Facts and ideas from anywhere

William C. Roberts, MD

THE AMISH, BODY WEIGHT, AND EXERCISE

Bassett and colleagues (1) studied 98 Old Order Amish adults, all of whom lived in an Amish community in southeastern Ontario, Canada. Most were farmers. The 53 men and 45 women aged 18 to 75 years represent 42% of the 455 people in the Amish community. A pedometer was given to each of the 98, and they recorded the number of steps per day and their physical activities for 1 week. The average number of steps per day during that week was 18,425 for the men and 14,196 for the women. The men reported 10 hours per week of vigorous physical activity, 43 hours per week of moderate physical activity, and 12 hours per week of walking. Women reported 3.4 hours per week of vigorous physical activity, 39 hours per week of moderate physical activity, and nearly 6 hours per week of walking. A total of 25% of the men and 27% of the women were overweight (body mass index ≥25 kg/m^2), but none of the men and only 9% of the women were obese (body mass index ≥30 kg/m^2). Thus, only 4% of these Amish adults were obese compared with >30% of the US population.

I also wear a step-counter pedometer every day, and I average about 7500 steps daily. Most of that is simply walking around the large Baylor University Medical Center (BUMC) campus. I try not to eat between meals or at bedtime, and I eat desserts sparingly. I also try to avoid the white starches. In contrast, these Amish men and women, who are averaging 18,000 or 14,000 steps daily, eat meat, potatoes, gravy, cakes, pies, and eggs. But they are moving on their feet all day (2).

Two thousand steps averages 1 mile. The Amish men walk about 9 miles on average each day and the women about 7 miles each day. Each mile uses 100 calories. The men by their walking alone use up 900 calories daily and the women, 700 calories daily. Vigorous and moderately vigorous physical activity consumes even more calories. The Amish appear to be more modern than we give them credit for. All of us need to acquire some of the Amish habits.

OBESITY-RELATED COSTS

A piece in *Obesity Research* evaluated state-by-state expenditures related to weight problems (3). States spend an average of about 5% of their health care dollars for medical costs on obesity-related disease. California is number one, spending nearly $8 billion annually, or 5.5% of its total medical spending. Texas is third, spending $4.3 billion on obesity-related problems, or 6.1% of its total medical spending. Obesity costs the USA about $40 billion a year, or about $175 per person, in health care–related expenditures. Maybe the best way for the USA to decrease its health care costs is for each one of us to lose ≥10 pounds. Ideal body weight is the most healthful thing for any of us. The most attractive dress or most handsome suit is ideal body weight! By losing weight, our blood cholesterol, our blood pressure, and our blood sugar drop. Thus, we decrease our chance of getting atherosclerotic diseases, high blood pressure and all of its consequences (particularly stroke and aortic dissection), and diabetes mellitus with all of its consequences. Those of us in the health care arena need to set the example. When doctors quit smoking, the lay public noticed. Setting ideal body weight examples for patients might be the best medicine of all.

NEUROLOGIST, AUTHOR, MASTER OF PEMBROKE COLLEGE OF OXFORD UNIVERSITY, AND BREAKER OF THE 4-MINUTE MILE RECORD

It was one of those athletic milestones like scaling Mount Everest (Edmund Hillary, 1953), running for 2000 yards in a season in the National Football League (O. J. Simpson, 1973), hitting 60 home runs in a season in the major leagues (Babe Ruth, 1927), stealing >100 bases in a season (Maury Wills, 1962), shooting <60 in a Professional Golf Association tour event (Al Geiberger, 1977), and scoring 50 goals in 50 National Hockey League games (Maurice Richard, 1944–1945 season). Roger Bannister beat the 4-minute mile record on May 6, 1954, 50 years ago, by <0.6 second. His 3:59.4-minute mile has been likened to Lindbergh's crossing the Atlantic or a man walking on the moon (4–7).

Bannister is now 75 years old and still lives near the Iffley Road track where he broke the record as a medical student. His question at the time was who would get there first. The Australian John Landy and the American Wes Santee, a track star at the University of Kansas, were the other two who had the best chance of breaking the record. Bannister believed the meet scheduled for May 6, 1954, was his last best chance to break the barrier before someone else did. He was deeply disappointed when the day dawned windy and rainy. He felt he could break the record but only if the weather would cooperate. Fortunately, moments before the

start, the rain stopped, although the wind blew. In the weeks and months before he broke 4 minutes, Bannister trained 35 minutes a day, hardly enough for today's top athletes to stretch. The day he broke 4 minutes, Bannister worked on medical research at a London hospital before taking the train to Oxford. Only 46 days after Bannister broke the record, both he and Landy together broke the 4-minute mile in another race, which was won by Bannister. He retired from running at the end of that year.

Bannister never cashed in on his achievements. He became an academic neurologist, and he and his wife live comfortably in a modest, cluttered flat in north Oxford. He has given his trophies and mementos to Pembroke College, where he was master (or president in American parlance) for 8 years. The walls of the Bannister house are covered with family photos and multiple shots of Bannister as he hit the tape at 3:59.4. He and his wife, Moyra, have 4 children and 14 grandchildren.

From 1954 to 2004, 16.27 seconds have been taken from Bannister's record. It is now held by Hicham El Guerrouj of Morocco, and the time is 3:43.13. Thus, the record has fallen at a rate of about a third of a second per year during these past 50 years. If that rate continues, someone will break the 3:30-minute record in another 50 years.

PRO WRESTLING AND "HEALTH"

About 20 million people in the USA watch pro wrestling matches each week (8). Since 1997 about 1000 wrestlers, aged ≤45 years, have worked on pro wrestling circuits worldwide. At least 65 of them have died since 1997, 25 from coronary heart disease. Pro wrestlers have death rates about 7 times higher than the general US population. They are 12 times more likely to die of heart disease than other Americans aged 25 to 44 and are about 20 times more likely to die before age 45 than are pro football players, another profession that's exceptionally hard on the body. Some pro wrestlers apparently bet among themselves on who will die next. Drugs are widely used by pro wrestlers, and drug use in the profession is essentially unregulated. Pro wrestling does not test for performance-enhancing drugs such as anabolic steroids or growth hormones. The use of steroids and other drugs in pro wrestling appears to be ingrained in the culture and has gone on for decades. A joke in that particular profession has been "if you did not test positive for steroids, you were fired." When anabolic steroids were labeled a controlled substance in 1991, federal law made purchase and possession of them illegal except for medical purposes. The big wrestling stars, however, found physicians who would supply them with what they needed.

Despite, or because of, its testosterone-fueled danger, wrestling attracts mostly young men to a circuslike life built on outsized personalities. Only a handful of the stars have more than a high school education. During a typical 15-minute match, combatants exchange choreographed body slams and punches. Some leap from top ropes onto cement surfaces outside the ring. And in the more physical "hard-core" matches, wrestlers are smashed through tables, whacked in the head with steel chairs, and punched with barbed wire and tacks. These antics are not faked. Top performers make >$1 million annually. But for every star, scores of others toil in obscurity at run-down gyms.

USA Today interviewed 15 current and former professional wrestlers, and the lifestyles of each were similar. They usually performed 5 times a week; recently, that has been reduced to 3 or 4 times per week. Because some wrestlers take anabolic steroids and some take growth hormones as well, there are lots of injuries, which lead to the taking of numerous pain pills and muscle relaxants. Some of these athletes take up to 150 pills a day. And now because anabolic steroids are prescription only, they often deal with the law and its consequences. Cocaine use also is apparently highly prevalent among these wrestlers.

Physicians played a major role in improving the safety of boxing, which has lost much popularity in recent times, and we need to be more involved in the activities of the pro wrestlers.

TRAFFIC DEATHS IN THE USA AND WORLDWIDE

Motor vehicle crashes kill about 1.2 million people a year worldwide, and that number is estimated to grow to >2 million by 2020 (9, 10). It is predicted that road traffic injuries will rise to be the third-largest cause of death worldwide. Economic development all over the world is leading to more cars and more roads, without much attention to road safety. The number injured by automobile accidents worldwide is now estimated to be 50 million a year. Almost one quarter of those who sought medical attention from a clinic or hospital after a traffic accident suffered from brain injuries. A study released by the World Health Organization and the World Bank in April 2004 urged that road crashes be ranked with cancer, heart disease, and stroke as major threats to public health (9, 10).

The death and injury toll is related to poverty. Between 2000 and 2020, vehicle-related deaths are predicted to decline by 30% in high-income countries but increase 80% in poor ones. In China, traffic deaths more than tripled between 1975 and 1988. The developing world has 20% of the world's cars, but 80% of the deaths from vehicle accidents. In low-income countries the victims are often pedestrians, cyclists, or people not in vehicles. In India, more than half of those who die are pedestrians; in the USA, <15% of those who die are pedestrians.

About 43,000 people died in traffic accidents in the USA in 2003, up about 1% from 2002, the fifth consecutive increase. Despite billions of dollars spent in recent years to equip cars and trucks with airbags and other safety features, as well as numerous seatbelt campaigns ("click it or ticket"), US drivers are not much safer now than before. While passenger car fatalities dropped slightly, the number of deaths related to sports utility vehicles (SUVs) rose 11% to 4451. One reason for the increase in fatalities in light trucks and SUVs is that they continue to make up a greater proportion of the vehicles on the road; now 40% of registered vehicles are light trucks, including SUVs. Rollovers continue to be the top safety concern for SUV drivers, and rollovers occurred in about 60% of fatal SUV accidents in 2003. Today nearly 80% of drivers in the USA wear seatbelts, but of those who died in fatal accidents in 2003, nearly 60% were not wearing seatbelts. The largest jump in fatalities involved motorcycles. Nearly 3600 bikers died in crashes last year, an 11% increase from 2002, and another 64,000 were injured. Riders who were middle aged and older accounted for nearly 50% of those killed in 2003. It's the sixth consecutive year that motorcycle deaths have increased. (I've always wanted a motorcycle but have always wanted to survive, so the motorcycle always lost out.)

The total of 43,000 deaths a year in the USA means that 117 Americans are killed in automobile crashes every day of the year (11). In contrast, flu kills 36,000 a year; guns, 26,000; foodborne illnesses, 5000; and terrorism (except for September 11, 2001), essentially zero. Vehicle fatalities do not get much attention because they occur in ones and twos. If people died at the same rate but in one crash a month that killed 3500 people, it would quickly get the nation's attention. Driving a car is one of the most dangerous things Americans do.

Sweden has reduced traffic deaths by encouraging seatbelt use, converting intersections to traffic circles, replacing rigid guardrails with new rails or cables that absorb or "catch" cars, and exhorting cyclists to wear helmets. As a result, Sweden's accident rate is one of the lowest in the world. If the USA could achieve Sweden's current standard, the USA would lose 12,500 lives per year rather than 43,000 from vehicle accidents.

NURSE CHARLES CULLEN

In April 2004, former nurse Charles Cullen pleaded guilty to 13 deaths in 1 county (12). He has arranged with the court to lead police to the rest of his estimated 30 to 40 victims; by doing so, he will avoid the death penalty. How can the Charles Cullens of the world be prevented from entering the health "care" profession?

RATTUS NORVEGICUS

Although bubonic plaque first appeared in the USA in San Francisco and although the brown rats (about a foot long not counting the tail and a pound or so in weight) originally came from Southeast Asia, they entered the USA from England during the Revolutionary War. One of the first places where the brown rats set foot was New York Harbor. Robert Sullivan, in his new book *Rats: Observations on the History and Habitat of the City's Most Unwanted Inhabitants*, spent a year studying the wild (urban) rat in its natural (urban) habitat (13). Because rats are mainly nocturnal, Sullivan, using night vision equipment and sitting on a portable camping stool, set up shop in an inconsequential piece of real estate known as Eden's Alley, not far from the World Trade Center, which was still standing when Sullivan began his study. Because a Chinese restaurant, an Irish bar, and an upscale supermarket backed onto the alley, it was prime rat territory. Here Sullivan first observed rats as being "thigmophilic"—needing to be in touch, literally, with a wall as they moved about, always staying on the same side of the passageway as their food source. In an effort to determine how fast rats moved, Sullivan ran alongside them, clocking the rats at 6 miles per hour.

Sullivan consulted numerous rat experts, most of them exterminators. Rat catchers are doomed to failure, and failure is what drives their business: eliminate the rat and you eliminate the need for the rat catcher. However, it won't happen. The math of rat reproduction mitigates against it. According to Sullivan

> If they are not eating, then rats are usually having sex. Most likely, if you are in New York while you are reading this sentence or even in any other major city in America, then you are in proximity to 2 or more rats having sex. Male and female rats may have sex 20 times a day, and a male rat will have sex with as many female rats as possible. . . . A dominant male rat may mate with up to 20 female rats in just 6 hours. (Male rats exiled from their nest by more aggressive male rats live in all male rat colonies and have sex with the other male rats.) . . . One pair of rats has the potential of 15,000 descendants in a year.

As a consequence of all this rat sex, there may be one rat for every person in New York City.

Although rats and humans like similar foods, the real connection is more basic. Rats were the first mammals to be domesticated for research on human disease. In April 2004, the results of the sequencing of the rat genome were reported, and not only do rats and humans encode the same of number of genes but almost all human genes associated with disease have a functional equivalent in rats. Similarly, humans and rats have the same neurons, although we use them differently.

In New York City and other urban environs, a rat's main enemy is humans, and humans are everywhere, suggesting that rats live in constant fear. Rats are able to avoid large numbers of bait traps, which sends pest control professionals back to the drawing board again and again to build better rat traps.

BLACK DEATH IN THE GOLDEN CITY

Marilyn Chase has written a splendid book on the plague epidemic in San Francisco (14). That which follows is from her book, *The Barbary Plague: The Black Death in Victorian San Francisco*.

From 1900 until 1909, there were 280 confirmed cases of bubonic plague and 172 related deaths in San Francisco. In 1900 the population of San Francisco was about 340,000 people, 25,000 of whom were Chinese. Although bubonic plague had ravaged Europe from the 14th to the 17th centuries, it smoldered along the Himalayan borderlands between India and China into the late 19th century. As soldiers criss-crossed the borders, they brought plague into China's interior, where it flared to a ferocious epidemic in Hong Kong in 1894. From that port, plague embarked ships sailing to many continents, and among their destinations were Hawaii and San Francisco. In 1900 no one knew how plague spread. The theories of its transmission focused on dirt, tainted food, and a "miasma," or cloud, of infectious vapors. San Francisco at the time had an aging sewer system, a bay fouled with garbage, and a burgeoning population of rats. Chinatown was especially vulnerable to disease. It constituted a tenth of the city and was located in 12 tiny blocks.

On January 2, 1900, the ship *Australia* anchored at the quarantine station off Angel Island while health officers searched it from stateroom to steerage. They failed to find any traces of infection, and the ship was granted permission to land at the port of San Francisco just a few miles away. After docking, the sanitized bags of 68 passengers and a shipment of fumigated mail, along with some 4-legged stowaways that somehow escaped detection, landed. The year 1900 for the Chinese was "the year of the rat." By February, merchants in Chinatown noted numerous dead rats in their alleyways and courtyards. In the old country, dead rats portended epidemics. In any house where rats had died, human deaths were to follow. In the old country, households would flee at the sight of a dead rodent. But in San Francisco there was nowhere to go. Discrimination hindered Chinese from living elsewhere in town. Many, however, considered rats as the inevitable companions of human settlements and even as natural garbage collectors. Many kinds of illnesses, from typhoid to diphtheria, had raked the city's poor. When the rats died, the fleas abandoned

their corpuses, seeking new blood, human blood, in the warrens of the poor.

The first death occurred on March 6, 1900. Although autopsy and cremation were an affront to the Chinese, an autopsy was done and samples were taken to Joseph Kinyoun, a 39-year-old bacteriologist, who resided on Angel Island. He had trained in Europe in bacteriology, and in 1886 he had joined the US Marine Hospital Service, the federal agency that inspected ships for disease, imposed maritime quarantines, and tended sick seamen. Not long thereafter, he diagnosed cholera from blood samples in an ailing passenger who had just docked in New York Harbor. This was the first bacteriologic diagnosis of cholera in the Western Hemisphere. By 1891, Kinyoun became director of what came to be called the National Hygienic Laboratory, where he gained broad powers to pursue bacteriologic diagnoses of other epidemic diseases. That laboratory later became known as the National Institutes of Health.

With bubonic plague now ravaging China, the surgeon general sent Kinyoun to the Marine Hospital in San Francisco as the quarantine officer on the Golden Gate. The autocratic scientist was not the man for that job. Joseph Kinyoun proved that the plague germ had killed Wong Chut King. First, he isolated the bacterium. Then he grew the bacteria in pure culture. He injected the germs into laboratory animals, and the animals died of the same disease. He isolated the germ again and confirmed beyond all doubt that the killer was bubonic plague. The Chinese community was briefly cordoned. But the local politicians, the merchants, and the Chinese had good reason to deny the diagnosis. No one wanted to see the yellow flag of pestilence flying over the portal to the Golden State. It would tarnish tourism and trade. It would turn Chinatown into a quarantine zone and subject the Chinese to the interventions of white doctors with their dissection tools, chemicals, and fire. To the Chinese, who were not unacquainted with epidemics, the cure must have seemed far worse than the disease.

The surgeon general, in Washington, DC, prescribed mass vaccination of all Chinese in Chinatown. The product was a broth of heat-killed bacteria called the Haffkine vaccine after its creator, Waldemar Haffkine, a Russian scientist who fled his homeland for a post at the Pasteur Institute in Paris. Haffkine's vaccine used a small amount of the bacteria to produce an immune reaction, but it had many side effects. The surgeon general also sent 300 bottles of Yersin's plague antiserum, a solution of antibodies drawn from the blood of horses that had been exposed to plague. Alexandrie Yersin had identified via the Gram stain the plague bacterium, which prompted a name change from *Bacillus pestis* to *Yersinia pestis*. The antiserum could serve as a ready-made immune defense against infection, and it was safer than the vaccine for people already exposed to the plague. The antiserum, however, was scarce and costly.

What happened in the next several months, and indeed for the next 2 years, is shameful. Despite more confirmed cases of plague, the city's leaders, including the mayor, the newspapers, the leading businessmen, the Chinese themselves, and even physicians continued to deny that plague was in the city. The bacteriologist Joseph Kinyoun was so detested that eventually he was run out of town. The city, of course, had no idea that plague most often was spread not by people but by the rat flea. By mid May 1900, 9 more people had officially died from plague, but the number was probably much more than that because the Chinese hid the dying victims so their community would not be burned or cordoned off by the city officials. The rats were not given much attention early on. The Chinese people were terrified of the needle, and they would not submit to forced vaccination. And they would not stand for relocation to detention centers, which they feared, such as Angel Island. Although the white San Franciscans believed that the plague cases were occurring only in the Chinese community, a case appeared in a Japanese person and, finally, in some white people.

Not only did the governor of the state of California issue a 14-point proclamation denying that there was any plague in "the great and healthful city of San Francisco," but this no-plague manifesto bore the signatures of San Francisco's elite, including blue jeans manufacturer Levy Strauss and the deans of 3 medical schools, including Levy Cooper Lane, president of Cooper Medical College, which would become Stanford University Medical School.

Although it wasn't the court's job to settle matters of science, the judge of San Francisco threw out the Chinatown quarantine on legal grounds because it lumped all Chinese homes and businesses together while exempting white-occupied buildings. It didn't distinguish between homes of the plague-infected and homes of healthy Chinese but confined them all together, increasing the risk of transmission. It forbade the Chinese access to physicians of their choice. Judge Morrow ruled that the San Francisco quarantine was imposed with "an evil eye and unequal hand." Joseph Kinyoun had decided that a travel ban was necessary on all people in San Francisco, but he was quickly overruled by President McKinley.

By August 1900, an autopsy confirmed plague in the city's first white. Despite 23 confirmed plague deaths in 10 months, Cage, the governor of California, proposed making it a felony to import plague bacteria, to make slides or cultures from it, or to inoculate animals with it. He also proposed making it a felony for newspapers to publish "any false report on the presence of bubonic plague." The governor essentially denounced Joseph Kinyoun—who in just over a year had inspected >1000 ships and >14,000 passengers who disembarked in San Francisco—as a fraud.

Joseph Kinyoun was out, and Joseph H. White was in. The new chief inspector in San Francisco urged Surgeon General Wyman to send a panel of independent experts to determine once and for all whether plague existed in San Francisco. Surgeon General Wyman agreed and tapped Simon Flexnor, a 37-year-old medical educator who later gained fame at the Rockefeller Institute in New York; Frederic Novy, a 36-year-old professor of medicine at the University of Michigan; and Lowellys Barker, a 33-year-old anatomy professor at the University of Chicago who in 1905 would replace William Osler as the chairman of the department of medicine at The Johns Hopkins Hospital. After a 2-week investigation, these 3 consultants, who examined 13 people dying of all causes, including 6 who unquestionably had died of plague, concluded that the state did indeed have the plague, and they intended to report that fact to the surgeon general. In the meantime, the governor collected some of his business friends together; they went by a fast train to the surgeon general

and convinced him that in exchange for a news blackout, the city of San Francisco would be cleaned up. Concealing plague in the port of San Francisco, however, was illegal. Lowellys Barker, who had risked his own health to verify plague in San Francisco (developing a febrile illness, originally thought to be plague but later diagnosed as serum sickness from Yersin's plague antiserum, which he had taken), was uneasy with the bargain between Governor Cage's men and the surgeon general. He wanted to see the commission's plague findings published.

Hamstrung by his government's gag order, Joseph White felt helpless to cure the plague in Chinatown. He was replaced by 33-year-old Rupert Blue, who was the perfect man for the job. Just as he took over in San Francisco, the newspaper *Sacramento Bee* and a western medical journal, *The Occidental Medical Times*, obtained bootlegged copies of the plague commission's study from anonymous sources and rushed it into print. Surgeon General Wyman then had the commission's findings published in the *US Public Health Reports*. Thus, it was finally out nationwide.

In contrast to Joseph Kinyoun, Rupert Blue walked the streets of Chinatown and got a Chinese man as a trusted associate and translator, and he and his colleagues started cleaning up Chinatown and the waterfront. Although Blue and his colleagues did not realize that fleas played a role, they knew that sick rats had been harbingers of plague for centuries. Paul-Lewis Simond, a Pasteur Institute scientist working in India, theorized that plague in rats and people had a common cause. Simond suspected that the missing link was the bite of a flea. He conducted a simple but elegant experiment in 1897. He installed 2 rats in separate cages side by side. One had plague; the other was healthy. The cages prevented physical contact between the 2 rodents, but their open grillwork let the fleas hop back and forth. When the plague rat died, the fleas deserted the corpse and jumped through the bars to the healthy rat in the neighboring cage. As they sucked blood from their new host, they injected plague bacteria. Within 6 days, the second rat died of plague.

Unfortunately, Simond's breakthrough drew scorn from the medical skeptics. Plague was still seen as a scourge of dark-skinned aliens. The prejudice persisted until 1906, when the British plague commission in India confirmed Simond's findings. Only then would the medical establishment accept fleaborne transmission as the spark of deadly plague epidemics. Scientists in Sydney, Australia, in 1900 added credence to Simond's discovery by discovering plague bacteria in the stomach of fleas. Meanwhile, San Francisco rats bred and spread, heedless of the skin color of their hosts.

Despite the state's hostility, Rupert Blue and his new Chinese interpreter, Wong Chung, relaxed some of the most rigid protocols of quarantine. Where Joseph Kinyoun and Joseph White, his predecessors, had seen the Chinese as liars, Rupert Blue and his assistants saw instead a people driven from fear to evasion and from evasion into further danger. The fear of ruinous quarantine had made the Chinese quite hostile. Rupert Blue changed policy by quickly disinfecting a plague house, isolating only the patient's immediate family, and reopening the place in a few days so life could return to normal.

Blue and his colleagues found that cold weather was the off-season for plague. Sweeping in ahead of the rain, the chilly winds drove the rats underground into warm basements and subterranean sewers. There the rat sickness would fester unseen until spring coaxed the animals back into the human dwelling.

In the summer of 1902, the plague came roaring back. The previous governor of California was replaced by Dr. George C. Pardee, a physician, who despite his silence on the campaign trail sent private signals to Blue and his federal colleagues that he would support their fight to wipe out plague.

Plague was still not gone from San Francisco when the earthquakes struck on April 18, 1906. Approximately 300 humans were killed by the earthquakes and the later fires. The earthquake immediately produced 300,000 refugees, and most of the city's inhabitants slept outdoors for many days. The earthquake and fires together destroyed 250,000 homes, libraries, courts, jails, theaters, restaurants, schools, churches, and businesses. A total of 490 blocks were incinerated. The earthquake shook thousands of rats from their hiding places. From the fractured walls and ruptured sewer pipes, rats and fleas poured forth, joining the refugees moving through the crumbled city. The rats slowly made their way to the refugee camps, feasted off the garbage, and bred in abundance.

Rupert Blue, who at the time was in Washington, DC, temporarily to clear the halls of government of too many cockroaches and too few spittoons, immediately boarded a train and headed back to San Francisco. He found the town he knew so well a smoke-stained desert. Its features were scoured away, leaving a plain of blowing ash and sand. His first task was to visit refugee camps in the Mission district. He found that nothing stood between these refugees and disease outbreaks. Contaminated water, bad food, and overflowing latrines practically guaranteed an outbreak of typhoid fever. Little food was available. Refugees hoarded food in their tents, attracting hungry vermin. The army ordered communal kitchens, but refugees disobeyed, setting up kitchens close to latrines, and many camps lacked anything to keep out the flies. The homeless on the hills shunned the latrines and found relief in the shrubs, contaminating soil and ground water. Garbage and latrine excavators were unreliable in their pickups. From the fractured sewer mains, rats scurried out to the garbage heaps. They found sanctuary in the ruins, grew fat on the leftover rations, and bred furiously. Soon, typhoid fever, scarlet fever, measles, mumps, diphtheria, and smallpox were present among the refugees. Mass vaccination of the refugees began.

After checking the condition of the refugee camps, Blue learned of a sick teenager in Oakland and found that the boy had bubonic plague. The refugee camps were close to the warehouses and the broken sewers, which harbored the largest numbers of rats, and there were still many pit latrines in use. The federal plague laboratory was reestablished, and Blue recruited 12 medical men for his new public health service in San Francisco. Although the city was now ideal for an explosion of plague, the lone bright spot turned out to be Chinatown, where plague was almost now nonexistent. Blue attributed this to his campaign back in 1903 and 1904 to build cement basements in that district. In the 5 months after the earthquake, Blue identified 55 positive cases, 44 suspicious cases, and 30 fatal cases of plague.

With the rats flourishing and the sickness increasing, Blue enlisted the city in his campaign; they set traps and poison for the rats; they plugged up rat holes. They sealed garbage in metal cans. He wanted to make every building ratproof. Blue avoided

the word "plague." By November 1906, the rat-catching had reached a high of 13,000 rats weekly. Nevertheless, the rats bred faster than they could be trapped. A female rat bears 10 to 15 pups every 4 months. The pups mature quickly and begin to breed at the age of 4 months. By the end of the year, 1 family can produce 800 rats. The quake ruins served as both honeymoon bower and nursery. The explosion in the rat population was echoed by a flea baby boom. In the winter months Blue observed that 20 rats could harbor only 1 flea among them. But in warm weather, a healthy rat could harbor 25 fleas, while a sick one could carry 85. Thus, amid all these multiplying vermin, everyone in town, rich and poor, was put in harm's way.

Not until the second plague in 1906 was under way did San Francisco address the rats' portal of entry: the waterfront. Although ships had long been fumigated, few barriers had prevented the rats from scuttling between ship and shore. Now at Blue's urging, the city ordered the building of metal and concrete wharves and piers replacing the old rat-ridden wooden pilings. On the hawsers that moored ships to the docks, shippers placed new effective rat guards, some with traps to thwart the 4-legged stowaways.

In the meantime on dry land. Blue and colleagues refined the training of the rat-catcher corps. Blue and his executive officer, W. Colby Rucker, transformed rat-catching into a precise science. They wrote a detailed treatise titled "How to Catch Rats." By the end of 1907, doctors had diagnosed plague in 136 people and had buried 73 of them, almost all in 4 months. There were 5000 stables and countless chicken yards in the San Francisco area in the early 1900s. Blue ordered them to be destroyed or rebuilt in ratproof concrete. Eventually all of the major groups in the city got behind Blue in his efforts to eradicate the rats and eradicate plague from San Francisco.

In 1908, Blue ordered the rat-trappers to bring rats back alive. Baskets of the wriggling prey were emptied into glass jars with chloroform-soaked gauze. Once the scrambling rats slowed in their struggle and died, their fur was combed for fleas, which by now also were dead. They put the fleas from each rat into glass bottles filled with alcohol. Each bottle was labeled with the date, type of rat, and the district from which it was captured. Rucker found that a flea had the largest, most powerful hind legs of any creature its size, enabling it to jump 500 times its length, a feat equal to a human vaulting over a skyscraper of almost 200 stories. The flea, he asserted, was responsible for more annual deaths than any monstrous reptile or carnivore in nature. In an article entitled "The Wicked Flea," Rucker from microscopic studies demonstrated that the fleas were armed with armadillo-like plates, triangular slashing weapons, 2 lances, and a stiletto with which they pierce their victim's skin and suck their blood. He studied their mating habits. During courtship he watched the lordly males sit back in a passive role while the females engaged in a frenetic dance of seduction. After coupling, the female laid a clutch of waxy ovoid eggs that over her lifetime could produce up to 500 hungry hatchlings. He learned that the fleas, after penetrating human skin, left a deposit on the skin of its victim. When the victim scratched, this deposit got rubbed into the skin. Scratching helped to inoculate the bacteria with deadly efficiency.

Some have wondered why the San Francisco plague claimed hundreds rather than thousands of casualties. It turned out that the main flea species on the Golden Gate was the northern European rat flea, which, although capable of transmitting plague, delivers with each injection a less potent and less infectious dose of the germ than either the oriental or Indian rat flea, which is far more lethal.

Within 2 years after the earthquake, 25 new skyscrapers had appeared. Nine reconstructed landmarks reclaimed their spots on the skyline. A new Chinatown arose from the ruins. Nine years after the death of the first victim and 1 year after the last plague case, the ordeal was over. In March 1909, the city celebrated. Blue and his officers were honored at a banquet at the Fairmont Hotel in that month, and 400 of the city's elite honored the health officers whose mission they had scorned in 1900.

As the sanitarian who liberated San Francisco from bubonic plague in 1908, Blue gained a reputation for the kind of vigorous epidemiology the country needed. He served as the country's surgeon general from 1912 to 1920, a period when world conflict and vast migrations of soldiers once more carried diseases around the globe. During World War I, Blue fought the twin epidemics of influenza and venereal disease. In 1915 the American Medical Association named him "the doctor who did the most good for humanity." As surgeon general, his goals were to mandate universal milk pasteurization and to create a network of child health clinics. He also wanted to convert hospitals nationwide into veterans' medical centers, but there was not enough money to do so. He warned Washington about the danger of plague spreading to squirrels in the countryside. He had implored Washington for men, tents, rifles, and traps to route the rural infestation, but his requests were deferred or denied. By the time he got some money, it was too late. Plague had spread to wildlife over thousands of square miles of California and, later, over the Sierra Nevada Mountains into the Rocky Mountains. In each zone, the fleas found a new host animal, jumping from rats to ground squirrels, to golden mantled squirrels, and to chipmunks and prairie dogs, who inhabit villages of burrows throughout the Southwest. Plague's natural reservoir has always been rodents, but it found a home in the wildlife of the American Southwest, where it still smolders today.

A century after its discovery, untreated plague remains one of the most deadly diseases known to humankind. Without treatment, the mortality of bubonic plague is about 60%. When untreated plague spreads to the lungs or bloodstream, the mortality is nearly 100%. Today, as other epidemics strike, stricken countries must sometimes learn all over again that the politics of denial, commercial protectionism, and discrimination too often trump science and sound medical judgment. The politics of 1900 San Francisco, far from being an anomaly, simply foreshadowed the dynamics of later epidemics.

CALMING AGGRESSIVE MALE BABOONS

Dr. Robert Sapolsky, a neuroscientist at Stanford University, and his colleague, Dr. Lisa Share, have been studying baboons in Kenya's Masai Mara Game Reserve since 1978, nearly 26 years (15, 16). A notion has been prevalent for years that violence and aggression in humans and in their primate cousins, the baboons, are inevitable. Males are clearly the primary aggressors in baboon society, often beating up or intimidating other males for no apparent reason.

In 1983, a wave of tuberculosis spread through the troop of baboons that the 2 investigators were studying. The males had been in the habit of eating meat from a nearby garbage dump. When infected meat was thrown in the dump, almost half the troop's adult males died. Left behind were females and less aggressive males (16). As is natural in baboon culture, new males eventually joined the troop. But the troop did not return to its aggressive ways, as reported in the April 2004 issue of the journal *Public Library of Science: Biology*. After the outbreak, females spent more time grooming males, a measure of baboon bonding. The old, stricter hierarchy softened. And even as these now kinder, gentler males left the troop and new ones entered, the peace persisted. The 2 investigators found that stress hormone levels, normally high in the low-ranking males, were lower. (Low stress hormones correlate with a better immune system, making the baboons better able to survive infections.)

Scientists who study primate behavior say the new work is the first documentation of passing social customs from one generation to the next. The new work shows that mankind's animal cousins can share social customs, just like people do. There is a perception that humans are cultural beings and nonhuman animals are instinctual, only doing what nature tells them to do.

The new research actually is not the first to show that nonhuman primates are flexible in their social behavior. In an earlier study of monkeys in which a normally ornery rhesus monkey is placed in a cage with a naturally calmer stumptail monkey, the rhesus monkey adapts to the calmer culture of the stumptail species. The common thread in all this seems to be that if humans or other primates are treated kindly, then they tend to treat others kindly. The 2 investigators believe that the baboon troop calmed down because the females prevailed for a time. When the females take over, the environment is simply nicer. When females spend more time grooming males, stress goes down and so does aggression. In this particular study, either the females calmed down new male troop members or they chose whom to let in. Peace has reigned in this baboon colony for >15 years. Wouldn't it be nice if the same held true in our human colonies? Maybe we need to appoint a woman to be secretary of defense. Would a female president of the USA be less aggressive?

A PARADOX OF OUR TIME

Rodney Brainard wrote the following, which has been circulated through e-mail and falsely attributed to George Carlin.

> The paradox of our time is that we have taller buildings but shorter tempers; wider freeways but narrower viewpoints; we spend more but have less. We have bigger houses and smaller families; more conveniences but less time; we have more degrees but less sense; more knowledge but less judgment; more experts but more problems; more medicine but less well being. We have multiplied our possessions but reduced our values. We talk too much, love too seldom, and hate too often. We've learned how to make a living but not a life; we've added years onto life but not life onto years. We've been all the way to the moon and back, though some have trouble crossing the street to meet their new neighbor. We've conquered outer space but not our inner space; we've cleaned up our air but polluted our souls; we've split the atom but not our prejudice. We have higher incomes but lower morals; we've become long on quantity but short on quality. These are the times of tall men and short character; steep profits and shallow relationships. These are the times of world peace but domestic warfare; more leisure but less fun; more types of food but less nutrition. These are the days of two incomes but more divorce; of fancier houses but broken homes. This is a time when there is much in the display window and nothing in the stockroom. A time when there is much inner sadness mixed with confusion and a time when you can care enough to read this letter and have the choice to pass it on and make a difference or merely throw it away.

PHYSICIANS VS GUN OWNERS

Dr. Venkata Ram sent me the following. The number of physicians in the USA is about 700,000; the number of accidental deaths caused by physicians per year is about 120,000; accidental deaths per physician, therefore, are 0.171. The number of gun owners in the USA is 80 million; the number of accidental gun deaths per year is 1500; the number of accidental deaths per gun owner is 0.0000188. Therefore, physicians are approximately 9000 times more dangerous than gun owners. Not everyone has a gun, but almost everyone has a physician!

US POPULATION PROJECTIONS

The US population in 2000 was 282 million (17). By 2050 the population is projected to be 420 million, a 49% increase, and by then Americans who are white but not Hispanic will make up only half the total. By 2050 Hispanic and Asian populations in the USA are projected to triple. Hispanics surpassed blacks as the largest minority group in the USA in 2002, when numbers hit almost 39 million. The number of Hispanics is expected to increase to 103 million by 2050, and their share of the nation's population will almost double to 24%. In contrast to these projections, the populations in Europe will be less in 2050 than they are today.

DONALD M. BERWICK, MD, MPP, AN EVIDENCE-BASED HEALTH SYSTEM REFORMER

Elsewhere in this issue is an interview with the Baylor Health Care System leaders of clinical transformation. Another interview on this topic appeared in the April 28, 2004, issue of *JAMA*, and the interviewee was Dr. Donald M. Berwick, who 10 years ago published an article on 11 worthy aims for clinical leadership in the health care system (18). Don Berwick is now president and chief executive officer of the nonprofit Institute for Healthcare Improvement, and he is perhaps the most articulate advocate of large-scale, evidence-based changes to the health care system. The following are some of his comments during the interview:

Inappropriate care is the consequence of doing too many things. If American medical markets were divided into quintiles of expenditures, the highest-quintile markets would have the poorest quality. Thus, in the USA, spending more does not improve quality.

The only way to modernize the management of medical information is through appropriate use of computerization. He cautions that the barriers to achieving integrated information systems, both in capital costs and in achieving the cultural changes, are very high. The ideal information system would crosscut care and allow the different systems to talk to each other. Patients cross boundaries; they move from one site to another, from one phase of their illness to another. There ought to be a government-sponsored electronic medical record suitable

for office-based practices—a kind of "American medical record" that anyone could download off the Internet.

There are 2 ways to decrease medication errors: 1) simply recognizing that they are common, and 2) implementing a computerized order entry system.

He emphasized that system innovations—new scheduling systems, new architecture, new processes of care—seem to be arising primarily in community-level hospitals, where there is not the inertia of the extraordinarily large medical centers.

SECURITY OF ELECTRONIC MEDICAL RECORDS

In April 2005, new health care information security provisions will go into effect under the medical privacy law known as the Health Insurance Portability and Accountability Act (HIPAA) (19). The provisions are designed to protect data transmitted and stored electronically. In auditing >300 health care organizations for security accreditation, URAC, a nonprofit group that audits and accredits quality measures in health care organizations, found just 3 with comprehensive security management programs that enable them to meet HIPAA standards. The Center for Medicare and Medicaid Services will enforce the security. Should a provider or employee steal information with the intent to sell it, the fine is $250,000, imprisonment of up to 10 years, or both. Consumers can sue health care organizations under state laws for violations of the Federal Privacy Act. The HIPAA security looks to me to be a major headache in development of the electronic medical record.

OUR BLUE BLOOD LEADERS

David Brooks (20) wrote: "We pretend to be a middle-class, democratic nation, but in reality we love our blue bloods . . . Roosevelts, Rockefellers, Kennedys, Bushes, Deans, and Gores. We love the prep school manners, the aristocratic calm . . . the dappled lawns stretching before the New England summer homes." Although neither Bush nor Kerry would qualify to lead a major party in the United Kingdom, in the USA we like to elect to the White House the guy who has lived a life nothing like our own.

Democrats will soon nominate John Kerry. He descended from John Winthrop, the first governor of the Massachusetts Bay Colony, and his mother is a member of the fabulously haughty Forbes clan. He spent part of his childhood at a boarding school in Switzerland, the estate of which included a bowling alley inside the barn. In 1962, Kerry sailed with President John Kennedy while visiting the Auchincloss estate. It was then off to Yale, Skull and Bones, and Vietnam. After Vietnam he married Julia Thorne, a jet-setting heiress with a family fortune of about $300 million, whose grandfather kept the entire island of Hilton Head, South Carolina, as a hunting preserve. Kerry's second wife, Teresa Heinz Kerry, is worth >$500 million. Between them they have a $4 million mansion in Georgetown (Washington, DC), a $6 million townhouse on Louisburg Square in Boston, a $6 million summer home on Nantucket, a $3 million estate in Pittsburgh, and a $5 million ski lodge in Idaho, which is a 15th-century English barn that was disassembled and imported to the USA. They also have a 42-foot powerboat, which is valued at about $700,000.

The anthropologist Lionel Tiger points out that in many primate communities, the offspring of high-status females are immediately accorded membership in the troop's elite. Both candidates have always been in that troop. It's a tremendous advantage to have been instilled since infancy with a habit of self-assertion. Both candidates possess that self-confidence.

WE SHOULD HAVE LISTENED TO SETH GLICKENHAUS

Seth Glickenhaus is the founder and head of the billion-dollar Manhattan-based firm that bears his name (21). Speaking in June 2003, he said the following about Iraq:

> We all wanted to get rid of Hussein, who is a very evil man. However, the price that is being paid in human lives and properties and the chaos that is inevitably ensuing in Iraq was far too great a price to pay for this war. It is totally unjustified. If we were to take on every evil man who runs a country, we would have at least 15 or 20 wars on our hands. . . . The public thinks we won the war and that it is over. They don't realize we are going to keep more troops in Iraq than we thought. The deficit will grow. We are not going to win the peace. Iraq is so divided internally it makes Afghanistan look like one unified group. Do you think soldiers know how to straighten out a country? They know how to make war. Do you think the State Department has the people and the training to help the country rebuild. . . . No, of course not.

These comments were made 13 months ago!

PRESIDENT MARVIN J. STONE, MD, AND THE ANNUAL MEETING OF THE AMERICAN OSLER SOCIETY

Figure. Marvin J. Stone, MD, MACC, president of the American Osler Society.

The 2004 annual meeting of the American Osler Society was held in Houston, Texas, from April 19 to 21. Marvin J. Stone, MD, as president *(Figure)*, gave the presidential address: "Thomas Hodgkin: Medical and Immortal and Uncompromising Idealist." As a show of their admiration and respect for Dr. Stone, 16 members of the BUMC staff also attended the meeting. Presentations by BUMC staff included the following: 1) *Robert G. Mennel, MD*, "A Medical School Comes to the American Colonies: The University of Pennsylvania and the Influence of the University of Edinburgh"; 2) *John S. Fordtran, MD*, "Preventing Death Due to Cholera by Oral Ingestion of Glucose-Saline Solution"; 3) *Alan Menter, MD*, "Leprosy: Stigma and Pestilence, Emancipation and Cure"; 4) *Marvin J. Stone, MD* (second presentation), "A Tribute to John P. McGovern"; 5) *Andrew Fenves, MD*, "The Rise and Fall of Bright's Disease"; and 6) *William C. Roberts, MD*, "Tomlinson Fort of Milledgeville, Georgia: Physician and Statesman." BUMC had by far the largest attendance at this meeting of any medical center in the USA. Marvin Stone was responsible for opening the door of the American Osler Society to all the other members from BUMC.

—William Clifford Roberts, MD, MACC
May 14, 2004

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