



The Raleigh Aquarium Society

P.O. Box 31564, Raleigh, North Carolina 27612-1564
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July 5th, 2008

Next Meeting: Thursday @7:30pm August 7th, 2008.

Meetings are held on the first Thursday of each month at the [North Carolina State University College of Veterinary Medicine](#) located at [4700 Hillsborough Street in Raleigh](#). Visitors are welcome! Snacks and light refreshments are provided. A raffle of fish and fish related items follow the meeting. Due to Security Issues, NCSU has required that the doors going into the downstairs lobby remain locked. Please be on time, as we will have a designated person standing by the door to let you in. If you are late, you may try knocking or call Linda Twaddle at 919-880-3782 or John Patterson at 919-264-4011.

Meeting Agenda

Picnic

As most of you already know since it's been discussed at the last two meetings, instead of having a regular meeting for July since the first Thursday falls on July 3rd we're going to have a BBQ on Saturday, July 5th. Chris & Mitch have generously agreed to host our party - thanks so much! We're planning on doing a later event than last year - start time is to be 4pm since we're not sure what the weather is going to be and Chris is concerned that it's going to be too hot in the early afternoon with just a limited amount of shade.

So for those of you who want to go collecting prior to eating - you'll have plenty of time. Do we have a volunteer to coordinate the collecting trip?????

As usual, the club will be providing paper goods, soda, condiments and meat. We ask that everyone bring a covered dish and/or a dessert to share. You should plan to bring your own chairs.

There will not be a speaker this month since we're doing the BBQ, but we will be having a full raffle.

Directions to Chris's house:

Chris and Mitch Duncan
1114 Brucemont Dr.
Garner, NC 27529
919 649 9499

Directions if you are coming from Cary, Durham, or other points north:

Go East on I 440 towards Rocky Mount. Take the Hammond Rd. exit 299 turning right onto Hammond (Not Person St. It changed names right at 440). Continue down Hammond and cross over Hwy 70 at the red light. The road changes names and you will be on Timber Dr. Continue down Timber Dr turning left onto Brucemont. Our house will be on the left and will have several wooden raised flower beds in the front yard.

Directions from North Raleigh, Rocky Mount, Wake Forest:

Again get to I 440 going East. You can either stay on the belt line past the 440/I 40 east split to the Hammond Rd exit 229, turning right onto Hammond Rd and following the above directions. Or you can take the I 40 east exit towards Wilmington and get off at the Garner exit 306 towards Garner. This will put you onto HWY 70 west. Take the Vandora Springs Rd. Exit you will be turning right onto Vandora Springs Rd. Past the Forrest Hills shopping center turn left onto 7th Ave. at the stop light. 7th Ave. empties into Aversboro Rd so bear right onto Aversboro Rd. Right before you get to Aversboro Baptist Church turn right onto Brucemont Dr. My house will be on the right with the wooden raised flower beds.

Directions from points east of Raleigh and Garner:

From I 40 east exit get off at the Garner exit 306 towards Garner. This will put you onto HWY 70 west. Take the Vandora Springs Rd. Exit. You will be turning right onto Vandora Springs Rd. Past the Forrest Hills shopping center turn left onto 7th Ave. at the stop light. 7th Ave. empties into Aversboro Rd so bear right onto Aversboro Rd. Right before you get to Aversboro Baptist Church turn right onto Brucemont Dr. My house will be on the right with the wooden raised flower beds.

Or you can map quest directions from your home using the address above. But please feel free to call and get more specific directs if you like or if you get lost.

Business Meeting

Business meetings are open to everyone who is interested in participating in Committees, general business of the club and the Workshop and Swap Meet planning. Business Meetings are held on the 3rd Thursday of the month at the NC State Vet School, upstairs in the lobby area as follows:

July 17, 2008

August - no meeting

September - no meeting

October 16, 2008

November 20, 2008

December 18, 2008

January 15, 2009

February 19, 2009

March 19, 2009

April - no meeting

May - no meeting

June - no meeting



ARTICLE INFORMATION:

Author: Huntley, Wright (*Wright Huntley*)
Title: *Jordanella floridae* The American-Flag Fish
Summary: A comprehensive article about a sometimes neglected and misunderstood fish. Includes detailed observations of different spawning behaviours, and a suggestion as to the reasons for them.
Contact for editing purposes:
email: Wright Huntley jwwiii@pacbell.net
Date first published: June 1995
Publication: SF Bay Area Killifish Association
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Jordanella floridae, Goode & Beane 1879
The American-Flag Fish

By Wright Huntley,
SF Bay Area Killifish Association, June 1995
Aquarticles

INTRODUCTION

Described by Tutaj 9 as "An American Beauty," this strikingly lovely and peaceful algae eater deserves a better break.



Of the hundreds of species of killies kept and propagated by dedicated specialists, very few qualify as a suitable fish for the more casual aquarist. The American-Flag fish, *Jordanella floridae* is a notable exception. Misunderstood, improperly identified, and frequently described inaccurately in the general aquarium literature, this pupfish deserves a place in many community tanks that it has been denied by an undeserved reputation. While consuming algae like the best Siamese Algae Eater, it is beautiful, rugged and extremely tolerant of varied water conditions. Highly prized in Europe, maybe it's too close to home, here, for proper appreciation. Recently priced at less than \$3.00 in local stores, it is a colorful bargain when it matures.

Originally thought to be a cichlid, this native of the gulf coast, but primarily Florida, also was identified with the sunfish. Now known as a unique, single-species genus of native American pupfish, it has uncanny behavioral resemblance to both the sunfish and cichlid groups. The spiny dorsal ray is unique among *Cyprinodontidae*. The only time the *Jordanella floridae* shows belligerence, above that of a molly, is during courtship and when guarding eggs. At that time, the female, or any territorial invader, is at real risk from an irate male, who can do serious damage. This is no different than almost any nesting cichlid or gourami.

The generic name is for David Starr Jordan, the first president of Stanford University. The species name is for the state where it is most prevalent. The habit of shipping wild specimens from selected gathering grounds in Florida has left the species free of the dominance of ugly mutations that have ruined many other good aquarium fish. Typical *J. floridae* of today probably look identical to the specimens so eagerly greeted in Europe over 70 years ago. Unfortunately, that appearance gets masked in the living conditions of many fish shops, and poor understanding of the needs of this fish often has turned a real swan into an ugly duckling.

As in most killifish, the male and female are different in appearance, but their coloring is as variable as any chameleon. Each has a different kind of attractiveness, but both may be quite dull and drab in the wrong conditions. Their behavior is as interesting as their appearance. In this paper, the author proposes a hypothesis to answer the question of why there are so many conflicting descriptions of this species. The breeding behavior under two different environments, and their general behavior is described, following the description of the fish and proper living conditions. A concluding section puts forth the hypothesis. A proposal for defining correct conditions for keeping and breeding *Jordanella floridae* is advanced.

APPEARANCE

The body is much shorter and more laterally compressed than most other cyprinodonts. The unique spiny fin rays and unusual body qualify it for a separate genus. The body of both sexes is similar, with the male size about 25-30% larger than the female (3~ vs. 2 ¼~). The flattened sunfish-like shape, with dorsal and anal fins displaced to the rear, gives it an unmistakable silhouette. It is easily the most colorful of our native aquarium fishes, rivaling the dwarf gourami in overall attractiveness. The origin, unique shape, and bright colors should qualify the *Jordanella floridae* as the signature fish in the AKA logo, rather than some non-native that is rarely kept by most modern killifish aquarists. The particular color pattern of the male is even more reason we should proudly display this fish as our logo.



Male and female *Jordanella floridae*.
Original photo supplied to Aquarticles by Steve Coach, of San Diego.

In a well lit, heavily planted tank, the male takes on the appearance that leads to the common name. "American-Flag Fish" requires the hyphen of a compound adjective, for the male looks as if he dressed in the national pennant. [Almost all other authors and editors seem to miss this simple grammatical point] With red stripes on the sides, and an upper fore-quadrant of deep blue, the resemblance is uncanny. The iridescent green-white spot on each scale makes the stars in the blue field, as well as the "white" rows between the red stripes (if you don't mind a grass-stained look to the white). The upper and lower edges of the scales are bright red, forming solid, horizontal, brilliant red stripes. The transparent unpaired fins are a pale sky blue, but dorsal and anal are so covered with red markings that red is the dominant hue.



Female *Jordanella floridae*, showing false eyespots.
Photo by Steve Coach

The female sports a false eyespot in the center of her side, directly below the start of her dorsal fin, and another in the rear base of her dorsal fin. Her basic color is tan to gray, and only the central portion of two or three scale rows may carry the iridescent green shine. She has a chameleon-like ability to shift colors and patterns in all kinds of interesting ways. Sometimes a checkerboard, then vertically barred, her most happy appearance is to echo the central eye spot several times back toward the caudal fin, each spot with less contrast as the tail is approached. At the height of breeding passion, she can become a buttery bright yellow, with almost no dark body markings.

The eyespot on the side of the male is still present, exactly at the right angled corner of the blue star field. It is not so hard-edged and well defined as in the female. While the male loses his dorsal

spot as he matures, the female's jet-black dorsal spot has a brilliant white "iris," making it more obvious than her normal eye. It should confuse many predators.

The male flashes his bright red unpaired fins, to attract the female's attention, and uses them in the actual mating as described below. The upward facing mouth has somewhat wide fat "lips." His sharp teeth are capable of taking neat bites out of sword plant leaves, if enough algae, riccia and duck-weed aren't present to satisfy the craving for vegetable matter. Their face has an expression that some have described as "froggy."

BEHAVIOR

Like many partially vegetarian fish, the routine behavior is a slow and dignified search for algae, and a calm resting position among top weeds. In shallower tanks, the resting position may be nearer the bases of plants. A mated pair will spend most of their non-breeding time in close proximity, with lots of affectionate brushing and touching. Rarely will they allow the other out of visual range. While seldom molesting others, more aggressive species can cause the *floridae* to become timid and to hide. Like many killies, the young do become frantic when frightened, but this tends to go away with age. Small babies are often very hard to see. They instantly dive for cover at any approach to the tank.

The most striking behavior is during mating, described in detail below. The spawning behavior is radically different in different conditions, which has led to a lot of confusion in the literature. *1,3-8,10* Hopefully, this report will start to clarify this point, and future efforts can proceed with better direction. Most of the cited references contain some material factual errors, and only the JAKA/Killie Notes references should be trusted. *2,9* In particular, the males are larger than the females, they are very brightly colored, they don't "dash around" the tank, and they don't molest other fish, despite the claims of some famous encyclopedists.

LIVING CONDITIONS

The literature is, again, somewhat divided on desirable conditions. The *J.* so readily adapts to very different situations that most stated conditions are probably correct. This author has obtained viable eggs from the same pair, both in soft, too-warm, deep, acid water, and shallower, hard, cooler water. The only requirement seems to be reasonable acclimation, and adequate mix of animal and vegetable matter in the diet.

They first spawned in the top plants of a 55 gallon "Amazon" plant tank. Since the temperature was 81° F. and the hardness was down around 2 dGH, with pH about 6.2, the spawning was a complete surprise. These parameters were well outside the range of almost every reference, yet the *floridae* happily deposited eggs on hygrophila leaves, duck-weed roots, floating water sprite and anything else near the surface. Introduction of a power head caused enough surface turbulence that they tried spawning on lower plants and an algae-covered log. They went back to surface spawning when the current was directed slightly downward, leaving some still corners at the surface. They never attempted to spawn on the bottom.

Some days after completion of the spawning round, they were generally peaceful. However, an *Apistogramma macmasteri* pair started defending a new brood, and the female *J. floridae* simultaneously showed some tattered fins. Moving the pair quickly to an old 10 gallon tank, they received only hastily drip-acclimation to the 74° F., hard-water tank. dGH was estimated at about 20, but was not measured, at the time, and pH was well above 7 (above 7.4 without CO₂ injection). The depth of the 10 (8.5~ from gravel to surface) was much less than the tall 55G show tank (16~). Some salt had been added earlier, but intervening partial water changes made the residual concentration uncertain.

Heavy rear-corner planting in the 10G filled all the swimming space but a central clearing by the front glass. This turned out to be an observational jackpot, for the area chosen for next spawn was within range of a strong hand-held magnifying glass, in the center of the clearing.

Even with the abrupt change in conditions, the male harassed the female, and, within a day, spawning resumed. Fussy about conditions, they are not!

SPAWNING -- HIGH VS LOW

The initial spawning in the 55G tank was at odds with the sunfish-like descriptions in many books. The tendency was to just say those authors were busy quoting each other and had not bothered to observe that the *Jordanella floridae* was a typical killifish that should spawn in mops near the surface. After all, everyone "knows" killies don't guard their young.

In the shallower tank, the difference in behavior was almost unbelievable. The mating dance changed completely, and the egg-laying looked almost as if it really was in the gravel. The male fanned the eggs, and in all ways fit the cichlid-sunfish-like pattern, described so often, before.

In the tall tank, earlier, eggs were rescued from the floating roots of duck weed and placed in a small fishbowl to gestate and hatch. One egg even floated in the meniscus at the top of the water. They weren't very sticky, and the one egg led to the belief that the eggs were buoyant. Later, the author observed that bottom-laid eggs were not buoyant. They pulled on attached fine strands of algae to hang down when undisturbed. The difference in spawning was so great it leads to speculation that the salinity or fat content of the eggs might be different for deep-water spawning and for shallow-water bottom spawning, to minimize egg loss.

The original mating behavior, in the deep tank, started with a male dance to attract the female. When she was receptive, she would swim up to him, and then lead him to some, often distant, part of the tank she had chosen to deposit her eggs. Snuggling together, head-to-head, she was always on top, with the male cupping her from below as they semi-inverted to push her vent up against the plants chosen. His unpaired fins all curled to clasp her in a cup as they lay on their sides, nearly parallel to the surface, and vibrated along the plants. Repeated several times each evening, there were long rest periods while they recovered. When resting, they tended to stay close and keep within easy eye-contact range.

In the smaller tank, the male so severely chased and bit the female that physical separation became necessary. He, not the Apisto, had been the fin shredder. Despite the fighting, both tried to find a way through the installed barrier. By the next morning, they were getting so frantic that it was removed. Spawning was resumed, right away.

This time, the female clearly led the dance. It takes quite a bit of room, and smaller tanks could be a problem here. She grabbed the exact center of the clearing, and pointed herself directly away from the male. Flicking little puffs of water at him with her tail, as he circled the clearing (always in a clockwise direction), he displayed his fins to her. She rotated with him to keep him visible in both eyes, and her tail pointed directly at him. Gradually, his circles tightened and/or she backed up until her tail was actually stroking his side with each flick. When he became sufficiently aroused, they moved to a side-by-side position and started a vibrating spawning pass over the gravel. Cupping his anal fin near her vent, she deposited the eggs on plant strands in rows as they slowly wriggled along.

Watching with a magnifying glass, it was possible to observe in detail. The spawning "in the gravel" was no such thing. Every single egg was getting deposited on a strand of hair algae, a root, or strand of Java moss. No eggs were seen attached to, or free, in the gravel.

Driving the female away, the male groomed and fanned the egg site. He thrust forward with his

caudal fin and backward with his pectorals to create a strong current over the eggs, while tilted, head down, at about 30° from the horizontal over the "nest." Several spawnings were completed, over the next few days, before he drove the battered female away for the last time. He diligently fanned and watched the eggs, driving the female into hiding whenever he could see her, and threatening the author whenever he approached the glass for a closer look.

Some eggs were lost to ramshorn snails (which the father ignored), but most hatched successfully, after about a week. No infertile or fungused eggs were observed. A portion of the spawned-on plants was removed, early in the process, to a small floating container, but most were left with the parents to see what happened. When all the eggs were hatched, the male still fanned and watched over them. The parents were finally returned to the big tank as the babies started to scatter on the second day after hatching started. The separated fry were returned from the floating container to the tank and the babies were started on infusoria, to supplement the already-active fauna of the aged water in the tank.

Yield of viable, free-swimming fry was very poor in the 10G tank. The earlier eggs, collected in the deep tank, hatched in a much shallower container, with much better results. Many killies do not develop proper swim-bladder function if trapped in too-deep water, and it is easy to speculate that this is true here, too. The fry struggle very hard to reach the surface as soon as they can swim. The few who do, seem to grow better and swim better than the ones left belly-sliding on the bottom. The ability to stay at the surface seems related to the first attempts to get there. Filling the swim bladder with air, early, may be critical.

CONCLUSIONS

Combining the need for shallow water in the babies, and the two radically different spawning behaviors leads to an interesting hypothesis. The spawning of the *Jordanella floridae* is simply adjustable to the early needs of the young.

In deep water, surface spawning on free-floating plants allows the eggs to be blown ashore, where the hatching can occur in shallow water. In shallower water, the protection of the parent is more safe, so the eggs are laid in a nest and protected. In nature, 8.5-inch-deep water is rarely more than a few feet from shore, so shallow water easily could be reached by belly-sliding fry. Unfortunately, the 10G tank did not provide that protection, and most of those fry did not get to the free-swimming stage. While algae growth was prolific in the old water of this tank, the hydra came out in droves to further deplete the fry population. The fry do not swim well for the first couple of days, so were easy prey. Only five or six, that probably started in the floating container, survived.

The next variation on a theme will be to collect eggs and test the growth of fry hatched at several different depths, to see if an optimum can be defined. The results may take a while, so they will have to be reported later.

It may be better to keep only males for quantity display in the community aquarium, like dwarf gouramis. While mildly territorial, they do well together if given a little room, and will even school in groups. Parboiled spinach, algae or veggie flakes should supplement live foods and regular flake food, if the softer plants are to be protected. After all, these are pupfish, with long intestines, and they like and need some vegetable food. Their grazing will, however, tend to keep unsightly hair or beard algae under control. They are less expensive and much more ornamental than almost all other really effective algae eaters.

The breeding roughness and fierce male guarding of the young might suggest that females should be kept only for breeding, and raised/maintained separately from the males, once breeding

age is reached. This author so enjoys their normal affectionate behavior that it seems a shame to keep them apart. If kept with a male, in a small tank, just provide plenty of hiding places for the female. Otherwise, the spawning-frenzied male might cause severe injury to her fins.

This is an easy-to-breed species, and would be an excellent and entertaining first breeding project for someone just starting out in killifish culture. Who knows, we might eventually get enough out at our own shows to rival the large numbers usually entered in the DKG show.

REFERENCES

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Wright Huntley Santa Clara, CA
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Please contact John Jankowski at raleighaquariumsociety@yahoo.com if you are an active member of the Raleigh Aquarium Society and do not have an up to date membership card. Membership cards can be picked up at any meeting.

Raleigh Aquarium Society

Application for Membership

Membership privileges include:

- Ability to post items in trading post section of monthly newsletter
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- Yearly Membership - \$15.00 (includes spouse and children)

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