an appropriate creature. It could even flap its elastic-powered wings and fly. Guess what the wings were made of? That's right, polyethylene! Now if we could make these wings bigger, they could perhaps be attached to pigs. I bet the animals would enjoy that even more than rolling around those polyethylene pig balls. And when will we finally run out of interesting uses of polyethylene to talk about? The answer is obvious. When pigs fly.

The Great Phenol Plot

"Kills Germs by Millions on Contact." Most of us recognize this as the famous Listerine mouthwash and gargle slogan. Joseph Lawrence, an American physician, developed the familiar yellow liquid in the late 1800s and named it after the brilliant British surgeon Joseph Lister. No, Lister did not have bad breath. The product was named in his honor because Lister is widely considered to be the father of antisepsis, the science of preventing infection.

Lister knew that fractures that broke through the skin would often become infected, whereas those that did not pierce the skin healed nicely. The prevailing opinion at the time was that the exposed tissues were affected by oxygen in the air; oxygen would break down the components of organic matter in a wound and generate pus. The common method of excluding oxygen in Lister's time was to dress wounds with tight bandages. These dressings actually encouraged bacterial growth and resulted in a virtually indescribable stench on hospital wards. Many doctors believed that the odor caused the infection and that it was directly responsible for the extremely high death rate following surgery. Yet, incongruously, nobody tried to solve the problem by eliminating the smell. The sole source of light in this darkness was Florence Nightingale, the

legendary Lady with the Lamp, who espoused a doctrine of soap, warm water, and sunshine but was largely ignored.

Then came a breakthrough. A professor of chemistry, Thomas Anderson, introduced Lister to the ideas of Louis Pasteur, who had shown that rotting and fermentation could occur in the absence of oxygen, as long as microorganisms were present. Furthermore, the microorganisms could be killed by heat. This really struck a chord with Lister, who had never believed in the oxygen theory anyway. Indeed, he had fantasized about some sort of invisible dust settling into wounds. Lister immediately designed an experiment. He took some fresh urine, heated it, and sealed half of it in a glass tube, leaving the other half exposed to the air. When he smelled the samples in the morning, the one that had been exposed to the air reeked while the sealed sample was odorless. Evidently, microorganisms from the air had infected the open sample.

Since heating a patient was of course not a viable approach, he wondered if the germs could be killed with appropriate chemicals. Lister thought of carbolic acid, or phenol, because he knew that it had been used to clean foul-smelling sewers. He also knew that when the treated sewage was used as fertilizer, the cows grazing in the pastures it had been spread upon did not become infested with parasites, an otherwise common occurrence. Perhaps the stuff that destroyed the smell and the parasites could also kill Pasteur's microorganisms.

Lister got some carbolic acid from Anderson and tried it on a boy who had been run over by a cart and had suffered an exposed fracture of the tibia. The child recovered with no complications. Soon Lister was washing his instruments with phenol, and he also developed a sprayer with which he could mist disinfectant throughout the operating room. The results were immediate: the mortality rate from amputations dropped from 50 to 15 percent. Nevertheless, Lister had to deal with a great deal of skepticism, because the germs, or "little beasts" as some called the microbes, were not readily observable. But, in 1867, the prestigious British journal the *Lancet* accepted Lister's article on the prevention of infections, and the era of antisepsis was launched. Phenol would save thousands of lives — but it would also end many, for scientists quickly discovered that phenol could be converted into the potent explosive trinitrophenol.

Every student of history knows that the First World War began with the shooting of Archduke Ferdinand in Sarajevo, but what many don't realize is that the United States did not enter the fray for another two years. During this time, the Germans made various attempts to keep the United States out of the conflict and to prevent it from offering technical help to Germany's enemies. One of the most intriguing schemes hatched by the Germans has come to be known as the Great Phenol Plot.

The "plot" revolved around an attempt to corner the market for phenol and the powerful explosives that could be derived from it. The phenol manufacturing industry was, at that time, centered in England, and after the outbreak of the war, most of the available phenol was channeled into munitions production. This resulted in a decline of phenol exports and caused a phenol shortage in the United States. The Germans were worried that the shortage would spur the Americans to start manufacturing their own phenol. American efficiency would likely yield massive amounts of phenol, some of which would undoubtedly find its way into the hands of Germany's adversaries. The German ambassador to the United States was therefore assigned the task of preventing American chemical companies from supplying phenol to the Allies already engaged in fighting Germany.

For this unique undertaking, the German ambassador enlisted the help of Hugo Schweitzer, a German chemist living in

New York. At first, Schweitzer's job was not difficult because the American phenol industry was hardly significant. But then, in 1915, he ran into an unforeseen but monumental problem: the American genius Thomas Edison. Edison, by this time, was heavily into the business of marketing his phonographs and records. The records were made of a plastic called Bakelite, which was made from phenol. Since the United States had no access to the British supply of phenol, Edison decided to make his own, and the brilliant inventor devised such an efficient manufacturing process that he had more than enough phenol for his phonograph records — in fact, he had begun looking for a market for his excess.

Schweitzer, charged with keeping Edison's excess phenol from being turned into explosives and shipped to Europe, racked his brains. Thanks to his background in chemistry, he soon came up with a solution. Phenol, he knew, was used in the making of aspirin. Furthermore, the Bayer Company, operating in the United States, was already feeling the phenol pinch. Maybe he could convince Edison that the most humane thing to do with his surplus phenol was to sell it to the aspirin maker. Who could object to that?

Not Edison, apparently: he signed a contract with Schweitzer that enabled the spy to divert a supply of phenol equivalent to four and a half million pounds of explosives. But then the US Secret Service caught wind of the plot. Schweitzer could not be jailed because the United States was not yet at war and Germans were still allowed to buy any American product they desired, but when Edison learned the real motive behind the Bayer phenol purchase, he decided to sell his excess phenol to the US military. The Great Phenol Plot was spoiled. Still, we must grudgingly recognize the ingenuity of the German spy, Schweitzer, whose knowledge of the chemical link between aspirin and phenol almost caused the Allies one giant headache.