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Cover: *Autographa californica baculovirus*. This virus attacks and destroys some of the worst pests of food and fiber crops in the United States. It is among the microbial agents that are becoming increasingly important as biological pesticides. See story p. 10. (Photo: Jean R. Adams/Insect Pathology Laboratory/USDA)

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LETTERS

The glow of the earthquake

I read with much interest the item "Phenomena preceding two large quakes" (SN: 12/17/77, p. 408), which mentioned the unusual sky brightening phenomenon which preceded the September 5, 1975, earthquake in eastern Turkey. It is worth emphasizing, however, that earthquake-associated sky luminescence has not only been reported prior to two quakes in Japan, as the article implied, but that it is often reported prior to, during, and after earthquakes.

Seismic strains must somehow (perhaps as a result of a piezoelectric effect associated with quartz) generate enough voltage to produce electrical surges. It occurs to me, though I have been unable to find any mention of it anywhere, that measurements of radio emissions ("whistlers") which might be produced by these surges could be of use in earthquake prediction.

José J. Valdés
Boston, Mass.

I was puzzled, then dismayed, by the conclusion to the item regarding earthquake research. The teaser that "several hypotheses have been proposed to try to account for such glows," offered without even cursory mention of what those hypotheses are, is excruciating to the reader truly interested in the topic. It would have been better, if space did not permit a more complete report on this item, to completely omit this sentence.

Donald L. Day
Arlington, Va.

(The subject of earthquake lights is fascinating. Few scientists have worked on the question because observations are rare and are usually made by untrained persons. Nevertheless, observations have been made for many years, and the existence of earthquake lights is well established. One hypothesized explanation is linked to the piezoelectric effect in quartz-bearing rock. Changes in stress on certain rocks can set up an electric potential; changes in strain before a large earthquake could produce stress on piezoelectric quartz in the rocks and the resultant discharges might be seen before the actual fault break. Another hypothesis involves the transportation of a space charge by a violent low-level air oscillation produced by landslides triggered from a quake. This might set up electrical imbalances that could lead to luminosity. The sky brightening before the September 5, 1975, earthquake in eastern Turkey was seen over a wide area. Whether it was definitely linked to the quake cannot be said for sure, but it seems consistent with sightings of

such lights at the time of the great Tangshan, China, earthquake of July 28, 1976. Japanese physicist Yutaka Yasui has collected photographs of lights seen during the Matushiro earthquake swarm in Japan from 1965 to 1967. Other reports of earthquake lights were made at the time of the Idu Peninsula earthquake of November 26, 1930, and the Santa Rosa, Calif., earthquake of October 1, 1969. The May-June 1977 U.S. Geological Survey EARTHQUAKE INFORMATION BULLETIN contains further information.—Ed.)



T. Kuribayashi photographed Matushiro earthquake swarm (1965 to 1967). His is the only known photo of earthquake lights.

Dream on

Since 1900, when Freud first published his book on "The Interpretation of Dreams," thousands of dreams reported to psychoanalysts by their patients have been found to be directly and meaningfully associated with their immediate emotional problems as well as their lifelong themes of personal psychological significance.

The sleeping brain is no more "preprogrammed" for these psychological issues in dreams than is the waking brain "preprogrammed" for the playing of a violin sonata or for the writing of a scientific paper. For both, the neurobiological program is not yet fully known to us. Of course, the neurobiology of the brain during the dream state, as reported by Hobson and McCarley (SN: 12/17/77, p. 405), has its specific characteristics, and it is very different from the neurobiology of the brain in the waking state, but there are as yet few precise correlates between brain neurobiology and the specific detailed psychological contents of dreaming or waking experience.

Neurobiology may explain certain characteristics of dream form and rhythmicity but not the psychological themes that are contained in them. Not yet.

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