Preliminary Report on the Artificial Hybridization of Black Crappie (*Pomoxis nigromaculatus*) and Sacramento Perch (*Archoplites interruptus*)

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Introduction

Sacramento perch *Archoplites interruptus* are the only native centrarchid west of the Rocky Mountains. Fossil records indicate that they have been isolated since the Miocene period and due to this isolation and lack of competition have retained many ancestral traits,

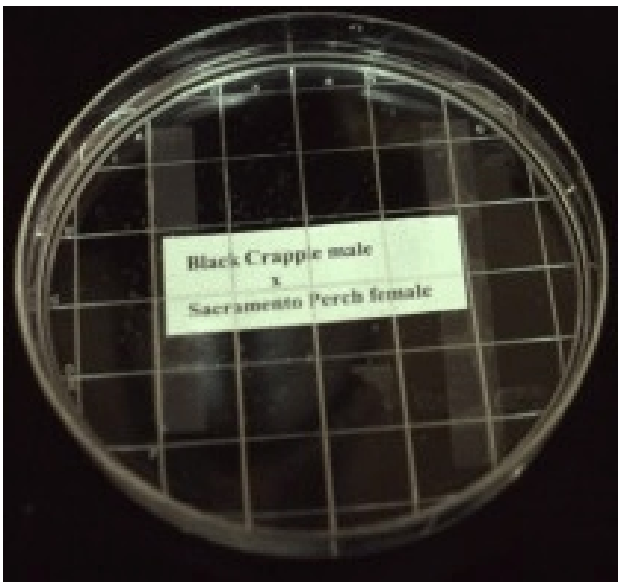
Female Sacramento perch

both structural and behavioral (Moyle, 2002). Some researchers believe Sacramento perch are closely related to Crappie (*Pomoxis sp.*) and Flier (*Centrarchus macropterus*) (Mabee 1993, 1995) although recent DNA sequencing indicates that Sacramento perch are sister species to the rock basses *Ambloplites* sp. (Near et al, Molecular Phylogenetics

Male black crappie

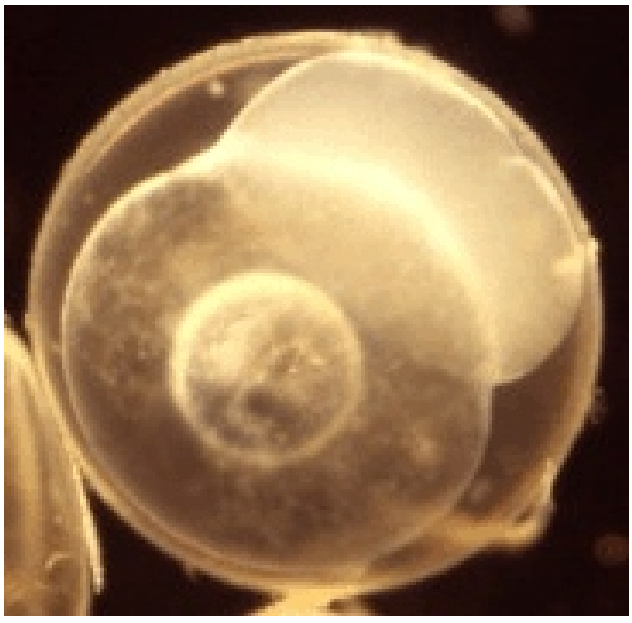
and Evolution, 2004). Interest in using artificial hybridization to provide additional information on genetic relationships among species of sunfish has recently reemerged. To date there has only been one hybrid experiment conducted with Sacramento perch (Miller, Chris. May 2002. Artificial Hybridization of Green Sunfish (*Lepomis cyanellus*) and Sacramento perch (*Archoplites interruptus*). In Prep. Contra Costa Mosquito & Vector Control District, cmiller@ccmvcd.net). In order to add to data on centrarchid hybrids and to shed light on possible interactions between Sacramento perch and black crappie (sperm drift), we conducted the following experiment.

August 23rd, 2004 at 9:30 a.m. a pair of Sacramento perch began to spawn in a 20 gallon aquarium. The female was removed and 127 eggs were stripped into a petri dish (9:38 a.m.). A male black crappie was sacrificed and the testes were removed. Testes were macerated with a scalpel and placed in the petri dish with Sacramento perch eggs



Petri dish with hybrid eggs.

and water and gently stirred for 3-4 seconds (9:45 a.m.). After approximately two minutes testicular material was removed with forceps and eggs rinsed with fresh water. At 10:15 a.m. several eggs had started cell division. Eggs were again gently rinsed by



Developing hybrid egg. 106 minutes post fertilization. 40x

adding small amounts of water and decanting off equal

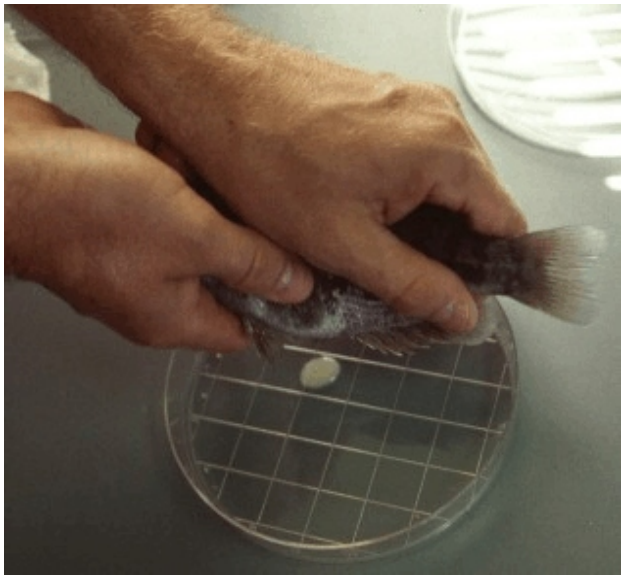
amounts of water. Water temperature was 23.54°C. At 11:24 a.m. (106 minutes post fertilization) a photomicrograph was taken of one of the developing

Hybrid egg at 212 minutes post fertilization. 40x

hybrid eggs. Another photomicrograph was taken at 1:10p.m.(212 hours post fertilization). Embryos were developing as normal until approximately 2:25 p.m. when development seemed to stop. At this point all developing eggs were counted (10 developing embryos) and rinsed with freshwater. At 6:45 a. m. the following day (21 hours post fertilization) all embryos were dead.

Discussion

Results this hybrid cross experiment were a fertility rate of 7.9% , hatch rate of 0%, and viability of 0% (male black crappie and female Sacramento perch). These results are not consistent with our results from hybrid experiments with green sunfish (*Lepomis cyanellus*) and the published literature. Hubbs (1963) discussed the complexities involved in hybrid crosses and concluded that there is no question that degree of hybridization success indicates phylogenetic relationship. More recent work also supports this theory (Daniel Bolnick, Univ. Of Texas at Austin) personal communication). Since black crappie are more closely related to Sacramento perch we expected higher compatibility resulting in higher fertility rates and hatch rates than experienced with green sunfish hybrid crosses. Therefore, results of this experiment may have been due to poor quality gametes. In our experiments the only way to obtain eggs from Sacramento perch has been to observe a pair spawning, remove the female and hand strip the eggs. A small amount of eggs (100-300) can be expressed (this may be repeated 2-3 times). Generally the female is allowed to spawn a portion of eggs so that overripe egg are expelled in the tank, increasing the likelihood of good quality eggs. After fertilization was observed a large



Hand stripping eggs from Sacramento perch

portion of eggs were wrinkled in appearance and did not water harden until approximately of 3 hours after the addition of sperm and water. Since no control (Sacramento perch fertilized eggs) was used it is difficult to determine if this group of eggs were of poor quality. The eggs produced by this female naturally spawning produced 11,907 swim-up larvae. Sperm quality may have been poor due to either poor condition of the fish in general or out of season condition of the testes (small in size). Regardless of the cause of the inconsistent results between this and previous results, this experiment should be repeated to generate more reliable data.

References

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