**MORPHOLOGICAL DIFFERENCES BETWEEN IRGHIZITES AND SPLASH-FORM GLASSES FROM LONAR CRATER – EVIDENCE OF DIFFERENT CONDITIONS OF ORIGIN OF THOSE GLASSES.**

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**Introduction:** Zhamanshin impact crater is located in Kazakhstan (48° 21.6´ N, 60° 59.1´ E), the outer diameter of the crater being 13 km [1]. Zhamanshin is world famous by its unique association of impact glasses which are usually divided into two groups: irghizites and zhamanshinites [1,2,3,4]. Zhamanshinites are up to 50 cm big glassy or recrystalized bodies, some of them looking volcanic bombs [1,2]. Irghizites often look like volcanic lapilli usually not bigger than 3 cm [1,2]. Irghizites have a fibered structure. Small spherules of glass are stuck on their surface [1]. This paper accepts classification of glasses from Zhamanshin into three gropups [5]: Together with irghizites and zhamanshinites another group of glasses is recognized: akmurynites which are usually described as dull (mat) or corroded irghizites [6]. Akmurynites have no fibered structure, there are no glassy spheurules on their surface, and their chemical composition differs from irghizites.

The Lonar meteorite crater lies in India (19° 58´ N, 76° 31´ E). The crater diameter is 1830 m and it attracts researchers, because it is the only known impact crater in basalts on the Earth. Therefore it is possible to compare this structure with impact craters on the Moon [7] and some regions of Mars [8]. In the Lonar crater, there were also found impact glasses, the detailed description is in [8]. This paper is focused especially on splash-form glasses which hardly ever exceed 1 cm in size, resemble irghizites and are probably similar to the "a" type in [8]. In our research massive glasses from Lonar which can be compared with zhamanshinites, were not classified in detail.

Three weeks in 2002, the authors of this paper were collecting impact glasses in the Zhamanshin impact crater. In 2006, Jan Frank collected glasses in the Lonar crater (locality Glass Pit 120 m SE from the crater rim, described in [9]. The paper is introducing results of morphological research of those glasses carried out by naked eye.

**Results and conclusion:** Irghizites originated by accretion of plastic fibres and small spherules of glass. The enclosed photos (a-i) can prove, that this genesis is not typical only of clues of glass described by [1], but fibres and spehurles could create compact samples as well to give rise to splash form shapes. Surprising is the big volume of small glassy spherules in forming of bigger samples.

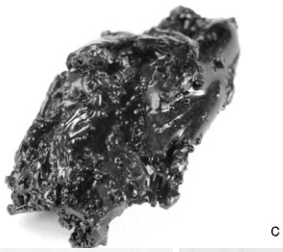
However, irghizites from Zhamanshin are not the only known impact glasses in the world on whose surface there are small spherules or fibres of glass. Similar objects were also found on the surface of splash-form glasses from the Lonar crater (photos g and i). Nevertheless, the surface spherules of Lonar splash-form glasses are much less abundant and are smaller compared to surphace spherules on the irghizites. Only one glass fibre was found on the Lonar splash-form glass surface. In this case, the accretion of spherules and fibres was almost total, or this process was not their main forming mechanism and the accretion appears marginal compared to irghizites. Even in their case, it is not clear, if accretion of fibres and spherules was the only irghizite-forming mechanism.

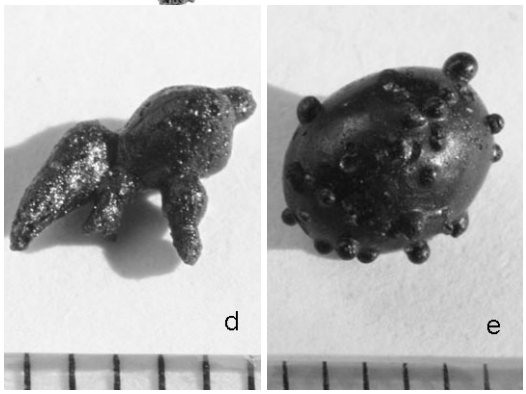
Both, irghizites and splash-form glasses from Lonar were ejected into the atmosphere during the impact process. The surface of irghizites is mostly smooth and lustrous. Therefore it is evident that the plastic glass matter of irghizites had sufficient time to be smoothened by the surface forces in liquid glass. Moreover, those forces formed spheric shapes of pieces of glass smaller 1 mm. On the opposite, in the Lonar splash-form glasses the smooth lustrous samples are very rare. Most splash-form glasses from Lonar have a dull (matt) and rough surface. The smoothening proces could be blocked by high glass viscosity, or by permanent collisions with other particles. The impact glasses from Lonar were ejected together with ash and other impact ejecta [10]. It is assumed that it is the numerous collisions with particles of impact ash and dust that prevented the splash-form Lonar glasses form forming the smooth lustrous surface. Only the trajectories of rare lustrous samples ejected them out of the cloud of ash and dust, whereas most of the irghizites were flying for some time out of the cloud of ash and dust.

**Fig. 1 a-i:** a: Irghizite originated by accretion of fibres, b,c: Irghizite originated by accretion of fibres and spherules, d: Bizzare irghizite originated by accretion of droplets and spheres, e: unusual irghizite created only by acretion of spheres (Some spheres can be seen deeply engaged in the main body), f: Splash-form irghizite with glass fibre stuck on its surface, g: Splash-

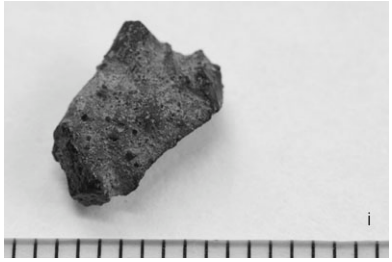
form glass from Lonar crater with the glass fibre on its surface, h: Typical splash-form irghizite with spheres stuck on its surface, i: Splash-form glass from Lonar with spherules of glass stuck on its surface. a-i: Scale in mm, photo Ivan Vetvicka (2007).





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