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Boudins from the Sutlej & the Zanskar Sections of the Western Indian Higher Himalaya

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In the Sutlej section of the Higher Himalaya different manifestation of brittle-ductile extension parallel to the northeasterly dipping main foliation is deciphered from different varieties and sizes of boudins e.g. lenticular boudins, pinch and swell structures, foliation boudins, and shear fracture boudins. Calc-silicate layers, quartz veins and migmatitic foliations are boudinaged. The boudinaged clasts may be separated as far as a decimeter or even more than a meter. Even in a single train of boudins, the degree of separation of various clasts varies significantly. Few of the lenticular clasts have notches at one of their corners, and some do not. The aspect ratios (long axis/short axis) of the clasts ranges between 1.5-5.2, which is narrower than the limit 2 to 20 as compiled by Ghosh (1993) from different shear zones. The foliation planes are drawn towards the gap created by partly or completely separated clasts and define prominent scar folds. In some lenticular- and foliation boudins, the inter-boudin partition is filled with quartz, which indicates accumulation of the melt fraction at sites of low stress during extension parallel to foliations (Marchildon and Brown 2003). The quartz filling geometries, however, do not match with their standard forms modeled and documented by Arslan et al. (2008).

Thin-sectons prepared from the Zanskar section of the Higher Himalaya, at higher magnifications, reveal boudins of different varieties viz., pinch and swell structures, lenticular boudins, spectacular spindle-shaped single grains of quartz, foliation boudins and fish-mouth lenticular boudins. Single minerals and also mineral aggregates constituting the main foliation are boudinaged. The aspect ratios of the boudinaged clasts ranges between 3.3-4.3, which is narrower than 2-20 as compiled by Ghosh (1993) from different shear zones.

Lenticular- and foliation boudins denote small competence contrast between the clasts and the matrix (Ghosh 1993). On the other hand, foliation boudins indicate their genesis guided by high fluid pressure (Arslan et al. 2008). Variable distances amongst individual boudins indicate variation in their rigidities and/or local brittle-ductile extension parallel to the main foliation. Pinch and swell structures indicate insufficient tectonic force in comparison to the rigidity of these clasts to separate them into two completely separate pieces. On the other hand, lenticular- and foliation boudins denote small competence contrast between the boudins and the matrix (Ghosh, 1993). In all the observed cases, the long axes of the boudinaged clasts are parallel to the main foliation. Rigid clasts such as quartz have been boudinaged even when they are present in quartzofeldspathic matrix of presumably similar competency. Similar cases of muscovite boudins within muscovite matrix were also documented in micro-scale. These boudins are characterized by a lack of quartz veins between pairs of adjacent clasts. Microboudins have previously been reported often to be zoned by some other minerals (Passchier and Trough 2005). However, such zones are lacking in the observed boudins from the Zanskar section.