

## A new oospecies of parafaveoolithids from the Pingxiang Basin, Jiangxi Province of China

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### Abstract

Upper Cretaceous dinosaur egg clutches, single eggs, and countless eggshell fragments have been found in the Pingxiang Basin, Jiangxi Province since 2002. In this paper, the specimens described from the Pingxiang Basin are oblate in shape. The polar axis of this egg is 7.32 cm, the equatorial diameter is 13.81 cm, and its shape index is 189. Outer surface is smooth. Eggshell is usually composed of three or five superimposed slender shell units. In some portions, 6-10 shell units are assembled in the middle and upper part of the eggshell. Pores are straight and unbranching, extremely numerous, and closely spaced, looking as a whole like a honeycomb in tangential section through the middle part of the eggshell. Compared to the members of faveoolithids, the specimens described here should be ascribed to the oogenus *Parafaveoolithus* on the basis of some shell units tending to assemble in the middle and upper part of the eggshell. However, the difference is remarkable between the new specimen and the known oospecies, *Parafaveoolithus microporus*, *P. macroporus*, *P. tiansicunensis* and *P. guoqingsiensis*, of which the eggshell has usually two or three shell units tending to assemble in the middle part of the eggshell. Therefore, the specimens described here represent a new oospecies, *Parafaveoolithus pingxiangensis* oosp. nov.

**Key words** Pingxiang, Jiangxi Province; Late Cretaceous; Zhoutian Formation; dinosaur egg

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# 江西萍乡地区晚白垩世副蜂窝蛋类一新蛋种

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**摘要:** 依据采自江西省萍乡地区上白垩统周田组的恐龙蛋化石, 记述了蜂窝蛋科 (Faveoolithidae) 副蜂窝蛋属 (*Parafaveoolithus*) 一新蛋种。材料包括一枚较完整的蛋和若干破碎蛋壳。根据蛋壳弦切面呈蜂窝状结构, 径切面蛋壳中、上部蛋壳局部呈现由6~10个以上壳单元成群聚集一起等特征, 将其订为一新蛋种——萍乡副蜂窝蛋 (*Parafaveoolithus pingxiangensis* oosp. nov.)。

**关键词:** 江西萍乡, 晚白垩世, 周田组, 恐龙蛋

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江西省萍乡地区自2002年发现恐龙蛋化石以来, 已在10多个地点采集了近200枚不同类型的恐龙蛋(彭安保, 2004), 并于2008年发现恐龙骨骼化石。这些材料补充、完善了恐龙蛋化石的系统分类, 并为萍乡地区白垩系红层的划分与对比提供了重要的依据。本文首次对萍乡地区发现的一类属于蜂窝蛋类的恐龙蛋进行系统描述。

**蜂窝蛋科 Faveoolithidae Zhao & Ding, 1976**

**副蜂窝蛋属 *Parafaveoolithus* Zhang, 2010**

**属征修订** 蛋壳由3~5个壳单元叠加组成, 蛋壳局部发育多个壳单元成群聚集。

**萍乡副蜂窝蛋(新蛋种) *Parafaveoolithus pingxiangensis* oosp. nov.**

**词源** “pingxiang” 是恐龙蛋化石产地“萍乡”的汉语拼音。

**正型标本** 1枚保存较为完整的蛋化石(PXMV-0009-01), 保存于萍乡市博物馆(图1)。

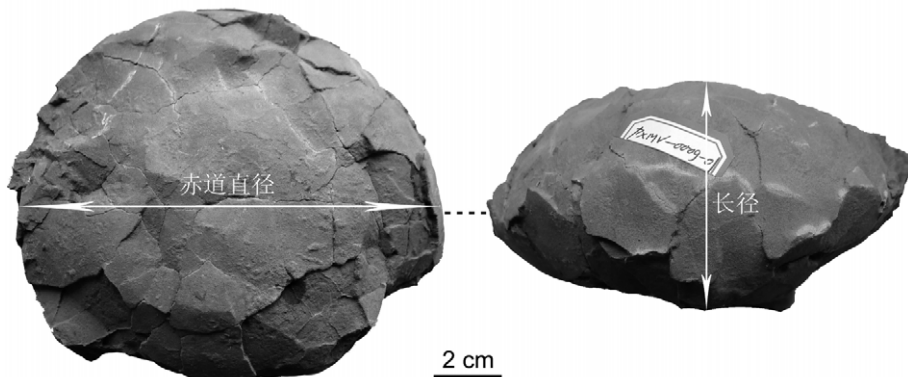


图1 萍乡副蜂窝蛋(新蛋种)正型标本, PXMV-0009-01

Fig. 1 Holotype of *Parafaveoolithus pingxiangensis* oosp. nov., PXMV-0009-01

归入标本 碎蛋壳多片(IVPP V 18619), 保存于中国科学院古脊椎动物与古人类研究所。

地点与层位 江西省萍乡市庵坡里, 上白垩统周田组。

鉴定特征 蛋化石扁圆形, 蛋壳外表面光滑。蛋壳由3~5个壳单元叠加组成, 中、上部见有壳单元成群聚集。弦切面显示, 蛋壳具有蜂窝状结构, 蛋壳中部气孔平均密度为50个/mm<sup>2</sup>。

描述 蛋化石扁圆形, 长为7.32 cm, 赤道直径为13.81 cm (图1), 形状指数(赤道直径/长径×100)为189。蛋壳外表面光滑, 可见密集分布的气孔开口(图2E)。

蛋壳厚度为1.4~1.6 mm。蛋壳径切面显示, 蛋壳由3~5个长短不一的壳单元叠加组成, 壳单元一般呈柱状, 形状不规则, 生长纹不发育, 近蛋壳内表面相邻壳单元相互分离(图2A), 蛋壳中、上部局部呈现为由6~10个以上壳单元成群聚集(图2B), 偶尔见有少量

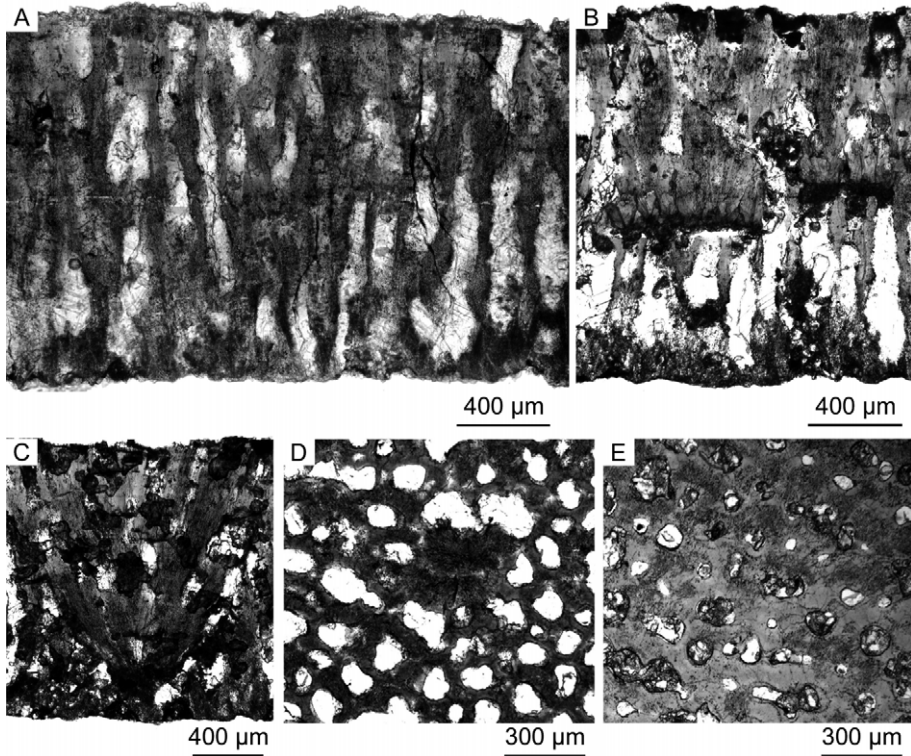


图2 萍乡副蜂窝蛋(新蛋种)蛋壳显微结构

Fig. 2 Eggshell microstructure of *Parafaveoololithus pingxiangensis* oosp. nov.

A-C. 蛋壳径切面。A. 显示蛋壳由3~5个纤细的柱状壳单元叠加一起组成; B. 显示蛋壳中上部出现由6~10个以上的壳单元成群聚集一起; C. 显示蛋壳局部出现壳单元呈放射状排列; D-E. 蛋壳弦切面。D. 蛋壳中部弦切面, 示圆形、椭圆形及不规则气孔组成的蜂窝状结构, 围绕气孔的壳单元纤细, 同径切面观察到纤细的壳单元结构相一致, 局部见有聚合壳单元的锥体; E. 蛋壳近外表面弦切面, 示圆形、椭圆形或不规则形的气孔, 部分气孔相互连通, 部分壳单元变粗、紧密排列并相互融合, 使得部分气孔缩小或消失

A-C. Radial section of eggshell. A. Note the eggshell of 3-5 superimposed shell units; B. Note the shell units tending to be assembled by 6-10 in a single layer in the middle and upper part of the eggshell; C. Note a fan-like arrangement of the shell units in some upper parts of the eggshell; D. Tangential section through the middle part of the eggshell, showing a honeycomb-like organization; E. Tangential section through the nearly surface of the eggshell, note the round, oval or irregular pores, and honeycomb-like structure

壳单元分枝呈放射状(图2C)。气孔直,不分枝(图2A)。蛋壳弦切面显示,蛋壳具有蜂窝状结构(图2D-E),蛋壳中部气孔呈圆形或不规则形,大小不等,气孔直径为0.06~0.21 mm,大气孔占绝大多数,气孔密度为40~55个/mm<sup>2</sup>,平均为50个/mm<sup>2</sup>,局部可见成群聚集的壳单元(图2D);近蛋壳外表面,气孔呈圆形、椭圆形或不规则形,由于壳单元变粗或相互融合,使得部分气孔变小或消失,气孔直径为0.05~0.18 mm,小气孔数量较多,气孔密度为36~45个/mm<sup>2</sup>,平均密度为42个/mm<sup>2</sup>(图2E)。

**对比与讨论** 本文记述的萍乡副蜂窝蛋(*Parafaveoololithus pingxiangensis*)的蛋壳弦切面具有典型的蜂窝状结构,将其归入蜂窝蛋类。

然而,蛋壳由3~5个壳单元叠加组成,中、上部局部呈现为由6~10个以上成群聚集;壳单元柱状,少量壳单元分枝,生长纹不发育等特征,与具有壳单元粗大、锥形、生长纹发育等特征的宁夏蜂窝蛋(*Faveoololithus ningxiaensis*)(张蜀康, 2010)明显不同,但与副蜂窝蛋属成员比较相似。在小孔副蜂窝蛋(*Parafaveoololithus microporus*)、大孔副蜂窝蛋(*P. macroporus*)、田思村副蜂窝蛋(*P. tiansicunensis*)和国清寺副蜂窝蛋(*P. guoqingsiensis*)中,壳单元在蛋壳中部通常是2~3个壳单元聚集一起(张蜀康, 2010; Wang et al., 2011)。并且,以上蛋种的蛋化石形态、蛋壳厚度、蛋壳中部气孔孔径和气孔平均密度等特征参数与萍乡副蜂窝蛋的这些参数也有着显著的差异(表1)。因而,本文记述的恐龙蛋代表副蜂窝蛋属的一新蛋种。

表1 蜂窝蛋类主要特征对比

Table 1 Characteristics of different faveoololithids

oospecies	polar axis (mm)	equatorial diameter (mm)	shape index	eggshell thickness (mm)	pore diameter in the middle part of ggshell (mm)	pore density in the middle part of eggshell (number/mm <sup>2</sup> )	References
<i>Faveoololithus ningxiaensis</i>	113.6	120.3	92.7	1.20 ~ 1.54	0.07 ~ 0.40	18	Zhao & Ding, 1976; Zhang, 2010
<i>Parafaveoololithus microporus</i>	141.06	129.44	91.8	2.20 ~ 2.35	0.06 ~ 0.25	35	Zhang, 2010
<i>P. macroporus</i>	130, 135	100	74, 76	1.85 ~ 1.90	0.04 ~ 0.64	12	Zhang, 2010
<i>P. tiansicunensis</i>	—	—	—	1.37 ~ 1.45	0.10 ~ 0.42	17	Zhang, 2010
<i>P. guoqingsiensis</i>	187	177	94.7	1.40 ~ 1.50	0.05~0.12*	55*	Wang et al., 2011
<i>P. pingxiangensis</i> oosp. nov.	73.2	138.1	189	1.40 ~ 1.60	0.06 ~ 0.21	50	this paper
<i>Hemifaveoololithus muyushanensis</i>	130, 137	120, 121	90.3	1.60	0.03~0.12*	50*	Wang et al., 2011
<i>Youngoolithus xiaguanensis</i>	165.6	98.9	59.8	1.45 ~ 1.60	0.07 ~ 0.33	26	Zhang, 2010

\* 数据分别获取自正型标本蛋壳中部弦切面 data obtained from the tangential section through the middle part of eggshell, respectively.

萍乡地处江西省西部,位于扬子板块和华夏板块对接带西部的萍(乡)-乐(平)坳陷构造带的西段,地质构造极为复杂(刘细元, 2003)。盆地内含恐龙蛋和骨骼化石的红层为一套红色砂岩、粉砂质泥岩,局部夹有石膏层。关于这套岩层的划分与对比研究不足。20世纪60年代,湖南区测队将萍乡地区的白垩系划分为上、下统,以株洲盆地的红层为

代表,其中“下统”含有石膏。此后,江西省地质矿产局(1984)在讨论江西省白垩系地层划分与对比时,依据岩性组合特点,并以石膏层为标志,认为“下统”与赣州组相当,其地质时代为晚白垩世早期。江西省地质矿产厅(1997)进行全省岩石地层多重划分时,将赣州组升级为群,并以上下岩性的差异进一步划分为茅店组和周田组,其中周田组以杂色粉砂岩、泥岩为主,夹薄层细砂岩、石膏层和盐岩层,局部夹薄层砾岩、砂砾岩。由此可见,萍乡地区产恐龙蛋化石红层应该为周田组。

蜂窝蛋类被认为是相对较原始的类群(Zhao, 1994),是我国晚白垩世早-中期天台恐龙蛋化石群和西峡恐龙蛋化石群的主要分子(汪筱林等, 2012),尚未在晚白垩世中-晚期恐龙蛋化石群中发现,尤其是副蜂窝蛋类为天台恐龙蛋化石群的优势类群。天台盆地含恐龙蛋红层中凝灰岩夹层的锆石SIMS U-Pb测年显示其时代为99~91 Ma (Cenomanian-Turonian)(He et al., 2013),据此可见萍乡地区含蜂窝蛋类周田组的时代也可能为晚白垩世早期。

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## References

- Bureau of Geology and Mineral Resources of Jiangxi Province(江西省地质矿产局), 1984. Regional Geology of Jiangxi Province. Beijing: Geological Publishing House. 286-307(in Chinese with English summary)
- Department of Geology and Mineral Resources of Jiangxi Province(江西省地质矿产厅), 1997. Stratigraphy (Lithostratic) of Jiangxi Province. Wuhan: China University of Geosciences Press. 278-290(in Chinese with English abstract)
- He H Y, Wang X L, Wang Q et al. 2013. SIMS zircon U-Pb dating of the Late Cretaceous dinosaur egg-bearing red deposits in the Tiantai Basin, southeastern China. *J Asian Earth Sci*, **62**: 654-661
- Liu X Y(刘细元), 2003. Mesozoic-Cenozoic tectonic character and it's geological meaning in Pingxiang, Jiangxi Province. *Geol Surv Res(地质调查与研究)*, **26**(4): 233-240(in Chinese with English abstract)
- Peng A B(彭安保), 2004. Dinosaur eggs found in Pingxiang, Jiangxi Province. *Vert PalAsiat(古脊椎动物学报)*, **42**(1): 86(in Chinese)
- Wang Q(王强), Zhao Z K(赵资奎), Wang X L(汪筱林) et al., 2011. New ootypes of dinosaur eggs from the Late Cretaceous in Tiantai Basin, Zhejiang Province, China. *Vert PalAsiat(古脊椎动物学报)*, **49**(4): 446-449
- Wang X L(汪筱林), Wang Q(王强), Jiang S X(蒋顺兴) et al., 2012. Dinosaur egg faunas of the Upper Cretaceous terrestrial red beds of China and their stratigraphical significance. *J Stratigr(地层学杂志)*, **36**(2): 400-416
- Zhang S K(张蜀康), 2010. A parataxonomic revision of the Cretaceous faveoololithid eggs of China. *Vert PalAsiat(古脊椎动物学报)*, **48**(3): 203-219(in Chinese with English summary)
- Zhao Z K, 1994. Dinosaur eggs in China: on the structure and evolution of eggshells. In: Carpenter K, Hirsch K F, Horner J R eds. *Dinosaur Eggs and Babies*. Cambridge: Cambridge University Press. 184-203
- Zhao Z K(赵资奎), Ding S R(丁尚仁), 1976. Discovery of the dinosaur eggs from Alashanzuoqi and its stratigraphical meaning. *Vert PalAsiat(古脊椎动物学报)*, **14**(3): 42-44(in Chinese)