

Select Aquatics of Erie, CO.

## Developing the Hi - Fin mayae

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In 2004 I received a bag of 6 young *Xiphophorus mayae* from another hobbyist that I knew well. My interest in them developed from having been told they were the largest-bodied swordtail in the world, and that they had only been recently identified. I had been keeping another large swordtail, the *Xiphophorus montezumae*, for a few years, and I wanted to continue with trying to raise the largest swordtails I could obtain.

Given a single species tank of at least 30 gallons with lots of live food, the mayae did very well. They are a shy fish, often preferring to stay hidden in the plants whenever they feel threatened. I generally remove females when they become gravid, putting them into a 10 gallon tank with lots of Java moss to raise up the young separately. They thrive on frequent water changes and some water movement, which I provide by using simple box filters for filtration. I keep them in bare bottomed tanks, with floating plants (Java fern, java moss and Bolbitis fern), or clay pots with plants potted in peat (Amazon swords, Crypts etc).

Though I keep other swordtail species in my fishroom, I do not have any developed high fin fish. On one occasion I had a high fin male sent to me along with other fish, which I then gave away to another hobbyist, but I have not kept a high fin line in my fishroom. These new mayae reached maturity and were soon dropping fry. I have always had an interest in spotting albino or leucistic fry, so with new batches of young I usually observe them fairly closely, and at some point- I truly don't remember the exact date, at about a month old a fry was spotted with an exaggerated dorsal fin. It appeared to be undersized overall, so I pulled what turned out to be a female and put her in a breeder to make sure she ate well, and I could keep an eye on her.

Having a fish appear that seemed to be "mixed" is a serious cause for concern. Who could have gotten in with the mayae? And not just been mixed in, but had been in the tank long enough to mate with one of the females? And why had I not seen it? My fishroom is about 60 tanks, I have a number of species, but there is nothing with a high fin. I went over whether I had any fancies that could be carrying the high fin trait, but did not show it. Nothing came close. Because I wanted to grow out these mayae to their potential, I had kept them in a 50 gallon tank of their own, and they had never been moved. The tank they were in was high up on a stand without tanks next to it, so other fish could not have jumped across- the reason I keep all similar species far apart from one another. I do keep a large number of *Xiphophorus alvarezii*, a similar looking fish when younger, but they were not near the mayae tank, and besides, they did not possess a high fin dorsal. It did not appear that this fish could have picked up the trait from any other fish in my fishroom.

If the fish were a simple cross with a hifin *X. helleri*, it would not be of interest, and its breeding program would be dictated by already well understood genetics. For it to appear "spontaneously" within a species implies an entirely new appearance of a genetic trait that had not previously existed, which then became of great interest. Is a double dose of the gene lethal? How does it affect other aspects of the fish's growth? Could this be an entirely new gene? The fish I obtain are intended to be bred and shared with other hobbyists- if this was not a pure mayae I needed to know that. I could easily start a contaminated line in the hobby, which would continue to reveal other non-mayae characteristics besides not being the fish I was saying that it was. Wanting to develop a high fin mayae from having crossed it with an established *X. helleri* high fin line is something I did not have an interest in doing. If the provenance could not be determined, the fish would have to be destroyed to prevent it from entering the hobby as a pure mayae.

So I needed to find out with some certainty whether the line was pure when I received it. I called the hobbyist I got them from, aware that the panic I had just been through was being passed on to him. He was positive that a cross could not have happened in his room, either, and he had only obtained them about 6 months before he gave them to me, so he called who he got them from. We traced the line back 2 years, and were ultimately convinced that an accidental cross could not have occurred.

I spoke with a number of people about this fish, and a group who felt they would be the ones to know such things agreed to meet me at the next ALA convention to take a look at them. I brought a pair, and all agreed they didn't look like anything they'd seen- certainly not an established helleri type high fin dorsal. The following year I brought a pair and put them in the show, and that was the first time anyone had seen the fish.

I maintained my skepticism for a couple years, primarily because it would simply have been too easy for a cross to happen, but a spontaneous appearance of a new gene could not be considered lightly. Until it could be proven to me otherwise, I felt that the simplest solution continued to be the most responsible explanation. However, as the trait revealed itself, the proof I was hoping for gradually presented itself.

When a single fish with a mutation appears, there is a way to develop more fish with that mutation. I have the minimal

knowledge of basic genetics most of us share, having been familiar with the Punnet square diagram. When I see a fish with a mutation I wish to develop, I assume the trait is recessive, in that I will not expect to see the trait expressed by the young of a breeding between that and a normal fish. Only after I determine that a fish with a new mutation is healthy do I attempt to breed it, and occasionally a mutation may also be sterile. This female looked good, and in fact became gravid, producing 2 or 3 drops of young before she died. After being crossed with a normal fish, the mating of the young from that cross who carry the trait, but do not show it, will produce young displaying the new mutation 25% of the time. A mating of two of those young that show the mutation should then begin to produce fish that are consistently showing the mutation. With swordtails a generation is generally considered to be 8 months, so the appearance of a number of fish possessing the trait who are then old enough to breed will take approximately 16 months.

After the time it took to accomplish this, most of the fry were not growing out as expected. I was hoping for large Xiphophorus mayae, just like their cousins across the room, but now with high fin dorsals. What I was getting were often little miniature fish. They were quite cute actually, with all of the color and much of the finnage, but they matured out early and topped out at between 2 and 3 inches. It occurred primarily with males, many of whom also possessed a long extended gonopodium, such that they were useless as breeders. I was getting concerned that they would be the only high fin fish I'd have to work with, so instead of culling them, I put them in their own tank to see if they would reproduce. I also knew that a new mutation may carry a number of other consequences, and that ultimately the line may simply die out. These little fish didn't reproduce, and instead gradually died away within just a couple months. But there did continue to be occasional fish that grew out almost normally, though still moderately undersized when compared to the normal mayae. It was within the finnage characteristics of these fish that I was finally convinced that the high fin occurrence was genuinely spontaneous, and not the result of an accidental cross.

Both sexes carry the high dorsal fin, though it can be dramatically different between individual fish, and the basic female and male structures differed- the females possessed broader dorsals, often with the first 2 or 3 rays extended. The male's dorsal fins were longer, thinner, almost banner-like, and occasionally so long that they would extend out past the tail! There was no consistency, and there were still many normal finned fish within each drop. My brief experience from working with fancies was that if the high fin had been the result of a cross with a well established high fin line of *X. helleri*, the finnage should be expected to show some consistency. That was not the case with this line. I was curious as to whether the normal finned fish within each drop would then be normal sized- I wanted to know if the high fin trait was linked to their also being undersized. If there were full sized normal finned siblings, they could possibly be crossed with better examples of the high fin fish to increase the overall size of the line. But though robust and healthy, only a few of the normal finned fish in my cull tank have come close to reaching full normal mayae size.

I watch these fish fairly carefully, and rather than separating them by sex as soon as possible, I have been allowing them to grow up to sexual maturity together, first removing any early maturing males, then all normal finned fish. I try to move them infrequently, and disturb them only when I have to. When certain individuals draw my attention for their overall size, broadness and height of the dorsal fin, as well as depth of color, I pull them to become breeders. I make sure to remove males I do not want as breeders before they mature out enough to breed. Females I select for a combination of overall size and size of the dorsal fin.

With each subsequent generation, they are in their 5th now, the number of high finned fish per brood seems to be increasing, though the percentage is better with some females than others. I have a 50 gallon breeder tank with about 15 fully adult fish, 4 females that are currently regularly producing young. However, there are approximately 200 others in various stages of growth. Because of the line's current inconsistency, I do not know how many will reach full size until it happens. I expect to see a higher percentage of genuinely full sized fish with the current generation growing out, though I expect the next generation may still come from about a half dozen pairs.

With each generation there has also been an increase in the overall size of the fish. Fortunately, My current breeders have been fairly prolific, and do best when kept in groups of their original drops. From this I have also seen that the percentage of high fins within each brood does differ between females. I have also learned to be careful to release future breeders into the breeder tank only when large enough to fend for themselves, I have still lost fish when introduced at too young of an age. All I can surmise is that the longer finnage reduces mobility somewhat in their heavily planted tank, and when competing with larger fish, the smaller, younger fish don't fare as well.

I do feel that they are at least two generations away from being somewhat consistent in their look and percentage of high fin young showing the trait. I was recently approached concerning the potential for a "double dose" of the high fin trait possibly being lethal. All I can say is that I have been breeding high fin to high fin to produce the young I continue to work with. However, I have had times where very large females ultimately drop only 15 or 20 young- fish that of that size should be having broods 2 or 3 times that size. This may imply lethality in utero, though I cannot say what this means for the high fin fry that survive.

I recently launched Select Aquatics ([selectaquatics.com](http://selectaquatics.com)), personally breeding and selling many of the specialty fish we work with but often have difficulty finding, or that we need to wait for the next ALA convention to obtain. There are now over 20 species, including some swordtails and goodeids. These high Fin mayae will be offered again shortly.

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