

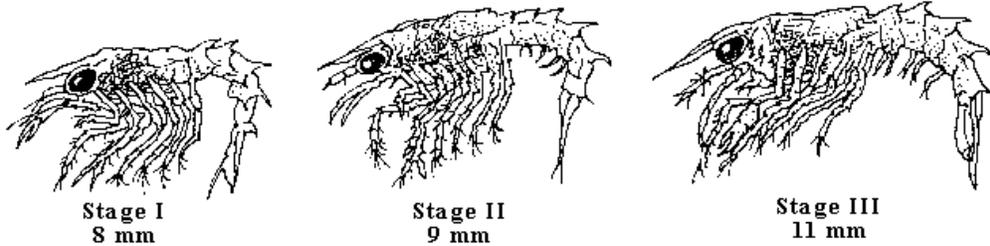
A Lobster's Life

The early years



Newly Hatched Larva

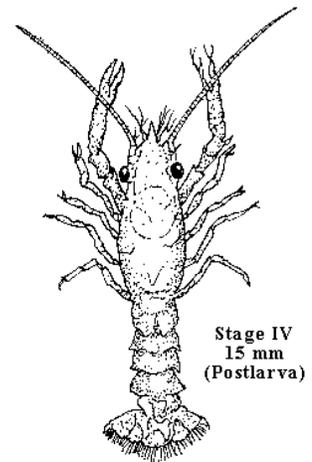
When first hatched, a lobster doesn't look at all like an adult lobster (which may be why lobstermen call it a "bug").



Feathery hairs on its legs help it swim in the water for the first month or so after hatching. Here it is prey for seabirds and for any larger animals in the sea, which is most of them. Most lobster larva are found within the top meter of the sea's surface. Here the lobster will molt, or shed its shell, three times before it begins to look like a miniature adult.

By that time, as a "fourth-stage" lobster, it is between 15 days and a month old. At this stage, the lobster is a very good swimmer, although it appears to be helplessly bobbing up and down in the water column. Actually, it is beginning to purposefully look for a place on the bottom of the ocean on which to settle. This stage may last for many weeks, as the postlarva move up and down the water column. The lobster may settle in a variety of habitats, such as salt marsh peat on Cape Cod, but the preference seems to be for a hard bottom with lots of hiding places, such as cobble. This is where the most dense settlements are found. Of 10,000 eggs that a female may release, only 1/10 of 1%--maybe 10--will survive beyond the first four weeks of life.

After the lobster settles to the bottom, it molts to the fifth stage. At this point, a small lobster still has many enemies. It spends the first year or so in a small tunnel which it can excavate, or in a natural crevice beneath cobble or other hard bottom material. Cod, sculpin, eelpout, sea robins, skates, and other lobsters will attack it if it leaves its shelter. During the first year, the lobster captures small prey which are carried in water which the lobster pumps through its living space using its abdominal pleopods (small appendages called swimmerets under the flexible abdomen, which is commonly called the "tail.") The tiny lobster spends the next few years, until almost age four, hiding under seaweed and small rocks, catching food that drifts down to it. At this size it may also stalk and eat little shrimp-like creatures, amphipods and isopods, called "sand fleas," even though they may be twice its size.



Stage IV
15 mm
(Postlarva)

A small lobster rarely ventures out of hiding. If it does it is attacked by a fish within minutes. One experiment in which baby lobsters were tethered with fine thread to the ocean floor and monitored by video suggested that new settlers could expect to be attacked within minutes if they did not find shelter. However, they outgrow that vulnerability with small increments in body size. Even as an adult, the lobster will avoid predators by remaining primarily nocturnal.

Home is where the hiding place is

Research has found that lobsters have definite opinions as to the type of ocean bottom they prefer. Given the option of settling down on mud, sand, gravel, or cobble (small stones), they all gravitated to the cobble bottom where they could hide from predators in the spaces between the rocks and still catch falling food. "Adolescent" lobsters (a few years old to market size) prefer areas with larger boulders. Adult lobsters don't seem to care--they'll go anywhere and sometimes migrate long distances. They also have fewer predators.

Molting

The lobster molts, or sheds its shell, up to 25 times in its first 5 years of life. As an adult, it molts about once a year, until it becomes quite large, at which point it may go several years between molts. Molting is hard work. In advance of molting, the flesh inside the claws shrivels to about a quarter of normal size, as water and blood leave the appendages. The lobster's shell weakens, as the flesh reabsorbs some of the calcium that will help harden the new shell. Some of that calcium is stored in a structure called a gastrolith (stomach stone) deposited on the outside of the forgut. The old shell cracks along the joint that separates the carapace (the back shell) and the tail and along a line down the middle of its back. The lobster lies on its side and flexes its body several times to pull itself from the cracked shell. Even though the claw muscles have shrunk, they sometimes get stuck in the narrow knuckle of the claw during molting, and the lobster must throw the claw and abandon both the shell and flesh.

The remaining old shell is a perfect double of the lobster, down to the claws, legs, mouth parts, and even the covering of the eyeballs. The lobster eats its old shell to help harden the new one more quickly. While the new shell is still soft, the lobster absorbs sea water to gain about 15% in size and 40-50% in weight. A just-molted lobster feels like a rubber toy. If it is lifted from the support of the water, its heavy front claws may drop right off. It stays in hiding for a week or two until the new shell is fortified against predators.

Much of the weight of a "shedder," or newly-molted lobster, is water, as disappointed diners who crack open a soft-shell lobster quickly learn. That allows the new shell to accommodate the growing lobster for a year or more. Most of us can remember our parents using a similar concept when they bought us clothes several sizes too big to give us some "growing room."

Many factors control when a lobster will molt: water temperature, food supply, salinity (the amount of salt in the seawater varies from place to place and from season to season), availability of shelter, the type of bottom, and the depth of water. Lobsters living in warm water grow faster than those in cold water. Experiments have shown that lobsters raised in hatcheries with water at 70 degrees Fahrenheit can grow to one pound in less than two years, while in the frigid waters of the north Atlantic, it takes a lobster 5 to 7 years to reach this market size, known as a "chicken lobster." Males grow faster than females, and females may go two years between molts when they are breeding. Female tails (abdomen) grow relatively larger than males' tails, but male claws grow larger than females'. In the largest lobsters, claws make up as much as 45% of the total body weight.

Diet

While the lobster has been called a scavenger, it actually prefers fresh food, though a whiff of lobster bait might belie that fact. Its diet typically consists of crabs, clams, mussels, worms, and an occasional sea urchin or slow-witted flounder. A lobster may eat up to 100 different kinds of animals, and occasionally eats some plants as well. One large lobster in an aquarium was seen gnawing on the tail of a skate while the fish tried vainly to flutter away. A lobster has been observed catching a crab, dragging it back to its home, and burying it like a dog buries a bone. For the next few nights the lobster snacks on the crab instead of going hunting.

An opportunist, a lobster will also eat another lobster if given the chance. Captive lobsters become especially cannibalistic, which is why they must be banded in a lobster pound or separated in individual compartments in a lobster hatchery. However, cannibalism has not been observed in the wild. Because lobsters eat their molts, it is dangerous to make this inference based on gut content analysis!

Predators

Many animals, especially humans, eat lobsters. After humans, cod are probably the lobster's principal enemy, followed by other bottom dwelling fishes, such as flounder, sculpins, wolffish, eels, rock gunnels, crabs, and seals. Even raccoons have been known to raid coastal lobster pounds at low tide.

A Lobster's Neighbors

After their first month or so of life, lobsters settle down on the ocean floor and become bottom dwellers. They co-exist with other bottom-dwelling life in the Gulf of Maine such as algae, sea urchins, crabs, mussels, and sculpin. Crevices in rocks, cobble bottoms, and kelp provide good hiding places for lobsters which like to hunker down during the day.

Not long ago, hordes of sea urchins had created vast open stretches of ocean floor-urchin barrens-where they had devoured kelp beds. As a result of being harvested for their roe, as uni for the Japanese market, sea urchin populations have decreased, and fields of kelp have once again flourished. Some scientists believe the resulting proliferation of hiding places for young lobsters has helped the lobster population grow. Others think the decline in cod and flounder due to overharvesting has also helped the lobster population increase.

Lobsters don't make good neighbors

Aside from the fact that a lobster will eat almost any of its neighbors given the opportunity, an American lobster is not by nature a convivial beast. It is aggressive, territorial, and secretive. It hides in a burrow by day and prowls the ocean floor by night. It may cover a mile or more each night foraging for up to 100 different kinds of animals (and some plants). It may sneak into its neighbor's burrow when it's not around, and sometimes even if it is!

Lobsters living together, whether in tanks or in territories on the ocean bottom, soon establish a hierarchy of dominance. They usually fight once, sometimes with great ferocity, to determine who will become the boss. The winner, not surprisingly, is usually the larger and more aggressive one, but occasionally a smaller but tougher opponent wins. After that, whenever the two lobsters meet, the winner whips his antennae across the other lobster's claws. The loser grovels in the sand until the dominant one passes by. In captivity, subordinate lobsters often suffer slower growth and less frequent molting. It could be the result of stress or less food. The dominant lobster gets first choice of shelter, food, and mates. In captivity, the female lobsters actually stagger their molts in order to wait their turn to mate with the dominant male!

Dr. Robert Steneck of the University of Maine has videotaped lobster behavior in many bays in Maine. "It's amazing how much more you can learn when a lobster doesn't know it's being watched," he says. "They're very sensitive to human presence." He has even used Remotely-Operated Vessels (ROVs), unmanned minisubs, to follow deep-dwelling lobsters.

In one experiment, Dr. Steneck used PVC pipes for lobster shelters. He grouped them close together in a tight formation he called "lobster condos." He left a camera running to see how the lobsters would deal with living in close proximity. Several lobsters took up residence in individual "condos." Before long, Dr. Steneck observed a large male evicting smaller lobsters from their tubes. He would back into the tube, raise his claws, and more often than not, abandon the shelter after establishing his superiority.

Lobsters are known as cannibals, but they don't usually eat each other unless they are in crowded conditions like a lobster pound, or if they find a particularly vulnerable lobster just after molting that is unable to get to a shelter before its new shell hardens.

Courtship and mating

For more than twenty years, Dr. Jelle Atema of the Marine Biological Laboratory has been studying lobster mating behavior. He claims lobsters make tender lovers.

A female lobster can mate only just after she sheds her shell. Lobster society has evolved a complex, touching courtship ritual that protects the female when she is most vulnerable. When she is ready to molt, the female lobster approaches a male's den and wafts a sex "perfume" called a pheromone in his direction. Unlike a female moth, whose sex pheromone may attract dozens of random suitors, the female lobster does the choosing. She usually seeks out the largest male in the neighborhood and stands outside his den, releasing her scent in a stream of urine from openings just below her antennae. He responds by fanning the water with his swimmerets, permeating his apartment with her perfume. He emerges from his den with his claws raised aggressively. She responds with a brief boxing match or by turning away. Either attitude seems to work to curb the male's aggression. The female raises her claws and places them on his head to let him know she is ready to mate. They enter the den, and some time after, from a few hours to several days later, the female molts. At this point the male could mate with her or eat her, but he invariably does the noble thing. He gently turns her limp body over onto her back with his walking legs and his mouth parts, being careful not to tear her soft flesh. They mate "with a poignant gentleness that is almost human," observes Dr. Atema. The male, who remains hard-shelled, inserts his first pair of swimmerets, which are rigid and grooved, and passes his sperm into a receptacle in the female's body. She stays in the safety of his den for about a week until her new shell hardens. By then the attraction has passed, and the couple part with hardly a backward glance.

Pregnancy

A lobster's pregnancy is long: from mating to hatching takes perhaps twenty months. After mating, the female stores the sperm for many months. When she is ready to lay her eggs, she turns onto her back and cups her tail. As many as 10,000 to 20,000 eggs are pushed out of her ovaries. They are fertilized as they pass through the sperm receptacle, marked by a small triangular shield at the base of her walking legs. A sticky substance glues the eggs to the bottom of the female's tail.

She will carry the eggs for 9 to 11 months, fanning them with her swimmerets to bring them oxygen and to clean off any debris that might stick to the developing eggs. Finally, when it's time for the eggs to hatch, the female lifts her tail into the current and sets them adrift in the sea. It may take up to two weeks for all of the eggs to be released.

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