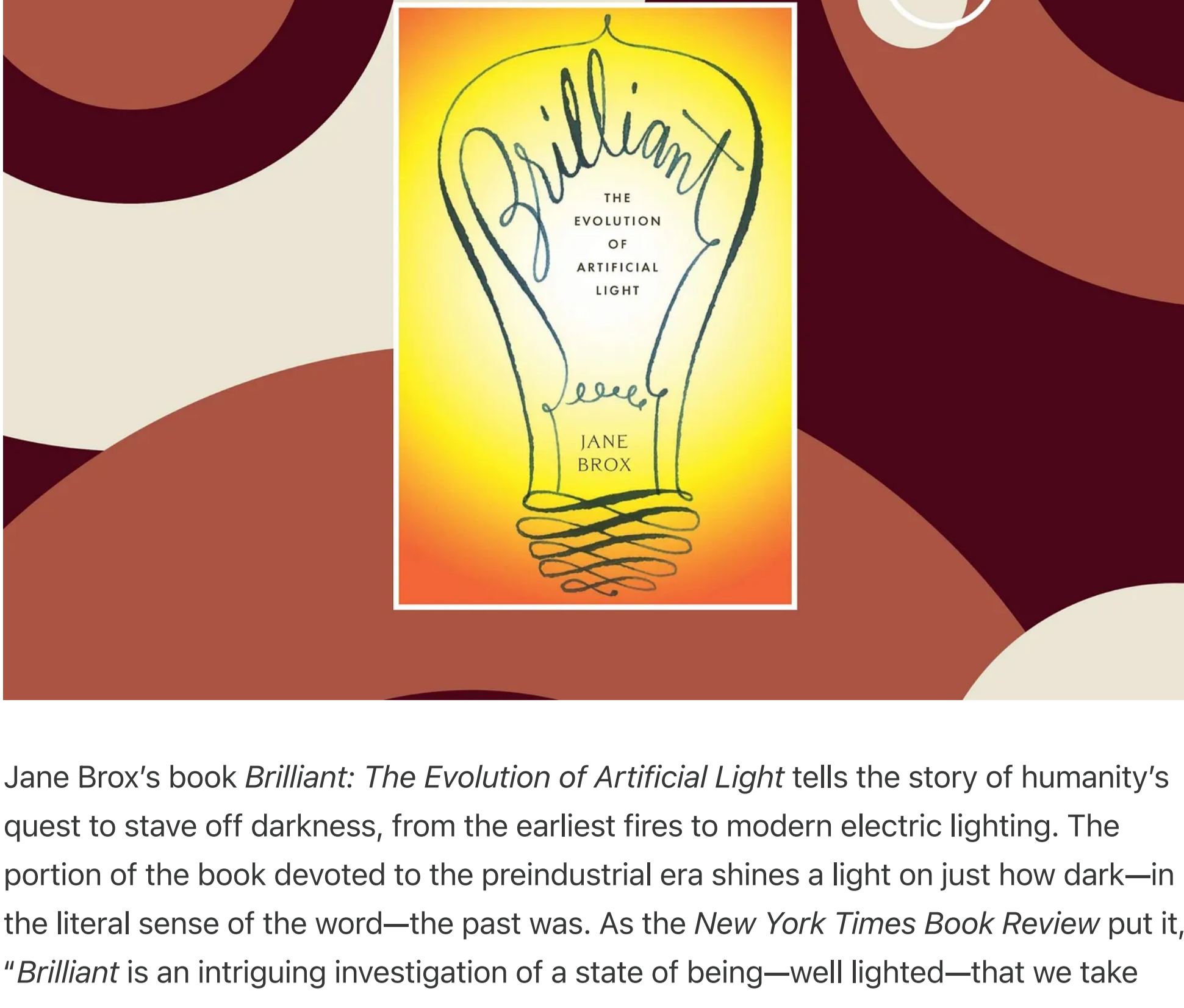


Grim Old Days: Jane Brox's Evolution of Artificial Light

The next time you flick a light switch and flood a room with light, reflect on the unsteady glow of tallow candles that once illuminated the world.

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Jane Brox's book *Brilliant: The Evolution of Artificial Light* tells the story of humanity's quest to stave off darkness, from the earliest fires to modern electric lighting. The portion of the book devoted to the preindustrial era shines a light on just how dark—in the literal sense of the word—the past was. As the *New York Times Book Review* put it, "*Brilliant* is an intriguing investigation of a state of being—well lighted—that we take utterly for granted." Our preindustrial ancestors did not have that luxury.

Progress in artificial lighting transformed the world, "granting more working hours in the day and creating a night that is no longer impenetrable, no longer a void, a night easily traveled through and expansive with free time."

A preindustrial person would be thoroughly bewildered by the array of colorful electric lights in any modern urban center past nightfall; New York City's famed Times Square would strike them as wondrous and disorienting. Picture the scene in the 16th century:

If you could have seen the earth from above, cities, towns, and villages would have appeared nearly as dark as the oak forests. Perhaps glints of light would have leaked through doorways and shuttered windows early in the evening, or a few lanterns would have bobbed down the lanes, but no streetlights would have shone. Within, candles and lamps no brighter than those of Roman times would have lit only a bowl of porridge, a book, a shirtsleeve in need of mending, another. If someone reached for a thread or let out a long sigh, the flame would quiver, and the shadows would quiver, too. . . . Such small light was precious and meted out sparingly.

Indeed, "before the seventeenth century, street lighting was almost nonexistent everywhere in the world. . . . Renaissance Florence had no streetlights, nor did imperial Rome." Brox quotes historian Jérôme Carcopino describing nightfall in Ancient Rome: "Night fell over the city like the shadow of a great danger. Everyone fled to his home, shut himself in, and barricaded the entrance. The shops fell silent, safety chains were drawn across . . . the doors." Centuries later, little had changed. In early modern Europe, "Almost everyone gladly left the streets to the thieves, the scurrying of rodents, and the lingering smells of the day—rotting food, old straw, and horses' dung."

Staying indoors and in bed made sense because the poor lighting made most ordinary activities dangerous. One unfortunate man staying at a New Haven tavern in 1796 "was going to bed without a light . . . [and] opened the cellar door instead of a chamber door, and falling down the cellar steps fractured his Skull, [sic] of which he expired the next morning."

The earliest artificial lights were just rocks with animal fat poured on them. "Often the lamps were merely unworked flat slabs of limestone, or limestone with natural cavities for the nubs of tallow—animal fat—that had to be replenished every hour." Over time, lamps were made of shells and then pottery. The shape of ancient Greek and Roman lamps evolved to enclose the oil.

The cost of tallow (rendered animal fat) was high. "In the middle of the fifteenth century in Tours, a laborer had to work half a day to earn enough for a pound of tallow." Today, in contrast, lighting is not only of far higher quality but costs [practically nothing](#). Given the expense, people made do with what they had. Any fat could be used to make light:

Rare and costly beeswax was long the province only of . . . the wealthy. Most other people depended on fat they pressed or rendered from animals, fish, or vegetation near at hand: manatees, alligators, whales, sheep, oxen, bison, deer, bears, coconuts, cottonseed, rapeseed, and olives, the chosen oil of the Mediterranean. In England tallow candles from domestic herds provided the main source of light. . . .

In the West Indies, the Caribbean, Japan, and the South Sea Islands, people saw by the light of numerous fireflies, which they captured and kept in small cages. South Sea Islanders skewered oily candlenuts on bamboo to make torches, while those on Vancouver Island placed a dried salmon in the fork of a stick and lit it.

New England colonists "made use of deer, moose, and bear fat."

Ancient Romans may have created the first beeswax candles. Candles remained a main source of light centuries later, often made of tallow. The miserable job of making candles often fell to women. Brox quotes author and abolitionist Harriet Beecher Stowe (1811–1896) on the challenges of candle-making.

"Women spent long hours painstakingly dipping candles—a serious undertaking . . . sevenfold worse in its way even than washing-day," claimed Stowe. "A great kettle was slung over the kitchen fire, in which cakes of tallow were speedily liquefying; a frame was placed quite across the kitchen to sustain candle-rods, with a train of hoard underneath to catch the drippings." The slightest mistake could ruin the candles. "Wicks couldn't be dipped too quickly, or the candles would be brittle [and] the candles had to be cooled slowly, or they would be likely to crack."

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Storing the candles also presented a challenge. "They softened in warm weather and, being made of animal fat, spoiled on the shelf overtime. They had to be stored where the mice and rats couldn't get at them." Vermin enjoyed eating candles. In times of hunger, people also consumed candles out of desperation. In the mid-18th century, during the construction of the Eddystone Lighthouse near Plymouth, England, the civil engineer John Smeaton noted that he "found it a matter of complaint through the country that the light keepers had at various times been reduced to the necessity of eating the candles."

Despite the intense effort required to make candles, and the carefully limited use of candles demanded by economic necessity, candles did not last long. Historian Marshall Davidson notes:

Even the best-read people remained sparing with candlelight. In his diary for 1743 the Reverend Edward Holyoke, then president of Harvard, noted that on May 22 and 23 his household made 78 pounds of candles. Less than six months later the diary records in its line-a-day style, "Candles all gone."

Not only were candles costly and labor-intensive to produce, and short-lasting, but they also had other drawbacks. Lighting candles was difficult before the invention of the safety match in the 19th century. "In eighteenth-century Europe . . . the tinderbox found in almost all kitchens would have contained fire steel, flint, and tinder — usually charred linen. To make a fire by striking flint against steel and setting off sparks, which were aimed toward the charred cloth." The slightest breeze might easily extinguish the fire. "Once gotten, fire was carefully guarded, and many households maintained some glowing embers in the hearth. If the fire went cold, a child would be sent to a neighbor's with a pail or shovel to fill with live coals."

Once candles were lit, tending to their fragile flames proved a constant task:

Unlike the paraffin candles of modern times, tallow candles were not easy to keep lit. Not only did they soften in warm weather, but they also burned unevenly and lost their brilliance as they burned. To maintain more than a few at any one time required constant work: each would have to be snuffed — that is, the charred wick had to be trimmed — and rekindled at least every half-hour to be kept from guttering. (Guttering occurs when the melted wax channels down the side of the candle, which makes the taper burn unevenly and causes the flame to flicker.) A draft would misshape and often douse a candle. If it wasn't properly extinguished, it would give off excessive smoke and an acrid stench.

Lamps were also high-maintenance.

As for lamps, even with tallow of the highest quality, they needed frequent cleaning to work well. Tallow, being thick, had trouble climbing up the wick—often nothing more than a twisted rag in poorer households—which had to be pulled up from time to time and trimmed. If the fire was starved of fuel, it would produce a thin, smoky flame, though given too much, it would smoke as well. And it smelled gamy: "stinking tallow," Shakespeare called it.

And then there was the ever-present danger of a house fire. Indeed, "the danger of fire from an open flame never ceased. In truth, as cities grew larger, entire districts of tightly packed wooden houses were at the mercy of an overturned lamp, a stray cinder, a child careless with a candle. One eighteenth century writer noted, 'The English dwell and sleep as it were, surrounded with their funeral piles.'"

"By the late 1600s, authorities in large European and several American cities began to require householders to hang a lamp or place a candle on their street-facing windowsills for a few hours after winter sunset and during the dark of the moon." Later, streetlights emerged. "In Vienna in 1688, authorities threatened to cut off the right hand of anyone caught damaging a street lantern."

A major breakthrough occurred with the advent of candles made of spermaceti, a substance produced by the sperm whale. Benjamin Franklin praised spermaceti candles, the "new kind of Candles very convenient to read by. . . . They afford a clear white Light; may be held in the Hand, even in hot Weather, without softening. . . . They last much longer, and need little or no Snuffing. . . .

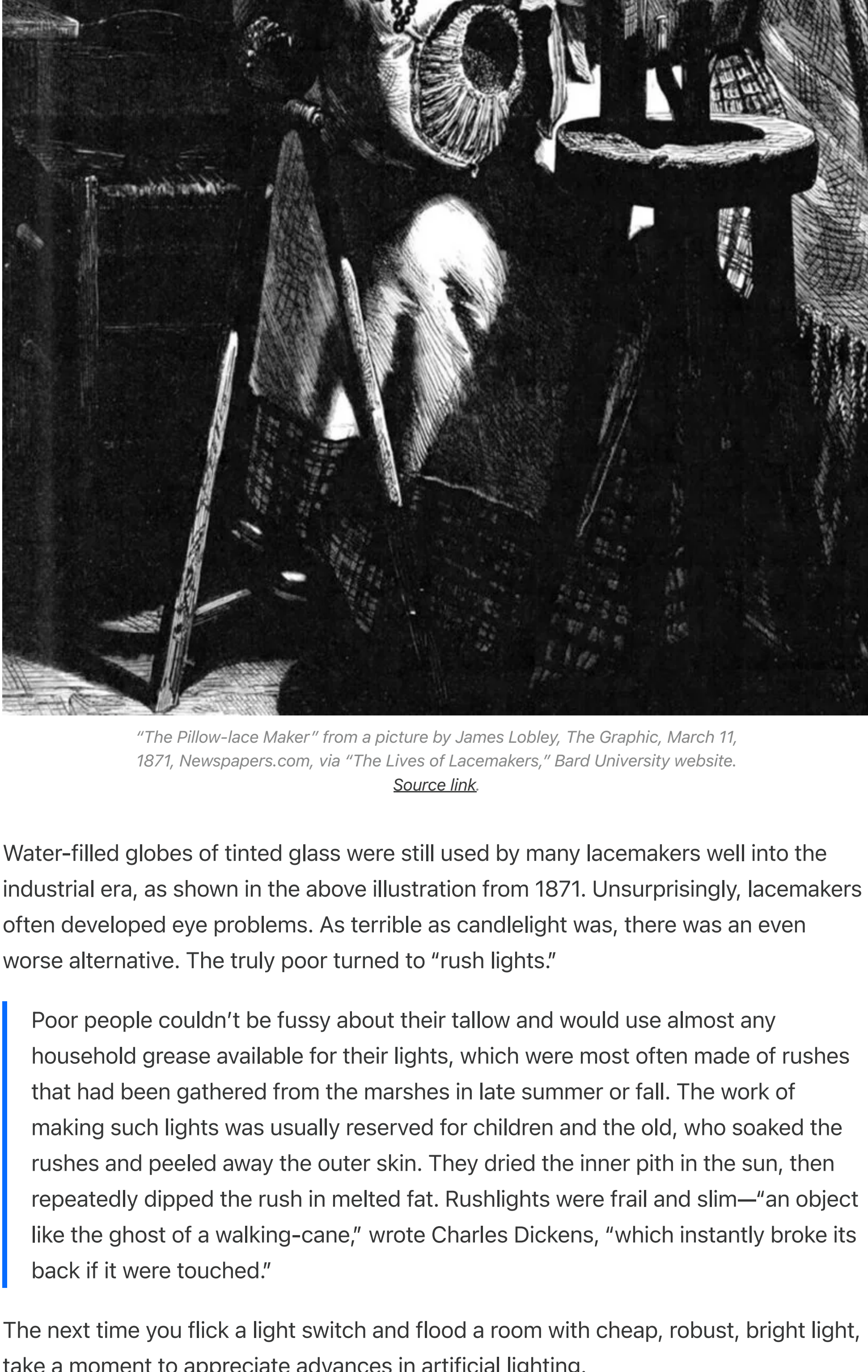
"By the mid-eighteenth century, as city streets and homes grew brighter and the demand for oil . . . continued to grow, the number of ships pursuing and capturing whales increased. During the years just before the American Revolution, more than 360 whaling vessels sailed from New England and New York alone." These ships brought back spermaceti as well as other kinds of whale oil. (The whaling trade continued well into the industrial age before being largely supplanted by kerosene, which is derived from petroleum, in the second half of the 19th century).

But oil, whether from whales or other sources, remained expensive for the average person. The Swiss inventor François-Pierre Ami Argand developed "the first significant improvement in the lamp," resulting in a brighter, more robust, and less smoky flame, and if fed by spermaceti, the so-called Argand lamp "produced about ten times the illumination of a customary lamp." The Argand lamp had a cylindrical wick and a glass chimney, which improved air flow and produced a brighter, steadier flame than a traditional oil lamp.

Brox quotes historian Davidson, who noted, "The modest versions [of the Argand lamp] that Yankee tinsmiths were advertising as early as 1789 did not win any broad popularity. Absurd as it sounds they gave too much light. That is to say, it was impracticable . . . as anything that burned more oil, proportionately, whatever its brilliance and efficiency, was uneconomical for ordinary domestic purposes."

The average person still made do with flickering tallow candles. "In a time when labor was often ceaseless during the day, the constrictions of the night could be welcome." When nocturnal labor was necessary, it was done in groups to conserve candles.

In European villages, women would gather at one cottage in the evening and position themselves around a raised lamp that had been surrounded with globes of tinted blue water. (Women in cold countries used snow water.) The color, it was said, tempered the glare. Though all kinds of snow were done by such light, this was called a lacemakers lamp . . . Women [in the outer row] facing the inky backs of their companions, glean[ed] light from the diffuse rays that fell from above or between those in front of them. It illuminated little more than their hands and work.



"The Pillow-lace Maker" from a picture by James Lobley, *The Graphic*, March 11, 1871, [Newspapers.com](#), via "The Lives of Lacemakers," [Bard University website](#).

[Source link](#)

Water-filled globes of tinted glass were still used by many lacemakers well into the industrial era, as shown in the above illustration from 1871. Unsurprisingly, lacemakers often developed eye problems. As terrible as candlelight was, there was an even worse alternative. The truly poor turned to "rush lights."

Poor people couldn't be fussy about their tallow and would use almost any household grease available for their lights, which were most often made of rushes that had been gathered from the marshes in late summer or fall. The work of making such lights was usually reserved for children and the old, who soaked the rushes and peeled away the outer skin. They dried the inner pith in the sun, then repeatedly dipped the rush in melted fat. Rushlights were frail and slim—"an object like the ghost of a walking-cane," wrote Charles Dickens, "which instantly broke its back if it were touched."

The next time you flick a light switch and flood a room with cheap, robust, bright light, take a moment to appreciate advances in artificial lighting.

[Read more about the Grim Old Days](#)

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