

from his New Jersey laboratory
an alumnus combats the rising tide of

Bubble Trouble



In the laboratory of his New Jersey research and engineering company, Dr. Eldib uses a miniature sewage treatment plant to determine the degree to which wastes can be destroyed by bacteria.

WHEN New York City was no more than a cluster of houses and farms on the tip of Manhattan island, salmon and sturgeon ran in the nearby Hudson River, and Dutch girls washed their clothes in streams where skyscrapers now stand.

Today, more than eight million people crowd the once-deserted shoreline of the city. The salmon and sturgeon have long disappeared. The clear waters have turned brackish and foul. The surf along some of the beaches is often polluted with infectious organisms.

The city's inhabitants, as well as its industries, generate tremendous quantities of refuse. Much of this waste finds its way into the adjoining rivers and ocean.

Ironically, some of the products polluting our streams and rivers are cleansing agents—the detergents. These “soapless soaps” are sometimes called *syndets*, short for *synthetic detergents*. They can dissolve the most stubborn dirt and grease. But the unsuspecting housewife who washes these “magic suds” down the drain has no idea of the problems she creates for water pollution engineers.

In 1947, soon after detergents were introduced to the public, a manufacturer passed out free samples to every household in a small Pennsylvania town. The samples were handed out on a Friday.

The following Monday, most of the housewives in the town used the samples in their weekly wash. A few hours later, a tidal wave of foam hit the local sewage treatment plan. When the (continued)

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Dr. Eldib's solution to the problem— you simply fight bubbles with bubbles

wind blew, the suds scattered like snow. Even worse, the detergents could not be reduced to disposable waste.

Like soaps, detergents have the ability to emulsify oils and hold dirt in suspension. But the resemblance ends there. Ordinary soaps are made from vegetable and animal fats. They can be biochemically reduced by bacteria in the ground, in streams, or in sewage treatment tanks. But synthetic detergents are petroleum products. Bacteria cannot reduce their chemical structure, and sewage treatment plants cannot separate them from other wastes. The indestructible syndets bubble merrily along through sewers, sewage disposal plants, water treatment plants, and may eventually find their way back into the public water supply. Result: In some regions, water often froths as it comes out of the tap.

Many scientists and engineers are now struggling against the rising tide of trouble caused by the syndets. One of these researchers is Dr. Ibrahim A. Eldib, a chemical engineer.

Working in his New Jersey laboratory not so long ago, Dr. Eldib carefully assembled an ingenious apparatus: He first fastened a piece of bent glass tubing to the top of a long vertical glass cylinder. The tubing curved over and down into a large beaker. Then Dr. Eldib reached out and opened a stopcock on a large glass reservoir containing a solution of detergents in water. The solution rapidly began to fill the cylinder.

When the cylinder was about half full, Dr. Eldib closed the reservoir stopcock. He reached for another valve and opened it slightly. Slowly, bubbles of air began to rise from tiny holes in the bottom of the glass cylinder. They bubbled up through the water, racing each other to the surface.

Soon, a thin layer of foam began to form on the surface of the water. The layer of foam steadily increased in height until it reached the top of the cylinder. Then, it surged through the bent glass tubing and oozed into the beaker. After a few minutes, the foaming stopped.

Dr. Eldib smiled triumphantly and removed the beaker of foam from the ring stand. He had shown a promising solution to the puzzling problem of "foaming faucets." By attacking bubbles with more

bubbles, Dr. Eldib came up with an effective method for removing syndets from our sewage.

Dr. Eldib takes the sewage as it comes from the treatment plant, bubbles air through it in a tall glass cylinder, and literally "foams the foam away." Nearly 95 per cent of the dissolved detergent is separated from the water by this method. The detergent can then be disposed of by other means.

Dr. Eldib's technique is based on the fact that one end of the long detergent molecule has little attraction for water. When air bubbles pass through the solution, the "water-hating" ends of the molecules "hitchhike" a ride to the surface, where they form a layer of foam.

"But foaming is only one solution to the problem," Dr. Eldib pointed out to *Science World*. "A better answer lies in the development of detergents which will respond to bacterial attack in sewage treatment plants."

Dr. Eldib also emphasized that detergents make up only about ten per cent of the soluble carbon compounds that remain in water passed through a sewage treat-

ment plant. Other culprits are insecticides, weed killers, dyes, and industrial wastes.

"But the detergents are always singled out because of the spectacular foaming which they can cause," Dr. Eldib added, "even when present in low concentrations. The volume of foam is deceiving because the foamability of the detergents is increased by the presence of other materials.

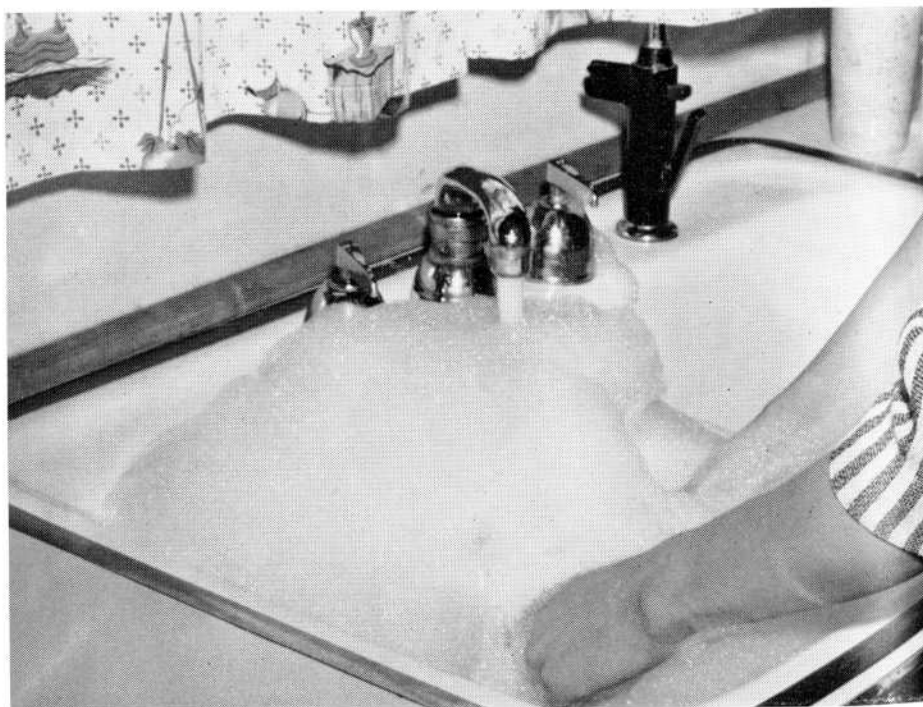
"Thus, syndet foam is only an indication that other untreated contaminants may still be in the water."

One of the services which Dr. Eldib performs for industry is to determine the degree to which industrial products can be destroyed by bacteria. In order to do this, Dr. Eldib has constructed a complete miniature sewage treatment plant in his laboratory. Thus, he can duplicate the methods used in a large sewage treatment plant—using actual sewage in his experiments.

Born in Alexandria, Egypt, Dr. Eldib's interest in chemistry began early in his youth. "I was first inspired by an uncle who was an industrial chemist," Dr. Eldib recalls. "He used chemicals in his leather tanning business."

As a teen-ager, Dr. Eldib was trained in an oil refinery in Egypt. There, he gained valuable experience, which whetted his appetite for a career as a chemical engineer.

In 1950, Dr. Eldib earned his B.S. degree in chemical engineering. Then, he came to the United States at the age of 20 and attended the University of Tulsa in Oklahoma. (continued on page 23)



Those grease-cutting detergent suds may be a boon to the housewife but they can also contaminate a city's water supply since these suds cannot be destroyed by present sewage treatment methods.

Force Officer Training School at Lackland Air Force Base, Texas. He was honored as a distinguished graduate at graduation ceremonies for his class. He has been assigned to Otis Air Force Base, Massachusetts, as a photographic officer.

2nd Lt. Frances A. Schuler, '62, Fort Worth, Texas, has been assigned to the Air Force hospital at Andrews Air Force Base, Maryland. She is a physical therapist.

2nd Lt. Stuart M. Scoggin, '62ba, Oklahoma City, recently completed the 8-week officer orientation course at The Southeastern Signal School, Fort Gordon, Georgia.

2nd Lt. James E. Stuckey, '62bus, Burlington, recently completed an 8-week field artillery officer orientation course at The Artillery and Missile Center, Fort Sill.

2nd Lt. Thomas A. Wood, '62bs, Davenport, Iowa, has entered Air Force pilot training at Webb Air Force Base, Texas. Wood will fly T-37 and T-33 jets and will be awarded the silver wings of a pilot upon graduation. Mrs. Wood is the former Patricia A. Waganer, '61bus.

2nd Lt. Dan Rae Harlow, '62bs, Norman, has been assigned to Walter Reed Army Institute of Research as a research parasitologist in the department of medical zoology. Before going to Walter Reed, Harlow was an instructor in parasitology at the Medical Field Service School at Fort Sam Houston, San Antonio, Texas.

Sybil L. Hall, '62ba, is now living in Dallas, Texas, where she is an elementary school teacher with the Dallas Independent School District.

MARRIAGE: Donna Jean Hudiburg and Richard Wayne Dodson II, '62pharm, both of Midwest City, were married February 23 in Wickline Methodist Church, Oklahoma City. The couple has established a home in Oklahoma City.

BIRTH: R. Leon Brining, '62pharm, and Mrs. Brining are the parents of a daughter born December 27 in Norman.

Bubble Trouble

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After obtaining his M.S. in petroleum refinery engineering, Dr. Eldib went on to the University of Oklahoma. In 1955, he was awarded his Ph.D. degree in chemical engineering. For the next six years, Dr. Eldib worked for Esso Research and Engineering Company.

At Esso, Dr. Eldib discovered that air bubbled through petroleum products could remove metal impurities. In 1960, at a conference of scientists, he delivered a talk on the uses of foaming techniques to purify petroleum. After the speech, engineers from the U. S. Public Health Service

brought up the problem of foaming at sewage treatment plants.

"A bell immediately rang in my mind," Dr. Eldib said. "I wondered if perhaps the foaming technique might be a solution to their problem."

Laboratory experiments soon demonstrated that foaming was indeed a possible solution. Since then, Dr. Eldib has concentrated his efforts on water pollution problems.

In August 1962, Dr. Eldib founded his own research and engineering company. In his laboratory, he daily seeks new answers to challenging problems in the world of chemistry. His next frontier: new methods of removing salt from seawater to make it drinkable.

The Incomparable Eva

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often speak of her. They all know about her. I have no need to speak of her because they know before ever I open my mouth . . .

And also there are the students such as Elsa Porter, who is now professor of voice at Canyon, Texas, near Amarillo, and Harold Thompson, who is in Arkansas at Hendrix College, and there are many who are teaching and having great success. Harold Thompson is one of the judges for the Metropolitan Opera auditions. I could go on

ad infinitum to tell you the students from this campus who are doing splendid work around the state and well out of the state, in many other states and other countries. There is this boy John Turnbull, the organist, who is in Holland now on a Fulbright and having enormous success. . .

Well, of course, I was here for 10 years, so you can imagine that when I hear of these things, I swell with pride—and I really mean that. It is a great pleasure always to me to hear of the success of the students of the University of Oklahoma.

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