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the  
**Soul of an Octopus**  
A Surprising  
Exploration into  
the Wonder of Consciousness

**Sy Montgomery**

**ATRIA** PAPERBACK

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# Contents

CHAPTER ONE • ATHENA	
<u><i>Encountering the Mind of a Mollusk</i></u>	<u>1</u>
CHAPTER TWO • OCTAVIA	
<u><i>This Shouldn't Be Happening: Tasting Pain, Seeing Dreams</i></u>	<u>30</u>
CHAPTER THREE • KALI	
<u><i>The Fellowship of the Fishes</i></u>	<u>61</u>
CHAPTER FOUR • EGGS	
<u><i>Beginning, Ending, and Shape-Shifting</i></u>	<u>93</u>
CHAPTER FIVE • TRANSFORMATION	
<u><i>The Art of Breathing in the Ocean</i></u>	<u>125</u>
CHAPTER SIX • EXIT	
<u><i>Freedom, Desire, and Escape</i></u>	<u>154</u>
CHAPTER SEVEN • KARMA	
<u><i>Choice, Destiny, and Love</i></u>	<u>180</u>
CHAPTER EIGHT • CONSCIOUSNESS	
<u><i>To Think, to Feel, to Know</i></u>	<u>210</u>
<i>Postscript</i>	<u>243</u>
<u><i>Acknowledgments</i></u>	<u>245</u>
<u><i>Selected Bibliography</i></u>	<u>249</u>
<i>Index</i>	<u>255</u>
<u><i>About the Author</i></u>	<u>263</u>



# Athena

*Encountering the Mind of a Mollusk*

On a rare, warm day in mid-March, when the snow was melting into mud in New Hampshire, I traveled to Boston, where everyone was strolling along the harbor or sitting on benches licking ice cream cones. But I quit the blessed sunlight for the moist, dim sanctuary of the New England Aquarium. I had a date with a giant Pacific octopus.

I knew little about octopuses—not even that the scientifically correct plural is not *octopi*, as I had always believed (it turns out you can't put a Latin ending—*i*—on a word derived from Greek, such as *octopus*). But what I did know intrigued me. Here is an animal with venom like a snake, a beak like a parrot, and ink like an old-fashioned pen. It can weigh as much as a man and stretch as long as a car, yet it can pour its baggy, boneless body through an opening the size of an orange. It can change color and shape. It can taste with its skin. Most fascinating of all, I had read that octopuses are smart. This bore out what scant experience I had already had; like many who visit octopuses in public aquariums, I've often had the feeling that the octopus I was watching was watching me back, with an interest as keen as my own.

How could that be? It's hard to find an animal more unlike a human than an octopus. Their bodies aren't organ

go: head, body, limbs. They go: body, head, limbs. Their mouths are in their armpits—or, if you prefer to liken their arms to our lower, instead of upper, extremities, between their legs. They breathe water. Their appendages are covered with dexterous, grasping suckers, a structure for which no mammal has an equivalent.

And not only are octopuses on the opposite side of the great vertebral divide that separates the backboned creatures such as mammals, birds, reptiles, amphibians, and fish from everything else; they are classed within the invertebrates as mollusks, as are slugs and snails and clams, animals that are not particularly renowned for their intellect. Clams don't even have brains.

More than half a billion years ago, the lineage that would lead to octopuses and the one leading to humans separated. Was it possible, I wondered, to reach another mind on the other side of that divide?

Octopuses represent the great mystery of the Other. They seem completely alien, and yet their world—the ocean—comprises far more of the Earth (70 percent of its surface area; more than 90 percent of its habitable space) than does land. Most animals on this planet live in the ocean. And most of them are invertebrates.

I wanted to meet the octopus. I wanted to touch an alternate reality. I wanted to explore a different kind of consciousness, if such a thing exists. What is it like to be an octopus? Is it anything like being a human? Is it even possible to know?

So when the aquarium's director of public relations met me in the lobby and offered to introduce me to Athena, the octopus, I felt like a privileged visitor to another world. But what I began to discover that day was my own sweet blue planet—a world breathtakingly alien, startling, and wondrous; a place where, after half a century of life on this earth, much of it as a naturalist, I would at last feel fully at home.



Athena's lead keeper isn't in. My heart sinks; not just anyone can open up the octopus tank, and for good reason. A giant Pacific octopus—the largest of the world's 250 or so octopus species—can easily overpower a person. Just one of a big male's three-inch-diameter suckers can lift 30 pounds, and a giant Pacific octopus has 1,600 of them. An octopus bite can inject a neurotoxic venom as well as saliva that has the ability to dissolve flesh. Worst of all, an octopus can take the opportunity to escape from an open tank, and an escaped octopus is a big problem for both the octopus and the aquarium.

Happily, another aquarist, Scott Dowd, will help me. A big guy in his early forties with a silvery beard and twinkling blue eyes, Scott is the senior aquarist for the Freshwater Gallery, which is down the hall from Cold Marine, where Athena lives. Scott first came to the aquarium as a baby in diapers on its opening day, June 20, 1969, and basically never left. He knows almost every animal in the aquarium personally.

Athena is about two and a half years old and weighs roughly 40 pounds, Scott explains, as he lifts the heavy lid covering her tank. I mount the three short steps of a small movable stair and lean over to see. She stretches about five feet long. Her head—by “head,” I mean both the actual head and the mantle, or body, because that's where we mammals expect an animal's head to be—is about the size of a small watermelon. “Or at least a honeydew,” says Scott. “When she first came, it was the size of a grapefruit.” The giant Pacific octopus is one of the fastest-growing animals on the planet. Hatching from an egg the size of a grain of rice, one can grow both longer and heavier than a man in three years.

By the time Scott has propped open the tank cover, Athena has already oozed from the far corner of her 560-gallon tank to investigate us. Holding to the corner with two arms, she unfurls the others. Her whole body red with excitement, and reaches t



white suckers face up, like the palm of a person reaching out for a handshake.

“May I touch her?” I ask Scott.

“Sure,” he says. I take off my wristwatch, remove my scarf, roll up my sleeves, and plunge both arms elbow-deep into the shockingly cold 47°F water.

Twisting, gelatinous, her arms boil up from the water, reaching for mine. Instantly both my hands and forearms are engulfed by dozens of soft, questing suckers.

Not everyone would like this. The naturalist and explorer William Beebe found the touch of the octopus repulsive. “I have always a struggle before I can make my hands do their duty and seize a tentacle,” he confessed. Victor Hugo imagined such an event as an unmitigated horror leading to certain doom. “The spectre lies upon you; the tiger can only devour you; the devil-fish, horrible, sucks your life-blood away,” Hugo wrote in *Toilers of the Sea*. “The muscles swell, the fibres of the body are contorted, the skin cracks under the loathsome oppression, the blood spurts out and mingles horribly with the lymph of the monster, which clings to the victim with innumerable hideous mouths. . . .” Fear of the octopus lies deep in the human psyche. “No animal is more savage in causing the death of man in the water,” Pliny the Elder wrote in *Naturalis Historia*, circa AD 79, “for it struggles with him by coiling round him and it swallows him with sucker-cups and drags him asunder. . . .”

But Athena’s suction is gentle, though insistent. It pulls me like an alien’s kiss. Her melon-size head bobs to the surface, and her left eye—octopuses have a dominant eye, as people have dominant hands—swivels in its socket to meet mine. Her black pupil is a fat hyphen in a pearly globe. Its expression reminds me of the look in the eyes of paintings of Hindu gods and goddesses: serene, all-knowing, heavy with wisdom stretching back beyond time.

“She’s looking right at you,” Scott says.

As I hold her glittering gaze, I instinctively reach to touch her head. “As supple as leather, as tough as steel, as cold as night,” Hugo wrote of the octopus’s flesh; but to my surprise, her head is silky and softer than custard. Her skin is flecked with ruby and silver, a night sky reflected on the wine-dark sea. As I stroke her with my fingertips, her skin goes white beneath my touch. White is the color of a relaxed octopus; in cuttlefish, close relatives of octopus, females turn white when they encounter a fellow female, someone whom they need not fight or flee.

It is possible that Athena, in fact, knows I am female. Female octopuses, like female humans, possess estrogen; she could be tasting and recognizing mine. Octopuses can taste with their entire bodies, but this sense is most exquisitely developed in their suckers. Athena’s is an exceptionally intimate embrace. She is at once touching and tasting my skin, and possibly the muscle, bone, and blood beneath. Though we have only just met, Athena already knows me in a way no being has known me before.

And she seems as curious about me as I am about her. Slowly, she transfers her grip on me from the smaller, outer suckers at the tips of her arms to the larger, stronger ones nearer her head. I am now bent at a 90-degree angle, folded like a half-open book, as I stand on the little step stool. I realize what is happening: She is pulling me steadily into her tank.

How happily I would go with her, but alas, I would not fit. Her lair is beneath a rocky overhang, into which she can flow like water, but I cannot, constrained as I am by bones and joints. The water in her tank would come to chest height on me, if I were standing up; but the way she is pulling me, I would be upside down, headfirst in the water, and soon facing the limitations of my air-hungry lungs. I ask Scott if I should try to detach from her grip a

us apart, her suckers making popping sounds like small plungers as my skin is released.



“Octopus?! Aren’t they monsters?” my friend Jody Simpson asked me in alarm, as we hiked with our dogs the next day. “Weren’t you scared?” Her question reflected less an ignorance of the natural world than a wide knowledge of Western culture.

A horror of giant octopuses and their kin, giant squid, has animated Western art forms from thirteenth-century Icelandic legends to twentieth-century American films. The massive “hafgufa” who “swallows men and ships and whales and everything it can reach” in the Old Icelandic saga *Orvar-Odds* is surely based on some kind of tentacled mollusk, and gave rise to the myth of the kraken. French sailors’ reports of giant octopuses attacking their ship off the coast of Angola inspired one of the most lasting images of octopus in modern memory, one that is still tattooed on sailors’ arms: Mollusk expert Pierre Denys de Montfort’s iconic pen-and-wash drawing of 1801 shows a giant octopus rising from the ocean, its arms twisting in great loops all the way to the top of a schooner’s three masts. He claimed the existence of at least two kinds of giant octopus, one of which, he concluded, was surely responsible for the disappearance of no fewer than ten British warships that mysteriously vanished one night in 1782. (To Montfort’s public embarrassment, a survivor later revealed that they were really lost in a hurricane.)

In 1830, Alfred Tennyson published a sonnet about a monstrous octopus whose “Unnumber’d and enormous polypi / Winnow with giant arms the slumbering green.” And of course an octopus was the nemesis-star of Jules Verne’s 1870 French science-fiction novel, *Twenty Thousand Leagues Under the Sea*. Though the octopus becomes a giant squid in the 1954 film of the same name, the man who

shot the underwater sequences for the original film in 1916, John Williamson, said this about the novel's original villain: "A man-eating shark, a giant poison-fanged moray, a murderous barracuda, appear harmless, innocent, friendly and even attractive when compared to the octopus. No words can adequately describe the sickening horror one feels when from some dark mysterious lair, the great lidless eyes of the octopus stare at one. . . . One's very soul seems to shrink beneath their gaze, and cold perspiration beads the brow."

Eager to defend the octopus against centuries of character assassination, I replied to my friend, "Monsters? Not at all!" Dictionary definitions of monster always mention the words *large*, *ugly*, and *frightening*. To me, Athena was as beautiful and benign as an angel. Even "large" is up for debate where octopuses are concerned. The largest species, the giant Pacific, isn't as big as it used to be. An octopus with an arm span of more than 150 feet may have once existed. But the largest octopus listed by *The Guinness Book of Records* weighed 300 pounds and boasted an arm span stretching 32 feet. In 1945, a much heavier octopus captured off the coast of Santa Barbara, California, was reported to weigh 402 pounds; disappointingly, a photo of this animal displayed with a man for size comparison suggests a radial span of only 20 to 22 feet. But even these modern giants hardly measure up to their close molluscan relative, the colossal squid. A recent specimen of this species, captured by a New Zealand boat fishing off Antarctica, weighed more than 1,000 pounds and stretched more than 30 feet long. These days, lovers of monsters lament that the biggest octopuses seem to have been captured more than half a century ago.

As I described Athena's grace, her gentleness, her apparent friendliness, Jody was skeptical. A huge, slimy cephalopod covered with suckers qualified as a monster in her book. "Well," I conceded, changing tacks, "being a monster is not necessari

I've always harbored a fondness for monsters. Even as a child, I had rooted for Godzilla and King Kong instead of for the people trying to kill them. It had seemed to me that these monsters' irritation was perfectly reasonable. Nobody likes to be awakened from slumber by a nuclear explosion, so it was no wonder to me Godzilla was crabby; as for King Kong, few men would blame him for his attraction to pretty Fay Wray. (Though her screaming would have eventually put off anyone less patient than a gorilla.)

If you took the monsters' point of view, everything they did made perfect sense. The trick was learning to think like a monster.



After our embrace, Athena had floated back to her lair; I staggered down the three stairs of the step stool. I stood for a moment, almost dizzy, and caught my breath. The only word I could manage was “wow.”

“The way she presented her head to you was unusual,” said Scott. “I was surprised.” He told me that the last two octopuses who lived here, Truman and, before him, George, would only offer their arms to a visitor—not the head.

Athena's behavior was particularly surprising given her personality. Truman and George were laid-back octopuses, but Athena had earned her name, that of the Greek goddess of war and strategy. She was a particularly feisty octopus: very active, and prone to excitement, which she showed by turning her skin bumpy and red.

Octopuses are highly individual. This is often reflected in the names keepers give them. At the Seattle Aquarium, one giant Pacific octopus was named Emily Dickinson because she was so shy that she spent her days hiding behind her tank's backdrop; the public almost never saw her. Eventually she was released into Puget Sound, where she had originally been caught. Another was named

Leisure Suit Larry—the minute a keeper peeled one of his questing arms off his or her body, two more would attach in its place. A third octopus earned the name Lucretia McEvil, because she constantly dismantled everything in her tank.

Octopuses realize that humans are individuals too. They like some people; they dislike others. And they behave differently toward those they know and trust. Though a bit leery of visitors, George had been relaxed and friendly with his keeper, senior aquarist Bill Murphy. Before I came, I had watched a video of the two of them together that the aquarium had posted on YouTube in 2007. George was floating at the top of the tank, gently tasting Bill with his suckers, as the tall, lanky aquarist bent down to pet and scratch him. “I consider him to be a friend,” Bill told the cameraman as he ran his fingers over George’s head, “because I’ve spent a lot of time interacting with him, taking care of him, and seeing him every day. Some people find them very creepy and slimy,” he said, “but I enjoy it a lot. In some ways they’re just like a dog. I actually pet his head or scratch his forehead. He loves it.”

It doesn’t take long for an octopus to figure out who his friends are. In one study, Seattle Aquarium biologist Roland Anderson exposed eight giant Pacific octopuses to two unfamiliar humans, dressed identically in blue aquarium uniforms. One person consistently fed a particular octopus, and another always touched it with a bristly stick. Within a week, at first sight of the people—looking up at them through the water, without even touching or tasting them—most of the octopuses moved toward the feeder and away from the irritator. Sometimes the octopus would aim its water-shooting funnel, the siphon near the side of the head with which an octopus jets through the sea, at the person who had touched it with the bristly stick.

Occasionally an octopus takes a dislike to a particular person. At the Seattle Aquarium, when one biologist wou

mally friendly octopus each night, she would be greeted by a blast of painfully cold salt water shot from the funnel. The octopus hosed her and only her. Wild octopuses use their funnels not only for propulsion but also to repel things they don't like, just as you might use a snowblower to clear a sidewalk. Possibly the octopus was irritated by the night biologist's flashlight. One volunteer at the New England Aquarium always got this same treatment from Truman, who would shoot a soaking stream of salt water at her every time he saw her. Later, the volunteer left her position at the aquarium for college. Months later, she returned for a visit. Truman—who hadn't squirted anyone in the meantime—instantly soaked her again.

The idea of octopuses with thoughts, feelings, and personalities disturbs some scientists and philosophers. Only recently have many researchers accorded even chimpanzees, so closely related to humans we can share blood transfusions, the dignity of a mind. The idea set forth by French philosopher René Descartes in 1637, that only people think (and therefore, only people exist in the moral universe—"Je pense, donc je suis") is still so pervasive in modern science that even Jane Goodall, one of the most widely recognized scientists in the world, was too intimidated to publish some of her most intriguing observations of wild chimpanzees for twenty years. From her extensive studies at Gombe Stream Reserve in Tanzania, she had many times observed wild chimpanzees purposely deceiving one another, for example stifling a food cry to keep others from discovering some fruit. Her long delay in writing of it stemmed from a fear that other scientists would accuse her of anthropomorphizing—projecting "human" feelings onto—her study subjects, a cardinal sin in animal science. I have spoken with other researchers at Gombe who still haven't published some of their findings from the 1970s, fearing their scientific colleagues would never believe them.

"There's always an effort to minimize emotion and intelligence

in other species,” the New England Aquarium’s director of public relations, Tony LaCasse, said after I met Athena. “The prejudice is particularly strong against fish and invertebrates,” agreed Scott. We followed the ramp that spirals around the Giant Ocean Tank, affectionately known as the GOT, the three-story, 200,000-gallon re-creation of a Caribbean reef community that is the central pillar of the aquarium. Sharks, rays, turtles, and schools of tropical fish floated by like daydreams as we broke the scientific taboo and spoke of minds that many deny exist.

Scott remembered an octopus whose sneaky depredations rivaled those of Goodall’s deceitful chimps. “There was a tank of special flounder about fifteen feet away from the octopus tank,” he said. The fish were part of a study. But to the researchers’ dismay, the flounder started disappearing, one by one. One day they caught the culprit red-handed. The octopus had been slipping out of her tank and eating the flounder! When the octopus was discovered, Scott said, “she gave a guilty, sideways look and slithered away.”

Tony told me about Bimini, a large female nurse shark who once lived in the Giant Ocean Tank. One day the shark attacked one of the spotted eels in the tank and was swimming around with her victim’s tail protruding from her mouth. “One of the divers who knew Bimini well wagged his finger at her, and then bopped her on the nose,” Tony told me. In response, Bimini instantly regurgitated the eel. (Though the eel was whisked to the on-site veterinarian for emergency treatment, he unfortunately could not be saved.)

Once a similar thing had happened with our border collie, Sally. She had come upon a dead deer in the woods and was feeding on it. When I growled, “Drop it!” she actually vomited it up for me. I had always been proud of her obedience. But a shark?

The sharks don’t eat all the fish in the tank, because they’re well fed. “But sometimes they will eat or injure



other reasons besides hunger,” Scott told me. One day, a group of permits—long, thin, shiny fish whose dorsal fins are shaped like scythes—were thrashing around near the surface of the Giant Ocean Tank. “They were making a lot of noise and commotion,” Tony said. One of the sand tiger sharks shot to the surface to attack the fish, biting their fins—but not killing or eating them. Apparently, the shark was just irritated. “This was a dominance bite, not a predator bite,” Tony said.

To many, we spoke heresy. Skeptics are right to point out that it’s easy to misunderstand animals, even those most like ourselves. Years ago, when I was visiting Birute Galdikas’s research camp in Borneo, where ex-captive orangutans were learning to live in the wild, a new American volunteer, smitten with the shaggy orange apes, rushed up to an adult female to give her a hug. The female picked up the volunteer and slammed her against the ground. The woman didn’t realize that the orangutan didn’t feel like being grabbed by a stranger.

It’s alluring to assume that animals feel as we do, especially when we want them to like us. A friend who works with elephants told me of a woman who called herself an animal communicator, who was visiting an aggressive elephant at a zoo. After her telepathic conversation with the elephant, the communicator told the keeper, “Oh, that elephant really likes me. He wants to put his head in my lap.” What was most interesting about this interaction was the part the communicator may have gotten right: Elephants do sometimes put their heads in the laps of people. They do this to kill them. They crush people with their foreheads like you would grind out a cigarette butt with your shoe.

The early-twentieth-century Austrian-British philosopher Ludwig Wittgenstein once famously wrote, “If a lion could talk, we couldn’t understand him.” With an octopus, the opportunity for misunderstanding is greatly magnified. A lion is a mammal like us;

an octopus is put together completely differently, with three hearts, a brain that wraps around its throat, and a covering of slime instead of hair. Even their blood is a different color from ours; it's blue, because copper, not iron, carries its oxygen.

In his classic *The Outermost House*, American naturalist Henry Beston writes that animals “are not brethren, they are not underlings” but beings “gifted with extensions of the senses we have lost or never attained, living by voices we shall never hear.” They are, he writes, “other nations, caught with ourselves in the net of life and time, fellow prisoners of the splendor and travail of the earth.” To many people, an octopus is not just another nation; it's an alien from a distant and menacing galaxy.

But to me, Athena was more than an octopus. She was an individual—who I liked very much—and also, possibly, a portal. She was leading me to a new way of thinking about thinking, of imagining what other minds might be like. And she was enticing me to explore, in a way I never had before, my own planet—a world of mostly water, which I hardly knew.



Back at home, I tried to replay my interaction with Athena in my mind. It was difficult. There was so much of her, everywhere. I could not keep track of her gelatinous body and its eight floaty, rubbery arms. I could not keep track of her continually changing color, shape, or texture. One moment, she'd be bright red and bumpy, and the next, she'd be smoother and veined with dark brown or white. Patches on different parts of her body would change color so fast—in less than a second—that by the time I registered the last change, she would be on to another. To borrow a phrase from songwriter John Denver, she filled up my senses.

Unconstrained by joints, her arms were co

coiling, stretching, reaching, unfurling, all in different directions at once. Each arm seemed like a separate creature, with a mind of its own. In fact, this is almost literally true. Three fifths of octopuses' neurons are not in the brain but in the arms. If an arm is severed from an octopus's body, the arm will often carry on as if nothing has happened for several hours. One presumes the severed arm might continue hunting and perhaps even catching prey—only to pass it back toward a mouth to which the arm is, sadly, no longer attached.

Just one of Athena's suckers was enough to seize my complete concentration—and she had 1,600 of them. Each was busily multitasking: sucking, tasting, grabbing, holding, plucking, releasing. Each arm on a giant Pacific octopus has two rows of suckers, the smallest at the tips, the largest (three inches across on a big male, perhaps two on Athena) about a third of the way to the mouth. Each sucker has two chambers. The outer one is shaped like a broad suction cup, with hundreds of fine radial ridges stretching to the rim. The inner chamber is a little hole in the center of the sucker, which creates the suction force. The whole structure can bend to fit the contours of whatever the sucker is grasping. Each sucker can even fold to create a pincer grip, like your thumb and forefinger can. Each is operated by individual nerves that the octopus controls voluntarily and independently. And each sucker is fantastically strong. James Wood, webmaster of the long-running biological website *The Cephalopod Page*, has calculated that a 2.5-inch-diameter sucker can lift 35 pounds of weight. If all the suckers were that size, the octopus would have a sucking capacity of 56,000 pounds. Another scientist calculated that to break the hold of the much smaller common octopus would demand a quarter ton of force. "Divers," Wood said, "should be very careful."

Athena's suction had been tender with my skin. Since I was not

afraid, I had not resisted her pull. This was fortunate, I learned when I later spoke with her keeper, Bill, on the phone, setting up my next visit.

“A lot of people are freaked out by them,” he told me. “When visitors come, we always have someone there to help in case the person freaks out. Keeping the octopus in the tank is the main goal. We can’t guarantee what they’ll do. With Athena, I’ve had four of her arms on me, and you peel them off and then the other four arms are on.”

“I think we’ve all been on dates like that,” I observed.

While Athena was tasting my arms and hands, she had made a point of looking into my face. I was impressed that she even recognized a face so unlike her own, and wondered whether Athena might like to taste my face as well as look at it. I asked Bill if that was ever allowed. “No,” he said emphatically, “we don’t let them near the face.” Why? Could she pull out an eye? “Yes,” Bill said, “she could.” Bill has gotten into futile tugs-of-war with octopuses who have grabbed the handles of cleaning brushes. “The octopus always wins. You have to know what you’re doing,” he said. “You cannot let her go near your face.”

“I felt as if she wanted to pull me into the tank,” I told him.

“She could pull you into the tank, yes,” he said. “She will try.”

I was eager to give her another chance. We set a date for a Tuesday, when both Bill and his most experienced octopus volunteer, Wilson Menashi, would be there. Scott, and now Bill, told me the same thing about Wilson: “He has a real way with octopuses.”

Wilson is a former engineer and inventor with the Arthur D. Little Corp. with many patents to his name. Among his other accomplishments is having brought cubic zirconia to market as an imitation diamond. (It had been artificially produced by the French, but they didn’t know what to do with it.) At the aquarium, Wilson had been tasked with an important mission: des

toys to keep the intelligent octopus occupied. “If they have nothing to do, they become bored,” Bill explained. And boring your octopus is not only cruel; it’s a hazard. I knew from living with two border collies and a 750-pound pet pig that to allow a smart animal to become bored is to court disaster. They will invariably come up with something creative to do with their time that you don’t want them to do, as the Seattle Aquarium had discovered with Lucretia McEvil. In Santa Monica, a small California two-spot octopus, only perhaps eight inches long, managed to flood the aquarium’s offices with hundreds of gallons of water by experimenting with a valve in her tank, causing thousands of dollars’ worth of damage by ruining the brand-new, ecologically designed floors.

Another danger of boredom is that your octopus may try to go someplace more interesting. They are Houdini-like in their ability to escape their enclosures. L. R. Brightwell of the Marine Biological Station in Plymouth, UK, once encountered an octopus crawling down the stairs at two thirty in the morning. It had escaped from its tank in the station’s laboratory. While on a trawler in the English Channel, an octopus who had been caught and left on deck somehow managed to slither from the deck, down the companionway, to the cabin. Hours later, it was found hiding in a teapot. Another octopus, held in a small private aquarium in Bermuda, pushed off the lid from its tank, slid to the floor, crawled off a veranda, and headed home to the sea. The animal had traveled about 100 feet before it collapsed on the lawn, where it was attacked by a horde of ants and died.

Perhaps an even more surprising case was reported in June 2012, when a security officer at California’s Monterey Bay Aquarium found a banana peel on the floor in front of the Shale Reef exhibit at 3 a.m. On closer inspection, the banana peel turned out to be a healthy, fist-size red octopus. The security officer followed the wet slime trail and replaced the octopus in the exhibit it had come from.

But here's the shocking part: The aquarium didn't know it had a red octopus living in its Shale Reef exhibit. Apparently the octopus hitchhiked there as a juvenile, attached to a rock or sponge added to the exhibit, and grew up at the aquarium without anyone knowing it was there.

To avert disaster, aquarium staff carefully design escape-proof lids to their octopus tanks and try to invent ways to keep their octopuses occupied. In 2007, the Cleveland Metroparks Zoo put together an enrichment handbook for octopus, filled with ideas of how to keep these smart creatures entertained. Some aquariums hide food inside a Mr. Potato Head and let the octopus dismantle the toy. Others offer Legos. Oregon State University's Hatfield Marine Science Center has devised a contraption that allows an octopus to create art by moving levers that release paint onto a canvas—which is then auctioned to generate funds to maintain the octopus tank.

At the Seattle Aquarium, Sammy the giant Pacific octopus enjoyed playing with a baseball-size plastic ball that could be screwed together by twisting the two halves. A staffer put food inside the ball but later was surprised to find that not only had the octopus opened the ball, it had *screwed it back together* when it was done. Another toy was constructed from the plastic tubing through which pet gerbils like to tunnel. Rather than probe into the tunnel with his arms, which was what the aquarists had expected, Sammy liked to unscrew the pieces—and when he was done, he handed them off to his tank mate, an anemone. The anemone, who, like all of its kind, was brainless, held on to the pieces with its tentacles for a while, bringing them to its mouth, and finally spat them out.

But Wilson was ahead of the curve. Long before the first octopus-enrichment handbook was published, many octopuses ago, he set out to create a safe toy worthy of an octopus

Working at his lab at Arthur D. Little Corp., Wilson devised a series of three clear Plexiglas cubes with different locks. The smallest of the three has a sliding latch that twists to lock down, like the bolt on a horse's stall. You can put a live crab—a favorite food—inside and leave the lid unlocked. The octopus will lift the lid. When you lock the lid, invariably the octopus will figure out how to open it. Then it's time to deploy the second cube. This one has a latch that slides counterclockwise to catch on a bracket. You put the crab in the first box and then lock it inside the second box. The octopus will figure it out. And finally, there's a third cube. This one has two different latches: a bolt that slides into position to lock down, and a second one with a lever arm, sealing the lid much like an old-fashioned canning jar closes. Bill told me that once the octopus "gets it," the animal can open all four locks in three or four minutes.

I was looking forward to meeting Bill and Wilson, and was hungry to hear what they had to tell me. But even more, I longed to see Athena again and to learn how she behaved among people she knew. And I wondered: Would she recognize me?



Bill meets me in the aquarium lobby. He's thirty-two years old, six foot five, slender, and strong, with short brown hair and a smile that takes over his whole face, crinkling the edges of his eyes. Tentacles creep down from under the right sleeve of his green aquarium shirt—the tattoo of a Portuguese man-of-war, a stinging jellyfish, with an azure sail. We walk up the staircase to the aquarium café, and then take the Employees Only stairway to the Cold Marine Gallery, which Bill runs. He's in charge of 15,000 animals here, from invertebrates like Athena and the sea stars and anemones, to giant lobsters and endangered turtles and the strange, ancient chimera, or ghost shark—a deepwater species with grinding, instead

of sharp, teeth, whose cartilaginous kind branched off from the shark lineage 400 million years ago. Bill knows each of his charges personally; he has known many of them since they were born (or hatched, or budded) under his care; many others, he collected on expeditions to the chilly waters of Maine and the Pacific Northwest.

Wilson is already here. He's a much smaller man than Bill, trim and quiet, with a dark moustache, the hairline of a grandfather of nearly grown grandchildren, and a Middle Eastern accent I can't quite place. He looks much younger than his seventy-eight years.

It's nearly 11 a.m., Athena's feeding time. A dish of silvery, five-inch capelin awaits her, sitting on the lid of an adjoining tank. We don't want to keep her waiting.

The men heave the heavy tank top up and attach it to an overhead hook to keep it propped open. The lid is covered in fine mesh and precisely contoured to fit the elaborate curves of the tank's outlines, a precaution perfected over the course of many octopuses, to prevent escape. Bill leaves me with Wilson to attend to other chores in his gallery. Wilson mounts the short movable stair and leans over the tank.

Athena rises up from her lair like steam from a pot. She's coming to Wilson so quickly it takes my breath away—much faster than she had come to see me earlier.

"She knows me," Wilson states simply. He reaches into the cold water to greet her.

Athena's white suckers arch from the water to grasp Wilson's hands and forearms. She looks at him with her silvery eye, then surprises me: She flips over, like a puppy showing its belly. Wilson hands a fish to the center suckers on one of her front arms. The food heads toward her mouth like on a conveyor belt as she passes it from sucker to sucker. I'm eager to see inside her mouth, glimpse her beak. But I am disappointed. The fish disapp



she did greeting Wilson. I lean over to glimpse her pearly eye, and she pulls her head to the surface to look me in the face.

“She has eyelids like a person does,” says Wilson. He gently passes his hand over her eyes, causing her to slowly wink. She doesn’t recoil or move away. The fish are gone; she is staying near the surface for the company.

“She’s a very gentle octopus,” Wilson says, almost dreamily, “very gentle. . . .”

Has working with octopuses made him gentler or more compassionate? Wilson pauses. “I don’t have the language to answer that question,” he says. Wilson was born along the Caspian Sea, in Iran, near Russia, and spoke Arabic before he learned English as a small child because his parents were from Iraq. He doesn’t mean that he lacks the English skills to answer. He means that he hasn’t thought of this before. “I’ve always liked toddlers and kids,” he says. “I can relate to them. This is . . . similar.”

As with a child, to commune with Athena demands a level of openness and intuition greater than that used in the usual discourse between adult humans of a common culture. But Wilson doesn’t equate this strong, smart, wild-caught adult octopus to a baby human—unfinished, incomplete, not quite fully developed. Athena is, in the words of the late, great Canadian storyteller Farley Mowat, “more-than-human,” a being who doesn’t need us to bring her to completion. The wonder is that she will allow us to be part of her world.

“Don’t you feel honored?” I ask Wilson.

“Yes,” he says emphatically. “Yes.”

Bill, rejoining us from his errands, leans his tall frame over the tank and reaches in to stroke Athena’s head.

“It’s a rare pleasure,” Bill says. “Not everyone can do this.”



How long did we stay with Athena? It's impossible to say. Of course, we had removed our watches before plunging our arms into the water. Once we did, we entered what we called Octopus Time. Feelings of awe are known to expand the human experience of time availability. So does "flow," the state of being fully immersed in focus, involvement, and enjoyment. Meditation and prayer, too, alter time perception.

And there is another way we alter our experience of time. We as well as other animals can mimic another's emotional state. This involves mirror neurons—a type of brain cell that responds equally whether we're watching another perform an action, or whether we're performing that action ourselves. If you are with, for example, a calm, deliberate person, your own perception of time may begin to match his. Perhaps, as we stroked her in the water, we entered into Athena's experience of time—liquid, slippery, and ancient, flowing at a different pace than any clock. I could stay here forever, filling my senses with Athena's strangeness and beauty, talking with my new friends.

Except our hands froze—so red and stiff that we could not move our fingers. Taking our hands out of Athena's tank felt like breaking a spell. I was suddenly desperately uncomfortable, awkward, and incompetent. Even after rinsing my red skin with hot water for nearly a minute, I was so cold I still couldn't pick up the pen in my purse, much less write in my notebook. It was as if I had trouble returning to the person, the writer, I was before.



"Guinevere was my first," Bill tells us, "so she's my favorite." Bill, Scott, Wilson, and I have gone to a nearby sushi place for lunch. I think it an odd choice, but perhaps not; we have just been watching Athena eat raw fish, after all. No one orders octopus. I get California rolls.

couldn't find him even after a long, frantic search. "I thought he'd escaped," Bill said.

"Any hole, they're going to go right through it," Wilson agreed.

More than a decade earlier, Scott had known a dwarf Caribbean octopus who lived in one of the smaller display tanks known as jewel cases at the aquarium. One day Scott came in to work to find the tank overflowing onto the floor, and the octopus nowhere in sight. He found that the animal had oozed behind the background of its exhibit and wedged itself into the half-inch-diameter pipe that recirculated the water. What to do?

"I remembered having watched this National Geographic show as a kid," he said. It had showed fishermen in Greece pulling up amphora pots they had set for octopuses. After hunting all night, the octopuses thought they had found safe dens there, only to be hauled up by fishermen who wanted to eat them. Naturally they didn't want to come out of the pots, and the fishermen didn't want to break their vessels, so they had poured fresh water into the pots, and the octopuses came rushing out. So Scott did the same with the dwarf Caribbean octopus—and it worked.

He employed the same method years later with a misbehaving giant Pacific, so long ago Scott doesn't remember the octopus's name, but he vividly recalls the incident. When Scott lifted the lid to the tank to feed the animal, the octopus attached to his hands and arms. When he'd peel one arm off, he'd find two more stuck to him. "The octopus wouldn't go back inside the tank, and I had to move on," he said. "I had things to do." So he reached to the sink across from the tank, filled a pitcher with fresh water, and poured it on the octopus. She instantly recoiled. "I'm thinking: I outwitted the octopus!" he said. Scott was rather proud of himself.

But the octopus was incensed. "She got scarlet red and really thorny. It was a heated moment. What I didn't notice," he said, "was

and ridges. I reached for the webbing between her arms, which was as delicate as gossamer, and so thin I could see bubbles beneath it, as sometimes happens with a swimsuit. And yet, this body, so unlike my own, was responding to my touch like a dog's or a cat's or a child's. Even though her skin can change color and taste flavors, it, like mine, relaxes into a caress. And though her mouth is between her arms, and her saliva dissolves flesh, she, like me, clearly enjoys a good meal when she's hungry. I felt as if I had understood something very basic about her at that moment. I don't know what it's like to change color or shoot ink, but I do know the joys of gentle touch and of eating food when hungry. I know what it feels like to be happy. Athena was happy.

I was too. As I drove home to New Hampshire, my happiness swelled to elation. Now that I have fed her, I thought, surely she will remember me next time, if she doesn't already.



A week later, I was shocked to receive this e-mail from Scott:

"Sorry to write with some sad news. Athena appears to be in her final days, or even hours." Less than an hour later he wrote again that she was gone.

To my surprise, I broke down in tears.

Why such sorrow? I don't cry often. I would have been sad, but probably would not have wept, over a person I had met only thrice, with whom I had spent, in total, less than two hours. I had no idea whether I meant anything at all to Athena, and even if I had, it was surely little. I was not, like Wilson and Bill, Athena's special friend. But she meant a great deal to me. She was, like Bill's Guinevere, "my first." We had hardly known each other, but she had given me a glimpse into a kind of mind I had never known before.

And that was part of the tragedy: I had just started to know

# Octavia

*This Shouldn't Be Happening: Tasting Pain, Seeing Dreams*

“Hello, beauty!” I greeted the new octopus as I perched next to Wilson on the step stool, leaning over the top of her tank. Even though I couldn’t see her now, I knew she was beautiful, because I had seen her moments before from the public side. I couldn’t wait to meet her. She was much smaller and more delicate than Athena, with a head the size of a large clementine. All of her skin was dark brown and thorny, and she’d been plastered by her white suckers to the front of the glass. Her largest suckers were less than an inch in diameter; the smallest, tinier than pencil points. Her silvery eye had peeked out from behind the hedge of her arms.

“What’s her name?” I called out to Bill, behind us, who was adjusting the filter on a tank temporarily housing a grunt sculpin, a bug-eyed fish with a face like a Boston terrier.

“Octavia,” he called back, over the din of the pumps and filters. A little girl visiting the aquarium had come up with the name and Bill thought it was a good one.

Octavia had come from British Columbia, where she had been caught wild and shipped to the aquarium at greater expense than she cost to buy, via Federal Express. I had waited impatiently for several weeks before coming to meet her, to give her a chance to settle in. With me today was my friend Liz Thomas, the author and anthro-

Wilson tried one last time. He held out the squid to Octavia on the grabber, and a single arm came floating tentatively over.

“Liz! *You* touch her!” I cried, sensing that the opportunity for interaction might be fleeting. My friend mounted the three little stairs to the top of the tank and extended her index finger to the ten-drill-like tip of Octavia’s arm. The scene reminded me of the ceiling of the Sistine Chapel, showing Adam extending his hand to God in heaven.

The encounter lasted just a moment. Liz felt the slender, slippery back of the tip of Octavia’s arm, and Octavia twisted it over to taste Liz gingerly with her elfin suckers.

Both of them instantly withdrew in alarm.

Liz is not frightened by animals, or by anything else, for that matter. The first day we met, nearly thirty years ago, I introduced her to one of our ferrets, who immediately sank his pointy teeth into her hand, drawing blood.

“Sorry,” I said.

“I don’t mind *at all*,” Liz told me, and she meant it. She’s spent days alone with wolves in the Arctic and been stalked by a wild leopard in Uganda. In Namibia, when a hyena, a species that has been known to bite off the noses of sleeping people, thrust her head into Liz’s tent, my friend’s only response was to ask the bone-crushing carnivore, “What is it?” as if her mom had appeared at the door to her room. But Liz said that Octavia’s touch had been “viscerally surprising.” Her response was atavistic. Liz couldn’t help but spring backward.

And what had alarmed Octavia about Liz? I couldn’t be sure, of course, but Liz is a pack-a-day smoker. I wondered whether Octavia’s exquisitely tuned senses, with 10,000 chemoreceptors on each sucker, had tasted the nicotine on Liz’s skin or even in her blood. Nicotine is a known insect repellent, and toxic to many other inver-

tebrates. Liz's finger may have tasted, to Octavia, just plain icky. I hoped this wouldn't make her think we all tasted bad.



On my second visit, I waved a dead squid back and forth in the cold water till my right hand cramped and I could no longer move it. I switched to my left hand till it froze, too. Octavia stayed way over on the opposite side of the tank. She didn't even extend an arm.

This was a Friday, and Wilson wasn't there. I went downstairs to get a better view of Octavia. She was thorny and dark, and almost invisible in the dim light of her rocky lair. Because giant Pacific octopuses are, like most species of octopus, nocturnal, the tank isn't brightly illuminated, and conveys quiet mystery. Her only tank mates, the sunflower sea star, about forty rose anemones, and two types of starfish, a bat star and a leather star, sat affixed to their stations. Anchored by his thousands of tube feet, the sea star had taken up what seemed to be his usual position, opposite the octopus. This is a good spot from which to snag a fish should an aquarist open the tank. Sunflower sea stars can move quickly for starfish, three feet per minute if in a hurry, but even with no brain, he seemed to know he wasn't as fast as an octopus.

The anemones' tentacles swayed in the water like the petals of flowers in a breeze. In fact anemones look like plants but are actually predatory invertebrate animals, like Octavia and starfish—but more closely related to corals and jellyfish. They attach themselves to the substrate with sticky feet, harpooning small fish and shrimp with organs called nematocysts and injecting their prey with stinging venom.

Octavia appears to be sharing her tank with two lugubrious-looking wolf eels and a number of species of big rockfish with spiny, often poisonous dorsal fins—thou

cally since my previous visit. The giant Pacific octopus is one of the world's most efficient carnivores in converting food to body mass. Hatching from an egg the size of a grain of rice weighing three-tenths of a gram, a baby giant Pacific octopus doubles its weight every eight days until it reaches about 44 pounds, then doubles its weight every four months until maturity.

Scott was pulling with all his considerable strength on the tongs to keep Octavia from pulling me into the tank. I submitted to the tug-of-war. I had no choice. Though fairly fit for a person of my size (five foot five, 125 pounds), age (fifty-three), and sex (female), I didn't have the upper-body strength to resist Octavia's hydrostatic muscles. An octopus's muscles have both radial and longitudinal fibers, thereby resembling our tongues more than our biceps, but they're strong enough to turn their arms to rigid rods—or shorten them in length by 50 to 70 percent. An octopus's arm muscles, by one calculation, are capable of resisting a pull one hundred times the octopus's own weight. In Octavia's case, that could be nearly 4,000 pounds.

Though octopuses are usually gentle, there are accounts of people who have drowned, or nearly so, as a result of the animals' attentions. English missionary William Wyatt Gill spent two decades in the South Seas, among octopuses much smaller than the giant Pacific; but even these species are strong enough to overwhelm a young, strong, fit man. He wrote that “no native of Polynesia doubts the fact” that octopuses are dangerous. Gill reports that one fellow, who was hunting octopus, would have smothered were it not for his son, who rescued him when he surfaced with an octopus blanketing his face.

Another account comes from waters off New Zealand from a D. H. Norrie, who was wading in sea channels searching for lobsters with Maori friends. Suddenly, one of his companions “began shriek-



# Index

## A

Aelianus, Claudius, 51  
Alaska, 228  
Amazon, 36, 121  
anacondas, 70–72, 77, 79–80, 102, 175, 240  
Anaxagoras, 90  
Anderson, Jackie, 183–86  
Anderson, Roland, 9, 52–54, 63  
anemones, 35, 122–23, 138, 185  
angelfish, 121–22  
*animus mundi*, 144  
Aquatic Specialties, 131, 132, 139  
Aristotle, 62  
arowanas, 57–60, 102, 173–75, 238  
Athena, 2–8, 11, 13–15, 18–23, 27–29, 30, 33, 41, 62, 96, 143, 227  
death of, 28, 29, 56

## B

basket stars, 181  
bass, 134–35  
bats, 29  
Becken, Guy, 97, 98  
Beebe, William, 4  
Beijing Aquarium, 69  
Beston, Henry, 13  
bird wrasses, 106  
bites, 102, 103, 173  
octopus, 24, 100–103, 238  
Blackmore, Susan, 112–13  
Boyle, Susan, 105–6  
brain:  
dreaming and, 38

human, 49, 81  
neurons in, 14, 23, 38, 49, 192  
of octopuses, 14, 48–50, 161  
size of, 48, 49  
Brandeis University, 223  
Brems, Björn, 192  
Brightwell, L. R., 16  
British Columbia, 228  
*British Journal of Pharmacology*, 158–59  
Britt, Marion, 70–72, 77, 79–80, 85, 89, 104, 167–70, 174, 175  
marriage of, 206–7, 216, 240  
Buddha, 113, 190  
Burnett, Frances Hodgson, 118  
Bushmen, 237  
butterfly fish, 215  
Byrne, Ruth, 160

## C

Cambridge Declaration on  
Consciousness, 224  
Carceo, Christa, 77–80, 85–89, 100, 102, 104, 105, 107, 111, 119, 121–22, 126, 130, 131, 155, 156, 161–65, 168–70, 172, 175, 177–78, 183, 190, 191, 206, 207, 220, 235–36, 240, 241  
Carceo, Danny, 78–79, 85–89, 101, 175, 177, 183, 206  
Caribbean, 139, 140, 211  
Cephalopod Page, The, 14  
*Cephalopods: Octopuses and Cuttlefishes for the Home Aquarium* (King and Dunlop), 65