STUDIES OF TROJAN AND HILDA ASTEROID LIGHTCURVES; William K. Hartmann, Planetary Science Institute, Tucson, AZ 85719. David J. Tholen and Dale P. Cruikshank, University of Hawaii, Honolulu, HI 96822

We have initiated an observing program to study shape and rotational properties of Trojan and Hilda Asteroids. In particular, we believe it is important to compare the statistical distribution of shapes (amplitudes) and periods of Trojans and Hildas relative to those of main belt asteroids. The Trojans occupy two dynamically isolated clouds 60° ahead of, and behind, Jupiter and its orbit, and the Hildas are also somewhat isolated from the main belt. Therefore, these objects plausibly have had a different collisional history or degree of collisional evolution than the main belt.

For example, the largest Trojan, 624 Hektor, has been known since pioneering work by Dunlap and Gehrels (1969, Astron. J.) to have unusually high amplitude. Cruikshank (1977, Icarus); and Hartmann and Cruikshank (1978, Icarus; 1950, Science) proved that Hektor is very dark and large, and that its amplitude is due to shape, not albedo markings. Thus, Hektor emerged as one of the most elongated large asteroids with dimensions roughly 160 x 270 km. Weidenschilling (1980, Icarus) has shown that with its rotation period of 6.9 h, it may have an unusual contact binary equilibrium configuration with two ellipsoid lobes of low-tensile strength material. This would explain its lightcurve.

Recently, we have located another extremely elongated object, Hilda 2483 Guinevere. Its mean size is smaller, only about 42 km. We find an amplitude of about 1.3 magnitude, corresponding to a length/width ratio of 3.3! Because we have observed from only a limited aspect angle, we must regard this as only a lower limit on the full elongation, or amplitude as seen in the equatorial plane. We are preparing to publish these data, along with data on Trojans 884 Priamus and 1172 Aneas, which have sizeable amplitudes of 0.37 and 0.55 mag, respectively. Contrary to estimates of only a few years ago, our limited observations to date raise the question of whether there could be an unusual abundance of elongated objects among Trojans and Hildas.

More lightcurves of these faint objects (typically magnitude 17-18) are thus warranted. We have obtained useful data for about 12 other Trojans and Hildas objects (in preparation). Observational interest has also been expressed by Linda French et al. (1986 DPS abstracts, 1986) and other observers. French et al. (1986) reported periods and amplitudes (>0.5 mag) for two more Trojans, and a probable low amplitude for a third. We look forward to growing interest in these remote asteroids, which are, in some ways, a unique class of interplanetary bodies.

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