

# Venomous freshwater chimera

Anne-Kathrin Juch

Platypus

*Ornithorhynchus anatinus*

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It is venomous. It has a sixth sense. And it looks like its's borrowed all of its body party from different animals. The result of Dr. Frankenstein's cute streak: the platypus. Meet Amelia, the female platypus of the Biodiversitätsmuseum in Göttingen. Unfortunately, neither the collector nor the year are known to tell more about her origin.

If she did not come from a zoo, Amelia most certainly lived in the wetlands across the east and south-east coast of Australia and throughout Tasmania, as one of two members of the monotreme order. And she is smaller than you might think - only measuring about 50 cm long. Unlike placental mammals, and marsupials, which both give birth to live young, monotremes are mammals that lay eggs. But laying eggs is by far one of the least interesting things about the platypus. Besides being cute Amelia hides many secrets that occupied scientist a very long time, and even to the present day.

The Platypus is a perfect example of convergent evolution, when similar traits evolve separately in different species based on similar problems the species had to solve. But instead of evolving one or two traits similar to other species, the platypus is seemingly made up entirely of parts from other animals.

When British explorers first brought a specimen of a platypus back from Australia to England it was deemed too ridiculous to be real no one could believe that this creature wasn't just a Frankenstein of different animals stitched together so it took several more expeditions and more specimens to prove that this thing was indeed a mammal that laid eggs with a duck-like bill. George Shaw of the British Museum was the first one to describe it in 1799 and it was said that it was “rendering the latter half of his life miserable, from his utter inability to determine whether it was a bird or a beast.”.

The platypus has a bill like a duck, a tail like a beaver, webbed feet like an otter, electroreceptors like a shark, they lay eggs like a turtle, they have their limbs on their sides like reptiles, they don't have stomachs and lack teeth like echidnas, and they have venom like a viper.

While their variety of parts make them look like a fresh-water chimaera, all of their disparate features come together perfectly to create one highly effective animal. Each one of their strange features serves a valuable purpose.

The reason platypuses have evolved to have a duck-like bill is because of the environment that they were able to conquer - rivers, lakes and wetlands. Fresh-water is murky by nature, and if you're going to hunt in it, you need to rely on something other than your eyes. And so, the platypus has evolved a superpower; electroreception. Commonly found in sharks and few other cartilaginous fish species, platypus have bills lined with tiny dots called electroreceptors. Platypuses don't have very good eyesight but the way that they see the world is through electric pulses. Whenever you move a muscle, the contraction generates an electric field. The platypus uses the electroreceptors in the skin of their bills to calculate the voltage difference around them, allowing them to target the electric fields of moving prey with pinpoint accuracy. Maybe one time in her life, Amelia may have dove, heading for the bottom, shaking her head quickly from side to side, seeking out any moving prey. If she would detect anything, she could use her sixth sense to zoom in and focus on the prey. They feed on worms, insect larvae, crayfish and whatever they can find between rocks. They are nocturnal animals and spend about 40% of the night actively looking for food.

One consequence of the development of electroreceptors is that adult platypuses have no teeth. In order to crunch up their meals, they have to scoop up small rocks and press them against the top of their bills. Platypuses also lack stomachs. Similar to Echidnas, their food is digested by going straight from the esophagus to the intestine.

Borrowing yet another strategy, but this time from crocodiles, on top of the platypus' bill are two nostrils. This positioning allows them to stick a little bit of their snout out of the water to breathe without giving their position away to predators. When they dive, they close their nostrils. Platypuses only dive for about 30 seconds

The second most iconic thing about the platypus is their wide-tail - an adaptation that they share with a species on the other side of the world - the beaver. These tails are perfectly evolved for a life in the water, offering the platypus both excellent propulsion and steering. But they also have a surprising use - carrying things. They look like they have on the cutest little backpacks. These tails are quite dexterous, and they use them to carry reeds and sticks to construct their burrows. When the platypus prefers not to be disturbed, they will use these reeds and sticks to barricade the entrance, allowing them to snooze in peace. The entrance to their den is usually just under water but they can extend into the riverbank, up to 5 meters.

Next up we have the platypuses' rather unusual feet. They resemble otter feet in that they are heavily webbed, but the closer you look, the weirder they get. Their webbing extends well beyond the tips of their fingers. This allows them to be much larger than they would be if the webbing stopped at the fingertips as it does in most webbed-footed species.

Spending most of their time floating around looking for food, you may have noticed something strange about their legs - they're located on the sides of their body, rather than underneath them. This is strange in the mammalian world and is usually only seen in reptiles. This adaptation makes them more hydrodynamic, a must for an aquatic mammal. But beyond strange webbing, male platypuses have an extra weird adaptation on their hind limbs, they have sharp spurs. Sharp, venomous spurs.

In humans the venom leads to excruciating pain that can last for months and whose effects do not respond to treatment with morphine. Researchers also discovered that the venom contains a hormone that could potentially be used to treat type 2 diabetes.

Male platypuses use their venom primarily during the mating season in combat with other male platypuses. Interestingly, the venom, while it does share chemical properties and effects with

reptile venom, is not meant to kill or even permanently damage tissue. Platypus venom is meant to subdue competing males while they mate with prospective females. Once the battle for mating rights is won, females will dig out their burrow in preparation for their young.

After 4 weeks of gestation 2 to 3 eggs are laid and will hatch after about 10 days. Since the mom has no teats, the young, called puggles, will lap up milk from her mammary glands for about four months before they are old enough to eat solid meals.

In their ecosystem platypuses are quite hardy animals and can live lives of up to about 11 years in the wild and 17 in captivity. Unfortunately, they're extremely sensitive to the health of their environment so if there's a lot of pollution in their lakes and river systems, they get problems.

So that's been decreasing their survivability for some years now. The platypus is listed as a near threatened species and with their numbers decreasing, it will take a concerted effort from all of us to maintain the wetlands Amelia once called home.

## Literature

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