

SECRET

UNITED STATES DEPARTMENT OF COMMERCE
WEATHER BUREAU

Report

Information on "Ball Lightning"

I. Origin

Various theories and suggestions have been proposed to explain ball lightning, most of them being without well-established physical foundations. There is still doubt in scientific circles regarding the origin of a number of reported cases of ball lightning.

Probably, the explanations of the origin of ball lightning may be broken down as follows:

(1) Break discharge (St. Elmo's fire).

[May be stationary over sharp-pointed objects, or moving along or near the surface of wires, roofs, rocks, etc., especially on mountains. Conditions most favorable for break discharges occur during thunderstorms, but the phenomenon may occur even during clear, dry, dusty weather. When a lightning stroke is approaching an object, the break discharge becomes especially intense.]

(2) Intensely heated, ionized mass of air forming end of lightning stroke and lasting for short interval of time.

[This would occur mainly during thunderstorms following the passage of a lightning stroke. At the ground end, the terminal flash is intense, and vapors, smoke or melted material from objects struck at points struck may enhance and extend the duration of ionization. After-image formed on the retina of the eyes of a person looking at the brilliant flash at the point of discharge may give surprising effects.]

(3) Break discharge in air containing high concentration of dust or other aerosols, during thunderstorms. [If this occurs, it probably is associated with the path taken by a real lightning stroke, and presumably involves corona discharges from suspended particles and possibly induction in some cases.]

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