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Heat-transfer basics

In "Course treatment makes heat flow surge" (SN: 9/5/98, p. 157), the photo suggests the grid is of tiny 90-degree pyramids. While flow turbulence may be a factor, the grid also increased the surface area of each cap by 40 percent over that of a smooth cap. Engineers know that heat flow is a function of temperature differential, thermal conductivity, and heating or cooling area.

More data are needed. What happens if one or the other cap is left smooth? What happens if only grooves are cut, instead of a grid?

*Teck A. Wilson
Osprey, Fla.*

Roughening the caps does increase their surface area, and that increase, in itself, can contribute significantly to heat flow. The pattern of perpendicular grooves used in the experiment, causes a 41 percent leap in surface area compared with the smooth surface, says Penger Tong. Yet the heat flow increases by 76 percent. In a prior experiment, which is described in

the Feb. 5, 1996 PHYSICAL REVIEW LETTERS, his group demonstrated that the same increase in surface area can produce a much smaller heat-flow gain. In that test, the researchers cut the identical pattern of grooves into the caps, but less deeply (3 mm deep vs. 9 mm in the other experiment). The heat flow increased only 20 percent. —P. Weiss

Nip toxins at U.S. source

How inconsistent, that the United States, with some of the toughest domestic environmental laws, allows its corporations to be "a major manufacturer" of toxic compounds for export ("PIC and choose—a toxic-imports accord," SN: 9/19/98, p. 181). I would suggest that compliance is relatively easy—by controlling the source through laws that prevent

CORRECTION

The article "Lava may have sculpted Martian plains" (SN: 11/7/98, p. 295) should have said that the Elysium Basin in the northern lowlands of Mars—not the entire northern lowlands—is half the size of the United States.

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Cover: The flower now called *Yermo* is so distinctive that taxonomists gave it its own genus. Yet it was not known to science until 1991, after a botanist noticed it while riding his dirt bike along a proposed pipeline route in Wyoming. Some taxonomists worry that little effort is going into identifying the still unknown plants in the United States and Canada. **Page 8** (Charmaine Delmatier)

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U.S. corporations from transporting these chemicals outside our boundaries.

*Del Dietrich
Campbell, Calif.*

Correlation is not cause

I appreciate that yours is one of the few news journals that summarizes both the conclusions and some of the methodology and data of experiments, allowing the reader to make some judgments about the validity of the science. However, there have been a number of times when I've noticed that correlation studies have been presented as cause and effect. For example, in "Exposure to smoke yields fetal mutations" (SN: 10/3/98, p. 213), if I understand the experiment correctly, there is no way of ruling out whether the one group of infants had something else in common besides being exposed to smoke. As a teacher, I find myself constantly struggling against my students' misconceptions about what science is and what it can and cannot tell you.

*Lowell Chapnick
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