

SCIENCE

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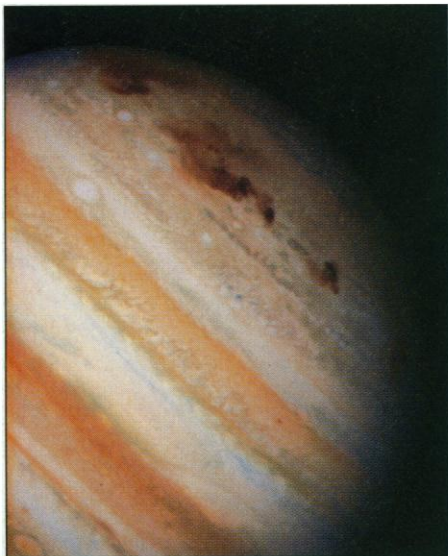
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Information for Contributors appears on pages 112–114 of the 6 January 1995 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005.
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LETTERS

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.



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?

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References and Notes

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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-