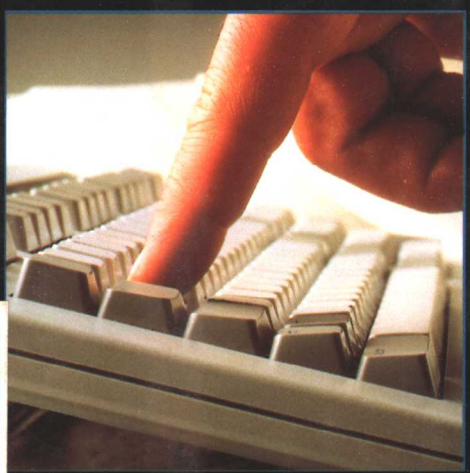
PREDICTING THE FUTURE

FROM JULES VERNE



TO BILL GATES

JOHN MALONE

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From Jules Verne to Bill Gates

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This book is dedicated to
Vincent and Ellen McLaughlin,
who made it possible

INTRODUCTION

Attempts to predict the future, to anticipate the unknown, are as old as humankind. The most ancient forms of prediction were religious in their import, prophecies of salvation or damnation and intimations of our spiritual fate, both in this life and in terms of some kind of afterlife. In the nineteenth century, with the start of the Industrial Age, a new kind of prediction came into being, as both scientists and writers of fiction began to imagine future technological innovations, extrapolating from what was already known. Scientists were primarily concerned with expanding human knowledge and gaining greater control over the world we live in, while fiction writers (and social visionaries) often focused on what affect new inventions would have on our everyday lives and the shape of society as a whole. The scientists were apostles of progress, but the writers were split into two camps, one envisioning the possibility of improving humankind and developing a more perfect world, while the other warned of the dire consequences of science run amok.

Arthur C. Clarke, who is both a scientist and a science-fiction writer, several of whose predictions are included in this book, has said that when an "expert" strays out of his or her own field to make a prediction, it is usually to state that something is impossible and the prediction is almost always wrong. You will find numerous examples here that validate his point. But it is also true that the experts can be astonishingly myopic even within their own area of expertise, which leads to truly embarrassing miscalls. We tend to

be much harder on scientists who get it wrong than we do on imaginative writers who get carried away with their visions of the future. Jules Verne is celebrated for his many remarkable bull's-eyes and forgiven all the arrows that missed the target completely—after all, he was just telling a story. On the other hand, there is the great physicist Albert Michelson, who made the mistake of announcing in 1903 that all the fundamental physical laws had been discovered—just two years before Albert Einstein turned everything upside down. The fact that Michelson was subsequently awarded the Nobel Prize in Physics for work he had done earlier has not prevented physicists from laughing at his misguided certainty ever since.

Predicting the future is a perilous business. While a prediction that proves correct may considerably enhance your fame, your reputation can be forever clouded by a bad enough mistake. There are also those, several of whom you will meet in this book, who are best remembered for having got it dreadfully wrong—indeed, some poor souls are remembered *only* for that reason. The majority of the predictions in this book were made by scientists, but some of the most amazing were made by writers of fiction, who could of course indulge in reckless forecasts with greater impunity. Scientific and technological predictions are the book's central focus, but many other kinds of predictions are also included. You will find economic, political, and cultural predictions—most of them wrong, not only because the mistakes are more fun to read about, but also because nonscientific predictions tend to be more difficult to make and more often a matter of simple prejudice of one kind or another. And, of course, there are some predictions of the end of the world or of "civilization as we know it."

There are also some predictions in this book that focus not on future technological or social developments, but deal instead with the possibility of eventually proving theories

about the past. That includes speculations about how the universe was formed and how it evolved; when astronomers peer beyond our own solar system they are in fact looking into the past, and the greater number of light years away another star system is, the further into the past they are gazing. Thus the prediction that black holes must exist could only be confirmed by future efforts to pinpoint them in the vast reaches of space where they were formed millions of years ago. But even on the Earth itself, answers to the mysteries of our own planetary history have often lain in the future—and many still do. Theories concerning such matters as the existence of a single huge land mass from which the known continents broke off, or that the extinction of the dinosaurs was the result of the impact of an enormous asteroid or comet, were initially met with skepticism. Yet in the years that followed, evidence was eventually uncovered to prove both theories correct. Although these theories concerned past events, their corroboration lay in the future, making them in that sense predictions that came true.

Given the nature of predicting the future, there are a lot of fancies in this book, but there are also a great many facts. Looking back over 140 years of predictions, we can see the history of the twentieth century unfolding, sometimes along expected lines but more often in ways that were wondrous, even jolting. What has happened since a young Jules Verne began predicting the shape of the twentieth century can give us at least some perspective on the twenty-first century that Bill Gates, and others like him, are now leading us into.

PREDICTING THE FUTURE

1858 Impossibility of building the Suez Canal

Benjamin Disraeli

In 1858, The British Chancellor of the Exchequer, Benjamin Disraeli, rose in Parliament to attack the idea of British investment in the building of the Suez Canal. Disraeli was one of the greatest figures of nineteenth-century England, not only as a politician who would become Queen Victoria's favorite prime minister, but also as a successful novelist and intellectual leader. The construction of the Suez Canal was just getting under way in 1858, and Disraeli was echoing a widely-held view when he told Parliament that the effort was "a most futile attempt and totally impossible of being carried out." Part of his disdain, however, was no doubt due to the fact that the construction of the canal was being carried out by a company chartered by the French government. (A century later, many politicians would have the same reaction to the idea of constructing the "Chunnel" connecting France and England beneath the English Channel.)

The Suez Canal was to provide a direct route between the Mediterranean Sea and the Indian Ocean, thus making it unnecessary for ships to follow the lengthy route down the west coast of Africa, around the Cape of Good Hope, and north again along Africa's east coast. Given England's vast imperial holdings in India, the canal really should have been an English idea, but here were the French trying to pull it off. It should be said, however, that the construction of the one-hundred-mile waterway from Port Said on the Mediterranean to the Gulf of Suez,

despite making use of three lakes that lay along the route, was the most daunting engineering project yet undertaken in modern times. Many compared the effort to the building of the Egyptian pyramids two thousand years earlier, a feat that no one in the nineteenth century had really managed to explain, although it must have involved hundreds of thousands of slaves. Workers would actually be paid to build the Suez Canal, and the engineering problems hardly seemed less mind-boggling than the construction of the pyramids themselves.

In contrast to Disraeli's scorn, the building of the Suez Canal served as an inspiration to a young Frenchman by the name of Jules Verne. When the canal was begun, he was trying to make his mark as a playwright, without any great success. But then he turned to writing novels of adventure and speculation, achieving fame with his very first effort in this genre, *Five Weeks in a Balloon*, which was published in 1863. His second effort, *Paris in the Twentieth Century*, was turned down by his publisher as too fantastic. One of the elements of the story that bothered Pierre-Jules Hetzel, who also edited Balzac and Hugo, was that Verne had imagined twentieth-century Paris as a great port, the river Seine having been dredged to accommodate ocean-going vessels. If they could build a canal across the sands of Suez, Verne reasoned, why not bring ships to Paris!

The Suez Canal, ridiculed by Disraeli but a spark for Verne's imagination, was finally completed in 1869. The original canal was only 26 feet deep, with a bottom width of 72 feet and a surface width of 190 feet. But it would become a vital element in England's dominion over India during the next eighty years.

1863 Fax machines

Jules Verne

When editor Pierre-Jules Hetzel rejected Jules Verne's second novel, *Paris in the Twentieth Century*, he wrote, "No one today will believe your prophecy." The manuscript was found in 1989 in a safe thought to be empty, published in France in 1994 and in English translation, by Richard Howard, in 1996. It turned out to contain more astonishing predictions than any other work of Verne's. Horseless carriages run by gasoline engines based on Ferdinand Lenoir's 1859 invention, automated trains, electric lights making day of night—the forecasts are remarkable. And while Paris has not been transformed into the inland port Verne imagined, he also envisioned a five-hundred foot lighthouse standing at the head of the port, and placed it only yards from the exact spot where the Eiffel Tower was eventually erected.

Perhaps most astonishing of all, however, his Paris of 1960 had something we didn't get until a decade later: the fax machine. "Further," Verne writes, "photographic telegraphy, invented during the last century by Professor Giovanni Caselli of Florence, permitted transmission of the facsimile of any form of writing or illustration, whether manuscript or print, and letters of credit or contracts could now be signed at a distance of five thousand leagues."

How did Verne do it? By paying attention to everything that was going on around him in a world of explosive developments in technology, and then combining and extrapolating those inventions in new ways. The new technologies of photography and telegraphy already existed,

so why not eventually pictures sent by wire? Today we have come to expect extraordinary technological developments to appear as a matter of course; we get annoyed when something like high-definition television takes longer to perfect than originally predicted. But in the nineteenth century, people were as often dazed as dazzled by the "newfangled gadgets" that kept popping up. The nervousness that many older people today feel about computer technology was evident across a much broader range of fields. From the mid-nineteenth to the mid-twentieth century there was always a tendency, even among experts, to cast doubt on the possibilities the future might hold. The atomic bomb, the landing on the moon, and the miniaturization of computer technology have knocked a good deal of the skepticism out of us. These days, the predictions that are most likely to get us to say, "Never in a million years," are sociological rather than technological. But in Verne's time, people were so busy trying to adjust to the changes that were taking place that they resisted many ideas about the future. Verne had no such problem, but the rejection of the manuscript of *Paris in the Twentieth Century* taught him a lesson. Instead of peering far into the future, he set his subsequent novels in a very recognizable nineteenth-century world. Rockets to the moon, yes, submarines, yes, but placed in the context of a world everyone already knew, where they could be accepted as fantasy rather than as visions of a coming reality.

Manned travel to the moon and back

Jules Verne

Jules Verne's *From the Earth to the Moon*, published in France as the American Civil War was drawing to a close in 1865, postulates a trip to the moon in the near future. It is led by one Impey Barbicane, president of the Gun Club, a society of artillery inventors supposedly founded in Baltimore, Maryland, to aid the Yankee cause against the Confederate states. Verne assumes a Union victory in the Civil War, which leaves the members of the Gun Club without a focus for the creation of their gigantic cannons. Barbicane thus proposes making a manned trip to the moon in a craft fired from a nine-hundred foot gun.

This was a wildly fantastic idea in 1865, but Verne was astonishingly correct in his predictions about a great many aspects of such a project, as the American space program would prove a century later. He foresaw the use of aluminum, because of its light weight, in building a moon vessel, although in his time the metal could be produced only by methods that were prohibitively expensive. The use of animals in the preliminary testing of the effects of weightlessness was employed in the novel, with Verne showing his sense of humor by having the test mouse devoured by the test cat in the course of the flight. The escape velocity calculated by Verne—12,000 yards per second—was correct, as was the flight time of 97 hours from the earth to the moon. The use of rockets to propel and steer the ship in space would become fact. Verne also placed his launch

site on the Atlantic coast of Florida, only 134 miles from the eventual location of Cape Canaveral; moreover, his technical reasons for the choice of that location were the same ones NASA, which had originally wanted to blast off from Houston, eventually took into account.

Of course, the actual Apollo program used rockets for lift-off as well as for power in space. Yet by the 1990s, NASA had an equivalent of Verne's Space Gun on the drawing boards, with testing already under way, for use in the twenty-first century. Such a launching device, already nicknamed the "Verne Gun" by engineers, would cost a fraction of rocket blastoffs per flight. Thus Verne was in this regard even more prescient than it originally seemed when the first NASA flights began.

At the end of *From the Earth to the Moon*, the three intrepid explorers (Verne was also right about the number of crewmen), Impey Barbicane, Marcel Ardan, and Captain Nichols, are believed to have been trapped in an orbit around the moon. But Verne's sequel, *Round the Moon*, first serialized in 1869, brings the crew back to earth, with a splashdown in the Pacific Ocean. Here, Verne's foresight is almost uncanny. In 1969, after his voyage to the moon and back on Apollo 9, astronaut Frank Boorman wrote a letter to Verne's grandson, noting that his own capsule "splashed down in the Pacific a mere two and a half miles from the point mentioned in the novel."

1866 Maximum age of the sun 150 million years

Lord Kelvin

Lord Kelvin, born William Thompson, was one of the most respected and honored scientists of the nineteenth century. His scale of absolute temperatures, called the Kelvin scale, is a fundamental tool of science to this day. Using that scale, he subsequently calculated the age of the sun as 150 million years at most. This was a devastating blow to Charles Darwin, whose epochal *Origin of Species* was published in 1859. Darwin's theory of evolution depended on a time span of billions, not millions, of years to work. Fortunately for Darwin, other fields, particularly those of geology and paleontology, seemed to support his ideas, and pointed toward a time scale far grander than that suggested by Kelvin's calculations. What's more, Kelvin had added a parenthetical caveat to his findings: "I do not say there may not be laws which we have not discovered." Despite the ungainly triple negative in this sentence, it gave him a measure of protection that would prove invaluable nearly forty years later.

In 1901, Ernest Rutherford and Frederick Soddy discovered the nature of radioactive elements. These generate much more heat than their size would suggest was possible, some giving off heat for billions of years. This discovery not only validated Darwin, but showed that Lord Kelvin's estimation of the age of the sun was absurdly small. Imagine the horror, then, that Ernest Rutherford felt when he rose to deliver the first important paper on what he and Soddy had discovered in 1903. As Timothy

Ferris reports in *Coming of Age in the Milky Way*, Rutherford was appalled to see the now very elderly Lord Kelvin sitting at the back of the hall where Rutherford was speaking at the Royal Institution.

"To my relief," Rutherford wrote, "Kelvin fell fast asleep, but as I came to the important point, I saw the old boy sit up, open an eye and cast a baleful glance at me!"

At this point, the quick-witted Rutherford recalled Lord Kelvin's famous caveat. "Then a sudden inspiration came, and I said Lord Kelvin had limited the age of the earth, providing no new source (of energy) was discovered. That prophetic utterance refers to what we are now considering tonight, radium! Behold! the old boy beamed upon me!" Thus was a parenthetical hedge by one great scientist accorded the distinction of a splendid prediction by another, the second making a hedge of his own.

1868 Dreams of flying are fraudulent

London Daily Telegraph

The dream of men one day being able to fly went back to the ancient Greeks, but in the second half of the nineteenth century, making that dream a reality had become an obsession among many inventors. Such men were constantly carrying out experiments, announcing modest successes, and generally getting themselves into the newspapers on a regular basis. All this attention annoyed the editors of the *London Daily Telegraph* to the point that they announced their vexation in print: "Flying philosophers may be compared to . . . the proprietors

of donkeys which are announced to ascend a ladder. The donkey never really goes up, and the philosopher has not yet flown."

Although the Wright brothers would not get off the ground for more than thirty years, the *Daily Telegraph* was ignoring a great deal of progress in the previous fifteen years. In 1853, Sir George Cayley, who laid the foundations for many principles of aerodynamics, built his third full-size glider—a tri-plane—put his coachman aboard as a passenger, and launched the plane on a trip from a hillside across a Yorkshire valley. The coachman had no controls—he was not a pilot in the true sense—but the result was still the first manned flight in history. On a smaller scale, another breakthrough was made in 1858 by a French naval officer named Felix Du Temple. He built a model airplane, designed a clockwork mechanism for it, and achieved the first successful flight of any kind using a powered device. In 1859 another crucial invention came when Ferdinand Lenoir designed the first gas engine. And in 1865, seventy years ahead of its time, Charles de Louvrier patented the first jet-airplane design.

Thus, even as the *Daily Telegraph* scoffed, many crucial elements of manned flight were already in place, waiting for future philosophers to get the donkey up the ladder.