Hybrid Crosses in Sunfishes

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As Hubbs and Hubbs (1931) pointed out anyone who has collected and identified sunfishes in Illinois and adjacent waters encounters numerous individuals which are undoubtably natural hybrids between genera and species common to the waters where the collections are being made. They were able to produce experimentally hybrid offspring from crosses between the common genera of sunfishes by placing males and females of the genera to be crossed in single pair matings in rather large aquaria. Under these conditions the male built a nest in one corner of the aquarium and the eggs were shed and fertilized over the nest.

Mr. Francis D. Hunt of the Illinois State Natural History Survey in the spring of 1932 tried controlled fertilization by stripping the females of eggs and then adding sperm stripped from males. This was at Lake Senachwine near Henry, Illinois. The eggs thus treated appeared to be fertilized and to start development though the young lived only a few hours.

Following this lead through the courtesy of the Illinois State Natural History Survey which placed the facilities of the laboratory boat at my disposal, I was able to develop a method for the controlled fertilization in generic crosses of sunfishes. It is the purpose of this paper to describe this method and briefly indicate some of the results obtained.

The sunfishes used in making the crosses were obtained either from the hoopnet catches of the Natural History Survey field men who were making a fish population study of Lake Senachwine at that time, or from seine catches made by seining along the shore with a 20-foot common sense (¼-inch mesh) minnow seine. Ripe individuals of both sexes of the kinds desired were selected from the catches. Whether the individuals were ripe could be determined by holding the fish in the left hand and applying gentle pressure with the right hand to the sides of the abdomen just anterior to the vent. If eggs or milt are ready to be shed only a small amount of pressure will cause exudation. The individuals thus selected were taken to the laboratory boat. Here the males and females were segregated. Each fish was washed off in spring water which was free from either fish sperm or eggs. After washing, the males of each species and the females of each species were segregated and placed in glass battery jars or other similar containers filled with clear spring water. Of course in handling the fishes, temperature differences in the water by which they were treated were guarded against. The water in the containers was changed several times. Before fertilization of the egges the fishes were kept in the spring water for several hours usually overnight.

In preparation for fertilizing the eggs, a dozen or more Woods Hole finger bowls were placed on a table, each bowl being tilted slightly. A small amount of water was added to each. The hands were throughly wet with spring water and a ripe female selected, and her eggs were stripped in to the already prepared finger bowls. There should be just enough water in each bowl to cover the eggs. A male was then selected to be used to fertilize the eggs. A large drop of milt was stripped from the male into each finger bowl. If one wishes, the eggs of one female may be fertilized by sperm from several different kinds of males. In changing from one kind of male to another care must be taken to clean the hands thoroughly so that no sperm of the first male remains. This may be done by first rinsing the hands followed by washing with soap and water, then rinsing with 70 per cent alcohol or some disinfectant and finally moistening the hands with clean spring water before the second male is selected. As soon as the milt is placed on the eggs it is spread over them by shaking the finger bowl. After the addition of the milt and shaking, the finger bowls are allowed to stand undisturbed for 10 to 15 minutes. The water containing the excess sperm is then decanted off, the eggs rinsed with spring water, and then covered with spring water to a depth of ⅛ to ¼-inch. The bowls are now shaken vigorously to loosen up the eggs which should be as evenly distributed as possible over the bottom of the finger bowl. Having only a thin layer of water above the eggs keeps the oxygen supply high enough so that no further aeration is necessary. The water has to be changed often, every few hours on warm or hot days. Spoiled eggs may be removed by means of a pipette. As soon as the eggs begin to hatch the young fish may be transferred to new finger bowls or other dishes. As soon as the young become active they should be placed in balanced aquaria if one wishes to attempt to raise them to adults. The fish should first be fed small protozoa, then paramecium, small entomostraca, Daphnia magma, chopped angleworms, silver fur fox food.

Crosses 1932. Matings made 6/16-23 and 7/11-21

No attempt was made to rear these fish

1. *Allotis humilis* female X *Eupomotis gibbosus* male, successful
2. *Helioperca macrochira* X *Eupomotis gibbosus* male, successful
3. *Allotis humilis* female X *Apomotis cynellus*, successful
4. *Eupomotis gibbosus* X *Helioperca macrochira* male, successful
5. *Helioperca macrochira* female X *Apomotis cyanellus* male, successful

Successful crosses 1933. Matings made 6/17 and 6/29

1. *Allotis humilis* female X *Eupomotis gibbosus* male
2. *Eupomotis gibbosus* female X *Allotis humilis* male
3. *Allotis humilis* female X *Apomotis cyanellus* male

Crosses successful, some fish being raised to one year age in all cases. Some fish still being kept are from these crosses.

Crosses 1934. 6/23

Eggs from one *H. macrochira* female X
- (1) *A. cyanellus* male
- (2) *E. gibbosus* male
- (3) *A. humilis* male

6/21

Natural female hybrid between *A. humilis* X *E. gibbosus* X *A. humilis* male