

Mole Salamanders

The Family



Ambystoma cingulatum
Photo: D. A. Dennis

Ambystomatidae



Ambystoma mavortium mavortium. Photo: B. Love



Torsten Blanck



Tailed amphibians (order Caudata or Urodela) make up about 9 percent of the amphibian species living in the world today.

There are about 400 species altogether worldwide, of which some 160 are distributed in North and Central America.

Currently 33 recognized species belong to the genus *Ambystoma* (Tschudi, 1838), the mole salamanders. These include salamanders of various sizes, from dwarf species such as *Ambystoma mabeei*, *Ambystoma laterale*, and *Ambystoma opacum*, which reach only 7.5–13 centimeters in total length, to the large terrestrial

species *Ambystoma mavortium*, which reaches up to 44 centimeters in total length.

All members of the genus have a fairly plump, powerful build, with a broad head, a body that appears to be “segmented” with clearly visible ribs, and a large laterally flattened tail. Most species have large venom



Wet. *Ambystoma mavortium melanosictum* Form B. Photo: T. Blanck



Ambystoma maculatum from North Carolina. Photo: J.D. Wilson



Ambystoma macrodactylum. Photo: D. M. Dennis



"Albino" Tiger salamander, *Ambystoma mavortium mavortium*. Photo: B. Love



Juvenile *Ambystoma gracile gracile*. Photo: T. Blanck



Ambystoma opacum from South Carolina. Photo: J. D. Wilson



Ambystoma talpoideum. Photo: J. D. Wilson



The axolotl, *Ambystoma mexicanum*. Photo: B. Love

glands on the head and along the body with which they secrete a sticky fluid if attacked by predators or picked up — this substance is practically harmless to humans.

Almost all species of mole salamanders reproduce in fish-free bodies of water. Internal fertilization is indirect — in courtship the male deposits a spermatophore near the female, after which the female picks it up with her cloaca, and then deposits fertilized jellylike eggs. When mating is finished, the adults usually leave the water.

Only two species are exceptions to this mode of reproduction: *Ambystoma opacum* and some populations of *Ambystoma cingulatum*. With *Ambystoma opacum*, mating and egg deposition take place on land — the female then protects the clutch until rainwater forms pools triggering the larvae to hatch. *Ambystoma cingulatum* normally reproduces like the majority of species of the genus, in the water, but clumps of eggs from this species have also been found in the grass and in terrestrial entrances to crab holes.

All species hatch as aquatic larvae that breathe with gills. The larvae may metamorphose into terrestrial adults after several months in the water, or may remain as aquatic neotenic forms for their entire lives, becoming sexually mature without ever metamorphosing. The best known neotenic species is *Ambystoma mexicanum*, the axolotl.

Another noteworthy species is *Ambystoma taylori*, the only mole salamander known to live in brackish water — it is found only in the salty Alchichica Lake in central Mexico, and is in grave danger of extinction.

The range of the genus *Ambystoma* stretches from southeastern Alaska to southern Mexico, one of the largest extensions of any genus of salamander. The oldest fossil records are from

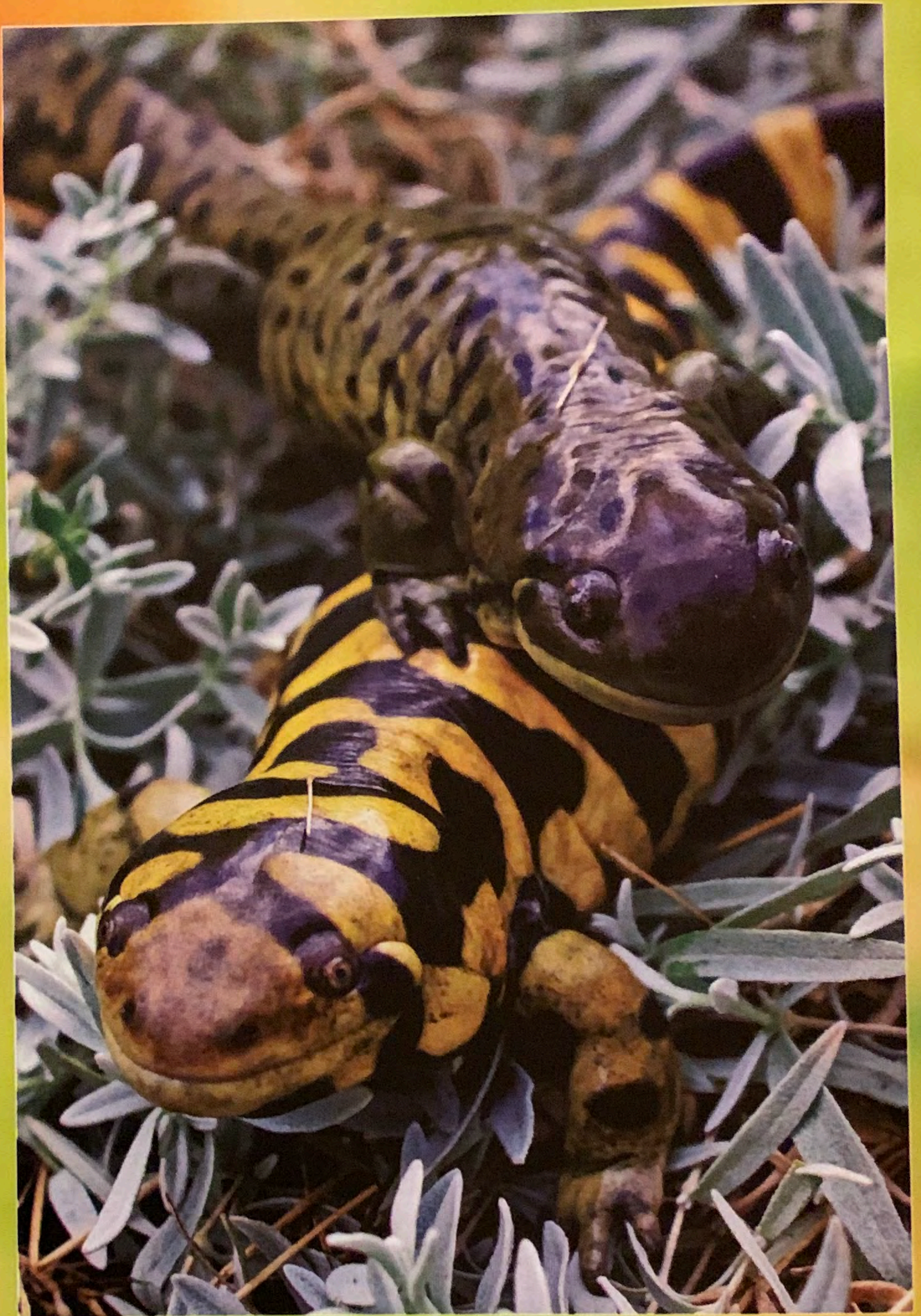
the Oligocene Epoch, and are about 30 million years old.

Mole salamanders occupy a variety of habitats including semideserts, moors, woodlands, high plateaus, marshes, and streams, ponds, and lakes. The terrestrial adults are generally secretive, spending most of the day hiding in burrows that they may dig themselves, and coming out only after the sun goes down, or during rains, or during the breeding season to migrate back to the water where they were born.

Mole salamanders are among the most studied of any animal — more than 3,000 papers have been published on the genus. Some species are quite easy to reproduce in captivity (e.g., *Ambystoma mexicanum*), and the genus shows complex hybridization. Some species (*Ambystoma laterale*, *Ambystoma jeffersonianum*, *Ambystoma texanum*, and *Ambystoma tigrinum*) are able to produce polyploid hybrid forms (with more than the normal two homologous sets of chromosomes), raising many questions for scientists, and challenging the biological and genetic species concepts. Some researchers believe these hybrids are recent; other researchers believe they are millions of years old. Some of the hybrids have been scientifically described — *Ambystoma platineum* (Cope, 1868) = *Ambystoma jeffersonianum* x *Ambystoma laterale* x *Ambystoma jeffersonianum*; *Ambystoma tremblay* (Comeau, 1943) = *Ambystoma laterale* x *Ambystoma jeffersonianum* x *Ambystoma laterale*; *Ambystoma nothagenes* (Kraus, 1985) = *Ambystoma texanum* x *Ambystoma laterale* (and maybe *Ambystoma tigrinum*).

As early as 1788, Lacépède described the first species of the genus *Ambystoma* as *Salamandra punctata*, which, following much debate and various taxonomic changes, is now known as *Ambystoma maculatum*.

The genus *Ambystoma* involves an unusually great number of confusing synonyms and invalid names, such as *Siredon*, *Rhyacosiredon*, and of course *Amblystoma* (meaning “blunt mouth”), which is presumably what Tschudi originally meant to call the genus. The name *Ambystoma* was simply a spelling error, but being the first published name of the genus, the rules of zoological nomenclature give it priority. ■



Comparison of males: *Ambystoma m. mavortium* (in front) and *A. m. diaboli* (on top). Photo: T. Blanck



Female *Ambystoma andersoni*. Photo: J. Fleck



Ambystoma mabeei from South Carolina. Photo: J. D. Wilson



Ambystoma jeffersonianum. Photo: J. D. Wilson



Melanistic specimen of *Ambystoma melanostictum*. Photo: T. Dimmler



Ambystoma texanum. Photo: D. M. Dennis



"*Ambystoma platineum*," a hybrid: *A. jeffersonianum* x *A. laterale* x *A. jeffersonianum*. Photo: D. M. Dennis