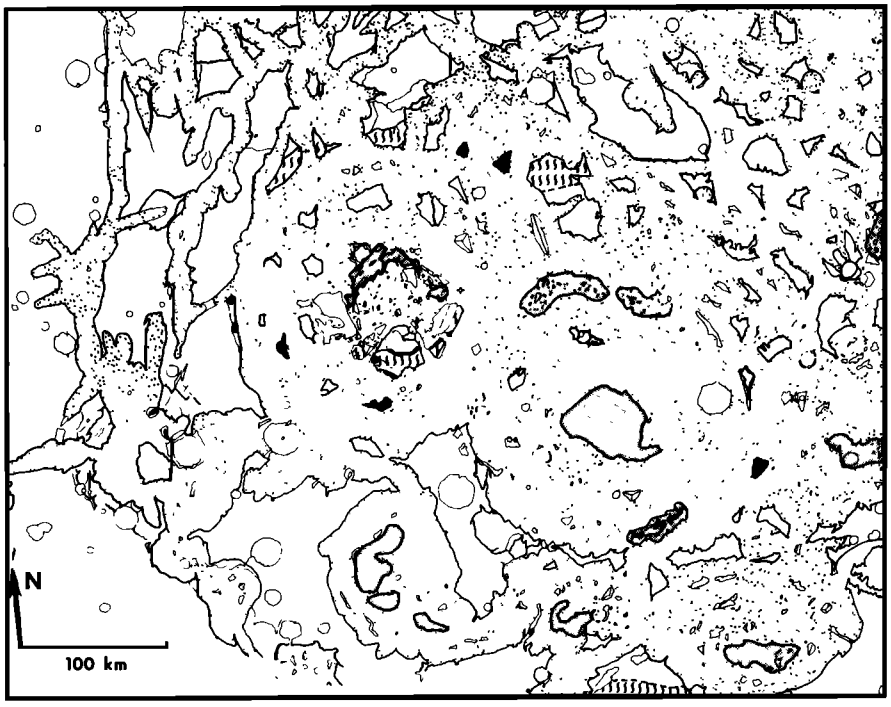

Fig. 9. Terrain map of Deuteronilus A and B shown in Figure 8. The concentric arrangement of scarps, plateaus, and terrains (e.g., valley networks) of Deuteronilus A provide a basis for identifying the location of ring patterns in common with Ladon and Aram. The partly eroded structure shown in Figures 5 and 6 provides support for such comparisons by extrapolations from uneroded through eroded sections. Deuteronilus B has been extensively eroded with the central hummocky region indicating an inversion of topography relative to other structures.

called (for convenience here) Deuteronilus A; that to the east is called Deuteronilus B. Deuteronilus A is the better preserved of the two but is clearly more eroded than the larger example previously considered, which is about 700 km to the east. The multiring pattern is expressed by concentric flat-floored valleys surrounding a low-lying circular plains region. The circular plains region contains a concentric arrangement of plateaus, hills, and subtle scarps centered on a low-lying hummocky terrain (Figure 9). Possible remnant massifs (identified on the basis of stereo views and shadow lengths) occur along the edge of the major circular scarp to the west; a pair of peaks is found within this boundary to the southwest. The low-lying plains and hummocky interior zone is surrounded by a series of floor blocks which are crossed by an inward-facing scarp. Narrow valleys related to a previous erosional epoch can be identified on top of one small mesa to the southwest.

In contrast, Deuteronilus B is principally expressed by an arcuate scarp to the southwest that can be extrapolated across the low-lying plains as a series of arcuately arranged knobs, hogbacks, and plateaus. The central portion of this structure is a hummocky core that stands above the surrounding plains in contrast with Deuteronilus A. Similar but smaller circular depressions are found to the southwest and southeast, both of which contain arcuately arranged knobs and hogbacks. However, Figure 8 clearly shows that Deuteronilus B cuts these smaller structures in a cookie cutter fashion.

Erosion clearly has removed most of the original impact crater structure. In doing so, however, it has added a valuable third dimension, i.e., vertical structure. With certainty we can say that the outer limit of erosion is controlled by a relatively well defined zone marking this limit of impact-induced disruption. Beyond this limit, however, concentric zones of weakness are revealed by grabens, scarps, and plateaus. The central core appears to be an erosionally resistant zone that is consistent with the central uplift of competent basement material. With less certainty, we can reconstruct how these two features (outer scarp and central core) would overlay on less eroded examples. This example is discussed in detail in the following section, but clues from the half-eroded structure 700 km to the east already indicate that much of the relief shown for these two examples reflects an inversion of topography.

Discussion

The five preceding examples all have a common pattern of concentric modified and unmodified terrains that reflect regions of basin-controlled stability and instability, respectively. In this section, we first compare such zones and other common features in order to recognize processes that destroy and reactivate old basin structure. We next identify other major impact basins on Mars that have been previously unrecognized and discuss their role in controlling regional geologic processes, such as the distribution of narrow valley networks and the source regions of outflow channels. Finally we combine these results and infer the structure of multiring impact basins from a perspective unique to Mars.

Comparison of basin-controlled processes. Each of the basins examined in the previous section display common terrains and processes. A direct comparison can be made if the different zones are referenced to a common ring characterized by a well-defined series of massifs or inward-facing arcuate scarps of the uneroded Orientale basin on the moon. We shall first compare this and the outer ring zones of the better preserved structures of Aram and Ladon with the Orientale Basin;