

**And now it's silver that is finding wholly new uses  
as a wonder in modern medicine...**

Perhaps it soon will be recognized as

**OUR MIGHTIEST  
GERM FIGHTER**

by Jim Powell

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"Silver is the best all around germ-fighter we have."

*(Continued on next page)*

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## SILVER — NEW MAGIC IN MEDICINE (Continued)

Developed by Dr. Charles Fox of Columbia University, a silver compound known as silver sulfadiazine is used in 70 percent of burn centers in the U.S. It also stops the herpes virus responsible for cold sores and fever blisters. With silver sulfadiazine, Dr. Fox scored what properly is acclaimed as a momentous breakthrough, for it was the first new silver compound to win FDA approval and become generally available. A pharmaceutical house, Marion Laboratories, is offering it as an ointment, under the brand name of Silvadene; other companies are making silver sulfadiazine available in several countries from Canada to India.

Doctors are reporting that, taken internally, the compound works against three scourges—syphilis, cholera, and malaria. And even tiny amounts of silver wipe out huge quantities of disease organisms in water. Some specific instances of silver's use:

- To guard against such water-borne diseases as dysentery, more than half the world's airlines now use silver water filters. For instance: British Airways, Swissair, Scandinavian Airlines, Lufthansa, Olympic, Air France,, Canadian Pacific

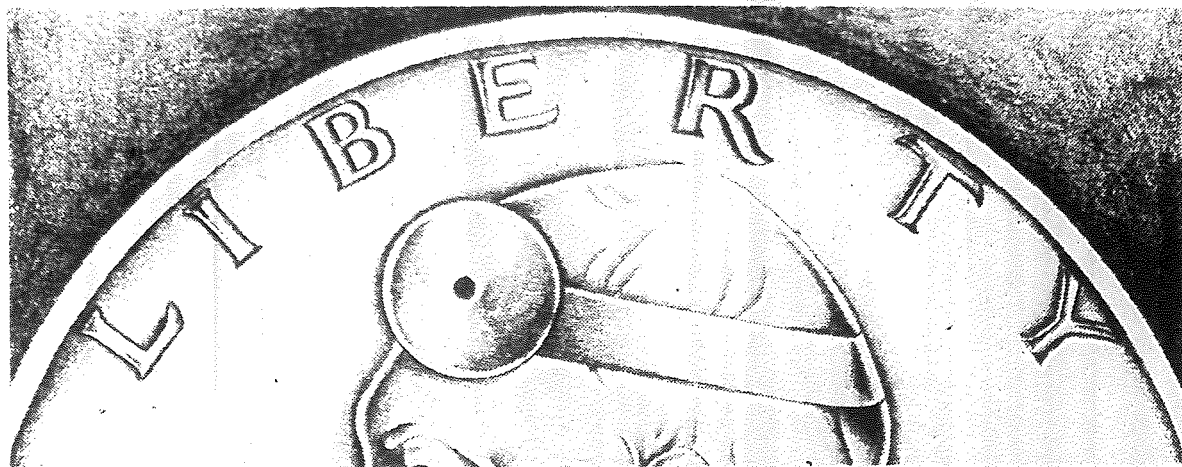
Airlines, Alitalia, KLM, Japan Airlines and Pan Am.

- The Swiss government has approved silver water filters. They're used in homes and offices throughout the country.

- After testing 23 methods of purifying water, NASA selected a silver system for the space shuttle.

- Silver is widely used to purify swimming pool water, and it doesn't sting your eyes as chlorine does. A dramatic demonstration recently took place in Nebraska: Fifty gallons of sewage was pumped into a pool without any disinfectant. A standard measure of contamination is the count of E. coli, an organism found in the human intestinal tract. The count soared to 7000 E. coli cells per millilitres of water. Then the water was flushed through silver electrodes—and within three hours it was completely free of E. coli.

- Silver also can fight deadly poisons. Japanese firms have announced five startling technologies which use silver to purify air. One company converts 50 parts per million of carbon monoxide to harmless carbon dioxide by passing the gas through a stack of screens coated with silver compounds. Another uses silver compounds to remove



vinyl cyanide, methyl cyanide, and hydrocyanic acid from its discharges. A gas chemicals company removes all the 200 parts per million of nitric oxide by passing the gas through its silver compounds.

The currently increasing medical interest in silver actually reflects a kind of revival in the public health sector: In ancient Greece and Rome, people used silver containers to keep liquids fresh. American settlers, travelling across the West, often put a silver dollar in milk to delay its spoiling. Around the turn of the century, some doctors used silver nitrate to help the healing of stomach ulcers.

*Yet silver fell out of favor. The reason was argyria—a skin discoloration that results when hundreds*

*of times the proper amount of silver compounds are injected or taken orally. Silver becomes deposited under the skin and stays there. It's harmless. In fact, it kills bacteria that may be present. But of course, nobody wants gray skin.*

So for a while, then, only two medical uses for silver continued: dentists fill teeth with a silver alloy, and doctors put a few drops of 1 percent silver nitrate solution in newborn babies' eyes to kill bacteria that can cause blindness.

The comeback of silver in medicine began more than a decade ago.

The late Dr. Carl Moyer, chairman of Washington University's Department of Surgery, received a grant to develop better treatments for burn victims. Dr. Margraf, as the chief biochemist, worked with

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## Rx Silver: Case Histories

✓ A speeding car overturned and burst into flames. The 18-year-old driver suffered burns all over his face, neck, arms, hands, back, stomach, and legs—burns covered more than 80 percent of his body.

Until recently, this would have been a death sentence. Doctors knew how to restore vital body fluids and salts, but had no way to fight infection, the primary cause of death in burn cases.

Fortunately for this youth, a new silver compound killed deadly bacteria and enabled him to heal. He was out of the hospital within four months.

✓ A 65-year-old diabetic cut himself on the leg. He washed and bandaged it, but as often

happens with diabetes, the pain persisted, and the cut grew into a sore. Soon it became bigger than the bandage, and he had to apply a dressing. Still, it grew bigger and uglier.

In desperation, he went to a clinic. His sore was diagnosed as a "stasis ulcer." For a year, one treatment after another was tried. Nothing, including penicillin and sulfanamide, could heal the ulcer. If his condition had continued unchecked, his leg probably would have been amputated.

But finally he was referred to a clinic that treated skin ulcers with a new silver compound. This promptly stopped growth of all bacteria. In less than two months, the ulcer was completely healed.

## SILVER — NEW MAGIC IN MEDICINE (Continued)

Dr. Moyer and other surgeons to find an antiseptic strong yet safe to use over large areas of the body.

Dr. Margraf reviewed 22 antiseptic compounds and found drawbacks in all of them. "Mercury, for example, is an excellent antiseptic, but toxic," he comments. "Popular antiseptics such as Mercurochrome and Merthiolate can be used over small areas only. Many iodine compounds are effective, but quite a few people are allergic to iodine. Since the doctor rarely knows if a patient is allergic, it's prudent to rely on something else. Dilute alcoholic solutions, hydrogen peroxide, and other antiseptics can be used on little cuts, but are too painful on big wounds. Disease organisms can become resistant to antibiotics, triggering a dangerous super-infection.

"**T**hese compounds are also ineffective against a number of harmful bacteria, including the biggest killer in burn cases—a greenish-blue bacterium called *Pseudomonas aeruginosa*. It almost always shows up in burns, releasing a poison."

Reviewing medical literature, Dr. Margraf found repeated references to silver. It's described as a catalyst that disables the enzymes microorganisms depend on to breathe. Consequently, they die.

When Dr. Margraf began his search, the best-known compound was silver nitrate because it's the simplest silver compound that dissolves in water. (Pure silver won't dissolve.) But though silver nitrate kills microorganisms, it can also be corrosive and painful. Dr. Margraf noted that it had been used in relatively high concentrations.

*What would happen, he wondered, with more dilute solutions?*

The researchers began testing, and after several months settled on a .5 percent solution. It killed *Pseudomonas aeruginosa* and permitted wounds to heal. Resistant strains did not appear.

Silver nitrate, however, was far from ideal, reports Dr. Margraf: "It severely disturbs the balance of body salts, and its use must be halted from time to time. It must be applied in thick, cumbersome dressings, and stains everything it touches."

So he tested 53 other silver compounds, some of which were newly synthesized. The most promising: a complex, silver-zinc-allantoinate.

It proved to be as effective with chronic skin ulcers as with burns. In *Archives of Surgery*, published by the AMA, Dr. Margraf now reports his latest findings: Silver-zinc-allantoinate helped 339 of 400 chronic skin ulcers heal. On an average, bacterial counts dropped 99 percent in a week. Many diabetics were saved from needless amputation. The compound now is undergoing tests by Miles Laboratories.

Meanwhile, at Columbia, Dr. Fox, who had been studying the germ-fighting property of silver for nine years, tested nearly a hundred different compounds before settling on silver sulfadiazine. "Though it contains sulfa," he reports, "the silver keeps this compound from acting like a sulfanamide. Resistance hasn't been a problem."

Richard L. Davies, executive director of the Silver Institute, which monitors silver technology in 37 countries, reports:

"In four years, we've described 87 important new medical uses for silver. We're just beginning to see to what extent silver can relieve suffering and save lives."