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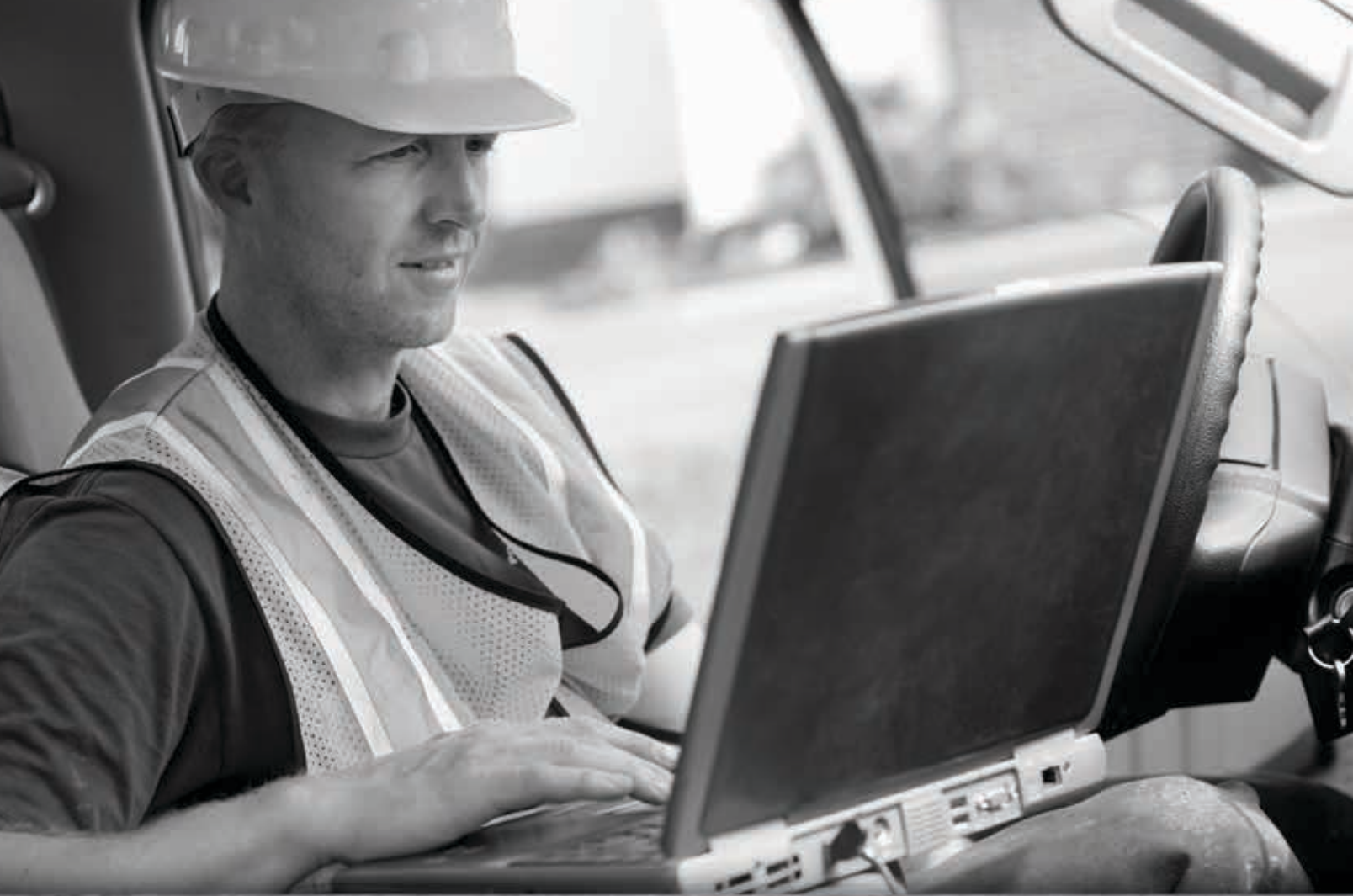
## THE PANAMA CANAL: FEAT OF ENGINEERING

An ambitious expansion will double the cargo-carrying capacity of the canal, which famously unites the Atlantic and Pacific oceans

**SUMMER 2014**  
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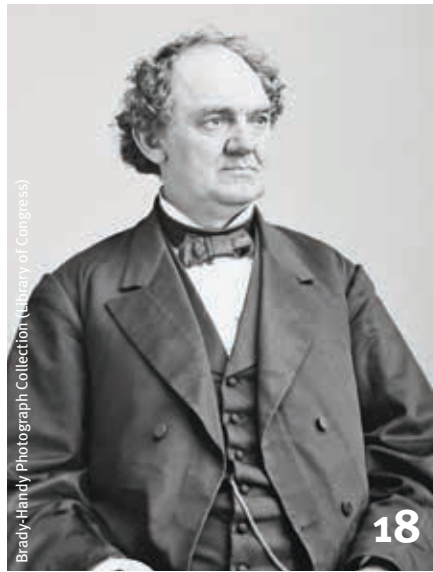
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## A FEAT TO ADMIRE

**This issue's cover story**, "The Panama Canal: Feat of Engineering," brought back vivid memories of my time as an Army second lieutenant stationed at Fort Davis in the Canal Zone. I spent about 10 months testing tank weapons and ammunition in tropical conditions.

The Army needed wet and humid conditions for the tests and Panama proved the perfect environment. During the wet season, from May through November, rainfall averaged 8 to 18 inches per month. We soon learned that issued rain gear was useless: When the torrential rains came they soaked right through our ponchos. Fortunately for us, the heavy rain would only last for short periods, several times a day; each downpour was followed by beautiful weather until the next storm.

The weather's uncertainty made planning and testing difficult, but that was nothing compared to what builders of the original Panama Canal must have encountered for days, weeks and years on end. Moving tons of dirt (enough to create a 16-foot tunnel to the center of the Earth, as our article reports) seems an almost impossible task in the face of so much water. What's more, my fellow servicemen and I did not have to deal with the mosquito-borne illnesses that killed so many of those brave souls who worked the original dig.

My hat goes off to the workers who dug the original canal in the early 1900s—and to those now engaged in its impressive expansion.

Thanks for reading,

*Dick Goodall*

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## Reason to Celebrate

Survey signals shift in honesty among American youth

> It's easy to feel discouraged by today's headline-grabbing incidents of dishonest and unethical behavior from political leaders, business executives and athletes. But the latest report card on the ethics of American youth, issued every two years by the Josephson Institute in Los Angeles, California, offers some reason for optimism: For the first time in a decade, students are lying, cheating and stealing less than in previous years.

"It's a small ray of sunshine shining through lots of dark clouds," said Michael Josephson, founder and president of the Josephson Institute of Ethics and a nationally noted commentator on behavior. "Changes in children's behavior of this magnitude suggest a major shift in parenting and school involvement in issues of honesty and character."

The report is based on a survey administered to 23,000 high school students. Among the findings:

**Cheating:** In 2010, 59 percent of students admitted they had cheated on an exam in the past year; in 2012 that rate dropped to 51 percent. Students who copied an Internet document for a classroom assignment dropped 2 percent, from 34 percent in 2010 to 32 percent this year.

**Lying:** Students who said they had lied to a teacher in the past year about something significant dropped from 61 percent in 2010 to 55 percent in 2012. Those who lied to their parents about something significant also dropped, from 80 percent to 76 percent.

In 2012, 38 percent of the students said they sometimes lie to save money; that is a drop of 3 percent from 2010.

**Stealing:** In 2010, 27 percent of the students said they had stolen something from a store in the past year. In 2012 that number dropped to 20 percent.

In 2010, 17 percent said they had stolen something from a friend in the past year, compared to 14 percent in 2012. The percentage who said they had stolen something from a parent or other relative in the past year also decreased (from 21 to 18 percent).

Based on the number of schools adopting the Josephson Institute's Character Counts! program, and the number of parents who visit the institute's website, Josephson believes "that adults interacting with young people are more concerned with teaching kids that honesty really is

important." He added, "Though there is still far too much cheating, lying and stealing, I think we have turned the corner."

Josephson's theory is supported by survey results showing that 93 percent of students said their parents or guardians always want them to do the ethically right thing, no matter the cost. Eighty-five percent said most adults in their life consistently set a good example in terms of ethics and character.

*For more on this survey and to see a report on issues related to youth violence, bullying and high-risk behavior, visit: <http://charactercounts.org/news/2012-report-card/>*

### OTHER IMPORTANT FINDINGS OF THE 2012 REPORT CARD ON THE ETHICS OF AMERICAN YOUTH:

Young people believe ethics and character are important, and they think highly of their own ethics:

**99%** say "it is important for me to be a person with good character."

**93%** say they are satisfied with their own ethics and character.

**81%** believe that when it comes to doing what is right, they are better than most people they know.



# An Education Revolution

Sal Khan has transformed the world of teaching—and learning

> Back in 2004, Sal Khan was a 20-something hedge fund analyst working in Boston. In his spare time, he tutored his 13-year-old cousin Nadia in math by phone. Occasionally, when they couldn't connect, Khan created videos using Yahoo Doodle to illustrate the mathematical concepts they had discussed so that Nadia, who lived in New Orleans, could review their lessons on her own time.

Then a funny thing happened.

Nadia told Khan that instead of being tutored by phone she preferred to watch the videos he had created. "She basically said, 'I like you better in video than in person,'" Khan told *Wired* in 2011.

That realization helped launch an education revolution.

Khan took to the Internet with his homemade videos—teaching everything from art history and economics to math, physics and medicine—offering them for free on YouTube to whoever cared to watch. In 2008 he founded Khan Academy, a nonprofit funded through donations and other sources, which is dedicated to providing a "free world-class education for anyone anywhere."

He quit his job in 2009 to focus on Khan Academy full time. Today Khan's 5,500-plus short instructional videos, available in several dozen languages, reach some 1 million students of all ages

and education levels per month. Khan Academy is the largest school in the world, and Khan, 37, has been lauded as a "superstar teacher" and "hero."

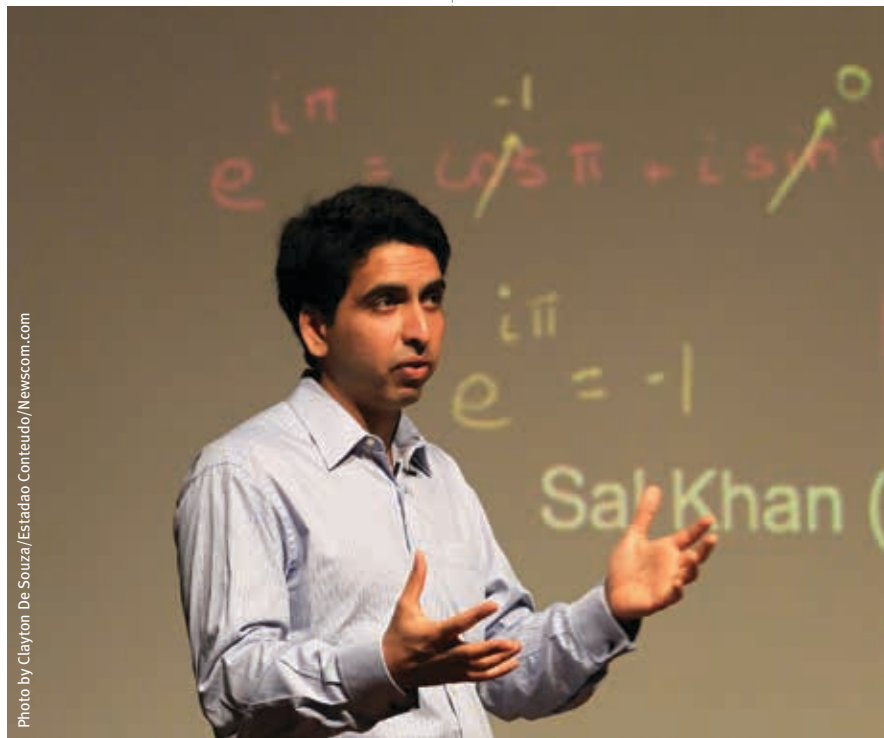
"This is the future of education," said Bill Gates, who donated \$1.5 million to Khan Academy in 2010 after Khan's 2011 TED Talk (an annual conference of the world's leading thinkers).

Watch one of Khan's lectures and you'll see he's a natural teacher—relaxed, enthusiastic and accessible. At times he's even a little geeky. He never trained formally as a teacher, but he has experienced some of the finest educational institutions in the world.

Born and raised in New Orleans, Khan attended Grace King High School before going on to MIT, where he earned undergraduate degrees in mathematics and electrical engineering/computer science, and a graduate degree in electrical engineering and computer science. He continued his education by earning an MBA from Harvard Business School.

The beauty of learning online, Khan has said, is that it allows for pausing, rewinding and fast forwarding, and for learning on your own time. Students don't have to feel embarrassed that they don't know a certain fact, and they can move ahead at their own pace when they have already mastered the material.

Khan Academy's website is filled with comments from students—ranging from elementary schoolers to senior citizens—who relate how the site has improved not only their grades but their outlooks. Siama, a middle-schooler,



wrote, "Math has always been my least favorite subject because I just really couldn't get into it. Since Khan Academy I've learned so much about math. I've learned that math can be fun."

It wasn't long before Khan realized that his videos weren't just reaching individual students. They were changing classrooms. Teachers told him how they were "flipping" their classrooms by assigning their classes Khan Academy videos as homework and then having students do their regular homework assignments in class.

"By removing the one-size-fits-all lecture in the classroom, then letting them have a self-paced lecture at home, then when they do work having peers help each other, these teachers have used technology to humanize the

classroom," Khan said in his TED Talk. "They took a fundamentally dehumanizing experience ... 30 kids not allowed to interact with each other ... and now it's a human experience where they're actually interacting with each other."

The beauty of learning online, Khan has said, is that it allows for pausing, rewinding and fast forwarding, and for learning on your own time.

Khan has added badges and performance metrics to the site to help students see their progress and assist educators in measuring how far their classrooms and individual students have progressed. Going forward, he wants to

make sure that he doesn't just provide education but that he continues to help transform it.

"When I started, you wouldn't have imagined that some crazy dude in a closet making videos would help lead this charge," Khan told *USA Today* in

2012. "But my mission is to have every precocious 13-year-old in the world have access to every bit of information they could ever want." ■

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# THE PANAMA

## FEAT OF

BY KEN STIER





# CANAL: ENGINEERING

An ambitious expansion will double the cargo-carrying capacity of the canal, which famously unites the Atlantic and Pacific oceans

A cargo ship clears Gatun Locks. Once a ship starts its passage through the locks, it can take eight to 10 hours to pass from one ocean to another.



W

hen the Panama Canal opened 100 years ago to great fanfare, few could have imagined that the marvel of engineering would ever need to be enlarged.

But as the canal marks its centennial anniversary this year, it is indeed getting its first major expansion—a third set of locks that will double its cargo capacity and along the way alter trading patterns, particularly for East Coast ports in the United States.

The \$5.2 billion expansion, which got under way in 2007, is expected to be completed in 2015. In addition to a new three-step lock complex, the original American-built canal will have new approach channels, a 2.3-kilometer-long dam, and wider and deeper navigational channels going to and through Gatun Lake, an artificial lake long ago created in the middle of the isthmus to provide water for transporting ships from one coast to the other.

While only 12 to 14 additional vessels will be able to pass through each day as a result of the Panama Canal expansion, total cargo capacity will double, since the third set of locks will be able to handle the very largest ships plying the seas—the so-called



This undated file photo shows workers building one of the gates at the Gatun Locks on the Panama Canal. The canal has three locks: Miraflores and Pedro Miguel on the Pacific side and Gatun on the Atlantic.

post-Panamax class. These megaships are 1,200 feet long and 165 feet wide, allowing them to carry nearly three times as much cargo as older ships (which were 965 feet long and 106 feet wide).

The new mammoth ships represent a growing portion of the world's shipping fleet, roughly 40 percent now, where size translates into lower transportation costs.

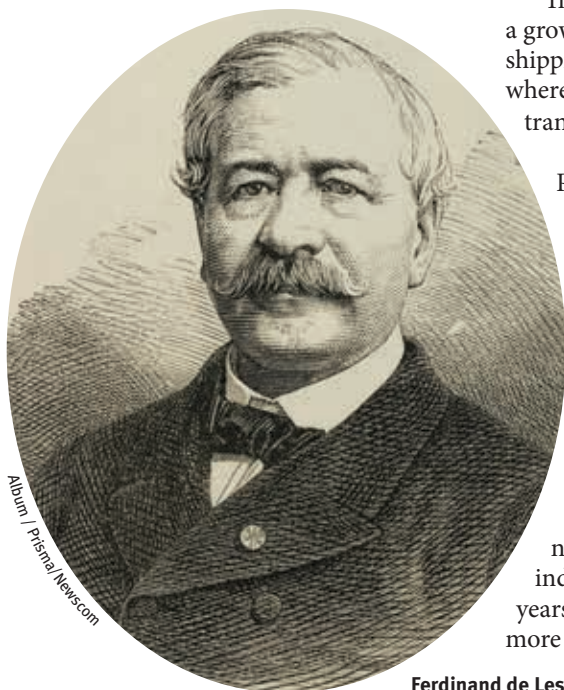
By uniting the Atlantic and Pacific oceans, the Panama Canal saves shippers 3,000 miles en route from the East Coast of the United States to Japan (the alternative would be to go around the tip of South America through the Strait of Magellan). Ships sailing from South America's West Coast to European cities—say from Ecuador to Holland—shave some 5,000 miles off the voyage. So it's no wonder that the global shipping industry has been clamoring for years to enlarge the canal to allow more cargo to pass through.

### 'A PROFOUNDLY IMPORTANT HISTORIC EVENT'

The monumental accomplishment of the Panama Canal—celebrated as the Seventh Wonder of the World by the American Society of Civil Engineers (ASCE)—casts a long shadow on those working on today's expansion project.

Although the current expansion is technically comparable to the original canal project, it does not come close to having the same sense of historical import. "It was a profoundly important historic event and a sweeping human drama not unlike that of war," writes historian David McCullough in his book *The Path Between the Seas—The Creation of the Panama Canal, 1870–1914*. "Apart from wars, it represented the largest, most costly single effort ever before mounted anywhere in the world. It held the world's attention over a span of forty years."

Although Europeans had dreamed of a Central American canal as early as the 16th century, the first attempt at



Ferdinand de Lesseps





**This November 1906 file photo shows U.S. President Theodore Roosevelt (center) sitting on a steam shovel at the Culebra Cut of the Panama Canal.**

cutting a canal across Panama did not start until 1870, when Ferdinand de Lesseps, the French developer of the Suez Canal, stepped up to the task. He envisioned blasting a “big ditch” across the isthmus to create a 50-mile-long, sea-level canal without any locks, like those in Egypt. Importantly, the canal would follow the path of the Panama Railroad, which would be crucial for delivering workers, equipment and supplies, and carrying spoils away from the construction area.

Unfortunately, the Frenchman’s effort wilted under multiple blows, not the least of which was the loss of 40,000 men to malaria and yellow fever. After years of slow digging, torrential rains and death to tropical disease, de Lesseps’ efforts ended with just 11 miles of canal being dug (to the tune of \$287 million, about \$344 billion today).

Enter the United States and President Theodore Roosevelt, who famously declared to Congress: “No single great material work which remains to be undertaken on this continent is as of such consequence to the American people.” After all, sailing from New York City to San Francisco at that time required a 13,000-mile trip over many months, around Cape Horn, the dangerous southernmost tip of South America.

**By the time the canal opened on August 15, 1914, the United States had lost 8,000 men to disease, from an initial work force of 42,000.**

When officials in Colombia began to shy away from Roosevelt’s negotiations, he shifted his support to rebels on the isthmus who wanted to break away from Colombia, offering them timely protection by U.S. naval ships. The result: a new Republic of Panama, established on November 3, 1903.

No wonder, then, that McCullough describes the canal as “the first grandiose and assertive show of American power at the dawn of the new century.”

When the Americans took over the project in 1904 under U.S. Col. George Washington Goethals, they vowed to eradicate every nearby mosquito. Nevertheless, by the time the canal opened 10 years later, on August 15, 1914, the United States had lost 8,000 men to disease, from an initial work force of 42,000.

The original canal excavated 200 million cubic meters—enough earth to bury the island of Manhattan 12 feet under, or to open a 16-foot-wide tunnel to the center of the Earth, according to the ASCE.

Of course, the current expansion project is no cakewalk. It requires excavating 150 million cubic meters—enough to fill the Empire State Building nearly 150 times.

### **IMPROVING ON THE ORIGINAL DESIGN**

Even before the 2006 national referendum on the expansion—overwhelmingly approved by Panamanians (76.8 percent)—the canal was showing signs of being maxed out. Dry season slowdowns left jumbles of ships at anchor at the canal entrances, burning

**A general view of the expansion works project of the Panama Canal in the Pacific area.**

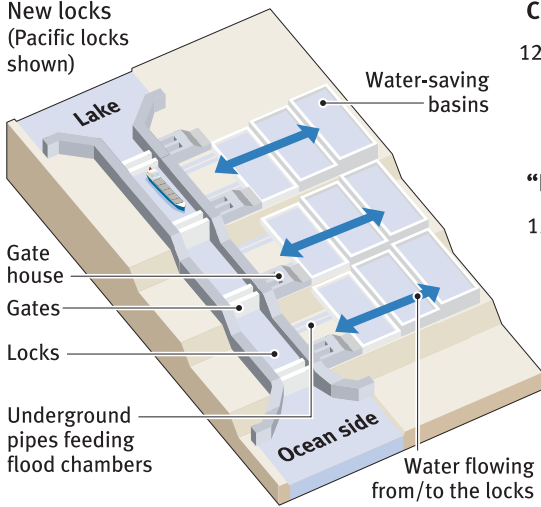


Alejandro Bolivar/EPA/Newscom

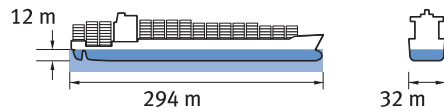
# PANAMA CANAL EXPANSION

General specifications for the Panama Canal expansion project, expected to be finished by 2015.

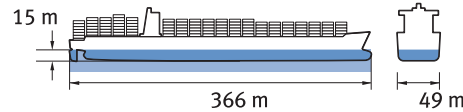
New locks  
(Pacific locks shown)



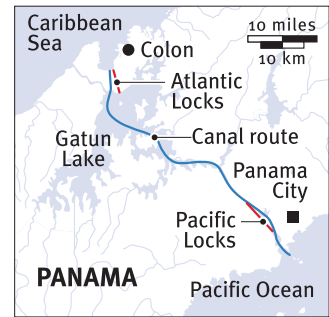
Current "Panamax" ships



"Panamax" ships after the expansion



Location of the new locks



Building consortium

Consortium Grupo Unidos por el Canal (GUPC), led by Spanish construction company Sacyr, won the Panama Canal expansion contract in 2009.

- Sacyr Spain
- Impregilo Italy
- Jan de Nul Belgium
- CUSA Panama

through as much as \$40,000 a day in operating costs, sometimes for as long as a week. Taking advantage of such a seller's market, canal officials staged auctions to jump the queue. One BP oil tanker bid an extra \$220,300 which, with regular transit fees, brought the total passage cost to \$400,000, noted an account in *Popular Mechanics* magazine.

"Much like an aging bridge or highway, the Panama Canal has become a transportation paradox—at once a vital artery and a worrisome bottleneck," noted the 2010 article.

The United States had actually begun work on a third lock in 1939 to accommodate its largest warships, but this effort was discontinued soon after the United States joined the fighting in World War II. After reviewing dozens of options, the Panama Canal Authority decided to pick up the exact same route the Americans had earlier begun excavating; much of it was usable for the current expansion.

It is just as well that the Americans stopped when they did because they could not have imagined how much larger ships have gotten over the last seven decades, notes Ilya Marotta, executive vice president for engineering and programs management, Panama

Canal Authority (in Spanish, the ACP). The new locks are projected to be able to handle traffic for the next 60 years—but "we have left enough real estate for a fourth set of locks if we need [it]," says Marotta.

Marotta says she is daily aware of the "sheer magnitude" of the expansion, which has required design and fabrications work in several

places around the world.

There are some 10,000 workers on the eight-year-long project, she says, which is being financed with toll revenues and \$2.3 billion in bilateral and multilateral development bank loans.

The new locks—the largest by far in the world—give some sense of the scale of the expansion. The

Panama Canal, Gatun Locks, closing of the gates



RINGS/RTR/Newscom

©iStockphoto.com/OraIleff



reinforced-concrete lock chambers will be 1,400 feet long, 180 feet wide and 60 feet deep, with each lock complex measuring more than a mile and a half in length. The gates—changed from the old miter ones to more compact rolling gates—have doors that weigh 2,000 tonnes. These also allow easier, on-site maintenance, as do the new filling and emptying systems.

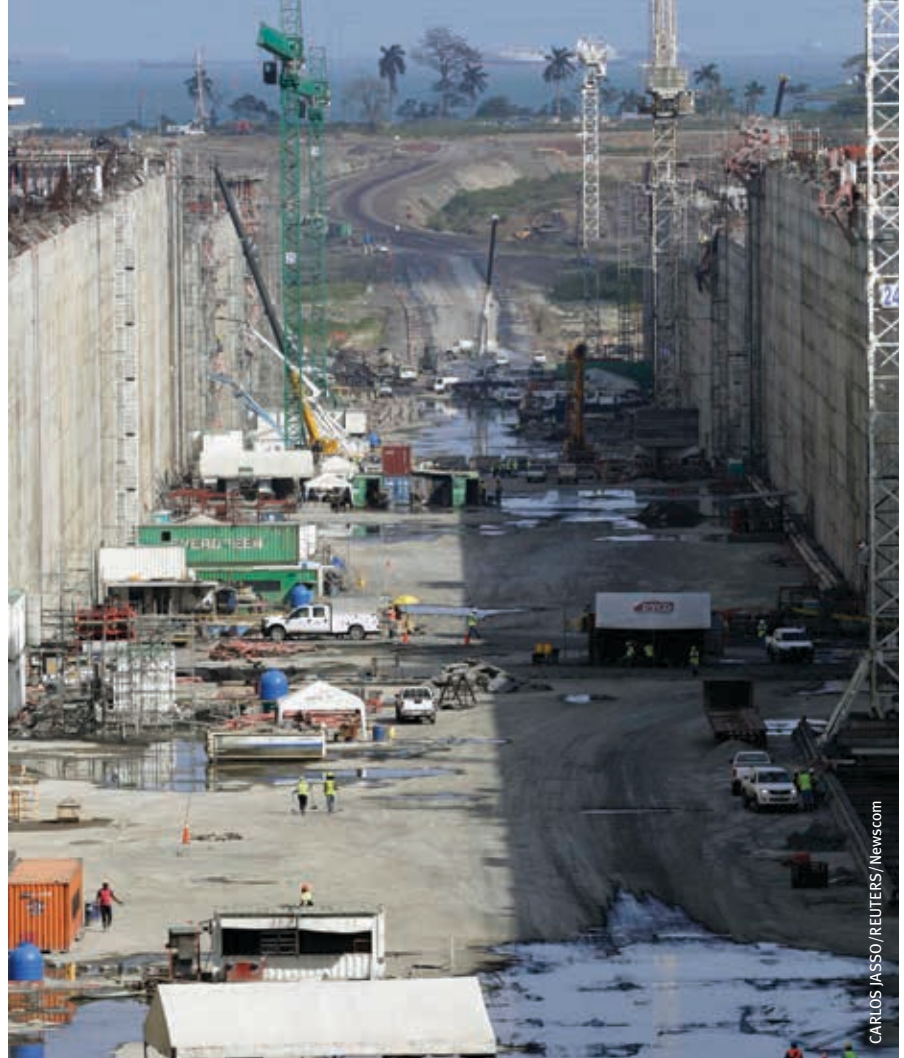
Another key improvement involves the delicate task of positioning ships into the locks: With just two-foot margins, big ships can look like sumo wrestlers in an undersized bathtub.

Currently ships are positioned by electric locomotives—known as mules—which run on lock-side rails with precious little room for error. In the newer locks, far more nimble tugboats will take over, one at the bow and another at the stern, for faster positioning, replacing the need for 12 to 16 mules that would be required for post-Panamax vessels.

Perhaps the expansion's most important design improvement relates to water—critical since the canal is at its core a hydrologic engineering feat.

Ships pass through the Panama Canal by being raised up from the coast-level entrance some 85 feet higher to the level of the Gatun Lake, which covers much of the 48-mile-wide isthmus, and then back down on the other side to the coast. This is

**The Panama Canal currently services some 14,000 vessels a year—close to 300 million tons of cargo—but for all its prominence that only accounts for roughly 5 percent of the world's ocean cargo. But for the United States, the canal is vitally important. That's especially true of East Coast ports, which accounted for more than half of total canal traffic in 2011.**



Workers and cranes are seen at the construction site of the Panama Canal expansion project on the Atlantic side on the outskirts of Colon City on January 15, 2014.

accomplished in the lock complexes, which are composed of interconnected water chambers that lift boats up, usually in three “steps.”

Currently each ship passing through these locks requires 52 million gallons of water—twice (once up and then back down). That water is “lost” in the sense that it simply drains away, eventually making its way to the ocean. That’s a huge amount of water, some 200,000 cubic meters (enough to supply a city of 250,000 people for a day), for each of the 40 ships that pass through every day.

It helps that Panama has prodigious rainfall—100 inches a year (about three times Chicago’s annual rainfall). That’s the product of a seven-to-nine-month rainy season that supplies some 500 rivers, coursing first as mountain streams before cascading steeply down either side of the

continental divide, to the Pacific or Atlantic oceans.

This water is a blessing that engineers say should not be taken for granted, especially in the face of potential climate change. The new canal locks include water-saving basins for the first time. These help capture and reuse 60 percent of the water needed to lift the ships through the lock’s three steps. Even though the new chambers are significantly larger than the old ones—holding 65 percent more water—they will ultimately use 7 percent less water. “This is technology that has been used in Germany for 100 years,” notes Marotta.

The politically unpalatable alternative would have been building even more dams to create new reservoirs, a project that would have necessitated relocating residents, even entire communities.



Transport ship at Panama Canal.

# BY THE NUMBERS

The U.S. trade lane most likely to be impacted by Panama Canal expansion is Northeast Asia-East Coast U.S. trade because it is the largest trade lane (as shown here) and because it is where larger ships are most likely to be deployed. East Coast U.S.-West Coast of South America trade, the second-largest trade lane in terms of tonnage, could also be affected. There is likely to be minimal impact on trade lanes with smaller volumes, such as U.S. East Coast trade with the West Coast of Central America, which are handled by feeder services using smaller vessels and trans-shipment through Panamanian ports.

## PRINCIPAL PANAMA CANAL TRADE ROUTES BY CARGO TONNAGE – FY 2012

Panama Canal Principal Trade Routes	Volume (million long tons)	Percent of Total 2012 Tonnage
Northeast Asia-East Coast U.S.	84.3	38.7%
East Coast U.S.-West Coast South America	27.6	12.7%
Europe-West Coast South America	14.4	6.6%
South America Intercoastal	11.1	5.1%
East Coast U.S.-West Coast Central America	12.2	5.6%
Europe-West Coast U.S./Canada	9.8	4.5%
U.S. Intercoastal	5.7	2.6%
East Coast South America-West Coast U.S./Canada	3.7	1.7%
East Coast U.S. Canada-Oceania	2	0.9%
All Other Routes	47.6	21.7%
<b>TOTAL</b>	<b>218.1</b>	<b>100%</b>

Source: Panama Canal Authority, Statistics and Models Administration Unit, October 2012.

## TOTAL U.S. TRADE VALUE – 2010 & 2040 (in \$ billions)

World Region	IMPORTS			EXPORTS		
	2010	2040	CAGR (Compound Annual Growth Rate)	2010	2040	CAGR (Compound Annual Growth Rate)
Canada	\$261.9	\$684.3	3.3%	\$230.6	\$628.0	3.4%
Mexico	\$219.4	\$553.2	3.1%	\$149.8	\$441.0	3.7%
Rest of Americas	\$175.2	\$515.4	3.7%	\$196.0	\$630.0	4.0%
Europe	\$271.6	\$958.2	4.3%	\$228.5	\$909.6	4.7%
Africa	\$86.0	\$154.5	2.0%	\$22.7	\$69.1	3.8%
SW & Central Asia	\$122.3	\$251.0	2.4%	\$82.8	\$254.4	3.8%
Northeast Asia	\$613.5	\$2,327.4	4.5%	\$251.9	\$1,052.3	4.9%
SE Asia & Oceania	\$65.7	\$224.0	4.2%	\$54.7	\$210.7	4.6%
World Total	\$1,815.6	\$5,667.9	3.9%	\$1,217.1	\$4,195.1	4.2%
Asia Share of World	44.1%	49.4%	-	32.0%	36.2%	-

Source: Federal Highway Administration, Freight Analysis Framework 3, December 2011.

Forecasted trade patterns underscore the importance of Asian trade to the future of the U.S. economy and the need to accommodate a forecast of more than threefold increase in the value of imports from, and almost a fourfold increase in exports to, the whole of Asia (NE, SW, and SE) from 2010 to 2040. The value of trade with other regions will also grow significantly.



## DIVINING THE IMPACT

The canal's expansion is largely driven by the intensely cost-competitive shipping industry, and by the fact that larger vessels mean less expensive operating costs per cargo unit. Bunker fuel (fuel used aboard ships that is so-named from the containers it is stored in) is the biggest cost, and the larger, newer vessels have more efficient engines.

The expanded canal's enhanced economies of scale are expected to have a meaningful impact on global trade, but divining what those possible impacts are is a major analytic challenge, now the subject of an increasing number of studies.

The U.S. Department of Transportation's Maritime Administration is currently funding one of the most comprehensive examinations, which will likely shape public and private infrastructure investment choices to come. "We think it is going to be a huge tool for



CARLOS JASSO/REUTERS/Newscom

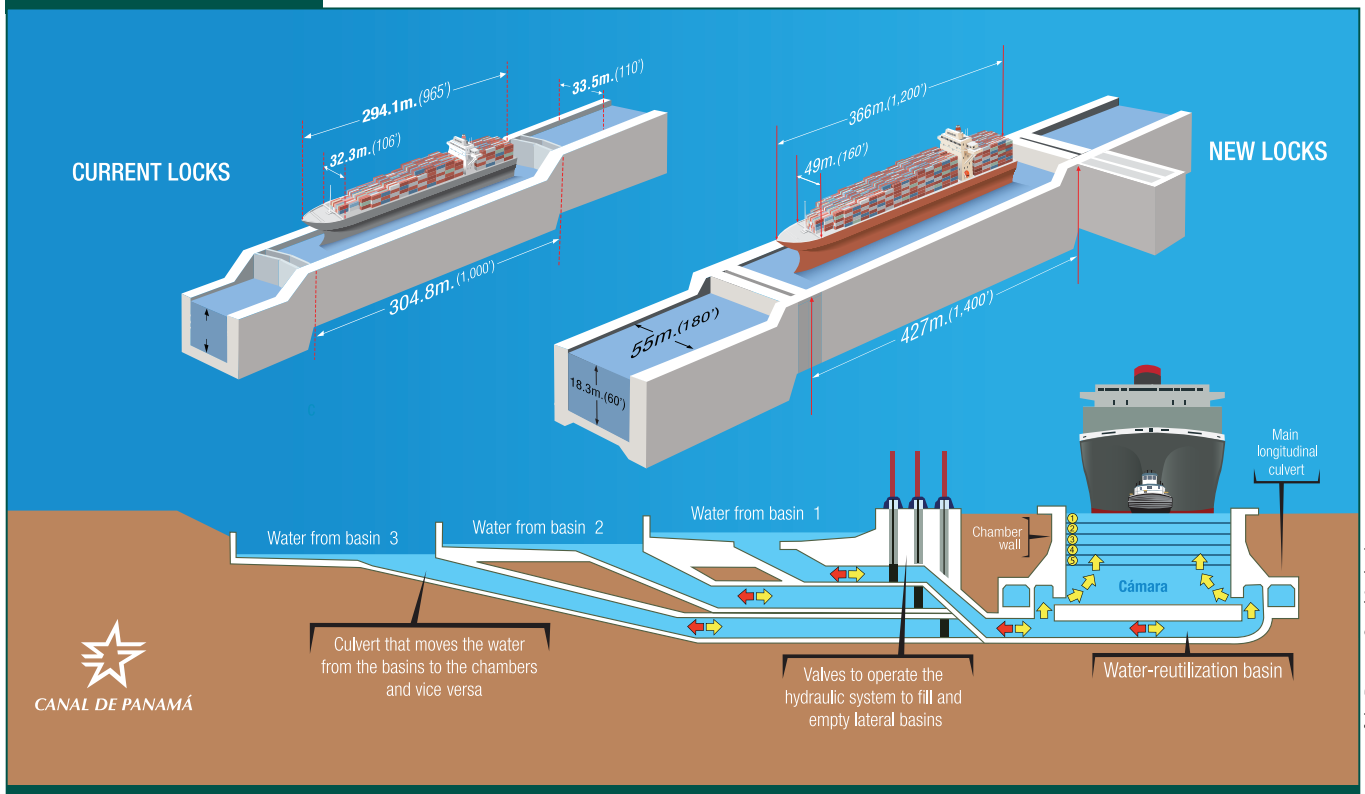
The first four new gates for the Panama Canal's third set of locks are seen on top of a cargo ship during their arrival to Colon in Colon City on August 20, 2013. The third set of locks has a total of 16 rolling gates, eight for each new lock complex.

[policymakers and the private sector] to reference," says Keith Lesnick, a senior Department of Transportation (Maritime Administration) official.

Phase One of the 202-page *Panama Canal Expansion Study*,

released in November 2013 (and conducted by consultants led by the Economic Development Research Group in Boston), offered some preliminary findings rooted in the most basic expected change: "Because larger

## LARGER LOCKS





A tanker ship in the MiraFlores locks on the Panama Canal.

ships transiting the canal will mean lower unit costs for transporting a container via the Panama Canal, volumes may be shifted to Panama Canal routes to take advantage of the lower relative cost.” These costs savings will be most attractive to key U.S. trade routes—U.S. trade with Asia, Australia/New Zealand, and the

West Coast of Central and South America.

The report noted that the East Coast ports of the United States are the dominant users of the canal, accounting for 51.6 percent of total canal traffic, up from 42.9 percent in 2000.

These are also the routes that are expected to be the main potential

beneficiaries of the canal expansion. Their all-water routes—to be plied by ships double the previous capacity, from 5,000 TEU (20-foot equivalent unit) vessels to 13,000 TEU—should offer significant transportation cost savings. That should make the landed price of goods at Eastern and Gulf ports cheaper and more competitive than those being delivered now from West Coast ports, where goods from the largest (post-Panamax) ships are currently received after being trucked or hauled by rail across the continent.

That natural waterborne advantage is explained by the Maritime Administration’s Lesnick: “One of the things we are focused on in this agency is that we want to keep freight on water as long as we possibly can before it reaches the ultimate consumer—because waterborne is so much more efficient, environmentally sound and is extremely beneficial for the economy in general.”

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**“We want to keep freight on water as long as we possibly can before it reaches the ultimate consumer—because waterborne is so much more efficient, environmentally sound and is extremely beneficial for the economy in general.”** —Keith Lesnick, Maritime Administration

But whether these potential cost reductions are realized—and who pockets the savings—depends on myriad, currently unknowable, factors. These include the toll rates Panama intends to collect, and how current transportation providers—ports, railroads and truckers—will respond, possibly by reducing prices to retain market share.

A key factor: how smartly the East Coast ports of the United States prepare for the gargantuan ships that could come calling by 2015. Those

ports with greater capacity for container handling, storage and movement to inland destinations will be in a better position to win port calls. So far only Baltimore, Norfolk and Miami are believed prepared.

Veteran engineer Stephen Curtis, who has testified before Congress on transportation issues, says megaprojects like the Panama Canal expansion are measured not only by the usual terms—of coming in on budget and on time—but whether the project fulfills its larger objective over a

time frame that could stretch a century or longer.

When the expansion project was first suggested by then Panamanian President Martin Torrijos in 2006, he promised it would transform Panama into a First World country. If that does come to pass—the country already has a relatively high per capita income level of \$7,910 but also one of the most highly skewed income distributions in the region—it might serve as a kind of final vindication for Panama’s U.S.-orchestrated breakaway from Colombia, more than a century ago.

With unemployment in Panama now at the lowest levels ever experienced, about 4 percent, the future definitely looks bright, notes *Port Technology International*, which calls the expansion project “an economic engine capable of offering a myriad of opportunities for generations to come.” ■

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- Coupler
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# THE GREAT ENTERTAINER

P.T. BARNUM BROUGHT A GENIUS FOR MARKETING  
AND SHOWMANSHIP TO 19TH-CENTURY AMERICA.  
HIS TACTICS SEEM STRIKINGLY MODERN.

BY DAVID HOLZEL

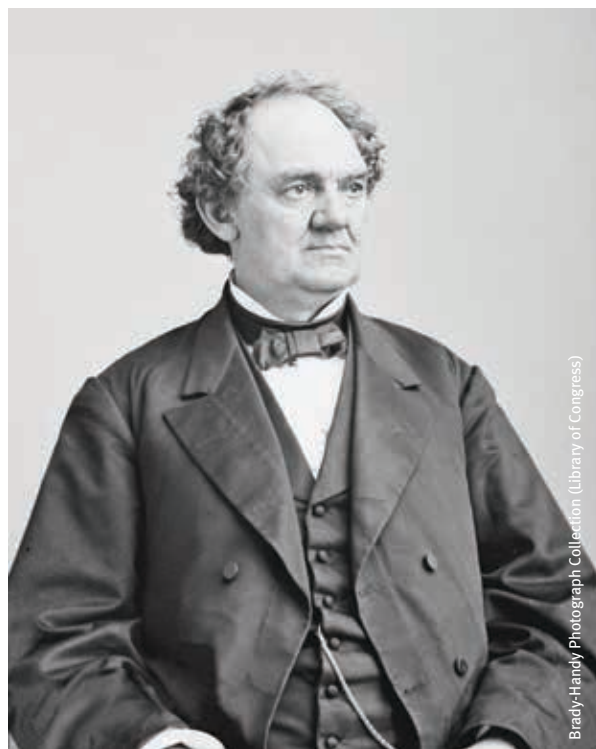
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**A**t the age of 2, Phineas Taylor Barnum received his inheritance. His maternal grandfather told the boy that he was deeding to him a valuable piece of land called Ivy Island. When he reached adulthood, he could take possession of Ivy Island and his fortune would be made. As P.T. grew up in the farming village of Bethel, Connecticut, his parents often referred to him as the richest boy in town.

Born in 1810, P.T. seemed bent on acquiring a fortune. He collected pennies. He sold candy and drinks to soldiers training for the War of 1812. He knew early on that he hated the physical work the family farm demanded and much preferred what he later called “head work,” which involved numbers and sums.

So when at age 10 he was finally given a tour of Ivy Island, P.T. was humiliated. What he found there was not his fortune but a worthless, snake-infested swampland. His grandfather had hoaxed him, and the entire family had been in on the joke from the beginning. The boy was a laughingstock. But the whole experience was just a reflection of the times.

The rural Connecticut of Barnum’s boyhood was physically remote and culturally isolated. The farmers’ Puritan heritage discouraged common entertainments as sinful. Instead, storytelling and



This photograph of P.T. Barnum was taken between 1855 and 1865.

Brady-Handy Photograph Collection (Library of Congress)





Moving Barnum & Bailey's "Greatest Show on Earth," with its 12 colossal pavilions, required planning so intricate that the Army viewed Barnum's circus as a model for moving large numbers of personnel and equipment efficiently.

mendacity flourished in this rough, straitlaced society.

"In the dullness of life in rural Connecticut of the 1820s and '30s, trickery acted as a form of Yankee entertainment, a harsh but widely practiced method of testing wits," write Barnum biographers Philip B. Kunhardt Jr., Philip B. Kunhardt III and Peter W. Kunhardt.

Later, when he became a rich and famous showman, P.T. Barnum looked back on his grandfather, who was also his namesake, and called him his greatest inspiration.

"He would go farther, wait longer, work harder and contrive deeper to carry out a practical joke than any[one] else under heaven," Barnum wrote in his autobiography. "In this one

particular, as well as many others, I am almost sorry to say I am his counterpart."

Circus master, huckster of monsters and curiosities, inventor of the media event, P.T. Barnum never did mutter, "There's a sucker born every minute." For Barnum wasn't out to sucker the public but to humbug it: to blur the lines between truth, exaggeration and outright deception—and invite a debate over what was real and what was not.

Barnum may be best known today for the circus that bears his name, but that was his last act. Between his visit to Ivy Island and his death in 1891, Barnum harnessed his boundless energy, native organizing skills and a gift for marketing and publicity to make a fortune by entertaining

America. By the time he was done, he had become a recognized brand. He could raise the value of a product simply by lending his name to it.

### GEORGE WASHINGTON'S NURSE

Barnum escaped the family farm by going into business. He clerked in and owned a succession of grocery stores. He ran lotteries. To oppose the blue law movement in Connecticut—which denounced alcohol, entertainment and lotteries—Barnum created a forum for his views by founding a newspaper.

He married a tailor, Charity Hallett, and in 1834, the couple moved to New York City. The 24-year-old Barnum found himself in "the epicenter of deception," according to the Kunhardts.



Joice Heth holding George Washington in an image created by Mark Copeland for the National Fairground Archive.

New York was the third largest city in the world, with a population of 300,000 looking to be entertained.

Not long after, Barnum heard about an elderly African American woman named Joice Heth, who was on public display. A slave, she had a singular claim to fame. She professed to be not only 161 years old but the former nurse of George Washington. Her stories about the Father of the Country were a nostalgic connection to a fast receding revolutionary past.

Barnum purchased Joice Heth and invited New Yorkers to see her. Barnum quickly discovered he had a knack for drawing crowds.

“Joice Heth ... had been exhibited before Barnum even got hold of her,” biographer Neil Harris points out. “The difference was that Barnum made a profit, and that was because of his publicity techniques.”

Barnum planned a campaign that used all available media to promote buzz and curiosity about Heth. Her face appeared on posters and handbills that called her “the most astonishing and interesting curiosity in the world.” Barnum sold illustrated pamphlets about Heth and her personal knowledge of George Washington, and he persuaded newspapers to write about the exhibit.

learning that publicity, whether good or bad, was good for business because it kept people interested. “First he humbugs them,” one of Barnum’s ticket sellers said, “and then they pay to hear him tell how he did it.”

Success followed success. In 1841, Barnum opened the showplace that was really his life’s work: Barnum’s American Museum, on lower Broadway, one-half mile north of the Battery. Five stories tall, the museum featured a variety of entertainers—jugglers, serpent charmers and rope dancers—as well as large animals that were a novelty to American audiences: giraffes, elephants and the first rhino displayed in America.

Barnum sought to attract the city’s emerging middle class, which was wary of what it considered low-class and immoral entertainments. One of these was the theater. Barnum removed the stigma by calling the museum’s theater the “moral lecture room.” He tried to make the plays performed there suitable for families by sanitizing their themes and dialogue. To attract women and children as ticket buyers, he invented the matinee.

### TOM THUMB AND JENNY LIND

Nineteenth-century Americans were fascinated by curiosities and freaks, and these were on abundant display

Next, he took her to a new audience—New England. When interest there declined, Barnum wrote an anonymous letter to a Boston newspaper claiming that Heth was an automaton. The ensuing controversy brought crowds back, as people now wanted to determine if the claim was true.

Barnum was always cagey about whether he knew that Joice Heth was not what she claimed to be before he bought her. But he was

at Barnum’s American Museum. Fat children, bearded ladies, giants and dwarfs, albinos and “other wonderful curiosities” fed the public’s vanity that there was a comfortable divide between them and the “Other.”

Charles Stratton was the exception. He was 4 years old and only 25 inches tall when Barnum set eyes on him in 1842. The showman made a quick agreement with the boy’s parents, and the family moved to rooms on the fifth floor of the museum.

Barnum trained his protégé in how to speak, what to say, how to perform. The boy was a natural actor. Barnum renamed him General Tom Thumb, changed his age to 11 and announced that his new attraction was just arrived from Europe—to pique Americans’ curiosity for exotica—and engaged at extraordinary expense.”

Together they made a fortune. “Crowds identified with him, not against him,” Harris writes of Tom Thumb.

In 1844, Barnum took Tom Thumb on tour in Europe. They were gone three years. There were command performances before Queen Victoria of Britain and King Louis Philippe of France. European acclaim sealed Barnum’s reputation as a showman.



Soprano Jenny Lind, the “Swedish Nightingale,” became an angel in the public’s imagination.



He was always Tom Thumb's advance man and promoter. Barnum had a miniature coach made for the general, pulled by tiny ponies with children dressed as liverymen. It was "a rolling, eye-catching advertisement" for General Tom Thumb and P.T. Barnum, the Kunhardts write.

As he approached middle age, Barnum began to want to put his reputation as a practical joker behind him. Increasingly, he desired to be seen as a successful businessman who brought entertainment to uplift the public. In 1850, Jenny Lind, a soprano dubbed the "Swedish Nightingale" who was the toast of Europe, provided an opportunity for Barnum to cement his respectability.

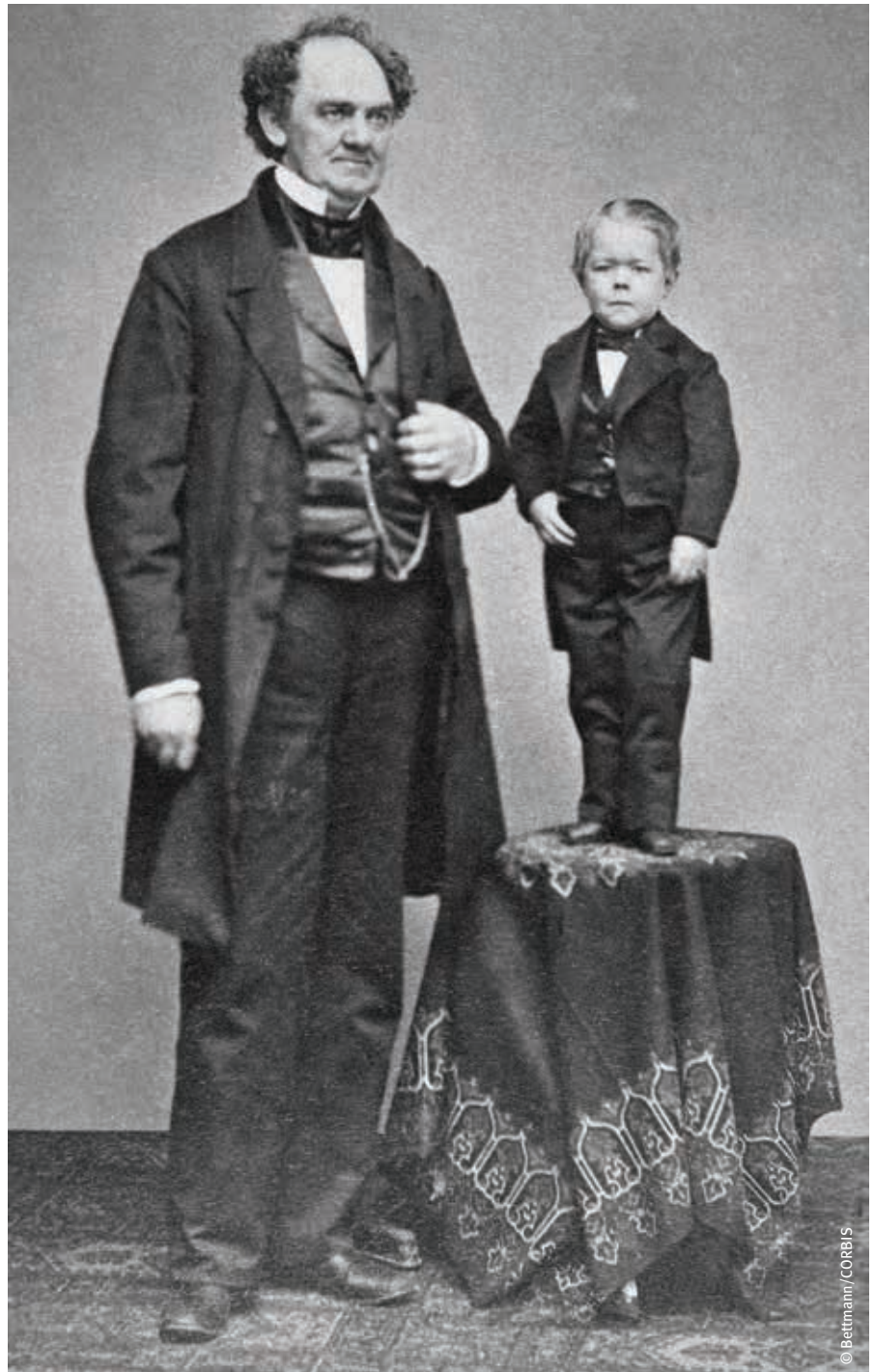
Barnum reached an agreement with Lind without having heard her sing, such was her reputation and Barnum's confidence that an American tour would be an unprecedented success. Lind drove a hard bargain. Barnum offered her \$150,000 for 150 concerts (about \$4.6 million today). The singer insisted he deposit the sum along with other expenses in a London bank up front. Barnum raised the \$187,500 (about \$5.7 million today) by converting everything he owned into cash and taking a loan from a friend.

It was the best investment he ever made. Jenny Lind was every bit as remarkable a singer as her reputation had promised. But Barnum was convinced people would have paid to see Jenny Lind even if her voice was middling. With Barnum behind her, Americans snapped up tickets because of her story—and her celebrity.

She had come up through adversity and had become a national treasure in Sweden. In Barnum's hands she became an angel in the public imagination, kind and philanthropic, beautiful and virginal. "Barnum was presenting not simply a great artist but a friend to humanity," Harris writes.

When her ship docked in New York, tens of thousands were on hand to greet her. It was Jennymania—orchestrated by Barnum.

To increase excitement, Barnum held a ticket auction for the first



**Barnum with Charles Stratton, whom he renamed General Tom Thumb. Just 25 inches tall when Barnum met him, the boy turned out to be a natural actor and a popular attraction across the United States and in Europe.**

concert. Thousands paid a quarter each just to attend the auction. It was, as historian Daniel Boorstin called it, a "pseudoevent," "the planned happening that occurs primarily for the purpose of being reported," according to Harris.

The tour was even more lucrative than Barnum expected. Lind performed

95 concerts before splitting with Barnum. Together they took in \$700,000, of which Lind received \$176,000 and Barnum more than \$500,000, before expenses. The take was "unprecedented in the history of American entertainment," Harris writes.

Over the next four decades, Barnum maintained his museum, ran unsuccessfully for public office and dabbled in urban planning, which bankrupted him. Then there was the circus, “the Greatest Show on Earth,” which Barnum founded in 1870. It included elements of his museum—the animals and freaks—and its most famous attraction was Jumbo the elephant, whose name came to mean “large in size.” Still a master organizer, Barnum harnessed America’s railroad network to move his circus around the country. It required planning so intricate that the Army viewed Barnum’s circus as a model for moving large numbers of personnel and equipment efficiently.

The circus is Barnum’s most visible legacy. But just as lasting is the lesson he took from his crude, practical joking boyhood—a lesson he developed and refined until it became a blueprint for marketing to a mass audience that is still used today. ●



The most popular attraction of Barnum’s circus was Jumbo the elephant. His name came to mean “large in size.”

[http://commons.wikimedia.org/wiki/File:Jumbo\\_and\\_Matthew\\_Scott.png](http://commons.wikimedia.org/wiki/File:Jumbo_and_Matthew_Scott.png)

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#### Did you know that...

### TRIVIA

**Watermelon** is summer's most popular vegetable. It is part of the cucumber, pumpkin and squash family. The average American eats 15 pounds of watermelon a year.

**The modern Summer Olympics** were revived in 1896.

**The first bathing suit** for women was created in the 1800s. It was long-sleeved with woolen bloomers.

**Summer movie season** is considered the most popular time for audiences to watch films.

**Hurricane season** begins June 1 and lasts until November 30.

**The United States** has only two holidays officially recognized that take place during the summer time: Fourth of July and Labor Day.

**The Eiffel Tower** can grow up to six inches in hot weather due to the expansion of the iron structure.

**According to NOAA's National Climatic Data Center (NCDC)**, the average summer temperature within the United States is 71.9 degrees

Fahrenheit or 22.9 degrees Celsius.

**Horace Mann**, a 19th-century early American educator, created summer vacation for schools in 1837.

**Popsicles were invented** by accident in 1905 when a young boy left a mixture of powdered soda and water outside overnight and it froze.

**July is National Ice Cream Month.** More Americans buy ice cream in July than any other month.

[2020site.org](http://2020site.org)

### ON THE LIGHTER SIDE

**Jerry, an avid golf player**, couldn't help challenging his boastful son to a game of golf. He was in for quite a surprise when on the first swing his son got a hole in one. "OK," Jerry quickly said. "Now I will take my practice shot, and then we will start."

**There were four teenagers** who played hooky one morning. Upon coming to class in the afternoon, they reported that their lateness was because their car got a flat tire. "That's fine," the teacher said, much to the students' relief. "But

there was an oral test this morning that you boys have to make up, so please have a seat and take out a piece of paper.

"Now for the first question: Which tire was flat?"

**Bernice had been employed** at the same office for more than 50 years and was the boss's top secretary. Everyone was jealous of her. Every day when Bernice showed up for work she would open the drawer to her left, peek inside, and then lock it. When she finally died, her coworker, Sandy, who was dying

of curiosity, made it her mission to figure out what was in that drawer.

After days of searching she finally found the key. Sweating with excitement she slowly opened up the drawer. Inside was a folded piece of paper. Slowly she reached inside and took it out, while cautiously looking over her shoulder. After a few seconds of trepidation she opened it up.

It said the following: "Put only one spoonful of sugar in the boss's coffee."

[greatcleanjokes.com](http://greatcleanjokes.com)

### Dates in History

**1799:** On July 19, the Rosetta Stone is found. During Napoleon Bonaparte's Egyptian campaign, a French soldier discovers a black basalt slab inscribed with ancient writing near the town of Rosetta, about 35 miles north of Alexandria. The irregularly shaped stone contained fragments of passages written in three different scripts: Greek, Egyptian hieroglyphics, and Egyptian demotic. The Greek passage announced that the three scripts were all of identical meaning. The artifact thus held the key to solving the riddle of hieroglyphics, a written language that had been "dead" for nearly 2,000 years.

**1863:** On July 1, the largest military conflict in North American history begins when Union and Confederate forces collide at Gettysburg, Pennsylvania, in the Battle of Gettysburg. The epic battle lasted three days and resulted in a retreat to Virginia by Robert E. Lee's Army of Northern Virginia.

**1916:** On July 1, a 25-year-old Army lieutenant named Dwight D. Eisenhower marries 19-year-old Mamie Geneva Doud at her parents' home in Denver, Colorado. He would go on to become the nation's 34th president.

**1979:** On July 1, the Sony Walkman goes on sale for the very first time.

**1984:** On July 1, the Motion Picture Association of America (MPAA), which oversees the voluntary rating system for movies, introduces a new rating, PG-13.

**1991:** On July 28, Dennis Martinez of the Montreal Expos becomes the first Latino ever to pitch a perfect game in a 2-0 victory over the Los Angeles Dodgers.

[www.history.com](http://www.history.com)



# Kia Ora

## —AND WELCOME TO NEW ZEALAND

From national park splendor and city sophistication to fishing rivers and foodie tours, the small island nation features a large range of offerings with broad appeal

BY KATHY OMBLER



Lamb behind the rocks of a New Zealand hillside.

Whatever visitors choose to do in New Zealand, invariably they comment on the friendly locals—the laid-back Kiwi folk who, indigenous Maori or not, welcome everyone with a sing-song *Kia ora!* (Greetings and good health!), and mean it.

*Manaakitanga*, loosely translated as hospitality, is about the Maori way of hosting with warmth and respect, of welcoming people as visitors who then leave as family, and it's a notion consciously embraced by the New Zealand tourism industry as a whole.

**A SNAPSHOT:** New Zealand is essentially about natural landscapes. One-third of the entire country is protected as conservation land. This includes 14 national parks, 19 forest parks and three World Heritage areas, encompassing scenery that will inspire, energize and fill your camera cards. Be they glaciers, mountains or fiords; rainforests, remote rivers or steaming volcanoes; you can take your pick on how you explore them, as actively or as passively as you wish.

Thus, two-thirds of the country remains for farms, orchards and world-renowned vineyards and for scattered cities and towns. Of the total population, more than 1 million people

live in Auckland; the remaining 3 million live throughout the rest of the country. So there is plenty of open spaces, and that's even accounting for the 30 million sheep!

New Zealand is, in fact, the last country to be discovered by humans. Polynesian voyagers arrived about 800 years ago. The Maori were followed by the English and Europeans in the 1700s, and more recently New Zealand has seen significant growth in Pacific Island and Asian populations.

**GET HIKING:** Such is the wealth of multi-day hiking in New Zealand's national parks that the top 14 choices have been identified as Great Walks; they are managed by a helpful online information and booking system for cabins and campsites en route. The Great Walks list includes the classic Milford Track, a four-day exploration of sheer mountain valleys and passes, waterfalls and lakes. This walk was described as early as the 1900s by a British travel writer as "the finest walk in the world." Golden sand beaches and granite headlands make the Abel Tasman Coast Track one of the most popular Great Walks, while curiously the Whanganui Journey, a canoe trip through the remote, forest-lined gorges

**Clockwise from top: Views from Milford Track, Fiordland National Park, South Island. Canoeing on Whanganui River. Golden sand beach in Abel Tasman National Park. Clear, clean water cascading down the rocks to a pond in the Fiordland rainforest near Milford Sound.**





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## Maori Culture

Nowhere else in the world will you find Maori culture, that of the first tribal peoples to settle New Zealand. But first, a point to be settled. One of the questions often asked by visitors to New Zealand is: “Do the Maori people still wear grass skirts and live in grass huts?”

In Rotorua, a major geothermal and Maori cultural tourism destination, it’s perhaps a fair question. Many cultural shows feature dancing, singing and chanting men and women clad in traditional-style flax skirts; and meals of smoky-flavored meats and vegetables dished up from underground hangi ovens in a village setting of thatched huts with dirt floors. These villages are, in fact, reenactments to show how earlier Maori used to live.

The cultural shows are simply that — shows, usually informative, often humorous and always stirring, delivered

from the heart. Maori (an overarching term for many tribal groups) today live in modern society alongside all New Zealanders. Maori also own both major and smaller tourism companies. As well as showcasing their own culture, art and history, they will be your hosts on tours and activities throughout your visit; whale watching, glacier and wilderness walking, jet boating, rafting, bird watching, cycle touring and wine tasting. Without doubt, they will offer a unique cultural and historical perspective to your New Zealand holiday.

**Originally a form of weapon training, the poi dance (clockwise from top) has evolved to become a fascinating display of skill and timing. Usually performed by women and accompanied by singing or chanting, the dance involves the twirling of balls on either short or long strings. Percussive sound is produced by striking the ball on the body or other hand, immediately reversing its rotation. Baskets of food, meat, vegetables are loaded in the *hangi* (earth oven) for cooking in this traditional Maori way. Warrior face carved in the wood. Traditional New Zealand Maori carving on a meeting house.**







Legend Photography



Courtesy of The Farm at Cape Kidnappers

Cycle touring is an active way to explore the extraordinary volcanic landscape of Rotorua, where tracts of native and exotic forest provide a deep green contrast to the unusual geology of the region. Cape Kidnappers golf course is hailed as a modern marvel.

of the Whanganui River, is also included as a “Great Walk.” Never mind the terminology, this historic Maori waterway is stunning and quite suitable for novice paddlers. All Great Walks can be tackled independently, though fully guided and catered trips are available. [www.greatwalks.co.nz](http://www.greatwalks.co.nz)

**TAKE IT EASIER:** You don’t have to be a professional hiker to appreciate New Zealand’s parks. Short walks explore some of the finest landscape features; many of these walks feature clever little signs explaining how the landscapes came to be. Cruises—daylong and overnight—will get you onto the lakes, or into the drama of the southern fiords, where the glacier-gouged walls soar sheer from the water, waterfalls crash back down and dolphins come to party. If fly-fishing is your thing, a helicopter will buzz you from fishing lodge to remote park river, where prize brown or rainbow trout lurk in hidden, secret pools. [www.doc.govt.nz](http://www.doc.govt.nz)

**GET PEDALING:** Free-wheeling through the open tussock, pedaling an old forestry road, or cruising lakeside in the shadow of the mountains—all are part of a government-inspired scheme to boost tourism jobs has in recent years seen the development of a grand

network of cycle trails throughout the country. Many paths follow the gentle contours of old railway lines, gold mining trails and country roads. All the bike trails feature fine scenery, pioneer history and small towns. You’ll definitely meet the locals on these increasingly popular trails—either riding beside you or serving up a coffee or ale along the way. [www.nzcyclerail.com](http://www.nzcyclerail.com)

**TEE OFF:** Not only does New Zealand, for its size, have a disproportionate number of championship golf courses, the settings of some are, quite simply, spectacular. The cliff-top fairways of Cape Kidnappers, voted in *Golf Digest’s* World Top 50 Courses, is one example. Indeed, no less than six top courses nestle beneath the mountains around southern tourist mecca Queenstown, including The Hills, home of the New Zealand Open,



## New Zealand Fact File



**GETTING THERE** Air New Zealand flies daily to both Auckland and Christchurch from Los Angeles and San Francisco.

**GETTING AROUND** Air New Zealand flies daily to all major towns and cities. Few flights are longer than one hour. Smaller airlines also fly some regional routes.

- Driving is popular—just remember to keep left. Highways are well sign-posted. Driving from Christchurch to Queenstown takes about six hours. From Auckland, allow three hours to drive north to the Bay of Islands, also south to Rotorua. Auckland to Wellington is an eight-hour drive—you'd best stop over along the way, for example at Tongariro National Park and Waitomo Caves. Rental car and RV companies operate out of all major airports and provide a wealth of touring information.
- Two companies, Interislander and Bluebridge, operate vehicle and passenger ferry services between the North and South Islands (Wellington to Picton).
- InterCity operates daily bus services between all major cities and towns, while a host of private companies also run sightseeing tours and packages throughout both islands.
- Train travel is limited to three KiwiRail scenic journeys: Tranzalpine (Christchurch/Greymouth and West Coast), Coastal Pacific (Christchurch/Picton) and Northern Explorer (Auckland/Wellington).

**ACCOMMODATIONS** You name it, New Zealand has it; from luxury lodges at NZ\$1,000 (\$830 U.S.) plus per night to international chain hotels, backpacker lodges and camp grounds. A wealth of B&Bs and farm stays offer opportunity to meet the locals in their homes. Motels in New Zealand are of high standard and repute; many are outstanding for their comprehensive and modern facilities. Similarly, holiday parks offer a quality mix of motel units and cabins, plus powered sites for your RV.

Look for the "Qualmark"—New Zealand tourism's official, independent quality assurance mark for accommodation, activities and attractions. [www.qualmark.co.nz](http://www.qualmark.co.nz)

Currency is the New Zealand dollar. Banks, Bureau de Change kiosks and ATM machines are located in major airports and towns and cities. All major credit cards can be used; Visa and MasterCard are most readily accepted.

**CLIMATE** New Zealand generally has a temperate climate, though it changes significantly with latitude. The far north experiences subtropical weather during summer while inland alpine areas of the South Island can be bitterly cold (with sub-zero temperatures, snow and frosts in winter). January and February are the warmest months, July the coldest: ski time!

**The Luckie Strike cave in Waitomo is quite possibly the most physically demanding and beautiful cave in the country.**



and Millbrook, consistently voted best golf resort in Australasia. Or you could simply hack your way around the six holes of tiny Ringa Ringa Course, on Stewart Island. Green fees are \$5; the views rival those of Cape Kidnappers. [www.bestofgolfnewzealand.com](http://www.bestofgolfnewzealand.com)

**TRIM THE SAILS:** Surrounded by water, Kiwi kids grow up sailing. Olympic medals and the America's Cup (at times) have crammed the nation's trophy cabinets. So you'll be in safe hands if you join a pleasure cruise, perhaps exploring the forest-lined bays and inlets of the Marlborough Sounds, or Auckland's sparkling, island-studded Hauraki Gulf. Better still, learn how those first enterprising Polynesians crossed the Pacific, sailing only by the wind, navigating only by stars and currents. An outing on the Haunui, a traditionally built, double-hulled migration canoe on the Auckland harbour, can be a truly memorable experience. (You can count on the Haunui's crew, which just completed a 20,000-km, 18-month journey across the Pacific and back.) [www.wakaquest.com](http://www.wakaquest.com)

**SIP AND SAVOR:** New Zealand is about new world wine: innovation, intensity and flavor. Check any international wine awards and you'll find Kiwi Pinot Noirs, aromatics, Sauvignon Blancs and bubbly up there in the medals. Sipping one of these in the home vineyard with the winemaker—perhaps among the hillocks and rocks of Central Otago, or sun-drenched river plains of Marlborough—is an experience that's hard to beat. Even better is to match the







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Ian Brodie

wine with local fare: artisan, organic, export-quality fare such as grass-fed lamb and beef, wild venison or marine-farmed green-shell mussels. If you're city bound you'll learn how cuisine, coffee and craft beer can be taken very seriously in New Zealand. So get seriously gourmet, visit the delis, coffee roasters and brewers with Zest Food Tours, touted as one of the Top 10 walking tours for globetrotting foodies. [www.newzealand.com/int/food-and-wine](http://www.newzealand.com/int/food-and-wine) and [www.zestfoodtours.co.nz](http://www.zestfoodtours.co.nz).

**MIDDLE EARTH:** Modor, Mount Doom, Edoras—Oscar-winning director and local boy Peter Jackson considers the New Zealand landscape the perfect match for J.R.R. Tolkien's mystical, mythical world. *Lord of the Rings* and *The Hobbit* film location | tours are offered throughout Middle Earth/New Zealand, including the actual, ingeniously created Hobbiton set. [www.lordoftheringstours.co.nz](http://www.lordoftheringstours.co.nz), [redcarpettours.com](http://redcarpettours.com) and [www.hobbitontours.co.nz](http://www.hobbitontours.co.nz) •

Boats in a bay in Marlborough Sounds, New Zealand. Young vines in the Marlborough region of New Zealand. This area is said to be the best in the world for Sauvignon Blanc. There are 44 Hobbit holes at Hobbiton Movie Set Tours, which were reconstructed in 2011 for *The Hobbit* trilogy.

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# the Black Death

BY EUGENE FINERMAN

In the late 1340s, a devouring plague threatened the extinction of mankind

**ON MARCH 15, 2013**, the construction of an underground rail line in London suddenly halted. Eight feet below the surface of the modern metropolis, the excavation had uncovered a mass grave. A team of archaeologists rushed to the site, exhuming 13 bodies and collecting the evidence of history. The manner and location of their burial testified to the date of their death. They had died in the last months of 1348, and their corpses were quickly interred on the outskirts of medieval London. In better times they would have been buried in churchyards, but these were the worst of times.

Many thought it the end of time: A devouring plague threatened the extinction of mankind. As those 13 had died, covered in boils and coughing blood, so did half the population of London and one-third the population of England. That grim toll was exacted throughout Europe: One-third of its population—at least 25 million—succumbed to the pandemic remembered as the Black Death.

In its studies of bacteriology, modern science has traced the plague's origins to Asia. Medieval chroniclers had believed that, too. They attributed the disease to the Mongols and their 1346 siege of Caffa, a Genoese-held port in the Crimea. Already frustrated by the Genoese resistance, the Mongols then suffered an outbreak of plague in their camp. The horde commander thought that the disaster might succeed

where his soldiers had failed; he had catapults fling the plague corpses into the Genoese fort. And so the plague came to Caffa. The city held out, however, and the siege was lifted in 1347. But when Genoese ships left the port, they carried the plague with them. Their ports of call would be the Black Death's itinerary.

In May, the ships docked in Constantinople; by July, the plague was ravaging the city. The capital of the Byzantine Empire, the crossroads of European and Asian trade, Constantinople was one of the largest cities in Christendom. A third of its population died. In his memoirs, the Byzantine Emperor John VI Kantakouzenos described the

symptoms of his dying son: the swelling growths known as buboes, the fever and the blood-spewing cough. The victim's blood vessels would disintegrate, causing dark splotches under the skin. This manifestation gave the plague its name: the Black Death. The emperor's anguished narrative would recur in every language, in every region of Europe and the Middle East.

From infection to death, the course of the disease was some five weeks. Until the final week, however, the victim did not even seem ill. Yet, he was contagious and spreading the plague, sometimes by his sneeze but more often by his fleas. With the abysmal standards of hygiene in the Middle Ages, the blood-sucking insect was a common



[http://en.wikipedia.org/wiki/Black\\_Death](http://en.wikipedia.org/wiki/Black_Death)

Left: "The Black Death," an 1877 woodcut by Friedrich Hottenroth, depicts the Plague in Germany, 1349. Above: Miniature from the Toggenburg Bible (Switzerland) of 1411.



alg-images/News.com

Map showing the spread of the Black Death.

companion, and no one imagined it fatal. But as fleas leaped from the diseased to the healthy, they were the primary conveyance of the plague. Just as the fleas from a Mongol corpse had infected the Genoese, the Genoese walking the wharfs of Constantinople spread their fleas to the sailors and traders of other nations.

An Arab chronicler described how the plague arrived in Egypt that September. A ship left Constantinople with more than 300 people on board: 32 merchants, a full crew and a cargo of slaves. When the ship reached Alexandria, only 40 were still alive. Alexandria was the commercial center of the Islamic world, and caravans to Baghdad and pilgrimages to Mecca would carry the plague.

Meanwhile, ships were docking in Sicily. From there, death sailed on to Naples, Venice, Pisa and Genoa; people fleeing the infected ports brought the plague to Florence and Rome. By the end of 1347, the Black Death had desolated all of Italy and spread to southern France. Spanish ships brought the fatal cargo to their home ports. In the summer of 1348, every major port of the Mediterranean had the Black Death, and the plague was moving north. French ships

brought it to England. English ships brought it to Scandinavia; Scandinavians spread the plague through the Baltic. And from the stricken ports, the refugees brought the Black Death to cities and towns far from the sea.

The plague was at its worst in the cities. The medieval streets and the sewers were one and the same. In such conditions, infection was effortless. London and Paris lost half of their populations to the plague. Giovanni Boccaccio described the plight in Florence: "Such was the multitude of corpses brought to the churches every day and almost every hour that there was not enough consecrated ground to give them burial, especially since they wanted to bury each person in the family grave, according to the old custom. Although the cemeteries were full, they were forced to dig huge trenches, where they buried the bodies by hundreds. Here they stowed them

### WORLDWIDE: Death by the Numbers

- **The Black Death (late 1340s):**  
75 million to 200 million died\*
- **Influenza Pandemic of 1918–1919:**  
50 million died
- **World War I:** 16 million died
- **World War II:** 60 million died

*\*all figures are estimated*



away like bales in the hold of a ship and covered them with a little earth, until the whole trench was full.”

There were just too many dead to bury. In Southern France, the Catholic Church consecrated the Rhone River for dumping bodies. The poor, being malnourished and living in squalid conditions, were the most likely to die. Yet, a king of Castile and an English princess also succumbed. The archbishop of Canterbury died of the plague, as did his successor and his successor’s successor—all within a year. From 1347 to 1353, at least 25 million in Europe died, as did another 75 million in North Africa and the Middle East. One hundred million dead in the 14th century would be approximately one-quarter of all mankind.

Medicine had no treatment for the plague or even an understanding of its nature. Doctors who tried lancing the buboes only succeeded in infecting themselves. In 1348, the best minds at the University of Paris concluded that the plague resulted from the conjunction of Mars, Jupiter and Saturn drawing poisonous

vapors from the Earth. In their report, these medieval scholars recommended breathing only northerly winds or at least filtering one’s breath with a bouquet of scented herbs.

scapegoats. When the plague ravaged Cyprus, the island’s Muslims were blamed and slaughtered. In Western Europe, the victims were Jews. They were accused of causing the plague by

The certainties of the Middle Ages had died, too, in the plague. The Church had failed to protect mankind, and a sense of religious alienation broiled in England and Germany.

The English would remember that prescription as “a pocketful of posies.” However, that rhyme ends with the prognosis, “Ashes, ashes, we all fall down.”

Others saw the plague as the wrath of God. To atone for mankind’s sins, people would flay themselves with whips. Mobs of these penitents—Flagellants—would go from town to town, making a public display of their torment. Others found a more traditional outlet for mass hysteria:

poisoning wells. Two hundred Jewish communities in France, Switzerland and Germany were wiped out. Pope Clement VI condemned these attacks, asserting the Jews were blameless. He was a voice of reason in the midst of terror.

Where the plague struck, death reigned for a year; then it ended, leaving the survivors lost in a different world. The certainties of the Middle Ages had died, too, in the plague. The Church had failed to protect mankind, and a sense of religious alienation broiled in England and Germany. The earliest outbreaks of rebellion would be crushed, but the dissension remained and would eventually triumph. In Italy, the educated developed a secular perspective, and humanism challenged the constraints of tradition. This intellectual fervor, expressed in art and literature, would be the beginnings of the Renaissance. In Western Europe, the feudal order had collapsed; those who survived were no longer content with the status quo. The dissatisfied peasant simply walked off the land and sought a trade in the town; the remaining peasant refused to be treated like property. His wages would be determined by his labor, not his ancestry. Even without an edict by King or Parliament, serfdom had effectively ended.

The Black Death was the scourge of mankind, an unprecedented horror in history. Yet, in its wake was the beginning of our modern world. ◀

**Flagellants, like the one depicted in this 16th-century woodcut by Jost Amman, saw the plague as the wrath of God. To atone for mankind’s sins, they would flay themselves with whips in a public display of their torment.**



World History Archive/Newscom

# Staying on Task

Cutting corners with industrial hose assemblies can have disastrous results.

> Industrial hose, in general, is capable of many uses. These products convey air, steam, water, chemicals and an almost unlimited assortment of other products from here to there. Sometimes they move under great pressure and travel great distances. When industrial hose and couplings are properly mated to the task, these assemblies perform their function flawlessly and without notice. Then again, there are tasks

industrial hose assemblies should never be asked to do.

Such was the case when a construction crew, tasked with building homes, arrived in their pickups at the new development. One truck had a portable air compressor in tow. The crew's task today was to build the frame for the first house in the development. The air-powered nail hammers, or "nailers," allowed the crew to put together the



house's wooden skeleton much faster than they could have done by swinging conventional hammers—and with a lot less effort. For them, with blueprints in hand, a flat slab of concrete is like a blank canvas for an artist.

The foreman pulled his truck onto the dirt lot near the concrete slab to

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select the best place to set up the compressor. The pickup with the compressor was to follow, but before he got off the macadam, he saw dirt and mud flying from the tires of his boss's truck and decided not to venture in. Knowing he didn't want to "bury" his truck in the muck, the foreman stopped trying to move it before it got in too deep. He yelled at the guys in the other truck to unhook the compressor and bring a tow rope. They unhooked the compressor and found a rope, but it wasn't nearly long enough to reach their boss's pickup.

Pondering the situation and knowing the clock was ticking, the foreman was weighing his options when a light bulb went off in his head. He yelled at the guys standing on the side of the street to get the longest length of

compressor hose they had and bring it to him. With hose in hand, the foreman tied it to the hitch of his truck and told the guy who brought it to him to hook the other end to the hitch of the other pickup just like he'd done. With "tow hose" in place, one of the crew directed the driver of the tow pickup to start taking up the slack. When the slack was out, he signaled the foreman and tow pickup to start moving. The tow pickup kept moving and moving, but the foreman's truck didn't budge. Just when it looked like the foreman's truck was about to break free, everyone heard what sounded like rifle fire. The hose had snapped and recoiled away from the foreman's truck with blinding speed.

The crew member giving the signals to the trucks never saw it coming. The hose struck him on the right side of his

head breaking his jaw and knocking him out. At the hospital, in addition to having his jaw wired shut and a headache the size of Mount Rushmore, the young man found out he'd permanently lost sight in his right eye.

Industrial hose assemblies have a multitude of useful, productive applications. Whether it's conveying liquids, fluids, powders or pellets, with the right combination of hose and couplings they do their job well and with little fanfare. But, when we try to get them to do things they were never designed to do, such as running steam through chemical hose or using cam and groove couplings for air, or any assembly as a tow rope, they fail miserably with blinding results. ◀

## Nitrile Washdown Hose from Dixon

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### Materials:

- hose: black nitrile reinforced with woven polyester
- fittings: aluminum



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# Wonder Drug

For everything from heart disease to cancer, aspirin may be just what the doctor ordered

> Aspirin soothes headaches, eases pains and cools fever. It calms cramps and can—for certain patients—reduce the risk of heart attack and stroke. New research suggests aspirin can protect against dementia and cancer, not to mention perk up flowers and revive batteries. No wonder they call it a wonder drug.

Aspirin has been around a long time. Historians cite 3,000-year-old prescriptions etched in stone that call for willow bark. The ancient Greek physician Hippocrates noted that willow reduced fevers and labor pains. He wasn't the only one. Native Americans relied on the bark to treat pain, as did later arrivals Lewis and Clark.

**Bayer reports global sales of 10 billion to 15 billion tablets a year. Some estimates have the world taking 80 billion tablets a year.**

In 1763, an Oxford University researcher identified the bitter analgesic as salicylic acid. In 1897, a chemist at the German company Bayer synthesized a derivative, called acetylsalicylic acid. With this, the headache-prone were spared the trouble of gnawing on trees to find relief.

It wasn't a simple "Aha!" moment. According to Christian Nordqvist, CEO of *Medical News Today*, there were intrigue, competition and a detour to develop another analgesic called heroin. But by 1899 Bayer had standardized, named and trademarked Aspirin (the trademark was later stripped in the

U.S.). The drug was originally sold by pharmacies; customers shook the powder from paper bags. A year later the company came up with an easier way to dispense the medication: the tablet.

Soon aspirin, with its new over-the-counter availability, was as ubiquitous as hangovers on New Year's Day. It was valued for its ability to reduce pain, fever and inflammation. And, after a California doctor noted that his aspirin-taking patients had fewer heart attacks, it was discovered that aspirin "thins" blood by interfering with its clotting action. Aspirin became

the standard of care for (in specific instances) reducing the risk of heart attack and stroke.

Aspirin earned a spot on the World Health Organization's list of "essential" drugs. It accompanied astronauts to the moon. Bayer reports global sales of 10 billion to 15 billion tablets a year. Some estimates have the world taking 80 billion tablets a year.

Best of all, it works. But it wasn't until 1971 that British pharmacologist John R. Vane figured out why: Aspirin inhibits the synthesis of prostaglandins.

Much like hormones, prostaglandins are chemical messengers. Their jobs



include sending pain signals and promoting inflammation and fever. Tamp down prostaglandins and you tamp down pain, swelling and fever.

For this insight, Vane was eventually bestowed both knighthood and (along with Bengt I. Samuelsson and Sune K. Bergstrom, in 1982) a Nobel Prize. As Vane put it: "No other drug in the world has had such a fascinating and record-breaking history—a development that has not yet come to an end."

Indeed. Recent research pits the little white pill against the big menace cancer ... with encouraging results.

A series of studies published since 2012 in the British medical journal *The Lancet* compared patients who took aspirin daily against those who didn't. Peter M. Rothwell, a professor of clinical neurology at the University of Oxford, found that the aspirin-taking group had fewer cancers, less spreading of cancer and fewer cancer deaths. The effect was particularly striking in reducing esophageal and colorectal cancer.

Last year, a study released by Brigham and Women's Hospital and Harvard Medical School found that healthy women who took aspirin every other day were less likely to develop colorectal cancer. Other studies have found reductions in lung, breast, neck and skin cancers.



The mechanism is not yet fully understood, but some researchers are focusing on “somatic genome abnormalities”—damage to cancer-afflicted DNA. Aspirin is believed to slow down this damage, slowing down the disease.

Which doesn't mean we should all pop the pill.

“The important thing to note is that while [the research is] promising, it's still very early on,” says Brent Reed, assistant professor of pharmacy practice and science at the University of Maryland School of Pharmacy.

“It's not something where patients who might have those conditions should just start taking aspirin. It's a discussion they should have with their health care provider.”

Aspirin can have dangerous side effects, including bleeding in the

stomach and brain. And in children and teenagers, aspirin is no longer recommended for treating flu-like symptoms because it has been linked to a rare but potentially fatal condition called Reye's syndrome.

“There are very real risks of taking aspirin,” says Reed. “For patients for whom a benefit exists, it comes down to a risk versus benefit decision.”

**Generally speaking, aspirin is recommended in adults for:**

- Minor aches and pains
- Headache
- Fever

**According to the Mayo Clinic, aspirin is often recommended to:**

- Patients who have had a heart attack or stroke

- Patients who have had a stent placed in a coronary artery
- Certain patients at high risk of heart attack
- Men over 50 and women over 60 with diabetes

**Aspirin is generally contraindicated for:**

- Patients with an allergy to aspirin
- Children (due to the risk of Reye's syndrome)
- Patients at risk for bleeding

Maybe the doctor's old adage needs an update. Forget: “Take two aspirin and call me in the morning.” Try: “Call me first; the answer may well be aspirin.” ➤

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# Zap It!

The ubiquitous microwave oven is a stepchild of World War II technology.

> There's a direct line connecting radar and the microwave oven, and it runs through a candy bar in the pocket of a man named Percy Spencer.

Spencer was an engineer for defense contractor Raytheon and an expert in radar tube design. During World War II, he worked to improve radar systems and speed up their production in the Allied fight against the Nazis.

Radars run on high-speed radio waves called microwaves. Early in the war, British scientists developed a microwave tube called the magnetron to run their radar sets. One day in 1946, Spencer was touring a Raytheon laboratory when he accidentally stepped in front of a live magnetron. He remained unaware that he was in the line of fire—until a candy bar in his pocket started to melt.

Could microwaves heat food? Spencer was intrigued by the idea and began to test his hypothesis. He placed some corn kernels in front of the

of microwaves on food. It was the first microwave oven, and Spencer reputedly used it to warm his lunches.

Microwave ovens work by heating water molecules in food. A magnetron produces an oscillating electronic charge, which causes the water molecules to spin to match the polarity of the microwaves. The movement of the water molecules as they spin and bump into each other produces heat and, in a matter of moments, popcorn.

Microwaves also have the benefit of being “non-ionizing”—that is, they do not detach electrons or protons from the atoms they interact with. Unlike the ionizing ultraviolet radiation and X-rays, microwaves do not make food radioactive.

Some 90 percent of U.S. homes today have microwave ovens. But it took more than two decades for



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In 1954, Raytheon introduced a commercial model, the 1161 Radarange. It cost \$2,000 to \$3,000 (\$16,000 to \$24,000 today). The next year Tappan Stove Co., licensing Raytheon technology, came out with a 220-volt wall unit. By then the price had dropped to \$1,295 (\$10,500 today).

After 1967, when Amana, a Raytheon subsidiary, introduced the countertop Radarange (\$495 then/\$3,200 today), buyers began to take notice. Sales grew from 40,000 in 1970 to 1 million in 1975.

“It was a time of astronauts, instant Tang orange drink and TV dinners, and many appliance manufacturers, such as Amana, aimed to take the drudgery out of the typical homemaker’s life and replace it with the modern conveniences of the ‘home of the future,’” noted Dixie Trout, Amana vice president of consumer communications, on the microwave oven’s 30th anniversary.

“In reality,” she added, “it was the dawn of the ‘Supermom,’ which was spurred by the large number of mothers who entered the workforce. In retrospect, while the microwave oven did not replace the conventional oven entirely, we now have an entire generation that’s grown up with the microwave oven, and have come to rely upon it just as much as their PCs and cellphones.”

One day in 1946, Spencer was touring a Raytheon laboratory when he accidentally stepped in front of a live magnetron. He remained unaware that he was in the line of fire—until a candy bar in his pocket started to melt.

magnetron. They popped. He did the same with an egg. When a colleague went to view it close up, the egg exploded in his face. Next Spencer put a magnetron at the back of a closable metal box, where he could more accurately measure the effect

microwaves to become practical and cheap enough for the average consumer. Raytheon’s first microwave was 6 feet tall and weighed 750 pounds. The tubes had to be water cooled, so it required plumbing to operate. It was placed in a restaurant in Boston.





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