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What's your diagnosis?

Dermal Lesions, Hemorrhage, and Limb Swelling in Laboratory Axolotls

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The axolotl (*Ambystoma mexicanum*) is a large salamander native to Lake Xochimilco, Mexico. It belongs to the group of salamanders known as mole salamanders. Other members of this group include the tiger salamander (*Ambystoma tigrinum*) and the spotted salamander (*Ambystoma maculatum*). Axolotls exhibit neoteny, which is the retention of juvenile characteristics in adult stages of life. Adult axolotls display arrested transformation of selected features such as gills, despite the sexual maturation of their gonads. They keep their feathery external gills and tailfin their entire lives, and they maintain their aquatic lifestyle.

Developmental biologists, neurobiologists, and amphibian research scientists find the axolotl an excellent animal model for their research. Not only are axolotls easy to handle, but females produce large

eggs, juveniles have unsurpassed regenerative capabilities, adults have large nerves, and genetically defined mutants are available. All axolotls used in research come from the Indiana University Axolotl Colony (IUAC; <http://www.indiana.edu/~axolotl/>), which was founded in 1957. There we breed axolotls ~10 months of the year and distribute tens of thousands of embryos, larvae, and adult axolotls.

We house adult axolotls individually in 1 gallon bowls or in groups of three or four in plastic tubs, ~10 inches x 18 inches x 6 inches deep (25 cm x 46 cm x 15 cm). Adult males live in individual bowls when they are not being mated, and adult females live singly or in groups. We maintain the axolotls at 15–18 °C (60–65 °F) in 1/2 gallon (2 L) of water per animal, and change the water daily using Holtfreter's solution (<http://www.indiana.edu/~axolotl/>). We feed larval axolotls brine shrimp, and juveniles and adults pelleted food.

From October 2001 through February 2002, we had a larger than normal number of axolotls and had to house some animals in unusually crowded conditions. During this period, a colony-wide disease outbreak occurred. Juvenile and adult axolotls showed skin pustules, reddening and swelling of the vent, limbs, and neck, and occasional bleeding from the gills (Fig. 1). All animals that exhibited these signs died within one to five days.

Following the introduction in late 1994 of wild axolotls from Lake Xochimilco, our

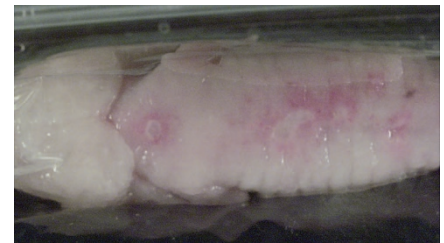


FIGURE 1. Dermal pustules with diffuse petechial hemorrhaging on the vent of a white axolotl.

colony had undergone a similar disease outbreak in the summer of 1995. Not only did our colony have similar high-density conditions, but we were also housing tiger salamanders. The disease moved through the entire colony in a four- to five-month period, and then the incidence tapered off. Careful husbandry and immediate removal of animals showing clinical signs eventually extinguished the disease.

Considering the epizootic history and clinical signs, what do you think is the cause of the two outbreaks? Is there any potential problem in housing tiger salamanders with axolotls or introducing wild axolotls to the colony? Could other amphibians or reptiles housed in close proximity be affected?

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