

## The Mexican Axolotl as a Pet and a Laboratory Animal

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### Basic taxonomy, life span and habitat preferences:

The axolotl is a urodele amphibian from the largest family of salamanders, the new world's Ambystomatidae or mole salamanders. The Mexican axolotl is known scientifically as *Ambystoma mexicanum*. The axolotl is originally from two large lakes, Lake Xochimilco and Lake Chalco, in the same central plateau where Mexico City is now located. One hundred years ago, these lakes and their connecting marshes, swamps, and lagoons covered over 200 square km (77 square mi). The lakes were filled by springs and meltwater from the nearby snow capped volcanoes.

Up until this century, the axolotl was also a common food source, taking the place of fish in the region. Today, the lakes have been sacrificed to provide farmland and space for Mexico City itself (Brandon, 1989). Lake Chalco is completely dry. Lake Xochimilco has shrunk to 314 hectares (personal communication, Virginia Graue). The reduction in size and the pollution of the axolotl's natural habitat has led to its being listed in Appendix II of the Endangered Species list.

European naturalists have been commenting on the axolotl as far back as the late 1500s (Smith, 1989). Unfortunately, it is now so rare in the wild that almost all scientific observations on behavior and preferences are based on laboratory animals. The axolotl has a long and honorable history as a lab animal. The ancestry of some individual animals can be traced all the way back to an original large group of axolotls imported from Mexico in 1864. Six of the specimens were given to M.A. Dumeril of the Jardin des Plantes of Paris. At least one more of the original group, and perhaps more, were subsequently added to collection (Smith, 1989; Newth, 1960).

Axolotls have enjoyed extensive use by scientists, particularly classical embryologists, since that time (Smith et al, 1971).

The name axolotl comes from Aztec mythology. The god of the dead, Xolotl, tried to evade banishment from earth by taking on a number of repulsive and unattractive forms. He was finally captured and killed while in the form of an axolotl and as such was used to feed the sun and moon. The name, which can be translated as water dog, is rendered ajolote in Spanish (Smith, 1989).

The term axolotl is often used to refer to any large branchiate salamander (one that has not undergone metamorphosis and still has its gills). Larval or neotenic tiger salamanders (*Ambystoma tigrinum*), a closely related species, are also often called axolotls in the vernacular. In particular, many pet shops and pet books refer to larval or neotenic tiger salamanders as axolotls. Usually these animals differ significantly in appearance from the Mexican axolotl, being more olive in color and more stocky in build with shorter, stubbier toes, and they cannot be depended upon not to metamorphose. Mexican axolotls, on the other hand, ordinarily will not metamorphose unless they receive thyroxine, either by injection or by addition to the water or diet. They are inducible obligate neotenes, remaining in the water-dwelling, larval state for their entire life cycle unless artificially induced (see Martin et al, 1995, for definitions of the terms facultative, inducible obligate, and uninducible obligate).

The scientific name, *Ambystoma mexicanum*, was firmly agreed upon by the scientific community only in 1974. There are at least 48 other scientific names, especially *Amblystoma*, and variations in spelling that are used in pre-1974 literature (Brandon 1989, Smith 1969).

There are at least eighteen other Mexican *Ambystoma* species, several of which closely resemble *Ambystoma mexicanum*. There is a subspecies of tiger salamander that is found in the same part of Mexico as the axolotl. Before metamorphosis, this subspecies of tiger salamander is virtually indistinguishable to the untrained eye (Brandon, 1989; Shaffer 1989; Smith 1989).

### **Physical characteristics:**

The Mexican axolotl is a large, heavy-bodied tailed amphibian with relatively short legs, (Fig.1). The tail is normally as long as the head and body length combined. The dorsal tail fin extends from the middle of the back to the tip of the tail, and it is matched, caudal to the vent, by a vertical fin on the ventral side. Like other salamanders, axolotls have four toes (Figs. 2) on the front feet and

