

- Conclusion:* 1. It is possible to differentiate Upper Murrees, Kamlials and Chinjis on the basis of the studies of zircon types in the laboratory.
2. Studies of heavy residues and zircon types indicate a major igneous contribution for Upper Murrees and Kamlials and a major metamorphic contribution for Chinji rocks.
 3. The sediments comprising Upper Murrees and Kamlials were derived mainly from northern and eastern side while for Chinji state contribution was mainly from the northern side.
 4. It is probable that pre-Miocene igneous rocks of Ladakh range and Precambrian schists, gneisses and quartzites possessing huge granitic intrusive bodies of Kashmir, Punjab and Kumaon Himalayas exposed in the northern and eastern side have contributed to give rise to Upper Murrees and Lower Siwaliks.

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ON THE OCCURRENCE OF A RING DYKE IN THE TUSHAM IGNEOUS COMPLEX, HISSAR (HARYANA)

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The purpose of this communication is to report and describe the occurrence of a ring dyke from the Tusham area (Fig. 1) located in the NW part of Indian shield about 120 kms WNW of Delhi. No detailed work on the area has been done but for the scanty references made by McMahon in the years 1884 and 1886, who described the petrography of the rocks exposed, namely, felsites, quartz porphyry, granites and quartzites, and schists and correlated the acid volcanics and granites with the Malanis. These acid volcanics and granites are included in the trans-Aravalli rock sequence and form a part of north-western part outcrops of true shield elements, which as isolated occurrences are not visibly connected with the main shield mass.

Ring dyke: The term 'ring dyke' was first used in geological literature by E. B. Bailey in 1914, but the fundamental idea was evolved in a study at Glencoe, Scotland (Clough *et al*, 1909). The studies at Mull (Bailey *et al*, 1924) also contributed to the concept of ring dykes. Billings (1943) defines a ring dyke as a discordant intrusive body that is circular, oval or arcuate in plan and has steep contacts. The angular shape is essentially that which the body possessed originally. Figure 1 shows the disposition of the various lithologic units exposed in the Tusham hill. The ring fracture is marked by the ring dyke of quartz-porphry which traverses the hill from N to SE quadrant and encompasses about 270°. It is important to mention

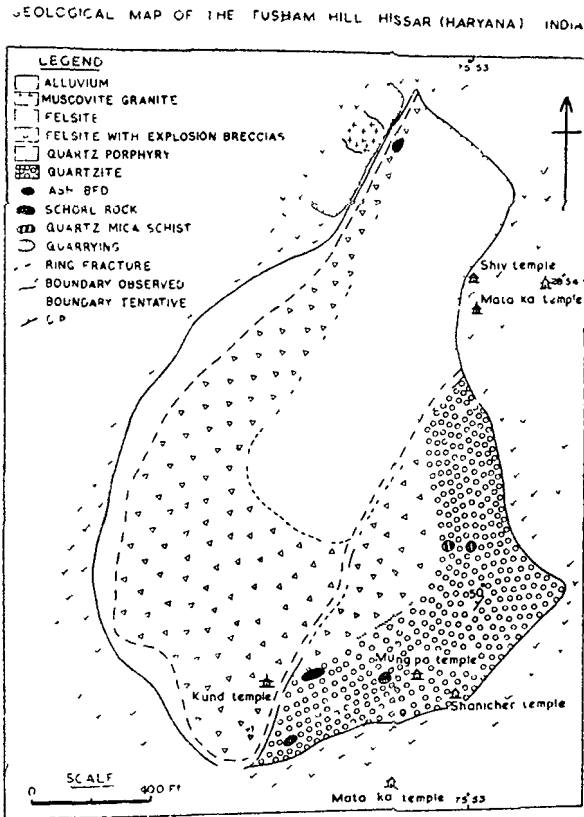


Figure 1.

that the ring dykes need not be complete rings. The complete rings that encircle 360° are rare, but the ring dyke of Ossipee Mountain is of this type (Kingsley, 1931). Here the noncommittal term 'ring fracture' is used in preference to 'ring fault' because there are no convincing field evidences which could indicate that the quartz porphyry ring dyke occupied a ring fault, but for the presence of a fault scarp on the eastern side of the hill. The quartz porphyry dyke has an elliptical ground plan, the long axis of the ellipse making a considerable angle with the regional strike of the prevolcanic quartzites. It is, therefore, discordant and cross cutting. The major external diameter is 0.8 km in NE-SW direction and the minor external diameter is

0.32 km in NW-SE direction. The dyke attains its maximum width on the western flank of the hill and is about 30.5 m. The inner and outer walls of the dyke run parallel throughout the length of the hill but at the proximities they converge and form a crescent. The central volcanics consisting of felsites and explosion breccias are in direct contact with the ring dyke. The contacts, where well exposed, are steep and sharp. The central volcanics are domed up, possibly because of high volatile content of the acid magma. It is, therefore, not possible to find out the initial amount of downfaulting which took place at the time of emplacement of ring dyke prior to the updoming. There is a sharp turnover from the steep walls of the domed felsites to the flat roof at the top. The contacts with the quartzites on the eastern and south-eastern flanks are obscured by the debris and therefore their attitude cannot be determined accurately. The emplacement of the quartz porphyry ring dyke has not disturbed the structural framework of the surrounding rocks significantly. The current bedding in the quartzites indicates that the sequence is right side up (Kochhar, 1970). On the eastern side of the hill, bordering the ring fracture, there are some down sagged areas which are due to the up doming of the central volcanics. According to Billings (1962), the depressions develop if the down dropped block settles different amounts along the strike of the fault; and lakes swamps or sag ponds may occupy these depressions.

In hand specimen the quartz porphyry consists of phenocrysts of quartz and K feldspar embedded in a dark coloured fine grained matrix. The quartz porphyry is invariably weathered to a greyish green material; at places, it is red due to the oxidation of iron. Under the microscope, the quartz porphyry consists of clear embayed crystals of 'high quartz' with cracks and inclusions of groundmass and negative crystals. The orthoclase is mostly altered to sericite. The biotite is of deep brown colour and contains pleochroic halos around zircon. The accessories are zircon and oxides of iron. The groundmass is characterized by micrographic intergrowth of quartz and orthoclase. Biotite also occurs in the groundmass.

The presence of explosion breccias with the felsites occurring all along the length of ring dyke, which formed as a result of escape of gases from the acid magma, emphasizes the explosive aspects of ring complexes and their volcanic associations (Reynolds, 1956). Detailed work on the mode of emplacement of the quartz porphyry ring dyke is in progress.

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CORRENSITE FROM THE SIRBAN LIMESTONE OF RIASI
JAMMU AND KASHMIR STATE, INDIA*

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Introduction: The Sirban limestone of Riasi occurs as an inlier in the Muree belt of the outer Himalayas in Jammu and Kashmir State, near the town Riasi (33°41'N : 74°50'E). In aerial plan it is lenticular in shape, and structurally thrown into an asymmetrical anticline (Rao *et al*, 1967). A section measured from the core of this anticline to the base of an Eocene quartzite near Salal to the north of Riasi town presents a stratigraphic thickness of about 1370 m and is divisible into nine units on a lithological basis. The first eight from the base are essentially dolomites, and a flysch like repetition of thin micritic limestone and shale form the ninth unit. The sample containing corrensite described in this paper is reported as coming from unit no. 4.

Petrography: In hand specimen, the sample yielding corrensite, is a dull bluish grey, earthy rock that crumbles to powder on gentle crushing. Petrographically, it is a microdolosparite and gives the exclusive peak for dolomite (2.884Å) on the X-ray diffractogram. Thin sections of this rock also show a microspar mosaic with individual spars coated with clay minerals of golden yellow colour. Sometimes, the clay mineral aggregates are organized as thin, intercalated, impersistent streaks in the otherwise microspar mosaic. Obviously, the golden yellow clay coatings and streaks contain corrensite.

X-Ray analysis: The carbonate rock was leached in dilute acid and insoluble clay residues were separated. A slurry containing the minus two micron size fraction of this material was prepared and sedimented on glass slides to obtain oriented (001) aggregates. Some slides were exposed to ethylene glycol vapors for more than 24 hours. Air dried slides were also heated up to 500°C for half an hour in steps of 100°C. A General Electric XRD-6 X-ray diffractometer operating at 36 KVP and 18 mA with nickel-filtered copper radiation (CuK α) was used in this investigation. The goniometer speed was calibrated at 2° 2 θ per minute with electronically controlled strip-chart recorder. X-ray data for the Riasi sample are presented in Table I; Fig. 1 shows diffractograms of air dried, glycolated and heat treated oriented aggregates of the same material. It is evident from both the table and illustration that air dried aggregates of clay from the Riasi material show a fundamental periodicity

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