

Small is Beautiful: Economical Axolotl Colony Maintenance with Natural Spawnings as if Axolotls Mattered

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A Smaller Laboratory's Success With the Axolotl

In an era of growing concern about animal rights and decreasing research dollars, keeping laboratory animals is becoming increasingly problematic. We have approached this problem in the axolotl colony at the University of Manitoba by developing what we have found to be a very successful and economical system. Our lab is small, with one researcher, an average of three students, and two summer B.Sc.(Med.) students. We typically require 15-20 spawnings per year for the lab. The majority of these are needed in the University's May-August summer session. (We are all very busy during the regular sessions with teaching and classes.) We work with the axolotl embryos at the earliest stages of development. Although we had regularly ordered fertilized eggs from the Ottawa colony, these often arrived beyond a stage we could use or in a questionable state from shipping conditions. (The embryos were frequently overheated in summer or frozen in winter.) The only solution seemed to be the establishment of our own colony.

The system we developed is one that is both low cost and low labor. This is critical for us as we have no animal technicians. We have 24 adult breeding animals and a somewhat larger population of juveniles of various ages. Our animals were originally supplied from adults from the Ottawa colony. We have only a few of the Ottawa animals left and now breed successfully enough to provide our own replacements from our own spawnings. All the care and maintenance is done by the students in the lab.

Induced versus Natural Spawnings

When we first began, we used induced spawnings almost exclusively. We didn't care for the results because the animals invariably acted extremely distressed by both the injections and being removed from the water. More than once an animal suffered minor skin damage from net handling that then led to infection. We also noted that natural spawnings rarely have any abnormal jelly sacks, such as a single long sack containing two or more eggs. We had three unexplained deaths following injection, a major disaster for a small colony. Both male and female induced animals

seemed exhausted and weakened following induced spawnings. The spawnings themselves were not conducted with the animals appearing in the same happy state of excitement as natural spawnings. Animals also showed unusually high susceptibility to infection following induction. Finally, HCG (human chorionic gonadotropin) is expensive and has a short shelf life.

Accordingly we are quite proud that we have been able to gradually decrease the number of induced spawnings to the point where we have not needed an induced spawning for almost two years. In our quest for natural spawnings we also have attempted to address the thorny and somewhat controversial problem of the axolotl's psychological wellbeing (see below). We believe this consideration is the primary reason that we have been able to eliminate induced spawnings. Our Canadian Animal Care Council level of intervention may be reduced to the lowest one. We are now confident we will no longer need any induced spawnings.

Raising the Larval Axolotl

To keep a steady supply of juveniles available, we take about a dozen eggs from each normal spawning and set them aside. The developing embryos are kept in plain glass tanks near the door of the main working area of the lab where the student desks are. (We found this ensures they are well cared for because they are checked many times daily as the students come and go.) Only those animals that are able to hatch normally without assistance are kept. All newly hatched animals are examined and fed live, freshly hatched brine shrimp daily for two to seven days. At this point four to six of the most robust hatchlings are transferred to a large "pond tank."

The pond tank is a well aged 40 gallon aquarium. It is a mini ecosystem provided only with fresh distilled water and an overhead light. The tank contains a variety of natural live food, in particular a great abundance of *Daphnia*. The axolotls are left to fend for themselves in this tank until they have grown big enough to be easily spotted in the tank, and the *Daphnia* population begins to drop visibly. This normally takes a month to six weeks. In the early summer when the *Daphnia* are particularly abundant it can happen as quickly as two and a half weeks, since the axolotls grow more quickly with greater food abundance and the higher temperatures.

When the axolotls are removed from the pond tank, they are about 4cm long and have grown all four legs. The axolotl survival rate in the pond tank is about 85%. It has been our experience that animals raised to this stage by this method are almost guaranteed to make it into our breeding colony as adults. (The pond tank is given a week for the *Daphnia* population to recover before more hatchlings are added.)

We have raised axolotls to this stage by keeping them in more crowded conditions and feeding them brine shrimp daily. It is our experience that the axolotls grow at only half the rate and are much more likely to lose a leg to a sibling. This method is also highly labor intensive and expensive because the water needs frequent changing, and we must raise the brine shrimp ourselves from purchased "eggs." The survival rate for the axolotls

