**ALL SHOCKED METEORITES WERE SHOCKED AT SIGNIFICANT DEPTH IN THEIR PARENT BODIES**

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**Introduction:** Shock waves have been important in the history of virtually all meteorites. Recent studies of melt veins in meteorites have indicated that many meteorites were deep within a parent body at the time of shock metamorphism. We have recently realized that it is virtually impossible for a meteorite to survive strong shock unless it is well below the surface of a parent body. The unconfined compressive strength of the strongest rocks is only about 500 MPa. To survive a stronger shock without being pulverized, the rock must be confined by surrounding material.

**Experimental:** The experimental evidence is all of a negative nature. Shock wave experiments on unconfined samples over a large range of scales, ranging from grams of explosives from hundreds of tons of explosives, have failed to yield shocked samples larger than about a mm in dimensions. The only way to successfully recover larger shocked sample has been to confine the sample in a ductile metal container.

**Discussion:** The most serious consequence of this observation is the recognition that observed shock metamorphic effects may be unrelated to the event that resulted in the ejection of the meteorite into an Earth-crossing orbit. For meteorites of asteroidal origin, a connection is possible. The implication would be that the event that produced the metamorphic effects fragmented the asteroid. For lunar and martian meteorites, it seems highly unlikely that there is a connection between observed shock effects and the event that ejecteda the meteorite.