

Epaulette Sharks: Earning Your Stripes

Breeding epaulette sharks may just be the challenge you're looking for. Here are some tips to get you started.

Text and photos by Kelly Jedlicki

The breeding of *Hemiscyllium ocellatum*, also known as the epaulette shark, can be accomplished by the aquarist with a large home aquarium. Shark breeding can often be easier than breeding many marine fish. Unlike most newly hatched marine fry, newly hatched sharks first food source can be prepared frozen food.

Decoding Their Biology

Egg tumblers, magnifying glasses and microscopes, green water, newly hatched brine shrimp and rotifers are not required for shark breeding. Shark eggs can easily be visualized by the human eye, and unlike other marine fish that are egg layers, sharks only produce one to two eggs at a time. Because of the limited number of eggs that are produced, the practice of culling eggs and fry is not required. With the limited number of offspring, the problem of ensuring adequate food is also not an issue.

Sharks can be sexually identified right after they hatch. Examining the ventral aspect of the pelvic fin area will yield the gender of the shark. Males have small bilateral tubelike projections from the inner aspects of the pelvic fins. These are the epaulette's copulatory sex organs referred to as claspers.

Male epaulette sharks have siphon sacs that are located beneath the skin of the abdomen and extend down the pectoral fins and connect to the claspers. These siphon sacs are muscular organs that are filled with salt water and serotonin containing secretions that help with lubrication and provide a liquid to assist in the viability of the semen. Females lack claspers.

The Mysteries of Love

Adult males usually obtain larger overall body lengths than females. Female epaulettes sexually mature when they reach 23 to 25 inches in total length (TL). Males reach sexual maturity when they are 23 to 27 inches TL. Male epaulettes are sexually mature when their claspers calcify, becoming long, rigid and firm.

Baby epaulettes can be quite cute, but getting them to feed may be difficult. After their yolk sacs are exhausted, getting them to accept food should be your top priority.

Photo by Kelly Jedlicki

Keeping two sexually mature males in the same tank can be problematic when the male-to-female ratio is higher than 1-1. Besides causing chronic stress, aggression can lead to acute stress and severe bite wounds. This stress can affect successful breeding as well as the epaulette shark's ability to cope and heal. Secondary bacterial infections can occur and treatment can become difficult as a separate hospital tank large enough to hold an injured shark will be needed.

Male sharks will often bite the females' back, pectoral fins or gill area in an attempt to elicit cooperation and interest. Mating activities and behavior of the sharks can be violent and may lead to injury. Biting of the pectoral fins may open deep wounds, which can develop secondary bacterial infections. After copulation, the male's claspers can be red and swollen. On occasion, cohabitating fish or other sharks may pick at these swollen red claspers. Being proactive and having a treatment plan as well as antibiotics on hand is recommended.

Setup Requirements

All tank decorations, rockwork and caves need to be secured and sturdy. Caves and tank decorations can be dislodged and fall during mating activities. Both the sharks as well as the egg cases can accidentally suffer crushing injuries. Tank lids or tops are highly recommended.

During mating there is a chance of inadvertent jumping or accidental pushing that may cause one of the sharks to end up outside of its tank. Coarse substrates can cause skin abrasions, which can be a potential source of a secondary bacterial infection.

To read more about embryo development, [click here](#).

Photo by Kelly Jedlicki

Secrets to Success

Besides the obvious fact of needing sexually mature male and female sharks, what else does it take to breed epaulette sharks?

Good husbandry plays a direct role in breeding. Chances of shark reproduction are affected by chronic stressors. These would include tanks that are too small or that are subject to poor water parameters.

Nutrition greatly impacts shark breeding as well. Caloric requirements significantly increase during courting and breeding of sharks. Feedings high in protein and vitamin-enriched food should occur at least two to three times per week. Mazuri Shark and Ray vitamins (www.mazuri.com) are an excellent vitamin.

Changes in water temperature can stimulate epaulettes to spawn. Warmer tank temperatures can stimulate mating behavior but at the expense of decreasing the oxygen in the tank. Higher tank temperatures also increase the metabolic rate, oxygen demand and caloric needs.

Increasing the feeding frequency can also stimulate the sharks to breed. Females must have adequate nutrition and energy stores in order to produce viable eggs. Besides the extra caloric needs for egg production, there is an added caloric need for the energy demand of the actual courting and breeding activities. With increased feedings, water parameters need to be monitored closely and more frequent water changes may be in order.

The Joyous Event

As the eggs mature, the gravid females will become distended or bloated in appearance. The edges of the egg cases can be easily visualized and palpated. Females can lay one to two egg cases every three to six weeks. The egg cases are about 4 inches by 2 inches and weigh in between 1.1 to 1.3 ounces. They are leathery with a sticky filamentous material that helps keep the egg cases secure in the rocks. As many as 24 eggs may be produced in a year.

Removing the egg cases from the display tank is highly recommended. There are many predatory fish and inverts that can destroy the integrity of the egg cases. Bristleworms will often eat away the egg case and damage the integrity of the yolk sac as well as the integrity of the embryo's skin. Adult sharks have often been witnessed sucking the embryos from their cases. Many fish, especially predatory fish like triggers and puffers, have physically damaged egg cases and developing embryos.

Physically removing the egg cases and placing them in a floating basket in a sump or separate tank provides protection from predators. A small powerhead may be needed to ensure a constant gentle flow or circulation around the egg case and developing embryo. Another option is to place the egg cases in a separate bare-bottom holding tank with a well-established biological filtration.

A cycled air-driven sponge filter is an excellent source for biological filtration. These filters are safer than standard hang-on-the-back filters and powerheads, as the associated risks of inadvertent entrapment in an intake tube do not occur with cycled air-driven sponge filters. Cycling an air-driven sponge filter with pure ammonia will also prevent the potential introduction or transfer of unwanted pathogens, such as hydroids, bacteria or parasites. The filter can be cycled and maintained in a bucket, separate tank or Rubbermaid container.

Adequate flow is essential for the development of the embryo. If powerheads are used, the intake should be covered with a sponge or placed in a partitioned section of the tank. Partitioning a portion of the tank with a screen will allow the placement of potentially dangerous pieces of equipment like hang-on-the-back filters, powerheads and heaters to be placed out of the way of the newly hatched epaulette shark, without interfering with filtration and water circulation.

This infertile wind egg is easily identified as soon as it is candled and the lack of an embryo is revealed.

Photo by Kelly Jedlicki

Candle in the Wind

The biggest question that arises when an egg is found either in the tank or at a local fish store is whether the egg is fertile or infertile. The first few eggs produced will be empty or infertile. These are referred to as "wind" eggs. Checking the contents of eggs can be done by shining a light source through the eggs. The eggs can be scooped up in a glass or clear container with a light placed under it. This is referred to as candling. Dive lights are a great light source for candling eggs.

When candling an egg case, care should be taken not to expose the egg case to air. Air can become entrapped in the egg case and cause the egg to become buoyant and float. This will suffocate the developing shark. If air inadvertently becomes trapped in the egg case, it needs to be evacuated as soon as possible. The egg case needs to be held under the

water with one of its ends up. Gentle squeezing of the egg case will cause the trapped air to be released. Visible air bubbles should be seen upon successful evacuation.

When a yolk sac is detected, the egg case may be viable. There is high morbidity with eggs. About 30 percent of all eggs produced will actually hatch. The egg cases should be inspected frequently for any signs of deterioration.

Any eggs that become buoyant, or develop an odor or a white fungus and discoloration should be removed immediately. Candling should be done weekly to check viability of the developing embryos. If the yolk sac loses its circular shape and becomes fragmented, this is a sign that the egg is not viable. Deteriorating eggs will foul the tank water.

Out of the Shell

The hatching of the shark embryo is dependent on the tank temperature. The average length of time for an egg to hatch is 130 days at 78 degrees Fahrenheit. Lower temperatures render longer development and hatch periods. Raising the tank temperature can decrease the hatching time, but it will decrease the oxygen carrying capacity of the tank.

Newly hatched sharks are around 5 to 6 inches and weigh in at 0.35 to 0.5 ounces (10 to 15 grams). Their coloration and patterns differ slightly from their parents. The newly hatched epaulettes will have a brown nose and dark brown bands in addition to the characteristic black spots for which they are appropriately named "ocellatum." The babies will also have the classic small spots scattered throughout the body.

Even if sharks develop and hatch, there are still potential mortalities. There is often the difficult challenge of getting newly hatched sharks to accept prepared foods. Initially, newly hatched sharks don't need to eat and can survive by absorbing their yolk sacs. It may take a couple of days or weeks for sharks to use up their yolk sac and become hungry.

It is not uncommon for newly hatched sharks to have well-rounded abdomens and not until the roundness starts to disappear will sharks begin to accept food. But once this absorbed yolk sac is consumed, getting nutrition into sharks as soon as possible is imperative.

As embryos develop, the egg cases will become thinner, more transparent and the integrity of the eggs will be disrupted. Embryos usually can get out of the egg cases without intervention. Embryos will hatch after the yolk sac has been absorbed. The temptation to open eggs should be resisted as the ones that are unable to get out due to weakness will usually succumb shortly after being removed.

Shark Nursery

Newly hatched sharks should be kept in a separate tank. A 20-gallon long tank is an ideal grow-out tank. Many fish, such as damsels, tangs, porkfish and wrasses, will pick at the skin and eyes of newly hatched or small juvenile sharks. These fish are also faster swimmers and will outcompete baby sharks for food.

Pristine water conditions are a must for the babies. A cycled biological filter must be established. Target feedings will aid in sharks finding food without unnecessarily expending energy. All uneaten food should be removed within the hour to prevent the fouling of the food and the potential for ingestion of fouled food. In a larger tank, newly hatched sharks can expend a large amount of calories and energy trying to find food.

Food should be offered at least once to twice a day and be small enough to fit in the mouths of baby sharks. Larger pieces of food can become lodged or stuck in the mouth or throat. Good beginner foods include squid, scallops, silversides, shrimp and Mysis shrimp. Vitamins are recommended. Some hobbyists have reported greater success feeding their sharks at night or when the lights are off or dimmed.

Newly hatched epaulette sharks can grow as much as an inch a month for the first year of their lives. As juveniles, this growth rate will slow down to 2 inches a year. As the newly hatched sharks begin to grow, they start to act more like their parents and will walk on their pectoral fins. Juvenile epaulette sharks will become more active and start exploring. Lowering the water level and having a tank lid or covering is recommended, as these little sharks can jump and escape from their tank.

Gavage, or tube, feedings may be an option for newly hatched sharks that refuse to eat after a couple of weeks, or for newly hatched sharks with deteriorating physical conditions. Deterioration includes changes in activity level and/or weight loss. An intravenous angiocatheter or a butterfly venipuncture collection system (with the butterfly needle removed) can be used as feeding tubes.

The feedings should consist of a high-protein food source that is blended into a slurry that can easily pass through the

feeding tube. The desired volume to be fed is 2 to 4 percent of the hatchling's weight. A small scale is recommended to monitor growth of the sharks. These scales are relatively inexpensive and can be purchased at many local stores.

While breeding epaulette sharks may be easier than breeding other marine fish, patience is definitely a virtue. If juvenile sharks are obtained, it may take several years for them to reach sexual maturity. Then the actual production of viable eggs may take several months to years. If the egg is viable, it will take several months of waiting and watching. But once one sees that little brown-nosed baby epaulette for the first time, the wait will be well worth it.

Thanks to Lise Christopher of the Shedd Aquarium, Scott W. Michael and Ray Perrin of Tropicorium for their input into this article.