

Occurrence of Permian palynofossils from the Saltoro Formation, Shyok-Suture-Zone, Ladakh Himalaya, India

Ram-Awatar

Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow-226 007 (UP), INDIA
E-mail: rawatar_2003@yahoo.com

In India, the Shyok Suture Zone (SSZ) is tectonically intercalated between the rocks of the Indus Tsangpo Suture Zone (ITSZ) to the south and Karakoram Zone to north (Srimal 1986, Sinha 1992, Thakur 1992, Sinha and Upadhyay 1995). The major thrusts which make both boundaries are known as Shyok thrust and Karakoram thrust respectively. The Shyok Suture Zone is a complex association of Late Palaeozoic to Miocene rocks including turbidites and ophiolitic mélanges with volcanic, calcalkaline magmatic rocks, granite batholith and molasses-type sequence forming an accretionary complex. The following opinions exist regarding the tectonics of the Shyok Suture Zone: 1) It is a subduction zone older than the ITSZ (Frank et al. 1977). 2) It is a subduction zone younger than the ITSZ (Brookfield and Reynold 1981). 3) It is a tectonic repetition of the ITSZ (Rai 1982). 4) It is a back-arc complex related to the ITSZ (Thakur and Misra, 1984). 5) It is a the tectonic repetition of a marginal oceanic crust that existed between the ITSZ and the Asian land mass in the Middle Cretaceous (Srimal 1986, Upadhyay et al. 1999). 6) It is a back-arc basin (Thakur and Misra 1984, Sharma 1991).

The sedimentary, volcanic and plutonic rocks of the SSZ are highly deformed and occur as tectonics slices between Ladakh and Karakoram Batholith. The lowermost unit of the Saltoro Formation is well exposed to the south of Khalsar, where it consists of thinly and even bedded, highly fissile and cleaved slates, phyllites and siltstones. A diverse palynfloral assemblage has been recovered from the siltstone unit collected from the Khalsar-Sakti road section of the same formation. The palynoflora is represented by 14 genera and 20 species of the spores and pollen grains. The significant palynotaxa of the assemblage are: Leiotriletes, Verrucosisporites, Platysaccus, Primuspollenites, Alisporites, Gondisporites, Faunipollenites, Striatopodocarpites, Densipollenites, Caheniasaccites, Scheuringipollenites, Hemipollenites, Parasaccites, Crescentipollenites, Corisaccites, Vesicaspora and Tetraporina. Based on the qualitative and quantitative analysis, Early to Late Permian age has been assigned to the assemblage.

Although, on the basis of the gastropods, echinoids, foraminifera and bryozoans, age of the Saltoro Formation has

been assigned from Late Jurassic / Early to Middle Cretaceous (Upadhyay 2002). However, the palynomorphs recovered from the Saltoro formation are of Permian times. These palynomorphs could be found under two conditions: 1) Either the sediments (siltstone unit) containing palynofossils of Permian time remain intact in this highly tectonized region, or 2) These palynomorphs have been eroded, recycling and deposited into the tectonically active Cretaceous–trench-subduction complex that existed between the Indian and the Asian plates.

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