Five different crater populations have been recognized in the Solar System based on their size/frequency distributions. Two (Pops. A and B) are found in the inner Solar System, one (Pop. E) at Jupiter, and two (Pops. C and D) at Saturn (Fig. 1). These five crater populations indicate that five distinct families of impacting objects have been responsible for the observed cratering record in the Solar System. Population A represents the period of late heavy bombardment in the inner Solar System and became extinct about 4 B.Y. ago. The younger Population B is the lunar post-mare and martian plains accumulation of craters during the past 4 B.Y. (1). Population E is found only at Jupiter (Ganymede and Callisto) and is characterized by a paucity of large craters relative to the inner Solar System (1). Populations C and D are found only on the Saturnian satellites. Population C is the oldest and recorded on the most heavily cratered regions, while the younger Population D is recorded on resurfaced areas. Although Populations B (inner Solar System) and C (at Saturn) have similar size/frequency distributions it is unlikely they have a common origin because such a distribution function is not found at Jupiter. Therefore, it is almost certain that all five families of impacting objects had different origins and source regions.

Six different origins of impacting objects have been proposed: (1) asteroids, (2) comets, (3) accretional remnants, (4) impact-disrupted satellites, (5) tidally disrupted planetesimal from the outer Solar System, and (6) tidally disrupted planetesimal from the inner Solar System. If comets were primarily responsible for the observed cratering record then the size/frequency distribution should be the same everywhere, and there should be an orbital leading/trailing asymmetry in crater density on the Galilean and Saturnian satellites (2). Since neither of these conditions are met (3,4,5) it is probable that comets have been only a minor contributor to the cratering record. The two different crater populations found on the Saturnian satellites (Pops. C and D) together with the lack of an orbital leading/trailing asymmetry in crater density implies that the two impacting families were indigenous to the Saturnian system. Perhaps the older family (Pop. C) was accretional remnants and the younger family (Pop. D) was debris from an impact-disrupted satellite. The different Jovian crater population (Pop. E) and the lack of a leading/trailing crater density asymmetry on Ganymede (4) and possibly Callisto implies that the impacting objects were indigenous to the Jovian system; perhaps an impact-disrupted Jovian satellite. Since Population A in the inner Solar System is not found in the outer Solar System this family of impacting objects originated within the inner Solar System. It may have been a long-lived "tail" of accretional remnants (6), a tidally disrupted planetesimal perturbed into the inner Solar System from the region of Neptune and Uranus (7), or a tidally disrupted planetesimal originating within the inner Solar System. The younger inner Solar System population (B) may be the result of Apollo-Amor objects derived from the asteroid belt.

Although the origin of the impacting objects is still very uncertain, the differing crater populations in various parts of the Solar System strongly suggest that the impacting objects had diverse origins located at different regions in the Solar System.
CRATERING POPULATIONS
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Fig 1, "R" plot of the size/frequency distribution of crater populations in the Solar System. Population A occurs on Mercury, Moon and Mars; B on Moon and Mars; C on Tethys, Dione, and Rhea; D on Mimas, Enceladus, Tethys, Dione, (Rhea ?); E on Ganymede and Callisto.