ACS Centennial: Pomp and Pauling

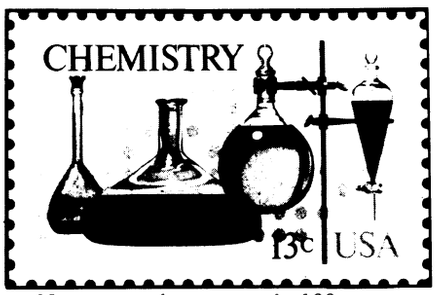
The American Chemical Society celebrated its 100th anniversary this week at its annual meeting in New York City. Opening ceremonies included presentation of greetings from scientific societies from around the world, predictions by Linus Pauling on what the next 100 years will bring for chemistry and the world, and inauguration of two public exhibits.

In 1874, nearly 100 chemists discussed formation of a society, but some argued there would never be enough members. Within two years things had changed, and in 1876 Congress chartered the ACS, now the world's largest scientific society devoted to a single discipline, with some 100,000 members. A formal procession of internationally known science luminaries highlighted an unusual display of traditional academic pomp. The proceedings were even immortalized by the filling of a time capsule with items pertaining to the ACS, for installation in the wall of the New York University building on the site of the Society's first meeting.

Linus Pauling's address and press conference were characterized by his usual blend of scientific insight and controversial opinions. The next 100 years, he said, will see the extension of quantum mechanics to the treatment of molecular structure and reactions. He noted that only within the last year have scientists accomplished the first successful theoretical treatment of the simplest chemical reaction—that of a deuterium atom with a hydrogen molecule. As new discoveries are applied to improving human welfare, he predicted, the average life span will increase as much as 25 years.

He remains completely outspoken on social issues, warning that within 50 years "the greatest catastrophe in the history of the world" will probably occur. Though any number of events could trigger such a collapse—destruction of the ozone layer, weather modification or war—the most likely, Pauling says, is famine. Nevertheless, he calls himself an "optimist," for after mankind muddles through the tribulations of the coming century, it could well be on the way to a life of peace under a system of world law.

To share an appreciation of chemistry with the rest of the country, the ACS commissioned two public exhibits, which opened this week in the Union Carbide Building in New York. An exhibit of artifacts includes original paintings, rare books and antique pieces of laboratory equipment used by famous chemists. The paintings, on loan from the Fisher Scientific Co.'s collection, trace the history of chemistry back to the alchemists, trying to make gold in cluttered chambers with stuffed alligators hanging from the ceiling for good luck. Among the other artifacts are pieces of equipment used by Lavoisier, the founder of modern chemistry,

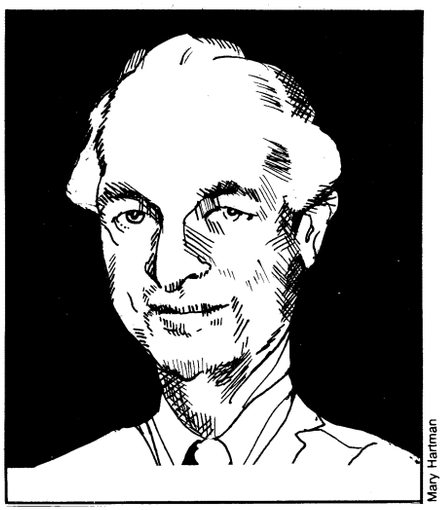


ACS

New stamp honors ACS's 100 years.

and the first pieces of cellophane and nylon produced in the United States.

A second exhibit will be sent on a 13-city tour over the next three years. Called "Taking Things Apart and Putting Them Together," it aims at acquainting people who have never studied the subject with what chemistry is all about. With its straightforward presentation of accomplishments, the exhibit also shows what a speaker at ACS's 25th anniversary called the true dignity of chemistry. □


Mary Hartman

Pauling: A Cassandra, yet an optimist.

Elicitor of plant immunity isolated

When bacteria or fungi attack a plant, the resulting infection is usually thrown off by an immune mechanism that is still not completely understood. But now a chemical elicitor of this response has been isolated, an apparently nontoxic substance that may lead to development of a new type of pesticide based on stimulation of a plant's natural response to disease.

The discovery was announced at the American Chemical Society meeting in New York this week by Peter Albersheim, who isolated and characterized the first known elicitors while studying plant immunity with co-workers at the University of Colorado. Co-authors of the report are Barbara Valent, Jurgen Ebel and Arthur R. Ayers.

For some years, scientists have known that when microorganisms attack a plant they are killed by certain toxic substances, called phytoalexins, that are produced when the invasion is detected. What starts this production was unknown, but the system was assumed to be analogous to the human immune response, in which the presence of certain foreign chemicals on an organisms's surface, called antigens. trigger production of antibodies.

Albersheim and his colleagues studied a fungal infection of soybeans and finally isolated a polysaccharide, called beta-glucan, on the surface of the fungi, which seemed to be the factor initiating the plant's protective secretion of phytoalexin. Then came the surprise. Not only would beta-glucan elicit the response from tissues of a wide variety of other plants—ranging from parsley to the sycamore tree—but similar elicitors were found on the surface of other microorganisms. The basic reaction seems to be very general.

This generality raises hopes for developing what Albersheim calls "truly a new kind of pesticide." He takes the recently disastrous epidemic of corn blight as an example. If ways could be found to successfully spray the elicitor on corn not yet infected, high enough levels of phytoalexins might be stimulated to fight off the blight before the microbes arrive. Since the polysaccharides are not poisonous themselves, they could be sprayed on a field without killing beneficial organisms; and since elicitors have been found on such a plentiful substance as brewers yeast, commercial production could potentially be very inexpensive. Finally, the polysaccharides involved are not "persistent," like many pesticides, but are naturally broken down in the soil.

Chemical companies are already reportedly showing interest in the new process, but some further advances must be made before elicitors can be marketed—assuming they are indeed proven to be safe, economical and effective in the field. Most important, ways must be found to make them absorbable by the plant. In the laboratory, workers have had to painstakingly introduce the substances through incisions. Next, large scale production must be perfected. Certainly the initial isolation of beta-glucan was a rather tedious procedure, but one factor in favor of the new process is that only relatively small amounts of elicitors are apparently needed.

Much remains to be learned about plant immunity, and discovery of elicitors may provide a new tool for research. Though the plant defense mechanism is very general, invasion by various microorganisms is very specific, and no one yet knows why. Neither is it known how phytoalexins kill the invading microbes. □