

AUXILIARY STRATOTYPE SECTIONS FOR THE GLOBAL STRATOTYPE SECTION AND POINT (GSSP) FOR THE DEVONIAN-CARBONIFEROUS BOUNDARY : NANBIANCUN

by

WANG Cheng-Yuan¹

The D/C Working Group proposed a compromise package after prolonged discussion at the Courtmacsherry Meeting in May 1988 :

1. To select La Serre as Global Boundary stratotype Section with the Global Boundary stratotype Point at the base of bed 89.
2. To select Hasselbachtal and Nanbiancun as Auxiliary Stratotype Sections.

The D/C Voting members of the Working Group accepted the La Serre section as stratotype and GSSP in Sept. 1988, and it was also accepted by the IUGS Executive Committee at its annual meeting in Sao Paulo in January 1991.

Over hundred DCB sections of various facies, with diverse fossils and excellent outcrops have been studied during last ten years, in China. The Nanbiancun section in Guilin is one of the best among them.

At the Courtmacsherry meeting in May, 1988, the English monography : "Devonian-Carboniferous Boundary in Nanbiancun, Guilin, China - Aspects and record's" YU Chang-Min (ed.) had not been published; it was published in August, 1988. All TMs of the D/C Working Group could not have a thorough understanding of Nanbiancun section without this monography.

The Nanbiancun section is located at Nanbiancun Hill, 6.6 km northwest of Guilin. The marker point for the base of the Carboniferous is within a continuous and monofacially carbonate succession through the Nanbiancun Formation and 74.7 cm above its base.

This point is coincident with the first appearance of *Siphonodella sulcata*.

Several groups have doubted the exact position of the D/C boundary and the existence of the late *praesulcata* Zone (Ji *et al.*, 1989; Gong *et al.*, 1991), but the results of recollection have indicated the correctness of original conclusions. The originally proposed position (base of bed 56) seems the exact level for the DCB, and the late *praesulcata* Zone is clearly present between the first appearance of *Protognathodus kockeli* as the lower limit of this Zone and the first appearance of *Siphonodella sulcata* at the Upper limit (Fig. 1). The rocks of the late *praesulcata* Zone are 18.3 cm thick, and those of the *sulcata* Zone are 50.1 cm thick in the Nanbiancun section.

The Nanbiancun section is characterized by having abundant and diverse fossils which are mostly well preserved. Up to 14 fossil groups have hitherto been found in the section representing both pelagic and benthic biotas allowing intercontinental stratigraphic correlations. The boundary horizon is placed in the deposits of favourable autochthonous facies and not in debris flows or in turbidite or in storm flow deposits.

All of the $\delta^{13}\text{C}$ values are positive but the $\delta^{18}\text{O}$ values are negative, reflecting primary depositional conditions. However, the $\delta^{13}\text{C}$ value of rocks are more close to those of deep sea carbonates, indicating that the DCB beds here were deposited paleogeographically between an open sea platform and a sea basin dominated by a gentle slope environment. The analysis of geochemistry indicates that the sedimentary environment is chiefly lower neritic to shallow bathyal.

¹ Nanjing Institute of Geology and Palaeontology, Academia Sinica.

The trace element analysis reveals that the REE distribution patterns of brachiopod shells in Beds 54, 55, 56 and 57, which encompasses the DCB, are consistent with the REE patterns of their surrounding rocks. This indicates that the brachiopods were buried at their original living place. Moreover, the brachiopods are prevailing in the boundary horizon, with their preserved valves, even as thin as 0.1 mm thick, generally regularly arranged side by side parallel to bedding plane. They are not agitated or turned over after deposition as evidenced from geopetal infillings.

The existence of reverse graded bedding caused by wave shearing stress is of considerable importance. There is no evidence of the existence of normal graded bedding typical of gravity flows and storm flow deposition. There are also no abraded grains, allochthonous organisms and sediments with crossbedding of the matrix as common in turbidite current deposits. The surface of the boundary horizon is almost horizontal and even. All of these prove that the boundary horizon was deposited in a stable environment and the sedimentation was continuous.

The Nanbiancun section is free from metamorphism. This can be proved by the CAI value of conodonts and by the crystallinity indices of illites measured from the boundary beds which all fall within the range of nonmetamorphism.

The isochron age is dated as 361.0 ± 4.1 Ma in the clay bed 58 above the DCB (Young *et al.*, in Yu, ed. 1988). Magnetostratigraphic measurements shows that the remnant magnetization is rather high, being about $(1.30-2.1) \times 10^{-6}$. The paleolatitude measured from the Carboniferous strata was 2.1° N and from the Devonian it was 2.2° N indicating the location at the equator which is quite different from the present latitude of Guilin at 25° N.

The Nanbiancun section is located near a tourist city. There is no problem of accessibility. The section has been protected by the Government.

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