

A Story of Solo Motherhood -- An amazing new addition to the Seymour Marine Discovery Center



A swell shark at the Seymour Marine Discovery Center.



Swell shark egg case, also called a mermaid's purse.

Some of the most recognizable objects at the Seymour Marine Discovery Center are the swell shark (*Cephaloscyllium ventriosum*) egg cases, also called mermaid's purses. All of the swell sharks on exhibit at the Seymour Center are female, and continue to lay eggs whether a male has fertilized them or not, just like a chicken.

Earlier this year while aquarists were removing old egg cases from an exhibit, they discovered one egg case that was astonishingly fertilized! When they held the egg case up to light, they could see the yolk and an embryo inside. The fertilized egg case was moved into an exhibit so it could be displayed for our visitors. The mother shark is the only shark in the exhibit and has not had male contact for at least 7 years. **So how did she produce a fertile egg?**

Her egg was most likely fertilized through a reproductive method called **parthenogenesis**, which is derived from the Greek words for "virgin birth."

Parthenogenesis occurs when an egg develops and grows into an embryo without being fertilized by sperm. During female egg formation (or development) under normal

circumstances, a cell in the ovary, which is called an oocyte, divides. The divided cells do not receive an equal amount of cytoplasm and nutrients. The cell that has the majority of the cytoplasm and nutrients becomes the egg cell. The cells that have much less cytoplasm and nutrients are called "polar bodies." In sexual reproduction these polar bodies degenerate. However, during parthenogenesis, the egg cell fuses with a polar body which causes embryonic development.

While many invertebrates (animals without a backbone) such as mites, bees, aphids, walking sticks, and parasitic wasps reproduce parthenogenetically, it is **very rare in vertebrates (animals with a backbone)**. There have been a small number of documented cases in reptiles, amphibians, birds, and bony fish. A few cases have also been documented in sharks. All of the documented cases were from sharks that live in aquariums, isolated from males. It is still a mystery if this kind of reproduction occurs in the wild, and if it does, how frequently it happens and which shark species are able to do it.

Swell sharks are oviparous, meaning under typical fertilization circumstances, the egg is fertilized inside the shark's body, and is then laid and hatched outside of her body. When the egg is deposited from the mother, the long and twisted tendrils at the top and bottom of the egg case get stuck on a substrate like rocks or algae. A yolk inside the egg case will feed the embryo as it develops for 9-12 months. When the shark pup emerges, it will be fully independent and receive no care from its parents.

On the morning of January 29, 2020, aquarists at the Seymour Center were welcomed by a newborn **swell shark pup!** The egg case on display was empty, and at the bottom of the exhibit there was a small shark about 6 inches long! Swell sharks are nocturnal, so sometime in the middle of the night or early morning, the baby shark emerged from its case. This miraculous swell shark pup born of just a mother, emerged healthy and is on display at the Seymour Marine Discovery Center.

In the wild, studies show that sharks populations have declined anywhere from **50 to 90 percent in the past 20 years**. Much of this is due to sharks being killed to harvest their fins. While parthenogenesis may seem like a good backup strategy to reproduce in the wild if a female is unable to mate, it can have a negative long-term effect on a shark population's genetic diversity. An egg fertilized through parthenogenesis also is less likely to survive. Help keep shark populations healthy and avoid further population decline by not eating shark products and by supporting ethical seafood production.



*Left: Swell shark pup at the Seymour Center.
Hatched January 29, 2020*

Sources:

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