FALL 2005
Asia/Pacific – Spring 2005

BOSS

CONNECTING TO INDUSTRY

Between Cow and Kitchen

HOW DOES MILK GET FROM THE COW TO THE GROCERY STORE?

Louis Pasteur:

He changed the way we process milk *Page 20*

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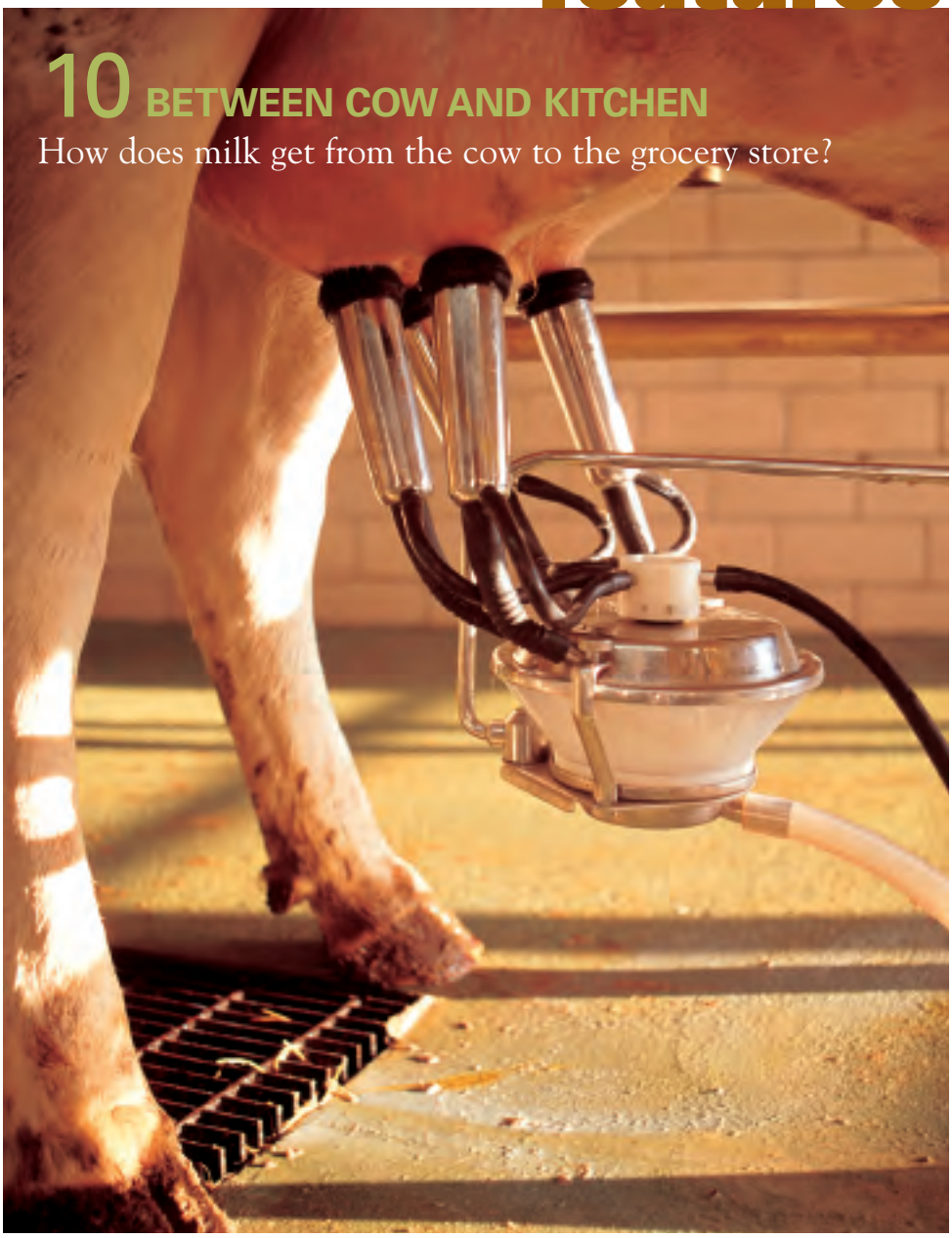

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The catastrophic destruction on the U.S. Gulf Coast caused by Hurricane Katrina presented Dixon with great challenges. Many of the products we make and sell are being used in the clean-up phase and will be used for the reconstruction of homes, businesses and highways.

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To meet the need for raw materials beyond our normal requirements, we made arrangements and began receiving additional bar, pipe and castings within five days of the storm. We also increased orders with the suppliers of the products that we do not make but offer through our distribution system. Our intention was to bolster our inventory levels to meet what we believe would be an extraordinary demand for our products. We believe this was the best way for us to help the disaster victims.

Untold numbers of homes and businesses have been annihilated and transportation systems were destroyed. America is facing another great challenge, and we, at Dixon, have the opportunity to make a significant contribution. The folks on the Gulf Coast need our help, and we plan to give it. Together we can make a difference.

Thank you,

Dick Goodall

R.L. Goodall
CEO, Dixon Valve & Coupling Company

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There are a number of different ways to build an in-ground swimming pool. One method is to dig the hole and then use gunnite for the floor and walls.

What is gunnite? Gunnite is a mortar conveyed through a hose and pneumatically propelled at high velocity onto a surface. Unlike conventional concrete, which is first placed then compacted in a second operation, gunnite undergoes placement and compaction at the same time due to the force with which it is projected from the nozzle. Because of this it is more dense, homogeneous, strong and waterproof then any other process.

DO AND DON'T

Do:

- Use safety cable to prevent a potentially dangerous situation caused when air hose becomes accidentally uncoupled or fails.
- Install safety cable in the fully extended position.

Don't:

- Allow slack in the safety cable when installing.

Several years ago while constructing a gunnite pool, the foreman of a crew was observing one of his employees as he sprayed gunnite onto the wall of the pool.

The pool under construction was right next to the owner's home. Fearful that the operator might spray the house, the foreman got into the pool and took over the spraying operation.

The air compressor supplying the air had been rented from a local rental company. The foreman did not have on a hard hat or safety glasses. Approximately one minute after taking the nozzle, the air hose disconnected from the fitting. This caused the air hose to whip and hit the foreman in the head and eye. Although he was not knocked unconscious, he received severe damage to his eye.

How could this accident have been prevented?

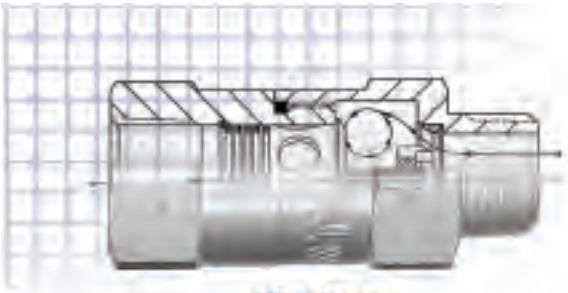
The foreman should have been wearing safety glasses and a hard hat which is an Occupational Safety and Health Administration (OSHA) regulation.

The Air King coupling used on the hose comes with safety pins that prevent accidental disconnection of the fitting. The safety clamps were not used.

A whip chek safety cable connecting the hose to the tool would have prevented the hose from whipping, also an OSHA regulation.

The 3/4-inch air hose had only one band clamp holding the fitting in the hose and two are recommended.

All of the above should be standard for anyone using an air compressor.



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MILITARY SPECIFICATIONS: Design and construction per MIL-A-25896E, Military Standard MS24484-5

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The Courage of John Bankston

A high school boy lost his life to help others.

BY DAN COOPER

It was in 1987, during the height of summer camping season in the Texas Hill Country, that John Bankston achieved a more memorable hero status than his considerable sports accomplishments had ever earned him. That year John was just another high school football player at summer camp…until the rain came to the Texas Hill Country.

There are more camps in this

region than anyplace in the United States west of the Mississippi River. It is the Hill Country's version of big business. During the height of the 1987 camp season, July brought an unexpected late season heavy rain and with it the severe flooding that is widespread in the hills.

In Texas it has been common practice to avoid the building of extensive bridges over waterways. People are frequently forced to cross rising floodwaters in creeks and even rivers by using "low-water crossings." These are poor substitutes for bridges that don't meet the need of traffic when water rises.

In normal low-water conditions, these crossings usually protrude slightly above the surface of the stream. After even slight rains, many of them are under water by a few inches, so vehicles frequently cross at those points through several inches of flowing water.

One such low-water crossing isolates the Pot of Gold Camp from outside traffic, and on one fateful day in July 1987, the rains came. They kept coming, and with considerable force. In the hills, streams can rise perceptibly, even dramatically, in a matter of seconds. It was at just such a time that the driver of a busload of Pot of Gold campers faced the decision to cross or turn back. Yes, the water was rising quickly, but the driver felt he had time to make it. He chose to cross. Big mistake. The light truck crossing ahead of the bus stalled, stranding the bus behind it in the rising water.

The vehicles lost contact with the pavement and the water slowly swept them into the churning, rising turbulence. Panic ensued. Many campers decided it would be best to stay in the bus. Another mistake. The sliding, tilting vehicle quickly began to fill with water, and those who had lingered now faced deeper, faster and more violent water than had been the case only moments before.

People scrambled for any refuge they could find. Trees were the most obvious and easiest to reach. But the swelling water carried the frantically struggling campers past several trees before they could manage to catch one and climb to apparent safety. The rain kept falling and the water kept rising. Locals familiar with such floods later estimated that the current reached speeds in excess of sixty miles per hour. Literally within minutes, a tree that seemed like a solid and secure stronghold on which to ride out the tempest became a moving, creaking, bending death trap. Enter our hero.

A PRETTY GOOD DEFINITION OF A HERO IS A PERSON WHO DOES WHAT HAS TO BE DONE REGARDLESS OF THE CONSEQUENCES. *–DAN COOPER*

John Bankston was a high school football star. He was a big boy and very strong. When the water kept rising and the trees that people were clinging to began looking like traps, John started saving lives. One after another, John retrieved them from their precarious, disappearing perches. He laboriously worked his way out to them, loaded them onto his powerful back, and slowly carried them to shore. The current grew increasingly swift and dangerous, filled with sharp and heavy debris, including whole trees that had already been uprooted upstream. But John was young and strong.

The newspapers said he carried several people to safety, but he was unable to get to them all. Some died in the water that day. Many of those he saved would surely have gone with them. One of the campers he managed to save was especially at risk of drowning. The camper was wearing a full-leg cast on a broken leg. It was a plaster cast. The kind you're not supposed to get wet. The kind that gets really heavy when it does get wet. Reports vary, but consistently they mention John carrying that particular camper on his back for thirty full minutes before getting him to safety – a half hour for just that one camper.

There is no telling how long John labored that day in the violently churning water that carried trees past him. In some ways, John was responding like a typical football player. He relied on his strength and his conditioning to keep him going when others might have stopped. He felt invulnerable in his athletic youth, and that same feeling of invulnerability that served him so well on the football field was also his undoing on that fateful day. Somewhere out there in the water, on yet another mercy mission to still another anonymous victim of the flood, John disappeared. Ten died in the water that day. John's body is the only one that was never found.

A pretty good definition of a hero is a person who does what has to be done regardless of the consequences. There are true heroes and there are pretend heroes. John Bankston was the real thing. I never knew John, but I salute him with all my heart.

Originally published in A Cup of Comfort for Courage *(2004), Colleen Sell, ed. [New York: Adams Media].*

One of the things that makes life at Dixon so interesting is staying attuned to the diversity of the products needed by our customers. We are constantly intrigued by the sophistication of the industries we serve. Fire protection, construction, mining, chemicals and petroleum all have their different requirements and methods of operations. Each has its own story waiting to be told.

In this edition of *BOSS*, we would like to introduce you to another area of our business—the dairy industry. We service these folks with Bradford sanitary/hygienic couplers. Moving milk from the cow to the kitchen table is a complex process that requires dedicated professionals and quality equipment. We are proud to make our contribution to this effort. —R.L. Goodall

Between Cow

and Kitchen

MILK IS PRODUCED IN EVERY COUNTRY IN THE WORLD. ITS JOURNEY TO YOUR REFRIGERATOR IS FAST AND FURIOUS.

BY DAVID HOLZEL

When you pick up a bottle of milk from your supermarket's refrigerator, it should practically moo. Two days before it was delivered to the store, that milk was still in the cow.

Historically, milk's perishability has made it among the most local of industries, yet its easy conversion into other foods makes it a significant item of international trade.

And new technologies are even expanding the distance between cow and kitchen, says Ed Jesse, professor of dairy economics at the University of Wisconsin, in the heart of the United States' dairy country. "The localized nature is a bit of an artifact. Better transportation and longer shelf life are changing that."

The world's cows produced 595 million tons (540 million metric tons) of milk in 2004, according to the International Dairy Federation. (Milk is measured by weight as well as volume. A gallon of milk weighs 8.62 pounds and a liter weighs 2.2 kg) The European Union is the top producer of milk, followed by North America and Asia.

The process that takes raw milk and transforms it into a beverage fit for drinking is pretty much the same the world over, Jesse says. But that's where the similarities end. Farm size varies from a single cow to a herd of 3,000. And those cows can produce anywhere from 22,000-24,000 (lbs.) per cow per year, according to the International Dairy Federation.

The cost of production varies, too—from $9 (U.S.) per 220 pounds (100 kg) of milk in Argentina to $79 (U.S.) for the same amount in Switzerland.

MAKING MILK IN A HURRY

The milk that is produced from a cow is 101° F (38° C). It travels through stainless steel pipes to refrigerated vats, where it is cooled and stored between 36° F and 38° F. Sterile refrigerator tanker trucks then transport the raw milk to the processing plant. These trucks hold 40,000-50,000 pounds (18,140-22,680 kg) of milk, says Steve Larson, managing editor of Hoard's *Dairyman Magazine*, published in Wisconsin.

"So any time you see one of those big shiny trucks driving by, it'll contain 4,000 to 5,000 gallons [15,140-18,930 liters] of milk," he says.

After the truck pulls up to the plant, its load is tested for acceptable levels of bacteria, as well as for fat and protein content and contamination by antibiotics. The raw milk is then pumped through chilled tubes into holding tanks, called silos, which keep the milk below 40° F (4° C), according to creamland.com.

The raw milk goes through a four-step process – clarification, separation, pasteurization and homogenization—to become the milk purchased at a local grocery store.

Clarification, performed in a centrifuge, removes bacteria,

spores, dirt and other solids from the milk.

Separation can take place at the same time as clarification. Centrifugal force separates the fat from the skim milk, pulling the less dense fat globules (cream) to the center of the centrifuge, and the denser skim milk to the edges, where it is drained off.

Pasteurization extends the life of the milk by killing harmful, but not all, microorganisms through exposure to heat. Before Louis Pasteur developed the process in the 1860s, drinking contaminated milk often led to sickness or death. Pasteurization involves either heating the milk to 145° F (62.8° C) for at least 30 minutes or to 161° F (71.6° C) for at least 15 seconds.

The boxes of milk that don't need refrigeration have been completely sterilized through ultra-high temperature (UHT) pasteurization. This process heats the milk to over 200° F (93.3° C) for a few seconds.

Homogenization involves "passing the milk under pressure through a very fine nozzle to evenly disperse the fat globules in milk," according to creamland.com. Without being homogenized, the cream in a container of milk would clump together. The proportion of cream reintroduced to skim milk determines whether the final product becomes 1 percent, 2 percent, whole or other types of milk.

Once homogenization is completed, each type of milk goes into a separate refrigerated storage tank before it is packaged.

WE ALL SCREAM FOR ICE CREAM

Let's face it, ice cream is so rich, so soothing, so scrumptious that if it didn't exist, someone would have to invent it.

In fact, no one knows who invented it. Legend has it that Chinese emperors enjoyed ices flavored with fruit wine and honey 3,000 years ago. Stories abound of Alexander the Great and Roman emperors doing likewise. But then, they had armies they could send on a whim to the mountains to bring back ice for what would be known today as Sno Cones. The plebeians and hoi polloi were denied this royal fare.

During the Renaissance, a dessert resembling sherbet was developed in Europe. Closer to ice cream, it contained milk, egg white or gelatin, as well as fruit juice and water. Such "cream ices" remained the province of royalty and the elite through the 18th century. It's easy to see why—President George Washington spent $200 on ice cream during the summer of 1790, according to the International Dairy Foods Association. Was that one scoop or two?

At the time, ice cream was made by hand in a bowl–no wonder it was so expensive. The bowl was suspended inside another container filled with ice and salt, a combination which lowered the cream mixture below the freezing point. A New Jersey woman named Nancy Johnson is said to have invented the first hand-crank ice-cream maker in 1847. And four years later, a Baltimore, Maryland, milk dealer named Jacob Fussell decided to rid himself of extra milk inventory by manufacturing ice cream commercially. Finally, ice cream was ready to meet the masses.

It takes 12 pounds of milk to make one gallon of ice cream. Today's manufactured ice cream contains at least 10 percent fat. Sweeteners and stabilizers, which prevent large ice crystals from forming, are part of the recipe. So are emulsifiers, which provide a smoother texture to the final product.

These ingredients are blended, then pasteurized, and finally homogenized and frozen. Nuts, fruits and chocolate chips are added to the batch as needed, and the final product is packaged and sent to a "hardening room" with sub-zero temperatures.

The results would have amazed Alexander the Great.

– David Holzel

Source: International Dairy Foods Association

YAKETY YAK

If cow milk isn't to your taste, how about yak's milk? Or milk of mare?

Milk production is found in all countries, according to the International Dairy Federation. And while cow's milk is preferred hooves down–it is seven times more popular than its closest competitor, the buffalo – numerous other animals continue to be prized for their milk.

Almost half of all other types of milk are found in Asia. Some 90 percent of buffalo milk is produced in India and Pakistan, for example.

Sheep and goats' milk is produced primarily in Europe, where it is used in specialty products. And according to CNN, small moose dairies exist in Sweden and Russia. Camels, donkeys and reindeer are also used for their milk.

And for those not watching their cholesterol: A nice cold glass of seal's milk is more than 50 percent fat.

At the Borden milk processing plant in Houston, Texas, an operator calls electronically to a particular storage tank when it is time to package that type of milk. The liquid is piped to a filler bowl, a stainless steel container with nozzles, according to Howard Depoy, the plant's manager.

"If we were filling cartons, the operator would insert the carton flats into the machine," he says.

One by one, the machine heats the bottom of each carton, activating a resin that seals that side. The carton is then conveyed under the nozzles, which shoot milk into the container through the open top. Now filled, the carton moves on. The top is heated using what Depoy calls "squeezing jaws," to seal the carton.

When plastic jugs are filled, they're brought on overhead conveyers to be filled from another part of the plant. "As they exit the filler, the bottles are spun around and a cap is automatically applied," Depoy says.

Both types of containers are stamped with the packaging and expiration dates, then put in cases and conveyed to a cooler set at 35° F (2° C). The cases of milk are loaded onto trucks and hauled to market no more than two days later, he says.

CURDS AND WHEY

When the spider of nursery rhyme fame spoiled Little Miss Muffet's meal, she was seated on her tuffet and enjoying a bowl of curds and whey. Today, curds and whey are better known as cottage cheese–made most simply by heating skim milk at a low temperature until it begins to clump, or curdle, and then refrigerating it. The clumps are the curds; the remaining liquid is the whey.

(A tuffet is a low stool, by the way.)

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OTHER PRODUCTS MADE FROM MILK INCLUDE:

Cheese – All cheeses begin with curdled milk. The variations in cheese are due to different kinds of bacteria and molds used in production, the level of fat content and the length of the aging process. It takes 10 pounds of milk to make one pound (or 4.5 kg to make 0.45 kg) of cheese. Greece is the largest cheese-consuming nation, according to the International Milk Federation – 63 pounds (28.7 kg) per capita.

Butter is made by churning fresh cream, with an 80 percent fat content. Butter is most popular in France, where 17 pounds (7.8 kg) are consumed per capita.

Yogurt is produced by bacterial fermentation. The United States leads the way in yogurt consumption – 189 pounds (85.8 kg) per capita.

Cream is the fat separated out during the milk production process. In addition to being the major component of butter, it is also processed into heavy cream for whipping (35 percent fat), cream for coffee (18 percent or 10 percent fat) and other products.

Buttermilk has no relation to butter. It is generally made from skim or low-fat milk which is fermented with bacteria that convert milk sugars into lactic acid. The lactic acid is what gives buttermilk its sour taste and thick texture.

Sour cream is made by the same process as buttermilk, but uses cream instead of skim or low-fat milk.

While some milk products are relatively perishable, others are fit for international trade.

Cheese is a well-known example. Some 1.5 million tons (1.37 million metric tons) were traded worldwide in 2003, according to the International Dairy Federation.

But the most important product in the international dairy trade is whole milk powder – an estimated 1.87 million tons (1.7 million metric tons) of it were bought and sold in 2003. That year, the volume of skim milk powder traded was 1.4 million tons (1.3 million metric tons).

Highly nutritious, universally consumed and capable of transforming itself into a variety of foods, milk appears to be the indispensable food. Improved transportation and technology will only make it more so. The cow already knows what to do.

Dixon employee, Larry Ford, an ex-dairyman, contributed to this story.

How Much Milk?

They do enjoy their milk in Finland. More than any other place on Earth, in fact. In 2003, the average Finn drank 385 pounds (174.5 kg) of milk, the International Dairy Federation reports. Icelanders are nearly as thirsty, drinking 372 pounds (168.8 kg) per person.

European Union countries are the world's biggest per capita consumers of milk. In the United Kingdom, the rate per person in 2003 was 241 pounds (109.6 kg); Australia 221 pounds (100.3 kg); Canada 208 pounds (94.5 kg); and the United States 189 pounds (85.8kg).

One of the biggest changes in the public's taste for milk is the shift away from whole milk (it contains 3.5 percent milkfat) to low-fat milk. By far, most drinkers opt for milk containing 1 percent or 2 percent milkfat. "They count for over half of all milk consumption," says Ed Jesse, professor of dairy economics at the University of Wisconsin.

Consumption of skim milk which, contrary to what you might believe, is not entirely fat-free (it contains a smidge, about 0.1 percent, of fat), has gone up since the heyday of whole milk, but its popularity seems to have reached a plateau, he says.

COWS MILK : SUMMARY FOR SELECTED COUNTRIES
1,000 Metric Tons

Fluid Milk Consumption	2000	2001	2002	2003	(P) 2004	(F) 2005
Canada	2,913	2,909	2,884	2,830	2,850	2,887
Mexico	3,915	4,075	4,080	4,352	4,345	4,400
United States	26,890	26,850	27,003	27,250	26,950	27,075
Argentina	2,300	2,350	1,990	2,050	2,150	2,200
Brazil	12,690	12,390	12,295	12,391	12,526	12,750
Peru	750	750	745	715	650	675
European Union [1]	36.226	36,385	34,471	34,217	33,998	34,141
Romania	3,435	3,500	3,460	3,662	3,770	3,755
Russia	14,156	14,140	14,350	13,350	13,000	13,000
Ukraine	3,100	3,200	3,300	3,450	3,400	3,350
India	33,000	33,300	33,500	34,000	35,500	38,500
China	3,813	4,463	5,678	7,661	10,315	11,606
Japan	4,971	4,941	5,002	5,035	4,965	4,965
Australia [2]	1,992	1,920	1,966	1,982	2,019	2,050
New Zealand [3]	346	355	355	360	360	360
Total Selected Countries	**150,497**	**151,528**	**151,079**	**153,305**	**156,798**	**161,714**

Figures supplied by the United States Department of Agriculture, Foreign Agricultural Service from various counselor and attache reports, official statistics and results of office research, released April 2005.

Notes:
(p) Preliminary.
(f) Forecast.
(1) Based on deliveries
(2) Year ending May 31 of the year shown.
(3) Year ending June 30 of the year shown. FAS/CMP/DLP Dec., 2004

I Never Thought I Was a Failure

By Michael Josephson

It was six months since Mac graduated from college and he wasn't making much progress finding a job. "I want a job I can enjoy," he told his father, who managed a muffler shop. His dad responded, "Son, they call it 'work' for a reason. Get a job to make a living so you can get on with your life." Mac shot back, "I don't want to waste my life managing a muffler shop. I've got higher standards."

Obviously hurt, his father said, "Don't you think I wished for an easier or more prestigious or better paying job? But you know what? I've had to face up to the fact that I didn't have the talent to play pro hockey or be a sportswriter. And I'm no business genius. But don't tell me I wasted my life. I've given you and your two sisters a good home and college educations, I love your mother and I'm respected in the community. Until now, it never occurred to me that I might be a failure." And he left the room.

Mac's mother was furious. "We don't begrudge your ambitions but how dare you demean another man's life? Here's our definition of success." She handed him a folded newspaper clipping of an old Ann Landers column with a poem by Betty Anderson Stanley:

"He has achieved success who has lived well, laughed often and loved much; who has enjoyed the trust of pure women, the respect of intelligent men and the love of little children; who has filled his niche and accomplished his task; who has left the world better than he found it, whether by an improved poppy, a perfect poem, or a rescued soul; who has never lacked appreciation of Earth's beauty or failed to express it; who has always looked for the best in others and given them the best he had; whose life was an inspiration; whose memory a benediction."

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LOUIS PASTEUR

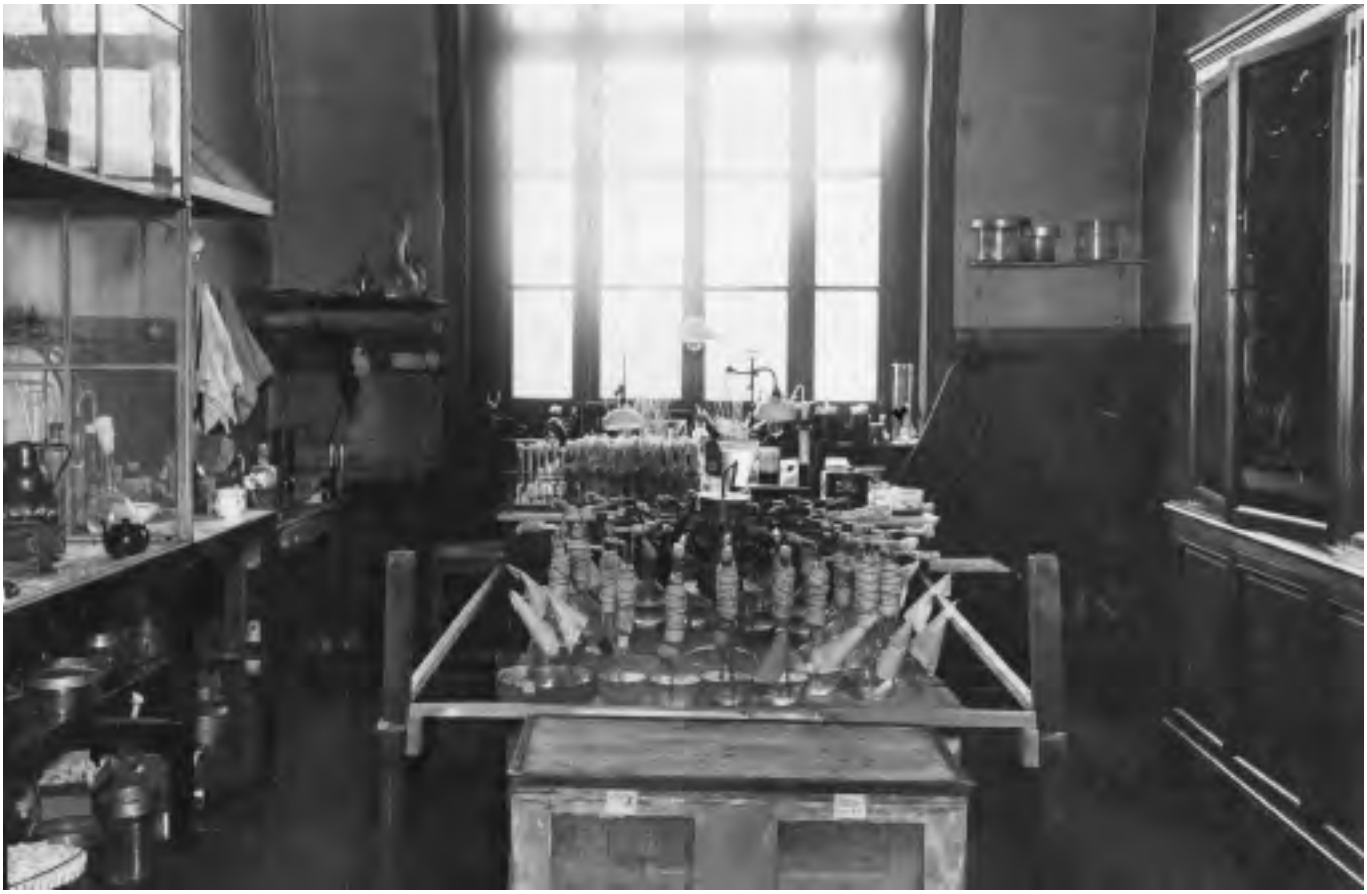
BY LESLIE LICHTENBERG

It takes hard work, tenacity and vision to accomplish what only a few scientists throughout history have been able to do: discover new science that not only advances our knowledge but also benefits the greater common good. Louis Pasteur, the French chemist and founder of microbiology, was among this elite group of men and women. His revelations in germ theory, pasteurization, fermentation and in the discovery of vaccinations created a ripple effect throughout the world more than a century ago that can still be felt today.

Born on December 27, 1822, in the small French village of Dole, Louis Pasteur was the son of Jean Joseph, a tanner, and Jeanne, a country woman. Louis lived with his parents and three sisters in the small town near Dijon. They were a hard-working, close-knit family.

The world into which Louis Pasteur was born was a dangerous one. Millions of people had died of diseases such as typhoid and cholera, while epidemics of flu, scarlet fever and diphtheria were wreaking havoc on large populations. Even a hospital visit in the early 19th century was considered a risky venture, due to the lack of knowledge about germs and their potential for harm to the human body. No one could have predicted then the impact Louis Pasteur's discoveries in microbiology and immunology would have on the future of medicine and human health care.

Though not a stellar student, Pasteur was an able fisherman and a talented artist. At age 15, things began to turn around in school, when the young Pasteur's academic progress garnered the attention of his teachers. At their urging, Pasteur left home for Paris in 1838, where he briefly attended the École Normale Superieure, the national school for training college professors. Unfortunately, a severe case of homesickness brought Pasteur back to Dole, where he once again took up his painting. A year later, Pasteur enrolled in the college at Besancon, where he thrived.



In 1842, Pasteur returned to Paris to attend the Lycee Saint-Louis. There, his hard work and diligence earned him not only the first prize for physics, but also a second chance at the École Normale. He completed his studies at the École Normale at the age of 26, with a Doctor of Science degree, and soon after he accepted a job as a chemistry assistant. By this time, Pasteur's desire for a career in science was firmly cemented.

Pasteur's doctoral thesis investigation of the form and structure of chemical crystals was the first of many scientific discoveries to earn him fame and respect among his colleagues. Picking up on earlier research by German chemist Eilhardt Mitscherlich, Pasteur's work further illuminated the behavioral properties of crystals. At 26, he became the young protégé of the science community.

At the death of his mother in 1848, Pasteur returned to Paris, where he took a position as a physics teacher at the high school in Dijon, and later as acting professor of chemistry at the Strasbourg Academy in eastern France. It was at Strasbourg that Pasteur met and later married Marie Laurent, the daughter of the school's religious leader. Marie shared Pasteur's traditional values and as such was his ideal mate. Despite her husband's constant preoccupation with work, she was a constant supporter and faithful assistant in the laboratory. The couple remained happily married well into their senior years and together raised five children: Jeanne, Jean-Baptiste, Cecile, Marie-Louise and Camille.

In the early 1850s, the Pasteurs left Strasbourg for Lille, where Louis began to investigate fermentation. Looking at the problems of fermentation in beetroot alcohol, Pasteur soon discovered ground-breaking laws regarding alcoholic and lactic fermentation; namely, that fermentation was caused by living organisms. It was considered a revolutionary concept and completely counter to the beliefs of the foremost chemists of the time, who maintained that the yeasts found in fermentation were dead, decomposing chemical substances.

As with his earlier research, Pasteur believed strongly in the importance of laboratory experimentation as the primary path to scientific discovery. Through diligence, perseverance and countless hours in the lab, he discovered and proved many theories that would forever alter the course of scientific investigation.

In 1857, Pasteur was named administrator and director of scientific studies at the École Normale. At his alma mater, Pasteur's research in microbes had already begun to dismantle the theory of spontaneous generation, until then thought to be the seminal theory of the origin of living things.

"Nothing is more agreeable to a man who has made science his career than to increase the number of discoveries, but his cup of joy is full when the result of his observation is put to immediate practical use," Pasteur said.

Using a few cramped rooms at the

École Normale to set up a makeshift laboratory, he once again set about the painstaking process of discovery that would mark the beginning of his work in germ theory. Pasteur used swan-necked flasks, into which he poured unsterilized, sugared yeast water, to prove that microbes were airborne, a stunning discovery that not only disproved spontaneous generation, but also laid the groundwork for renowned germ theory of disease.

In 1862, Pasteur was elected to the French Academy of Science. Not long after, the French Emperor Napoleon III invited the well-respected scientist to investigate the cause of a mysterious disease that was turning wine sour and thus threatening the viability of the country's wine industry. Pasteur was honored to have his counsel sought out by the ruler of France, and through his investigation, quickly learned that microbes were once again the root of the problem. Searching for a method that would kill the microbes without compromising the taste of the wine, Pasteur found that by heating, bottling and corking the wine, thus sealing it off from outside air, he could prevent new microbes from developing. This method, later named pasteurization, would eventually become a critically important method for preventing wine, beer, milk, cheese and other foods from turning sour.

When Pasteur lost his daughter, Jeanne, to typhoid fever in 1859, he found solace in his work. A workaholic who arrived at his laboratory before dawn every day, Pasteur vowed to continue his germ theory investigation in order to fight the disease that took his young daughter's life. Though his work brought him fame and renown, it also took its toll on his personal life. Pasteur was notoriously private, difficult to live with, and passionately dedicated to his science. Because of his knowledge and awareness of germs, Pasteur was care-

THE BIRTH OF PASTEURIZATION

In 1854, when he was named Dean of Sciences at the University of Lille, Louis Pasteur was asked to study the fermentation of beet sugar into alcohol. A local manufacturer was puzzled as to why the alcohol was often contaminated during the fermentation process. During the course of his investigation, Pasteur discovered that fermentation was caused by living organisms, and that in fact, the life processes of yeasts and other microbes were at the root of fermentation.

Pasteur soon extended this work, using other ferments, such as wine, vinegar, beer and milk. He claimed that "lactic yeast," comprising living organisms, was the reason behind the transformation of sugar into lactic acid, leading to such common by-products as sour milk and yogurt. These revelations, described in detail in Pasteur's 1857 paper, *Note on So-Called Lactic Fermentation*, marked the start of scientific microbiology and led to the process now known as pasteurization.

Pasteur's research was revolutionary because it shed light on ways to avoid spoilage of perishable products. By destroying the microbes already present in these products – mainly through heat — and by protecting the sterilized material against subsequent contamination, beverages and milk-containing food products could be preserved. Most disease-producing bacteria in milk could be killed by heating it to 145°F (62.8°C) and then keeping it at that temperature for 30 minutes.

Today, a more commonly used process known as "flash pasteurization" involves heating milk at a higher temperature of 161°F (71.6°C) and maintaining it for 15 seconds.

ful to a fault, examining the cutlery at the dinner table and avoiding handshakes at all costs.

The year 1865 marked a new chapter in Pasteur's career, when he was called upon by Jean-Baptiste Dumas, a chemist and politician, to investigate the cause of a disease that was threatening the French silk industry in Alais. Armed with his knowledge of microbes, Pasteur set about discovering the reason behind the plight of the silkworm farmers. Months into the investigation, however, Pasteur's work was cut short at the news of his father's death, followed shortly thereafter by the death of his own two-year-old daughter, Camille. When another daughter, Cecile, died from typhoid early the following year, Pasteur was nearly too distraught to continue, but he nevertheless continued his work.

"…I was only able to be with her (Cecile) for a few days, being kept here by my work, and full of deceiving hopes for a happy issue from that terrible disease," Pasteur wrote in a letter to a cabinet minister friend shortly after Cecile's death. "I am now wholly wrapped up in my studies, which alone take my thoughts from my deep sorrow."

Over the course of the next several years, Pasteur's silkworm investigation progressed. His discovery of bacteria in diseased silkworms and the conditions under which the bacteria thrived proved valuable for the farmers, who, under Pasteur's counsel, learned how to keep the silkworm nurseries clean, dry and bacteria-free. He also taught the farmers how to use microscopes to separate the diseased silkworms from the healthy ones. These revelations once again earned Pasteur great accolades, and in 1868, he returned to Paris, where Napoleon III ordered a new laboratory to be built especially for him.

Not long after his return to Paris, the 45-year-old Pasteur suffered a life-threatening stroke.

"Will I live to discover new mysteries and find these truths which God has created? Have I been able to provide a stone to this edifice of knowledge? I can only hope," wrote Pasteur.

These were the questions the ailing Pasteur pondered during his long road to recovery. Less than a year later, he returned to his laboratory, undeterred by the stroke that left him fatigued and slightly paralyzed.

In 1870, the start of the Franco-Prussian War punctuated the need for a deeper understanding of disease, as more than half of the French soldiers who underwent surgery during the war died of infection. French doctor Alphonse Guerin invited Pasteur to visit his hospital, enabling the chemist to gain a bird's-eye view of medical practice. His observations ultimately led to his development of a series of sterilization procedures for nurses and surgeons, including heating bandages, washing and sterilizing instruments.

"If it is a terrifying thought that life is at the mercy of the multiplication of these minute bodies, it is a consoling hope that science will not only remain powerless before such enemies," Pasteur stated in *The Germ Theory and its Application to Medicine and*

Surgery (1878).

In the late 1870s and early 1880s, Pasteur's continued investigations of germs – which he applied to such diseases as anthrax and cholera – led to a stunning discovery. After injecting a day-old culture of cholera microbes into several chickens, he learned that although the chickens remained slightly ill, they did not die. When the same chickens were injected with a fresh culture of cholera germs, they still lived, yet this same fresh culture injection killed a second group of chickens that had not received the old culture.

Pasteur's revolutionary experimentation with chicken cholera immunization revealed that a weaker strain of disease when injected into animals – and possibly humans – could aid in building immunity and fighting disease. Years later, when Pasteur applied the same principles of immunization to rabies, he would eventually have the opportunity to demonstrate them on his first human subject. In 1885, nine-year-old Joseph Meister, bitten by a rabid dog 14 times and near death, was brought to Pasteur by his distraught mother. Despite initial trepidation, Pasteur proceeded with the intensive and dangerous course of treatment, and not long after, the world rejoiced at the news that the young boy had survived. It wasn't long before victims of dog bites from around the world came to Pasteur's laboratory seeking his miracle cure.

In 1888, following the enthusiasm of Pasteur's discovery of the rabies vaccine, he was granted a new laboratory named in his honor, the Pasteur Institute. The world-renowned organization, still in existence today, became a hub of research into the cure of microbial diseases. In 1895, one year after discovering the diphtheria vaccine, Pasteur's failing health forced him into retirement. In September of that same year, he died peacefully in his sleep, surrounded by his family.

Louis Pasteur received a hero's funeral at Notre Dame Cathedral in Paris, and was buried in the chapel at the Pasteur Institute.

NEW ENGLAND, USA—

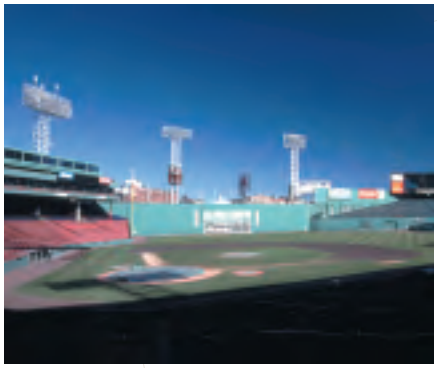
CHARMING ALL YEAR LONG

BY LINDA ESTERSON

Whether you are beach-bound during the summer months, on a quest for the most beautiful fall foliage, or in search of the best slopes around, New England is where relaxation and splendor abound all year long.

More than 14 million people call New England home, and they are spread across six northeastern states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. It is a region defined by cultural uniformity and a shared heritage, providing a little bit of everything: arts and culture, beaches, historic sites, breathtaking views and famous landmarks.

The area has its own unique charm with its rural landscape, seaside villages and small towns. Yet, its cities are booming with their own distinctive appeal and are rich in history.



Massachusetts

Boston is one of the country's most historic and cultured cities. It is a thriving, cultural metropolis with art museums and the renowned Boston Symphony and Boston Pops orchestras. The reigning world champion Boston Red Sox play at the famed Fenway Park, where the baseball experience is a throwback to the sport's early days.

There is plenty of history to Boston as well. It was the source of much of the Revolutionary War and pre-Revolutionary activity, including the Boston Tea Party, the Battle of Bunker Hill and Paul Revere's infamous ride, warning residents of the impending enemies' pursuit. Many of these and other historic events are retraced and are re-enacted by visitors on a daily basis in Boston. Walking along the Freedom Trail provides a look into America's early history with cobble-stone streets and buildings that mirror the colonial times. Just south of Boston is Braintree, the home of Founding Father and second United States president, John Adams.

Boston's suburbs provide an eclectic mix of luxury neighborhoods and tree-lined commons in town centers. Walking along the historic streets, tourists find a variety of quaint shops and corner taverns.

Cambridge, located adjacent to Boston, is home to notorious institutes of higher learning, Harvard University and the Massachusetts Institute of Technology.

Millions of visitors every year brave the traffic to enjoy Cape Cod's warm, sunny beaches. The Cape Cod peninsula juts out like a hook into the Atlantic, with the bay side featuring calmer, more tranquil beaches, and the outer cape offering higher waves and often unsafe currents. The islands of Martha's Vineyard and Nantucket, reachable only by ferry or air, offer more rustic and remote beaches with rocky shores and panoramic ocean views. The best known and most interesting beach, the Cape Cod National Seashore in South Wellfleet, provides more than 40 miles of beaches with huge sand dunes, swimming, hiking and biking trails, and nature programs for visitors of all ages.

Rhode Island

The country's smallest state is large in history. In Rhode Island's capital city, Providence, explorers find narrow streets of Victorian-era office buildings with grand designs and many windows– a must see for architecture buffs! College Hill is home to America's first Baptist church, the campus of Brown University and many historic colonial homes along Benefit Street. Some of the region's best restaurants are located in Federal Hill, Providence's well-known Italian-American neighborhood.

Providence is also known for its year-round lively arts district, including the Trinity Rep Theater, Rhode Island School of Design Museum, flame-throwing Waterfire show and touring Broadway plays.

Founded in the 17th century as a haven from religious persecution, Providence is the center of colonial history with museums and historic sites. One of the most popular is Roger

(opposite left) Boston's skyline shows the city's diversity by its unique buildings. The USS Constitution and Fenway Park are popular Boston sites.

(below right) White Mountain National Park in New Hampshire offers visitors beautiful surroundings.

Williams Park, located on the site where Roger Williams landed and founded his colony.

Newport is home to storied mansions and colonial history, with more colonial era inns and bed and breakfasts than any other town in the United States. Cozy lodges range from those built by the earliest settlers to great mansions constructed by 19th century industrialists. Here, there are plenty of museums including those based on American history, naval history, science and tennis. Newport's white sandy beaches and bustling harbor offer the perfect spots for relaxation, and a walk along the shore provides a sense of calm here, where walking, biking and shopping are always the order of the day.

Connecticut

In Hartford, visitors discover centuries of history and culture. Colonial homesteads prove popular attractions, most notably Mark Twain's eccentric home and the Harriet Beecher Stowe House, both on Farmington Avenue. Hartford is also known for its museums, both contemporary and historic. The Wadsworth Athenaeum, featuring more than 45,000 works of art, is one of the oldest art museums in the United States. The Old State House, the site of the signing of the country's first written constitution, is the oldest state house in the country. In addition, Hartford's Ancient Burying Ground houses early settlers and soldiers from the Revolutionary War. Visitors to Hartford also enjoy the Hartford Police Museum, Bushnell Park, the country's oldest public park, with the Soldiers and Sailors Memorial Arch, an antique carousel and the Pumphouse Gallery. Other favorite sites include Gillette Castle, Dinosaur State Park, the Old Newgate Prison and the New England Air Museum.

In Essex, a fine, old New England river town, visitors can ride an old steam train or cruise up the river.

Connecticut's diversity is reflected in the variety of state parks, beaches, quaint village greens, and hiking and biking trails. Key tourist destinations include the beautiful Litchfield Hills, Housatonic River and Connecticut River Valley. Long Island Sound offers beach-goers a calm experience: few waves and undertow for bathers and large, sandy beaches like you find at the ocean. This part of Connecticut offers visitors more beaches than any other part of the state, including state parks and small community beaches set on little inlets and coves.

Connecticut also features an array of lodging, including historic inns, cozy bed and breakfasts, as well as lush hotels close to the state's cities and casinos. The Mystic Region, located in Eastern Connecticut, offers the flash and pizzazz of the Foxwoods and Mohegan Sun Casinos. These vast gaming palaces feature outstanding entertainment and a variety of top restaurants.

Vermont

Known as the Green Mountain State, Vermont provides spectacular views and experiences every season of the year. In winter, its mountains and valleys are

Covered bridges in Vermont are familiar sights to visitors. Vermont visitors can enjoy sleigh rides and traditional architecture.

blanketed with the purest snow, for skiing, snowshoeing, snow tubing and snowmobiling. Vermont is known for its lush resorts, namely Killington, Woodstock, Quechee, Sugarbush, Mad River and Middlebury in Central Vermont. The scenic mountain roads also provide breathtaking views of fall foliage with a vivid array of color. In addition, Vermont's steepled meeting houses, pastures and covered bridges evoke a time past when life moved at the pace of a horse. Favorite warm weather activities include hiking, biking, swimming and sightseeing along country roads. The varied landscapes of Northern Vermont enable vacationing in quiet solitude or the hustle and bustle of the hip college scene. In the western part of the region is exquisite and historic Lake Champlain, where boating, fishing, exploring islands and enjoying the vista of the lake and mountains are easily accomplished.

Along the lake shore is Burlington, the state's largest town, and home of the University of Vermont. Church Street Marketplace is a vibrant urban mall with interesting shops, fine dining and spectacular nightlife. In Central Vermont, history and science discoveries to entertain the whole family are found at the Billings Farm & Museum in Woodstock. Activities include riding a gondola to walking a country road; schussing down a mountain on skis, snowboard or inflated tube; paddling across quiet water; or antique shopping. Southern Vermont is a favored destination for people seeking outdoor activities and quaint hospitality. The region features historic Bennington, a Revolutionary War battle site; Manchester, an outlet shopping Mecca; and in the valley below Stratton, Bromley and Magic Mountain ski areas; and Mount Snow, a hub for winter and summer activities.

New Hampshire

The city of Dartmouth, named for the Ivy League college located in Hanover, is the region's primary outdoor attraction for its culture and nature. Lake Sunapee and Lake Winnipesaukee, the area's largest body of water, as well as the region's more than 250 lakes and ponds and 18 miles of ocean shoreline offer great swimming, boating, fishing, biking and bird watching in the summer. Numerous ski and snowmobile trails, ice fishing and ice boat races keep winter enthusiasts busy. In addition, there is no

better place to view foliage and its changing colors in fall than among fields, stonewalls, old churches and barns among hills and beside ponds in Dartmouth.

Along the shoreline's winding roads are many attractive lakefront towns. Wolfeboro and Meredith are particularly striking and offer visitors the opportunity to spend days on a lake cruise, fishing for the big one, playing on the beach or strolling through town. Traveling along the Connecticut River to Cornish provides a view of the world's longest covered bridge and a chance to visit sculptor Augustus Saint-Gaudens' garden and home. Many nearby towns date back to the earliest days of colonial settlement, as seen at the Strawberry Banke Museum. New Hampshire's Seacoast region features Hampton Beach and a boardwalk packed with fun.

Located at the southernmost tip of New Hampshire, the Portsmouth Naval Shipyard is one of four remaining publicly owned shipyards in the nation. Portsmouth is America's oldest and most experienced naval shipyard in submarine design, construction, modernization and maintenance, and has a key role in the very-deep ocean submersible and special operations arenas. Today the shipyard's primary mission is the overhaul, repair, modernization and refueling of nuclear-powered submarines. It is currently the planning yard for the Navy's deepest diving submarine and submersible as well as other scientific research, defense prototype testing and submerged rescue platforms.

Maine

Maine is a land of many lakes, rugged coastline and vast forests, lined with the crashing white water rivers. Picturesque lighthouses, fishing villages and ocean vistas along the Maine coast add to the area's subtle beauty. Acadia, New England's only national park, also offers spectacular views.

The city of Portland has a beautifully restored historic district that combines fine restaurants and shopping with a feel for the seagoing past.

Summer sees Maine in its luster, with cool breezes, biking along the sea, guided whitewater rafting trips, whale-watching and discovering Maine's seafaring past. Beaches dot the entire coast of Maine. The South Coast is home to long, beautiful beaches accented by lighthouses, rock outcroppings and dunes. In mid-coast Maine, smaller, more secluded beaches line the coast.

Come wintertime, skiing, snowmobiling and ice fishing are actively pursued throughout the state.

Maine is also famous for its lobster. Maine lobster, also known as the American Lobster, comprises more than half of all lobsters caught in the United States. Maine lobster is easily distinguished from those caught elsewhere by its large heavy claws. Because of its sweet, delicious flavor and tender texture, Maine lobster is the world's most prized catch. Live Maine lobster is available year-round, with the bulk of the catch harvested in the summer and fall.

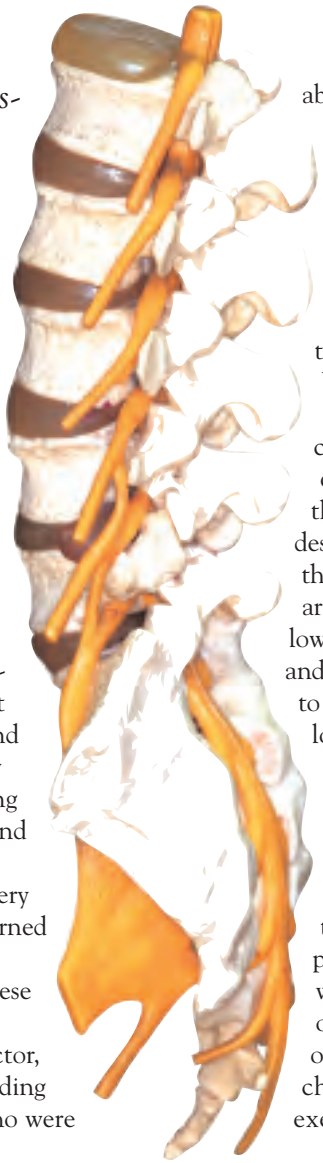
New England's diversity offers activities and sights to accommodate all its visitors.

Excerpted with permission from www.visitnewengland.com.
Lobster information provided by www.lobsteranywhere.com.

Back Pain

Everyone loves to talk about his or her diseases and I am no exception. So let me tell you about my low back problem and how I cured it – by accident!

BY MARK BICKLIN



The first time my back attacked me, I was only about 12 or 13 years old. I had taken a "set shot" with a basketball from the half-court mark, and I don't remember if a miracle happened and the ball went into the basket, but I do remember that I had to hobble home, crippled with pain. After several more such incidents, it seemed clear that I had inherited my father's bad back.

At 14, I took up weight lifting and concentrated on exercises for the lower back. At that point my back was still in good enough shape to respond to heavy weight lifting exercises. Throughout my teenage years, I continued these exercises. As long as I exercised regularly, my back stayed healthy and painfree.

In my twenties, I gave up weight lifting and every other form of exercise, and my back problem returned with a vengeance. About once or twice a year it would "go out" on me, and as the years passed, these episodes became more and more painful and disabling. On various occasions, I visited a chiropractor, an orthopedic surgeon and several osteopaths, finding the greatest and quickest relief with the latter, who were able to snap my spine back into alignment whenever the occasion demanded.

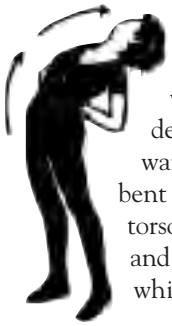
During this time, several doctors recommended that I do certain exercises and I did do them – sometimes…for a while. This cycle continued for several years until I read a book called *Orthotherapy* by Arthur Michele, MD, professor and chairman of the department of orthopedic surgery at New York Medical College.

Dr. Michele explains that the underlying cause of most back problems involves an extraordinarily large complex of muscles in the lower back known as the iliopsoas. He describes it as "mainly a broad flat muscle in the lower back, but like an octopus, it has arms reaching out in many directions." Its lower segments are attached to the pelvis, hips and thigh bones, while its upper extremities go to every vertebra in the lumbar area of the lower spine, and even up to the lower thoracic (chest) vertebrae in the mid-back.

Dr. Michele believes that 20 minutes to a half hour, twice a day, of stretching could eliminate back pain for a lot of people. Below are some exercises that will get to the heart of many muscular difficulties. In performing these exercises, it is important to warm up gradually and do the exercises in order because the last ones act most directly on the iliopsoas itself. Always be sure to check with a doctor before starting a new exercise program.

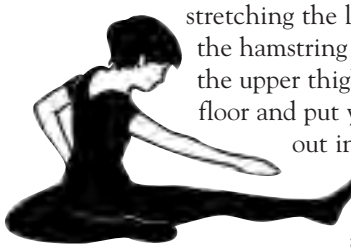
The Neck and Shoulder Uncramper is designed to relieve cramping and pain in the neck and shoulders. Stand with your feet slightly separated in the neck and shoulders. Bend forward with your arms and head hanging loosely. Bring your arms forward, up and back in a free-swinging circle. If it is more comfortable for you, swing just one arm at a time. Make from 50 to 300 continuous circles with your arms at least once a day.

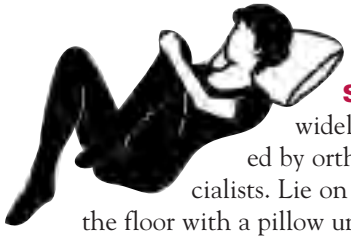
For an Ache in the Middle Back, this exercise is designed to work out the muscles of shoulder blades and middle back. It also helps correct an exaggerated forward or backward curvature of the spine. Stand with your feet wide apart and body bent forward at the waist, clasp your hands behind you. Let the weight of your head and shoulders pull your torso forward. Now, remaining bent at the waist, lift your torso by raising your head and arching your back while pulling your shoul-



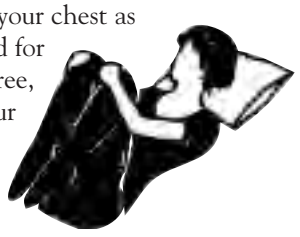
der blades sharply together. Hold this position for a fast count of ten. Then relax and let your body droop forward again. Repeat this movement 10 to 20 times whenever your upper back, neck or shoulders feel cramped, or at least twice a day.

The Low Back Stretcher is for stretching the low back and the hamstring muscles of the upper thighs. Sit on the floor and put your left leg out in front of you, toes straight up and then swing the leg over as far as possible toward your left side. Bend your right knee and bring the right heel close to the crotch, keeping the left knee flat on the floor and holding your left hand in the small of your back. Sit as erectly as possible, twist to the left until you're facing the outstretched left leg. Now reach out your right hand and try to touch your left toes, bending from the hips. Hold here a few seconds for a slow steady stretch, and return to the original position. Repeat and then change to the right side.



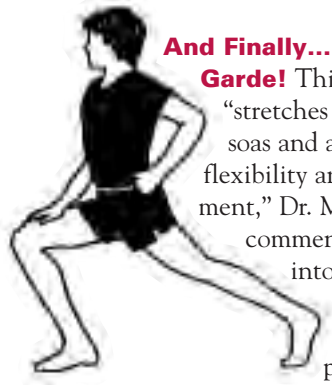


The Knee-Chest Stretch is widely recommended by orthopedic specialists. Lie on your back on the floor with a pillow under your head and your knees bent. Keep your feet about 12 inches apart. Now grab your left knee with your right hand and pull it as close to your chest as you can. Hold for a count of three, and lower your leg to the bent-knee position. Repeat three times. Do the same with the other knee and then hold both knees together.



Relax Your Uptight Spine by kneeling on the floor with your knees about six to eight inches apart and bend forward from the waist, stretching your arms out over your head. Your elbows should be straight so that your forehead and lower arms and hands are actually resting on the floor. Being sure to keep your thighs perpendicular to the floor, press your chest down as far as it will go, all the way to the floor if possible. Hold it for a fast count of ten and then relax the chest but stay down there for another few seconds. Repeat as many times as you can in three minutes. This exercise stretches the hip joints, the entire spine and the shoulder muscles as well.

For Happier Hips, Dr. Michele says this exercise "stretches the tight hip and thigh connector muscles and increases the range of motion, thus facilitating correction of hip and thigh disalignment." Stand at arm's length from a wall with your side to it. Place the flat of your hand on the wall for support, which you should be able to do without stretching. Now, lean the hip facing the wall in toward the wall so that your whole pelvis is curved to the side. Repeat 20 to 50 times and then switch sides. If you can't do 20, which you probably can't, do as many as you can without straining yourself.



And Finally...En Garde! This exercise "stretches the iliopsoas and aids body flexibility and alignment," Dr. Michele comments. Get into a fencer's thrust position, placing your right foot forward, bending your knee and stretching your leg as far in front of you as you can. Turn your right foot in slightly, but try to keep the left one pointing straight ahead, with the heel lifted. Hold your torso erect and stretch your torso backward until a pull is felt in the groin. To help balance yourself, keep your left hand on your left hip and your right hand on your right thigh. Repeat the stretch several times and then do it with the left foot forward. Dr. Michele urges doing this exercise "as many times a day as you have time and strength for."

Don't do calisthenics at all. Push-ups and chin-ups are especially bad, and trying to bend over and touch your toes with legs held straight is sheer insanity. Joining a yoga class is a very good idea. Some people make a big fuss over the kind of mattress you should sleep on. I have found that compared to the effect of stretching your muscles, the mattress is meaningless. Of possible value, though, is sleeping on your side, with your legs well bent and raised. On leg should rest on top of the other.

Reprinted from The Practical Encyclopedia of Natural Healing.

ECONOMICALLY SPEAKING

The International Dairy Federation states that the world's cows produced 595 million tons (540 million metric tons) of milk in 2004. However, some of this milk produced was used to manufacture cheese, butter, ice cream and other dairy products.

CHEESE PRODUCTION SUMMARY FOR SELECTED COUNTRIES
1,000 Metric Tons
2004 Preliminary

European Union[3]	6,292
United States	4,020
Former Soviet Union	530
Brazil	470
Egypt	455
Australia	391
Canada	326
New Zealand	313
Mexico	130
Japan	35

BUTTER PRODUCTION SUMMARY FOR SELECTED COUNTRIES
1,000 Metric Tons
2004 Preliminary

European Union[3]	2,201
United States	550
Former Soviet Union	465
New Zealand	407
Russia	270
Australia	132
Japan	82
Canada	88
Mexico	80
Brazil	75

Note:
New Zealand figures year end May 31.
Australia figures year end June 30.

In addition to milk cows, beef, veal, pork, broiler meat and turkey contribute to the 18.6 million tons of livestock raised throughout the world.

2004 TOTALS OF LIVESTOCK IN SELECTED COUNTRIES
1,000 Metric Tons

	Beef and Veal[1]	Pork[1]	Broiler[2]	Turkey[2]
Australia	2,100	n/a	n/a	n/a
Brazil	7,975	2,600	8,408	226
Canada	1,460	1,930	920	147
China	6,683	47,350	n/a	n/a
European Union[3]	8,077	21,200	7,640	2,070
Japan	n/a	1,271	1,124	n/a
Mexico	2,150	1,150	2,400	14
Russian Federation	1,590	1,725	15	n/a
United States	11,261	9,312	15,285	2,441

Figures supplied by the United States Department of Agriculture, Foreign Agricultural Service from various counselor and attache reports, official statistics and results of office research, released April 2005.

Notes:
(1) Carcass Weight Equivalent
(2) Ready to Cook Equivalent
(3) Data represents EU-25 member states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