Breeding the Axolotl in its Native Habitat

V. Graue, J. Sánchez Robles, G. Castro, O. Cuamatzi, Y. Márquez, and M. Vázquez

Centro de Investigaciones Biológicas y Acuícolas de Cuemanco (CIBAC) Universidad Autónoma Metropolitana (UAM), Xochimilco, México, D. F.

Since 1995 our university has operated a government-owned center for the ecological restoration of the Xochimilco aquatic fauna. At that time our existing colony of axolotls, some 20 animals, which had been at UAM since 1992, was transported to this center, known as CIBAC, which is located right beside Cuemanco, one of Xochimilco's widest remaining channels.

To this original stock we added axolotls taken from the lake for an evaluation of the wild population. Breeding was undertaken, since repopulation is an ultimate goal of the program.

Dr. George Malacinski visited us in the spring of 1995, and in January, 1997, Susan Duhon and Sandi Borland stayed for two weeks working with us at CIBAC. From these visits very useful ideas and suggestions on the handling of adult breeding and raising of larvae resulted .

We had noticed better results in breeding with pairs kept in a hole we had dug outside and filled with channel water than in aquaria. This led to the construction of our "*axolotarium*," a deeper hole (45 centimeters deep) lined with plastic and filled with water from Cuemanco's channel through its connection to our pumping system. It has a drainage outlet that returns water back to the channel, establishing in this way a water flow.

Later, a second axolotarium was constructed at the back of the center, right beside the water. It was covered by a cage with a mesh to prevent birds and water snakes from getting in since it was farthest from our view where we work. Also, the cover gives nice shade for work outside.

In order not to lose track of the animal's registration number (our identification system is based on individual characteristics), floating cages were devised, so that each pair could be given a number. The floating cages are light cubical structures made of PVC and nylon mesh that allows the water to flow through.

Near the end of the 1997-1998 spawning

Our uncovered axolotarium has a bridge for reaching the cages in the middle of the pond and for children's visits. The yellow balloon with big eyes is our effective scarecrow.

season, we decided to evaluate larval survivorship in the covered axolotarium as compared to the uncovered one, since we had already noticed high predation of eggs in the floating cages in the latter axolotarium by voracious insect larvae.

Twelve pairs of sexually mature axolotls were chosen, and each pair was put in a floating cage with a stone for spermatophore deposition and casuarine tree branches for egg deposition. Six pairs were put in the covered and six in the uncovered axolotarium between May 22 and May 29, 1998.

We obtained five spawnings in the covered axolotarium and only three in the other one, perhaps because we were already at the end of the spawning season.

The adults were removed after they spawned, and the eggs were counted in each spawning. Temperature was 21°C, pH 9.4, and dissolved oxygen 12.9 mg/l (parameters measured at noon) in both axolotariums.

To keep to a minimum the entrance of predators or their eggs with the canal water, a filter was placed over the faucet of the covered axolotarium.

Survivors were counted after one month (June 29). In the uncovered axolotarium, with no filtration in the water, there were no survivors. Before the eggs hatched, we had observed coriccids and chironomid larvae, which entered from the air or with the unfiltered water and flourished in the spawnings. Also some frogs, which had escaped from the ranarium, were found inside the cages. Temperatures were at a record high in May, so populations of insects were very high.

Survivorship in the covered axolotarium was better, ranging from 4.9% to 32.2%. We attribute the wide variation to some cages having holes in the mesh at the end of the experiment because of handling. Some larvae escaped through these holes and thus could not be counted. We also noticed genetic differences in the spawnings themselves, since one male produced spawnings much stronger than others.

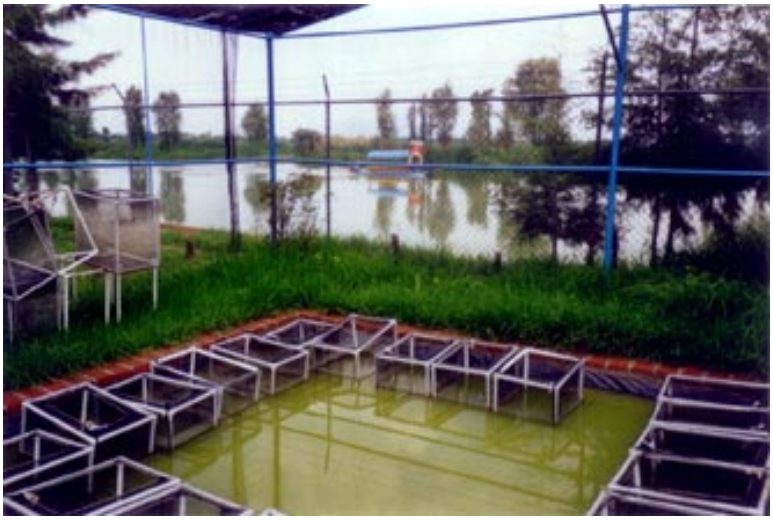
It was not possible to apply any statistical analysis because the mortality of all the larvae in the unprotected axolotarium prevented statistical comparison, but we plan to repeat the experiment next spawning season after improving the design of our system. One of the problems we have to solve is that, when we handle the floating cages, some larvae get underneath the tubes and are crushed when we put the cage back in the water. Also, separating the larvae that grow faster from their smaller siblings to prevent cannibalism is more difficult in this system than in aquaria.

The advantages we have found to this form of rearing are reduced costs and labor in the feeding of larvae, since in the floating cages the axolotl larvae are taking advantage of the rotifers, copepods, cladocerans, and insect

The construction of our covered axolotarium

larvae of the natural waters of their habitat. Water flux in these systems frees us from spending time cleaning containers, and also we presume the larvae will have to handle less stress when they are put in the lake from this seminatural condition than they would if transferred from aquaria into the lake. In this way we hope we can optimize breeding for repopulation purposes.

Our preliminary results show success with the protection factor although this will have to be corroborated with future studies.



The finished axolotarium

The floating cages showing the faucet covered by a filter