

A Brief History of the Axolotl at Rufus King High School

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My experiences with axolotls began in the fall of 1983. At that time, Laurie Haack, a high school student in my International Baccalaureate (IB) biology class had become interested in metamorphosis and regeneration in axolotls. This occurred after she had done readings in my college embryology book, *An Introduction to Embryology* by B.I. Balinsky, Saunders, 1960. She had been searching for a research topic in order to begin a required independent laboratory research project. After Laurie's initial interest, I referred her to a friend, Dr. Phil Clifford, who was a doctoral candidate in physiology at the Medical College of Wisconsin. Phil made us aware that the Axolotl Colony at Indiana University existed and could possibly provide live specimens. Contact was made with the colony director, Ms. Fran Briggs, who agreed to supply my student with 19 specimens for her investigation. The final project, entitled "The Effects of Low-voltage Electrical Stimulation on Regeneration Rate in *Ambystoma mexicanum*" was a remarkable project for a high school student. (Laurie is now a doctoral candidate in neurobiology at Standard University.) When Laurie finished her project she had more than enough axolotls to worry about. I inherited most of them, and, to this day, axolotls still impact my family life and school teaching.

Each year, since 1985, I have used axolotls in my IB biology class for an observation lab on gas exchange. The lab is best described in the following excerpt from an essay I wrote as an applicant for a Tandy Technology Scholars award which I won in 1993:

One of my favorite presentations occurs in my advanced biology class during our study of gas exchange mechanisms. The presentation is really a demonstration/laboratory involving a comparison of the gill structures in coho salmon and axolotls. In spite of our close proximity to Lake Michigan and the present popularity of sport fishing on the Great Lakes, many of our

students at this urban high school have never seen a coho salmon. Each fall, I am able to acquire an assortment of large frozen fish heads from a local charter boat captain. I also obtain living 6 cm axolotls from the Axolotl Colony at Indiana University. Through dissection and observation, my students investigate the concept of counter-current exchange as it pertains to oxygenation of blood in these contrasting animal specimens.

Every year, my students become enthralled by this seemingly simple laboratory exercise. This year, for example, a student carefully dissected out the entire gill structure from one side of the head to realize that the apparent top and bottom inside surfaces of a fish's mouth are actually the anterior visceral arch regions of the gills. This new perspective of the gill structure, which one normally views from the side, or posteriorly, amazed the young man. Under a stereoscopic dissecting microscope students can clearly view the rapidly pulsing flow of red blood cells through the capillaries in the axolotl gill filaments. The flow pattern around the periphery is well defined, but many cells also short circuit this longer route by randomly crossing the middle. Unfortunately, most biology students rarely view living organisms and never in this manner.

Because of the convenience for their maintenance, I keep the axolotls at home and bring them to school on the day of the lab. However, after the lab, I usually keep the axolotls at school for a few more weeks. Inevitably, students ask many questions about the axolotls and take pleasure in feeding them. Other teachers have also asked to use them in their classes as live demonstration animals. Unfortunately, a few axolotls have died over the years because of the occasional student, who out of a sadistic sense of curiosity, probably added some chemical in a toxic amount to the axolotl's water. (I share my classroom with chemistry classes which come in during all other periods of the day.) In recent years, I have also described this lab and promoted axolotls at biology workshops for new teachers

in the IB program. I have been a leader of these workshops which are held every fall in a different location around the U.S. and Canada.

The impact on my family has been manifested in many ways. At least one live axolotl has been in our household since 1984. As my three sons were growing up, their dad's exotic pets were always a source of fascination for visiting friends. Before vacation periods, a grandparent, or neighbor, or friend is always targeted as someone to take care of the axolotls. Since my wife is a first grade teacher, she has kept axolotls in a fish tank in her classroom. Little children have become so intrigued by axolotls that for some children their very first written passages were about axolotls. Perhaps, the culmination of axolotl impact on my family occurred last spring. My middle son, a senior at the University of Wisconsin in Madison, kept an axolotl in a specially purchased tank placed on a fireplace mantle in an apartment he rented with five other fraternity brothers. Although that axolotl drew the attention of numerous visitors, it is incidental to the real story which began with a typical routine phone call to home by my son. During the conversation last April, my son mentioned that in his advanced Spanish literature class he had recently read the original Spanish version of "Axolotl" by Julio Cortázar and described how famous the story is in South American literature. Eventually, I was able to obtain an English translation of the story. After reading the unusual story, my interest in the axolotl shifted to a new level of appreciation.

This fall it occurred to me that I might be interesting to link my IB biology class with the IB Spanish class through the axolotl. I talked to our IB Spanish teacher who was familiar with "Axolotl" by Cortázar. I proposed a mutual exchange of information during which my students would describe the biological significance of the axolotl while Spanish students could explain the literary significance of the axolotl. With help from Susan Duhon, present director of the Axolotl Colony at Indiana University, I obtained a copy of the original Spanish version of "Axolotl" and other useful information about the axolotl. A pilot exchange session with my class and representatives of the Spanish class was held with mixed results. The project holds great promise but needs more time to be fully developed. Since that attempt in early October, I had time to

discuss the idea with Tom Curtis, the Deputy Chief Examiner in Spanish for the IB and Antonio Ibarz, the Chief Examiner in Spanish. I was able to meet with them at a subject seminar for new IB teachers in Albuquerque. The idea resonated instantly with Tom because he already teaches "Axolotl" and its philosophical implications to his Spanish class at the United World College of the American West in Montezuma, New Mexico. Tom's scholarly knowledge of the literary and philosophical aspects of "Axolotl" and other writings of Cortázar enables him to elaborate at length about the topic. In listening to Tom, an additional idea came to me which is to include another IB class, Theory of Knowledge, in a three-way class linkup. Theory of Knowledge is a unique IB class which analyzes and compares the basis for "truth" in literature, or science, or mathematics. Tom is enthusiastic about that latest idea, and it is something that we will work on as time permits. In addition to familiarizing myself with an entirely new perspective on the axolotl, I find myself prompted to go beyond my present level of biological knowledge. Instead of just using the axolotls as an exotic animal in a simple gas exchange lab with casual reference to its ability to regenerate new limbs, I must now greatly widen my boundaries of knowledge about the biology of axolotls. To this end, the "Axolotl Newsletter" (I have kept my issues since being included on the mailing list) will be a rich source of reference information which I will examine more closely.

In closing, my experiences with the axolotl add up to a history with some depth in time. This history has been especially enriched in recent months. In the back of my mind, I have always imagined scoring many points with axolotl in a Scrabble game (which I sometimes play). Also, I would find great satisfaction in being able to breed axolotls but time and facilities do not favor that goal. I do, however, want to explore and improve the newly discovered bridge between my biology class, the Spanish class, and Theory of Knowledge. I am very grateful to the Axolotl Colony staff at Indiana University, particularly Susan Duhon, for the invaluable and unfailing help provided to me and my students over the years. Also, the school community where my wife teaches has enjoyed learning about the axolotl. We offer a sincere thank you and may the Axolotl Colony at Indiana flourish in the future.