Available online at www.sciencedirect.com

ScienceDirect

Palaeoworld 24 (2015) 430–437

Palaeoworld

www.elsevier.com/locate/palwor

A new eocrinoid fauna (Cambrian Series 2) from Guizhou Province, South China

Zai-Chun Yang [a], Jih-Pai Lin [b,c,*], Yao-Ping Zhang [d], Yi-Shan Wu [e], Xue-Yuan Meng [f]

[a] *University of the Chinese Academy of Sciences, Beijing 100049, China*
[b] *State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China*
[c] *Department of Geosciences, National Taiwan University, No. 1, Sec. 4, Roosevelt Road, Taipei 106, Taiwan, China*
[d] *Southeast Guizhou Association for Science and Technology, Kaili, Guizhou 556000, China*
[e] *Kaili No. 4 Middle School, Kaili, Guizhou 556000, China*
[f] *College of the Environmental and Life Sciences, Kaili University, Kaili, Guizhou 556011, China*

Received 2 August 2014; received in revised form 4 December 2014; accepted 30 March 2015
Available online 8 April 2015

Abstract

A new eocrinoid locality of the Balang Formation (Cambrian Series 2) near Kaili City is reported. The fauna is associated with index trilobites, such as *Redlichia* (*Pteroredlichia*) *murakamii* Resser and Endo in Kobayashi, 1935 and *Arthricocephalus chauveaui* Bergeron, 1899, that are common in the Balang Biota (Cambrian Series 2) but absent in the younger Kaili Biota (Cambrian Series 3). This new locality contains a new eocrinoid fauna ($n = 22$) that is different from *Guizhoueocrinus yui* Zhao, Parsley and Peng, 2007a in bearing a smaller theca, a shorter stalk, and a robust attachment disk; thus, a taxon *Globoeocrinus zhaoyuanlongensis* n. sp. is proposed.

Keywords: Echinodermata; Eocrinoidea; Gogiids; Balang Formation; Kaili Biota

1. Introduction

Gogiids (Eocrinoidea, Blastozoa) are a group of stalk echinoderms that first appeared in the Cambrian Series 2 and flourished with peak diversity during the Cambrian Series 3 (Sprinkle, 1973; Lin et al., 2008a; Lin, 2009a; Zamora et al., 2009, 2013; Zhao et al., 2011). Gogiids had a relatively good Cambrian fossil record in many palaeocontinents, including Laurentia (Robison, 1965; Sprinkle, 1973; Durham, 1978; Sprinkle and Collins, 2006; Nardin et al., 2009), Gondwana (e.g., Ubaghs, 1967; Ubaghs and Vizcaino, 1990; Fatka and Kordule, 1991; Parsley and Prokop, 2004; Zamora et al., 2009, 2013), South China (Zhao et al., 1994, 2007a, 2007b, 2008a, 2011; Parsley and Zhao, 2006, 2010, 2012; Parsley, 2009, 2012), and North China (Huang, 2012).

In China, there are at least eight eocrinoid species associated with *Fossil-Lagerstätten*, such as the Balang Biota (Cambrian Series 2) (Peng et al., 2005; Zhao et al., 2007a; Lin et al., in press; Sun et al., in press), Guanshan Biota (Cambrian Series 2) (Hu et al., 2007, 2013; Luo et al., 2008; Liu et al., 2012) and Kaili Biota (Cambrian Series 3) (Huang et al., 1985; Zhao et al., 1994, 2011) in the South China block, and the Mantou Biota (Cambrian Series 2) in the North China block (see Table 1).

Among Cambrian echinoderm faunas in China, the Balang Formation (Cambrian Series 2) contains one of the oldest echinoderm faunas. After years of quarrying, the unit has yielded a deposit of diverse taxa known as the Balang Biota, which contains thousands of articulated specimens of *Guizhoueocrinus yui* Zhao, Parsley and Peng, 2007a. With additional discoveries of soft-bodied arthropods, such as *Naraoia* (Yang et al., 2011; Peng et al., 2012a) and vermiform taxa (Peng et al., 2012b), the Balang Biota is undoubtedly a classic Burgess Shale-type deposit.

In contrast to gogiid faunas in Laurentia that has one dominant genus with many different species (Sprinkle, 1973), gogiids in China are commonly reported as monospecific genera

* Corresponding author at: Department of Geosciences, National Taiwan University, P.O. Box 13-318, Taipei 106, Taiwan, China. Tel.: +886 2 33662918; fax: +886 2 23636095.
E-mail address: jplin@hotmail.com (J.P. Lin).

http://dx.doi.org/10.1016/j.palwor.2015.03.007
1871-174X/

Table 1
List of known eocrinoid echinoderm faunas (Cambrian Series 2–3) in China.

Chronostratigraphy	Unit	Taxa	Remarks and key references
Cambrian Series 3	Kaili Fm.	*Sinoeocrinus lui* *Globoeocrinus globulus* *Turbanicystis inflatus* *Balangicystis rotundus*	*Orytocephalus indicus* Biozone; Zhao et al., 2011
Cambrian Series 2	Mantou Fm.	Unnamed stalked echinoderms	From North China block; Huang, 2012
	Shilongdong Fm.	*Sinoeocrinus* sp.	Liu et al., 2010
	Wulongqing Fm.	*Wudingeocrinus rarus*	Guanshan Biota; Hu et al., 2007; Luo et al., 2008
	Balang Fm.	*Guizhoueocrinus yui*	*Arthricocephalus chauveaui* Biozone; Zhao et al., 2007a
		Globoeocrinus zhaoyuanlongensis n. sp.	This study

independent of sample sizes. Take the Kaili Biota as an example, the main echinoderm faunal assemblages are derived primarily from the Miaobanpo Section (Site 1 in Fig. 1) and the Wuliu-Zhengjiayan Section (Site 2 in Fig. 1). Although relatively rarer, Kaili echinoderms also occurred in other localities, such as the Nangao Section (Site 4 in Fig. 1), which is the type section for the Kaili Formation, and the Zhuping Section (Site 3 in Fig. 1) (Lin et al., 2005; Zhao et al., 2011). To date, the Kaili Biota contains four species of gogiids belonging to four genera (Table 1). Monospecific echinoderm faunas also occur in some parts of Gondwana (e.g., Zamora et al., 2013; and references therein).

Unlike the successive Kaili Biota that contains at least four species of eocrinoids (Table 1) and one edrioasteroid (Zhao et al., 2011), it is quite puzzling that there is only one monospecific gogiid genus *Guizhoueocrinus yui* Zhao, Parsley and Peng, 2007a in the Balang Formation after recovering thousands of articulated specimens (Zhao et al., 2007a). This high-abundance and low-diversity echinoderm fauna occurs in at least six Balang localities (Sites 5–10 in Fig. 1) (Peng et al., 2005; Peng, 2009).

With discovery of a new section and a new eocrinoid, we have expanded the known geographic occurrences of the Balang Formation and increased the Balang echinoderm diversity. Based on approximately 22 specimens, the new gogiid is distinct from previously known taxa in the Balang and Kaili formations. Therefore, a new taxon is reported here. This study provides new fossil evidence leading toward an understanding of gogiid evolution across the Cambrian Series 2–3 Boundary in South China.

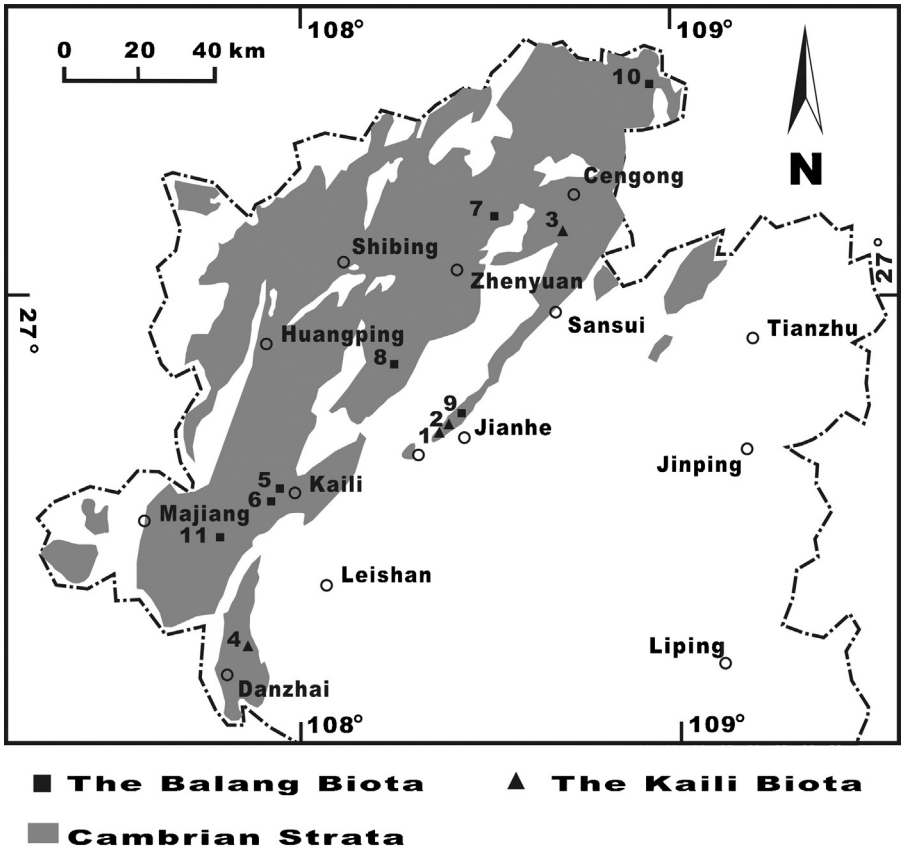

Fig. 1. Map of southeast Guizhou, China (modified from Lin, 2009b). Site 11 is the studied section of Balang Formation near Kaili City with a new eocrinoid fauna.