A New Leaf

Seaweed could be a miracle food—if we can figure out how to make it taste good.

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I stared for a while at the placid face of Long Island Sound before I could make out Bren Smith's farm. It was a warm, calm morning in September. Sixty buoys bobbed in rows like the capped heads of synchronized swimmers. It wasn't until Smith cut the engine of his beat-up boat, Mookie, that I knew for sure we had arrived. The farm, a three-acre patch of sea off Stony Creek, Connecticut, starts six feet underwater and descends almost to the ocean floor. From the buoys hang ropes, and from the ropes hang broad, slippery blades of sugar kelp, which have the color and sheen of wet Kodak film.

At first, the local fishermen thought that Smith was growing some kind of marine hemp; that seemed cool. When they found out it was seaweed, they ribbed him relentlessly. Smith, in any case, prefers to call his produce "sea vegetables." He also raises mussels, scallops, clams, and oysters in lantern nets shaped like accordions and stacked pyramids. He pulled up a lantern net full of twenty thousand black-and-orange scallops, two months old, the size of M&M's. The net was covered in murky, greenish clumps of seaweed, crawling with sea squirts, little crabs, and translucent shrimp. "The farm is a reef for hundreds of species," he said, cutting off a hank of seaweed —*Gracilaria*—for me to try. It crunched, filling my mouth with the taste of lobster juice. "This is what you want to see," he said. "This is good, restorative ocean farming."

Seaweed, which requires neither fresh water nor fertilizer, is one of the world's most sustainable and nutritious crops. It absorbs dissolved nitrogen, phosphorous, and carbon dioxide directly from the sea—its footprint is negative—and proliferates at a terrific rate. Smith's kelp can grow as much as three-quarters of an inch a day, maturing from pinhead to

ten-foot plant in the course of a winter, between hurricane seasons. It is resilient, built to take a lashing, but if a storm wipes out the crop he can just start over. Every year, he harvests between thirty and sixty tons of it, about the same per-acre yield as a potato farmer. Plentiful, healthy, and virtuous, kelp is the culinary equivalent of an electric car. "You're not just gaining nutrition, you're also gaining absolution from guilt," Mark Bomford, the director of the Yale Sustainable Food Program, says. "This is your get-out-of-anxiety-free card."

As industrial land-based agriculture becomes increasingly untenable—environmentally destructive and at the same time vulnerable to drought and changing weather—we are being pushed out to sea. Smith says, "The question is, Are we going to do it right or wrong?" He calls his system, which uses the entire water column, a "3-D farm," and he would like to see it become the dominant form of aquaculture. He would like to see kelp—a potential source of human food, biofuel, and animal feed—supplant crops like corn and soy. In October, his farm design, which he has made open-source, won a prize given by the Buckminster Fuller Institute for innovative solutions to urgent global problems. Not long before that, he was honored by Bill Clinton at the Clinton Global Initiative meeting in New York, where he showed up without realizing that he had a twelve-inch fillet knife in his backpack.

But Smith's ambitions extend beyond reshaping an industry. In his vision, kelp farming can rehabilitate the ocean's threatened ecosystems, mitigate the effects of climate change, and revive coastal economies. With thirty thousand dollars of start-up money and a boat, he figures, an out-of-work fisherman can make seventy thousand dollars a year. "There are no jobs on a dead planet," he likes to say. Two years ago, he started GreenWave, a nonprofit through which he trains fishermen to be kelp farmers. Smith plans to form a twenty-five-farm co-operative revolving around a seafood hub near New Haven, with processing equipment, a seed bank and hatchery, value-added venders making kelp smoothies, and a Beyond Fish market, where the only fish available will be barramundi, fed on seaweed. In the often overwhelmingly grim conversation about ocean health—some

scientists predict fishless oceans by 2050—Smith's hopeful narrative is good for morale, promising that we can eat and thrive in an ever more populous and warming world. "It's important to know that there's a way to still sustainably work within the ocean," May Boeve, the director of the climate-focussed advocacy group 350.org, says. "It's not a lost cause."

All Smith needs to do is to invent a new cuisine based on filter feeders and seaweed. He is starting with the East Coast offices of Google. "I use ocean vegetables at the center of the plate and garnish the plate with those restorative water-cleansing shellfish," Michael Wurster, the culinary director, told me. "My users are conscious about what they eat, where it comes from, and how it was raised." For others, though, there are some challenges. Sliminess is not a property that most Americans appreciate in food. "What is that disgusting oobleck?" was the comment that greeted the slick heap of kelp spaghetti I served to a preschooler not long ago. Howard Fischer, a hedge-fund manager who personally invests in regenerative agriculture and restricts himself to foods that meet those criteria, told me, "People who are eating with their minds first will be the early adopters, but there are no guarantees here." When I asked Boeve about her taste for kelp, she said, "I need a little more time with it. I'm more of a bivalve person myself."

The morning after taking me to the farm, Smith was back in Stony Creek to meet a fisherman he was recruiting to grow kelp for the co-op. Smith, who is five feet five, bald-headed, and bulk-shouldered, like the lobsters he spent his adolescence hauling from the sea in traps, was wearing dirty jeans, suspenders, and a blue T-shirt that said "Kelp Is the New Kale." He was drinking water from an old whiskey bottle. He has epilepsy, triggered by two things he likes and one that he can't avoid: alcohol, caffeine, and not getting enough sleep. Before he was a full-time farmer, he drove a lumber truck and sold pieces of the Coney Island boardwalk stencilled with obscure words like "petrichor" (the smell of rain on dry earth) and "limerence" (tingly infatuation) to tourists in Union Square. Once, while he was working at a table saw, a board flew in his face and knocked him out. He still has a scar running across the bridge of his nose. After the accident,

he found that he had developed an allergy to shellfish. He has never learned to swim.

The fisherman, David Blaney, had driven down from Point Judith, Rhode Island, where his family has been farming and fishing the coast for three hundred years. His people used to fertilize their crops with seaweed, insulate their houses with it, and eat it in hard times. He is sixty-seven, white-bearded, taciturn; around his neck he wore the tooth of a mako shark that tried to kill him when he caught it while long-lining for tuna off the Grand Banks. In the course of his career, he said, he'd trawled for cod on huge boats known as Big Green Dump Trucks and, when the cod ran out, for swill like butterfish and whiting; then there was only squid to catch, then nothing much at all. "The past ten years, the way fishing's been, I've branched out," Blaney said, stepping onto Smith's boat. "Marine survey, marine safety. But I've got nephews and kids myself who would like to go back to making a living from the sea."

Smith threaded his boat through the Thimbles, a collection of tiny private islands, some big enough for only a single house. It was low tide. An osprey sat on top of a long stick that served as a mooring. We passed the rusty barge where Smith proposed to his wife, Tamanna Rahman, a graduate student in nursing at Yale, last year. Smith and Blaney talked shop: to anchor the buoys, Smith recommended mafia blocks and mushrooms; Blaney, a diver, thought he might secure them with giant screws. When they got out to the farm, Smith stopped the boat and, using a hook, hauled up a line of kelp. He explained the process of thinning out the growth. "It's just like, you know, farming," he said, abashed before a man who had spent his career chasing monsters. "The smaller ones we sell as baby leaf kelp—it's real thin, sort of translucent, and has a subtler, slightly sweeter base."

"I've got a lot of fishermen looking at me like, You're gonna do *what*?" Blaney said. "The other day in the coffee shop, someone referred to me as Captain Kelp, and I'm thinking, I don't think I like that." But, he said, with the warmer water driving lobsters from southern New England and the glory days of fish-hunting over, some of his skeptical colleagues might be

persuaded to follow him. (Two-thirds of Rhode Island's commercial lobstermen have left the business in the past decade.) He had credibility, he said, by virtue of still being alive after decades at sea. "Kelp noodles—it's an economical and clean way to produce good protein," he said. "What's the problem?"

Blaney pulled off a piece of kelp and bit into it. To most fishermen, seaweed is a net-fouler, inimical. He chewed thoughtfully. "I know this old captain who used to say, 'Now we're going to shake weed till our heads fall off,' " he said.

Smith said, "It might be better than the fish in the net."

In kelp, Smith has found what he calls "ecological redemption." He was born in 1972 in Newfoundland, where his American parents had gone during the Vietnam War. His father, a linguist, wrote one of the first contemporary Inuttut dictionaries. His mother, who graduated from the Sorbonne, raised him and his sister and later became the managing editor of the French-textbook division at Houghton Mifflin. When Smith was in grade school, the family moved to Massachusetts; his parents divorced, and Smith, then fourteen, dropped out of school and moved in with his girlfriend and her mother in Section 8 housing. He worked as an emergency-room janitor on the night shift at a hospital, dabbled in selling acid and cocaine, and hung out on the docks with Hell's Angels. "Bren was a tough kid who could take care of himself," Sylvia Madrigal, his mother's partner, wrote to me in an e-mail. (His mother died in December.) "The more dangerous the task, the better." Talking up his "Newfie" roots, Smith found it easy to get work on boats. He started on a lobster boat out of Lynn, up the coast from Boston. It went out every day at 3:30 *A.M.* and returned at 5 *P.M.*, after which he'd bring lobsters to his mother's office and sell them at a markup.

At seventeen, Smith says, he went to Alaska, where he fished for cod in the Bering Sea and in illegal waters off the coast of Russia; the cod went to McDonald's. "We were throwing millions of pounds of bycatch over because we only had permits for a couple of kinds of fish," he told me. "It

was like a sea of death around the boat. I'm not an environmentalist"—he considers conservation alone to be an inadequate response to climate change, and insensitive to people's need to eat and work—"but I loved the sea, and wanted to spend my whole life working at sea. It was just clearly not sustainable." When the cod stocks crashed and Newfoundland's job market went with them, Smith saw it as the beginning of the end of wild fish. He returned to Newfoundland to try aquaculture, which promised both a solution to a food problem and a familiar way of life, but he was quickly disillusioned. "It was Iowa pig farming at sea," he said.

Between fishing gigs, Smith finished high school and enrolled at the University of Vermont; he graduated in 1996 with a degree in English and religion. By 2000, he was living in an Airstream in the woods near New Haven, trying to feed himself by growing fish from pet-store stock in plastic tubs. One day, he read in the paper that some of the historic shelling leases near the Thimble Islands—so-called king's grants, which had gone fallow after an oyster die-off in the nineties—would be made available. He got one, for fifty dollars an acre, and dropped some oyster cages on the seabed. During the next decade, he built a business, Thimble Island Oyster Company, around the allure of artisanally produced, eco-friendly filter feeders from an idyllic spot. He added clams, scallops, and mussels, and started a community-supported fishery program, with subscription customers.

Then came the one-two punch of Hurricanes Irene and Sandy, with storm surges that buried his entire crop in three feet of mud. He lost years' worth of produce and half his gear, and nearly drowned trying to recover the rest. "I decided that this was the new normal—I was going to exist in extreme weather and changing water temperatures," he said. "I started searching around for different species to grow and different ways of growing them." He pulled the lantern nets off the seafloor and hung them in the water column so they could swing in a storm and not get swamped. He drew a line around the farm: he would grow only species, like his filter feeders, that were delicious and restorative.

That is how he found kelp. Charles Yarish, a leading seaweed expert at the University of Connecticut who has successfully manipulated the life cycle of sugar kelp and studies its bioextractive capabilities, agreed to breed the plants in his lab. Yarish's lab is a library of species, a series of chilly walk-ins with brightly lit shelves of flasks holding acid-green tendrils, mossy puffballs, scab-red tufts. Smith picks up the seedlings, on thin twine wrapped around PVC pipe, and unspools them on his underwater lines when the water temperature drops into the low fifties, usually by late fall. There could come a day when the water in the Sound is too warm for kelp to thrive; Smith will adjust. "It wasn't just adding another species," he told me. "It was the beginning of adding another ten thousand species."

One afternoon, Smith invited me to the house that he and Rahman recently bought in Fairhaven, a neighborhood of New Haven that was once known as Clam Town, back when it was the nexus of the booming East Coast oyster trade. The house, a Victorian Gothic overlooking the river, was built in 1875 by an oyster kingpin; there is a shucking room in the basement, and Smith and Rahman still find shells in their garden. Smith took off his boots on the back porch before entering the kitchen, where Rahman was cleaning mussels at the sink. Her family is from Bangladesh; she grew up in L.A.'s Koreatown, eating the kinds of things that Smith pulls off his nets. She met Smith at a dinner party thrown by one of his customers. "Bren tried to woo me with his clams," she said. "I made this amazing Thai dish and then an hour later broke out in hives. It was my first allergic reaction." They have EpiPens placed strategically around their house.

Soon it was time to eat, at a table laden with seaweed and its cohabitants. There were bright-green flakes of roasted sea lettuce on cucumber, seasoned with salt that Smith harvests from the farm. The butter was flecked with yellow-green chunks of kelp, like the terrazzo floor in an old bank. Rahman found a tiny slipper shell in her mussels; Smith told her she could eat it, a bonus delicacy. The main course was fra diavolo, but instead of linguine it was made with kelp noodles. It tasted fresh and briny, like the breath in your nose on a windy day at the beach. "There's a learning curve with it," Rahman said delicately. She is the foodie of the family, but it was

clear that she still had her doubts.

"We're picking one of the toughest food types to convince Americans to eat," Smith said. "But we have no choice." In his opinion, there is nothing inherently delicious about kale, so bitter, tough, and leathery; we learned to love the stuff because Gwyneth Paltrow told us to and Dan Barber gave us recipes. But, much as kale needed Barber and his ilk to turn it from a T-bone garnish into a way of life, kelp will need a chef to make us desire it.

Seaweed is the unlovely name for marine macroalgae, an enormous, varied family of more than ten thousand species. Most are benthic: they attach to rocks, seabed, or other seaweeds with a clamplike structure called a holdfast. They come in brown, red, and green; some iridesce. Mating, they use eyespots, release pheromones, or extrude slime. Certain species can reproduce vegetatively. They can come equipped with floats so that their leaves—called blades—stay close enough to the surface to photosynthesize. Instead of rigid cell walls like those found in land plants, seaweeds' cell walls are rich in sugars to help them bend rather than break in swells. These sugars—known as alginates, carrageenans, and agars—thicken, bind, and emulsify toothpaste, shampoo, skin cream, and countless industrial foods, including most ice cream.

The ocean covers seventy per cent of the earth and produces less than two per cent of our food. To grow the rest, we use almost forty per cent of the world's land and nearly three-quarters of our fresh water. "We haven't begun to explore the ocean as a food source," Mike Rust, an aquaculture scientist with the National Oceanic and Atmospheric Administration, told me. "If you want a glimpse of the future, the best one is Jules Verne's 'Twenty Thousand Leagues Under the Sea' "—where Captain Nemo feeds his crew exclusively on food harvested from the ocean. Nearly half the world's ocean-farmed product is seaweed. Most of the industry, which is worth some six billion dollars, is in Asia, where seaweed has long been welcome on the plate. "If you were to extrapolate one of those Asian seaweed farms, it becomes incredible pretty quickly," Rust said. "You get speculative numbers, like, you could replace all agriculture with less than

one per cent of the oceans' surface area."

Seaweed can be rich in protein, Vitamin B_{12}, and trace minerals. Iodine and omega-3 fatty acids, which many seaweeds have in abundance, are essential for brain development; some researchers believe seaweed may have played a role in the rise of *Homo sapiens*. Archeologists have posited a "kelp highway," to describe the coastal migration of the early Americans, some fourteen thousand years ago. Among modern Westerners, it has largely been treated as the food of last resort, a hedge against starvation that lingers nostalgically in corners of authentic cooking after the crisis wanes. An exception to this is purple laver (nori, in Japan), which the Welsh make into cakes and cook in bacon fat, and which the British food writer Jane Grigson said is "the one seaweed we can decently count in English or Welsh cooking as a vegetable." Now that our brains are big enough to have devised a million ways to eat too much, seaweed could come to the rescue again. A recent study from the University of Newcastle found that the alginates in brown seaweed may inhibit the uptake of fat. Jamie Oliver, the British chef, recently lost almost thirty pounds and attributed it to seaweed, and to drinking only on weekends.

But seaweed's most compelling property may be its ability to scrub, absorbing excess nitrogen and phosphorous, deposited in the water by agricultural runoff and wastewater, and dissolved carbon dioxide from combusted fossil fuels. (More than a quarter of the CO_2 released into the atmosphere is absorbed by the ocean.) Too much nitrogen and phosphorous can cause algal blooms, which, when they go bust, leave deoxygenated dead zones where little can survive. Excess carbon contributes to ocean acidification, which dissolves coral reefs and harms shell-forming creatures on which many of the fish we eat depend. Research on aquaculture in Asia has shown that one ton of dried kelp can contain as much as a third of a ton of carbon. Rust has estimated that if we can accelerate seaweed production by fifteen per cent a year (the current growth rate is nine per cent) by 2050 that biomass will be able to remove eighteen per cent of the nitrogen and sixty-one per cent of the phosphorous contributed to the ocean by fertilizers annually, and will take up six per

cent of the ocean's emissions-related carbon.

Still, it would take decades of aggressive planting to lower atmospheric CO_2 below three hundred and fifty parts per million, the level that most climatologists say is necessary to avert planetary disaster. Seaweed might have a more meaningful influence in highly sensitive areas, such as coastal waterways. In Puget Sound, where the pteropods—tiny marine snails known as sea butterflies—are showing signs of dissolution from intensifying acidity and dead zones have been spotted, a study is under way to measure how seaweed cultivation may alter the local chemistry. The study will also look at potential problems associated with seaweeds' spongelike powers. Hijiki, the spiky brown seaweed often served at Japanese restaurants, is known to have elevated amounts of arsenic; according to Kelp Watch, which was established after the Fukushima nuclear disaster to monitor radioactive isotopes in kelp from Mexico to Alaska, kelp is a powerful concentrator of cesium. A primary goal of the research in Puget Sound is to propose ways to safely direct seaweeds into the human food stream. "We need to create a culinary bow wave for sea vegetables," Betsy Peabody, one of the investigators, told me.

An era of seaweed eating can start to seem inevitable—penance for the golden days of corn and cars and cows. Paul Greenberg, who has written extensively about the collapse of fish stocks, told *Business Insider* last year, "If I could buy kelp futures, I would." Given the exigencies of feeding the planet, it might be preferable to other available alternatives. "It's not worms and it's not bugs, so that's positive, right?" he said to me. "I don't think anyone is going to stick their finger down their throat and say, '*Blech*, kelp—I don't want to eat it.' " Cheryl Dahle, the founder of Future of Fish, says, "We eat things now we never would have imagined eating twenty years ago. We eat dogfish. It's called *dogfish*, for crying out loud! If we can develop a market for snakehead fish—an exotic, invasive aquarium species—out of the Chesapeake, we can create a market for kelp."

At Oregon State University, researchers have decided that bacon might be a more effective marketing vehicle than guilt, idealism, or fear. In July, the

university created a small media frenzy when it announced that it had patented a strain of dulse that tasted like bacon when cooked. It was a bit like announcing that you'd discovered a variety of orange that could be squeezed into juice—vegan restaurants have been selling "D.L.T.s" for years—but that didn't stop ABC News from calling dulse "the Holy Grail of seafood."

"It's bacon or sex, those are the two things that drive the world, as far as I can tell," Christopher Langdon, the marine biologist who grew the dulse, told me when I visited him at the Hatfield Marine Science Center, in Newport, Oregon. He is British, with rosy cheeks and a subdued twinkle. Twenty years ago, he started cultivating dulse in tanks of bubbling seawater to see if it would make an effective feed for farmed abalone. He observed some unusual traits—rapid growth, a distinct pompom-like morphology—and continued to experiment with nutrients, population density, and turbulence. The strain that he patented, called C3, grows by eighteen per cent a day.

Dulse is a delicate pinkish-red seaweed, sometimes called red kale, which the Irish ate during the famine. It is still wild-harvested in Ireland and the United Kingdom. "I've had a wonderful call from someone in Ireland who told me he only collects dulse when the moon is full," Langdon said. "He had all these recipes—they add dulse to potatoes, and that's apparently one of their favorite combinations."

A year ago, Chuck Toombs, a boisterous instructor at Oregon State's business school, stopped by Langdon's lab. When he learned that dried dulse sold for sixty dollars a pound at Whole Foods, he got inspired. "I kept thinking about it, driving home to Portland," he told me. "Sixty dollars a pound! How much can we grow, and what can we make of this stuff? I want to sell bales to Costco." Toombs quickly ran some numbers and estimated that eleven thousand acres of kale were planted in the United States last year. "Producing indoors under artificial light, we think we could produce the same amount of dulse in a building the size of Home Depot," he said. He recently launched a business selling dulse salad

dressing at natural-food stores.

Langdon took me to see the tanks—turbid vats roiling with tangles of dulse. "Here's the C3," he said, breaking off a piece for me. I took a bite. It was ticklish, like escarole, with the toothfeel of a Twizzler; beneath the strong salt flavor, it tasted slightly nutty. "Our next project is to develop a culture system where you can grow dulse on land, without a continuous supply of new seawater. The idea is a dulse farm outside London, Berlin, Paris, or Tokyo to supply restaurants with fresh dulse every day."

For the U.S. market, seaweed snacks may prove to be the point of entry—and the first battleground with kale. According to *Food Navigator*, an industry publication, the category is growing by about thirty per cent each year, with sales for 2014 as high as five hundred million dollars, compared with the kale-chip business, which is worth two hundred million. SeaSnax—organic, non-G.M.O.-certified nori sheets basted in olive oil and dusted with salt—have edged out cheddar bunnies on certain West Coast playgrounds. Ocean's Halo seaweed products have made it even further: at Whole Foods they're sold in the chips section. The company, in Burlingame, California, was founded by Mike Shim, a Korean-American former Yahoo employee, and Robert Mock, a Texan who became addicted to the nori sheets his son snacked on but wished that they were crunchy, like Doritos. With the natural-foods market growing faster than the conventional one, Shim thinks the seaweed-snack business can develop along the lines of coconut water, which is now a billion-dollar industry. "We're only two years old and we're selling millions of dollars' worth of seaweed snacks a year," he says. "We're really focussing on mainstreaming seaweed for the American consumer."

In Portland, at Oregon State's Food Innovation Center, a young chef with a large mustache had been assigned to create dulse-related products to introduce to the public. (His previous post was at the Nordic Food Lab, an offshoot of Rene Redzepi's restaurant Noma, where he ate a lot of jellyfish, wild herbs, and dulse ice cream.) To emphasize dulse's bacon flavor—from naturally occurring glutamates—he cold-smoked it and then fried it in

grapeseed oil. “This could be a big part of pushing meat to the side of the plate,” he said. It was a greasy dark green—heat brings out the chlorophyll—and intensely salty. Using meat glue to create a slab, he’d managed to get it chewy. It wasn’t bacon, but it wasn’t bad.

Bren Smith believes that seaweed can be the cheapest food on the planet, the fish sticks of the future. “We are going there,” he said. “The question is, Will it be cod-liver oil, or will it be delicious?” In late August, he had a breakthrough: he met Brooks Headley, a punk drummer turned pastry chef who recently opened Superiority Burger, an un-earnest vegetarian burger joint in the East Village.

At the end of the first week of September, Smith was at the train station in New Haven, wearing clean jeans and a green hat, swaggering like Popeye. He had two Whole Foods bags, each containing a box labelled “Sea Greens: Baby Kelp Leaf,” looped over his arms, and a tray of Dunkin’ Donuts coffee balanced in his hands. We were on our way to see Headley. “I bet this is the first time domestically grown kelp has ever been on Metro North,” he said.

A few days earlier, the *Times* had given Superiority an impassioned review, comparing it to Momofuku in the early days. Tonight, Headley was going to serve Smith’s kelp, both the fresh product Smith had with him and some frozen noodles he’d been working with all week. Smith showed me a picture of a five-dollar side that Headley had designed: a scribble of bright-green kelp noodles and roasted carrots in barbecue sauce, served with bread crumbs and a dash of lemon in a paper boat. “Maybe exactly what kelp needs is a little punk rock,” Smith said. “Not hippy vegans.”

The restaurant is tiny, six seats in three hundred square feet, including the kitchen. Headley, wearing a black knit cap, greeted us among boxes of the day’s produce. “When we started playing around with the kelp, I didn’t expect it to be so sturdy,” he said. “It seems like it’s going to wilt into spinach. But the texture is still there, even after it’s seared on the flattop.” He was practically bouncing. “I’m so excited,” he said. “This is, like, *new*.”

Smith said, “The reason the structure is so good is that in the winter it’ll

freeze-thaw-freeze-thaw-freeze."

A skinny cook with white-blond hair and an Orioles cap said, "It reminded me of pad-Thai noodles."

Headley agreed. "There's also like a gummy-bear quality to it. That gelatiny snap. Texture and mouthfeel is a huge thing for us. We try to do things that are gut-level fast-food satisfying without being meat." He gave us some kelp to try: one extremely long noodle piled like cat-mauled knitting yarn, topped with a heap of carrots and smothered in a re-creation of K.C. Masterpiece.

Superiority is open from six to ten and serves two hundred and forty people—one a minute—every night. Around five, a mob started to form outside the door. A ten-year-old boy with fair curly hair and braces, wearing a Decemberists T-shirt, pushed his nose against the glass. When he finally got in, he was giddy with delight. He had made his family come from Carroll Gardens to try the food. Of course he had ordered the kelp. "Everyone in my class thinks seaweed is disgusting," he said. "They're horrified." He went on, "I'm the adventurous eater in the family. I hate the SeaSnax. It's not like *real* seaweed. It's over-salted, over-olive-oiled. My sister likes anything that tastes *normal*. True story: if we put a plate of SeaSnax in front of her she'd eat the whole thing."

"You used to like them, too," his mother said.

"I *used* to like them."

"Seaweed's very mainstream now," his father added. "Well, mainstream in Brooklyn."

The kelp and carrots sold out in three hours. Smith seemed to have found his man: a crowd-pleaser with indisputable anti-establishment bona fides. "I've never had any kale in house," Headley said. "I'm actually not a big fan of raw kale."

As much as we need seaweed, it may need us more. Tom Ford is a marine

biologist and the director of the Bay Foundation, which works to reforest the giant kelp in Santa Monica Bay, three-quarters of which has vanished since 1950. I met Ford in his office, which is a trailer on the campus of Loyola Marymount University, where he also teaches. Scuba gear hung on the walls.

On his computer he showed me a presentation called “Kelp! I Need Somebody.” It opened with an aerial shot taken two years ago of light-blue, kelpless water off Honeymoon Cove, at the southern end of the bay. Like others around the world, this kelp forest had been devastated. Around the time of the Second World War, industrial harvesters came in, seeking alginates, and unwittingly took off the growth zone of the plants, slowing their recuperation. (The harvesters pulled out in 2006.) Now there is the additional stress of sewage and storm runoff from a megalopolis. But the largest problem is the purple sea urchin, which loves to eat giant kelp. In the eighteen-fifties, with sea otters, the urchins’ primary predators, hunted nearly to extinction for their fur, the purple urchins began experiencing a population boom. The dead kelp forest, these days, is called an urchin barren.

Ford refers to seaweed-sequestered carbon as “gourmet carbon,” but not because he’s trying to get people to eat it. The kelp forest is a potential carbon sink—problematic carbon, embodied, makes its way up the food chain until it reaches an apex predator, such as a shark, which when it dies sinks to the ocean floor—and it also rebuilds a decimated ecosystem, providing a place for fish to breed and feed, and for migrating gray whales to hide their young. The fishermen get reëmployed, and the coast is protected from storm surges and erosion. Besides, a kelp forest is an ecological refuge that can be installed in the only real estate that is readily available. “Where am I going to plant the giant forest in the middle of L.A. to sequester carbon?” Ford said.

For the past two years, Ford and his colleagues have been bringing the forest back to life. Their method is simple: dive down with a hammer and smash most of the urchins they see. It has been remarkably effective, and

thirty-four acres have been restored. One socked-in morning this fall, Ford picked me up in a truck to take me to Honeymoon Cove so I could see it for myself. He is from eastern Pennsylvania. The first time he saw giant kelp while diving, he was terrified. “It was the biggest, darkest, shadowiest thing I’d ever seen in the ocean,” he said. “Scared the hell out of me.”

We drove through a neighborhood of gracious houses with deep lawns, where the for-sale signs were from Sotheby’s, and parked by a steep cliff. Below us was a rocky beach and the Pacific, spit-white at the edge, then chalky, then blue. In wetsuits, we picked our way down a hundred and fifty feet of switchbacked trail. Ford stepped gingerly; he is afraid of heights. On the beach, he walked me to the water’s edge, which was piled with gloopy decomposing kelp. Flies buzzed all around. “This is how most people experience kelp,” he said. He picked up a dried-out holdfast, like a nest. Inside it was a small sea star.

Diving in the kelp is a biologist’s dream. “You can be sixty feet down, looking up at these giant columns of kelp spreading out on the surface, and these golden shafts of light, like light through a stained-glass window,” he said. “There are hundreds of species around you. It’s like flying through the forest.” We waded into the water and put our flippers and masks on. I ducked my head under and gazed. Two years ago, it was rocks and urchins. Now kelp was everywhere, ochre-colored, thirty feet tall, flailing like tube dancers outside a car wash. Three bright-orange Garibaldi fish swam past, then a group of opaleye, then five kelp bass. I came up to the surface and dove down again, plugging my nose with one hand and using the other to pull myself down the length of a plant. The water was milky with kelp slough. Southern sea palms swooshed and swayed as the waves tumbled over them. At the surface, Ford held up a loose piece of kelp, shaggy and decrepit with a small holdfast—it was sporifying. “More spores,” he said. “Go, go, go.” ♦

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