

SMITHIAN (EARLY TRIASSIC) AMMONOID SUCCESSIONS OF THE TETHYS: NEW PRELIMINARY RESULTS FROM TIBET, INDIA, PAKISTAN AND OMAN

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Following the end-Permian mass extinction, ammonoids were among the fastest clades to recover (Brayard et al., 2006), with at least two diversification phases during the Early Triassic. Diversification first peaked during the Smithian and was followed by a marked extinction phase at the end of this (sub-)stage. It was then followed by a second and massive evolutionary radiation during the Spathian. The well-documented, ammonoid-rich Smithian succession of NW Guangxi, South China is subdivided into three main faunas, i.e., the "*Flemingites rursiradiatus* beds", the "*Owenites koeneni* beds" and the "*Anasibirites multififormis* beds," in ascending order (Brayard and Bucher, *subm.*). Ongoing work on other Smithian Tethyan sections such as Tulong (Tibet), Spiti (India), Salt Range (Pakistan), and Oman (exotic blocks at Baid, Wadi Musjah and Jabal Safra) shows that these subdivisions have Tethyan-wide correlates. Moreover, even finer subdivisions can be correlated throughout the studied basins (Fig. 1).

The beginning of the Smithian is characterized by beds with *Rohillites*, which occur in Guangxi, Spiti (Krystyn et al., 2007), the Salt Range and Oman. The subsequent "*Flemingites* beds" occur in Guangxi, Spiti, the Salt Range, and Oman and contain a highly diversified ammonoid fauna. In the Tulong section, ammonoids are not preserved in this interval, but this time interval is nevertheless represented by diagnostic conodont assemblages. The next overlying "*new prionitid A*" beds were found in Tulong and in the Salt Range. Associated with this new genus are *Aspenites acutus* and *Juvenites*. Their exact correlation with the NW Guangxi succession remains open.

The genus *Owenites* of middle Smithian age is relatively long-ranging and occurs in all studied localities except for the Salt Range. In NW Guangxi, the "*Owenites* beds" are further subdivided into the *Ussuria*, *Hanielites/Proharpoceras* and the *Inyoites/Pseudocellites* horizons

(Brayard and Bucher, *subm.*). These smaller subdivisions are partly found in the other studied sections. The lower part of the *Owenites* beds in Tulong, Spiti, the Salt Range and in Oman is represented by beds containing a new genus, provisionally called "*new prionitid B*," as well as *Paranannites spathi* and *Owenites simplex*. These beds are more or less correlative to the *Ussuria* and *Hanielites/Proharpoceras* horizons from NW Guangxi. *Proharpoceras* was also found in an exotic block from Oman of presumably the same age (Brayard et al., *in press*). The next beds in the Salt Range and in Tulong are characterized by the occurrence of "*flemingitid A*," which may possibly represent a new genus among Flemingitidae. Exact correlation of this fauna with the NW Guangxi succession remains open. The upper part of the "*Owenites* beds" is characterized by the association of *Inyoites*, *Pseudocellites*, *Stephanites* and/or *Meekoceras* and is present at all studied localities.

The subsequent "*Anasibirites/Wasatchites* beds" also occur in all localities. However, in Tulong, only poorly preserved prionitids here referred to as *?Wasatchites* were obtained. Therefore, the occurrence of this fauna in South Tibet still needs to be confirmed. The "*Anasibirites/Wasatchites* beds" mark the onset of the end-Smithian ammonoid extinction and are characterized by reduced diversity and a high degree of cosmopolitanism. The next overlying beds with *Glyptopliceras sinnatus* (Waagen) occur in the Salt Range, Kashmir and Spiti (*G. aequicostatus* (Diener) is here treated as a synonym of *G. sinnatus*) and probably also at Tulong, where they contain a new species of *Hedenstroemia*, called here "*Hedenstroemia A*." The uppermost Smithian beds contain "*Hedenstroemia A*" and various representatives of *Xenocellites*. These beds were recognized in NW Guangxi, Tulong, Spiti and in the Salt Range. They correspond to the extinction peak at the very end of the Smithian.

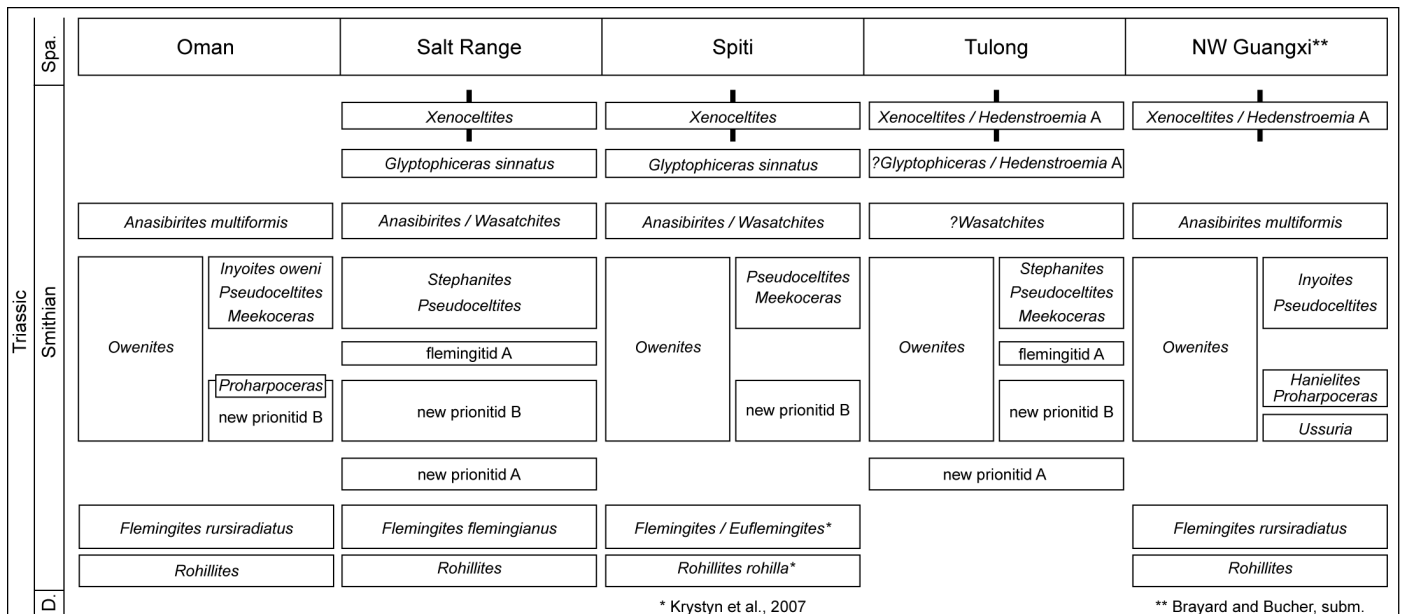


FIGURE 1. Correlation of Smithian Tethyan ammonoid successions.

REFERENCES

- Brayard, A. and Bucher, H., subm., Smithian (Early Triassic) ammonoid faunas from northwestern Guangxi (South China): taxonomy and biochronology: *Fossils and Strata*.
- Brayard, A., Bucher, H., Brühwiler, T., Galfetti, T., Goudemand, N., Guodun, K., Escarguel, G. and Jenks, J., in press, *Proharpoceras* Chao: a new ammonoid lineage surviving the end-Permian mass extinction: *Lethaia*.
- Brayard, A., Bucher, H., Escarguel, G., Fluteau, F., Bourquin, S. and Galfetti, T., 2006, The Early Triassic ammonoid recovery: Paleoclimatic significance of diversity gradients: *Palaeogeography, Palaeoclimatology, Palaeoecology*, v. 239, p. 374–395.
- Krystyn, L., Bhargava, O.N. and Richoz, S., 2007, A candidate GSSP for the base of the Olenekian Stage: Mud at Pin Valley; district Lahul & Spiti, Himachal Pradesh (Western Himalaya), India: *Albertiana*, v. 35, p. 5-29.