The Light from the Whale

By Mike Vogel
Early in the 19th century, Charles W. Morgan—the man, not the National Historic Landmark whalship—sent a shipment of sperm oil on its way from the wharves of New Bedford to the lighthouse in Buffalo. In doing so, he set in motion a chain of transportation links that included the century’s foremost engineering marvel, committed the product of a hazardous sailing occupation to a use for mariner safety, and probably made a little money to use in building his namesake vessel.

Sperm oil—a vastly different substance from the whale oil rendered from blubber—was the primary fuel for lighthouse lamps for decades. Eventually, it was overrun by new technologies. So were square-rigged whaleships. And lighthouses. And the whaling industry.

What remains is the history, the heritage—and a few tangible links to the past. The Charles W. Morgan, launched in 1841 and named for its builder and principal owner while he was away on business, still exists, a carefully-tended museum ship at Mystic Seaport. So does the even older 1833 Buffalo Lighthouse that once burned oils brought back by America’s world-leading whaling fleet.

And, this year, the Charles W. Morgan—now completely restored—even sailed again, on her 38th voyage. Sailing in her was the keeper of the also-restored Buffalo Lighthouse: me. Funny how life works, sometimes, whether it’s the life of a ship or the life of a person.

The bill of lading Morgan penned at his desk in New Bedford that day, sending barrels of precious oil trundling westward along wagon routes and the new and marvelous Erie Canal, added a drop to a vast river of light-giving fluids that lasted until the petroleum industry began its rise in the middle of the 19th century. Sperm oil, the brightest and cleanest-burning fuel available, was the illuminant of choice for the U.S. Light-House Establishment until cheaper post-Civil War replacements were found in vegetable and mineral oils: colza or rapeseed, lard oil, and kerosene.

In the early days, merchants such as Morgan dealt directly with the country’s lighthouse districts and depots, including the one in Buffalo, the western terminus of the Erie Canal and the key portal between the Atlantic Coast and the heartlands of the Great Lakes. Even with the canal, that journey took days. Buffalo-based office superintendent and inspector of lights Henry B. Miller, in an 1851 letter to Stephen Pleasanton who headed the lighthouse service from his office at the Treasury Department in Washington, noted that Samuel Grinnell of New Bedford had informed him that the oil for the “northwestern lakes” had shipped from that port on April 26 and that “it usually takes from four to six days to make the passage from New Bedford to Albany, and from eight to ten from Albany to Buffalo, so we can safely calculate on the oil being here by the 15th of May.”

That would be fine for Buffalo, but Miller urged Pleasanton—the man who, by the way, saved the Declaration of Independence and the Constitution as the British approached to burn Washington in the War of 1812—to instruct the collector of the Port of Buffalo to have a vessel chartered and ready to sail on that date for the rest of the Lakes’ lighthouses.

From 1867 to 1869, though, the Light-House Establishment burrowed a series of large vaults into the hillside behind its new General Light-House Depot on Staten Island and began processing all the sperm oil, lard oil, and eventually mineral oil for its lighthouses through that gateway site. The move centralized control of the oil procurement process, it let the penny-pinching bureaucrats of the service dole out amounts calculated from the specified usage rates of the lamps and lens arrangements at each lighthouse in a given district, and it allowed for a laboratory to test the quality of the oil being purchased from merchants for use in lighthouse lamps.

The volume of the oil trade was considerable; the depot had five 51-foot-deep vaults and a sixth half-size one, with arched ceilings 13 feet high. Each of the vaults—they, too, still survive—had large iron storage casks lined with tin, and long barrel storage platforms with iron drip
trays. Together, they allowed for the safe storage of 85,000 gallons of oil, 35,000 of that in the rows of barrels ready for shipment.

In the years sperm oil remained the illuminant of choice, that amount of oil would have been an expensive proposition. It would, in fact, become the biggest cost in lighthouse operation.

By the middle of the 19th century, fewer sperm whales were being taken and industrial uses of the oil as a lubricant were increasing, sending prices up. The oil had brought about 55 cents a gallon in the year the Charles W. Morgan was launched; sperm oil production peaked in 1846, but by 1855 it was scarcer and fetching $2.25 a gallon. At the average price for sperm oil when the vaults were built—and had they been used to store only sperm oil and not also the lard oil then coming into use—the vaults could have stored nearly $110,000 worth of the fluid. That's in post-Civil War dollars, the equivalent of about $1,800,000 today. The equivalent amount in 1855 would have been about $4,713,000. In that year the principal keeper of the Buffalo Light, James Anderson, made an annual salary of $400—the equivalent of only about 178 gallons of sperm oil.

Cost reduction seemed crucial. Kerosene, distilled from petroleum, had been invented in 1849, but in the mid-1850s the Light-House Board first followed the French interest in colza or rapeseed oil from varieties of Brassica rapa, a turnip-like wild plant abundant in Europe that offered a less efficient but far cheaper alternative to sperm oil. The rapeseed crop didn't catch on with American farmers—at least until 20th century Canadian scientists with an eye for marketing developed a tastier low-acid version they patriotically named Canola oil—so Light-House Board experiments headed by professor Joseph Henry of the Smithsonian shifted instead to lard oil.

By 1867 preheated lard oil was ready for use in the larger lighthouse lamps, and sperm oil use went into decline. Kerosene, experimented on by the board in the 1870s, would begin replacing lard oil in turn, reaching usage in the lamps of larger lenses in 1884.

Sperm oil had a long run, though, from the changeover from spermaceti candles in colonial lighthouses to the time of the Civil War. Because America dominated the whaling industry, American lighthouses stayed with the oil much longer than the lighthouse establishments in

France and Europe. And the journey from whale to lamp passed first through the holds of ships like the *Charles W. Morgan*, which could spend years at sea to fill its hold with casks of oil and spermaceti.

They were years of discomfort and hardship, with hours of dangerous action and days of hard work mixed into long periods of boredom and searching. The oil that burned in the lamps of American light-houses came from that hardship, one hunted whale at a time.

This summer brought a short taste of that life, although in much different circumstances. Aboard the *Charles W. Morgan* for a day-long passage through Boston Harbor, Massachusetts, and Cape Cod Bay and the Cape Cod Canal, I found a cramped berth just beside the foremast in a foc’sle made hot and humid by a day of blazing August sunshine. The tiny space “before the mast” housed 24 of us, all equally hot and humid, with little room to move in and out or even to shift position in the shelf-life berths; while the men sweated, one of the southern women in our crew (now there was a difference from the days of a working whaleship!) insisted that the women would not, but allowed that they might perhaps “glisten.”

Few drew the privacy curtains on the berths; some discovered that a shelf along the curve of the hull offered a tiny bit more space and a wall cooled by the sea outside. Under sail, full-voyage chronicler Ryan Leighton offered, there was also the comforting *swash* of the sea against the planks of the bow. This night, there would be only the scream of an able seaman awakened by a nightmare that caused him to kick the wall of the bunk next to his.

About 2 a.m.—four bells in the middle watch—a breeze came up. The sailcloth chute rigged to channel air down a companionway into the foc’sle lifted with it, sliding up a few rungs and alerting me to the possibilities. I slipped out, climbed to the deck, and had the cool breeze and ship—and the USS *Constitution*, docked just ahead—to myself for a while. The shadows and the wind whispering softly in the rigging took me back in time.

The heat and humidity would have been much the same back in the day, except when the whaleship left the South Pacific for the sharp cold of the Arctic grounds. But the living would have been made immeasurably worse, at least as long as the olfactory nerves survived, by the fact that the crew’s living quarters in the bow were just ahead of the “blubber room,” the ‘tween-decks processing center into which long strips of whale were lowered for cutting and storage. In close confined quarters, and with the fires of the blubber-melting try-works just above, the smell of the sea and its creatures must have been almost overpowering.

The *Charles W. Morgan* would have processed and packed thousands of barrels of whale products each voyage. One large sperm whale alone could yield about 500 gallons of spermaceti. The ship’s voyages covered thousands of miles in passages to the whaling grounds, and in the hunt.

One of the surprises in bringing this ship back to life was the quality of that sailing. The last of its kind, and the oldest merchant vessel in the world, the *Charles W. Morgan* essentially was a factory ship, but, as I would learn during a turn at the helm off the Gurnet Lighthouse, a surprisingly nimble one.

*Charles W. Morgan* was my fifth square-rigger under sail, and each has its own personality. Neither quite as solid as USCGC Eagle nor as elegant as the Norwegian Sail Training Vessel *Christian Radich*, she nonetheless answers to the helm quickly—maybe a little too quickly, until I got the hang of her combination tiller and wheel steering rig—and responds well to the wind.

She did eight knots on the approaches to her old home port of New Bedford, Second Mate Sean Bercaw noted as the crew spread sailcloth to the freshening breeze.

She sails, Capt. Kip Files said, “a lot better than anybody expected. People look at the blunt bow, but that’s not everything. I just looked at the hull, I knew she could sail.”

Whaleships like the *Charles W. Morgan* sailed all over the world’s oceans, from the edges of the northern icepacks to the heat of the South Pacific. The rapid spread of American whaling dates to the 1760s and 1770s, with ships returning an estimated 45,000 barrels of oil a year from 1770 to 1775, and the impact on lighthouses was early. Spermaceti candles, made since the 1750s, were used in the earliest chandelier arrangements of reflectors and lights. The definition of candlepower is the light emitted by one standard spermaceti candle, a measure still loosely linked to the candela and lumen.

But in the early 1780s, Swiss physicist Ami Argand developed a lamp that worked best with whale oil, boosting whaling while providing a new source of light for homes, European trains, and, eventually, lighthouses. Winslow Lewis, an American ship captain and entrepreneur who would corner the market on early American...
lighthouse construction and equipage, took the Argand burner and patented his version in 1810, promising to use only half the oil of earlier lamps at a time when the government was looking to cut costs by limiting consumption. His friend Pleasanton, who as fifth auditor of the Treasury ran the country's lighthouse service, took special notice of an opportunity for even better and brighter lights in the 1820s, when the expanding American whaling industry opened the "offshore grounds" of the Pacific and found itself with a glut of sperm oil that drove prices down. Pleasanton always had an eye for a cost-savings, sometimes to a fault; later, he and Lewis would delay converting lighthouses from the old chandeliers to the new Fresnel lens, even though it offered 3.4 times the light for the same amount of oil.

Sperm oil and whale oil are very different. Whale oil, generally, is rendered by boiling down blubber taken from such species as the bowfin and the right whale—named because it was the "right" whale to hunt for an abundant return. Spermaceti is taken from the head cavities of the sperm whale, although some poorer-quality sperm oil can be rendered from that species' blubber as well.

Whale oil is basically a triglyceride, which made it eventually useful in such products as margarine. But it was first a fuel, burning easily but dirty, and producing both a relatively poor light and a distinct fishy odor. If you were poor, it was affordable light.

Sperm oil is basically a wax, with varying percentages of wax esters depending on the age of the whale. It comes from the sperm whale's large head cavity, the "case," where it probably functioned mainly to aid in the whale's echolocation, and in the lower head cavities known as the "junk." It was a prime lubricant from the dawn of the machine age to the dawn of the aerospace industry, because it wouldn't break down in extreme conditions. It was used, until relatively recent whaling and whale product bans, in cosmetics, in automatic transmission fluid and as a watch lubricant, and it was the illuminant of choice in high-income homes and, because the lighthouse service needed maximum brilliance and minimum soot for its critically important ship-guiding lights, in America's lighthouses.

And Pleasanton, in 1831, could get it for 31 cents a half-gallon. By 1843 that would go up to 63 cents; one ship reported getting $1.25 a gallon for sperm, but only 43 cents a gallon for whale oil. The average price of sperm oil was $1.77 a gallon from 1845 to 1855, but it was rising as demand increased and whales declined; in 1854 it was $1.92 a half-gallon, prompting the Lighthouse Board to search for an alternative, and in 1866 when the conversion to lard oil was looming, it was still $1.28 a half-gallon.

Eventually the bottom would fall out and by 1896 sperm oil was 40 cents a gallon with replacement petroleum priced at only 7 cents. In the commodity's prime, though, the crew of a ship such as the Charles W. Morgan would delight in a successful hunt for a sperm whale.

Hauled alongside, the carcass would be secured and the head cavities would be cut open and bailed out. If the temperature was moderate, the straw-colored spermaceti would start to congeal into a white waxy substance when it hit the air; it could be reheated in the try pots to reliquify it, and the liquids would be quickly packed in casks for processing ashore. Between the head cavities and the blubber, an average sperm whale might yield 45 to 50 barrels of oil, and a large whale might yield 100 barrels. Most of the oil was rendered from the blubber, with the head cases yielding 6 to 8 barrels, although one ship reported 10 from a large bull. The blubber oil had only about 66% wax esters compared to the 71% to 94% in the spermaceti from the head case of an adult; clandestine mixing was not unknown, and Pleasanton made sure his lighthouse service quality control tried to stay on top of that.

In 1853 the Charles W. Morgan would return from its fourth voyage to the Arctic, South Pacific, and Sea of Japan with 268 barrels of
sperm oil at 30 to 35 gallons per barrel, 1,958 barrels of right whale oil, and six tons of whalebone, actually whale baleen that was sought for corset stays, buggy whips, and umbrella frames (10,700 pounds had been shipped home mid-voyage from Hawaii).

In 1859, the year former owner Charles W. Morgan died, the ship left on its sixth voyage to the same grounds, twice landing both oil and bone in Hawaii mid-voyage before returning to New Bedford in 1863, three years and seven months out. The crew had processed thousands of barrels of oil. The Civil War had doubled the prices of whalebone and right whale oil, and the ship landed its most valuable cargo ever, worth a bit more than $165,407.

That value could be changed a bit by subsequent onshore processing. Whale oil simply shipped, but there was more profit to be squeezed—literally—from the smaller amounts of spermaceti.

Casks of spermaceti were stored and allowed to freeze in the New England winter. Once frozen, the waxy substance was scooped into sacks and pressed; the oil that seeped out was the most valuable of all, the sperm oil that stayed liquid even in freezing cold. Partially thawed spermaceti would be pressed again in spring, and the congealed remainder would be pressed yet again in summer before what was left was sold as wax. The process produced winter-strained, spring-strained, and summer-strained grades of sperm oil, in descending order of value.

The Light-House Establishment (which officially became the Light-House Service early in the 20th century, a couple of decades before the hyphen was dropped) used the different grades, calling them simply winter, spring, and summer oil. Winter oil was sent in season to the colder climates, where even it occasionally had to be preheated in a warming stove. Spring oil was listed on some receipts—in 1852 Buffalo Lighthouse Keeper Alexander Ramsdell signed for 126 gallons of winter and 124 gallons of spring oil—but most often the shipments were either winter or summer oil, or both. While some lighthouses, like Buffalo on Lake Erie, simply went dark when ice covered the waters and ships couldn’t move, they too needed winter oil that would stay liquid in the lamps early and late in the shipping season.

The transition from living whale to casks of oil started with a lookout’s cry from “the hoops” atop a whaleship mast and the lowering away of whaleboats. The oared pursuit, after species of whale that were slow enough to catch and buoyant enough to float when killed, could be short or long but always was dangerous. Modern eyes would be appalled by the slaughter, but in its day whaling was an important driver of the American economy and an industry that was absolutely vital to an emerging nation whose maritime trades thrust it upon the world stage.

America’s whaling fleet was the largest in the world. In the 1840s there were 735 whaleships in the trade. Peak production in sperm oil happened in 1846, and then the petroleum industry began its rise and kerosene lit the way to the future. In 1876 there were just 39 whaleships left. Today there only is one.

Charles W. Morgan had been launched five years before the peak, in the winter of 1841—the same winter that a young sailor and teacher named Herman Melville boarded the whaler Acushnet just across the harbor for the voyage that would give him the basis for novels including Moby-Dick, a story in which the narrator describes sperm oil as “as rare as the milk of queens.” Charles W. Morgan took her last whale on her 37th voyage in May 1921, only about 70 nautical miles off Virginia Beach.

Just about everyone aboard during this summer’s 38th voyage had a copy of Moby-Dick. In my necessarily small kit, I carried two, as gifts to my grandchildren inscribed aboard a whaleship at sea.

And, although the oil burned in Buffalo long ago would keep safe inland-seas sailors who would never see a whale or salt water, I followed—symbolically, at least—those who did make the transition from lakes and canal to the brinier deep. Ishmael, in Moby-Dick, tells the dons of Lima, Peru, the story of the whaleship Town-Ho and its noble but rebellious sailor named Steelkilt, who leads a mass desertion after an encounter with the great white whale. Despite his origins on the shores of Lake Erie, he still is described by Ishmael as “wild-ocean
“born,” and he is joined in his rebellion by two “canallers” who also had signed on for the hunt; years later, I would race J-27 yachts off Buffalo Harbor against a competitor who had named his boat Steelhead in honor of yet another tie between the inland port and offshore whaling.

For this 38th ceremonial voyage, the whales were safe, despite some nervous joking about cetaceans with long memories. Some approached close aboard, spouting and fluking, during day sails from Provincetown to the marine sanctuary of the Stellwagen Bank. The Charles W. Morgan is a National Historic Landmark that sails now only for heritage and education and—like many lighthouses now—as a reminder of the maritime past that shapes our present and our future. Whaling and whale products were banned here by the Endangered Species Act of 1973 and have been curtailed in much of the world, except for native cultures and the sometimes-abused category of scientific research.

But whale exploitation is part of our past; indeed, it was an important part of our economic entry onto the world stage. And while lighthouses used only a fraction of the take, they at least provided an altruistic use for the whale’s oil.

As early as 1803, sperm oil was arriving on the inland seas, far from the salt water oceans. A British army officer recorded the arrival of a lighthouse reflecting lamp and a supply of sperm oil at Fort George, in Canada near the Lake Ontario mouth of the Niagara River, in that summer. On April 18, 1818, Winslow Lewis wrote to the American commissioner of revenue, Samuel H. Smith, that the cost of shipping a 250-pound barrel of oil from Boston to Buffalo included 8 cents for “truckage and wharfage” in Boston, 75 cents for freighting from Boston to Albany, another 10 cents for truckage and wharfage in Albany, and $11.25 for land carrying (the Erie Canal wasn’t completed until 1825) from Albany to Buffalo, for a total of $12.18 per barrel or $4.50 per hundred pounds.

Buffalo’s first lighthouse, lit in 1818 as one of the first two simultaneously built American lights on the Great Lakes, had nine lamps and reflectors, with an oil need calculated at 38 gallons per lamp, including a 15 percent allowance for leakage in transit. That meant the lighthouse, built about the same time Charles Wm Morgan began managing his first whaleship, would need 342 gallons, at a cost of $17.48 in that year. In September, Lewis reported to Smith, 384 gallons of oil were consigned to the Buffalo Lighthouse and 430 to the Presque Isle, or Erie, Lighthouse, which had 10 lamps.

On May 28, 1820, keeper John Skaats informed Lewis that Buffalo Lighthouse had on hand 62 gallons of winter oil and 119 gallons of summer oil at the end of the previous year, and that he had received 10 barrels in January and had held the six intended for Presque Isle until the ice cleared and they could be shipped. His light’s four barrels, he noted, contained 52 more gallons of winter oil and 61 of summer. One broken cask had leaked four gallons, which a wary Skaats took pains to document. By that point in the season, 10 gallons of oil already had been burned.

Keepers would have to cart the oil up stairs and ladders to reach the service rooms and lantern, the glassed-in tower top with the lens. Generally, they used five-gallon loads, but it didn’t all have to go up at once.

In May of 1842, with its new lighthouse about to finish its first decade, keeper Ramsdell had on hand 110 gallons of winter oil and 25 gallons of summer, and Superintendent of Lights William D. Wilson reported a Buffalo depot supply of almost 245 gallons of summer oil. A year later, Pleasanton would note a supply in storage at Chicago of 2,213 gallons of summer oil and 2,270 gallons of winter oil, which meant he would be ordering from Boston an additional supply of 4,514 gallons of summer oil and 2,270 gallons of winter oil for the four upper lakes (upstream from Niagara Falls, at that time a formidable navigation barrier between Lake Erie and lower Lake Ontario). He was basing the order on a calculation of 27 gallons per lamp, and chided Wilson on a discrepancy between the amount of oil signed for and the amount reported in storage, as well as expressing surprise that supplemental oil had been requested due to poor quality. The always watchful Pleasanton had had the oil tested and the sealed barrels branded, and he wanted to know if the casks in question were marked or not.

All that oil has gone up in flame (a very hot flame, as I once learned by passing my hand over the top vent of a lens lit by an oil lamp) and has been consigned to history. Whale and sperm oil have been replaced by other energy sources, synthetic lubricants, even better waxy oils from jojoba plant seeds. The whaling industry, at least in America, is no more. Even lighthouses now are lit with LEDs, in an era when navigation itself leans more heavily on satellites and radar.

But this summer, at least, the last of the great American whalers sailed past lighthouses from New London to Boston, on a journey that tied the past to the future.

Pine provision cask, possibly for use in whaleboat. Cask is painted gray, flaking to reveal light and dark blue undercoats. It is equipped with iron banding and an unusual swivel locking mechanism. It is attributed to New York’s Hudson River Valley, mid-19th century. Courtesy of Mystic Seaport.
• History of the U.S. Lighthouse Society
• History of Fog Signals
• History of the U.S. Lighthouse Service
• History of the Life-Saving Service