

Sponge Reproduction

Name: _____ Per: _____

Does this animal reproduce?

Of course it does. But how? Recall that all living organisms must reproduce. Is this sea sponge male or female? Or neither? Or both?

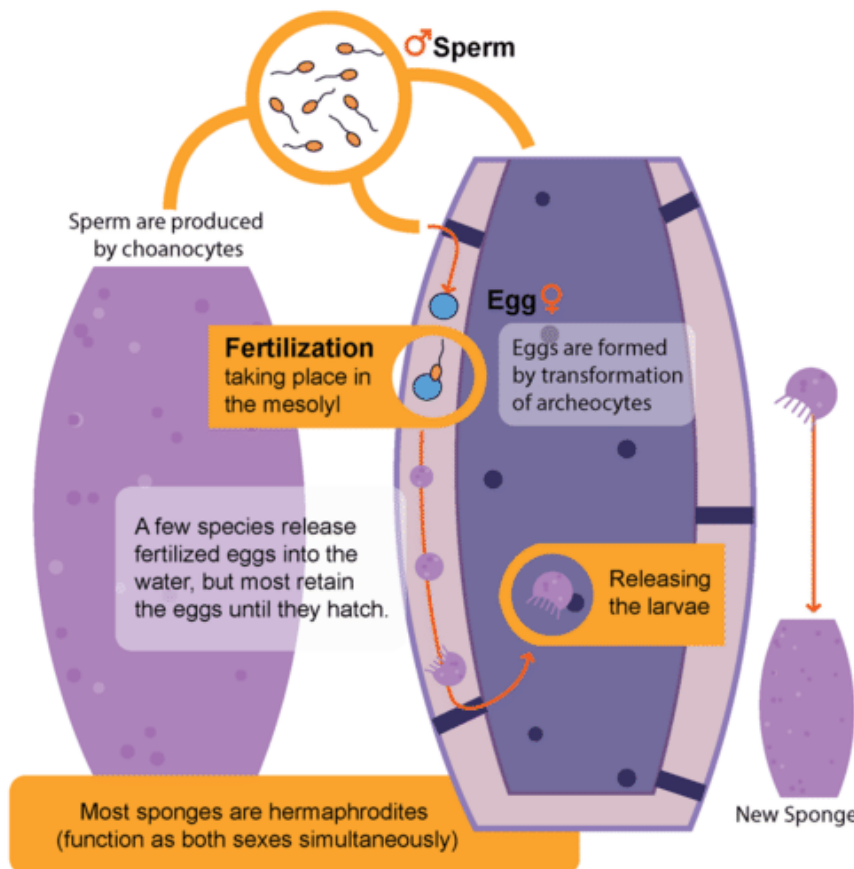
Reproduction of Sponges

Despite the fact that adult [sponges](#) cannot move, they are capable of sexual reproduction. Sexual reproduction is the formation of a new organism by the fusion of gametes - an egg and a sperm cell. The sperm is usually produced by the male parent and the egg is produced by the female parent. However, most species of sponges are hermaphroditic, meaning that each individual can produce both eggs and sperm (hermaphrodite). Gametes contain half of the genetic information of each parent (half of their [chromosomes](#)), and their fusion during [fertilization](#) provides a complete set of chromosomes to the offspring. [Sponges](#) are also able to reproduce asexually. [Asexual reproduction](#) does not involve the formation of gametes. The offspring are often formed by budding from a single parent organism. In this concept, we will discuss how sponges carry out each of these types of reproduction.



Sexual Reproduction of Sponges

Most sponges are hermaphrodites, but an individual will usually only make one type of gamete at a time, so they are not able to self-fertilize. The general life cycle of a sponge is depicted in Figure [below](#).



Gametes develop from the differentiation of either choanocytes or amoebocytes, depending on the species. Sperm produced by the “male” sponge (one that is producing sperm at the time of reproduction) is concentrated and released into the aquatic environment through the oscula. The sperm floating in the [water](#) reach the “female” sponge (one that is producing eggs at the time of reproduction) by the pumping action of choanocytes. In the same way that food is obtained, the choanocytes trap sperm [cells](#) as they flow through the interior of the organism. The sperm are then delivered to the eggs by the amoebocytes. Eggs are stored within the mesohyl, and that is where [fertilization](#) takes place to form a zygote. Once the zygote develops into a larva, it is usually released back into the water. A larva is a juvenile stage of an organism that is structurally very different from the adult stage. In the case of sponges, this is certainly true since the larvae of many species are able to swim using tiny hair-like projections called cilia that beat repeatedly to move the organism through the [water](#). As the larvae continue to develop in the water, they become structurally more similar to adult sponges and lose their locomotive ability. At

this point they settle and attach to a solid support where they complete development to the adult stage.

Asexual Reproduction of Sponges

Sponges are also capable of [asexual reproduction](#). This is accomplished by one of two mechanisms: external budding or internal budding. External budding is when a portion of the sponge breaks off and then regenerates into a complete organism. Internal budding takes place by the formation of internal buds called gemmules. Gemmules are a small collection of several different types of [cells](#) that are enclosed by a protective covering. This is an important survival mechanism in unfavorable conditions where the adult may not survive. The protected gemmule can withstand harsh conditions and can begin to develop into an adult sponge when conditions are more favorable.

One fascinating feature of some sponge species has been demonstrated by forcing individual animals through a sieve. This causes all of the [cells](#) of the animal to separate from each other. If the separated cells are incubated together in an aqueous environment, they begin to move and function somewhat independently. Over time the cells will come together to reform the original animal. This finding has strong implications for how multicellular animals may have arisen from the aggregation of single-celled organisms.

Summary

- Sponges are able to reproduce both sexually using gametes and asexually by budding.
- Even though sponges are hermaphroditic, individuals will only make one type of gamete at a time.
- There are two forms of [asexual reproduction](#) that sponges can go through: external budding and internal budding.

Review

1. What does it mean to be hermaphroditic?
2. Can sponges self-fertilize themselves?
3. What kind of cells do sponge gametes develop from?
4. Name some differences between the larva stage and the adult stage of sponges.
5. What are some advantages of forming gemmules?
6. What fascinating phenomenon of sponges points to how multicellular animals may have arisen?