

## SECONDARY FRAGMENTATION EVENTS OF COMET SHOEMAKER-LEVY 9

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The comet's tidal splitting near Jupiter occurring on July 17, 1992, did not represent the ultimate breakup of its nucleus before the catastrophic collision with the planet two years later. We document and investigate a long series of discrete secondary fragmentations that the primary components of the progenitor comet experienced during the 24 intervening months. We show that each of the off-train fragments (B, F, J, M, N, etc.) observed during the period of time between discovery and impact, broke off from one of the on-train fragments. For each event, the breakup time and the separation velocity vector are calculated by fitting the observed offsets between the parent (the primary fragment) and the companion (the secondary fragment). Possible differential nongravitational effects are also investigated. The separation velocities are found to be between 0.3 and 1.2 m/s. Whereas most of the events of secondary fragmentation took place in the second half of 1992, it is shown that at least one of them (the separation of Q<sub>2</sub> from Q<sub>1</sub>) occurred shortly after discovery and this circumstance may explain the fact that the Q region appeared to be the brightest condensation over an extended period of time, even though the phenomena associated with the impacts of Q<sub>1</sub> and Q<sub>2</sub> were rather disappointing in comparison with those of the fragments G, K and LA. Hierarchy and history of the secondary fragmentation events are presented and the most possible interpretation is offered.