forms a solid solution series significantly occurring calc-silicate rocks and jadeite occurring in subduction zone (high-pressure metamorphic) environment. Terms related to geophysics, geophysical and geomagnetic surveys also need more representation. Basic terms such as geomagnetic reversals, seismic profiles and elastic rebound theory for the origin of earthquake are missing. As the application of 'remote sensing' is increasing rapidly the significance of related terms such as (almost invariably abbreviated) IRS, LISS, PAN and colour bands necessitate inclusion in the book.

Recent additions in structural geology, geotctonics and geomorphology call for place in the glossary; to quote a few: fold and thrust belts, fault-bend folds, duplex structure, horse, wind gap/water gap, low velocity zone, paired metamorphic belt. Upcoming branches like Quaternary Geology, Meteorology and Palaeoclimate and Marine Geology required greater representation; to mention a few terms as glacial epochs, LGM and polymetallic/ manganese nodules. The phrase 'zone' is considered only in stratigraphic classification by the author; however, it is also used in metamorphic petrology, palaeontology and crystallography.

The 'concise' glossary, however, appears to a bit too concise. In the age of super-specialisation, with the rapid developments and addition of vocabulary to various branches of geological literature to write a 'glossary' by a single person virtually will not be able to do justice. The major drawback of the book is lack of illustrations. The subject is such that without pictorial representations the descriptions tend to be far less perspicuous. Nevertheless, the author has admirably shouldered the Herculean task of amassing vocabulary of geology.

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DISCUSSION

PETROLOGY AND GEOCHEMISTRY OF THE MOUNT ABU GRANITES, SOUTHWESTERN RAJASTHAN by B.N. Singh. Jour. Geol. Soc. India, v.69(2), 2007, pp.247-252.

(1)

Kamal Kant Sharma, Government Postgraduate College, Sirohi – 307 001. **Email:** sharmasirohi@yahoo.com
comments:

I appreciate the author for presenting geochemical and petrological data on Mount Abu granites. The following points are to be clarified to make it more useful.

1. It is described that 'the granitic body is separated from the metasediments and metavolcanics of the Delhi fold belt by Banas valley.' As a matter of fact the granites are outcropping in the Banas valley near Abu road and Achpura (Coulson, 1933). The granitic body is having intrusive relationship with Delhi metasediments and the valley does not define any relationship between granitoids and Delhi rocks in the field.
2. It is mentioned that Heron (1953) has correlated Abu granites with Erinpura granite this statement gives wrong impression. La Touche (1902) originated the name 'Erinpura granite' for the granites of the type area Erinpura (presently known as Sheoganj, Sirohi district). Coulson (1933) correlated granites of Abu with Erinpura on the basis of physical continuity.
3. Citations of Pascoe (1950), Heron (1953), Bhushan (1995), Pandit et al. (2003), Bhushan and Chittora (2005) for not carrying out the petrological and geochemical studies on Abu granite in the paper is undesirable. Their work is not related to the Mount Abu granite, in such a situation how can one find information on this, in these reference. Coulson (1933) presented first the petrological and geochemical studies on Abu granites, this fact is denied in the paper.
4. The porphyritic and non-porphyritic textural characteristic are described for the Abu granite. Further, it is also mentioned about the presence of porphyroblasts of feldspar and blue coloured quartz in the granite. The description indicates that the granite is metamorphosed in character and porphyritic and non-porphyritic textural terms should not be used. The presence of cracks filled with fine-grained sericite and quartz in the fieldspar indicates ductile shearing

and mylonitisation, this fact is not included in the petrology section.

5. Coulson (1933) reported hornblende in the Abu granites. At places, this becomes dominant and can be named as hornblende gneiss. The paper does not make any comment on the presence of hornblende in the Abu granite.
6. The location and type of thirteen granite samples (granite gneiss, biotite granite, aegirine bearing granite etc) is not in the paper.
7. On the basis of fluorite mineral presence in the rock, the author concluded that the Mount Abu batholith is affected by granulitic event prior to melting. This conclusion is irrational. Some other evidences are required to support granulitic genesis of Abu granite. The fluorite is a common mineral in the Neoproterozoic granites (Balda granite and Malani granite) of western Rajasthan (Coulson, 1933; Sharma, 2004). The presence of various types of granites at Abu indicate episodic magmatism in the region.
8. The citation of Coulson (1933) is written as 'A.K. Coulson' in the reference section. His correct name is Coulson, A.L. The number of pages are 1-166 instead of 1-66 in the memoir of Coulson (1933)

B.N. Singh, Department of Civil Engineering, Banaras Hindu University, Varanasi – 221 005; **Email:** bnsgranite@yahoo.co.in replies:

I thank Dr. Kamal Kant Sharma for his comments and for raising certain quarries that are not much related to the core theme of the paper. However, some of the related to petrography (including textural properties and mineralogy) seems to be of some relevance. The locations of the samples are not shown in the paper neither it was demanded by referees nor the need was felt to show them on the map. However, different rock types (i.e. biotite granite, gneissic granites, rhyoloitic dykes and riebeckite-aegirine and arfvedsonite bearing granite) are shown in Fig.1 of the paper. The granites show many evidences of tectonization and shearing. Therefore, at places it does not show some recrystallization of feldspar and quartz indicating porphyroblastic characters, though porphyritic and non-porphyritic varieties are most dominant. The presence and the importance of the hornblende in Abu granites is well known (*see* Singh, 1998). However, in the present paper only biotite granites are dealt with and hornblende was not encountered in the samples of the present study.

The reference cited in the paper are not only for the petrographic aspects but also to characterize the study area and the related aspects. So that it is not possible to describe the detailed studies carried out by all the authors. The correlation of Abu granites with the Erinpura is well established for about a century and many workers have pointed it out following different lines of evidences (Maithani et al. 1998). In the present study, however, the standard work of Heron (1953) has been quoted and followed.

As far as the field disposition of Mount Abu granites and their relationship with the associated rocks of the Delhi Fold Belt are concerned, I may agree that it is highly varied and at places granitic body has intrusive relationships. The Mount Abu granites show massif character as mentioned in the first line of the introduction of the present paper (Singh, 2007). However, as mentioned by Crawford (1975) that at places the granites are also found separated from the metasediments due to structural inhomogeneity in the Banas valley.

No doubt fluorite is a common mineral in the Neoproterozoic granites of western Rajasthan. Based on the presence of fluorite, it is only mentioned that the Mount Abu batholith is probably affected by granulitic event prior to melting. It is to be pointed out here that the paper presents only preliminary results of a ongoing work based on petrography and geochemistry. The author believes that some of the papers that are under preparation shall be able to clarify the comments raised by Dr. Sharma regarding the genesis of Mount Abu granites.

(2)

S. Viswanathan, Flat B-203, Block-B, United Avenue Apts., South End, 7-1-29, Ameerpet, Hyderabad – 500 016 comments:

1. The author has stated that the Mount Abu granites have high K/Rb ratios. Except for one sample (B7A) which has a K/Rb ratio of 242, the other 12 samples have K/Rb ratio ranging from 86-177 with an arithmetic mean of 135. Such values are not at all high. On the other hand, the mean K/Rb ratio of 135 for the 12 samples is anomalously low.
2. It is not clear as to why the author has considered only three ratios involving K, Rb, Sr and Ba. An extremely useful ratio is Ba/Rb, because, in a series of granitic rocks originating through magmatic crystallization-differentiation, the preferential uptake of Ba in early formed K-minerals and the incorporation of large amounts of Rb in late-formed K-minerals result in decrease of the Ba/Rb ratio during magmatic

differentiation (Taylor, 1965). Therefore, I have computed the Ba/Rb ratios of the 13 samples of the Mount Abu granites given in Table 2 on p.251. The results are indeed revealing. Based on Ba/Rb ratios, the Mount Abu granites can be classified into three distinct types: Type 1 comprising samples BNS1, BNS3A, B8, BNS22, and B4 having very low Ba/Rb ratios ranging from 0.27 to 0.54 with a mean of 0.38. Type 2 consisting of samples B1, BN1, BNS15, B7A, BN2 and B28 having Ba/Rb ratios of 0.99 to 1.58 with a mean of 1.20. Type 3 represented by samples BNS48 and BNS7A having Ba/Rb ratios of 2.02 and 2.84 with a mean of 2.43. It appears that the three types of granites have had different petrogenetic histories. The Type 1 granites might have crystallized from a highly evolved and fractionated melt. This inference is also supported by the very low K/Rb ratios of the Type 1 granite (87 to 133 with a mean of 101) and the very high Rb/Sr ratios (8.13 to 41.92 with a mean of 28.45). In sharp contrast, the Type 2 granite has K/Rb ratios of 132 to 242 (mean = 169) and Rb/Sr ratios of 3.11 to 15.02 (mean = 7.91), and the Type 3 granite has K/Rb ratios of 172 and 175 (mean = 173) and Rb/Sr ratios of 2.08 and 3.20 (mean = 2.64). The author should give his views on the significance of these observations.

3. The author has stated that the granite studied by him are sub-alkaline and sub-aluminous (p.249). His major conclusion is that, the Mount Abu granites "show close affinity to the A-type granites" (Abstract on p.247). If I am not mistaken, A-type granites are mostly alkaline and meta-aluminous. Furthermore, the (Na_2O+K_2O) vs SiO_2 diagram (Fig.4, p.249) he has used for proving the subalkaline nature of his samples was designed by Irvine and Baragar (1971) for volcanic rocks. Is it applicable for a plutonic rock-like granite?
4. The author has stated that "the present study granites from the Mount Abu batholith is probably affected by granulitic event prior to melting since fluorite is present in the rock". Is the presence of fluorite in a granitic rock an evidence that it was affected by a granulitic event?

B.N. Singh, Department of Civil Engineering, Banaras Hindu University, Varanasi – 221 005; **Email:** bnsgranite@yahoo.co.in replies:

I am really happy to receive the comments on my paper by a well known geologist Dr. S. Viswanathan, Former Director, AMD.

I welcome the suggestion that Ba/Rb ratio is an important factor to categorise different types of granites. However, this scheme is not followed in the present study. The author agrees that K/Rb ratio is not high in all samples. However, most of the samples (except 3 samples) have high K/Rb ratio. The K/Rb ratio averaging between 134 and 138 may be considered as a high value (*see* Singh and Joshi, 2001; Singh et al. 2005b). Na_2O+K_2O vs SiO_2 diagram by Irvine and Baragar (1971) is generally used for volcanic rocks. However, this approach is used in the present paper to know the nature of the samples whether they are alkaline or not. This approach has already been applied for granitic rocks (*see* Singh, 1998).

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NOTES

SEMINAR ON "SEISMOLOGY IN INDIA - 2007"

Over sixty delegates through twenty-three presentations reviewed recent work on multi-disciplinary seismological studies in the Seminar on "Seismology in India - 2007" organized on 12-13 March 2007 by Institute of Seismological Research, Gandhinagar.

S. K. Biswas suggested that the Gujarat region is presently undergoing active neotectonic compressive movement. The tri-junction of Kachchh, Cambay and Narmada rifts lying in the Gulf of Cambay is the zone of maximum subsidence forming Surat deep depression. Northern most Kachchh rift marks the earliest phase of break up in Early Jurassic followed by Cambay rift in Early Cretaceous and Narmada rift in Late Cretaceous. The rifting process in Kachchh region ended up with the change of stress direction due to rotation of Indian plate. Sea transgressed into the lows during Mid-Miocene high stand and receded during the Quaternary forming the vast stretches of Banni and Rann. During late Cretaceous pre-collision stage of the Indian Plate, upthrusting occurred along the faults in Kachchh. Later on due to plate induced horizontal stress, strike-slip movement occurred along these faults. The right-lateral slip shifted the uplifts eastward with respect to Kachchh mainland. Basic plutons have extensively intruded the Mesozoic sediments during rifting and post rift hotspot related Deccan volcanicity. During the present compressive stage the Kachchh Mainland Fault (KMF) has become the active principal fault. Towards the eastern end it left-steps and forms South Wagad fault. The over-step zone Samkhiali-Lakadia graben – is the most strained part of the basin.

L. S. Chamyal mapped four phases of tectonic activity during Quaternary. Faults of Mainland Gujarat show reverse nature and late reactivation under compression. In Mainland Kachchh, the Katrol hill range shows neotectonic activity in three phases of Quaternary tectonic uplift under an overall compressive stress regime. Javed Malik of IITk showed evidence of neotectonic activity along a fault that runs through Bhuj city. It was first identified as a bulge from satellite and field data. Trenching indicates its nature as strike-slip. From geomorphic evidences, George Mathew of IIT, Mumbai, indicated active Late Quaternary uplifts along eastern KMF. D. A. Sant of M.S. University suggested that gabbroic intrusions are responsible for uplifts in Kachchh region and are playing major role in present day seismic activity in the region. A. K. Singhvi of PRL, along with Dr. (miss) Naomi Porat of Geological Survey of Israel put forward a new concept of dating of sand dykes by luminescence method. This would yield date of an earthquake and not its bracket age.

Baldev Sahai identified Tons River in upper reaches and Ghaggar-Hakra-Nara at lower reaches as Vedic Sarasvati. He attributed desiccation of Sarasvati River due to neo-tectonism. He claimed that tectonic upheavals (and river piracy) led to weaning away of the Yamuna and changes in the courses of the Satluj in stages, which, resulted in disorientation of drainage system of the Sarasvati. Ultimately the Sarasvati became only an ephemeral stream around middle of the second millennium BC. The entire drainage system in the Thar Desert and the Aravalli Range shows continuous shifting of the river courses. Even the Indus course is reported to have shifted westwards by 150 km during the Holocene. These hydrologic changes led to mass migration of the Harappan people. On the basis of paleogeomorphic reconstruction R. V. Karanth ruled out the possibility of any mighty river originating from Himalayas and flowing into the region of Gujarat or into the Rann of Kachchh. Early settlements were likely in the