MARS: NEW EVIDENCE FOR ORIGIN OF SOME VALLES MARINERIS LAYERED DEPOSITS;
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The discovery of layered deposits in the walls of a deep trough in Lunae Planum [1] has implications for the origin of similar-appearing deposits in some canyons of Valles Marineris. Although layering is visible in the competent, cliff-forming upper walls of the canyons, the dissimilarity in appearance between canyon walls and soft rounded hills of layered deposits on canyon floors, as well as their contrasting patterns of erosion, has been considered strong evidence that their modes of origin were different. Most workers agree that the wall rocks are volcanic flows derived from fissure vents and other volcanic sources in the region [2-5]. However, several hypotheses have been advanced to account for the softer-appearing stratified floor deposits. Chief among them is the proposal that the floor deposits are water-laid sediments that accumulated in large lakes within the canyons and include materials eroded from canyon walls, eolian deposits, and subaqueous volcanic eruptives [2,6,7].

The trough on the Lunae Planum plateau is about 1000 m deep and exposes eight light and dark layers (Fig. 1). No stratigraphic break is visible in the walls of the trough, which probably consist of a sequence of lava flows and interbedded pyroclastic materials that form the ridged plains geologic unit. These lava flows cover the surface of Lunae Planum and are Hesperian in age [1,4]; an alternate interpretation [9] places the lower part of the layered material in the Noachian Period.

The interbedded volcanic materials closely resemble layered deposits that form a hill in Juventae Chasma (Fig. 2) more than 1500 km to the south; in both places the attitude, thickness, and albedo contrasts of layers appear to be similar, although more individual beds are exposed in the 2000-m-deep Juventae Chasma [10]. Although many investigators have favored lacustrine deposition for the layered deposits in the canyons of Valles Marineris, others have considered that deep filling of the canyons was improbable [11], or that residence times of water were insufficient to account for thick accumulations of sedimentary material [12]; they interpreted the layered deposits to be remnants of the adjacent plateau material (which at Juventae Chasma consists of ridged plains lava flows and possibly older volcanics of Late Noachian age [4,13]). This interpretation is now supported by the layering found in the lava flows of Lunae Planum. It is especially applicable to Juventae Chasma, where streamlined blocks within chaotic terrain on the relatively shallow chasma floor attest to a short duration of ponded water.

References
Figure 1. Trough on Lunae Planum plateau. Light and dark layers probably lava flows and pyroclastic material in the ridged plains geologic unit.

Figure 2. Hill in Juventae Chasma, a large collapse depression in Lunae Planum. Hill forms spur extending from base of canyon wall, consists of ridged plains unit.