

A New Advancement of the Devonian-Carboniferous Boundary in Central Hunan Province, China

FANG Xiao-Si (方晓思), Ph. Steemans* and M. Streef*
(Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, PRC)

Received December 28, 1992.

Keywords: spores, the Devonian-Carboniferous boundary, central Hunan.

The Devonian-Carboniferous (D/C) boundary in China has been studied for a long time. The type section of the lower Carboniferous in China is situated between Wuliqiao and Heishiguan villages, south of Dushan County, Guizhou Province. Yu Jianzhang (1931) established two coral zones: the lower one is the *Cystophrentis* zone in the Gelaohu formation and the upper one is the *Pseudouralinia* zone in the Tangbagou formation. Then he correlated the two coral zones with zone Z and zone C of the Avon Gorge section of Britain, and the traditional D/C boundary in South China was designated to the beginning of *Cystophrentis* zone. By studying the section in Jiuling of central Hunan Province, Hou Hongfei (1965) identified a set of deposits with a brachiopod fauna below the *Cystophrentis* zone and named it Shaodong member (13 m thick). He considered the Shaodong member a transitional unit of the Devonian to Carboniferous, and deemed that deposits corresponding to the Etroeungian exist in South China. The D/C boundary in central Hunan had thus been placed at the base of the Shaodong member until 1982. Later on, Wang Chengyuan and Ziegler (1982)^[1] proposed that the Shaodong member was of the late Devonian, by comparing the conodonts *Bispathodus aculeatus plumulus*, *Polygnathus communis communis*, *Clydagnathus cavusformis* from the Shaodong member with the fauna in the lower part of the K zone of Britain, which shows that it is necessary to conduct detailed work on the D/C boundary in that region. The D/C boundary was then placed within the Menggong'ao formation (broad sense) by Ji Qiang^[2], who assigned the boundary to the base of the conodont *simplex* zone above the extinction level of coral *Cystophrentis*. Tan Zhengxiu *et al.* placed the boundary between Menggong'ao formation and Malanbian formation^[3].

Since 1989, the authors have systematically studied spores from Malanbian section, Xinshao County, Hunan Province and got the following views (see Table 1).

1. Since the 1970s, some Chinese palynologists have mistaken monolete, fine net-veined spore from the Oujiachong formation and the Shaodong formation for the trilete, reticular-ornamented *Retispora lepidophyta* (cf. Ref. [4]), and placed the D/C boundary

* Liege University, Belgium.

Table 1 Historical Division of D/C Boundary in Central Hunan of China

Central Hunan													
Tian Qizhun <i>et al.</i> , 1932		Hou Hongfei 1965		Wang Chengyuan & Ziegler, 1982		Ji Qiang 1987		Tan Zhengxiu <i>et al.</i> , 1987		This note			
C	Menggong'ao system	C	Liujiatang member	C	?	C	Liujiatang formation	C	Malanbian formation	C	Malanbian formation		
			Menggong'ao member				Menggong -ao Fm. (broad sense)					Menggong -ao Fm.	Tianxin Fm.
			Shaodong member				Shaodong formation					Shaodong formation	Menggong'ao formation
D	Yuelu system	D	Yuelu system	D	Xikuang -shan Fm.	D	Xuefeng- shan sandstone	D	Oujiachong formation	D	Oujiachong formation		

between the Oujiachong formation and the Shaodong formation or between the Shaodong formation and the Menggong'ao formation. However, the present authors attribute the spores with fine, netted veins to a new taxa *Retizonomonoletes hunanensis* gen. et sp. nov., which first occurs at the base of the Oujiachong formation and extends up through the Shaodong formation to the upper part of Menggong'ao formation. In addition, the extinction level of *Retizonomonoletes hunanensis* gen. et sp. nov. is nearly close to that of the coral *Cystophrentis* (see Table 2) (cf. Refs. [5—7]).

2. The true *Retispora lepidophyta* is found only from a few meters thick clastic bed in the uppermost part of the Menggong'ao formation. Biostratigraphically *R. lepidophyta* first occurs at the base of the *Cystophrentis-Pseudouralinia* interval zone (coral) and after the disappearance of *Retizonomonoletes hunanensis* gen. et sp. nov. (spores). According to the present data, the spore assemblage with *Retispora lepidophyta* from the top of Menggong'ao formation possibly corresponds with spore PL zone of west Europe.

3. The clastic beds with spores and the important element *Retispora lepidophyta* are about 3.2 m in thickness and considered as the D/C transitional layers. So the authors hold that it is necessary to establish a new litho-stratigraphic unit, the Tianxin formation.

In central Hunan Province of China, this unit differs from the overlain Malanbian limestone with the coral *Pseudouralinia tangpakouensis*, the brachiopod *Eochoristites*

Table 2 Correlation of *Retispora lepidophyta* and *Retizonomonoletes hunanensis* gen. et sp. nov. Around the D/C Boundary

This note			Gao Lianda 1990
Carboniferous	Malanian formation		
	Tianxin formation	PL (zone)	FM (zone)
Devonian	Menggong'ao formation	<i>Retizonomonoletes hunanensis</i> gen. et sp. nov. <i>Retispora lepidophyta</i>	VI (zone)
	Shaodong formation		LN (zone)
	Oujiachong formation		LE (zone)
			LL (zone)
			Carboniferous
			Devonian

neipentaiensis, the conodont *Siphonodella levis*, the foraminifer *Chernyshinella* and from the underlain Menggong'ao limestone containing the coral *Cystophrentis*, the brachiopod *Yanguania dushanensis*, the conodont *Polygnathus obliquicostatus*, the foraminifer *Quasiendothyra communis*. In the series of clastic rock were discovered only spores which have been grouped into PL zone.

The type section of Tianxin formation (new name) is situated near Tianxin Village, Xinshao County, Hunan Province, in which Tianxin formation is 3.2 m thick and composed of light-grey thin-bedded siltstone, yellow-brown arenaceous shales, intercalated with black shales. It is conformably overlain by Malanian formation composed of grey thick-bedded limestones and dolomitic limestones and is conformably underlain by Menggong'ao formation composed of grey limestones, marls, shales.

Description of new genus and species

Turma Monoletes Ibrahim, 1933

Subturma Zonomonolites Lubert, 1935

Genus *Retizonomonoletes* gen. nov.

Type species *Retizonomonoletes hunanensis* gen. et sp. nov.

Etymology: Latin "ret-" means reticulum; "zon-" is cingulum; and "mon-" is single.

Diagnosis: Monolete camerate miospores; amb oval or subcircular; spore wall two-layered, with a central body; monolete mark traverses the center as a suture, on the broad side an imperfect curvaturae invaginated from distal surface to proximal surface; exoexine ornamented with a thin discontinuous reticulate pattern.

Remarks: This new genus is distinguished from the genus *Archaeoperisaccus* in that the new genus has an imperfect curvaturae on the broad side and exoexine ornamented with a thin discontinuous reticulate pattern.

Retizonomonoletes hunanensis gen. et sp. nov.

1981 *Spelaeotriletes lepidophytus* (Kedo) Streeel; Gao, pl.2, Fig. 20.

1987 *Retispora lepidophyta* (Kedo) Playford; Gao in Wang Genxian *et al.*, pl. 1, Fig. 3.

1990 *Retispora lepidophyta* (Kedo) Playford; Gao, pl. 2, Figs. 10—12.

Etymology: The new species "*hunanensis*" means that the samples are collected in Hunan Province, China.

Holotype: Fig. 1-1 (31527/23-28).

Paratype: Fig. 1-3 (31948/30-6).

Type locality: Sample 31527, Oujiachong formation, Malanbian section, central Hunan of China.

Diagnosis: Monolete camerate miospores; amb oval or rarely subcircular; exine two-layered; intexine laevigate to finely granulate, forms a central body, out-line conformable with amb, 1/3—1/2 of the total spore diameter; exoexine ornamented with thin

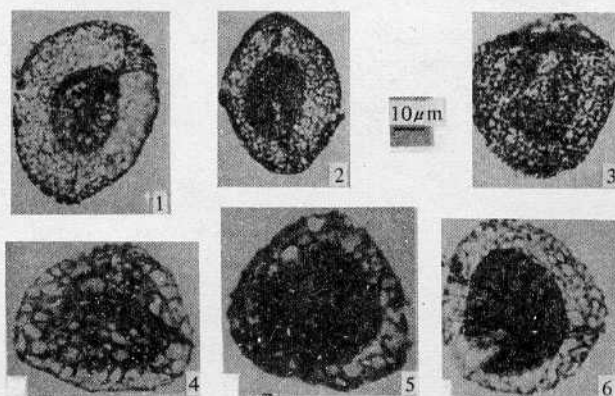
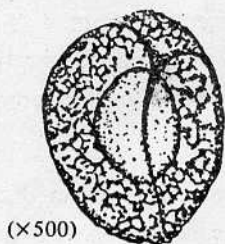


Fig. 1. 1—3, *Retizonomonoletes hunanensis* gen. et sp. nov., in Oujiachong formation; 4—5, *Retispora lepidophyta* (Kedo) Playford, in Tianxin formation (new name); 6, *Retispora lepidophyta* (Kedo) Playford, the picture from a teaching sample, No. 02 of Liege University, Belgium.

discontinuous reticulate pattern, which consisted of spines, coni or granulate on short verrucae ridges and discrete elements; the verrucae ridge less than 1 μm in width; the monolete mark traverses the center as a suture; two ends in equatorial ovaloid surface;



Retizonomonoletes hunanensis
gen. et sp. nov.

Fig. 2

Size range: 29—(51)—82 μm (based on 484 specimens).

Occurrence: Upper Devonian.

narrow end and broad end; broad end generally curves from upward to inward tendency and joins to the end point of suture in equatorial ovaloid, namely an imperfect proximal encroachment of the distal surface, and sometimes imperfect curvaturae extending into more than half equator; central body often broken near the side of the narrow end of ovaloid (Fig. 2).

Remarks: The distinct characteristics of this new species are in possessing monolete and being ornamented with like-reticulum.

The authors wish to thank Research Fellows Xiang Liwen, Hou Hongfei, Assoc. Research Fellow Sheng Huaibien of the Chinese Academy of Geological Sciences for collecting some samples; M. Giraldo and W. Strouvens of the Liege University, Belgium for analysing samples and printing spore photographs; we also thank Dr. Ji Qiang of the Institute of Geology, CAGS for giving some ideas and suggestions to this note.

References

- 1 Wang Chengyuan et al., *Geologica et Palaeontolog.*, 1982, 16: 151.
- 2 Ji Qiang, *Acta Geologica Sinica*, 1987, 6(1): 11.
- 3 Tan Zengxiu et al., *The Late Devonian and Early Carboniferous Strata and Palaeobiocoensis of Hunan*, 1987.
- 4 Kedo, G. I., *Rep. Byelorussian S. S. R.*, 1957, 2: 3.
- 5 Strel, M., *Ann. Soc. Geol. Belg.*, 1966, 89(3): 65.
- 6 Strel, M. et al., *Rev. Palaeobot. Palynol.*, 1987, 50: 211.
- 7 Gao Lianda, *Geological Review*, 1990, 36(1): 58.