Killifish from Outer Space

Glen E. Collier
Ithaca, New York

Along with every other AKA member, my ears perked up when while watching the news coverage of the recent Apollo-Soyuz space mission, I heard a newsman try to pronounce the word "killifish"! Not quite believing my ears, I started paying closer attention. Sure enough, he did say "killifish" and even more incredible there was a live television shot from the Apollo spacecraft showing small fish swimming around in a sealed plastic bag. This was certainly a strange way for our fish to make national headlines and I was determined to find out more of the details.

A few days after splashdown, I called the News Center of NASA Headquarters in Houston. I was quickly given the telephone number of Dr. F. William Schelb, the principal investigator of the project. I then called him and had a very interesting conversation. He was most cooperative and told me the whole story of killifish and the space program.

The fish involved was Fundulus heteroclitus originally from Beaufort, North Carolina. They were originally used in the space program as one of the test organism during the quarantine of the Astronauts after returning from the moon. As expected there were no "moon germs" brought back, but the F. heteroclitus continued to be maintained by NASA.

Then before Skylab III, one of the Astronauts requested to have some sort of pet to take along as a diversion during the long space mission. Fundulus heteroclitus was available and it was convenient to package them in sealed plastic bags, so off they went as the first fish in space. They spent the entire mission in their bag taped to the wall of Skylab. It was noted that these subadult fish displayed severe disorientation in the weightless environment. However after several days of looping and spinning on their axes, they finally learned to orient themselves to the light and from then on always swam with their backs to the light.

Along with the subadults, fifty eggs were sent on the mission. These eggs were five days postfertilization. Since they normally only take fourteen days to hatch, they were expected to start hatching about nine days into the mission. But this was not what happened. Their rate of hatching or development was greatly retarded. The first egg did not hatch until 21 days into the mission! Even after 35 days in space only 50% of the eggs had hatched. Also it was noted that the fry showed no signs of disorientation at zero G.

For the Apollo-Soyuz mission it was decided to again send subadults into orbit along with many staged eggs. The subadults again displayed the looping and spinning behavior. The eggs were again retarded in development. Of 50 fourteen day old eggs, only eleven had hatched by the end of the nine day mission.

Staged eggs were used to see if weightlessness had any detrimental effects on embryogenesis. The normal embryogenesis of Fundulus heteroclitus is well documented and thus provides a good standard for comparison. Preliminary examination of the eggs after returning from the mission indicates that weightlessness has little effect on the development of the egg. What few changes were noted, were rapidly corrected when the eggs again experienced gravity.

Staged eggs were also used in hope of being able to define what stage of development was retarded in the weightless condition of space. The data had not been fully analyzed to answer this question at the time I talked with Dr. Schelb, but it will be interesting to see if there are specific stages that are delayed and if these stages correspond to any of the ones at which annual eggs normally enter diapause.

Although America will not be sending more men into space for at least several years, killifish will be going up again soon. More Fundulus heteroclitus will be going up with the Soviet Cosmos satellite this Fall to further study the effects of weightlessness on embryogenesis.

This is no doubt a giant leap for killifishes!

Reprinted from the Journal of the American Killifish Association, Vol. 8 No. 9. Membership in the American Killifish Association is available at $10.00/yr. Contact Jerry and Bev Sellers, 1908 Bryon Road, Brandon, FL 33511.

****