



Fig. 4. Mare-type ridges on lava plains in the Tharsis region of Mars (24.9°S, 82.3°W). The geologic unit shown is ridged plains material in eastern Solis Planum. Viking Orbiter frame 608A43, width 225 km.

The third major tectonic episode produced a set of extensional fractures oriented radially with respect to a center at approximately 0°S, 110°W, near the present southeast flank of Pavonis Mons [Plescia and Saunders, 1979a]. Faulting in this episode produced the Tempe-Mareotis Fossae, most of the Memnonia-Sirenum Fossae, and additional tectonic features in Solis Planum and the Claritas-Thaumasia Fossae region. Formation of the main canyons of Valles Marineris may have also occurred at this time [Frey, 1979; Wise *et al.*, 1979a; Masson, 1980]. The predominant orientation of fractures in this system is northeast-southwest; presumably

fractures formed during this episode helped to control the locations of the shield volcanoes of Tharsis Montes [Wise *et al.*, 1979a; Plescia and Saunders, 1979a].

Emplacement of the Tharsis plains was followed by the final episode of extensional tectonic activity [Plescia and Saunders, 1979a; Scott and Tanaka, 1980]. This stage included limited reactivation of faulting on Pavonis-centered graben and formation of additional graben concentric to each of the major volcanic shields. The latter set of faults is the result of loading of the lithosphere by individual volcanic constructs [Solomon *et al.*, 1979; Comer *et al.*, 1980] rather