Fig. 1*a*. The Orientale basin on the moon. Portion of Lunar orbiter photograph LO IV-194M.

the moon, Mars, and Mercury (Figure 1), the ring structures of older basins on these planets are often incomplete and much more poorly preserved. There also are circular basins, possibly of impact origin, on Venus and on the icy Galilean satellites with at most very modest topographic relief. A major candidate for the process responsible for these different degrees of preservation of impact basin topography in the solar system is viscous relaxation of the stresses generated by topographic relief. The rate and degree of viscous relaxation is related to the regional thermal environment and to the thermal evolution of a planet. Extensive relaxation has probably occurred only in impact basins formed early enough in the history of a planet so that near-surface temperatures were high and solid state creep could readily occur on the scale of basin dimensions.

A number of previous studies have supported the suggestion that viscous relaxation has been an important modification process for many impact craters and basins. Viscous relaxation has been proposed by several workers to explain both the reduced topographic relief in a number of specific lunar craters, particularly those with fractured and apparently uplifted floors [*Masursky*, 1964; *Daneš*, 1965; *Scott*, 1967; *Baldwin*, 1968; *Pike*, 1968], and the general reduction in lunar crater relief with age [*Baldwin*, 1971; *Kunze*, 1974]. It