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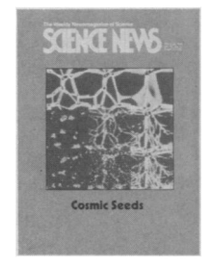
This Week

Research Notes

Articles



Departments

Letters

Rainbow phenomena

"Shaking raindrops wash out rainbows" (SN: 1/6/90, p.4) may answer a question for me. Six times I have seen a white rainbow, always associated with fog. The droplets, perhaps of uniform size, must all have been oscillating, since no trace of color could be seen even though the reflected light was intense.

Derham Giuliani
Big Pine, Calif.

"Shaking raindrops" may help to explain a mysterious phenomenon I have observed on very rare occasions when brightly colored rainbows abruptly and quite noticeably faded immediately following nearby lightning discharges. After some moments elapsed, the colors gradually returned to their original brilliance until the phenomenon was repeated with another bolt of lightning.

While the sound energy in the accompanying thunder might play some role in vibrating raindrops into oscillation, and therefore scattering the colors into fading or "washing out," this alone cannot account for the nearly instantaneous effect on the rainbow. Since the sound energy of thunder travels at the speed of sound — much too slowly to affect the rainbow as quickly as observed — some other mechanism must be involved.

Another curious phenomenon that occurs far more commonly, though rarely noticed, may provide a partial answer. During thunderstorms I have often noticed the abrupt increase in the noise level of raindrops impinging on the roof immediately following a nearby stroke of lightning. Since the sound of thunder most often arrives many seconds after the increase in the noise level of the shower, the thunder cannot be held responsible for the increase. Moreover, it is not at all apparent how a bolt of lightning, let alone the subsequent roll of thunder, could almost immediately increase the rate of rainfall wherever an observer (or the lightning bolt) may be located. Instead, it must be an abrupt increase in the size of the raindrops. This I have confirmed by subsequent observation.

Here, then, we have a possible explanation for two mysterious and very unusual, apparently unrelated phenomena: lightning-induced rainbow fades and sudden raindrop growth. Larger drops are more prone to optically distorting oscillations and tend to make more noise as they strike the roof. Thunder may play some role in breaking up large drops into smaller ones, restoring rainbow colors and gentle showers, but it seems more likely that the drops break up easily enough as they fall through the air. (Larger drops are also more rapidly depleted from the air, leaving a higher proportion of smaller drops.) As for the mechanism of sudden raindrop growth, perhaps smaller droplets merge to become larger drops as a result of some static electromagnetic attraction induced within or between raindrops by the lightning discharge, a process that could also immediately initiate oscillations in the resulting drops.

Adolf Schaller
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