen how popular these fishes will become. Expect to pay a premium price for these unusual fishes. They are offered for sale at between four and six inches in length.

Suckermouth catfishes are not restricted to Central and South America for they occur in Africa as well. The family Amphiliidae contains fishes quite similar in physical appearance to both plecostomus and whiptail catfishes in the family Loricariidae. These stream-dwelling species have a naked body except for a bony head shield. They are relatively small fishes rarely exceeding five inches and they can be kept in most community tanks. Although they will be considerably more expensive than their Neotropical counterparts, you will find them excellent sellers due to their exotic but pleasing appearance. Fishes in the genera Amphilius and Phractura are seen most often.
It's time to discuss some families of catfishes that are better known — in fact — staple items in most pet shops. Grasscutter catfish (*Shilbe mystus*) are from Africa and belong to the family Schilbeidae. They grow to a considerable size and swim constantly in mid-water. Maintain them in schools of 8-12 fish and alternate their availability with a close relative, the iridescent shark (*Pangasius suchti*) in the family Pangasiidae. Both species are recommended only for hobbyists with large tanks and communities of large, aggressive fishes.

There is a small species of catfish among the schilbeids, and it is known as the African glass catfish, *Eutropiellus debauwi*. It is an excellent tankmate for tetras, barbs, and rasboras and appears to be a typical glass catfish at first glance. The true glass catfishes belong to the family Siluridae, however, and they are restricted to Europe (cold-water species) and Asia. A few species of glass catfishes are predators and reach considerable size (*Ompok* and *Wallago*), but the vast majority are small, peaceful fishes in the genus *Kryptopterus*. Although there are several species, they are not particularly easy to identify. These fishes do not prosper unless kept in schools of four or more fish. They live in mid-water, and their strange tail-down swimming style can make them appear sick or injured. Be sure your customers are aware of this behavior. Glass catfishes require a good deal of frozen food in their diet and will benefit greatly from live food. Keep a tank of these fishes in your shop as frequently as possible.
Next month, I will discuss the popular groups of catfishes including the bagrids from Africa and Asia, the mochokids from Africa (Synodontis), as well as the talking catfishes, banjo catfishes, pimelodids, suckermouth catfishes, and armored catfishes from South America.
A Retailer's Guide to Tropical Freshwater Aquarium Fishes

Part 6

by Edward C. Taylor

This month I will cover eight families of catfish - all of which have very popular representatives in the aquarium trade. In fact, these families contain the vast majority of catfishes sold in petshops. To maximize your sales of these fishes, you must display them as you would any major item. Don't relegate them to the status of scavenger - raise them to the status of showpiece. There are probably more rare and unusual species of catfish available than in any other group of aquarium fishes. These are frequently expensive items that must be featured in order to sell. If you follow the recommendations offered in this article, your catfish sales should increase dramatically.

The family Bagridae contains a wide variety of catfishes from both Africa and Asia. Many of these are similar in appearance to pimelodids from South America. To tell the difference, look for nasal barbels (located near the nostrils) that stick up above the head. These are found on bagrids, not pimelodids. Only a few African species are available in quantity. The best known is the aluminum catfish, *Gephyroglanis longipinnis*. Other, seldom seen fishes are in the genera Bagrus, Porcus, Chrysichthys, and Auchenoglanis. African flathead catfishes in the genus Parauchenoglanis are excellent choices for community tanks with medium-sized fishes.
Most bagrids come to us from Asia and two commonly seen fishes are *Mystus vittatus* (striped bagrid) and *Leiocassis siamensis* (Asian bumblebee catfish). There are other species in these genera that are imported as incidentals, or as collector's items. The Asian red-tailed catfish, *Mystus wyckii*, should be given its own display tank and sold to hobbyists looking for a showpiece. Also, the black lancer, *Bagrichthys hypseloopterus*, is virtually a legend that deserves its own aquarium. Single specimens of bagrids need only 10-gallon tanks in prominent locations in order to sell. Small schools of 10-15 fish are the best way to offer the "bee" catfishes and other common species. Remember - all bagrids are prone to getting caught in nets, so capture them in plastic or monofilament nets or herd them into plastic boxes or buckets.

The African catfish family Mochokidae contains today's most popular catfishes - the upside down *Synodontis*. For years, *S. nigriventris* has been an aquarium staple primarily because of its unusual habit of swimming upside down. But virtually all species perform this feat - and there are well over 150 *Synodontis* to choose from. Many of the more strikingly marked fishes such as *S. angelicus*, *S. flavitaeniatous*, *S. schoutedeni*, and *S. multifasciatus* have experienced dramatic price reductions in the past year or two. This puts them in the price range of most customers, and they are easy to feed and maintain. You should have 2-4 specimens of the rarer *Synodontis* available at all times as well as moderate numbers of such species as *S. nigriventris*, *S. nyassae*, *S. pleurops*, *S. notatus*, and the so-
called lace cats \textit{(S. greshoffi} and others). Don't mix different species of \textit{Synodontis} in your shop since it may confuse not only your customers but also your employees. Expensive species should be showcased in their own aquaria and even those kept in schools should not be mixed with other types of fishes. There is no better community tank resident than a \textit{Synodontis} catfish - but not in your shop.

Two closely related families of South American catfishes are the Auchenipteridae and the Doradidae. Fortunately, it is easy to distinguish one from the other. Auchenipterids possess no bony plates (the body is naked) and the lateral line is irregular and dendritic in appearance. They resemble glass catfishes in body shape, but they do possess a small adipose fin. Only a few species are available in quantity - one of the most common being sold as zamora cunchi - obviously a native name. Frequently seen genera include \textit{Tatia}, \textit{Centromochlus}, \textit{Auchenipterus}, and \textit{Trachelyopterus}. A true collector's item is the jaguar catfish, \textit{Liosomadoras oncinus}, and you will be able to sell everyone you can obtain - at a premium price. This fish is quite unusual because its taxonomic position is directly midway between the auchenipterids and the doradids.
The family Doradidae contains the talking catfishes, so named because of their ability to produce a croaking sound by moving their pectoral fins back and forth (actually two bones rubbing together). They possess a thick bony shield and bony plates across the dorsal surface and down the flanks. The lateral line is protected by plates sporting spines. Needless to say, these thorny catfishes can easily become entangled in a net.

Common species of talking catfishes include the striped and spotted raphael. These should be carried in small numbers on a regular basis. They only reach 4-5 inches in length, but not all doradids remain so small. *Oxydoras niger*, the black doradid, may grow well over 30 inches and even though it is a vegetarian, it is suitable only for the largest aquaria. The same applies to members of the genus *Hassar* which are commonly known as Sierra Nevada catfishes.

Up until two years ago there were only two types of banjo catfishes offered for sale. These were the common banjo, *Bunocephalus knerii*, and the humped banjo, *Agmus lyriformis*. The South American family Aspredinidae is composed of two subfamilies, however, and recently a beautiful representative of the subfamily Aspredininae has become available. It is *Platystacus cotylephorus*, the mottled whiptailed banjo catfish. The anal fin has over 50 rays, and this separates it from the other subfamily (Bunocephalinae) members which possess a short-based anal (12 rays or less). No matter which banjos you offer for sale, they should be kept in tanks with only a thin layer of
gravel so they cannot bury themselves out of view. Always use power, box, or sponge filters and keep the fishes well fed on frozen foods and live worms. Banjo catfishes are consistent sellers if the customer understands they are more than scavengers. In fact, they are poor scavengers since they rarely eat prepared foods.

If you are looking for diversity, the Neotropical catfish family Pimelodidae has over 300 species to offer, some of which reach a considerable size. Several species of shovel nose catfishes are popular with aquarists who own large tanks. You should offer at least one representative from this group at all times - or - as an alternate choice, one of the larger pimelodids without the distinctive snout. Some examples include Sorubim lima (common shovel nose), Pseudoplatystoma fasciatum (tiger shovel nose), Perrunichthys perruno (zuni grito), Phractocephalus hemiolopterus (red-tailed catfish), Goeldiella eques (oddtailed catfish), and Callophysus macropterus (vulture catfish). There are many other large pimelodids and all of them should be offered as special purchases for community tanks with aggressive fishes.
Pimelodids also come in small sizes, one of the most popular being *Pimelodus pictus*, the angelicus catfish. You should have a small school of 15-20 fish on display as often as possible. You will also see *Pimelodella gracilis*, the one-stripped pimelodid, on a regular basis. Unfortunately, it is a rather drab species that does not sell well. *Pimelodus clarias*, on the other hand, is reminiscent of *Mystus vittatus*, and can be alternated for sale with *P. pictus*. The South American bumblebee catfish, *Microglanis poecilus*, is probably the smallest pimelodid commonly offered for sale. Its beautiful marbled pattern makes it a popular choice.

Pimelodids are at the top of the list as far as shredding nets is concerned. Always catch them in plastic boxes or bags and recommend that your customers do the same.

There are two families of catfishes left to discuss. Both are known as armored cats because their bodies are covered with a series of bony plates. These are undoubtedly the best selling catfishes in the aquarium trade. The family Loricariidae contains the suckermouth armored catfishes. Over 50 genera and 400 species of these dorso-ventrally compressed fishes exist, and it is exceedingly difficult to identify individual species. In fact, even pinning down a specific genus can be a major problem. The common plecostomus-type loricariids are sold simply as plecostomus, and they are treated strictly as scavengers. This function they perform adequately, and you can place one or two in every tank containing schooling fishes. Don't expect to sell them
in large numbers using this technique, however, since customers tend to overlook them, and you would certainly be reluctant to place a label on every tank containing a plecostomus or two. The problem with plecostomus is they are rather drab and people tend to consider them as necessary evils rather than fish to be cultured and appreciated. You can overcome this impression by offering for sale the more unusual species such as Panaque nigrolineatus (royal plecostomus), P. suttoni (blue-eyed plecostomus), Pterogoplichthys gibbiceps (spotted sailfin plecostomus), and P. anisitsi (snowking plecostomus). Since plecos are primarily plant eaters, they have a highly convoluted and elongated intestine. Wild fishes are frequently loaded with gut parasites and when these multiply sufficiently, the fish dies. Be prepared to treat these fishes in order to kill these dangerous organisms.

Unless there is a lot of excess food, loricariids will not get enough to eat as scavengers. Feed them specifically using leaf lettuce and sliced zucchini weighted so it will sink to the substrate. Recommend to your customers that they feed the same foods in addition to the normal aquarium fare.
The following information may be of some help in identifying loricariids. *Ancistrus* and *Xenocara* species are typically sold as bristle-nosed plecostomus. *Loricaria* and *Sturisoma* species are known respectively as whiptails and royal or highfin whiptails. *Farlowella* species are called twig catfishes and *Chaetostoma* species are naked-nosed plecostomus. *Otocinclus* are, of course, dwarf plecostomus, and *Pterogoplichthys* are sailfin plecostomus. Normal plecostomus-like species are in the genus *Hypostomus*, and over 20 species from this taxon may be available at one time or another. Any loricariid of six inches or more should be displayed in its own small tank and sold as a showcase fish - not a scavenger. Treat them as show specimens - not scavengers and your customers will respond in kind.

Finally, we reach the family Callichthyidae which contains a few species of armored and porthole catfishes in the genera *Callichthys*, *Hoplosternum*, and *Dianema*. Also, the very fishes that are the symbol of catfish in the aquarium hobby are members of this family - the *Corydoras*. These cute little creatures rarely exceed three inches in length and every fish keeper has owned a *Corydoras* at some point in his aquaristic life. Strictly South American in distribution, there are over 100 species of *Corydoras* and at least 50 of these are imported at one time or another. Only a handful of the species are bred in captivity so it is necessary to carry wild-caught fishes. You will be purchasing *Corydoras* in quantities of 10-50, and these should be kept in single species tanks. Never mix them together, leave that for your customers in their aquaria at home.
Keep 6-8 species of Corydoras on hand at all times. Some hobbyists will collect Corydoras like stamps, trying to accumulate as many species as possible. Obviously, the more decorative fishes will be the best sellers. Even though C. aeneus, the bronze Corydoras, is the most commonly available species, it is a very drab fish that would not sell nearly so well if it were not so readily obtainable and relatively inexpensive. As catfishes go, Corydoras make the best scavengers since they remain small, eat anything, and live on the substrate. Don't encourage the sale of scavengers, however, encourage the sale of catfishes. Make your customers aware of the vast array of catfishes available for their tanks. You will create business by creating catfish enthusiasts.

Next month, we will finally slip out of the Ostariophysi and head into a hodgepodge of small groups including the vastly underrated killifishes in the family Cyprinodontidae.
A Retailer's Guide to Tropical Freshwater Aquarium Fishes

Part 7

by Edward C. Taylor

The order Atheriniformes contains a number of families that few people realize are closely related. First of all, in the suborder Exocoetoidei, there are two families whose representatives are quite distinctive due to their elongated jaws. These are the halfbeaks and needlefishes. Next, the suborder Cyprinodontoidae contains almost all the familiar livebearing families as well as the killifishes and ricefishes. Finally, the suborder Atherinoidae consists of the rainbows and silversides—an assemblage of fishes that may prove to be the next "New Frontier" in retail fish sales. Let's look at these groups one by one.

Freshwater halfbeaks belong to the family Hemirhamphidae. There are several genera but the only freshwater representatives are members of the genera *Dermogenys*, *Nomorhamphus*, *Hemirhamphodon*, and *Zenarchopterus* all of which are found in Southeast Asia and the East Indies. Actually, the only species offered for sale on a regular basis is *Dermogenys pusillus*, the common halfbeak. It is a livebearer like the other freshwater species, and there is obvious sexual dimorphism. Males have a squat, rectangular-shaped anal fin, and females have a wedge-shaped anal similar to any common livebearer like mollies or swordtails.
Halfbeaks swim almost exclusively at the surface, and they are excellent jumpers. They rarely exceed 2 1/2 inches in length, and they are not a threat to any other fishes except those small enough to fit in their mouths. In fact, halfbeaks are quite vulnerable to attack by other fishes since their entire life is spent at the surface. You should display these fishes in long, low tanks with the water level dropped a few inches from the top. Corydoras catfishes are excellent tankmates but few other fishes are recommended. Live plants (especially those that float) will keep jumping to a minimum. Just be sure you don't obscure the fishes with too many plants. In order to thrive, halfbeaks will need some live foods in their diet. Also, they prefer to live in small schools of 6-12 fish. Try to sell them in groups of no less than four.

Occasionally, you may be able to offer Celebes halfbeaks for sale (genus Nomorhamphus). These species can reach four inches and their snouts are not perfectly straight. In fact, they are bent backwards somewhat and have the appearance of being damaged. Be sure your customers appreciate this condition as a naturally occurring phenomenon - not a fault.

The family Belonidae contains the needlefishes which look for all the world like gar. They feed and behave in somewhat the same fashion, so this is a clue they are predatory and require a tank to themselves. Most species are marine but a few occur in brackish and fresh waters. You are likely to encounter only
Xenentodon cancila, the silver needlefish, from Southeast Asia. It may reach a foot in length and will accept only live or freshly-dead fishes as food items. This is strictly a brackish-water species, and it should be sold only to customers willing to provide both adequate space and food. Keep it in long, low tanks with tight-fitting covers since it is a prodigious leaper. Also, in order to prevent damage to the fish's delicate snout, position the aquarium where the fish cannot be easily frightened and bang into tank walls.

Members of the suborder Atherinoidei are easily identified by their double dorsal fins, the first being small and spiny, the second, long-based and composed primarily of soft rays. Rainbows have been offered for sale in the aquarium trade since the 1930's, but it is only the past few years that have seen any major developments in the number of species available. The family Atherinidae is mostly marine but a few species inhabit freshwaters. Unfortunately, there are only two of these seen with any regularity. Best known by far is the Celebes rainbow, Telmatherina ladigesi. It is a beautiful fish, easily sexed, and makes an excellent choice for a community tank with small species. Display it in single species tanks with 25 or more fish and suggest that your customers purchase at least four at a time.

Another atherinid that is all too infrequently offered for sale is Bedotia geayi, the Madagascar rainbow. It is quite similar in appearance to standard rainbows but a bit more elongated. Males have red-tipped caudal fins, females have white. These fish must be kept in schools of six or more, and they can
grow to over five inches in length. They prefer a bit of marine salt in their water, but not nearly as much as a brackish-water species.

Most species of rainbowfishes in the aquarium trade are in the family Melanotaeniidae. They are native only to Australia and New Guinea with the new species coming from the latter. Around 1980, the red New Guinea rainbow, *Glossolepis incisus*, was introduced. It has proven extremely popular even though it grows quite large. New species of *Melanotaenia* you can expect to see include *trifasciata*, *goldiei*, *herbertaxelrodi*, *bosemani*, and *parkinsoni*. These are easily pond-raised in Florida, and it is just a matter of time until they are available in large numbers.

Keep the different species in separate tanks since females can be easily confused. A 30-gallon tank with 30-50 fish makes an outstanding display. You should carry any species in fairly large numbers, but rotate your stock from time to time, offering first one fish and then another. *Corydoras* or other small catfishes can be mixed with these in your store tanks, but don't add any schooling species. Leave that up to your customers in their aquaria at home. Rainbows are possibly the single type of fish best suited for life in captivity. They are virtually non-aggressive and will eat any food offered to them. Also, they tolerate a wide range of water conditions, and they are quite colorful - hence the name.
Other genera of rainbows you may expect to see include *Popondetta*, *Iriatherina*, *Chilatherina*, and *Pseudomugil*. Most of the species in these taxa are small and a bit more delicate than their relatives. They should be displayed in small tanks with live plants and offered live foods.

The suborder Cyprinodontoidei contains six families of fishes that are seen within the aquarium trade. In four of these, the fishes are livebearing in nature. I will discuss these in next month's installment. The rest of this article will deal with the so-called egglaying toothcarps in the family Cyprinodontidae and a small family of Southeast Asian fishes known as medakas. There are only 7-8 species of medakas in the Family Oryziatidae, but they are sufficiently unusual to be a good seller when they are available. The common name for medakas is ricefishes, and they are all in the genus *Oryzias*. These tiny fishes are no larger than two inches, but any hobbyist who would consider a small species of tetra would do well with ricefishes. In your store, keep them in small tanks (10 gallons) in schools of 25 or more. Since they are inexpensive, no one should complain about buying six or more.
And now - the fishes that somehow missed out on the aquarium trade - killifishes. There are at least 500 species in the family Cyprinodontidae, but only a handful are ever offered for sale in petshops. This is not completely the fault of retailers since killies are rarely available from wholesalers or importers. It is my firm belief that there is a very strong market for these tiny jewels if you are willing to go to the trouble of finding the fish and displaying them properly.

Killifishes are found in warm and temperate waters around the world. Some species are at home in brackish water, others live in water devoid of almost all minerals. A few species reach six inches or more, but the majority are at full size between 2-4 inches. They will eat virtually any food offered, but small live foods keep them in top shape. Most species exhibit enough sexual dimorphism so that it is easy to distinguish males from females. In community tanks with small fishes, killies make excellent tankmates. They are rarely aggressive, but they can take care of themselves.

Some killifishes are annuals in the wild and even in captivity these species live no more than 18-24 months. Most non-annuals will live 4-6 years, so they easily exceed the lifespans of such common aquarium fishes as guppies, platies, swordtails, and bettas. Since the hardiness of killies is not a problem, why then are these miniature fishes so difficult to obtain for resale? The answer lies in their fecundity which is considerably less than many other common aquarium fishes. In other words, killies
are not particularly prolific. Also, they lay eggs over a relatively long period of time rather than all at once. Fry of different sizes are competing for food, and invariably, the smaller fry lose out and are themselves consumed by their larger relatives. This prolonged spawning technique is not conducive to intense aquaculture. As a result, there is very little captive breeding of killifishes on a commercial scale.

A few killies reach the trade from the wild, but the only species to do so consistently are members of the genus *Aplocheilus*. These are the only representatives from Southeast Asia, but they are exceptionally hardy fishes that take heat quite well. Africa is the home of the truly colorful species in the genus *Aphyosemion*. Most dealers have sold a few golden lyretails (*Aphyosemion australe*), but that's about the only member of the genus available from standard sources. Annuals in the genus *Nothobranchius* are just as colorful and would sell just as well - if they could be found. Another African genus, *Epiplatys*, is seen on rare occasion in the presence of *Epiplatys sexfasciatus* and *Epiplatys annulatus* (clown killifish).

South America sports several genera of annuals including *Cynolebias*, *Pterolebias*, and *Rachovia*. Most of these prefer cool water between 72-75°F, but other than this drawback, they are no more difficult to maintain than a cardinal or neon tetra. As an example, the Argentine pearlfish, *Cynolebias nigripinnis*, is a great seller, but rarely available. Non-annual Neotropicals are primarily in the genus *Rivulus*, and a few of these are quite colorful. There are several species of killifishes from North
America that would be excellent as petfish, but these are consistently overlooked except for the flag fish, *Jordanella floridiae*.

Many dealers shy away from selling killies for the same reason they are reluctant to sell African Rift lake cichlids. They have trouble identifying and/or distinguishing one species from another. Once this bridge has been crossed, the next problem is how to display killies to promote the greatest number of sales. The answer is to create a special section in your fish department for small or miniature species. Tanks should be no larger than 10 gallons and down to 2 1/2 gallons in size. Keep only one species of killifish per tank in quantities of 5-10 pair. Live aquatic plants are very important to make the fishes feel at home. Use only sponge filters so there is no place for them to become trapped. Since killies are known for their ability to jump through the smallest hole, their tanks should be tightly covered and the water level dropped a few inches from the top. Even though they are small, killies are not inexpensive, so you can make a healthy profit in a small amount of space. You will also sell your killie customers a good deal of live and frozen foods. Actually, if you can promote the keeping of killies among your customers, you can expect increased sales of many items including tanks. Killies are the type of fish that promote compartmentalization and that means your customers will be adding tanks.
Finding killies to stock your shop may take a bit of detective work. You should first try your local distributors, then livestock wholesalers in other locales. Ask your customers if they know of anyone breeding killies, and local aquarium societies may have members who produce excess fishes. Finally, you can join the American Killifish Association (AKA) and receive the "Fish and Egg Listing" which offers many species for sale. Perhaps you will be able to strike a deal with one of the breeders. Expanding your livestock sales base is important to any growing business - and killies have a part to play - if you are up to it.

Next month, I will cover in detail the livebearing fishes which are perhaps the backbone of the entire tropical fish industry.
A Retailer's Guide to Tropical Freshwater Aquarium Fishes:

Part 8

by Edward C. Taylor

The suborder Cyprinodontoidei contains both egglaying and livebearing families of fish. Last month I covered the egglaying families including ricefishes and killifishes. Now, it's time to look at the four livebearing families. Three of these are little known in the aquarium trade, but the fourth is a blockbuster. I am speaking, of course, about the family Poeciliidae. This taxon contains all the fishes so familiar to every dealer and every hobbyist.

What would the aquarium trade do without livebearers? It would be hard to imagine walking into a petshop and not seeing their brilliant colors in a seemingly endless number of combinations. And where do most of these genetic wonders come from? Why, Florida, of course, and for over 40 years fish farmers have experimented to try and produce bigger and better livebearers. When it comes to these fishes, the U.S. does not have to depend on other sources. And for this reason alone, the popularity of domestic livebearers can be assured. If there is a completely dependable supply of a fish, it will find its way into every petshop in the country.
Pond culture in Florida is particularly well suited to the production of livebearers. If the pools are covered in the winter, growth and reproduction can continue without interruption. The water and soil combination seem to work a certain magic on the fish. Colors come out vivid and fully saturated. There is probably not a single tropical fish lover who has not kept at least one of the big four - guppies, platies, swordtails, and mollies. Let's look at these four types of fish in detail for they should make up a major segment of your fish sales.

Genetic work on livebearers began in earnest in the 1930's. The wild swordtail, Xiphophorus helleri, is a green fish from mountainous regions of Mexico. Red swordtails are strictly a creation of the breeder's art, and in order to produce this variety, it was necessary to go outside the species gene pool. The red was supplied by none other than the common platy, Xiphophorus maculatus. That's right - today's modern swordtail is a hybrid of two separate species. Enough generations have passed so that there can be no mistaking one for the other except in the case of females. In your shop, never mix platies with swordtails for you may not be able to tell platy females from swordtail females.

Many of your customers will be totally fascinated by the livebearing concept - and they will tend to specialize in these fishes. Be sure your displays are arranged so as not to confuse them. Keep only one variety of livebearer in a tank and don't locate similar strains in close proximity.
There are more types of swordtails available than any other of the big four. You could probably count 40 different varieties if you include the fancy fish with long, flowing fins. Keep a stock of 10-25 pair of any given strain. Since most swordtails grow to at least four inches in length, you will need 30 or 40-gallon tanks to display them to best advantage. Be certain your employees can distinguish one type from another. Swordtails are famous for their leaping ability, so keep the tanks tightly covered.

How many strains of swordtails should you stock? Well, you know your customers best. Some stores sell large quantities of the bread and butter varieties, others specialize in the so-called fancy types. I recommend you keep a minimum of six common types and two fancy ones. These numbers should fluctuate depending on your particular clientele.

There are two species of platies, *Xiphophorus maculatus* and *X. variatus*. These have been manipulated into such a large number of strains that it is now difficult to tell one species from the other. Originally, of course, *X. variatus* was a spotted fish with numerous black dots scattered about the body. It is best to accept the word of your supplier when he calls a particular strain a marigold variatus - or whatever.
Today's market seems to favor swordtails over platies, and, indeed, a fair number of platies are now imported from Southeast Asia. Since platies are substantially smaller than swordtails, you can maintain them in smaller aquaria. Fifteen or 20-gallon tanks will prove quite satisfactory for 20-30 pairs of fish. Two or three types of common platies and two variatus should be stocked at all times, and don't forget a fancy variety or two.

For your customers with community tanks of 30-gallon capacity or larger it is acceptable to recommend swordtails as well as platies. In smaller tanks, however, platies are a better choice since they take up less space and can be kept in greater numbers. Two pairs of swordtails plus a variety of other fishes are just about all a 20-gallon home aquarium can accommodate. Also, try to discourage hobbyists from mixing platies and swordtails if they are seriously interested in breeding the fish.

The guppy, *Poecilia reticulata*, was at one time king of the aquarium fishes. But today, it is just another livebearer, and, in fact, one that has experienced a substantial decline in popularity over the past ten years. Guppies are not a perfect fish for the average community tank. Instead, they do best when kept by themselves or with other miniature species. Selling guppies can be accomplished in one or more ways. First, they are excellent feeder fish, especially if a small size is desired. Most of the fancy guppy strains are imported from Southeast Asia, but feeder guppies are domestically raised. Second, you can
display show guppies as an integral part of your livebearer section, however, using this technique will probably not sell a lot of guppies.

I recommend a special section for fancy guppies. Employ small tanks of 5 and 10-gallon capacity that are set up with gravel and live plants. Stock each tank with 10-20 pair of fish. Try to cycle new or different varieties through these tanks on a regular basis, perhaps placing them in a miniature fish section. If you want guppy sales to prosper, you will have to use a little creative merchandising.

The final type of common livebearer is the molly. There are several species of mollies but only three play a major role in the aquarium trade. Unfortunately, these species have been hybridized with one another to the extent that it is difficult to distinguish one from the other. The smallest species is Poecilia sphenops, and it is best represented by the black molly. There are two species of so-called sailfin mollies, P. velifera and P. latipinna. Although the wild coloration is green, a number of different varieties have been developed from this basic fish.

Mollies grow as large or larger than swordtails so they should be given adequate display area. It is essential that you educate your customers as to the proper environment for mollies. They need clean, alkaline waters with a bit of marine salt added and keep them warm, between 78°- 82°F. You will want to stock at least four types of mollies including a fancy lyretail variety.
There are so many strains of the four common livebearers that all you can hope to do is stock a representative sample. Try to keep informed about new varieties becoming available and make a special purchase of these. Hobbyists are always on the lookout for something new, and your initial sales of such items should be brisk.

There are approximately 150 species of livebearers in the family Poeciliidae. Thus far, I have discussed only seven of these. The remaining fishes are little known in the aquarium trade, but that doesn't mean they won't sell - if you can find a supply. Since most of the exotic poeciliids are native to Central America, there is no commercial supply. You will have to look to hobbyists who are breeding desirable species. The following list of fishes are those I consider to have significant commercial potential: (1) Alfaro cultratus, (2) Girardinus metallicus, (3) Phallichthys amates, (4) Phalloceros caudimaculatus, (5) Poecilia melanogaster, (6) P. vittata, (7) P. nigrofasciata, (8) P. petensis, (9) P. versicolor, (10) Priapella intermedia, (11) Xiphophorus montezumae, and (12) X. nigrensis.

The family Goodeidae contains fishes commonly known as placental livebearers, or simply, goodeids. They are restricted in distribution to west-central Mexico. Here, they underwent explosive evolution and became the dominant group of fishes. There are approximately 17 genera with 35-40 species.
Goodeids give birth to live young just like poeciliids, but the fry are twice the size. During development, the embryos receive nourishment directly from the female by means of umbilical cord-like structures known as trophotaeniae. Since the fry are so large, litters are dramatically smaller than in most poeciliids. This immediately makes them less productive. To add to this problem, females do not exhibit superfetation, meaning the ability to store sperm. So, for every litter, there must be a new insemination.

Distinguishing poeciliids from goodeids is quite simple for males of the latter lack a gonopodium. Instead, the anal fin is notched with the first 6-8 rays forming a structure known as a pseudogonopodium. Females have a typical wedge-shaped anal fin.

Most species of goodeids reach no more than three inches in length. They are a bit more aggressive than poeciliids, however, so it is not a good idea to mix the two types. Still, goodeids do well in a community tank with other fishes, as long as the water is kept alkaline and not too warm (75° – 78°F.).

There are several species of goodeids that will sell quite well, but once again, these fishes are difficult to obtain. Thus far, no commercial breeder has met the challenge of producing goodeids in sufficient quantity to satisfy the demand. I would recommend the following species for retail consumption: (1) Ameca splendens, (2) Characodon lateralis (red or black form), (3) Chapalichthys encaustus, (4) Ilyodon xantusi, (5) Skiffia bilineata, (6) Xenotoca eiseni, and (7) Xenotoca variata.
Goodeids, on the whole, are at this point in time an unknown quantity as far as the aquarium trade is concerned.

There are two families of livebearers left to discuss. Fishes in both taxa exhibit a very peculiar adaptation. In the males, the gonopodium is bent at the posterior end, and it can swing only to the left or right in the direction of the bend. Such males are said to be right- or left-handed. Females have their vents positioned to the left or right of mid-body and can mate only with a male of the contrasting persuasion. The two families are Jenynsiidae and Anablepidae.

There are only three species in the genus Jenynsia, and the common one, J. lineata, is called the spotted livebearer. It comes from Argentina and on rare occasion it has been available through the trade. Look carefully at the male's gonopodium because it is the primary characteristic that distinguishes the fish from a poeciliid.

In the family Anablepidae, there are also three species. Only Anableps anableps is imported, and, of course, it is known as the four-eyed livebearer. Specimens of this strange split-eyed fish usually come in at 2-3 inches of length. These are actually quite young since a newborn can be as large as 1 3/4 inches. Anableps require a very special set-up and a great deal of care. First of all, they must be kept in brackish water like monos, scats, or archerfishes. Select a large, low tank of 20 or 30-gallon capacity and fill it only 2/3 full of water. The fish must be given room to crawl out of water and lay on rocks or other
suitable materials. This simulates their habitat in the wild. Both the water and the associated environment must be kept very warm - 82° to 86° F. Exposure to cooler water frequently causes bacterial infections in the fish, and they can be lost very quickly when this occurs. Recommend *Anableps* only to customers capable of meeting their requirements.

Next month, I will cover a number of odd and unusual families, as well as the brackish-water fishes in the order Perciformes.
To be successful in merchandising the fishes I am about to discuss, you will need two things. First, you must display them properly in a natural setting, of ample size, and with sufficient variety of species to warrant attention. Second, you should have a loyal clientele who frequent your shop in search of the rare and unusual. If your major marketing area is aquatic livestock, you already know the importance of stocking so-called brackish-water fishes. Let's take a closer look.

The order Gasterosteiformes contains several families including the sticklebacks, but the only taxon of interest to the aquarium trade is the family Syngnathidae. This is primarily marine in origin containing seahorses and pipefishes. There are, however, scattered throughout the tropics, a small number of brackish and/or freshwater species of pipefish. These are quite delicate and require their own tank in order to survive. Food is taken from the water by a slurping technique, much like sucking soda up a straw. Live foods are essential, and the fish will die in short order without an adequate supply. You are likely to encounter only a few species, the more common ones include the following: (1) *Syngnathus pulchellus*, (2) *Microphis smithi*, (3) *Dorichthys lineatus*, and (4) *Microphis boaja*. 
The Microphis species grow to at least ten inches, and they are imported at virtually full size. Your best bet on feeding them is baby guppies or live adult brine shrimp. Other pipefishes can take daphnia or brine shrimp nauplii. Display one species to a tank of no more than 15-gallon capacity. You should stock 6-12 at a time, but only carry them on an occasional basis. A teaspoon of marine salt per gallon will be beneficial.

There are several species of eel-like fishes that most people mistake for lungfish or even true eels. These fishes are in the order Synbranchiformes and family Synbranchidae. They lack both pectoral and pelvic fins and the dorsal and anal fins exist only as a ridge. There is a single gill slit located at mid-body on the ventral surface. Synbranchid eels have a distribution similar to that of the arowanas, being found in South America, Africa, Southeast Asia, and Australia. The fishes may be found in fresh or brackish waters, and since they are air-breathers, they can live in stagnant habitats.

Obviously, synbranchid eels are a curiosity that only a few of your customers will find interesting. They grow to at least three feet in length so a large tank is required for long-term maintenance. In your shop, place one specimen to a tank and drop the water level several inches from the top. These fishes are adept at "snaking" their way out of the aquarium, so keep them tightly covered. They will eat virtually any live or frozen foods.
One of the really fascinating things about synbranchid eels is the variety of colors they can exhibit. A single fish may be yellow when small, green at mid-size, and brown with dark reticulations when fully grown. The family contains four genera with about 15 species, but, unfortunately, it is difficult to differentiate one from the other. Probably the most commonly seen species is *Synbranchus marmoratus* from the Neotropics. All of them make excellent petfish, one to a tank, and they can be trained to take food from your hand.

We now move into the largest assemblage of tropical freshwater aquarium fishes — the order Perciformes. It is a highly diversified order, and it is the dominant fish group in many freshwater habitats as well as the coral reefs around the world. There are about 150 families in the order Perciformes and at least 20 of these are represented in the freshwater segment of the aquarium trade. Many additional families have marine species with which you would be familiar.

Fishes may live in (1) freshwater, (2) marine water, (3) brackish water, or (4) a combination of the three types. Technically, brackish water is freshwater that has been invaded by a certain amount of marine water. This type of water occurs where rivers enter the ocean or the ocean intrudes on freshwater bays or bayous. Most brackish-water fishes can live comfortably in any type of water for a period of time. In your shop, however, I recommend that these fishes be maintained with a minimum of one teaspoon of marine salt per gallon. Actually, a specific gravity
of 1.005 is preferable, but this level of salinity might create problems of acclimation for your customers when they take the fish home.

Most of the brackish-water fishes I will discuss can be kept together in a community tank. The exception to this is the family Ambassidae (formerly part of the family Centropomidae) which contains a number of small species commonly known as glassfish. They are typically seen in the 1-2 inch size range, and they must be kept in non-aggressive community tanks.

Fortunately, glassfishes can do without the salt in their water as long as the pH remains alkaline. They mix easily, therefore, with the majority of other schooling fishes, and six or more are suggested. Glassfishes are not particularly good sellers due to their placid disposition and lack of color. A well-planted 10-gallon tank with 20-30 fish will show them off to best advantage. Commonly seen fishes are in the genera Chanda, Ambassis, and Gynochanda.

There are six families of brackish-water fishes that can be mixed together quite effectively. In order to increase interest in these relatively expensive fishes, your best bet is to set up a large display tank. Start with small fishes and let them grow up in this community tank. This will permit you to sell large specimens occasionally since they are rarely imported. Most of the species make excellent pets and some of your customers may prefer to keep them for this reason.
In the family Lobotidae, there are only four species, two marine and two brackish. Tigerfishes in the genus Datnioides are large predacious animals that will eat anything they can swallow. They live in the mangrove swamps as juveniles, but move up rivers as adults. *D. microlepis* and *D. quadrifasciatus* should be carried on a regular basis, perhaps two to four of either one.

Only one species in the family Teraponidae is commonly available. It is *Terapon jarbua*, the targetfish. There are perhaps 40 species of these interesting and unusual fishes, but since most of them are native to New Guinea and Australia they are rare in the trade. These fishes are known as grunters since they have the ability to make a grunting sound by vibrating their swimbladders. In the aquarium, they behave a good deal like cichlids although they will school when small (2-3 inches). Grunters are aggressive but no more so than other fishes being discussed here. If additional species ever reach the trade, they could become quite popular. The targetfish (*T. jarbua*) has limited appeal so stock it only sporadically.

Most people associate the family Lutjanidae with marine fishes, specifically, snappers. There is a single freshwater representative from Southeast Asia known as the river Roman or mangrove snapper - *Lutjanus argentimaculatus*. It is listed as the red dat on most price lists since the small juveniles (1 to 1 1/2 inches) are a pleasing red brown in color. These grow rapidly and turn into very aggressive fish capable of holding their own with any Cichlasoma. When given adequate room, however, they rarely
cause trouble. Just don't keep them with large cichlids since the
cichlids usually start something the snappers will finish. You
will sell a few of these specialty items every year. They come in
small - collected as fry in the mangrove nurseries of the Asian
tropics.

Monos and scats are extremely popular fishes, yet they are
notoriously prone to disease especially when freshly imported.
Your best course of action is to increase salinity to 1.005 and
use a wide spectrum antibiotic. Once they are "cleaned up", these
fishes can live for many years and grow to a considerable size.

The family Monodactylidae has only two species of
Monodactylus - M. sebae and M. argenteus. Their unusual shape
(similar to a marine batfish or freshwater angelfish) is very
distinctive and enhances as the fish grow. Keep both species in
stock as often as possible, but 10-12 of each should be
sufficient. M. argenteus in particular should be sold in groups
of four or more.

The family Scatophagidae contains 2-3 species of interest.
Scatophagus argus comes in two varieties, regular green and ruby-
fronted. Selenotoca multifasciata, the silver scat, is shipped
from Australia and sells very well. Most sought after of all is
Scatophagus tetracanthus, the East African scat. This beautiful
but rare fish is imported primarily in marine shipments from
Mombassa. It must be carefully acclimated to fresh or brackish
water before being sold to non-marine hobbyists. Obviously, your
marine customers will be very interested in the fish as well. If
you can get this fish, be sure to do so.
Sell monos and scats from the same aquarium, but give them plenty of swimming room (30 gallons on up). It's a bit more difficult for brackish-water fishes to make the adjustment to captivity than their freshwater counterparts. Once they are settled in, however, they can outgrow and out-live most other fishes.

The final group of brackish-water fishes is a bit unusual to say the least. Archerfishes in the family Toxotidae are famous for their uncanny ability to shoot down insects above the water's surface. This is their primary means of obtaining food in the wild. In captivity, they will eat a variety of live or frozen foods placed directly in the water. Archers spend most of their time at the surface so they are not competing for space with most other brackish-water species. Although they may reach a foot in length, they are typically imported at 2-3 inches.

Display archers in a single species tank set up so the fish can use their sharpshooting skills. Crickets or flies make excellent targets. Stock them on a semi-regular basis which matches quite well their availability. It is not possible to maintain archers in every brackish-water community tank. Overly aggressive tankmates may harass them and prevent them from feeding properly. Recommend these unusual fish only to experienced aquarists. There is a single species, Toxotes jaculator, available to the trade.
There are several other types of brackish-water fishes that have already been discussed (in previous segments) or will be covered in future installments. All of these should be sectioned off in your fish area and handled as specialty items. Their water requirements are quite similar to cichlids from the East African rift lakes of Tanganyika and Malawi so you can maintain them in the same system. Unless you publicize brackish-water fishes as something special, your sales will not be impressive. Teach your customers about these interesting fishes, and their success will create additional sales.

My subject for the next two parts will be cichlids, one of the major marketing areas in freshwater livestock. There is no doubt that African cichlids offer the retailer a great opportunity for expanding sales. If you are having trouble in this area be sure and read next month's offering.
A very popular but controversial group of aquarium fishes are the cichlids - in the perciform family Cichlidae. These fishes are sold in every petshop in America, but some retailers have centered the majority of their freshwater livestock sales around those species from the Rift Lakes of East Africa. Specialty sales such as this are not for everyone, but for those dealers who haven't cracked the African barrier - you are missing a major marketing area.

Cichlids are spread over virtually the entire African continent. They occur in rivers and lakes as well as the Rift Lakes, but the majority are found in only three lakes; Tanganyika, Malawi, and Victoria. Although Victoria is a very large lake, it is not a Rift Lake for it occupies only a shallow depression in the ground. Very few species from Victoria reach the aquarium trade so I will not include them in this discussion. This installment will cover only the cichlid species from Malawi and Tanganyika. All other cichlids will be discussed next month.
If you want to sell African Rift Lake cichlids, you will have to learn to identify and distinguish the different species. This is a difficult task at best, and there are several ways to go about it. First, pick up the few books that are available and study the photos. Then, check out the popularity of the many species by visiting local wholesalers or even your competitors who carry a full line. Finally, send off for price lists from the companies and fish farms who specialize in Rift Lake cichlids. Once you have a handle on the popularity and availability of the fishes, you will be ready to consider adding them to your inventory.

Lake Malawi is the ninth largest and fourth deepest lake in the world. It is located in East Africa and the country of Malawi borders the western side of the lake. There are two collectors who ship wild-caught fishes from the lake. These fishes represent only a small percentage of the total number sold. The vast majority of fishes come from fish farms in Florida and small commercial breeders around the country. Estimates on the number of cichlid species in the lake run as high as 500, depending on one's definition of what constitutes a species.
As far as retail sales are concerned, Malawi cichlids can be separated into three major groups. These are (1) mbuna, (2) peacocks, and (3) Haplochromis. Mbuna are the small, colorful, rock-dwelling fishes that undoubtedly represent the majority of Malawi cichlids offered for sale. Both the juveniles and adults are quite attractive, and this is an important selling point. There are numerous genera of mbuna, including: Pseudotropheus, Melanochromis, Labidochromis, Labeotropheus, Petrotilapia, Cynotilapia, and Gephyrochromis.

In the wild, the primary food of mbuna is "aufwuchs". This German word describes the algae mat and the organisms living in it that cover the rocks among which the mbuna make their home. Fortunately, no special foods are needed for mbuna and they can live on a staple flake if necessary.

It's not confusing enough that there are many species of mbuna available - there are also many color varieties of some species. A good example is Pseudotropheus zebra which sports no less than 20 color morphs. Not all of these are in the trade, of course, but there are sufficient varieties to make identification a problem. To add to this problem, each type of male may have more than one type of female.
The second group of Malawi cichlids are the peacocks, and they belong to the genera Aulonocara and Trematocranus. In this case, only the males are colorful - but what beautiful fish they are. Peacocks rarely exceed five inches in length, and they are not nearly as aggressive as mbuna. In the lake, most species frequent the area where the rocks and sandy substrate meet, but a few prefer caves formed by the rocks.

Female peacocks are merely silver or gray and it is extremely difficult to distinguish one from the other. Juveniles have a pattern identical to their female parent, so they too are easily misidentified. It is important that you never mix juveniles or females of different peacock species. Males, of course, can be mixed, since their patterns are very distinctive.

The third group of Malawi cichlids to consider are the Haplochromis. There are well over 100 species of these open-water fishes, and they run the gambit in size, disposition, and color pattern. Some are predators that are super aggressive. Some are planktonic feeders that feed only on minute particles in the water column. Others are typical omnivores that make excellent tankmates for all types of Malawi cichlids. Virtually all mature male Haplochromis from the lake attain a beautiful iridescent blue color. Females, on the other hand, are quite drab, being silver or gray with some type of black spots or a horizontal stripe. A very few species have females with a bit of color in the fins. Juveniles are also relatively unspectacular since they mimic their respective female.
The key to selling Malawi cichlids is to display them properly and select the right species at the best sizes. Since mbuna are so colorful when small, they sell best at this size. Larger specimens are more quarrelsome and will certainly require more tank space. This rule applies to domestically raised fishes. There are numerous mbuna still being shipped directly from the lake and sold primarily as adults. These will sell quite well to more advanced customers who are familiar with the different species. The majority of your customers will be looking at the blue, yellow, red, and blotched fishes and not distinguishing one species or color morph from another. It's up to you to educate them.

Peacocks sell best as adults when the males are in full color. If you want to sell juveniles, you should have a large display tank with adult males of various types. This will give your customers an idea what to expect from the fry 6-8 months down the line. Since peacocks aren't particularly aggressive and don't get very large, it is feasible to carry adults of several types, as well as juveniles.

Haplochromis species can get large but they are popular with hobbyists who have big tanks. It is important to have a showcase aquarium stocked with numerous species of adult Haplochromis if you really want to sell these fishes. Since the adults are quite expensive, you should carry a large selection of juveniles and only a handful of adults, preferably the newer species from the lake.
Lake Tanganyika possesses only 150 or so species of cichlids, but the diversity is much greater than that in Malawi. While all the Malawi cichlids are mouthbrooders only about 25% of the Tanganyika species employ this breeding technique. The others are typical substrate spawners. Tanganyika boasts the largest cichlid in the world, Boulengerochromis microlepis which reaches at least 30 inches in length. One of the smallest cichlids also lives in the lake. It is Lamprologus brevis, and it is sexually mature at 1 1/4 inches. This type of diversity can be quite confusing and it is difficult for retailers to know which species will sell and which species will not.

One of the major drawbacks to Tanganyika cichlids is their price which is quite high even for Rift Lake species. There is only a limited amount of commercial breeding of these fishes so many are wild-caught. Europe produces a fair number of tank-raised fry, but again, the price is significantly higher than that of many Malawi cichlids. If you have a sophisticated clientele or your shop is in a major metropolitan area, you have a good chance of selling many Tanganyika species. Otherwise, the average shop will want to concentrate on those from Malawi and phase the Tanganyika species in gradually. This is a case of "never the twain shall meet" for it is highly recommended that neither you nor your customers mix fishes from the two lakes.
Getting to know Tanganyika cichlids is really not as difficult as it is with the Malawi species. First of all, there are fewer species. While some of these have color varieties, many do not. Furthermore, most species are quite distinctive and easy to tell apart.

There are quite a few small fishes in Tanganyika that customers can maintain in tanks as small as ten gallons. Examples include fishes in the genera Julidochromis, Eretmodus, Spathodus, Chalinochromis, Telmatocromis, and the shell-dwelling species in the genus Lamprologus. For larger tanks (20-30 gallons), a number of Lamprologus are suggested as well as fishes in the genera Cyprichromis, Triglachromis, Reganochromis, Limnochromis, Callochromis, and Xenotilapia. Large fishes or those which are very territorial will do well only in tanks of 40 gallons or more. Such fishes include *Tropheus moorii* (up to 20 color varieties exist), *T. duboisi*, Cyphotilapia frontosa, Simochromis species, Cyathopharynx furcifer, Ophthalmochromis species, Lobochilotes labiatus, Petrochromis species, and Cunningtonia longiventralis.

In your shop, if you decide to sell Rift Lake cichlids, you should expect a slow build-up of sales until people have become accustomed to the many species and color varieties. If your competitors have been carrying these fishes, and you have not, it's time to win your fair share of the market. The best approach is to start with a special section devoted exclusively to these fishes. I recommend the following set-up for those of you marking your initial investment in Rift Lake cichlids:
Mbuna
6 - 20-gallon tanks for fry (mixing species allowed)
6 - 30-gallon tanks for adults (mixing species allowed)

Peacocks
4 - 20-gallon tanks for fry (no mixing of species)
4 - 30-gallon tanks for adults (no mixing of species)

Haplochromis
1 - Large display tank for adults (100 gallons or larger)
   (mixing species allowed)
2 - 40-gallon tanks for adults (no mixing of species)
4 - 20-gallon tanks for fry (no mixing of species)

Tanganyika - small species
4 - 20-gallon tanks (mixing species allowed)

Tanganyika - medium species
4 - 20-gallon tanks (mixing species allowed)

Tanganyika - large or aggressive species
1 - Large display tank (100 gallons or larger) (mixing species allowed)
4 - 30-gallon tanks (or larger) (mixing species allowed)

I realize this may seem to represent a major commitment, but considering the number of fishes available you will be hard pressed to offer a representative selection even with this many aquaria.
Remember that Rift Lake cichlids like hard, alkaline water with a water temperature of 78–82°F. You will want to use marine salt in their tanks and possibly dolomite or crushed coral as a substrate material. As long as the water stays clean and free of pollutants, the health of these cichlids is assured.
A Retailer's Guide to Tropical Freshwater Aquarium Fishes

Part 11

by Edward C. Taylor

In the previous installment, I covered the Rift Lake cichlids from Lakes Malawi and Tanganyika. Now it's time to look at all remaining species. Before doing this, however, let me give a brief accounting of the zoogeography of the family Cichlidae.

Cichlids are distributed in the New World (Neotropics) from the Rio Grande River (Texas cichlid) to the Rio Parana in Argentina. In Central America, cichlids and livebearers are the dominant freshwater groups. Since there is no commercial collection in this region, many of these species are unavailable. Such is not the case with South American cichlids. Angels, discus, dwarf cichlids, and many species of Cichlasoma, Geophagus, and Aequidens are all commonly imported.

Cichlids are spread over virtually the entire African continent. They occur in rivers and lakes as well as the Rift Lakes, but the majority are endemic to only three lakes; Malawi, Tanganyika, and Victoria. As far as riverine cichlids are concerned, the most popular species come from West Africa and the Congo (Zaire) River. In Asia, there are only two species, both in the genus Etroplus.
It's obvious that Africa and South America are the major sources for cichlids in the aquarium trade. You will be able to obtain a representative selection of Central American species only from fish farms in Florida or small breeders around the country. Many of these cichlids from Middle America grow quite large and are very aggressive. Still, some have been important items in the Florida inventory since the 1930's and 1940's. Those Cichlasoma species commonly available include the following:

(1) \textit{C. meeki} - Firemouth
(2) \textit{C. octofasciatum} - Jack Dempsey
(3) \textit{C. nigrofasciatum} - Convict & Pink Convict
(4) \textit{C. citrinellum} - Red Devil
(5) \textit{C. labiatum} - Lobey-lipped Red Devil
(6) \textit{C. cyanoguttatum} - Texas Cichlid
(7) \textit{C. trimaculatum} - 3-spot Cichlid
(8) \textit{C. maculicauda} - Black-belt Cichlid
(9) \textit{C. salvini} - Salvin's Cichlid

There are numerous cichlids from Central America that are bred by only one or two small commercial breeders and a number of hobbyists. If you search carefully, you may be able to find the following species:
(1) *C. urophthalmus* - 7-stripe Cichlid
(2) *C. bifasciatum* - 2-stripe Cichlid
(3) *C. carpinte* - False Texas Cichlid
(4) *C. friedrichsthalii* - Freddie
(5) *C. umbriferum* - Freckled Cichlid
(6) *C. nicaraguense* - Blue-eyed Cichlid
(7) *C. sajica* - Blue Convict
(8) *C. synspilum* -
(9) *C. managuense* -

In addition to these *Cichlasoma* species, there are three Central American cichlids in monotypic genera. A very common fish is *Herotilapia multispinosa*, the rainbow cichlid. It is a popular choice since it remains small. *Neetroplus nematopus* is a nasty little species popularly known as the parrot cichlid because of its small beak-like mouth. It is unusual, but highly aggressive and your customers may return it for something less lethal. Finally, there is *Petenia splendida*, the bay snook, one of the largest cichlids in the world reaching almost two feet in length. In spite of its size, it is a peaceful species that mixes well in a large community tank. Just be sure its tankmates are large enough to avoid being swallowed. I can recommend this species without reservation for someone who wants a large petfish that is not going to knock off everything in its tank.
You will be able to purchase both adult and juvenile specimens of Central American cichlids. Carrying a large selection of adults will take up a good deal of space and may not prove productive. Instead, stock a show tank with adults of various species. These will help to sell the juveniles which you should segregate in separate tanks. Use 6-8 20-gallon tanks to rotate the various species available, but also allow 2-3 40-gallon aquaria for adults.

South American cichlids are a good deal more variable in size, shape, and disposition than their relatives to the north. Many of them are available as wild-caught fishes rather than captive-raised. While a few Geophagus and Aequidens can be purchased from Florida, many more must be imported. You will want to carry two or three representatives from each genus. Be sure they are given adequate space, a gravel substrate, and power filtration. The South American Cichlasoma available include the following:

(1) C. festivum - Festivum
(2) C. facetum - Chanchito
(3) C. festae - Red Cichlid
(4) C. coryphaenoides - Chocolate Cichlid
(5) C. severum - Severum & Gold Severum
(6) C. psittacum - Parrot Cichlid
While the Central American members of this genus (Cichlasoma) are quite aggressive, only C. festae exhibits this trait among the South American species. You can, therefore, sell adults just as easily as juveniles when it comes to these fishes. Stock festivum and severum on a regular basis and the others sporadically as the demand dictates.

Most of your angelfish (Pterophyllum scalare) will come from Florida, Southeast Asia, or local breeders. There are numerous strains including silver, black, black-lace, marble, gold, zebra, and half-black. These come in both regular and long-finned varieties. You can't carry all of them at once, but you should always stock 4-6 types. One of the hottest selling sales items is adult angels, but they are not easy to obtain. Try to secure a reliable source by cementing a relationship with a breeder who will sell old breeders or larger culls. In your shop, you can maintain adult angels and discus in the same large display tank.
While discus may be king of the cichlids, they are not an easy fish for the average hobbyist to maintain. They are picky eaters and very demanding in water quality. Also, the water temperature should never sink below 82° F. Based on these difficulties, and other considerations, I recommend caution in selling discus to your customers. Although there are several color strains of discus available, those coming out of the Far East are suspect in regard to their parentage. Frequently, a brilliantly hued juvenile turns into a drab, mid-size fish before the true adult colors are revealed. Customers may be very dissatisfied with such peekaboo discus. Adult wild specimens are fairly expensive, but at least their colors will not fade.

You should hold all adult discus in quarantine for a minimum of two weeks before selling them. This is best accomplished in an area not open to the public. Before placing the fish on sale, be sure they are feeding properly and their color is good. Remember - there are probably more customer complaints on discus than any other fish species. If you are going to sell a lot of discus, you must be prepared to offer accurate advise on their maintenance.

A really hardy fish you should stock in your shop is the Uaru. It is beautiful as a juvenile and quite attractive as an adult. This close relative of the discus is not nearly as difficult to keep, but it has many of the same requirements.
The oscar, *Astronotus ocellatus*, is a large, predatory cichlid from South America. It is a very common aquarium fish and Southeast Asia has developed red, tiger, gold, and long-finned varieties which all sell quite well. Frankly, it is my belief that oscars actually reduce fish sales. Once a hobbyist has an oscar that grows up and eats or kills most of his other fishes, he is apt to do one of three things. He may: (1) bring the oscar back and try to unload it on you, (2) keep the oscar as a petfish and never buy another fish because his tank is full, or (3) give up fish in disgust because no one told him the damage an oscar can do. I recommend you carry the oscar in your store but sell it only after you have explained how large it gets and what it may do to other fishes. It's much better to sell less aggressive species that can be kept in community tanks.

The past few years in Europe have seen a great surge in popularity in the so-called dwarf cichlids in the genus *Apistogramma*. These miniature South American cichlids still elicit very little interest in the U.S. There are over 50 species of these tiny wonders, but they are primarily imported into this country as "mixed dwarfs". A very few hobby breeders are producing some of the newer species, but no commercial interests have as yet taken up the cause. This is a group of fish to watch very closely for future sales potential, but right now you can cover all bets by stocking just 3-4 items. These include the regular and gold ram, *Papiliochromis ramirezi*, perhaps the only guaranteed item in the entire lot.
Moving on to Africa, there are three basic groups of cichlids to be concerned with. For the most part, these occur in the rivers of Africa. First of all, there are the Tilapia species, now split into several genera depending on their breeding techniques. Most of these fishes grow large and aggressive, and they will sell very poorly. Colors are rather drab with a few exceptions such as Tilapia buttiokoferi. Carry only juvenile Tilapia and don't go out of your way to stock such familiar items as black-chin or Mozambique mouthbrooders.

Everyone knows the kribensis, but its scientific name is actually Pelvicachromis pulcher. In West Africa, there are perhaps 30 + species of cichlids in the "kribensis" complex. Unfortunately, very few of these beautiful fishes reach the U.S. They are becoming more common in Europe, however, so it is perhaps only a matter of time before they make their appearance here. While you can obtain the common krib and its albino form, you should keep your eye out for such species as Pelvicachromis taeniatus, P. humilis, Thysia ansorgii, Pelmatochromis thomasi, and Chromidotilapia guentheri.
A third group of African cichlids to carry are those from the Congo (Zaire) River. These include fishes in the genera Steatocranus, Nanochromis, Lamprologus, and Teleogramma. These fishes are collected primarily in the rapids, and they have dorso-ventrally flattened bodies to aid them in their tough environment. Without exception, Congo cichlids are very aggressive and territorial, and they should be sold only to hobbyists who are ready to cope with such behavior. Unless you display them in bare tanks, your customers will never see them for they love to hide in caves and under low-lying rocks.

Finally, from Africa, there are a number of other cichlids that have been in the trade for a good many years. These include Hemichromis lifalili (jewelfish), H. fasciatus (5-spot cichlid), Haplochromis burtoni, and Pseudocrenilabrus multicolor (Egyptian mouthbrooder). These are all available from fish farms or as imports. You may wish to stock these, but I recommend you steer your customers to the Rift Lake species instead. They will have a much wider selection to choose from and you will be able to sell more fishes.
The last two cichlids to mention are the chromids from India and Ceylon (Sri Lanka). These are the only Asian cichlids, and they are both excellent aquarium fishes. The orange chromid, *Etroplus maculatus*, is a small, brightly colored species that will sell in fair numbers. Keep it stocked most of the time, especially the red variety. *Etroplus suratensis*, the green chromid, is a beautiful species when three inches or larger. It grows to 16 inches and in full color it is lime green with a black breast and silver spangles over the entire body. Both chromids should be kept in hard, alkaline water similar to the Rift Lake environment.

Cichlids can make up a significant percentage of your freshwater livestock sales, but you must develop your sources for obtaining rare and unusual species just as you build up a clientele for purchasing these fishes.
The suborder Anabantoidei contains four families of closely related fishes that all possess an accessory breathing organ known as the labyrinth. These fishes can utilize air as a source for oxygen. In fact, they are so dependent on "gulping air" that they will die if prevented from reaching the surface for more than an hour or so. Virtually all of the anabantoids make excellent aquarium fishes, and they are well represented in the pet trade. They are restricted in distribution to Africa and Asia with most common species being native to Southeast Asia and Indonesia.

The family Anabantidae has all but one of its representatives on the African continent. *Anabas testudineus*, the climbing perch, is the single exception since it is found in India, Ceylon, and Southeast Asia. This fish used to be raised in Florida, but farmers discovered that it migrated from pond to pond. It is able to use the pelvic fins and its body to literally walk across the substrate, be it in or out of water. Since the fish is an air-breather it can exist out of water for some time if the environment is sufficiently humid. Today, the climbing perch is available primarily as wild-caught specimens from Southeast Asia, and it makes an excellent community tank fish. Even better than this, however, is a special set-up which displays the fish's ability to walk on land. This is a specialty item that you should stock only occasionally.
Fishes in the genus *Ctenopoma* are distributed over much of tropical Africa, but they are especially concentrated in the Congo region. This means they are fairly expensive and available only on a sporadic basis. The most commonly seen species is the leopard ctenopoma, *Ctenopoma acutirostre*. This is one of the largest members of the genus, and it is offered for sale between 2-4 inches in length. It mixes well with all larger fishes (two inches and up), and most customers will be attracted to it. Perhaps the largest *Ctenopoma* is *C. kingsleyae*, a dark gray fish that can exceed eight inches in length. It is reasonably priced and a cheap alternative to the leopard ctenopoma.

Recognizing *Ctenopoma* is not particularly difficult since all of them possess a combed edge to the operculum. They all take air at the surface, but they rely more on their gills than other anabantoids. In your shop, display *Ctenopoma* in large (30 gallons or more) well-planted tanks. Here, they will settle down and feel secure. You may mix several species in the same aquarium or segregate them in different tanks. The only species too small to house with the others is *C. ansorgii*. This colorful little fish is perfect for the small community tank.

Species of *Ctenopoma*, besides the ones already mentioned, you may expect to see offered for sale include the following: *C. congcicum*, *C. fasciolatum*, *C. maculatum*, *C. nanum*, *C. ocellatum*, and *C. oxyrhynchus*. Stock only 6-12 specimens of each species.
The family Belontiidae contains most of the anabantoids so familiar to the pet trade. Undoubtedly, one of the top five tropical fishes of all time is the Siamese fighting fish, *Betta splendens*. This fish has been merchandised in a most unusual fashion throughout its history. It is sold from small bowls rather than tanks. Since males are extremely aggressive toward one another, they cannot be kept together in the same aquarium.

Bettas are not as popular as they once were. This is due in part to the lack of top quality fish that are available to the pet trade. In order to upgrade your selection, you should contact local hobbyists who breed bettas or professional breeders in other parts of the country. Super showy bettas will perk up sales, but unless you are displaying them properly you will still not reach full sales potential. The typical ivy bowl is just too small to give a good betta room to flare. Instead, use a quart bowl for every male. Be sure to keep the water clean by making frequent water changes.

Lighting is very important when displaying bettas and full spectrum bulbs are highly recommended. Place the lights directly over each level of bowls so the fish’s colors can be seen to best advantage. Throw in a female every fourth or fifth bowl just to liven things up. Customers are frequently looking for a pair of these fish. Remember – bettas prefer a water temperature of 80°F., so you should try to maintain them at or near this value. Be sure to offer a variety of different strains including red, blue, Cambodian, cellophane, and double-tail. The black betta, although difficult to obtain, will sell out whenever you offer it.
There are at least 15 species in the genus *Betta*, but, of course, the only one commonly seen is *Betta splendens*. Many of the "other" bettas are not bubblenest builders but mouthbrooders. These so-called "wild" bettas are available from Southeast Asia, but they usually come in mixed lots with no identification. The great selling point to these fishes is that males can be kept together. Stock them in standard tanks, not bowls, since mouthbrooding bettas come from waters that are more oxygenated than their bubblenest-building relatives. If you are able to determine the correct scientific name, it would be a plus in selling them.

The other major group of anabantoids in the family Belontiidae is the gouramis. Basically, there are three sizes of gouramis to deal with. The large species (4-10 inches) are in the genus *Trichogaster*, including *T. leeri* (pearl gourami), *T. microlepis* (moonbeam gourami), *T. trichopterus* (many names), and *T. pectoralis* (snakeskin gourami). The medium-sized species are in the genus *Colisa*, including *C. lalia* (dwarf gourami), *C. chuna* (honey gourami), *C. fasciata* (giant gourami), and *C. labiosa* (thick-lipped gourami). Let's look at these two groups first.

Gouramis are all native to Southeast Asia or Indonesia and breeders in that part of the world have managed to develop some colorful and commercially important fishes. First and foremost among these is *Trichogaster trichopterus*, commonly known as the three-spot or blue gourami. In the wild this fish has a series of bars extending from the dorsal surface about 2/3 of the way down
the flanks. There is a spot on the caudal peduncle, one at mid-body, and the so-called third spot is the eye. The basic ground color is a light brown. This variety can be found in Thailand, but on the island of Sumatra there is a population of this species with less banding and a blue body. This is the blue gourami, a wild variation that came into the trade in the 1930's. By the 1950's, a mottled strain was developed in Florida. It came to be known as the Cosby or opaline gourami.

Eastern Europe was the initial source for the gold gourami, but it is now bred in both Florida and Southeast Asia in large quantities. This fish is a sport derived from the Cosby gourami. Likewise, a platinum or silver gourami was spun off from the gold. More recently, a blushing gourami has appeared, and it seems to be developed from the original wild fish.

The flame gourami is a genetic variety of the dwarf gourami, *Colisa lalia*. It was considered a cross between two species for some time. This beautiful fish is normally sold only as males so that every individual is as saleable as the next. Also, derived from the dwarf are the neon royal blue and the neon royal red gouramis. These varieties emphasize the two primary colors in the wild fish.

The delicate honey gourami, *Colisa chuna*, is a good item if it is maintained properly and the males show full color potential. I recommend groups of 12-25 fish in 10 or 15-gallon tanks with plenty of plant cover. A new fish thought to be a variety of *C. chuna* is being called the sunset gourami, and it should be treated in a similar fashion.
The final group of gouramis in the family Belontiidae is comprised of the small species scattered over several genera. These fishes can be excellent sellers to customers who maintain small community tanks. In the genus Trichopsis, there is T. vittatus, the croaking gourami, and T. pumilis, the sparkling gourami. Several species in the genus Parosphromenus are collectively known as licorice gouramis. The chocolate gourami, Sphaerichys osphromenoides, is a delicate fish that does not do well in captivity. Still, you will find there is a high demand for this beautiful fish. Malpulutta kretseri is known as the Ceylonese gourami, and it comes in occasionally from that tropical isle.

All of the miniature gouramis should be displayed in small aquaria (10 gallons or less) with live plants. Demand for these tiny jewels will be great, and supply is short, so obtain them whenever possible.

Before moving on to the final families of anabantoids, I would like to mention the paradise fishes which are familiar to everyone. These are not tropical fishes in the true sense of the word so I will defer my comments on them to an upcoming article on temperate water fishes (non-native).

Due to their unusual characteristics, two gouramis are placed in their own distinct families. The kissing gourami, Helostoma temmincki, belongs to the family Helostomidae. It comes in two varieties, green and pink. The green form is basically the wild fish while the pink is a sport that may occur in isolated
wild populations. Both are certainly cultivated in large quantities in Florida and Southeast Asia. A bi-color or marbled kissing gourami is also available. Stock kissers in 30-gallon tanks since they are frequently offered for sale at large sizes. Unfortunately, these fish are not as popular as they once were. This is probably due to the proliferation of more colorful varieties of smaller gouramis.

The final gourami is in the family Osphronemidae, and it is a giant since it grows to well over two feet in length. Commonly known as the true gourami, *Osphronemus goramy*, is a fish that only aquarists with large tanks should try to maintain. Although sold at a relatively small size (1 1/2 to 3 inches), it grows quickly and cannot be kept with smaller fishes. Its lack of color also makes it a slow seller that you should offer only occasionally.

There is a strange fish that is related to the anabantoids even though it looks nothing like any of them. In the family Luciocephalidae, the single species, *Luciocephalus pulcher* is a rarely seen fish that is not easy to maintain for an extended period of time. While it is an air-breather, it requires very clean, well-oxygenated water with an appreciable current. The pikehead is a predator that will take only living foods. Its long, thin body is perfect camouflage for hiding among aquatic plants. If you have the opportunity to obtain this fish, purchase only a dozen or so since it is strictly recommended for your experienced customers.
Next month, I will offer the final installment to this series. There are only a few groups left to cover, but most of them contain important items in your livestock inventory.
A Retailer's Guide to Tropical Freshwater Aquarium Fishes

(Part 13)

by Edward C. Taylor

This will be the final installment of "A Retailer's Guide", and I hope that over the course of the past year you have been able to draw some valuable information from this material. It remains my firm conviction that the average retailer needs two things in order to sell more fish. First, he must have at least a skeletal knowledge of the interrelationships between the different groups of fishes. Second, he must know how to merchandise these fishes in order to maximize sales. A successful petshop must have qualified personnel on duty at all times, and "A Retailer's Guide" can easily be used as a training aid for your employees.

The only group of fishes I neglected to cover in correct phylogenetic order is the family Nandidae. Representatives from this taxon are commonly known as leaffish. I am covering leaffish at this time because they are an important commercial item. Bear in mind, they should have been discussed just prior to the cichlids when I presented the brackish-water fishes.
There are only a few species in the family Nandidae, but most of them reach the aquarium trade. Leafish are quite popular but only with aquarists willing to give them their own tank. They are, for the most part, piscavores (fish-eaters), that cannot be kept with small fishes since they would eat them. Also, they do not mix well with larger species because they are very non-aggressive as regards non-prey items. You should stock leafish on an occasional basis, displaying only a few in small aquaria of 10-15 gallon capacity.

In Southeast Asia, leafish are very different in appearance from the typical image. Two species of Nandus (N. nebulosus and N. nandus) are sold as leafish, but Pristolepis fasciata is usually sold as a black chromid, suggesting it is related to cichlids. Actually, this fish, which can reach eight inches in length, has close ties with a miniature species - Badis badis. The chameleon fish, as Badis is known, never exceeds two inches, and it is a perfect selection for a customer maintaining a community tank of small fishes. Males turn a bright blue, and the spawning ritual is reminiscent of bettas. Unfortunately, this small species will eat only live foods.

In Africa, there are two species of leafish, but only Polycentropsis abbreviata is imported. It is very similar in appearance to the South American species, so you must depend on your supplier for an accurate identification. These fish fight aggressively among themselves, so they must be split up into a number of display tanks.
The true leaffish is *Monocirrhus polyacanthus* and the demand for this South American oddity is much greater than the supply. Prices vary accordingly, but you should stock a few of these whenever they are available. *Polycentrus schomburgkii* is known as the poor man's leaffish because it is not as bizarre in appearance. It is, however, considerably cheaper, so some customers will prefer it. It exhibits considerable sexual dimorphism and that's another selling point.

Most leaffish will eat only live foods so you can expect to sell a lot of feeder guppies to those who purchase them. A drawback, of course, is the need for you to feed the same foods until you sell the fish. Price leaffish reasonably for fast sales with higher profits.

As we have progressed from the more primitive to the more advanced fishes, we first encountered some very bizarre types. These gave way to fishes more representative of what we would call "normal" in appearance. Now, that we have come to the end of the line, so to speak, the remaining groups of fishes are highly evolved but once again quite unusual in shape and structure.
The family Mastacembelidae contains the spiny eels. These are true perciform fishes, unrelated to other eel-shaped fishes. They are easily identified by the series of unconnected short dorsal spines set in front of the soft dorsal fin. Spiny eels are found in both Africa and Asia, but most of the species reaching the trade are from Southeast Asia. All but one of the species are in the genus *Mastacembelus*, and that single exception is the peacock eel, *Macrognathus aculeatus*. This fish is representative of the small spiny eels which include *M. circumcinctus* and *M. zebrinus*. Two popular species growing to at least 18 inches are *M. erythrotaenia* (fire eel) and *M. armatus* (tire-track eel). While the larger eels are more expensive, they are also more impressive. You should stock one or two specimens of each as often as possible. The small species can be sold on a rotating basis and purchased in lots of 6-12 depending on your turnover.

The maintenance of spiny eels is a bit tricky and requires some special care. As you probably have guessed, the eel-shape means that these fishes can snake their way out of a tank if there are any significant holes. Just to be on the safe side, maintain the water level several inches down from the top. Keep the eels with a thin layer of fine gravel. Since they love to bury in the substrate, a deep base would result in an aquarium seemingly devoid of fish. Avoid large gravel, number three or coarser, since it might damage the finely scaled skin. Give the eels transparent plastic tubes in which to hide (placed horizontally on the substrate), and don't use undergravel filters in their tanks since they have a propensity for slithering down the uplifts.
The family Tetraodontidae contains the puffers. For the most part, these are marine in origin, but there are a few brackish and freshwater representatives scattered around the world. Puffers exhibit a great deal of personality but one of the problems your customers will experience with them is aggression. In the retail display, they are not particularly prone to attack since they are crowded together. A community tank is an entirely different situation, however, and you should recommend puffers only to those aquarists who are maintaining fishes capable of taking care of themselves.

Another problem with keeping puffers is the water chemistry. Some species must be kept in a brackish-water environment. This means at least a teaspoon of marine salt per gallon of water should be used as an additive. Other puffers are strictly freshwater in nature and the use of salt may result in serious consequences for the fish. Fortunately, the breakdown as to preferred water chemistry is easy to remember since it falls along geographic lines. Those species reaching the trade from Southeast Asia are virtually all brackish-water in nature. African and South American puffers, on the other hand, are mainly freshwater.

From the great mangrove swamps of Southeast Asia, there come a variety of puffers including the following: Tetraodon fluviatilis (green puffer), T. steindachneri (figure-8 puffer), T. lorteti (Somphong's puffer), T. leiurus (red-eyed puffer), and Chonerhinus modestus (gold puffer). Only the gold puffer grows too large to be manageable in a 30-gallon tank.
You should carry at least one of these species at all times. Try to rotate them on a regular basis to insure sufficient variety of selection for your customers.

My favorite puffers come from Africa, but they are rare and expensive, and they grow fairly large. They make great pets in a one tank/one fish situation. The most beautiful is *T. mbu* which sports gold reticulated lines over a velvet black body. *T. fahaka* has a number of parallel stripes running from the head and gill cover back to the caudal. Perhaps the most bizarre is *T. miurus* which prefers to bury in the substrate with only its eyes exposed. It lies in wait for an unsuspecting small fish to swim by and in a move almost too fast to follow, it snaps the fish in two and swallows first one half and then the other. You should display these unusual puffers one to a 10-gallon tank, and they will sell as fast as you can stock them. Remember - these are strictly freshwater.

The common puffer from South America comes from far up the Amazon River. It is not nearly as frequently seen as in years past, but the pleasing pattern of alternating yellow and black stripes will help to sell it. *Colomesus asellus* is known as the bumblebee puffer, and it stays small in size and is perhaps the least aggressive puffer in the trade. Stock it in small groups of 15-20 fish in a 20-gallon tank.
The final group of fish I will cover is in the order Pleuronectiformes. While there are several families in this taxon only one has species that reach the trade. Flatfishes, as they are known, have highly compressed bodies with both eyes on one side. They lie on the substrate and swim on the eyeless side. In the aquarium, they will bury under the gravel or rapidly change their pattern to blend in with the color and texture of the substrate.

In the family Soleidae, there are several species of freshwater soles, primarily in the genus *Achirus*. These are imported at 1 1/2 to 2 inches in length, and they rarely grow any larger since they are not good scavengers. Instead, they are predators that prefer small live foods or frozen items such as bloodworms or brine shrimp. From Argentina, a large sole is available (eight inches or more), and it adapts quite well to a large community tank.

Display these so-called flounders in bare tanks so your customers can see them. You can keep an upper strata fish, such as a rasbora or danio, in the same aquarium. These specialty items should be stocked only on an occasional basis.
Well, that's the sum of all the parts. I have now covered approximately 90 families of tropical aquarium fishes and while the information presented has been as thorough as space permitted, there may be many questions left unanswered. If you have questions concerning specific fishes, their maintenance or merchandising, their distribution or identification, drop a line to me via PSM. I will be answering your questions in upcoming issues of the magazine.