

# 贵州册亨中三叠统坡段组中上部石珊瑚 及牙形石生物地层

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**内容提要:**为进一步精确限定黔西南中三叠统坡段组的地质时代, 论文选择贵州册亨中三叠统坡段组典型剖面开展了石珊瑚及牙形石生物地层研究, 在中三叠统坡段组(中上部)识别出石珊瑚 3 属 3 种, 它们包括 *Pentasmilia zaitingnaensis*, *Pinacophyllum spizzensis*, *Gillastraea delicate*; 识别出牙形石 *Neogondolella constricta* 带。该带除含有带分子外, 还含有 *Neogondolella bulgarica*, *Neogondolella navicula*, *Neogondolella acuta*, *Neogondolella alpina alpina*, *Cratognathodus kochi*, *Ozarkodina tortilis*, *Prioniodina* sp., *Lonchodina* sp. 等重要牙形石。通过对牙形石特征的分析 and 国内外同名带的对比, 认为坡段组 *Neogondolella constricta* 带大体可与贵州省盘县地区羊圈—楚皮凹剖面中三叠统关岭组上段、贵州罗甸关刀(2)剖面关刀岩楔、和云南开远马者哨法郎组的名同化石带对比, 进而确定贵州册亨地区坡段组含牙形石 *Neogondolella constricta* 带的地质时代为安尼期的 Illyrian 亚期。

**关键词:**石珊瑚; 牙形石生物地层; 坡段组; Illyrian 亚期; 册亨; 贵州省

扬子地台西南缘贵州青岩、安顺、贞丰、册亨、兴义一带广泛分布中三叠世台地边缘相和斜坡相的地层, 其中中三叠世碳酸盐岩地层剖面连续、出露良好、层序完整 (Mou Chuanlong, 1989; Wang Xiaofeng et al., 2009; Mei Mingxiang, 2014), 是开展中三叠统古生物和地层研究的重要地区。安尼期扬子区台地边缘礁(滩)相沉积地层以坡段组为代表。坡段组由贵州区调队在 1:20 万兴仁、安龙幅区调(1980)中建立, 命名地位于贵州册亨坡段附近, 与上覆垄头组(局部边阳组)、下伏安顺组整合接触, 断续分布于黔西南宽约 10km 范围内(图 1, B)(贵州省地矿局区调院, 1996)。坡段组以册亨县坡段剖面发育最好 (Guizhou Bureau of Geology and Mineral Resource, 1987; Mou Chuanlong, 1989; 贵州省地矿局区调院, 1996)。关于册亨坡段剖面岩性、地理位置、岩石地层单位沿革及各门类生物群组成等相关研究见 Guizhou Bureau of Geology and

Mineral Resource (1987), Yang Zunyi et al. (2000); 黔西南地区中三叠世生物礁(滩)相的研究已较充分, 相关资料见 Xu Guirong et al. (1992), Enos and Wei (1995), Xiao Jiafei et al. (2004), Enos et al. (2006), Lehrmann et al. (2009), Jin Hui et al. (2013), Lehrmann et al. (2015) 等, 在此不再赘述。牙形石和菊石是三叠纪地层划分对比的重要依据。由于岩性的限制, 目前在黔西南的册亨地区坡段组中还没有牙形石的报道; 虽有石珊瑚的报道, 但既没有描述也没有图版, 所以目前册亨地区坡段组的石珊瑚的资料仍非常欠缺。在前人研究基础上, 本文对贵州册亨地区坡段剖面坡段组(图 1, A)石珊瑚和牙形石进行了详细研究。

## 1 册亨坡段剖面坡段组地层介绍

为进一步确定黔西南三叠系坡段组的时代, 作者 2014 年重点在黔西南册亨坡段组中上部(剖面起

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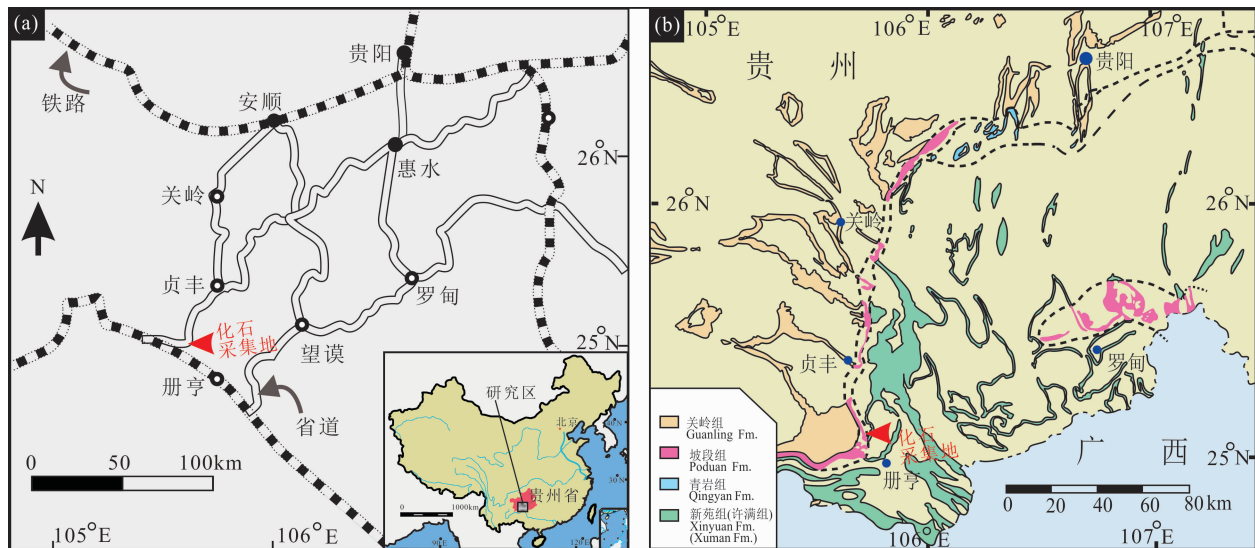


图1 (a),册亨坡段组石珊瑚及牙形石化石采集位置;(b),黔南坡段组相分布图  
(修改自 Guizhou Bureau, 1987; Enos et al., 2006)

Fig.1 (a), Location of middle Triassic coral and conodont samples from the Poduan Formation in Ceheng. (b), Approximate facies distribution of the Poduan Formation in west southern part of Guizhou Province (modified from Guizhou Bureau of Geology and Mineral Resource, 1987; Enos et al., 2006)

点坐标:25°05'55.1"N, 105°43'9.6"E,剖面终点坐标:25°05'59.3"N, 105°43'7"E,相当于 Guizhou Bureau of Geology and Mineral Resource(1987),贵州省地矿局区调院(1996)第17—31层对石珊瑚和牙形石标本进行了系统采集,共采集石珊瑚化石41件,牙形石标本13件,所有标本现保存在国土资源部地层与古生物重点实验室。经室内分析,共鉴定出石珊瑚3属3种,牙形石5属9种,进一步补充和完善了坡段组石珊瑚及牙形石的生物面貌和组成特征资料,并为确定坡段组的地质时代提供了重要依据。

现将黔西南册亨坡段组自上而下描述如下:

各层位其他门类化石资料和地层划分主要依据 Guizhou Bureau of Geology and Mineral Resource (1987),贵州省地矿局区调院(1996),此处只补充本文新报道的石珊瑚和牙形石资料。

上覆地层 边阳组褐灰色粘土岩夹细砂岩。

——整合——

坡段组

28-31. 上部深灰色泥晶砾屑灰岩。下部灰、深灰色厚层生物碎屑藻灰岩,含大量群体珊瑚。产珊瑚: *Gillastraea delicate*; 牙形石 *Lonchodina* sp., *Neogondolella navicula*, *N. constricta*, *N. alpina alpina*, *N. bulgarica*, *Cratognathodus kochi*, *Ozarkodina tortilis*。 116m

22-27. 青灰色厚至中层含砾藻屑灰岩为主,夹粘结藻灰岩及泥、泥晶砾屑灰岩。普遍见海百合、双壳类,腕足类、腹

足类、有孔虫、介形虫等生物碎屑,富含大量群体珊瑚。产珊瑚: *Pentasmilia zaitingnaensis*, *Pinacophyllum spizzensis*; 牙形石 *Lonchodina* sp., *Neogondolella navicula*, *N. constricta*, *N. alpina alpina*, *N. bulgarica*, *N. atuta*, *Cratognathodus kochi*, *Ozarkodina tortilis*, *Prioniodina* sp.。 129m

17-21. 青灰色—浅灰色厚层藻屑、藻团块灰岩、粘结藻灰岩,夹泥晶生物碎屑灰岩。除蓝绿藻外,含有孔虫、海百合、双壳类、腕足类、苔藓虫等生物碎屑。 91m

11-16 灰色厚层亮晶及泥晶砾屑灰岩为主,夹粘结藻灰岩及生物碎屑灰岩。产双壳类、腕足类及菊石等化石。 88m

6-10. 灰色厚层泥、亮晶藻屑砾屑灰岩夹藻屑灰岩,生物碎屑灰岩。产双壳类、腕足类和菊石等化石。 118 m

1-5 灰、浅灰色厚层亮晶生物碎屑灰岩夹亮晶藻团块灰岩及藻屑生物屑灰岩。产双壳类、腕足类和菊石等化石。 85m

——整合——

下伏地层 下三叠统安顺组灰色中厚层细粒灰质白云岩。

## 2 册亨坡段组石珊瑚

此前曾经报道在贵州册亨地区坡段剖面的坡段组中有珊瑚 *Thecosmilia* cf. *sublaevis*。因为 *Thecosmilia* 的地质历程限于侏罗纪—白垩纪,之前鉴定的所谓三叠纪的“*Thecosmilia*”与真正侏罗纪—白垩纪的 *Thecosmilia* 具有不同的内部构造 (Cuif, 1965, 1974; Deng Zhanqiu et al., 1984;

Liao Weihua et al., 2013), 此前我国学者鉴定的三叠纪的 *Thecosmilia* 都应该归入 *Retiophyllia* 或其他属 (Deng Zhanqiu et al., 1984; Liao Weihua et al., 2013)。本文作者在贵州册亨地区坡段组中上部发现大量群体珊瑚 (图 2), 从形态结构等特征来看, 主要为丛状复体, 个体较小, 平均体径在 2~3mm 左右。从骨骼构造特征来看, 下部层位的珊瑚多为隔壁型鞘壁, 且鞘壁较厚, 隔壁致密, 一般地隔壁数量及级数较少, 横列骨骼发育较少, 缺乏轴部构造; 上部层位的珊瑚为表壁型鞘壁, 隔壁数量众多且细薄, 鳞板丰富, 发育轴部构造。总的来说, 隔壁装饰较少, 隔壁排列方式多为辐射对称排列, 繁殖方式有萼内出芽或萼外边缘出芽。珊瑚属种多为地方性的, 如 *Pentasmilia ziatingnaensis*, 仅见于我国广西田阳再停拿中三叠统板纳组; *Pinacophyllum spizzensis* 仅见于我国贵州贞丰下按中三叠统竹杆坡组 (Deng Zhanqiu et al., 1984; Liao Weihua et al., 2013); 而 *Gillastraea delicate* 曾见于阿尔卑斯北部上三叠统 Bortepa 组 (Melnikova, 1983; Dronov et al., 1994) 及帕米尔地区 Šplevta 上三叠统地层中 (Turnšek, 1997)。这些珊瑚的发现进一步丰富中三叠统坡段组石珊瑚生物面貌和组成特征。

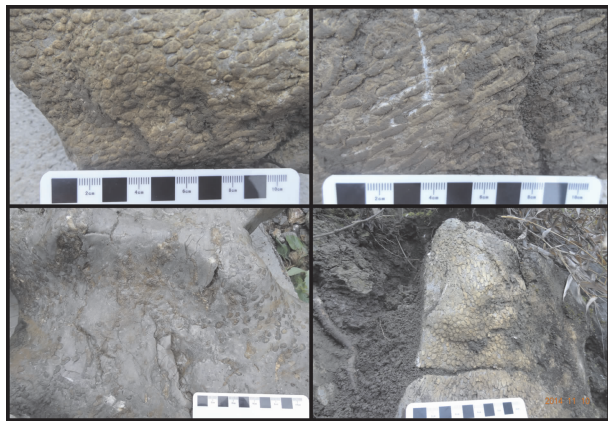


图 2 黔西南册亨中三叠统坡段组中上部群体珊瑚野外照片  
Fig. 2 Surface view of bedding plane in the middle-upper part of Poduan Formation in Ceheng, showing colonial corals. Scale below is in centimeters

### 3 册亨坡段组牙形石生物地层

依据牙形石属种特征和地层分布情况, 在贵州册亨坡段组中可以识别出一个牙形石带, *Neogondolella constricta* 带。 *Neogondolella constricta* 带位于剖面的 22 层至 30 层。该带顶、底

界均以带分子首现和消失为标志, 除带分子外, 还含有: *Neogondolella constricta*, *Neogondolella bulgarica*, *Neogondolella navicula*, *Neogondolella acuta*, *Neogondolella alpina alpina* 以及一些分枝型分子 *Ozarkodina tortilis*, *Cratognathodus kochi*, *Prioniodina* sp., *Lonchodina* sp. 等 (由于化石数量有限, 分枝型分子难以组成器官, 暂时按形态分类) (图 3, 4)。

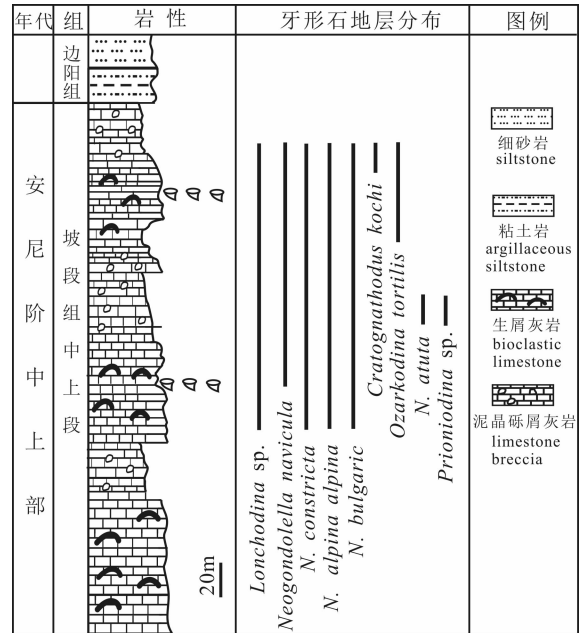


图 3 黔西南册亨中三叠统坡段组中上部牙形石地层分布  
Fig. 3 Distribution of conodont in the middle-upper part of Poduan Formation (middle Triassic) in Ceheng, west southern part of Guizhou

*Neogondolella constricta* 最早由 Mosher et al. (1965) 发现于北美内华达的 Prida 组 (Mosher, 1968), 之后在欧洲的匈牙利巴拉顿高地和意大利南阿尔卑斯地区的 Prezzo 灰岩和 Buchenstein 组 (Kovács et al., 1990)、西班牙东北部 L'Ametlla 剖面 and Riera de Sant Jaume 剖面的下壳灰岩 (Márquez-Aliaga et al., 2000)、西特提斯伊比利亚安尼阶中上部 (Escudero-Mozo et al., 2015) 等地层中均有报道, 由其建立的化石带代表安尼期的 Illyrian 亚期 (Sweet et al., 1970; Kozur, 2003)。在中国, *Neogondolella constricta* 见于贵州紫云石头寨剖面新苑组 (Ding Meihua et al., 1990)、贵州平坝地区兰木组 (Wang Zhihao et al., 1994)、贵州省盘县新民的羊圈—楚皮凹剖面中三叠统关岭组上段 (Sun Zuoyu et al., 2006, 2014)、西藏聂拉木县

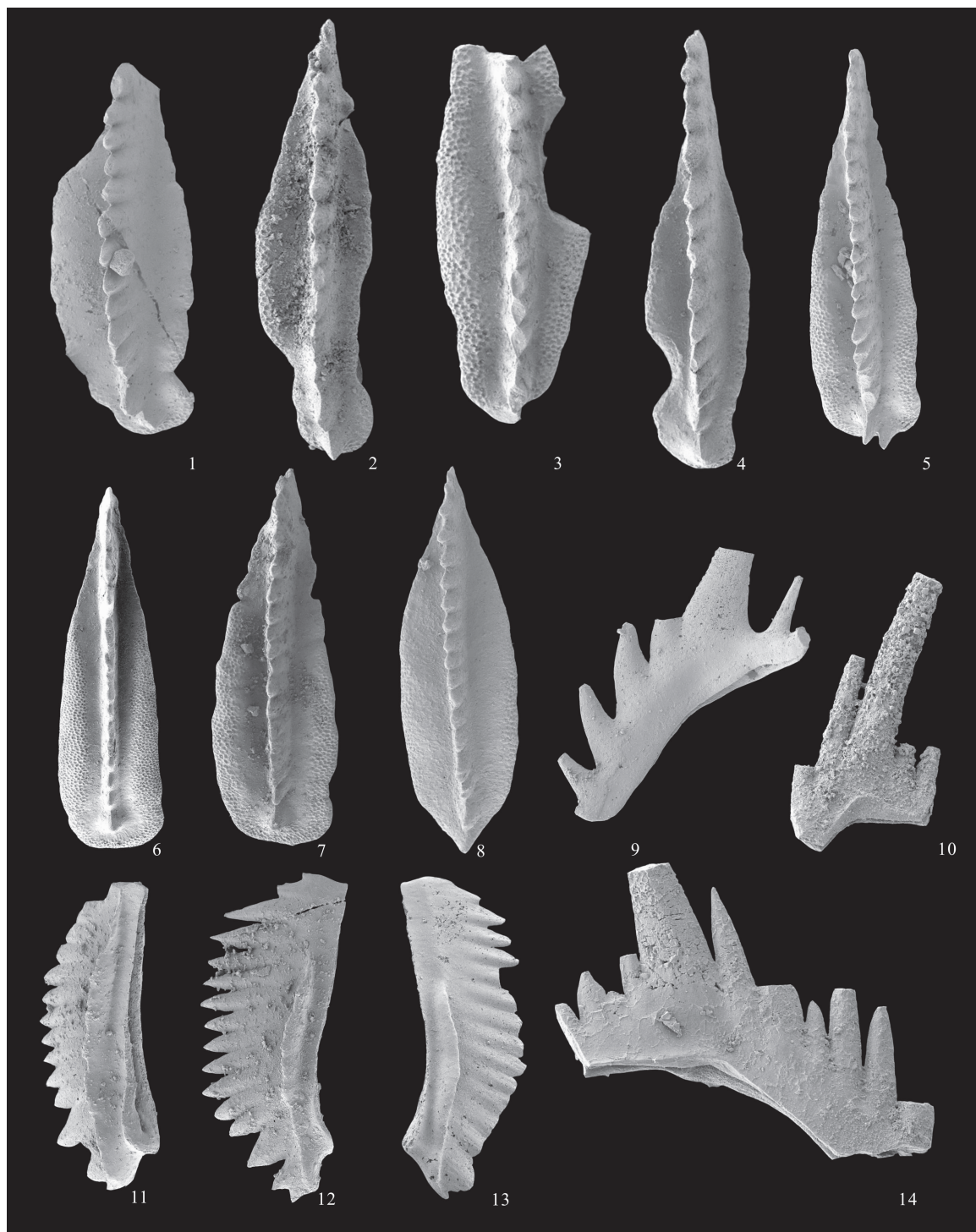


图4 册亨坡段组中上部牙形石化石

Fig. 4 Conodonts from the middle-upper part of Poduan Formation in Ceheng, Guizhou

1-4, *Neogondolella constricta* (Mosher and Clark, 1965). 1, 口视,  $\times 124$ , 采样号: PD-PD-Y4; 2, 口视,  $\times 143$ , 采样号: PD-PD-Y4; 3, 口视,  $\times 29$ , 采样号: PD-PD-Y8; 4, 口视,  $\times 147$ , 采样号: PD-PD-Y9. (5, 11) *Neogondolella bulgarica* Budurov and Stefanov, 1975. 5, 口视,  $\times 88$ , 采样号: PD-PD-Y4; 11, 侧视,  $\times 114$ , 采样号: PD-PD-Y9; 6-7 *Neogondoela navicula* (Huckried, 1958). 6, 口视,  $\times 66$ , 采样号: PD-PD-Y5; 7, 口视,  $\times 85$ , 采样号: PD-PD-Y9. 8, *Neogondolella acuta* (Kozur in Kozur, 1972). 口视,  $\times 95$ , 采样号: PD-PD-Y6. 9, *Cratognathodus kochi* (Huckried, 1958). 侧视,  $\times 98$ , 采样号: PD-PD-Y9. 10, *Prioniodina* sp.。侧视,  $\times 143$ , 采样号: PD-PD-Y6. 12-13 *Neogondolella alpina alpina* Kozur and Mostler, 1982. 12, 侧视,  $\times 116$ , 采样号: PD-PD-Y9; 13, 侧视,  $\times 112$ , 采样号: PD-PD-Y9. 14, *Ozarkodina tortilis* Tatge, 1956. 侧视,  $\times 150$ , 采样号: PD-PD-Y8

1-4, *Neogondolella constricta* (Mosher and Clark, 1965). 1, upper view,  $\times 124$ , sample PD-PD-Y4; 2, upper view,  $\times 143$ , sample PD-PD-Y4; 3, upper view,  $\times 129$ , sample PD-PD-Y8; 4, upper view,  $\times 147$ , sample PD-PD-Y9; 5, 11, *Neogondolella bulgarica* Budurov and Stefanov, 1975; 5, upper view,  $\times 88$ , sample PD-PD-Y4; 11, lateral view,  $\times 114$ , sample PD-PD-Y9; 6-7, *Neogondolella navicula* (Huckried, 1958); 6, upper view,  $\times 66$ , sample PD-PD-Y5; 7, upper view,  $\times 85$ , sample PD-PD-Y9; 8, *Neogondolella acuta* (Kozur in Kozur, 1972), upper view,  $\times 95$ , sample PD-PD-Y6; 9, *Cratognathodus kochi* (Huckried, 1958), lateral view,  $\times 98$ , sample PD-PD-Y9; 10, *Prioniodina* sp., lateral view,  $\times 143$ , sample PD-PD-Y6; 12-13, *Neogondolella alpina alpina* Kozur and Mostler, 1982; 12, lateral view,  $\times 116$ , sample PD-PD-Y9; 13, lateral view,  $\times 112$ , sample PD-PD-Y9; 14, *Ozarkodina tortilis* Tatge, 1956, lateral view,  $\times 150$ , sample PD-PD-Y8

朗弄拉山口东约 3~4 km 处的土隆群中组(Wang Chengyuan et al., 1976), 地层的时代主要集中在安尼期的中晚期, 少量可以延伸到拉丁期。依据形态变化及地层分布状况, *Neogondolella constricta* 又被划分出的不同形态型或亚种(Kovács et al., 1990)。目前以 *Neogondolella constricta* 为代表的牙形石 *Neogondolella constricta* 带常被作为 Illyrian 亚阶的重要划分标志(Yao Jianxin et al., 2016)。

*Neogondolella bulgarica* 最早报道于保加利亚 Golo Bardo Mountain 地区的 Pelsonia 亚阶中上部(Budurov et al., 1975)。其后, 在意大利的 Prezzo 灰岩(Kovács et al., 1990)、阿尔卑斯地区的中三叠统安尼阶的 Gjuraj 组(Gaetani et al., 2015)、匈牙利南部 Mecsek 山区(Kovács et al., 2005)、匈牙利东北部(Hagorn, 2006)、德国下壳灰岩(Jena 组)中三叠世安尼期 Bithynian-Pelsonian 期(Götz et al., 2010)、西特提斯伊比利亚安尼阶中上部(Escudero-Mozo et al., 2015)、美国内华达西北部的 Prida 和 Favret 组(Carey, 1984)、伊朗中部 Nakhlak 的 Alam 组(Berra et al., 2012)和西北太平洋海(Northwest Pacific seas)中三叠统下部(Klets, 2006)地层中都有发现, 是特提斯生物区和太平洋生物区安尼期 Bithynian 亚期到 Pelsonian 亚期地层中常见牙形石分子(Budurov et al., 1995; Pisa et al., 1980; Márquez-Aliaga et al., 2000)。在中国, *Neogondolella bulgarica* 发现于贵州关岭一带的三叠系杨柳井组下部(Chen Lide et al., 2009)、贵州罗甸关刀(2)剖面三叠系关刀岩楔内(Wang Hongmei et al., 2005)和贵州省盘县新民的羊圈一楚皮凹剖面中三叠统关岭组上段(Sun Zuoyu et al., 2006, 2014), 其时代延限大致对应于中三叠世安尼期中一晚期。

*Neogondolella navicula* 由 Huckriede(1958)首次报道。在欧洲 *Neogondolella navicula* 从安尼阶延续到诺利阶下部, 在北美 *Neogondolella navicula* 从安尼阶延伸到卡尼阶(Mosher et al., 1965;

Mosher, 1968)。在中国 *Neogondolella navicula*, 发现于贵州关岭新铺乡竹杆坡组顶部(Chen Lide et al., 2002)、贵州贞丰挽澜竹杆坡组下部(Zeng Xiongwei et al., 2013)、贵州省盘县新民的羊圈一楚皮凹省盘县地区羊圈一楚皮凹剖面中三叠统关岭组上段(Sun Zuoyu et al., 2006, 2014), 是见于安尼晚期一卡尼早期的牙形石分子。

*Neogondolella acuta* 最早发现于德国图林根州安尼期 Illyrian 亚期地层中, 常见于西特提斯安尼期的 Illyrian 中晚期至拉丁期 Fassanian 早期(Narkiewicz et al., 2004)。在中国见于贵州省盘县新民的羊圈一楚皮凹省盘县地区羊圈一楚皮凹剖面中三叠统关岭组上段(Sun Zuoyu et al., 2014)。

*Neogondolella alpina alpina* 发现于西特提斯的匈牙利等地, 是匈牙利的巴拉顿高地 Felsőors 剖面安尼阶一拉丁阶界线地层上的重要的牙形石分子; 在中国 *Neogondolella alpina alpina* 发现于贵州西南部的关岭县永宁镇中三叠统杨柳井组(Chen Lide et al., 2009)、贵州盘县地区羊圈一楚皮凹剖面中三叠统关岭组上段(Sun et al., 2006, 2014)和贵州罗甸关刀(2)剖面关刀岩楔上部(Wang Hongmei et al., 2005)。

分枝型牙形石 *Cratognathodus kochi*, *Ozarkodina tortilis*, *Prioniodina* sp. 等曾发现在北美内华达和奥地利中三叠统(Mosher et al., 1965; Mosher, 1968)、德国阿尔滕地区中上三叠统(Kozur et al., 1972)、土耳其凯梅尔西部地区中下三叠统(Onder et al., 1998)、中国在云南省罗平县大凹子村中三叠统关岭组(Zhang Qiyue et al., 2009), 是中三叠世地层中常见的分枝型牙形石分子。

从上述牙形石的组成和特征看, 坡段组 *Neogondolella constricta* 牙形石带的大体时代为安尼期的 Illyrian 亚期。

## 4 讨论

根据 Marquez-Aliaga et al. (2000) 研究, *Neogondolella constricta* 出现在奥地利、保加利亚、

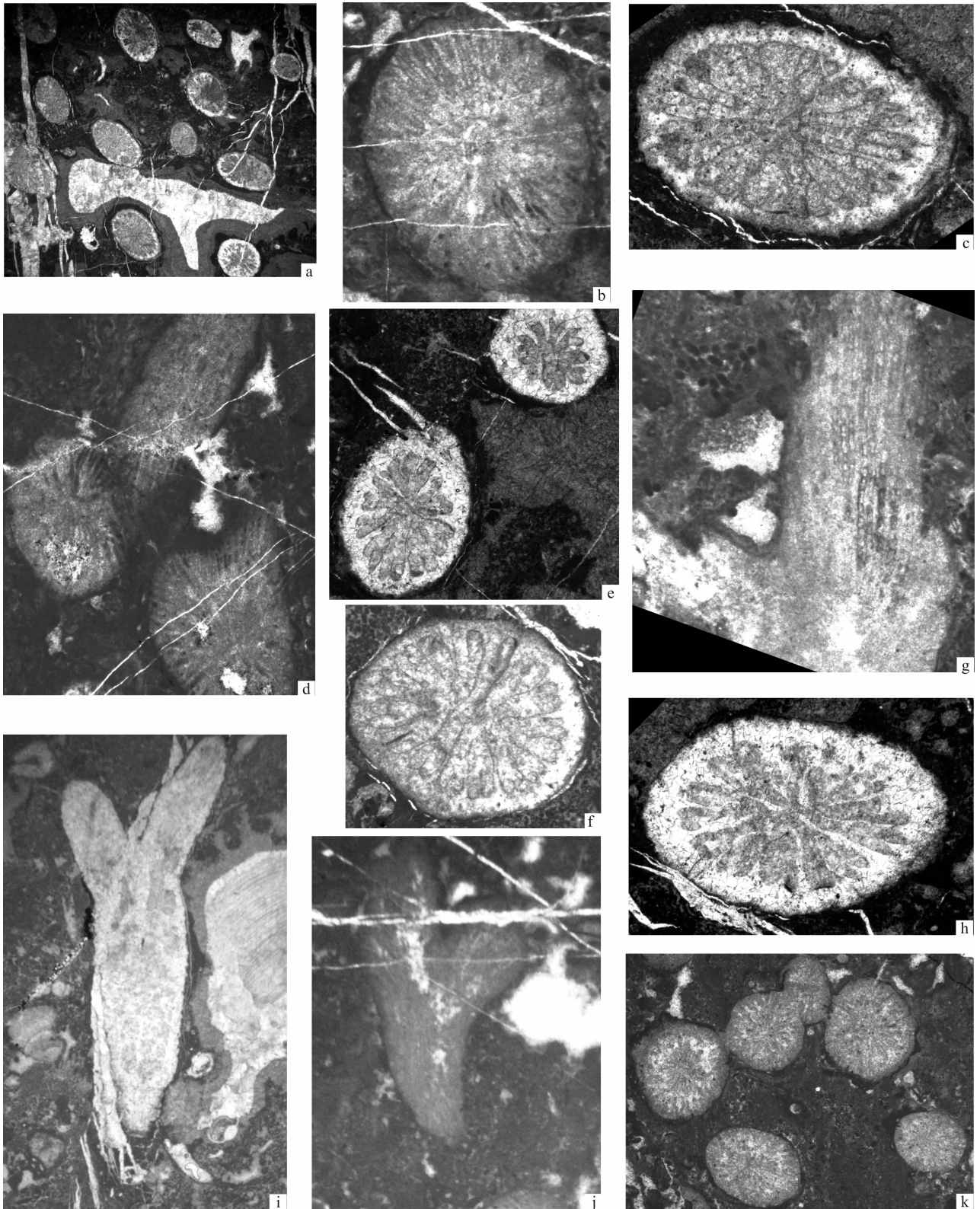


图5 册亨坡段组中上部石珊瑚化石

Fig. 5 Scleractinian corals from the middle-upper part of Poduan Formation in Ceheng, Guizhou

(a, c, f, h) *Pinacophyllum spizzenensis* (Tornquist). (a), 横切面,  $\times 3$ ; (c),  $\times 17$ , (f),  $\times 17$ , (h),  $\times 20$ , 部分个体横切面; 采样号: PD-06-01。  
 (e, i) *Pentasmilia zaitingnaensis* Deng. (e), 横切面,  $\times 18$ ; (i), 纵切面,  $\times 3.5$ ; 采样号: PD-06-02。  
 (b, d, g, j, k) *Gillastraea delicata* Melinokova. (b), 某一个体横切面,  $\times 23$ ; (d), 横切面局部, 示薄的表壁及细薄而多的隔壁,  $\times 13$ ; (g), 纵切面局部, 示密集分布的鳞板,  $\times 21$ ; (j), 纵切面, 示侧方出芽,  $\times 9$ ; (k), 横切面,  $\times 4$ ; 采样号: PD-20。

(a, c, f, h) *Pinacophyllum spizzensis* (Tornquist). (a), transverse thin section,  $\times 3$ ; (c),  $\times 17$ , (f),  $\times 17$ , (h),  $\times 20$ , partial transverse thin section showing clearly septa system. Sample PD-06-01. (e, i) *Pentasmilia zaitingnaensis* Deng. (e), transverse thin section,  $\times 18$ ; (i), longitudinal thin section,  $\times 3.5$ . Sample PD-06-02. (b, d, g, j, k) *Gillastraea delicata* Melinokova. (b), transverse thin sections of one single corallite belonging to the colonial coral specimen,  $\times 23$ ; (d), partial transverse thin section showing pellicular epithelial and numerous thin septa.  $\times 13$ ; (g), partial longitudinal thin section showing dissepiment distributed densely,  $\times 21$ ; (j), longitudinal thin section showing the reproduction type of budding lateral,  $\times 9$ ; (k), transverse thin section,  $\times 4$ . Sample PD-20

德国、匈牙利、日本、美国内华达、斯洛文尼亚、南阿尔卑斯和西班牙的三叠系安尼阶的 Illyrian 亚阶中上部到拉丁阶的 Fassanian 亚阶下部, 相当于菊石 *Paraceratites trinodosus* 带上部到 *Eoprotrachyceras curioni* 带。在亚洲东北部, 含牙形石 *Neogondolella constricta* 的层位可以与菊石 *Frechites nevadanus* 带的 *Frechites nevadanus* 和 *Parafrechites sublaqueatus* 亚带对比 (Konstantinov et al., 2009)。 *Neogondolella constricta* 带的重要分子 *Neogondolella bulgarica* 出现在保加利亚、匈牙利、日本、斯洛文尼亚、南阿尔卑斯和西班牙的三叠系安尼阶的 Pelsonian 亚阶到 Illyrian 亚阶下部, 相当于菊石 *Aghdarbandites ismidicum* 带到 *Paraceratites trinodosus* 带的位置 (Márquez-Aliaga et al., 2000)。从贵州册亨地区坡段组牙形石整体特征和区域对比关系看, 我们认为贵州册亨地区坡段组牙形石 *Neogondolella constricta* 带赋存地层的时代应为安尼期的 Illyrian 亚期。贵州册亨坡段组 *Neogondolella constricta* 带大体可与贵州省盘县地区羊圈—楚皮凹剖面中三叠统关岭组上段 (Sun et al., 2006, 2014)、贵州罗甸关刀(2)剖面关刀岩楔 (Wang Hongmei et al., 2005)、云南开远马者哨中三叠统法郎组二段 (Wang Zhihao et al., 1990) 同名化石带对比。

## 5 珊瑚化石描述

本文采用 Turnšek (1997) 及廖卫华和邓占球 (2013) 的分类系统。

石珊瑚目 Scleractinia Bourne, 1900

五剑珊瑚亚目 Pentasmiliina Deng, 2013

五剑珊瑚科 Pentasmiliida Deng, 2006

五剑珊瑚属 *Pentasmilia* Deng, 2006

模式种 *Pentasmilia guangxiensis* Deng, 2006

再停拿五剑珊瑚 *Pentasmilia zaitingnaensis*

Deng, 2013

(图 5, e, i)

2006 *Pinacophyllum* aff. *Spizzensis*, 邓占球, p. 40, pl. 1, fig. 9

2013 *Pentasmilia zaitingnaensis*, 廖卫华和邓占球, p. 94, pl. 33, fig. 10

描述 丛状复体。个体圆柱状, 横切面圆形, 体径约为 1~2mm。隔壁型鞘壁, 厚度达个体半径的 1/4。隔壁致密, 辐射对称, 体系较规则, 计有三级, 数目约 20 条, 5 条一级隔壁, 直伸, 几达个体中心; 5 条二级隔壁, 长度约为一级隔壁的 3/4; 10 条三级隔壁, 短小, 长度约为一级隔壁的 1/4。隔壁侧面光滑。无轴部构造, 未见床板和鳞板。萼内二分裂出芽。

比较 描述标本与广西田阳再停拿的标本相较, 仅个体体径略小于后者 (3~4mm), 其他特征一致。

柱珊瑚亚目 Stylophyllina L. Beauvais, 1980

柱珊瑚科 Stylophyllidae Frech, 1890

匾珊瑚属 *Pinacophyllum* Frech, 1890

模式种 *Pinacophyllum parallelum* Frech, 1890

斯皮茨匾珊瑚 *Pinacophyllum spizzensis* (Tornquist), 1899

(图 5, a, c, f, h)

1984 *Pinacophyllum spizzensis* (Tornquist), 邓占球, 孔磊, p. 495, pl. 3, fig. 9.

2013 *Pinacophyllum spizzensis* (Tornquist), 廖卫华, 邓占秋, 2013, p. 35, pl. 2, figs. 12-13; pl. 29, figs. 8-10; pl. 32, figs. 10, 11.

描述 丛状复体。个体圆柱状, 横切面圆形或椭圆形, 体径约 1.5~3.5mm。隔壁型鞘壁, 厚度一般为个体半径的 1/5。隔壁致密, 外端膨大, 向内逐渐变细薄, 数目约 24~32 条。隔壁四级, 通常一级隔壁伸达个体中心, 但不汇成轴部器官, 部分个体一级隔壁在轴部膨大或者弯曲, 但这一性状并不稳定; 二级和三级隔壁按级序变短, 四级隔壁发育不完全, 呈短刺状。隔壁侧面一般平坦或者有少量瘤状突起。无轴部构造。

比较描述标本与邓占球和孔磊(1984)及廖卫华和邓占球(2013)描述的采自贵州贞丰下按中三叠统竹杆坡组的标本区别在于后者个体更大些(体径约3.5~4mm)。但Deng Zhanqiu et al. (1984), Liao Weihua et al. (2013)均将*Thecosmilia spizzensis* Tornquist (Tornquist, 1899)作为同义名,认为贞丰的标本与Tornquist(1899)南阿尔卑斯Orcothal unterhalb San Rocco als Block中三叠世安尼期的*Thecosmilia spizzensis*在横切面的特点上基本一致,实际上,后者的隔壁在表壁区与表壁融合加厚成一个显著的三角区,然后迅速变尖灭并且一般地波浪状或之字型弯曲,本文作者在贵州盘龙树发现数量众多的与Tornquist(1899)标本一致的珊瑚化石,该特征稳定地存在,所以本文没有将*Thecosmilia spizzensis* Tornquist (Tornquist, 1899)作为同义名;而贞丰的标本隔壁一般地刺状,隔壁从外端向内逐渐变细薄与当前描述标本一致。此处暂时保留种名。

古石芝亚目 *Archaeofungiina* Alloiteau, 1952

基夫珊瑚科 *Cuifastraeidae* Melnikova 1983

基拉珊瑚属 *Gillastraea* Melnikova, 1983

模式种 *Gillastraea delicate* Melnikova, 1983

雅致基拉珊瑚 *Gillastraea delicate*

Melinokova, 1983

(图5, b, d, g, j, k)

1983 *Gillastraea delicate* Melinokova, p. 52, pl. 4, fig. 1.

1987 *Gillastraea delicate* Melinokova, Turnšek and Ramovš, pp. 36 – 37, pl. 6, figs. 3 – 4.

1997 *Gillastraea delicate* Melinokova, Turnšek, p. 96, pl. 96.

描述 丛状复体。个体圆柱状,体径约1~2mm。表壁型鞘壁,薄。隔壁细薄而多,长达中心,因保存原因各级隔壁不易区分,隔壁数目难以判断。但可见隔壁在个体中心形成一个显著的轴部器官,隔壁侧面发育近似羽翅的装饰。合隔桁稀少,大量鳞板充填在隔壁之间。粤外边缘出芽。

比较描述标本依据薄的表壁型鞘壁,隔壁细薄而众多,且隔壁侧面发育装饰,及显著的轴部器官,无疑应该归入*Gillastraea*属。当前标本近似于Melinokova(1983)描述的帕米尔东南Belk河谷与Khan-Yuly之间的标本,以及Turnšek(1997)描述

的帕米尔Šplevta的标本,区别在于后者个体体径更大些(5~9mm)。

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## Scleractinian Coral and Conodont Biostratigraphy of the Middle-Upper Part of the Poduan Formation in Ceheng, Guizhou Province, South China

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### Abstract

To further determine the biological appearance and composition features of corals and conodonts in Poduan Formation, the geological age of Poduan Formation in south western part of Guizhou and the contrast relationship between conodonts and other categories, the typical section of Poduan Formation in Ceheng is selected to carry out the research on corals and conodont biostratigraphy. Three species of scleractinian corals, *Pentasmilia zaitingnaensis*, *Pinacophyllum spizzensis* and *Gillastraea delicate*, and one conodont zone, *Neogondolella constricta* are identified in middle-upper part of the Poduan Formation in Ceheng. Besides *Neogondolella constricta*, there are some other important conodonts: *Neogondolella bulgarica*, *Neogondolella navicula*, *Neogondolella acuta*, *Neogondolella alpina alpina*, *Cratognathodus kochi*, *Ozarkodina tortilis*, *Prioniodina* sp., *Lonchodina* sp., etc. in the *Neogondolella constricta* zone. Based on the analysis of conodonts characteristics and regional stratigraphical correlation, this conodont zone of the Poduan Formation can be comparable to the following synonym conodont zone: the upper member of Guanling Formation of Yangjuan-Chupiwa Section in Panxian of Guizhou, Guandaoyanqi of Guandao Section (2) in Luodain of Guizhou, Falang Formation of Mazheshao in Kaiyuan of Yunnan, and the stratigraphic age of the middle-upper part of the Poduan Formation, can be considered as the Illyrian substages of the Anisian stage (middle Triassic).

**Key words:** Scleractinian Coral, Conodont, Poduan Formation, Illyrian substages, Ceheng, Guizhou Province