

## Against pollution

Antipollution is becoming as sacred as motherhood. Last week the House and Senate, by unanimous voice votes, approved the clean air bill that came out of conference little changed from the stiff version earlier reported out of Sen. Edmund Muskie's (D-Me.) air and water pollution subcommittee (SN: 9/26, p. 271). And although President Nixon is under pressure from the automobile and other industries to veto the bill, bets on Capitol Hill are that he has to sign it. The bill will establish air quality standards "protective of public health." Anyone who wants to argue with that will have to turn some contorted somersaults.

The provision of the bill that got most attention was the one that would require a 90 percent reduction in new car emissions by 1975 (instead of 1980, as earlier required by the National Air Pollution Control Administration). But the bill contains some other, less-noticed provisions that could have even more significant long-range effects.

It would, for example, require the adoption of strict national ambient air standards—as opposed to the earlier suggested "criteria" released by NAPCA—which would be so stiff that many states will have no choice but to make major reductions in automobile traffic within cities.

Another section makes it likely that the standards will be met. It stipulates that if citizens or citizen groups believe NAPCA is not doing the job, they have the right to sue the administrator of the Environmental Protection Agency to require enforcement. □

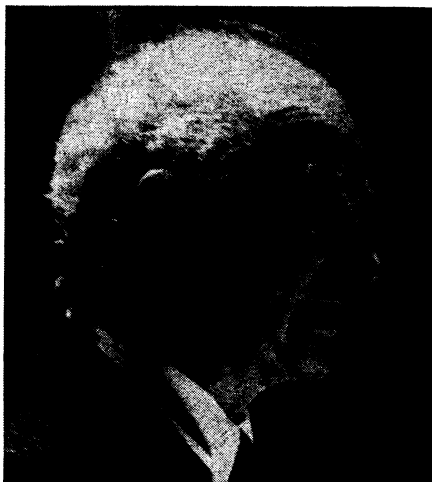
### GULLIBLE SKEPTICS

## The case of vitamin C

A number of the profession's more sophisticated medical reporters, brought together for the meeting of the American Medical Association in Boston (SN: 12/12, p. 446), were discussing informally the phenomenon of Dr. Linus Pauling and his theory that large doses of vitamin C will prevent colds. The general consensus was a good blend of journalistic skepticism and tolerance: It was felt that a man with two Nobel Prizes to his credit (one for Chemistry, the other for Peace) was entitled to make a fool of himself.

The image was marred, however, by the fact that some of the reporters were later observed in the hotel drugstore stocking up on vitamin C.

The incident is typical of the ambivalent attitude prevalent in America toward both vitamins and science. Decades of rampant hucksterism have trum-



Stephen Siegel

*Pauling: Scientist as vitamin promoter.*

peted the virtues of vitamins for action against everything from beriberi to fleabite; while the advertising overkill has resulted in the usual healthy skepticism toward overblown claims, the brainwashed subconscious apparently waits only the proper stimulus to spring into action as a consumer.

Similarly, scientific evidence has been cited so often with so little regard to qualification or restriction that there is much popular resistance to far-out claims—a resistance exemplified a few years ago by the title of a book, "How to Lie with Statistics." But when an authoritative figure cites scientific evidence, skepticism is often overcome.

The result of these factors was that a few weeks after Dr. Pauling's book, "Vitamin C and the Common Cold," hit the stands, the nation's drug shelves were stripped of vitamin C, and Food and Drug Administrator Charles E. Edwards was waspishly lamenting the fad as a waste of money by those who succumbed to it.

Dr. Pauling's case for vitamin C's activity in preventing colds has three legs:

- He claims that since starting a regimen of heavy doses of the vitamin he and his wife have noticed "a striking decrease in the number of colds that we caught, and in their severity."

- He cites a catalogue of studies in which subjects receiving vitamin C appeared to be less susceptible to colds than control subjects. Some of these same studies have been used by other authorities to debunk the vitamin C theory. (Dr. Pauling also cites studies that indicate the vitamin helps heal wounds, prevents back trouble, guards against some types of bladder cancer and increases, if not intelligence, at least mental alertness.)

- He suggests, admittedly without any evidence, that vitamin C may act against cold viruses by stimulating the production of the body's universal antiviral agent, interferon (SN: 8/29, p. 163).

Critics of the vitamin C idea, besides attacking the validity of the studies cited by Dr. Pauling, also express uneasiness about the safety of taking abnormally large dosages of the vitamin over long periods. Although vitamin C is not known to have any adverse effects, the high-dosage long-term regimen has not been studied.

Dr. Pauling's enthusiasm will probably be translated into more, and more rigorous, experimentation on the activity of his wonder chemical. In the meantime, druggists are probably chewing their nails wondering how long the current vitamin C fad will last. □

### OPTICAL MEMORY

## All at a glance

The operation of memory elements in computers and related devices depends on the possibility of making some alteration in the electric or magnetic properties of the element that will remain for a reasonable amount of time. A most common way is to impress a particular direction on the orientation of magnetic domains in a magnetic tape or metal chip. The information thus stored can later be read out by a sensing device.

Light can alter the electrical properties of certain materials in a more or less lasting way, and the use of optical effects to store information could be more advantageous than magnetic means. An optical memory element could instantly take up an entire picture or an optical display containing many thousands of bits of information and play it back instantly. Other types of memory devices tend to record bits of information in sequence, as a TV camera takes pictures by scanning them in horizontal lines and recording spots of darkness or light, one by one. An optical element could take all the spots at once. This could greatly speed data processing and computation rates. An optical memory element must be both photosensitive, that is, capable of recording the light that strikes it, and electro-optic, capable of altering a read-out light beam in such a way that it can give back the information.

A number of approaches have been tried in which one substance is used as the photosensitive part and another as the electro-optic. This method, says Dr. D. S. Oliver of Itek Corp. in Lexington, Mass., encounters problems: It must bond together two dissimilar substances and make them cooperate in the working of the device. He and a group working with him have produced an optical memory element that uses only one substance for both functions, and he says it is not only easier to fabricate and operate but also more efficient than previously reported approaches.



*A photographic slide projected onto an optical memory element is recorded and later read out and imaged on film.*

D. S. Oliver

The device is called PROM for Pockels Readout Optical Memory. (Pockels effect is the name of the electro-optic process by which it is read.) It involves a zinc sulfide crystal as the active element.

To record, a voltage is first put across the crystal. Then light from the image to be recorded is shone on the crystal. The light, by moving electrons in the crystal, changes the voltage pattern so that the pattern represents the light and dark spots of the image. This pattern remains frozen in the crystal for times up to 100 hours, experiment has shown.

To read the information out, a voltage is first placed across the crystal in what crystallographers call the (100) direction. This makes the crystal birefringent: Light polarized in one direction, the fast axis, goes through faster than light polarized in another direction, the slow axis.

Light whose axis of polarization bisects the angle between the fast and slow axes of the crystal is then shone

on the crystal. As this light goes through the crystal it is split into two components along the fast and slow axes. What comes out the other side of the crystal is an elliptically polarized beam. A device called a crossed analyzer is used to select the component of the beam that vibrates along the minor axis of the ellipse. This component has had its intensity altered by the pattern recorded in the crystal and will give back the light and dark spots of the original image.

Recording can be done with ultraviolet and read out with visible light. If the readout is quick enough, it can be accomplished without destroying the recording.

The Itek group reports that images have been read out in visible light sufficiently intense for viewing through an eyepiece and have lasted for periods up to one hour. In the experiments also, photographic slides were projected onto the crystal and later read out and imaged on Polaroid film. □

#### NASA PROGRAM

### Subsonic transport for 1980's

Among the many woes of the aviation industry is a growing gap between technological advancements and actual market applications. Until now, the United States, by out-producing its European competitors, has been able to control 80 percent of the world's aviation market, even though it may not always maintain a clear technological superiority. Few believe, however, that this production lead is unsurpassable or that the environmentalists' cries for more quiet, pollution-free aircraft will wane. To survive, the industry will have to respond.

Although aware of the problem, aviation is already faced with current marketing problems with the Boeing 747 and financial indebtedness with the supersonic transport, which was struggling for life in the Senate this week. The risk of producing prototypes for which

there may be no market, or which may not work, is great. To help ease the problem, the National Aeronautics and Space Administration proposes to develop an advanced experimental transport (SN: 11/28, p. 413).

If funded, such a subsonic transport would be ready to meet the demands of the 1980's, when the industry would be faced with the shutting down of production lines on the Boeing 747, McDonnell Douglas DC-10 and the Lockheed 1011.

The new plane would incorporate new advances in the critical areas of aerodynamics, flight control, structural design, materials, propulsion and avionics. It would fly just below the speed of sound at around 630 miles per hour, about 120 miles per hour faster than current aircraft.

Advances in structural design are

focused on the supercritical concepts developed by Dr. Richard T. Whitcomb of NASA's Langley Research Center in Hampton, Va. (SN: 11/14, p. 389). In propulsion research, the goal is to improve the performance, durability and reliability of engine components that reduce weight, noise and pollution. Research has already demonstrated the feasibility of combustors that operate at high temperatures with lower pressure losses and less smoke formation.

NASA is looking at a new class of structural materials such as filaments of boron or graphite in conjunction with polymeric matrix to reduce structural weight while increasing strength and durability.

A major problem to overcome in avionics is to increase reliability by adding redundant electronic units without increasing weight. The new plane will also use digital control systems with automated communications displays. Another problem is to improve manual control of the larger airplanes in crises situations. Currently, the movable parts, such as flaps and rudders, are almost impossible to control manually; NASA and the industry are working on electronic devices to transmit the signals. □

#### SCIENCE NEWSBRIEFS

### Destroying the stockpile

The Pentagon said last week that it would soon begin destroying the nation's stockpile of germ and biologic weapons. The announcement followed an earlier pledge by President Nixon that the United States would no longer have programs for development of biological warfare for offensive purposes (SN: 2/21, p. 194).

The Pentagon's plans must be approved by the President's Environmental Quality Council, as well as by state and local environmental agencies. But they have already been reviewed by the Department of Health, Education and Welfare, and Army spokesmen said there appeared to be no problems. Full details of disposal techniques were not announced. □

### Apollo 14

The National Aeronautics and Space Administration said this week that the flight of Apollo 14, scheduled for lift-off to the moon Jan. 31, would be one day shorter than previous flights. "We want to get them home as fast as we can," says Apollo Mission Director Chester M. Lee. The day will be saved by performing the burn to return the command module Kitty Hawk and the lunar lander Antares home 24 hours earlier, eliminating the day of lunar orbit photography. The change is one of several to avoid a repeat of the near disaster of Apollo 13. □