Engineering Romance in Late Nineteenth-Century Literature
About the Author

Rosalind Williams attended Wellesley College and received degrees from the Harvard University, the University of California at Berkeley, and the University of Massachusetts at Amherst. Since 1982 she has taught at Massachusetts Institute of Technology (MIT), and from 1995 to 2000 she served as MIT’s first Dean of Students and Undergraduate Education. In 2001 she joined MIT’s Program in Science, Technology, and Society, serving as program head from 2002–06. Her main scholarly affiliation is the Society for the History of Technology (SHOT), of which she served as president in 2005–06, and from which she received its highest award, the Leonardo da Vinci Prize, in 2013. She has been awarded honorary degrees from KTH Royal Institute of Technology in Stockholm and the Technical University of Eindhoven.

Her first three books (Dream Worlds, Notes from the Underground, Retooling) address this question: what are the implications for human life, both individual and collective, when we live in a predominantly self-constructed world? In responding to it, she has studied the emergence of consumer culture in late 19th century France; the creation of underworlds, both imagined and actual, as models of a technological environment; and the retooling of MIT as the Institute confronts the effects of an information age of which it has been a prime generator.

Her most recent book, The Triumph of Human Empire (University of Chicago Press, 2013) surveys the overarching historical event of our time: the emergence of human dominance of the planet. The book examines the works and lives of three well-known writers (Jules Verne, William Morris, and Robert Louis Stevenson) to illuminate the event of consciousness at the end of the 19th century, when humans realized that they were close to mapping the entire globe and that the global frontier was closing. Human Empire is about this still unfolding event, as grasped by three writers exceptionally successful in conveying its depth and significance.
We are pleased to present the 19th annual Dibner Library Lecture, given on November 28, 2012. The Dibner lecture series presents accomplished historians of science, whose work in some way relates to the collections of the Dibner Library of the History of Science and Technology. The Dibner Library is named for Bern Dibner, whose magnanimous donation of 10,000 of the greatest works in scientific and technological history form the nucleus of this repository. As the Bern Dibner Professor of the History of Science and Technology at the Massachusetts Institute of Technology, Rosalind Williams was the perfect choice for the 2012 lecture. Her topic, “Engineering Romance in Late Nineteenth-Century Literature” is likewise perfect: Engineering is one of the major strengths among the 35,000 rare scientific and technological works and 2,000 manuscript groups, dating from the fifteenth to the nineteenth centuries.

Dr. Williams’ educational credentials come from Wellesley, Harvard, University of California at Berkeley, and the University of Massachusetts at Amherst. Joining MIT’s Program in Writing and Humanistic Studies in 1982, she later served as MIT’s first Dean of Students and Undergraduate Education. In 2001, she joined the Program in Science, Technology and Society. She served as president of the Society for the History of Technology in 2005–06 and received its highest award, the Leonardo da Vinci Medal, in 2013. Writing in the London Telegraph, Philip Hoare called her most recent book, The Triumph of Human Empire: Verne, Morris, and Stevenson at the End of the World (University of Chicago Press, 2013), “one of the most fascinating books I’ve read this year, deftly drawing together the themes of utopian ambition, technological change and a visionary sense of escape.” That might also apply to Dr. Williams’ lecture, drawn from her work on the book.

It is a happy coincidence that Dr. Williams’ essay is published in the opening weeks of the Smithsonian Libraries’ latest exhibition in the National Museum of American History, “Fantastic Worlds: Science and Literature, 1780 to 1910,” opened July 1, 2015, and displays the imagination and creativity of authors who were inspired by 19th-century discovery and invention. Jules Verne, Mary Shelley, and L. Frank Baum are icons of this literature, but there were many others who explored the farther reaches of the new scientific landscape to craft hoaxes, satires and fictional tales.

Just so, in her essay Dr. Williams brings together “two types of human activities that apparently differed greatly — engineering and romance writing” and explores their intersection in the works of Jules Verne and Robert Louis Stevenson. “In a world that opened with railroads, telegraphs, and steamships,” she writes, “and closed with electric lights, ether and X-rays, the marvelous mingled with the everyday.” It seemed magical and stimulated writers to describe other possibilities — ships that could sail underwater or balloons (and then space ships) that could discover winged creatures on the moon. Williams’ two authors “engineer romances for a world in which engineering presents new and thrilling sources of adventure.”

World famous for its collections, The Dibner Library of the History of Science and Technology is one of twenty-one libraries that compose the network of the Smithsonian Libraries. Spread among the museums and
research centers of the Smithsonian, from Washington, D.C., to the Republic of Panama, to New York City, and to Edgewater and Suitland, Md., these libraries advance knowledge at home and around the world by making their collections and expertise accessible on site and through the Smithsonian Libraries Digital Library (library.si.edu/digital-library) and the Smithsonian Research Online website (research.si.edu).

Four generations of Bern Dibner’s family have been supporting the Dibner Library’s programs and services since the mid-1970s. The family’s contributions have guaranteed that this precious heritage will be carefully stewarded and made available for future generations. We are eternally grateful to the Dibner Family and their support of the Dibner Library Annual Lecture.

Nancy E. Gwinn
Director, Smithsonian Libraries
June 10, 2015
The title of this essay is meant to have a double and also paradoxical meaning. It proposes that engineering—usually associated today with rationality and practicality—assumed a dimension of “romance” in the nineteenth century, when engineering as a modern profession was taking shape. The title also suggests that writers of romance in that century saw themselves as engineers in the way that they went about constructing their stories. This talk is therefore about the back-and-forth mutual shaping of two types of human activities that apparently differed greatly—engineering and romance writing—at a time when both were part of the creation of a much larger human-built world.

Before going any further, I want to clarify the two key words engineering and romance, in that order.

In the nineteenth century, in that remarkable epoch between the age of steam and the age of electricity, the ancient profession of engineering was defined and redefined in multiple ways. Long tied to civil and military purposes and sponsors, new branches were emerging in response to demand for the production of goods for a capitalist marketplace. For the first time in history, too, engineering was becoming routinely and tightly connected with scientific research, as power and knowledge were methodically joined.

But there lingered an older understanding of engineering as art. “Before ‘applied science’ and ‘technology’ became key words, the concept of art was central to discourse about material culture and its connections to natural knowledge.”¹ During the nineteenth century, new modes of engineering of mass production and applied science were displacing the
longstanding connection with art, which also meant — not at all incidentally — displacing the centrality of artisanal, worker-based knowledge and skill. At a time when the word technology was new and hardly used, and when the concept of science-based engineering had not yet been named, the association of engineering with art lingered, in part for lack of new terminology.

At the same time, romance, an old term of art, was taking on important new meanings. Romance emerged in the West as a distinctive mode of literature in the twelfth century: the name of this medieval literary invention comes from the fact that the stories were written in vernacular tongues, or Romance languages, as opposed to literature accessible only to readers educated in the classical languages of Latin and Greek. The best-known medieval romance, still very much alive in a wide variety of adaptations, is the cluster of stories about King Arthur and the Knights of the Round Table.²

As the age of chivalry waned in the fifteenth century, so did romance as a vital form. During the late seventeenth and eighteenth centuries, the novel emerged as a new form, as its very name advertises. This, too, is a literary invention intended to appeal to a new type of reader, in this case bourgeois (and in particular female), for whom the novel served not only as entertainment but also as a sort of guidebook to social behavior in that material world. The novel was defined by its fidelity to social and material lifeways. Realism was the backbone of the novel as it emerged along with bourgeois society.³

But alongside realism there coexisted, as a sort of shadowy, well-liked but somewhat less respectable relative, the fiction of romance. By the nineteenth century, romance had become a catchall term for fiction writing that was not determinedly “realistic.” It had no strict definition beyond its evasion, whether gentle or pronounced, of the contemporary social and material world. This evasion could be found in the time frame in which the romance was set — usually the past, often medieval times, but also, as Sir Walter Scott indicated in the subtitle of his best-selling historical novel Waverley (1814), the recent past of “sixty years hence.” The time of romance could also be set in an imagined future (such as William Morris’s self-proclaimed “utopian romance” News from Nowhere, 1890), an imagined place (the Treasure Island of Robert Louis Stevenson, 1883, or Journey to the Center of the Earth of Jules Verne, 1864), or semi-imaginary worlds, what we would now call genre fiction (Gothic fiction, children’s stories, adventure stories, and the like).

By the late nineteenth century, realism was the ascendant mode, dominating the novel in the hands of masters such as Honoré de Balzac and Émile Zola, the latter pushing toward a grim naturalism. There were crossover writers such as Charles Dickens (or, arguably, Balzac himself), but in the nineteenth century the general distinction between realism and romance was commonly accepted.

But by that time, the visible world was being reshaped by often invisible but amazingly powerful forces — and this is where the new meaning of engineering intersected with the new definitions of romance that were proliferating. In a world that opened with railroads, telegraphs, and steamships, and closed with electric lights, ether, and X-rays, the marvelous
mingled with the everyday. Ordinary life no longer seemed “realistic” when human beings assumed powers that appeared quasi-supernatural. If realistic novels helped readers navigate bourgeois society, romance helped them navigate the quasi-magical world that bourgeois society was creating. The essence of romance “is not merely a tale of adventure or of love but a representation of forces beyond matter of fact.” It is pretuned to represent and probe a world in which forces are multiplying that cannot be understood within the framework of “matter of fact.”

The expansion, intensification, and acceleration of human powers were progressively removing from human experience “otherness, the sense of something not ourselves.” Where is “otherness” to be found in a planet dominated by human presence, so that we are constantly encountering ourselves in reified forms? When the everyday world could seem so fantastic, and everyday language so inadequate to describe it, the division between world as “fact” and literature as “fiction” no longer seemed self-evident. These insecurities fed a “new reservoir of unstructured sentiment” that flowed into romance. They also suggested that the process of engineering, in creating such a world, could serve as a model for the world-creating power of literature.

With these themes laid out, let us now turn to examine how engineering and romance intersect in two of the best-selling writers — then and ever after — of the late nineteenth century: Jules Verne, writing in French, and Robert Louis Stevenson, writing in English (both translated into many other languages, especially Verne). They have both had a reputation as writers of adventure yarns for juveniles, especially boys. However, both attracted far more serious attention beginning in the late twentieth century. There are many reasons for this resurgence in appreciation, but the one I will emphasize here is that they engineer romances for a world in which engineering presents new and thrilling sources of adventure.
Jules Verne
1828–1905

Figure 1
Portrait of Jules Verne, from an English translation of The Mysterious Island published in Boston in 1875, when Verne was 47 years old.
(Smithsonian Libraries)
Jules Verne (fig. 1) was born in 1828 in Nantes, a port on the Loire River near the Atlantic coast of France. Many years later, in 1891, after he had become a famous writer and was living in Amiens in northern France, he was asked by the editor of a Boston children’s magazine to reflect on his youthful days in Nantes. Verne responded: “I have seen the birth of phosphorus matches, fake collars, cuffs, letter paper, stamps, pants with free legs, the overcoat, the opera-hat, the ankle boot.” Here he shifts from items to systems:

The metric system, steamboats on the Loire, called “inexplosible” because they blew up a little less than the others, omnibuses, railways, tramways, gas, electricity, the telegraph, the telephone, the phonograph! I am of the generation between these two geniuses, [George] Stephenson [inventor of the steam locomotive] and [Thomas] Edison.8

Verne left Nantes in 1848 for Paris, supposedly to study for the bar in order to follow in the footsteps of his lawyer father. In explaining to his father why he decided to stay in Paris after passing his bar exams rather than return to a good living in Nantes, Verne wrote:

A fatality rivets me to Paris. I can be a good writer and would never be anything but a bad lawyer, since in all things I see only the comic side or the artistic form, without attaching myself to the precise reality of objects.9

Between then and the Paris Commune of 1871, through many years of hard work and disappointment, Verne tried to make his name in literature in the Paris of the Second Empire. For many years he focused on

Figure 2
Photographic self-portrait by Nadar (Gaspard-Félix Tournachon, 1820–1910), aloft in the basket of a balloon. (Smithsonian Libraries)
writing romantic comedies for the theater. Only one was ever staged, and to make ends meet he had to manage a theater company and to beg constantly for money from his parents.

But in Paris Verne discovered another crowd outside the theater, people interested in what we now refer to as science and technology. Of them, he was closest to a cousin, Henri Garcet, a professor at a Paris lycée who published popular textbooks in mathematics, mechanics, and astronomy. Verne also met Jacques Arago, an explorer-adventurer who had visited and written about his adventures in the American West, South Seas, and Antarctic, and his brother, François Arago, a well-known physicist and author of a popular book on astronomy. Reportedly he also came to know the flamboyant Nadar (Gaspard-Félix Tournachon), photographer and promoter of heavier-than-air flight (fig. 2). In 1861 Verne apparently joined the Circle of the Scientific Press, a science club that held weekly meetings and published pamphlets and a journal on topics ranging from electricity and magnetism to guano fertilizer to submarine telegraphy to human flight. The editor of the Circle’s review managed to survive an accident in 1850 when a balloon that he and a colleague had taken to 17,000 feet burst and fell to the ground in under five minutes.¹⁰

Verne himself started writing what we would now call science journalism: short pieces, nonfiction or lightly fictionalized, about science-related topics for popular magazines. He continued to write plays, but it seemed to him that every time he wrote a play the director changed or bowed out, or someone stole the title. The story goes that during his years in Paris, through many moves from one cheap apartment to another, Verne took with him a desk that had two drawers: one he used to store his writings about science, the other to store his plays. This tale seems too good to be true: it persists because it points to the hybrid nature of his literary invention, which would eventually merge, as it were, the contents of the two drawers. What is unquestionably true is that in his frequent moves in Paris, Verne took with him many unpublished manuscripts.¹¹

His breakthrough came when he took a story about ballooning to the well-known Parisian publisher Jules Hetzel. Hetzel turned it down but later claimed that he suggested to Verne that he try a more fictional form. Verne, then thirty-five, turned it into a yarn about three explorers who set forth in a balloon to map the heart of Africa. Published in early 1863, Five Weeks in a Balloon was the first example of Verne’s great invention, a new kind of story that he called the “geographic romance.” From this first tale, all the elements of this invention are there: the voyage as the central story line, usually a quest for some invisible point in the universe interrupted by exciting dangers; a nifty vehicle that assumes its own personality and becomes a traveling home; a small band of brothers, headed by a dispassionate captain, and usually including one chatty character to offset the captain’s dourness, as well as an indescribably loyal servant. This formula opened the way to approximately seventy novels collectively titled by Hetzel Extraordinary Voyages: Known and Unknown Worlds, published first in serial form in Hetzel’s journal for young people, and then in beautifully and lavishly illustrated year-end bound volumes ideal for the holiday market (fig. 3).¹²
The paradox of these geographical romances is that they are methodically constructed from heaps of scientific and technical information. In a newspaper interview published toward the end of his life, Verne explained, “I think that an attentive reading of the most documented works on any new subject is worth more than concrete experience, at least when it comes to writing novels.” Verne constructed — engineered — his works through grafting, collage, and assembly of scientific reports, myths, and popular tales, methodically accumulating and assembling these fragments of information about the world into a secondary world of text. Verne’s archives are reputed to include a research card index of 20,000 items, unused pieces of information not woven into his published works. In the words of one well-known literary critic, Timothy Unwin, Verne is “the inventor par excellence.” He could also be called a prophet of the information age, or an information engineer. He was acutely aware of the constructed character of his works and of his active role in building them from pieces of information produced by others (fig. 4).

Verne was so caught up in the collection and ordering of information that it sometimes comes close to overwhelming the storyline. For example, the first chapter of Five Weeks in a Balloon ends with a dinner to celebrate the expedition that its captain Samuel Ferguson has proposed to the Travellers’ Club meeting in Pall Mall. Toasts are offered to other illustrious explorers of Africa: “Among those remembered thus, were: Abbadie, Adams, Adamson, Anderson, Arnaud, Baikie, Baldwin, Barth Batouda, Beke, Beltram…” Thirteen more names starting with B follow, and so on down through the
alphabet, one hundred nineteen names in all.  

Many other times, numerical information is presented with overwhelming precision and detail. For example, in Verne’s masterpiece *Twenty Thousand Leagues under the Sea* (1869), chapter seven is titled “Some Figures.” In it, the vengeful Captain Nemo explains to Professor Pierre Aronnax — one of three captives on board the *Nautilus* — that the submarine is a cigar-shaped cylinder:

*The length of this cylinder, from stem to stern, is exactly 232 feet, and its maximum breadth is twenty-six feet.... These two dimensions enable you to obtain by a simple calculation the surface and cubic contents of the *Nautilus*. Its area measures 6,032 feet; and its contents about 1,500 cubic yards; that is to say, when completely immersed it displaces 50,000 feet of water, or weighs 1,500 tons.*

Words, numbers, names, facts — these specialized fragments of the material world are lovingly chosen and assembled in unexpected combinations, with dizzying precision. What saves his stories from the weight of information is Verne’s habit, from his years in the theater, of staging his stories. The extraordinary voyages can be read as romantic comedies featuring witty dialogue and sometimes racy innuendo on an especially imaginative set — aloft in a balloon, in underground caverns, on polar ice, on a comet, under the seas. Historian Eric Hobsbawm uses Verne’s moon novels to illustrate the confident middle decades of the nineteenth century:

*Railway lines constructed by humanity were expected to lead to destinations which the travelers might not know.*
having not yet arrived there, but about whose existence and general nature they had no real doubt. Just so, Jules Verne’s travelers to the moon had no doubt about the existence of that satellite, or about what, having got there, they would already know and what remained to be discovered by closer inspection on the ground. The twentieth century could be predicted, by extrapolation, as an improved and more splendid version of the mid-nineteenth.\textsuperscript{18}

But Verne’s pair of moon novels (\textit{From the Earth to the Moon}, 1865, and \textit{Round the Moon}, 1870) suggest that scientific assumptions about reality might not be so reliable (fig. 5). The three explorers encounter a series of miscalculations regarding their trajectory. They worry — needlessly, as it turns out — that their projectile will fall back to Earth before transporting them to the moon. When they encounter an asteroid that alters their course, they orbit the moon rather than landing on it as anticipated. They debate whether they are in a hyperbolic or parabolic trajectory, concluding that in either case they might end up lost in space forever.

Circling the moon, they encounter a series of sights they cannot explain, beginning with brilliant rays emanating from the mountain named Tycho: “What was this radiant glory? What geological phenomenon had designed these ardent beams?”\textsuperscript{19} Astronomers have hypotheses, the narrator comments, but no agreed-upon explanation. When a meteor shoots by the projectile, bursting like a bomb, it lights up the “ether of space” so that the travelers are able to glimpse for a moment the dark side of the moon. They discern some bands, apparently clouds that suggest the presence of an...
atmosphere, hints of immense seas reflecting the fires of space, and dark patches that might be forests:

Was it an illusion, a mistake, an optical illusion? Could they give a scientific assent to an observation so superficially obtained? ...The ether returned to its accustomed darkness; the stars, eclipsed for a moment, again twinkled in the firmament, and the disc, so hastily discerned, was again buried in impenetrable night.

Verne's questioning of material "reality" is especially pronounced in one of his later novels, *The Carpathian Castle* (1892, fig. 6). Unusually for Verne, it is romantic in the more conventional sense of the term, being a twisted love story about a celebrated singer whose voice and image seemed to be brought back to life by a deranged but inventive admirer. In the first words of the novel, Verne reminds his reader of the ambiguity of engineering, that it emerged in a "practical and positive age" and yet also seemed fantastically unreal:

This story is not fantastic; it is merely novelistic [romanesque]. Are we to conclude that it is not true, its unreality being granted? That would be a mistake. We live in times when everything can happen— we might almost say everything has happened. If our story does not seem to be true to-day, it may seem so to-morrow, thanks to the resources of science, which are the wealth of the future. No one would think of classing it as legendary. Besides, one does not invent legends at the close of this practical and positive nineteenth century.

When the nature of reality was being called into question by the "fairy of electricity" (to use a common
term of the time), not to mention the fact that X-rays were revealed only a few years after the publication of *The Carpathian Castle*, the line between what was known and what was unknown, between reality and fancy, was blurred and shifting. During his early years in Paris, Verne wrote to his father about his inability to attach himself "to the precise reality of objects." He worked on the edge of reality and fancy, of known and unknown, for he was convinced that scientific knowledge itself was working on this edge.
Robert Louis Stevenson
1850–1894

Figure 7
(Smithsonian American Art Museum)
Robert Louis Stevenson (fig. 7) was born a full generation after Verne (twenty-two years later, in 1850), but he died eleven years earlier, in 1894, after many years of precarious health stemming from lung disease. Louis, as his family and friends called him, was the prodigal son of a family of lighthouse engineers, beginning with his grandfather Robert Stevenson, who had undertaken responsibility for the construction of a necklace of romantically named “Northern lights” strung around the Scottish coast. The best known of them is the light on Bell Rock, completed in 1811 after four years of heroic effort amid the strong tides, crashing waves, and vicious storms of the North Sea (fig. 8). What engineering could be more romantic than the construction of lighthouses around this stern and rockbound coast?

Robert died the year Louis was born. By that time, Robert’s three sons, including Louis’s father Thomas, were overseeing what had become the family firm, which handled not just lighthouse-building but a whole range of less romantic water-related projects including river improvements and harbor works. When Louis entered the University of Edinburgh in the fall of 1867, shortly before his eighteenth birthday, it was taken for granted that he was headed for a career in engineering in the family business.

Approaching this career through university education was unusual at the time. Apprenticeship and other forms of on-the-job learning were more common, but the University of Edinburgh had begun to provide an academically based program. On the faculty was the distinguished professor of mathematics Philip Kelland, and in 1868, the year after Louis entered, Fleeming

Figure 8
Romantic image of the Bell Rock lighthouse, the world’s oldest surviving sea-washed lighthouse, constructed 1807–10 by Robert Stevenson, grandfather of the writer. (Smithsonian Libraries)
Jenkin became the first engineering professor appointed by the university. Though a young man, he was already well-known for his work on submarine cables and would later become known for his work on electricity-driven transportation.\textsuperscript{23}

As a student, Louis was often bored and occasionally disruptive. He attended classes irregularly, did little work, and noisily and rudely walked out of classes that he considered a waste of time. He adopted the pose of the bohemian artist (affecting long hair and velvet jackets), leading many fellow students to consider him an arrogant dilettante. Kelland’s class was the only one he ever attended with any regularity, though he became personally closer to Jenkin, who joined with students, including Louis, to put on amateur theatricals in his home (fig. 9).\textsuperscript{24}

At the same time, his engineering education included the more traditional forms of on-the-job training. During what passes for summer in that part of the world, Louis was posted by his father to various sites where the family firm was undertaking engineering projects. In 1868, Louis spent the last six weeks of the summer in Wick, on the north coast of Scotland, where the Stevenson firm was constructing a breakwater to improve the harbor for vessels involved in catching herring. Louis regarded Wick as “one of the meanest of man’s towns…on the baldest of God’s bays,” but because it was so far north (far beyond the reach of railway lines of the time), it had “a note of originality” that he came to appreciate. There were gypsies around, and most people spoke Gaelic.\textsuperscript{25}

At the harbor, Louis was intrigued by the railways, cranes, and engines at work on the breakwater, as well as

\begin{figure}
\centering
\includegraphics[width=\textwidth]{portrait_of_fleeming_jenkin_at_age_51.png}
\caption{Portrait of Fleeming Jenkin, at age 51, done from a photograph the year before his death in 1885. (Harvard University)}
\end{figure}
divers at work on its foundation. Eventually he convinced the men on the project to let him descend in diving gear — woolen underclothing, twenty pounds of lead on each foot, a warm cap, and a heavy helmet with a visor providing breathing air supplied by mills on the docks. After being hauled back to the surface, he was “propped upon my feet again like an intoxicated sparrow.”

In an essay written years later, “The Education of an Engineer,” Louis described how he saw the two contradictory aspects of engineering, the romantic and the deadly dull:

[Engineering] takes a man into the open air; it keeps him hanging about harbour-sides…it carries him to wild islands…it supplies him with dexterities to exercise; it makes demands upon his ingenuity;…And when it has done so, it carries him back and shuts him in an office! …With a memory full of ships, and seas, and perilous headlands, and shining pharos, he must apply his long-sighted eyes to the petty niceties of drawing, or measure his inaccurate mind with several pages of consecutive figures. He is a wise youth, to be sure, who can balance one part of genuine life against two parts of drudgery between four walls, and for the sake of the one, manfully accept the other.

Louis stuck at it for four years. When he graduated from Edinburgh, he gave a paper to the Royal Scottish Society of Arts, “On a New Form of Intermittent Light,” rated as “specially noteworthy” by the examining committee, which included Jenkin. Less than two weeks later, however, while taking an evening walk, Thomas Stevenson so insistently cross-examined his son that he finally wrung from Louis the confession that the young man was still not the least interested in engineering. Though his mother in her diary noted that her husband was “wonderfully resigned,” Thomas always regarded his son’s failure to go into engineering a bitter disappointment. Both Jules Verne and Robert Louis Stevenson were sons who disappointed their fathers and who were fond enough of their fathers to feel guilty about the pain this caused them.

The rest of Louis’s story can be summarized quickly. Slowly but surely he became a famous writer, and also slowly but surely improved relations with his parents, in part with the help of his extraordinary American wife Fanny Osbourne (fig. 10). After his father’s death, Louis and Fanny and her children left the Old World forever, eventually settling in Samoa — taking with them Louis’s mother Margaret, who wore her white widow’s cap of organdy through all their adventures in the South Seas. After Louis died there in 1894, Margaret returned to Edinburgh until her own death a few years later.

Through all this, Stevenson continued to think about the romance of engineering. Upon Jenkin’s untimely death in June 1885, his friends and family wished to publish some of his papers and asked Stevenson to write an introduction. Although this assignment promised neither critical attention nor significant income, Stevenson undertook it out of devotion to his former teacher, beginning work only a month after Jenkin died. Stevenson’s Memoir of Fleeming Jenkin is the only full-length biography he ever wrote, and he found it a chore: “I do not believe I would accept a similar task again,” he wrote. Nevertheless he was glad he had done it: “I do seem to see him clear and whole. I need not tell you,
the more I have gained this view, the better I love him.”

This assignment gave Stevenson much opportunity to describe the romance of engineering, as Jenkin experienced it in a series of “telegraph voyages” he made from 1858 to 1873. It was a critical time in the early history of submarine telegraphy. Efforts to communicate across — or rather, under — the waters of the world had begun in the 1840s, when Samuel Morse succeeded in transmitting a telegraph message across New York harbor through copper wire insulated by hemp soaked in tar and pitch beneath a layer of rubber. In 1855, during the Crimean War, a temporary link was laid across the Black Sea for military use. By 1856, submarine cables were regularly operating across the English Channel, as well as between Corsica and Italy. The great challenge was to lay a transatlantic cable. Attempts were made in 1857 and 1858, but they were unsuccessful.

In describing this epoch, I have relied upon Bern Dibner’s classic and delightful study *The Atlantic Cable* (1959), which so well sets forth the excitement of this moment in the history of submarine telegraphy. In this study, Dibner captures not only the obvious outward romance of the enterprise — massive vessels, crashing seas, daring rescues, heroic endurance — but also the less obvious and even more important romance of the larger mission. Dibner has often been called a Renaissance man, but he could just as well be called a romantic engineer (fig. 11). He was fascinated not only by the relationship between engineering and the fine arts, but also by engineering itself as a practical art. He saw science as intellectual adventure and engineering as practical adventure. His understanding of the latter is inherent in
his books about raising obelisks and laying transatlantic telegraph cables. They represent his special talent in demonstrating to himself and to others that engineering is not just about electrical connectors, fittings, and tools; it is a much bigger story of the expansion of human powers that reorders our habitat and transforms consciousness.

In the same spirit, Stevenson wrote about the engineering work of his dear friend and teacher Jenkin. His first telegraph voyage, in 1858, was tasked with the mission of retrieving two broken cables between Sardinia and Algeria. To narrate this adventure, Stevenson used as primary sources Jenkin’s diary and letters he wrote to his fiancée Anne, later his wife, addressing her as his “dear engineering pupil.” Incidents and accidents began almost as soon as the cable-grappling vessel cleared the estuary of the River Mersey and ran into a gale. Jenkin was so seasick that, he wrote his fiancée, “in spite of all my efforts to talk, to eat, and to grin, I soon collapsed into imbecility.”

Once in the Mediterranean, the cruise offered an unexpected range of human interest and social education. In various ports Jenkin encountered French troopers, turbaned Arabs, herdsmen, and a village priest. On board, the crew was constantly scrambling to grapple loose cable ends. In the midst of repeated resplicing, Jenkin enjoyed moments of aesthetic pleasure. In a letter to Anne, he wrote:

*Yesterday the cable was often a lovely sight, coming out of the water one large incrustation of delicate, net-like corals and long, white curling shells. No portion of the dirty*

Figure 11
Facsimile of the portrait of Bern Dibner by Lucerne Robert, 1959.
(Smithsonian Libraries)
black wires was visible; instead we had a garland of soft pink with little scarlet sprays and white enamel intermixed.  

In his biography, Stevenson also excerpted Jenkin’s letters from two other cruises, but more briefly, noting that “it is possible to have too much even of submarine telegraphy and the romance of engineering.” The biography as a whole emphasizes the adventurous side of engineering, not its scientific and technical side. This bias has been a source of dismay for Jenkin’s colleagues and other biographers and historians who feel that the work unintentionally does a disservice to its subject, who merits more recognition as an engineering scientist. No one questions, however, Stevenson’s success in showing Jenkin’s “life’s work” of engineering as providing “the whole web of human experience, nature, adventure, science, toil and rest, society and solitude.”

In this same time period, the early and mid-1880s, Louis was writing a series of essays that reflected on the analogies between engineering and writing as ways of making meaning of the world. They were part of a lively literary debate at the time between advocates of realism and those of romanticism. The debate had been sharpened by an essay by the American expatriate Henry James titled “The Art of Fiction” (1884), in which James asserted that art can successfully “compete with life.” In his essay published in the same year, “A Humble Remonstrance,” Stevenson responded to James:

To “compete with life,” whose sun we cannot look upon, whose passions and diseases waste and slay us — to compete with the flavor of wine, the beauty of the dawn, the scorching of fire, the bitterness of death and separation — here is, indeed, a projected escalade of heaven,... No art is true in this sense.

Instead of competing with life, Stevenson argued, art and science both use powerful abstracting tools to get a grip on it, by simplifying its complexities. To make his case, he proposed analogies from mathematics:

Man’s one method, whether he reasons or creates, is to half-shut his eyes against the dazzle and confusion of reality. The arts, like arithmetic and geometry, turn away their eyes from the gross, coloured and mobile nature at our feet, and regard instead a certain figmentary abstraction.... A proposition of geometry does not compete with life; and a proposition of geometry is a fair and luminous parallel for a work of art. Both are reasonable, both untrue to the crude fact; both inhere in nature, neither represents it.

At Edinburgh, engineering students learned to use mathematics to analyze a problem and to calculate solutions. With mathematical tools, they extracted salient information from the messy complexity of the world and selected appropriate simplifying abstractions to bring to bear on this information. Both the engineer and the writer, Stevenson argued, are artists in that they bring the simplifying power of symbolic representation to clarify the otherwise bewildering complexities of the world. Whether the design is for a breakwater or a story, it requires the ability to command the power of symbolic expression to understand and represent the rich disorder of the world. From his education as an engineer, Louis
had become convinced that the essence of engineering was not material realism, but the ability to use intellectual tools — numbers and words — to get a grip on human experience. In this sense, romance provided what he called a "higher realism."

This debate was a highly civilized one. James and Stevenson became the best of friends, and James was nearly alone among men of letters who fully accepted Stevenson’s decision to marry Fanny Osbourne and later to move to Samoa. It was after Stevenson settled permanently in Samoa that he composed his most thoughtful and most extended reflections on engineering in the book *Records of a Family of Engineers* (1912). Its core is the journal kept by his grandfather Robert during his supervision of the construction of the Bell Rock lighthouse. The grandson wrote an introduction to the journal, substantially edited and condensed it, and added several chapters of biographical and contextual background interwoven with general observations on engineering.41

In his introduction, Louis noted that others had called his grandfather’s journal “The Romance of Stone and Lime.” His grandfather’s calling required “adventure on horseback...through unfrequented wildernesses”; confrontations with wreckers; and always “the vicissitudes of outdoor life,” which gave him “joy...as strong as the love of woman.”42 He reminded his reader that his grandfather was “first of all and last of all, an engineer,” and that to be an engineer means above all to get the thing done: road, tower, breakwater, dock. To do this, the engineer works with hours, minutes, cost, pressures — everything that can be “measured, weighed, and numbered.” In collecting and connecting numbers, the “world’s huge chain of processes was brought down to figures and placed at the service of the engineer.”43

But, Louis continued, there is always a limit to quantification. Solving problems also requires imagination. In particular, the civil engineer needs more than calculations to deal with “the complexity and the fitfulness of nature.... He has to deal with the unpredictable, with those forces...that are subject to no calculation.” He has to imagine how his project will interact with tide, rain, waves. If he visits a river, he must not only understand its current at the time, but must also predict the results of occasional great floods: “He must not only consider that which is, but that which may be”:

*It is plain there is here but a restricted use for formulas. In this sort of practice, the engineer has need of some transcendental sense.... The rules must be everywhere indeed; but they must everywhere be modified by this transcendental coefficient, everywhere bent to the impression of the trained eye and the feelings of the engineer.*44

Truth is not to be found in the deceptive realm of sense impressions. With mathematical and scientific understanding, as it was rapidly developing in the nineteenth century, the engineer had tools that allowed him to see through deceptive appearances, to extract from them the geometric and mathematical relationships that allow him to create durable breakwaters and bright lights. Appealing to the “transcendental sense” suggests idealism and even divinity. It also alludes to the mathematics of transcendental numbers, which combine
“real” and “imaginary” ones; they were known at the time Stevenson studied mathematics with Kelland.  

Stevenson concluded his long introduction to Records of a Family of Engineers by noting with sorrow that the art of engineering is difficult to communicate in words, and that both his father and his grandfather were unable to find words to express it. As an example, he cited his grandfather’s “Travelling Diary,” which Robert Stevenson kept all his life, jotting down daily events and various useful and curious items. The journal is full of “repeated and heroic descriptions of reefs,” but just because Robert Stevenson was so engaged in the material world, he entirely overlooked the larger narrative of heroic engineering in his lifetime:  

He came to engineering while yet it was in the egg and without a library, and...he saw the bounds of that profession widen daily. He saw iron ships, steamers, and the locomotive engine, introduced. He lived to travel from Glasgow to Edinburgh in the inside of a forenoon, and to remember that he himself had 'often been twelve hours upon the journey, and his grandfather...two days'? The profession was still but in its second generation, and had already broken down the barriers of time and space. Who should set a limit to its future encroachments?  

Robert Stevenson lived through the birth of modern engineering: its transformation from apprentice-based craft to academic-based profession, the development of its capacity to alter experiences of time and space, its new ambitions to reshape the world. But he failed to apprehend all this because his imagination was limited.  

A diligent writer, he counseled other engineers — most of all his sons — to keep an encyclopedic diary as he had, “with a kind of sanguine pedantry,” but he missed the bigger picture. He succumbed to the temptation of the realist, which is “steadily to communicate matter which is not worth learning.” By being too much of a realist, Robert Stevenson did not understand the new realities of engineering.
We began with the paradoxical and ambiguous phrase “engineering romance.” We now end by returning to it, not just as a turn of phrase, but as one that points to the evolution of engineering as it emerged as a modern profession in the nineteenth century. It is not hard to make the case that particular feats of engineering at that time — balloon flights, lighthouse construction, submarine cable laying — for all their practical and commercial ends, had a strong element of romance in the process of accomplishing the project and also, in many cases, in giving the result an aesthetic appeal (fig. 12).

It is also not hard to make the case that the whole enterprise of engineering, as it emerged in the nineteenth century, conveys the higher romance of grand forces at work, summarized in the sublime concept of Progress. This was the generation between the two geniuses of Stephenson and Edison, to use Verne’s expression, or, to use Stevenson’s, the second generation of engineering, which broke down bounds of time and space that before had always constrained human ambitions. It was Louis, the third generation, who by “half-shut[ting] his eyes against the dazzle and confusion of reality,” understood just how astounding were those accomplishments. It was Verne, unable to look at reality straight on, “since in all things [he sees] only the comic side or the artistic form, without attaching [himself] to the precise reality of objects,” who more than any artist of his time saw clearly what the whole enterprise meant. If there is a lesson here, it is that engineering is far too important to be left to realists, for engineering romance is necessary to probe its essence.

But the insight of these writers of romance into
engineering is deeper than their celebration of it. Verne and Stevenson both wondered where it was all leading. They wondered where, and how, it would end, and their intuition about this was at best troubled. Both, especially as they grew older, worried more and more about the triumphal material progress of their time, which would later often be called technology. They sensed that something was emerging that was a sort of fictive superself of humankind, a semi-autonomous, swaggering projection of mastery not just of the nonhuman world but also of other human worlds, of past and present, organized around different values.

Romance does not necessarily have a happy ending. It can be frivolous and cheery, but just as often it leads to dark and tragic conclusions. Verne was always more prone than Stevenson to celebrating this technological and human mastery, but even he had grave doubts, which grew more grave over time, about where all this material progress was headed. One of the last of his books was titled The Lighthouse at the End of the World (1905), and it is the only one of his extraordinary voyages without a voyage: it is the story of cops and robbers confined to one island at the end of the world, in Magellania, at the southernmost tip of South America, ending in death for the robbers and a lonely retreat for the cops. The image of the lighthouse is meant to be one of human reason, but in the context of the story it represents an image of the bleak end of the world.

As for Stevenson, he made a move to the end of the world not just in imagination, but in reality: at least this is how his literary circle (again, with the crucial exception of Henry James) saw his decision to spend the
rest of his life in Samoa, where he is now buried (fig. 13). But Stevenson saw Western militarism and commerce—what he called “our shabby civilization”—washing over Polynesian civilization like a death-dealing tide. The first sentence of his best story about this, “The Ebb-Tide” (1894), begins: “Throughout the island world of the Pacific, scattered men of many European races and from almost every grade of society carry activity and disseminate disease.” 

He made the decision to bear witness to a human world that was inevitably, rapidly dying and made this witness the subject of his last works.

Verne and Stevenson both loved what we now call science and technology and celebrated their awesome and romantic achievements. They also refused to follow their family’s wishes to become a lawyer or an engineer, instead becoming writers dedicated to understanding their world, which they did through seeking the higher realism of romance. The highest truth conveyed by romance is that human beings carry a fictional view of themselves, of ourselves, which in some ways is the most real—enduring and significant—part of any individual. The work of romance expresses this higher realism to which Verne and Stevenson pledged their art.

Because they understood this, they understood that the triumph of material progress would not necessarily be limited to the externals of human life. They wondered how the advancing edge of science and technology might transform the inner life of an individual. Over and over again, Verne described captains of industry or of exploration whose inner selves had been turned into mechanisms, useful for completing missions but not for making human connections. In The Carpathian Castle, a crazed inventor creates an electronic replica of a living woman, trying to satisfy his damaged soul with a false image of her life and love. In similar tones, Stevenson created an unforgettable story of biotechnology being used by Dr. Jekyll to expand his fictional life, which leads to disaster when Mr. Hyde gets out of hand.

Stevenson's works, like those of Verne, suffered in critical estimation in the early twentieth century, but in the latter part of the century, critical judgment has been turned upside down. From the vantage point of the early twenty-first century, these works seem to be forerunners of our own cultural world, which is saturated by romance: sci-fi, young adult fiction, Tolkien-esque fantasy, Harry Potter, dragons, werewolves, genre fictions of all kinds, as they converge and multiply and add prequels and sequels and mate in texts, movies, TV shows, games, and Internet offerings. These multiple worlds of imagination are now so dominant that the notions of engineering romance, and of romantic engineering, seem not so much paradoxical as prophetic.
This lecture was prepared specifically for the Dibner Library Lecture delivered on November 28, 2012. It includes passages and paraphrases from my book *The Triumph of Human Empire: Verne, Morris, and Stevenson at the End of the World* (University of Chicago Press, 2013).


4 I am alluding here to Nathaniel Hawthorne’s preface to his novel *The House of Seven Gables*, in which he writes that a work of romance should not lather on supernatural effects but “mingle the marvelous rather as a slight, delicate, and evanescent flavor.” Preface to Nathaniel Hawthorne, *The House of*


15 In this respect, Verne is similar to Charles Baudelaire — also resident in Paris during most of the Second Empire, and also publishing with Hetzel. Verne and Baudelaire both understood their art as a construction site built from fragments of modern life in Paris; Verne’s fragments were informational, while Baudelaire’s were often visual. See Rosalind Williams, “Second Empire, Second Nature, Secondary World: Verne and Baudelaire in the Capital of the Nineteenth Century,” in Urban Assemblages: How Actor-Network Theory Changes Urban Studies, eds. Thomas Bender and Ignacio Farias (New York: Routledge, 2009).


17 Jules Verne, Twenty Thousand Leagues under the Sea, in Seven Novels, 549.


19 Jules Verne, Round the Moon, in Seven Novels, 478.

20 Ibid., 472.

21 Jules Verne, The Castle of the Carpathians (New York: Merriam, n.d.), 1. I have corrected the translation of romanesque, which in this anonymous translation is given as “romantic.”


26 Ibid.

27 Ibid., 256.


29 Stevenson, Author's Note, Memoir of Fleeming Jenkin, in The Works, 6: 287.


32 Cookson and Hempstead, A Victorian Scientist and Engineer, 38; Stevenson, Memoir of Fleeming Jenkin (from Jenkin letter of April 18, 1858), in The Works, 6: 358.

33 Stevenson, Memoir of Fleeming Jenkin, in The Works, 6: 357.

34 Ibid. (from Jenkin letter of May 25, 1858), 361.

35 Ibid. (from Jenkin letter of June 22, 1858), 374–75.


37 Stevenson, Memoir of Fleeming Jenkin, in The Works, 6: 378, 357.

40 Ibid., 135, 136.
42 Ibid., 273.
43 Ibid., 309–10.
44 Ibid., 311.
45 Ibid.
46 Ibid., 313.
48 Stevenson, “The Ebb-Tide,” in *South Sea Tales*, 123.
Engineering Romance in Late Nineteenth-Century Literature

by Rosalind Williams

Dibner Library Lecture