

BREEDING FUNDULUS HETEROCLITUS

by Hal Fairfield, Felton, California

Prompting Fundulus heteroclitus (the Mummichog) to breed is an easy matter, as this fish is very tolerant of its tank conditions. Normal fishkeeping maintenance and care in a permanently set-up aquarium should give good breeding results. The following is an account of the conditions I provided to give the Mummichog a chance to procreate.

The trio I purchased were placed in a standard ten-gallon aquarium provided with an undergravel filter; approximately two inches of coated, naturally colored gravel; several large, smooth river rocks; and several strands of Hornwort. The set-up did not contain a light or aquarium heater. I did supply a full cover, because this fish, like other killifish, loves to jump. Rock salt was added to the aquarium water at the rate of 0.5 teaspoon per gallon as a normal maintenance additive. My particular water had a pH of from 8.0 to 8.5, and the hardness was 11 DH (183.3 ppm CaCO₂). I mention this only in passing, because the Mummichog is quite adaptable, and in nature adjusts to many variable conditions. Every week 20 percent of the aquarium water was siphoned from the bottom and replaced with tap water treated with ten drops per gallon of "Novaqua" and 0.5 teaspoon per gallon of rock salt. I tried to provide a varied diet of live brine shrimp, Tetramin Staple food, crushed snails, and beef. You will discover that these fish will not turn down any food.

In the early spring, as the breeding time approached, I started feeding chopped earthworms, and added a floating spawning mop (made from a bottle cork and acrylic yarn) to the aquarium. This mop provided a spawning medium and was long enough to reach the bottom of the aquarium.

The normal color of my Fundulus heteroclitus is steel gray or brownish on the back and sides. This color gradually fades to white or yellowish on the stomach and breast. Most of the body is covered with a faint netlike pattern produced by the darkened edge of each scale.

As the water temperature reaches from 68°-70°, and as the male and female Mummichog achieve prime condition, body changes take place--most noticeably in the male. Small white or pale-blue spots, arranged in a vertical pattern on the males' sides, seem to glow on the steel-gray background of their bodies. The normally discrete spots in the caudal, dorsal, and anal fins become bright. A large, dark spot becomes very noticeable in the posterior parts of the dorsal and anal fins. In some specimens--though not, unfortunately, in mine--vertical blue bars in the posterior part of the body appear, and the fins take on gaudy yellow or yellow-orange margins. The color of the female changes little from the normal steel gray described earlier, but her body becomes fuller

a course I've seen taken by others within various specialties, usually with stifling and degenerative results. No, it truthfully had never occurred to me that nearly half of the species I'd been keeping were native fishes until I obtained some natives the real way--collecting them myself.

Until some local killies and darters found their way into my tanks, earlier American representatives were given no special treatment whatever (except during spawning efforts) and were usually tag-ends in otherwise-constructed biotopes (e.g., New World, Brackish, species size, etc.). They'd received the same temperatures, water movement, and foods as had their African, Asian, or Southern Hemisphere tankmates. Some had flourished, some hadn't--but none were given the individual attention they deserved. The use of aquaristics to "travel" to exotic, faraway places lures most of us from time to time; the more distant or romantic a fish's origin, the more important the fish can seem. Well, if you regard driving and tromping at a rate of an hour per animal as "distant," and "romantic" means slogging through waist-deep water or knee-deep mud, have I got some "important" fish for you!

My collecting experience began in a trip organized through a local aquarium society, following the instructions of more experienced collectors. Out of our catch, I only trusted myself with four of the darters (unidentified) and a dozen or so killies (probably Fundulus dispar notti). Trying to learn their identities and other information about them was difficult, far more so than with most of the tropicals available to aquarists through the usual channels. This is where field notes--mental, obviously, when one is hip-deep in water--are so helpful to the collector, and vital to the well-being of the collectees. It's much easier to duplicate the temperature, turbulence, substrate, etc., when these things have actually been felt, seen, and tripped over. It became very clear to me that I'd neglected the individuality of the native species I'd been keeping. The fact that they'd come out of a bag instead of a bucket had lulled me into the false security of lumping them, mentally and physically, with the tropicals I'd grown used to.

Thus I've been reborn as a keeper of native fishes, and been repaid with positive transformations of all the species involved. Comfortable animals simply feel better, eat better, and look better. Their behavior approaches normal, and (depending upon the effect of space limitations) captive reproduction can even be hoped for.

As government and industry care less and less about our wildlife, we must care and learn more. The beauty, charm, and captivating behavior of our native fishes are attractive incentives toward the responsible keeping of those species which can adapt to aquarium life (other species, obviously, should be left to the care of Nature).

Not only have I learned much about North American fishes, but my overall insight into providing for the natural requirements of all my fish has been refreshed and renewed as a result of my involvement with native fishes.

as it fills with eggs. I've noticed that the leading ray on the anal fin is long and quite opaque.

After a short courtship, the male drives the female to the spawning mop. If the male becomes too aggressive, she avoids the encounter, sending him into a frenzy. This is the reason two females are present in the breeding aquarium. Although the male can never be considered gentle in his breeding behavior, he soon calms down. With fin-stroking and bumping, the pair align at the upper part of the spawning mop, where quivering bodies produce an egg. The spawning mop should be removed, wrung out, and examined for eggs every other day. Mummichogs are avid spawn-eaters. The eggs are about 0.078" in diameter, clear and slightly adhesive. They can be easily removed from the spawning mop with your fingers.

I placed the eggs in a plastic margarine dish filled with water from the spawning aquarium and added enough acriflavine to color the water yellow. The acriflavine is a fungicide which protects the eggs for the first two days. I placed the covered margarine dish on top of the breeding aquarium to incubate the eggs. On the second day, the eggs were removed from the breeding aquarium (a length of airline used as a siphon is useful for moving eggs and fry). Replacement of the dish on the breeding aquarium and recleaning every two or three days is the norm. Incubation time varies with the water temperature. I found that most of the eggs hatch in two weeks (336-hr. average) at 67°F. Warmer temperature hastens hatching, but too much heat seems to have a detrimental effect on the number of live hatches. The fry are free-swimming within 24 hours and can be fed live baby brine shrimp or microworms immediately. They can also be fed hard-boiled egg yolk as a substitute. For the first couple of weeks, I maintain the fry in the margarine dishes and replace their water every two days with fresh water from the breeding aquarium. Finely powdered Tetramin Staple food can be alternated with the baby shrimp.

After the two weeks of "intensive care," the fry can be placed in larger quarters with aeration, and later in a regular aquarium for final rearing. The rearing aquarium should have some type of filtration system and should be cleaned frequently. The fry grow quickly. Allowances should be made not to overcrowd, to obtain optimal growth and health.

Before closing, I would like to relate some of the observations I have made while maintaining this species. I collected an average of six eggs every three days from the upper part of the floating spawning mop. The best spawning season seems to occur naturally in the early spring. I collected about 100 eggs from mid-February to early April. Eggs were also collected through the summer, but not in the quantities collected in spring.

I've enjoyed keeping and observing this fish because of its ease of care, willingness to breed, and independent nature.