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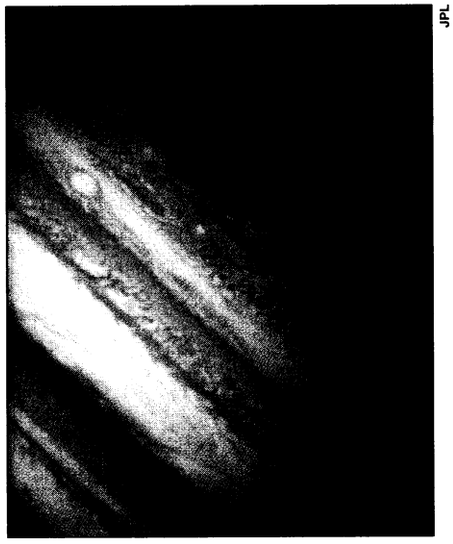
LETTERS

Jovian Lightning After Comet Impacts?

In 1994, predictions were made in a number of papers in *Geophysical Research Letters* (*1*) about phenomena to be produced by the impacts of the Shoemaker-Levy comet fragments on Jupiter. The observed effects were later analyzed in *Science* (Articles, 3 Mar., pp. 1277–1323). In neither place did investigators consider how the impacts may have affected the lightning known to occur in this planet's atmosphere.


JPL

Fireworks. Did lightning follow collision (brown area) and atmospheric convection on Jupiter?

A possible reason atmospheric electrical phenomena have been given little consideration is that many scientists still believe the old idea that falling precipitation particles supply the electrical energy and charge that are responsible for lightning in the atmospheres of the Earth and other planets (*2*). If this mechanism is assumed, one questions whether the comet impacts would produce sufficient numbers of precipitation particles having the proper size and composition to cause lightning.

On the other hand, Cook *et al.* (*3*) attribute lightning to upwelling in the Jovian atmosphere, saying

> We believe the mechanisms of generation of lightning on Jupiter and Earth may be similar. The most plausible mechanism is convective electrification. Convection in clouds distorts a pre-existing background charge distribution and thus collects the charges into a distribution which is discharged by lightning strokes.

If this is correct, the impacts would produce big effects.

While it is unclear how the comet impacts would affect precipitation formation in the Jovian atmosphere, there can be little doubt that the momentum and thermal energy they impart would produce regions of unusually intense convection. If convective mechanisms of electrification (*4*) are active, the impacts of the comet fragments would be expected to produce episodes of unusually energetic or frequent lightning.

In examining and interpreting the many observations made after the impacts of the comet fragments, would it not be worthwhile to consider the possible roles that extraordinary atmospheric electrification might have played in producing unusual electromagnetic radiation, auroral phenomena, and atmospheric chemical reactions?

Bernard Vonnegut
Department of Atmospheric Science, State University of New York, Albany, NY 12222, USA

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Delaney Reform

In her letter of 24 February (p. 1080), Environmental Protection Agency Assistant Administrator Lynn R. Goldman states that "the Delaney clause is an outdated approach for protecting consumers from pesticide residues" and that there is a need to cut through the "overheated rhetoric" on this issue. Now is the time for scientists to speak out on the need for Delaney reform and to clarify some basic facts for policymakers and consumers.

Congress enacted the Delaney clause nearly 40 years ago to help protect Amer-

icans against any possible hazard from food additives in the food supply. But today, the law may have the paradoxical effect of increasing public health risk. Since that earlier era, there have been enormous advancements in both analytical abilities and our understanding of cancer. It is now recognized that some animal models are not relevant to humans and that substances that induce cancer in animals at high doses should not be presumed to have the same effects in humans at low levels.

In the real world, humans are exposed to small doses of many carcinogens found naturally in foods. The Delaney clause does not apply to these carcinogens in traditional foods, although the body makes no distinction between whether a carcinogen is natural or synthetic. Furthermore, Delaney does not discriminate between potent carcinogens and those that pose a weak or insignificant risk. Thus, enormous resources are being spent to address what can amount to zero risk.

A more enlightened approach to cancer-related regulation focuses on the *mechanisms* by which a substance causes cancer at a particular dose, not solely the cancer endpoint. Such an approach has been recognized by the International Agency for Research on Cancer and by other respected worldwide health authorities.

Delaney also has the unintended and unfortunate outcome of leading individuals to believe that major dietary risks accrue from food additives and pesticides. Yet, scientific consensus overwhelmingly points to consumers' inadequate consumption of fruits and vegetables as a major carcinogenic risk. To the extent that Delaney adversely affects the availability, price, or variety of produce—by unnecessarily restricting pesticide uses or stifling the development of less risky alternatives—it is counterproductive to public health.

The United States is the only nation in the world that regulates carcinogens through a Delaney-type procedure. In more than 20 congressional hearings over 15 years, the National Academy of Sciences, the Food and Drug Administration, the Environmental Protection Agency, and independent health experts have testified on the need to reform Delaney to a negligible risk standard. At a time when resources are becoming ever more limited, Congress can no longer afford inaction. Americans deserve the best public health protection based on sound, scientific policy.

Samuel M. Cohen, *University of Nebraska Medical Center, Omaha, NE 68198–3135, USA;* **Fergus M. Clydesdale,** *University of Massachusetts, Amherst, MA 01003, USA;* **Carl Winter,** *University of California Cooperative Extension Service, Davis, CA 95616, USA;* **John D. Graham,** *Center for Risk Analysis, Harvard School of Public Health, Boston, MA 02115, USA;* **William B. Weil Jr.,** *Michigan State University, East Lansing, MI 48823, USA;* **Manfred Kroger,** *Pennsylvania State University, University Park, PA 16802, USA;* **Michael W. Pariza,** *University of Wisconsin, Madison, WI 53706, USA;* **Lester M. Crawford,** *Association of American Veterinary Medical Colleges, 1101 Vermont Avenue, NW, Washington, DC 20005–3521, USA;* **Dennis Avery,** *Hudson Institute, Post Office Box 202, Churchville, VA 24421, USA;* **Robert J. Scheuplein** *(formerly, Food and Drug Administration), Weinberg Consulting Group, Inc., 1220 Nineteenth Street, NW, Washington, DC 20036, USA;* **Elizabeth Weisberger** *(formerly, National Cancer Institute, Bethesda, MD), 5309 McKinley Street, Bethesda, MD 20814, USA.*

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Transgenic Plants: Effect on the Third World

I read with interest the article by Anne Simon Moffat "Plants as chemical factories" (News, 5 May, p. 659). It is true that, with the introduction of transgenic plants designed to synthesize specific fatty acids, and so forth, the capability of industry