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A CONODONT BIOZONATION FOR THE MIDDLE CAMBRIAN THROUGH LOWERMOST ORDOVICIAN IN HUNAN, SOUTH CHINA

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Twelve conodont zones, ranging from Middle Cambrian through lowermost Ordovician, are erected for strata in Hunan, South China. These biozones can be compared and correlated with extant zonations and partial zonations for North China, western U.S.A., western Newfoundland, Canada, and Iran (Table 1). We also are able to correlate these conodont zones with the trilobite zonation for Hunan (Table 2).

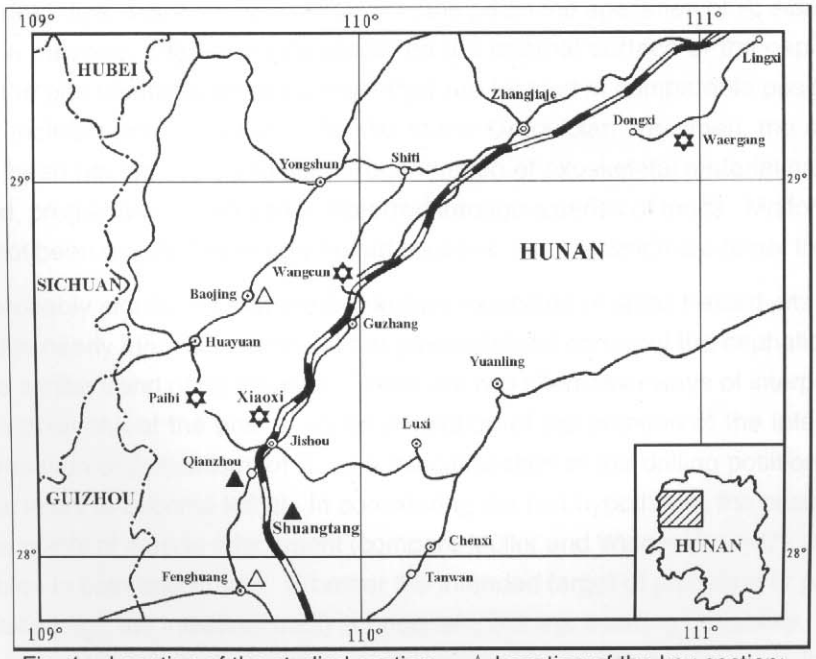

Fig. 1. Location of the studied section. ☆ Location of the key section; ▲ location of the auxiliary sections; △ location of reference section.

Table 1. Correlation of Middle Cambrian through lowermost Ordovician conodont Zones in Hunan, South China, and those in North China, western U. S. A., Newfoundland, Canada, and Iran.

Series	Chinese Stage	Hunan South China (this paper)	North China (An, 1982; Chen & Gong, 1986)	Western U. S. A. (Miller, 1980, 1988; Nicoll et al., 1999)	W. Newfoundland, Canada (Barnes, 1988; Cooper et al., 2001)	Iran (Müller, 1973)
Lower Ordovician (part)	Xinchangian	Above study interval	*Cordylodus angulatus-Chosonodina herfurthi*	*Cordylodus angulatus*	*Cordylodus angulatus* (*angulatus* Fauna)	Conodont Assemblage 6
		Cordylodus angulatus (lower part)				Conodont Assemblage 5
		Cordylodus lindstromi (upper part)	*Cordylodus lindstromi* (upper part)	*Iapetognathus*	*Iapetognathus fluctivagus* (*lindstromi-prion-lapetognathus* Fauna)	?
Upper Cambrian		*Cordylodus lindstromi* (lower part)	*Cordylodus lindstromi* (lower part)	*Cordylodus lindstromi sensu lato*	*Cordylodus intermedius* (*intermedius* Fauna)	
		Cordylodus intermedius	*Cordylodus intermedius*	*Cordylodus intermedius*		
	Fengshanian	*Cordylodus proavus*	*Cordylodus proavus*	*Cordylodus proavus*	*Cordylodus proavus* (*proavus* Fauna)	? Conodont Assemblage 4
		Eoconodontus	*Cambrooistodus*	*Eoconodontus*	*Eoconodontus notchpeakensis*	
		Proconodontus	*Proconodontus*	*Proconodontus muelleri*	No zonation established	Conodont Assemblage Zone 3
				Proconodontus posterocostatus		
			Proconodontus tenuiserratus	*Proconodontus tenuiserratus*		
	Changshanian	*Westergaardodina cf. behrae -Prooneotodus rotundatus*	*Westergaardodina* aff. *fossa -Prooneotodus rotundatus*	No zonation established		Conodont Assemblage Zone 2
		Westergaardodina proligula	*Muellerodus ? erectus*			
	Kushanian	*Westergaardodina matsushitai -W. grandidens*	*Westergaardodina matsushitai*			Conodont Assemblage Zone 1
		Westergaardodina quadrata	*Westergaardodina orygma*			
Middle Cambrian (part)	Chanhian	*Shandongodus priscus -Hunanognathus tricuspidatus*	*Shandongodus priscus*			
		Gapparodus bisulcatus -Westergaardodina brevidens	*Laiwugnathus laiwuensis*			
	Hsuchuangian (upper part)					

Table 2. Correlation between the conodont zones and trilobites zones of the upper Middle Cambrian through lowermost Ordovician in Hunan, South China.

Series		Formation	Conodont Zones (this paper)	Trilobite Zones (Peng, 1992; Peng & Robison, 2000)
Lower Ordovician (part)		Panjiazui Fm.	*C. angulatus* (lower part)	*Hysterolenus-Onychopype* A.–Z.
			C. lindstromi (upper part)	
Upper Cambrian	Upper		*C. lindstromi* (lower part)	
			C. intermedius	
		Shenjiawan Fm.	*C. proavus*	*L. (Leiostegium) constrictum-Shenjiawania brevica* A.–Z.
			Eoconodontus	*Mictosaukia striata-Fatocephalus* A.-Z.
				E. (Archaeuloma) taoyuanense-Leiagnostus cf. *bexelli* A.-Z.
			Proconodontus	*L. (Lotagnostus) punctatus-Hedinaspis regalis* Zone: *Shergoldia-Ivshinaspis* A.-Subz.
				L. (Lotagnostus) punctatus-Hedinaspis regalis Zone: *L. (Distagnostus) celatus-Charchaqia glabrescens* A.-Subz.
				Probilacunaspis nasalis-Peichashania hunanensis A.-Z.
	Middle	Bitiao Fm.	*Westergaardodina* cf. *behrae-Prooneotodus rotundatus*	*L. (Eolotagnostus) decorus-Kaolishaniella* A.-Z.
				NO ZONATION
				Rhaptagnostus ciliensis-Onchonotellus cf. *kuruktagensis* A.-Z.
				A. (Pseudoglyptagnostus) clavatus-Irvingella agustilimbata A.-Z.
			Westergaardodina proligula	*Corynexchus plumula-P. (Sinoproceratopyge)* cf. *kiangshanensis* A.-Z.
				Innitagnostus inexpectans-P. (Proceratopyge) protracta A.-Z.
				G. r. reticulatus-Chuangia wulingensis A.-Z.
	Lower	Chefu Fm.	*Westergaardodina matsushitai-W. grandidens*	*Glyptagnostus stolidotus*
				Linguagnostus reconditus
			Westergaardodina quadrata	
Middle Cambrian (part)		Huaqiao Fm.	*Shandongodus priscus-Hunanognathus tricuspidatus*	*Proagnostus bulbus*
				Lejopyge laevigata
			Gapparodus bisulcatus-Westergaardodina brevidens	*Goniagnostus nathorsti*
				Ptychagnostus punctuosus
				Ptychagnostus atavus

Since 1985, more than 1600 samples, representing a total mass of more than 7000 kg from eight sections, have been processed for the conodonts that form the basis of this zonation. These samples are mainly from four key sections in western Hunan and northwestern Hunan, South China (Fig. 1). The paraconodonts occurring below the upper Upper Cambrian, i. e., below the Fengshanian Stage, are found to be useful for stratigraphic subdivision and correlation of this interval.

REFERENCES

An Taixiang, 1982. Study on the Cambrian conodonts from North and Northeast China. *Science Reports. Inst.Geos. Univ. Tsukuba.* Sec. B, **3**: 113-159.

Barnes, C. R., 1988. The proposed Cambrian-Ordovician global boundary stratotype and point (GSSP) in western Newfoundland, Canada. *Geological Magazine*, **125**:381-414.

Chen Junyuan, and Gong Weli, 1986. Conodonts. p. 93-223, *In* Chen Junyuan (ed.), *Contribution to Dayangcha Internatconal Conference on Cambrian-Ordovician Boundary*. China Prospect Publishing House, Beijing.

Cooper, R. A., G. S. Nowlan, and S. H. Williams, 2001. Global Stratotype Section and Point for base of the Ordovician System. *Episodes*, **42**(1): 19-28.

Miller, J. F., 1980. Taxonomic revisions of some Upper Cambrian and Lower Ordovician conodonts, with comments on their evolution. *The University of Kansas Paleontological Contributions*, **99**, 39 p.

Miller, J. F., 1988. Conodont as biostratigraphic tools for redefinition and correlation of the Cambrian-Ordovician Boundary. *Geological Magazine*, **125**: 349-362.

Müller, K. J., 1973. Late Cambrian and Early Ordovician conodonts from northern Iran. *Report of Geological Survey of Iran,* **30**, 77 p.

Nicoll, R. S., J. F. Miller, G. S. Nowlan, J. E. Repetski, and R. L. Ethington, 1999. *Iapetonudus* (New Genus) and *Iapetognathus* Landing, unusual earliest Ordovician multielement conodont taxa and their ultility for biostratigraphy. *Brigham Young University Geology Studies*, **44**: 27-101.

Peng Shanchi, 1992. Upper Cambrian biostratigraphy and trilobite faunas of the Cili-Taoyuan area, northwestern Hunan, China. *Association of Australasian Palaeontologists Memoir* **,13,** 119 p.

Peng Shanchi, and R. A. Robison, 2000. Agnostoid biostratigraphy across the Middle-Upper Cambrian boundary in Northwestern Hunan, China . *Paleontological Society Memoir,* **53**, 104 p.