Biomedicine

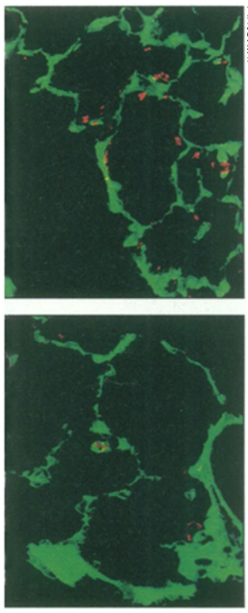
Janet Raloff reports from Atlanta at the Experimental Biology '95 meeting.

Fuming over stainless steel

Welders value the bonds they forge when joining pieces of stainless steel; such joints tend to be stronger than welds in mild (ordinary) steel. Lungs also can discriminate between those bonds — or at least the metals vaporized during their formation, a new study suggests. It shows that welding fumes from stainless steel are more irritating and linger longer.

It should probably come as no surprise that different metals behave differently in the lung. Yet until now, notes James M. Antonini of Harvard School of Public Health in Boston, welders and toxicologists generally have not differentiated between types of fumes when investigating why welders suffer more respiratory disease than the general population.

His team took fume particles collected by air filters during welding, added them to salt water, and then spritzed this mix into the airways of rats. At regular intervals, they killed the animals and looked for signs of the metal and any toxicity.



Antonini

Overall, 35 days after exposure, some 20 percent of the mild steel particles remained in the animals' lungs, compared to fully 50 percent of the stainless steel debris. Lungs of animals that had inhaled stainless steel fume particles also remained more inflamed at 35 days, as evidenced by their hosting five times as many inflammation-provoking cells (neutrophils).

Finally, adapting a new type of computer-enhanced microscopy to their studies enabled the Harvard researchers to map in three dimensions where the various fume particles settled and to study patterns of their removal over time.

The good news, Antonini says, is that while the fumes are toxic, the lungs can clear them out.

Stainless steel fume particles — colored red by the computer — initially settled throughout small airways of the lung (top). By day 35, remaining particles had been engulfed by cells that remove foreign debris.

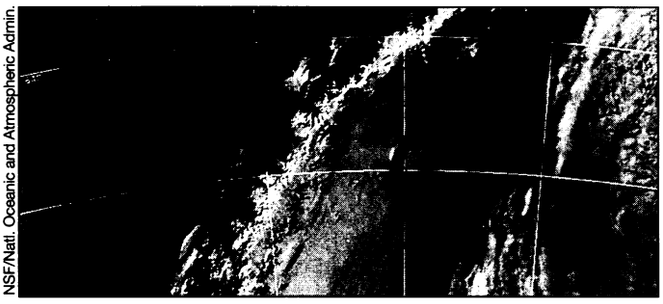
Vitamin E: A cancer warning

Few compounds match vitamin E's ability to quash biologically damaging free radicals. Because these radicals have been linked to cancer, atherosclerosis, and other chronic, degenerative diseases, health-conscious individuals often supplement their diet with extra E. But a new study suggests that in persons harboring a latent cancer, this vitamin may preferentially protect the malignancy — even aid its spread.

Mariette Gerber of the Inserm Cancer Center in Montpellier, France, and her team detected the first hints of this trend in a breast cancer study, published in 1988, involving 500 women. As in a follow-up study of 250 Italian women, the larger, more aggressive, or more invasive a woman's cancer, the higher her body's concentration of vitamin E and the lower its concentration of free radical by-products.

Gerber now reports finding the same trend in 146 men and women with cancers at other sites, such as the prostate, colorectal tract, and lung. Other studies argue against the link proving spurious, Gerber says; they show that cancers and other rapidly dividing cells tend to have better antioxidant protection (SN: 4/22/95, p.248) and to possess fewer of the fats most vulnerable to free radical attack. "I think this reflects an adaptive response of the cancer cells," she says. And taking antioxidant supplements, she adds, "might facilitate this advantage."

Earth Science



NSF/Natl. Oceanic and Atmospheric Admin.

Satellite image shows giant iceberg broken off from Larsen Ice Shelf. U.S. Palmer station sits on other side of peninsula.

Giant iceberg breaks off Antarctica

A cartographer's work never ends. Recent political changes have kept geographers busy by shifting national boundaries. Now, the forces of nature have served up more work for mapmakers by chipping away sections of Antarctic ice.

Researchers from the British Antarctic Survey (BAS) report that the floating Larsen Ice Shelf lost three major pieces earlier this year. Situated along the Antarctic Peninsula, the ice shelf lost two sections — each about 1,000 square kilometers — when they disintegrated into myriad icy fragments. An even larger block calved off to form a mammoth iceberg, according to David Vaughan, a BAS glaciologist. The berg measures 78 km by 37 km and has a thickness of 200 meters. It is almost as large as the state of Rhode Island.

Although the giant ice floe captured attention around the world, Vaughan says the two regions that disintegrated interest scientists even more. "This kind of deterioration is pretty significant. We have only ever seen one other ice shelf disintegrate like this," he explains.

Vaughan blames the ice loss on rising regional temperatures; the peninsula has warmed 2.5°C since the 1940s. Scientists cannot tell whether natural forces or greenhouse warming caused the temperature rise. But Vaughan notes that the continent as a whole has not warmed appreciably in the last 30 years.

Climate summit paves path for cuts

After wrangling for 2 weeks with little success, negotiators hastily patched together an agreement in the closing hours of the Berlin climate summit (SN: 3/25/95, p.183) earlier this month. Delegates from 115 countries agreed that the emissions limits set by the present climate treaty do not address adequately the threat of climate change. They also pledged to negotiate a new treaty on emissions reductions by 1997.

The climate treaty, signed in 1992, requests that developed countries return their emissions of greenhouse gases to 1990 levels by the year 2000. The new agreement, known as the Berlin mandate, calls on nations to set quantified objectives for reducing developed countries' emissions after 2000.

Some U.S. industry representatives criticized the mandate for not requiring developing countries to limit their own emissions. But environmental groups argued that, under the mandate, developing countries must increase their efforts to draw up inventories of emissions — a necessary first step toward meeting any future restrictions.

The Berlin mandate also settled, temporarily, debate over a concept known as joint implementation (JI). The term describes how one country might gain credit toward its own treaty goals by helping to reduce greenhouse gas emissions in another. Developing nations have opposed JI because they fear rich countries would use it to avoid cutting their own emissions. The mandate creates a JI pilot phase, but countries will get no credit for such activities during this time.