

**Carboniferous foraminifers from the lower part of Paleo-Tethyan  
seamount-type carbonates in the Changning-Menglian Belt,  
western Yunnan, Southwest China**

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The Changning-Menglian Belt in West Yunnan, Southwest China is well-known as a closed remnant of the Paleo-Tethys Ocean in East Asia (Wu et al., 1995; Liu et al., 1996). It is delineated to the east with the Lincang Massif by the Changning-Shuangjiang Fault and to the west with the Baoshan Block by the Kejie-Nandinghe Fault, and is generally subdivided into three zones: east, central, and west zones. In the central zone, various kinds of oceanic rocks such as harzburgite, cumulate websterite, gabbro, both mid-oceanic ridge basalt and oceanic island basalt. Devonian-Triassic radiolarian chert, and Carboniferous-Permian massive and huge carbonates with basaltic effusives as their pedestal are exposed (Liu et al., 1991, 1996; Wu et al., 1995; Ueno et al., 2003). These Central zone rocks are now interpreted to have been emplaced as nappes structurally overlying the East and West zones, which are considered as consisting mainly of passive margin sediments of the Baoshan Block (Wu, 1991; Ueno et al., 2003). The massive and huge carbonate successions in the Changning-Menglian Belt range from Visean or Serpukhovian (Mississippian/ Early Carboniferous) to the Changhsingian (Lopingian/Late Permian) (Ueno et al., 2003; Ueno and Tsutsumi, 2009) and are considered as having a Paleo-Tethyan seamount-capping atoll origin (Nakazawa et al., 2005, 2009). The southern continuation of the Central zone is found in the Inthanon Zone of Northern Thailand where seamount-capping shallow-marine carbonates and pelagic deep-water bedded chert having similar stratigraphic characters and ages, together with oceanic basalts, are widely distributed (Ueno and Charoentitirat, in press).

The Yutangzhai section, located in the northern part of the Central zone of the Changning-Menglian Belt, is known to exhibit one of the most continuous sections of those Paleo-Tethyan atoll carbonates (Ueno et al., 2003). The section is conventionally subdivided "lithostratigraphically" by Bureau of Geology and Mineral Resources of Yunnan Province (1984) into the Pinzhang, Shidongsi, Yutangzhai, Caobashantou, and Damingshan formations in ascending order. Nakazawa et al. (2009) recently studied sedimentological features of the lower part of this section and subdivided its shallow-water carbonate platform sediments into platform-margin, shoal, lagoon, and peritidal facies. They recognized a vertical facies succession from the platform-margin facies into inner-platform facies such as the shoal and lagoon facies, which is explained as resulting from the progradation of the carbonate platform. With respect to the biostratigraphic aspect of the section, Ueno et al. (2003) studied an overview of its foraminiferal faunal succession and reported almost continuous 17 fusuline assemblages ranging from the Serpukhovian (Late Mississippian) to the Midian (late Guadalupian/Middle Permian). In spite of this comprehensive biostratigraphic study, the foraminiferal succession of the lower part of the Yutangzhai section, particularly that in the Pinzhang and the lower part of the Shidongsi formations, is poorly known yet in Ueno et al. (2003). Recently, we examined foraminiferal faunal succession of this section based on densely and systematically collected samples.

In this study, we investigated an approximately 410-m-thick carbonate succession overlying highly weathered basalt in the lower part of the Yutangzhai section. A total of 105 samples were processed until now and over 400 thin sections were examined. In the basal, approximately 200-m-thick part of the section, limestones are often recrystallized and dolomitized, so that both foraminiferal occurrence and preservation are rather poor in that part. The overlying succession becomes abundant in foraminiferal occurrence.

We identified more than 28 foraminiferal genera including 11 fusulines. The basal interval of about 250 m thick is represented by *Eostaffella*, *Endothyra*, *Bradyina*, *Howchinia*, *Mediocris*, *Endothyranopsis*, and others. This interval is correlated broadly to the Mississippian. From a level approximately 160 m above the base, *Endothyranopsis sphaerica* occurs, indicating that this part is already Serpukhovian (Mamet and Skipp, 1970). It means that the very basal part of the section, further below this *Endothyranopsis-bearing* level, may possibly extend down at least to the Late Viséan, judging from its huge thickness. From a level approximately 250 m above the base, likely *Millerella* is found and we provisionally

consider this level as the base of the Bashkirian (Pennsylvanian) at the moment. In the Bashkirian part of the succession, the first *Pseudostaffella* (*Semistaffella* and *Pseudostaffella* (*s. s.*)) are recorded from levels about 290 m and 300 m above the base, respectively. Then the first *Profusulinella*, which is generally encompassed within the Upper Bashkirian (except the most primitive profusulinellid "*Staffellaeformes*", such as *P. staffellaeformis*: see Groves *et al.*, 2007), occurs from a level approximately 340 m above the base of the section. From the uppermost portion of the examined part of the section, the first *Fusulinella* is found from a level about 390 m above the base. This part is considered to be already of later part of the Early Moscovian (the Kashirian Substage) (e.g., Rauser- Chemousova *et al.*, 1951). In spite of partial dolomitization, micritization, recrystallization, and structural deformation, we found the foraminiferal succession of this part of the section to be almost continuous. It ranges from the Serpukhovian (or possible Late Visean) to the Early Moscovian.

#### **Key words:**

Carboniferous foraminifers; Changning-Menglian Belt; Yunnan; Paleo-Tethys; seamount-type carbonates

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