

A Native Fish Primer

Livebearers, Killifish, and Minnows

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By Dave Williamson

*Adapted from the series "The Natives are Restless," which originally appearing in Tank Topics, the publication of the Greater Akron (Ohio) Aquarium Society.*

Some may wonder why anyone would want to keep "minnows" when there are so many beautiful tropical fish available in any pet shop. Having worked in the retail pet trade for seven years, however, the thought of keeping fish like serpaes tetras and red wag platies makes my skin crawl. I see so many exotics, I have no interest left in keeping any of them.

Natives are seldom present in pet shops, and when they are, it's usually an accident. Catching fish to stock one's own tank can be really exciting. Even if you aren't up to that, it can be an adventure to track down a species you're interested in, either through other aquarists, or by finding occasional contaminants mixed in with so-called "feeder fish." (I've sorted through numerous tanks of Ghost shrimp, feeder goldfish, and guppies to find some real gems.)

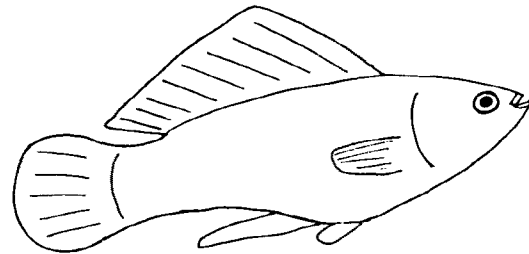
You can find a native species to fill any niche you may be interested in. There are livebearers, killies, schooling species, big predators, and some truly pretty fish. Many species are easy to keep, in part because they don't require the high temperatures that tropicals do. Also, as many natives have wide ranges, they can adapt to differences in pH and water hardness. There is a challenge in breeding many of them, however; being from temperate climates many may require a seasonal cycling in temperature and day length to induce breeding.

### Native Livebearers

There are many livebearers native to North America. The Sailfin Molly (*Poecilia latipinna*) has even become a part of the pet trade. The other two

livebearers commonly known in the aquarium hobby are *Gambusia affinis/holbrooki* and *Heterandria formosa*.

The Sailfin Molly can be seen in a number of color varieties in pet shops throughout the United States. It occurs naturally along the Atlantic coast from North Carolina south through Florida and along the gulf coast into Mexico. In nature, these are typically brackish water fish, seldom found in straight fresh water. In the wild their main diet is algae, something to keep in mind when maintaining them in captivity. Wild sailfins are usually bright metallic green with rows of small dots down their sides. Many males also have a bright golden shading around their heads, sometimes reaching down to



*Numerous color varieties of the Sailfin Molly are available in pet shops throughout the United States.*

their bellies.

The Females are not as colorful as the males and also don't have the very large dorsal fins that the species gets its common name from. Large males often have a dorsal fin that is taller than their body is deep. Males will use this in displays to warn off rival males and in courtship displays with females.

Although they will do well in captivity, tank raised males rarely grow as large as, or have the impressive dorsal fin of, males raised outside. The males tend to be rather aggressive toward each other, however. They may also need larger tanks, as the males may grow from four to six inches.

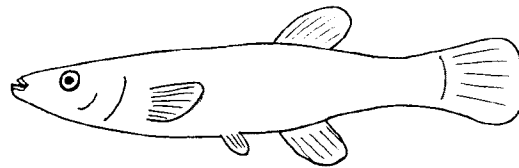
### Mosquito Fish

To the untrained eye, mosquito fish (*Gambusia* species) resemble feeder guppies. There are easy ways to tell them apart, however. First, mosquito fish have a dark stripe that runs at an angle through the eye to the throat. Their tails usually have a pattern of fine dots. The males have much larger gonopodiums in comparison to guppies and the gravid spot in the females is shaped differently than in the guppy. The most important difference between mosquito fish and guppies, however, is attitude: mosquito fish have a bad one. They will chase and nip at each other and at other small fish. The most commonly seen mosquito fish is *Gambusia hobrooki*. A small gray fish--females are two to three inches, males are about half that--this species is found throughout the Atlantic coast as far north as New Jersey, ranging south to Florida and as far west as the Mississippi. Across the Mississippi and into Texas is its close relative, *Gambusia affinis*. At one time, the two were considered subspecies, but have recently been accorded species status based on their distribution and differing number of dorsal fin rays. They are as easy to keep and breed as other livebearers, except that the adults will actively pursue the fry. These fish have been introduced throughout the U.S. and much of the world for mosquito control. This has often led to trouble for indigenous species, due to the mosquito fish offering stiff competition for food, aggressive tendencies, and hybridizing with local *Gambusia* forms. This species is easy to come by, as it is very common throughout its range. If you do not have any wild specimens near you, you can also "pet shop collect," as some may show up in feeder tanks.

### The Least Killifish

The tiny least killifish (*Heterandria formosa*) is one of the smallest vertebrates in the world. Large females can be just over an inch long and males only about two thirds that size. It is a pleasing gold color with a chocolate brown strip from nose to tail and some orange and brown markings in the dorsal and anal fins. Completely non-aggressive, they can be kept with any fish that won't eat them. They are also extremely easy to breed; just put some adults in a

tank with a few plants, feed them, and you will soon find fry. Unlike most other livebearers, however, the females don't have room in their bodies for a lot of developing fry, so they have an assembly line in their reproductive tract of everything from unfertilized eggs to ready-to-be-delivered fry. Typically, they deliver only a few fry at a time, but have more in a few days. This species is native to the Carolinas, Georgia, Florida, and Louisiana and appears in weedy fresh or brackish shallows. These, too, may also show up in feeder guppy tanks.



Most Topminnows and Killifishes have upturned mouths and other adaptations for surface feeding

### Native Killifish

To most people, the term "Killifish" conjures up images of small, brightly colored, delicate fish from the rain forests and savannah pools of Africa. While these habitats are home to the *Aphyosemion*, *Fundulopanchax*, and *Nothobranchius* species commonly encountered in the aquarium trade, many killies are found in the new world. The fact is, however, that there are more than 40 species of killifish native to the United States. They can be found in fresh, brackish, and coastal marine habitats from the Great Lakes, through the Mississippi drainage, throughout the East coast into Florida, and also in the Southwest.

Killifish are members of the family *Cyprinodontidae* (the toothcarps), along with the livebearers. (All killies, however, are egg layers.) The term killifish comes from a corruption of the Dutch term "Kil Vessen," given to the killie by the Dutch who settled in what is now New York and New Jersey. "Kill Vessen" means "fish of the kills"--kills meaning small bodies of fresh water.

The *Fundulus* species comprise the largest group of North American killies. They are diverse in relation to their size and habitat preferences, ranging in size from just under two inches (*lucia*) to over six (*grandis*, *seminolis*). Some species are strictly freshwater (*notatus*, *catenatus*). Others are found in brackish (*seminolis*, *heteroclitus*) or even salt water (*majalis*). The species listed here as examples are not the only ones that fit the descriptions--just some of the ones I've had experience with. Although the represent the range of the *Fundulus* genus, they do have some things in common. All are long-bodied and found in loose schools. They are adapted to surface living, having upturned mouths. Their main diet consists of insects and larvae. They have dorsal fins set far down the back near the tail, a trait shared with many surface-living species. These adaptations account for the common name "topminnows," given to many members of the group (*chrysotus*, *cingulatus*). Some species have a light spot on the top of their heads and are commonly called "Star Heads" (*notti*, *lineolatis*). Another group is called "Studfish" (*catenatus*, *stellifer*). These are some of the larger species in the group. Many have rounded heads and are not as dependent on feeding from the surface. Many species are used as bait (*diaphanus*, *heteroclitus*), which has allowed their introduction into non-native habitats.

*Fundulus* killies are easily maintained in captivity, and will eat the usual prepared foods. Most are large enough and active enough to be kept with almost any type of active "community:" tropicals such as barbs, tetras, and livebearers. I've had more success keeping them in twenty gallon and larger tanks, as they are quite active. Breeding them is straight-forward, since they will usually make use of a floating yarn mop, like many other killies will. If possible, try to keep more females than males, because the males can get quite rough when they want to breed. Some species are very colorful (*chrysotus*, *cingulatus*, *zebrinus*). In all of them, the males have much more color or patterning than do the females. *Fundulus* are found occasionally with feeder fish. Mummichog can be purchased for bait virtually anywhere along the Atlantic coast, and occasional *heteroclitus* or *grandis* stragglers may be found in the group.

Most typical of the killies are the species of *Lucania*. *Lucania goodei*, the Bluefin Killie, is a small species (2 inches or smaller). Both sexes have

a dark stripe from nose to tail and the males have a red spot at the base of the tail and a sky blue band in the dorsal fin that the species gets its name from. (In some specimens, this band may be absent, or even another color entirely, like red.) Bluefins are found in flowing fresh water and will do well in an aquarium with good filtration.

The other *Lucania* is *Lucania parva*, the Rainwater Killie. This species is found in brackish to salt water and is not as colorful as the Bluefin. Both species can be collected in Florida and Bluefins are also occasionally mixed in with feeders or sold under the trade name of "blue fin dace."

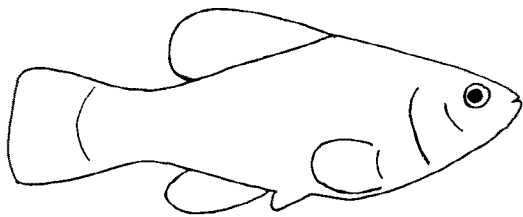
Another typical small killie is the pygmy killie, *Leptolucania ommata*. These little guys only grow to a little over an inch, but they make up for their lack of size with a pleasing golden color and ease of care. They can be collected in Southern Georgia and Northern Florida, or obtained from killie keepers who have captive bred them.

One species of *Rivulus* native is found in the United States. *Rivulus marmoratus* is found in shallow brackish water habitats throughout South Florida, the Florida Keys, as well as many other Caribbean islands. This species is not what you would call pretty--basically brown with black markings. What makes them unique is that they are hermaphrodites. They are all female, and lay fertile eggs by themselves! They are not common anywhere in their range and are often found living in crab burrows during low tide. They are fairly easy to keep and breed in captivity.

Another Florida native is the Diamond Killie (*Adinia xenica*). This two inch fish is found along the Gulf Coast of Florida in brackish and salt waters. They are quite different from the other species we've covered, since they are deep bodied and have large dorsal and anal fins. The males are marked with thin, vertical, silver bars along their flanks. Although they look much different than *Fundulus* species, they nonetheless behave like them and are easy to keep, provided there is some salt in their water.

The most commonly encountered native American killie is often not even recognized as a killiefish. Often seen in pet shops, the Florida Flag Fish is indeed a killie. It is deep-bodied, rather than the more traditional "torpedo" killie shape. Large males can grow to be three and a half inches long and are quite colorful, with red and green horizontal stripes.

The females are not as large as the males, do not have red stripes, and often show a dark spot on the base of their dorsal fins. Not only do they not look like typical killifish, they don't act like them either. Males set up territories and defend them from other males. These territories revolve around a spawning site on the bottom; after spawning, the male continues to guard his territory and eggs. In the aquarium, they are easily kept and bred, using spawning mops. In the wild, they are found throughout central Florida in fresh and slightly brackish waters. Their natural diet consists mainly of algae, but in captivity they will eat just about anything.



Unlike other killifish, Pupfish are deep bodied.

### Desert Killifish

Mention the term "Desert Pupfish" to a non-native fishkeeper and the likely reply will be "Aren't they an endangered species?" In truth, most of the fishes of the desert Southwest are endangered due to habitat loss. Many of the springs that feed the streams and pools that these fish live in are being pumped dry for agriculture and development. At first thought, you might ask "How could fish come to live in the desert, anyway?" Thousands of years ago, much of the North American continent was covered by a large inland sea. As the climate changed, the water receded and left small disconnected pools and springs. Due to their isolation, the fish in these disconnected bodies of water diverged into numerous distinct species.

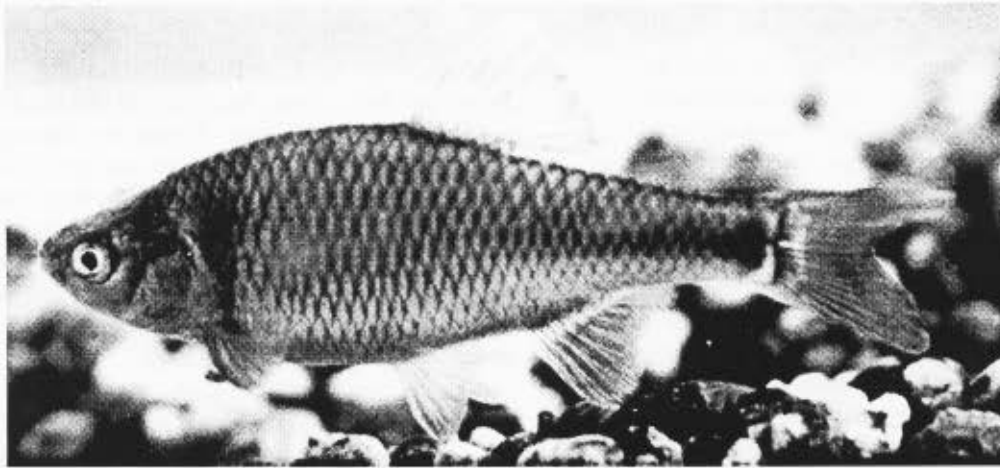
Basically, pupfish are small (at most, a little over

three inches), deep bodied fish, and definitely not shaped like a typical killifish. Males of most species are mainly blue, with or without markings of black, silver, or yellow on the fins and body. The females are much less colorful, usually silver or gray with a faint patterning like the male of the same species. In most species, the females also have a dark spot in the dorsal fin, in addition to smaller dorsal and anal fins.

All pupfish belong to the Genus *Cyprinodon*; the common name "Pupfish" refers to their habits when viewed from above in a pool. Like puppies, they chase each other. In fact, male Pupfish stake out territories consisting of an algae mat for feeding and a suitable place to lay eggs. Males constantly defend their territories against other males. Females, on the other hand, do not hold any territory and swim among the males in loose groups. When a female is ready to spawn, she will go down into the algae with the male of her choice and lay a few eggs which the male fertilizes and then promptly chases her away. He continues to guard the area--not because of the eggs--but to safeguard his territory. To avoid predation by the adults, the fry stick to the shallows. Once they reach a suitable size, they join the groups of females and other juveniles until the young males are big enough to try to hold territories of their own.

Of the dozen or so species found in North America, nearly all are considered endangered or threatened in their natural habitats. One species, *Cyprinodon diabolis* (the Devil's Hole Pupfish), is considered to be the vertebrate animal with the smallest natural habitat in the world, with the entire population contained in a single small spring.

One major exception to this restriction in habitat is *Cyprinodon variegatus*, commonly called the Sheep's Head Minnow. This species is not restricted to a desert habitat and is found in brackish and saltwater shallows all along the Southeastern coast of the U.S. as well as throughout the coastal areas of the Gulf of Mexico. In all likelihood, this species is probably very closely related to the ancestral pupfish that gave rise to all the land-locked desert forms. The adaptability of members of the genus, is amazing. Many can tolerate water temperatures from near freezing to over 100 degrees Fahrenheit and salinities more than four times the strength of sea water. Needless to say, the Sheepshead Topminnow is a very easy species to keep and breed in the aquarium. Males are predominantly mottled silver and gray with bright electric blue streaks along their sides.



*The Red Shiner was once sold in pet stores as the Asian Firebarb. Photo By Konrad Schmidt*

*Cyprinodon macularius*, the Salton Sea Pupfish, from Arizona and adjacent areas of California, is also occasionally available to hobbyists. While it's not legal to collect it in its native habitat, it is a free breeder in captivity and stock was released to hobbyists from the Columbus Zoo a number of years ago. There is even an albino strain of this species available. Males are mainly metallic blue with black edged dorsal, anal and caudal fins. There is also an indistinct golden yellow spot at the base of the caudal peduncle.

*Cyprinodon nevadensis amargosae*, The Amargosa Pupfish, comes from the Amargoso River and is not endangered. The males of this species have indistinct blue and gray tiger stripes and dark edging on the fins.

Some of the Mexican Pupfish include *C. fontinalis*, *C. longidorsalis*, *C. Veronicae*, and *C. nazas*.

The last group of desert killifish found in the desert areas are the Springfish. True to their name, they inhabit desert springs. All species are in serious trouble in the wild. Belonging to the Genera *Crenichthys* and *Empetrichthys*, Springfish are more closely related to the Goodeid Livebearers of Mexico than to other Killifish families. They do, however, lay eggs in true killifish fashion. As all these species are under siege, they probably will never be encountered by most aquarists.

#### **Minnows Aren't Just For Bait**

Almost everyone who grew up with an interest in the outdoors has chased minnows in a stream somewhere. In fact, many non-fishkeepers refer to any small fish anywhere as a minnow. In reality, minnows are members of the Cyprinid family, the largest family of fishes in the world. There are more

than two thousands species of Cyprinids worldwide, and more than two hundred are found in North America. Cyprinids lack teeth in their jaws, but many species do have "throat teeth," which are actually hardened knobs at the back edge of their gill arches. Called "gill rakers," these are used to grind up food items. Cyprinids also lack an adipose fin.

As a group, they are extremely diverse, having adapted to every possible habitat. They range in size from two inch dace and shiners to the Colorado squawfish, which may attain a size of five feet or longer. Some, like the squawfish, prey on other fish, while others eat insects and crustaceans, or even graze algae.

Most of the smaller species (under about 7 inches) are easily maintained. Nearly all of these are found in schools in the wild and will not be happy in captivity if maintained as solitary specimens or even in pairs.

Some general guidelines for keeping minnows include using as large a tank as possible, with a gravel bottom (whether or not an under gravel filter is used), as many species either spawn in gravel or root around in it searching for food. You won't necessarily need a heater in a minnow set up, as room temperature or even cooler is just fine for them. Set up the tank with a fair amount of current in the water, either from a powerhead, or even a large air stone, as most species are found in flowing, highly oxygenated water in the wild. Due to their streamlined shape, even lake species won't mind a little water movement. The most suitable captives are the omnivores and invertebrate eaters. Such a diet is easy to approximate with prepared foods, which most species will accept within a few days.

As for breeding, most minnows would be considered a little tricky for the average hobbyist. The hard part is that, like many temperate species, minnows have to go through a false winter to be in condition to spawn in the "spring." If you have access to a really cold (under 50 degrees) basement corner or a garage and can warm them back up after 8 to 12 weeks, most should spawn readily.

Telling the sexes apart in most minnow species is very easy. In many, the males have more color--sometimes brilliant color--than the females during breeding season. Also, males of many species have "nuptial tubercles" at this time as well. These are small white bumps that appear on the head, gill covers, and pectoral fins during breeding season, looking like infestation of the parasite "ich."

The only other trick to spawning minnows is to find out what substrate they lay their eggs in. Some bury them in sand or fine gravel, others broadcast them into fine leaved plants, and still others lay them singly in the crevices between rocks or the cracks in driftwood. A little research can get you started; or else you can simply supply all three substrates and see what happens.

At least two native minnow species are found in pet stores. The Red Shiner, *Notropis lutrensis*, is native to the Mississippi drainage from Illinois to Texas. This fish may turn up in pet stores as the Rainbow Dace or even the Asian Fire barb. Red Shiners grow to about 3 and one-half inches and the males are quite pretty, with metallic blue bodies and a bright red patch on the top of the head. The females are a metallic blue-gray.

Also occasionally seen in pet stores is the Red Bellied Dace, *Phoxinus erythrogaster*, native to the Great Lakes and Mississippi Basin. These three inch fish don't look like much outside the breeding season, being basically brown and silver. When the males are in color, a broad band of blood red covers the lower part of their sides. Under aquarium conditions, most males show a little red all year.

Another good place to get minnows is at the local bait store. Most carry a number of species, graded by Among those commonly available in many parts of the country are Emerald, Golden, and Common shiners, Creek Chubs, and Fat Head minnows. Some pet stores even carry the xanthistic (gold) form of the last species under the trade name "Rosy Red Minnows.) Golden Shiners and Creek Chubs both get rather large (7 and 12 inches, respectively).

Another way to get minnows is to go out and collect them yourself. Before doing so, you'll need

to check with your State Division of Natural Resources, but in many locations, all you need is a seine and a fishing licence. Almost any flowing stream has a population of at least one species of minnow. You can also catch minnows from a boat or a boat dock with a dip net. Look for schools near the surface, close to the bank. Bring along *Peterson's Field Guide to Freshwater Fishes* so that you have an idea of which species to bring home and which potential behemoths to throw back.

Lastly, use NANFA's guide, *Endangered, Threatened, and Special Status Fishes of North America* to familiarize yourself with any protected species near where you'll be collecting. Copies are available for \$10.00 from Marcie Ceryes, NANFA Librarian, 8681 Pequayan Lake Road, Duluth, MN 55803; telephone 218-848-2226. Send payment in check or money order.