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Permian (Guadalupian) fusulinids of Bawei Section in Baoshan Block, western Yunnan, China: Biostratigraphy, facies distribution and paleogeographic discussion

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Abstract

Permian fusulinids of the Bawei Section from southern Baoshan Block in western Yunnan, China, adds more data concerning biostratigraphy and paleogeography of this block. These fusulinids comprise 31 species of 11 genera and could be, ascendingly, grouped into two assemblages: *Yangchienia-Nankinella* assemblage and *Chusenella-Rugosofusulina* assemblage. The age of both assemblages is determined as late Murgabian–Midian (middle Permian). Regarding taxonomic composition, they are characterized by the dominance of staffellids and rather paucity of neoschwagerinids and verbeekinids, in sharp contrast with coeval fusulinids with prosperous neoschwagerinids and verbeekinids in Nansan-Hewai area, also located in the southern Baoshan Block. Such contemporaneous but disparate taxonomic composition is interpreted as "synchronous but heterogeneous fusulinid biofacies" due to varying depositional environments. The host rocks of fusulinids in the Bawei area suggest a littoral, restricted shallow marine with low to moderate water circulation, whereas the fusulinid-bearing carbonates in the Nansan-Hewai areas indicate a high-energy open platform. This phenomenon cautions that taxonomic variation might only reflect local sedimentary controls, rather than large-scale paleolatitudes, especially when limited fusulinid data among terranes are utilized for paleogeographic reconstruction.

Keywords: Fusulinid; Baoshan; Permian; Carbonate facies; Paleogeography

1. Introduction

The Baoshan Block in western Yunnan, China (Fig. 1) represents a probable Gondwana-derived continental fragment and demonstrates a remarkable switch from cool, Gondwana-affinity to warm, more Tethyan affinity with respect to its Permian fossils and sediments (Jin, 1994; Wopfner, 1996; Wang et al., 2001; Shen et al., 2002; Yan and Liang, 2005; Metcalfe, 2013; Huang et al., 2015a, 2015b). Such drastic switch has been interpreted to reflect the coupled effect of global climatic amelioration and a shift of Gondwana-derived blocks to lower paleolatitude during the Late Paleozoic (Jin, 1994; Shi et al., 1995; Ueno, 2003; Wopfner and Jin, 2009; Metcalfe, 2013). The Permian deposits of the Baoshan Block, therefore, record critical information for understanding the Paleozoic Gondwana disassembly and resultant paleogeographic evolution of the Tethyan region. In this regard, fusulinids are especially valuable for providing both temporal and paleobiogeographic constraints, because they exhibit rapid rates of morphological evolution and sensitivity to environmental variation (Smith and Xu, 1988; Ross, 1995; Kobayashi, 1997; Belasky et al., 2002; Ueno, 2003; Leven, 2004; Davydov and Arefifard, 2007; Zhang et al., 2010, 2013; Davydov et al., 2013).

A wealth of data on Permian fusulinids of the Baoshan Block has been accumulated in past years (Fang et al., 2000; Ueno, 2003; Huang et al., 2009; Shi et al., 2011; Huang et al., 2015a)

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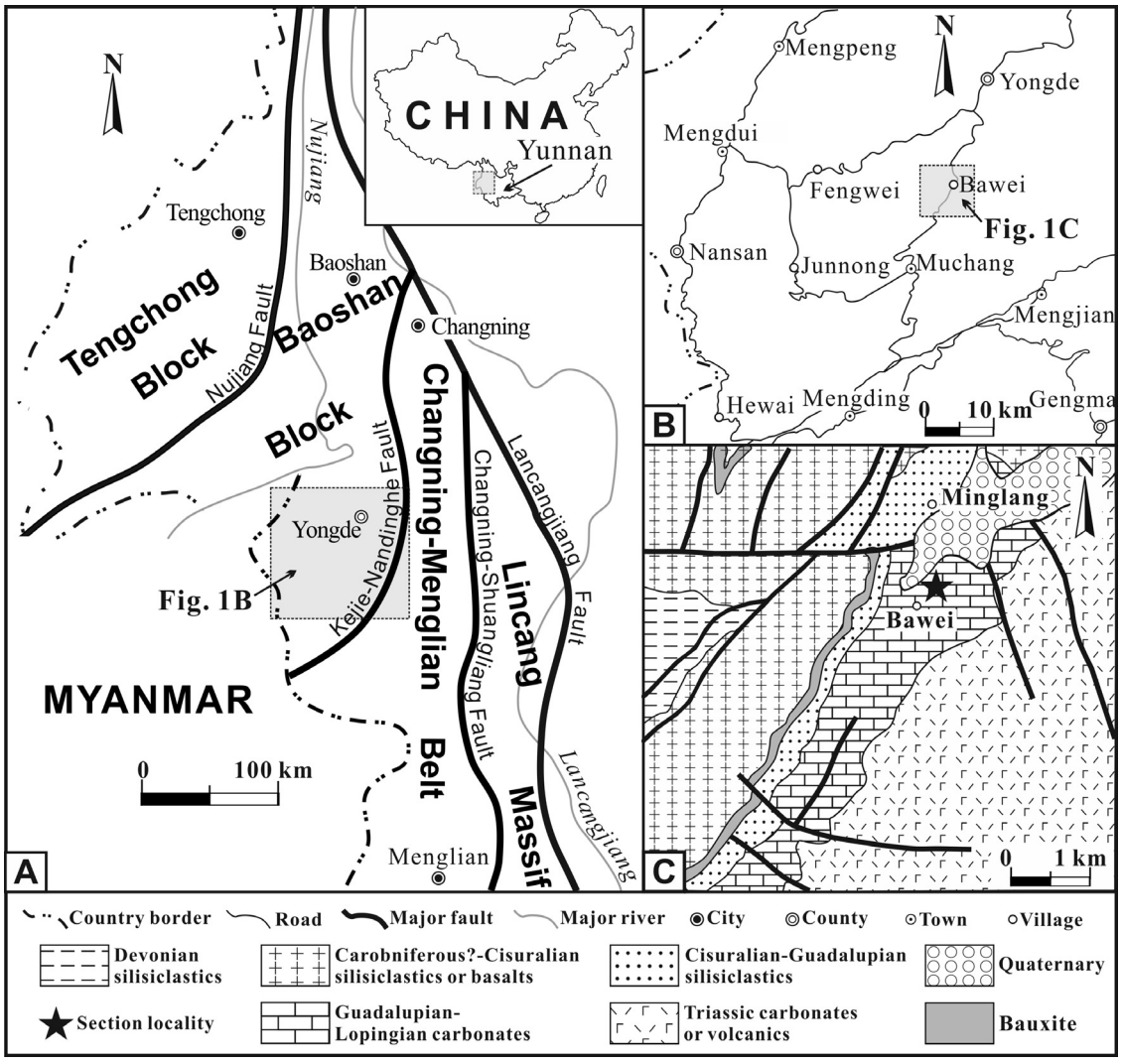

Fig. 1. Index map showing the locality of the Bawei Section in the Baoshan Block, western Yunnan, China. (A) Tectonic division of western Yunnan; (B) and (C) detailed geographic and simplified geological map, respectively, in the vicinity of the Bawei Section.

and was recently reviewed by Huang et al. (2015b). In that review, Guadalupian fusulinids newly collected from the Bawei Section in the southern Baoshan Block were briefly reported. These materials are systematically studied in present paper and further compared with coeval fusulinids from other sections also in the southern Baoshan Block. Results of this study lend more information to the regional paleogeographic configuration of the Baoshan Block. More significantly, it highlights the necessity to take environmental factors into account, when utilizing limited fusulinid data for large-scale palinspastic reconstruction.

2. Geological setting

Western Yunnan in southwest China is a geological jigsaw composed of terranes with different tectonic origin. The Baoshan Block lies between the Tengchong Block to the west and Changning-Menglian Belt to the east (Fig. 1A). The Permian of the Baoshan Block comprises siliciclastic sediments with probably glacio-marine diamictites and cool-water fossils in its lower part, and carbonates with faunas suggesting warm water in its upper part (Wang, 1983; Fang and Fan, 1994; Jin, 1994; Wang et al., 2001, 2002; Shen et al., 2002; Jin et al., 2008; Huang et al., 2015a, 2015b). The diamictites and cool-water fossils with Gondwana affinity are the main evidence to restore this block to the northern margin of Gondwana during the Cisuralian (Wang, 1983; Jin, 1994; Wopfner, 1996; Metcalfe, 2013). Subsequently, the appearance of warm-water fossils (e.g., massive wentzellophyllums of corals, diverse fusulinids) as well as carbonate facies of photozoan association signified a climatic warming through the late Cisuralian to Gudalupian (Wang et al., 2001; Shen et al., 2002; Yan and Liang, 2005; Wopfner and Jin, 2009; Huang et al., 2015b). Correspondingly, Cisuralian fusulinids are rather low in diversity and devoid of large, spherical pseudoschwagerinids which characterize the warm-water Eastern Tethys; Guadalupian ones are much more diversified and yield neoschwagerinids and verbeekinids which are diagnostically warm-water taxa (Huang et al., 2015a, 2015b).