A NEW CLASS OF PLANETESIMAL COLLISIONS AND A POSSIBLE CONFIRMATION.

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Collisions between comparable-sized planetary bodies are rarer than other collisions and have been little treated as a class. However, they can produce interesting results, such as highly brecciated bodies reconsolidated after catastrophic breakup, and possibly co-orbiting pairs or swarms. Most interesting are dumbbell-shaped objects resulting from low-velocity collisions where there is not enough energy to totally fragment the pair or cause them to rebound to infinity. Small examples of coalesced pairs almost certainly were produced among planetesimals, and the real question is on how large a scale the phenomenon could operate.

Asteroid 624 Hektor, isolated from the main belt in the Trojan cloud at one of Jupiter's Langrangian points, may be a large-scale example. It rotates in 6.9 hours, has a lightcurve amplitude up to 3.1, is apparently very elongated, and is about twice as big as its companions, which are relatively spheroidal. Its average albedo has been measured at about 0.02-0.03, giving a length of the order 300 km. Hektor is a few times bigger than the expected maximum size for unfractured contact pairs. However, Hartmann and Cruikshank (1978, Icarus, in press) have suggested it may be a result of a low-velocity collision of two spheroidal Trojans, producing a partly fragmented pair, partially preserving the shape of the two original bodies. If this model is correct, it may be a "fossilized" example of a planetesimal collision and thus a very interesting target for future exploration.

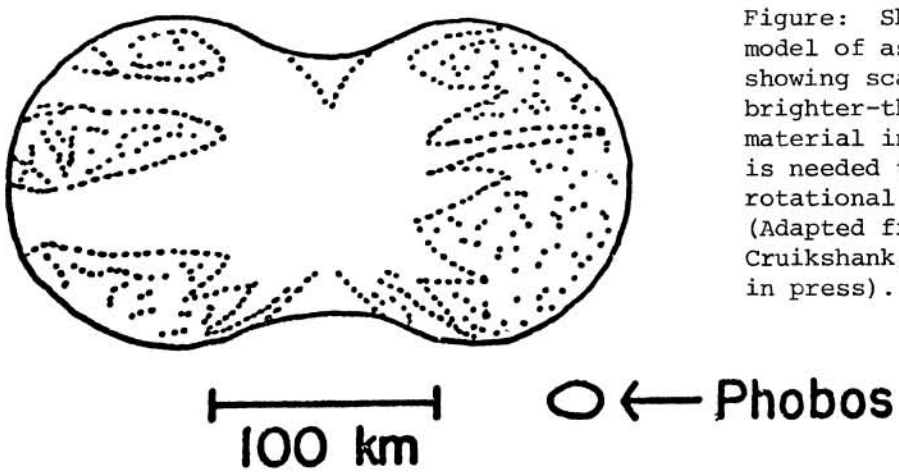

Figure: Sketch of proposed model of asteroid 624 Hektor, showing scale. Somewhat brighter-than-average ray material in the contact zone is needed to account for the rotational light curve. (Adapted from Hartmann and Cruikshank, 1978, Icarus, in press).