TEKTITE-LIKE BODIES FROM LONAR CRATER, INDIA; A. V. Murali, M. E. Zolensky*, M. A. Sommer** and D. P. Blanchard*, NRC, Johnson Space Center, Houston, TX 77058; *SN2, Johnson Space Center, Houston, TX 77058; **Lockheed/EMSCO C-23, 2400 NASA RD 1, Houston, TX 77058

Lonar Lake (19°58'N, 76°31'E) is a young meteorite impact crater (1,2,) in Deccan basalts, Buldana Dt., Maharashtra State, India. Major (electron microprobe) and trace element (INAA) abundances and volatile contents (H_2O and CO_2 by microcrushing and computer controlled quadrapole mass spectrometry (3)) were determined in different glasses from the vicinity of the Lonar Crater. Various basalt flows from the crater wall as well as the Georgia tektite DGA-1 (4) were also included in the study for comparison.

Chemical and petrographic data of the glasses from the Lonar Crater clearly reveal two distinct populations among them. One is the vesicular, texturally heterogeneous variety representing moderately to highly shocked melts of local basalts (1,2) without any significant material addition (~51 wt % SiO_2) which are referred to as impactites (5) in this study. The second group is the dense texturally homogeneous, splash form glasses (6) with significantly higher silica (65-68 wt %) contents and a correspondingly lower concentration of the rest of the major elements (Table 1). Chemically similar to tektites (except in Na_2O, Fig. 1) these glasses exhibit aerodynamic shapes and flow features typical of tektites (7). Also, they are depleted in H_2O (0.095 wt %) and enriched in CO_2/H_2O mole ratios (~0.15) similar to Georgia (H_2O:0.09 wt %; CO_2/H_2O:0.21) and other tektites.

The new occurrence of these tektite-like bodies even at the small (~2 km diameter) Lonar Crater supports the hypothesis that the tektites represent the splash form glass bodies produced from the terrestrial rocks due to the large scale hypervelocity impact events of extraterrestrial bodies on the Earth (8,9). These tektite-like bodies from the Lonar Crater seem to be related to the local basalts by silica addition resulting in the overall dilution of the rest of the major and trace elements. If about 33% of a siliceous material (inter-trappean sediment?) is added to the local basalts the resulting major element composition is remarkably similar to the composition of these tektite-like bodies (Table 1). Identical but depleted REE patterns of these tektite-like bodies compared to local basalts and impactites, also indicate the genetic affinity of these glasses to local basalts by silica dilution (Fig. 2). We think that a similar systematic depletion observed in the REE patterns (10) of the tektite-like bodies (Irghizites) relative to the local impactites (Zhamanshinites) also suggests the addition of silica to the country rocks resulting in the formation of Irghizites. A recent study indicated (11) that mixing of quartz with the Bosumtwi Crater target rocks is necessary for the formation of the Ivory Coast tektites. Therefore we consider that availability of free silica among the target rocks is essential for the formation of tektites due to impact.

The Lonar Crater in India appears to be a basaltic analogue of the Zhamanshin Crater in USSR (12) in the simultaneous occurrence of both impactites and tektite-like bodies.

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Table 1. MAJOR ELEMENT ABUNDANCES OF DECCAN BASALTS, IMPACTITES AND THE TEKTITE-LIKE BODIES FROM LONAR CRATER, INDIA

OXIDES %	DECCAN THOLEIITES# m s	IMPACTITES* m s	IMPACTITES (THIS WORK) m s	HIGH SILICA GLASSES (THIS WORK) m s	(RANGE)	MIXING MODEL (2/3 BASALT + 1/3 SILICA)
SiO_2	50.02+0.80	51.77+3.27	51.05+1.55	66.84+1.00	(64.50- 67.87)	66.68
Al_2O_3	13.43+0.81	13.46+0.79	13.57+0.30	8.37+0.41	(7.88- 8.95)	8.95
TiO_2	2.38+0.58	1.99+0.60	2.14+0.03	1.32+0.35	(0.88- 1.91)	1.59
MgO	6.40+1.01	5.30+0.50	5.05+0.48	3.64+0.25	(3.19- 4.13)	4.26
FeO	13.49+1.33	12.54+1.28	13.82+1.74	7.18+1.25	(5.83- 9.28)	8.99
CaO	10.72+0.70	9.88+1.33	9.74+0.85	6.18+0.40	(5.80- 6.90)	7.14
Na_2O	2.27+0.23	2.25+0.28	2.36+0.23	5.21+2.07	(1.42- 6.92)	1.51
K_2O	0.36+0.11	0.59+0.35	0.64+0.08	0.32+0.06	(0.26- 0.46)	0.24
MnO	0.23+0.03	n.d	0.16+0.04	0.13+0.03	(0.09- 0.16)	0.15

FeO: total Fe as FeO; n.d: not determined; m: mean; s: standard deviation

Based on data of 100 flows covering Mahabaleshwar, Igatpuri and Jabalpur areas (Mahoney, 1984)[13]

* Brown glass (24 samples) data (Schaal, 1976)[2]

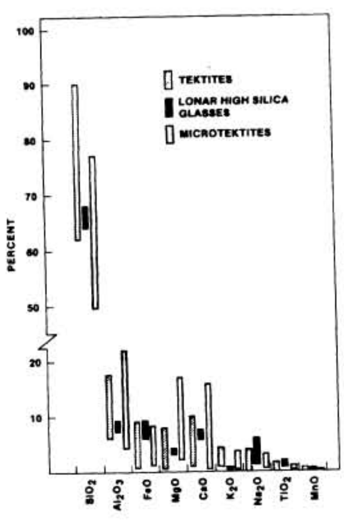

Fig. 1

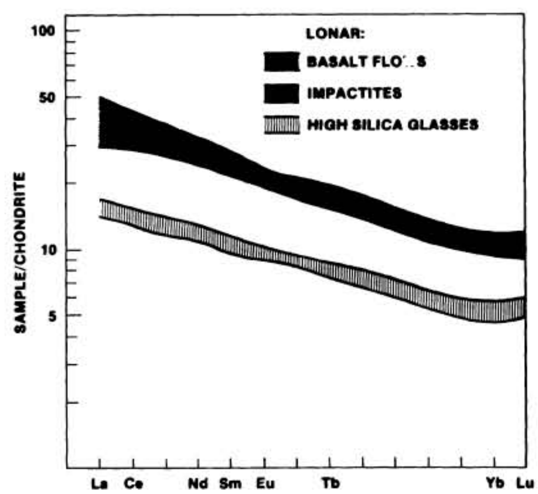

Fig. 2