# Greenland snow shows lead-lowering success

Snowflakes falling on central Greenland have grown cleaner over the past two decades because of antipollution measures adopted in the United States and other nations, conclude French and Soviet scientists who have conducted extremely sensitive measurements of heavy metals in Greenland snow.

Between 1967 and 1989, lead levels dropped by more than 85 percent while concentrations of cadmium and zinc declined by 60 percent, report Claude F. Boutron of Grenoble (France) University and his colleagues. They describe their findings in the Sept. 12 NATURE.

The group's analyses are part of a European project to collect climate information by drilling through the thick glacial cap that covers much of Greenland (see story, p.168). To ensure the purest possible samples, Boutron and his coworkers collected their snow from a site several kilometers away from the main drilling camp, which sits on the summit of the Greenland ice sheet.

"These are very difficult measurements. That's the reason why this is the first time such a profile has been made," Boutron told SCIENCE NEWS.

Because stray dirt or dust can contaminate samples, the researchers dressed in special "clean-room" clothing and wore shoulder-length polyethylene gloves while in the field. They used an all-plastic drill, cleaned in ultrapure nitric acid, to core a 10.7-meter-deep hole. After transporting the frozen snow core to France, the scientists removed samples from its center to obtain the cleanest snow for spectrometry measurements.

Previous work in Greenland showed that lead levels in the snow rose dramatically during the 1950s and 1960s, when the use of lead additives in gasoline increased. The subsequent lead decrease detected by Boutron's group reflects widespread efforts taken by many countries in the 1970s to curb lead additives in gasoline, the researchers say. In the United States, for instance, use of lead additives has declined by 90 percent since the late 1960s.

Cadmium and zinc pollution comes from many different sources, primarily fossil fuel burning, metal production, iron and steel manufacturing and garbage incineration. The snow analyses indicate that efforts to reduce cadmium and zinc pollution from these sources have significantly decreased atmospheric levels of the two metals in the Northern Hemisphere, the researchers conclude.

*— R. Monastersky*

# Brain scans track down attention systems

To search for a friend in a crowded, noisy room, you could look for a single key attribute — say, your comrade's trademark red jacket — or you could scan the crowd for a person with several signature traits, such as moustache, bushy hair and red jacket. Either strategy may work, but different parts of your brain spring into action depending on how you allocate your attention, according to a new brain-imaging study.

The findings indicate that the brain's ability to concentrate on a small fraction of the information that bombards it depends not only on identifying specific stimuli, but also on whether attention focuses on one or several perceptual features of a stimulus, concludes a research team led by neurologist Maurizio Corbetta of Washington University School of Medicine in St. Louis.

"[This] suggests that similar perceptual judgments involve different neural systems, depending on attention strategies," the scientists assert in the just-released August JOURNAL OF NEUROSCIENCE.

A series of trials with 11 healthy adults first demonstrated superior accuracy at noting a subtle alteration in the speed, color or shape of a visual stimulus when volunteers paid attention only to the feature that changed, rather than to all three attributes at once. Each participant watched a video monitor on which an image appeared for a fraction of a second. The image contained 30 small squares or rectangles of identical shape and color, moving at a constant speed to the left or right. A second image then flashed on the monitor; in half the trials, the shape, hue or speed of these boxes differed from that of the first image.

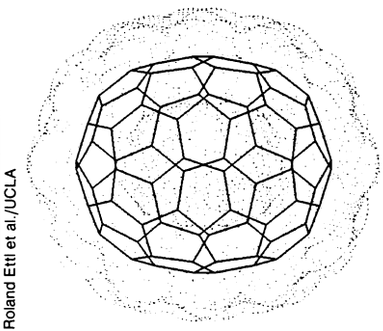
During "selective-attention" trials, experimenters told volunteers to look only for changes in a single feature, such as a slight shift in hue. In "divided-attention" trials, participants tried to detect whether a change occurred in any of the three features.

In a second experiment, nine healthy adults completed a series of the same selective- and divided-attention tasks while the researchers monitored blood flow throughout their brains with positron emission tomography (PET) scans. Volunteers received injections of water labeled with minute amounts of a radioactive oxygen isotope. A scanning machine detected positively charged particles emitted by the isotope and translated the data into images of blood-flow activity in the brain.

The PET scans showed that both selective and divided attention activated the primary visual center at the back of the brain. But on selective trials, attention to speed, color or shape each activated different visual regions that assist the primary visual center. Outside the visual system, selective and divided attention also activated different sets of brain regions, Corbetta's group reports.

Overall, the new evidence supports the theory that selective attention does not aid perception by making better use of the same brain mechanism that handles divided attention, the researchers say. Instead, the brain treats the two types of attention in entirely different ways, with specific regions assigned to help process selected visual features. *— B. Bower*

## Spiraling fullerene



Roland Ettl et al./UCLA

*The latest twist in the rapidly unfolding tale of fullerenes is the discovery of one that looks a bit cockeyed. Chemists have speculated on the shapes of these all-carbon molecules, but until now they had isolated and examined the structure of only two members of the fullerene family: the soccerball-shaped, 60-carbon buckyball and its rugbyball-shaped, 70-carbon cousin (SN: 8/24/91, p. 120).*

*Researchers at the University of California, Los Angeles, have now purified a 76-carbon fullerene with an intriguing corkscrew configuration.*

*Whereas the buckyball sports a completely symmetric lattice of five- and six-member carbon rings, nuclear magnetic resonance spectroscopy indicates that $C_{76}$'s atoms form a different sort of compact carbon cage. This fullerene's 28 carbon hexagons attach as if there were two chains of rings that spiral around each other, the team reports in the Sept. 12 NATURE. This slight twisting, they say, means that $C_{76}$ has both right- and left-handed versions, or isomers. Materials with such configurations tend to have interesting optical, chemical and electronic properties, the scientists note.*

*This way of fitting together also suggests that "you can build these things of any length," says study coauthor Robert L. Whetten. The UCLA team has since determined that $C_{84}$ has a similar structure, he adds. In theory, says Whetten, chemists could fashion a fullerene molecule into a millimeter-long carbon fiber, with pentagons capping the ends.*