The energies embodied by stony spheroids of various sizes at a relative velocity of 72 km/sec. are seen to overlap these high energy phenomena and fall within the rotational and translational energies of the earth and moon.

The justifications for the velocity chosen in the examples are simple: The distribution of velocities for meteorites in the solar system is between 13 and 72 km/sec., averaging 42 km/sec. (The probability of collision is increased for the faster ones, increasing the average). The earth-moon system has a velocity about the sun close to 30 km/sec. and, therefore, even more energy is available in the event of rarer, but nevertheless possible, head-on collisions.

The following observations are pertinent, based on the values of Table II. (1) The orbital motion of the earth, or moon, about the sun could be affected, but only to a small degree. The moon, because of its smaller mass, naturally would be subject to greater changes. (2) The orbit of the moon about the earth, on the other hand, can be affected significantly by collisions with spheroids of 50-100 km diameter. Secondary effects on the earth by lunar disturbances would be changes in body and superficial tides and in the precession of the axis. (3) Rotation of the moon about its own axis and the actual change of axis are within the capacity of collisions with bodies 1-10 km in diameter. Certainly the scarred face of the moon suggests many collisions of this order. It cannot be taken too patly that the moon's present rotation is of aeon-long duration. (4) The above are real, but with the earth as a protagonist a review of the mechanics of collision will offer more to savor. As a first approximation the earth is considered to behave as a rigid sphere in the short time of impact. The large spheroid, conversely, may behave as an inelastic body—that is, it may give all its in-flight momentum to the earth. However, because of the truly explosive nature of the collision the generation of a *reverse directed jet* of the blast material would approximate an elastic collision. The net momentum contribution to the earth could be between one and two times that of the spheroid. (If the collision were to set off a nuclear fusion process in the center of the collision zone the effective momentum in the jet could raise the net change to values greater than two. Theory does not countenance this possibility although pressures of 200-300 megabars and temperatures of 1½ million degrees may be available.)

The direction of the collision, for the present purpose, is taken as effectively tangential to the longitudinal or equatorial circles of the earth, and in their planes. The center of percussion is taken at the center of the earth. This combination tends to compensate one with the other in that the more probable collision angle is 45° and the center of percussion affords a lever arm 40 percent longer than the radius of the earth.