

贵州剑河寒武系“清虚洞组”管状微体骨骼化石初步研究*

王 圆¹⁾ 杨兴莲^{1,2)} ** 赵元龙¹⁾ 曹 鹏¹⁾

1) 贵州大学资源与环境工程学院, 贵阳 550025, yangxinglian2002@163.com;

2) 现代古生物学和地层学国家重点实验室, 中国科学院南京地质古生物研究所, 南京 210008

提要 华南寒武系地层中广泛富集微体骨骼化石, 为解决某些疑难化石的亲缘关系及研究早期后生动物的演化提供了重要化石证据。在贵州剑河八郎“清虚洞组”中发现一些管状微体骨骼化石。经鉴定后主要有 4 属, 分别为小钻孔螺 *Torellella*、似软舌螺 *Hyolithellus*、鞘状螺 *Coleoloides* 和表面具鳞片状管状化石 *Mongolitubulus squamifer*。*Mongolitubulus* 分布范围较为广泛, 本文结合前人对该化石亲缘关系的探讨及剑河寒武系“清虚洞组”化石的特征, 推测 *M. squamifer* 可能是高肌虫的装饰刺。

关键词 *Mongolitubulus* 微体骨骼化石 “清虚洞组” 寒武系 贵州剑河

1 前 言

管状微体骨骼化石是寒武纪常见的疑难微体化石类群, 可能为生物的骨骼框架, 如软舌螺、阿纳巴管等(Hua *et al.*, 2005), 也可能为与宏观母体化石分离的微小骨片化石(Malinky and Yochelson, 2007)。由于缺乏与宏体化石关联的直接化石证据, 目前许多管状化石的分类位置、生物亲缘关系仍不清楚, 许多表面饰有鳞片状、刺状或瘤状装饰物的管状化石, 也仅被称为具表面装饰的管状化石(Ornamented tubes)(Missarzhevsky, 1977; Zhu and Dong, 2004)。何廷贵和解永顺(1989)认为这些管状微体骨骼化石可能是不同类型后生物体上的硬件构造, 并将它们分为完全不同的三种类型, 即牙形状化石(conodont-like fossils)、棘盔状化石(helmet-like fossils)及开腔骨类(chancelloriids)。近年来有学者将类似的管状棘盔状化石 *Amoebinaella* 解释为可能的螳螂个体或水螅型珊瑚幼体(刘云焕等, 2013; Shao *et al.*, 2015)。湘西花垣寒武系花桥组灰岩中发现的具壳刺、锯齿状硬刺或斑疹状、瘤状等

壳面装饰特征的 Ornamented tubes 可能与高肌虫的亲缘关系更近(Zhu and Dong, 2004; Zhang *et al.*, 2014)。总的来说, 关于该类化石的生物亲缘关系的探讨一直是一个存在分歧的科学问题, 生物分类位置还需更进一步研究。

近期, 通过醋酸浸泡处理, 我们在贵州剑河八郎寒武系第二统“清虚洞组”的灰岩中发现了一些微体管状骨骼化石。经研究, 这些管状化石分别为 *Hyolithellus*, *Coleoloides*, *Torellella* 及表面具鳞片状装饰的磷质管状疑难化石 *Mongolitubulus squamifer*。*Hyolithellus micans* 最早发现于加拿大东南部下寒武统(寒武系第二统)地层中, 该种发现于美国的马萨诸塞州、蒙古、瑞典、丹麦、英国、澳大利亚、格陵兰岛地层中(Billings, 1871; Poulsen, 1967; Bengtson, 1968; Bergström and Ahlberg, 1981; Hinz, 1987; Landing, 1988; Skovsted, 2006; Skovsted and Peel, 2011), 在中国的峡东、陕西水井沱组中也有该化石的报道(汪洋等, 2010; Yang *et al.*, 2015), Skovsted(2006)认为其极有可能与环节动物有关。*Torellella* 出现于西伯利亚、欧洲、中国的早、中寒武世(寒武纪第二世至苗岭世)地层中(李国

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** 通讯作者。

祥,2004;汪洋等,2010;Landing,1988;Qian,1989;Vinn,2006;Skovsted,2006;Devaere *et al.*,2015;Yang *et al.*,2015),该化石的亲缘关系难定,Vinn(2006)认为其极有可能是 Sphenothallids 的分支或是刺胞动物的一类。*Coleoloides* 在格陵兰岛、峡东水井沱组中都有发现(汪洋等,2010;Brasier and Singh,1987)。*Mongolitubulus* 有鳞片状装饰的长刺主要报道于蒙古、哈萨克斯坦、南极洲、格陵兰岛、澳大利亚(Missarzhevsky,1977;Skovsted and Peel,2001;Dzik,2003;Skovsted,2005;Skovsted *et al.*,2006;Topper *et al.*,2007;Betts *et al.*,2014,2017)。国内主要在峡东地区的水井沱组中对 *Mongolitubulus* 与古盘虫 *Hupeidiscus orientalis* 之间的亲缘关系进行过探讨,并认为 *Mongolitubulus* 可能具有多源性(Li *et al.*,2012)。陕西水井沱组中发现具刺状的 *Spinella unialata* 后被更正为 *Mongolitubulus unialata* (= *Spinella unialata*) (Zhang *et al.*,2007;Topper *et al.*,2013),是 *Mongolitubulus* 在华南的首次报道。湘西花垣寒武系花桥组灰岩中发现的 Ornamented tubes 被确定为疑似高肌虫或奥斯坦型化石 *Cambrolongispina reticulata* 和 *C. glabra* 的一部分(Zhang *et al.*,2014)。

本文对采自贵州剑河“清虚洞组”的管状微体骨骼化石进行初步研究,并对发现于华南的 *Mongolitubulus squamifer* 的亲缘关系进行详细探讨。此次研究丰富了“清虚洞组”的生物化石种类、完善了其生物组成面貌,也为寒武纪早期生物演化的研究提供了新的材料。

2 地质背景

本文研究材料采自松山剖面“清虚洞组”,剖面位于贵州省剑河县革东镇一带,该区域为寒武系扬子区与江南区过渡地带(尹恭正,1987)(插图1)。贵州下寒武统(寒武系纽芬兰统至第二统)的岩石地层单位时空变化复杂,过渡区域的岩性以底部代表深水环境的黑色碳质页岩与硅质岩、磷块岩互层和上部的灰岩、碎屑岩地层为特征(Mei *et al.*,2007)。筇竹寺期至沧浪铺期为一套黑色碳质页岩、泥岩夹灰岩,龙王庙期至中寒武世早期(寒武纪第二世晚期至苗岭世早期)以灰岩、泥灰岩、页岩和粉砂岩为主,之后至晚寒武世(芙蓉世)主要为白云岩及白云质灰岩(周志毅,1979)。出露地层由老到新依次为牛蹄塘组、九门冲组、变马冲组、杷榔组、“清虚洞组”、凯

里组、甲劳组和娄山关组(Zhao *et al.*,2012)。

松山“清虚洞组”剖面位于屯州村西北部,与全球寒武系苗岭统乌溜阶国际层型剖面——乌溜—曾家崖剖面相邻。松山“清虚洞组”剖面厚272.2 m,与其上覆地层凯里组整合接触,下伏地层为杷榔组顶部的灰绿色泥岩。“清虚洞组”主要为灰岩、泥岩,下部以灰色中厚层灰岩为主,上部为中厚层、薄层灰岩和粉砂质泥岩呈不等厚互层,顶部为灰黑色白云岩。与黔北、黔中及黔西一带以灰岩、白云质灰岩及豹皮状灰岩为主的典型的清虚洞组和深水相以泥页岩为主的乌训组均有差异(张文堂等,1980),故文中用“清虚洞组”以示区别。袁金良等结合剑河“清虚洞组”的掘头虫类组合特征,厘定了“清虚洞组”的生物地层即下部的 *Arthricocephalus jishouensis-Changaspis plana* 带及上部的 *Protoryctocephalus wuxunensis* 带(Yuan *et al.*,2014,2015)。但在进一步研究中,八郎一带“清虚洞组”上部并未发现乌训古掘头虫 *P. wuxunensis*,而是发现了大量北极古掘头虫 *P. arcticus*,认为 *P. wuxunensis* 带难以成立(罗绣春等,2014),新建 *Protoryctocephalus arcticus* 带(王铭坤等,2016)。而下部仅发现吉首似掘头虫 *Arthricocephalus jishouensis*,由于该种延续时间过长而不适宜作带化石(王铭坤等,2016)。目前最新的研究认为下部为 *Arthricocephalus chauveaui* 带,上部建立 *Protoryctocephalus arcticus* 带(罗绣春等,2014;王铭坤等,2016)。本文所报道的管状微体骨骼化石多采集于“清虚洞组”中上部160—220 m 的灰岩中,位于 *Protoryctocephalus arcticus* 带下部(插图2),属于寒武系第二统第四阶中上部。

3 *Mongolitubulus* 亲缘关系探讨

Mongolitubulus 最早由 Missarzhevsky(1977)报道于西伯利亚下寒武统(寒武系第二统)地层中,Topper 等(2013)提议以 *Mongolitubulus squamifer* 为模式种建立新科 Mongolitubulidae。目前该科共有9个种,分别为 *M. squamifer*, *M. henriksoni*, *M. unispinosa*, *M. unialata*, *M. asperma-chaera*, *M. reticulatus*, *M. tunpere*, *M. anthelios* 和 *M. descensus*。此前有学者认为 *Mongolitubulus* 可能与毛颚动物(见 Skovsted *et al.*,2006)、叶足动物(Dzik,2003;Caron *et al.*,2013)及古盘虫类有关(Li *et al.*,2012),而 Skovsted 等(2001,2005,

2006)、Zhang 等(2007)、Topper 等(2007, 2013)、Smith 等(2014)和 Betts 等(2014, 2017)相继发现了具完整长刺的 *M. henriksenii*, *M. unispinosa*, *M. unialata*, *M. aspermachaera*, *M. anthelios*, *M. tunpere* 和 *M. descensus* 与高肌虫壳体相连,证实了这 7 个种与高肌虫的亲缘关系。*M. reticulatus* 虽未发现长刺与高肌虫完整壳体相连的部分,但其扩张基部与 *M. henriksenii* 的极为相似,且基部的褶皱与某些变形的甲壳碎片和完整的瓣膜边缘部分的褶皱都非常相似而被归入高肌虫中(Kouchinsky *et al.*, 2011)。目前, *M. squamifer* 的可靠生物分类位置还未解决。Caron 等(2013)认为 *M. squamifer* 可能是叶足动物 *Hallucigenia* 背部的刺状结构,是自底部螺旋向上倾斜的三角形装饰。而贵州剑河“清虚洞组”中发现的横切面为圆形或亚椭圆形、表面具有鳞片状装饰的长刺构造 *M. squamifer* 与叶足动物 *Hallucigenia* 背部的刺状结构明显不同。Li 等(2012)通过分析 *Mongolitubulus* 的壳体纹饰、轮廓、脱壳生长和时空分布等证据,认为 *Mongolitubulus* 具有多源性,某些 *Mongolitubulus* 可能与古盘虫 *Hupeidiscus orientalis* 的刺有关。通过对前人报道的 *M. squamifer* 及“清虚洞组”标本的系统测量,发现 *M. squamifer* 个体长度一般在 1—3 mm,直径一般也大于 0.2 mm(据 Skovsted

and Peel, 2001; Wrona, 2004; Topper *et al.*, 2007, 2013),与三叶虫 *H. orientalis* 的最大刺长和刺宽分别为 0.542 mm 和 0.072 mm(Li *et al.*, 2012; Topper *et al.*, 2013)不吻合。从成分和结构上看, *M. squamifer* 的壳壁为三层结构,成分主要为磷酸钙(Wrona, 2004),与霍世诚等(1991)提到的某些高肌虫类双瓣壳的壳体分层方式和化学成分基本一致。高肌虫由于其壳体具有清晰的边缘构造,缺乏真正的生长线,一般被认为行蛻壳式生长(霍世诚等, 1986)。经研究, *M. squamifer* 并未发现横向生长线或生长纹,说明它们可能也是蛻壳式生长,其亲缘关系可能限定于与蛻壳动物门类有关(Zhu *et al.*, 2004)。在通过酸解获得的高肌虫 *Duibianellidae* 和 *Monasteriidae* 中偶有保存壳瓣上的刺状装饰(Jones and Mckenzie, 1980; Zhang *et al.*, 2007)。Zhang 等(2014)在湘西花垣寒武系花桥组灰岩中也发现了具 Ornamented tubes 刺的完整高肌虫化石 *Cambrolongispina reticulata* 和 *C. glabra*,其壳瓣上突出两根表面具刺的细长型矿化管状壳刺。结合剑河“清虚洞组”中无论是宏观化石还是微体化石中均未发现古盘虫,却保存有大量高肌虫和大型双瓣壳节肢动物,本文认为贵州剑河“清虚洞组”发现的 *M. squamifer* 可能是高肌虫壳瓣上的刺状结构。

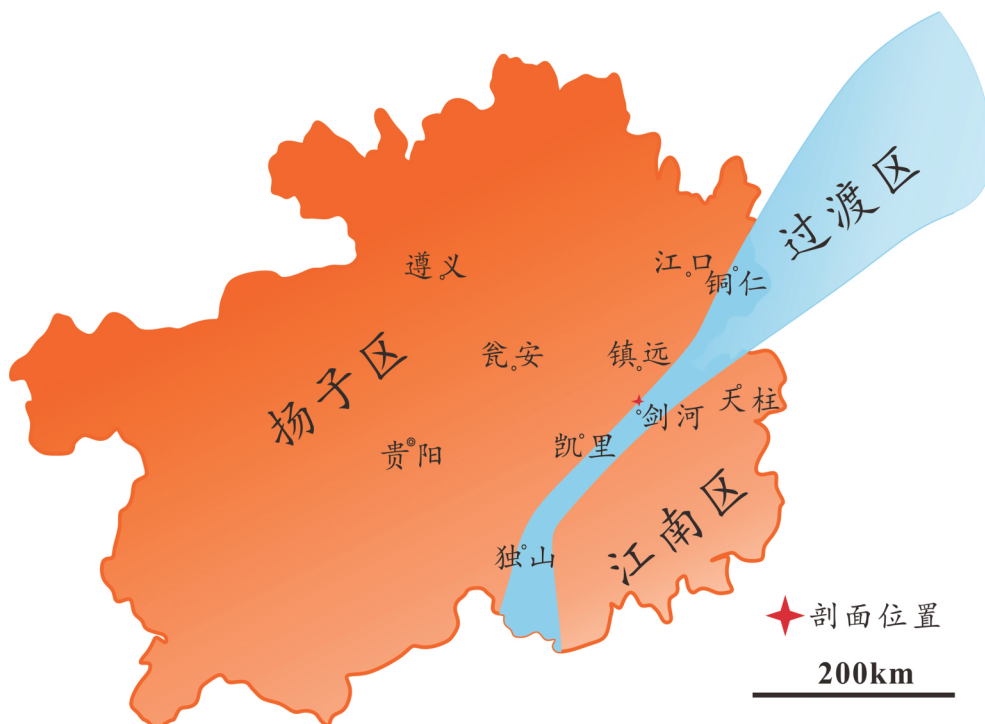


插图 1 贵州寒武系过渡区沉积范围示意图(据周志毅等, 1979)

Map showing sedimentary area of transition zone of Cambrian in Guizhou (after Zhou *et al.*, 1979)

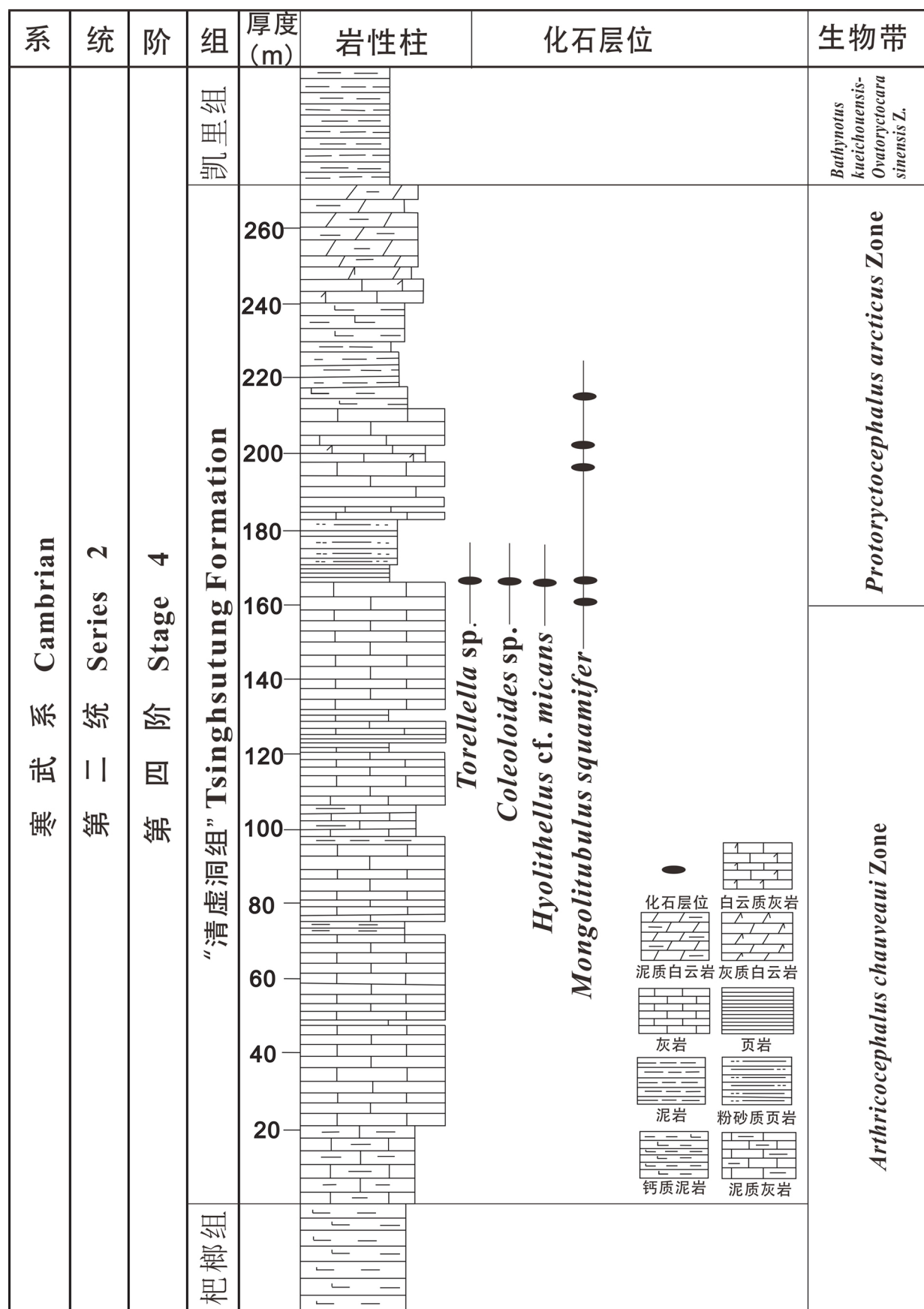


插图 2 “清虚洞组”(寒武系第二统)管状微体化石地层分布图(据 Zhao *et al.*, 2012 修改)

Stratigraphic range of tubular skeletal microfossils from the “Tsinghsutung Formation” (Series 2, Cambrian) (modified from Zhao *et al.*, 2012)

4 系统古生物学

节肢动物门 **Phylum Arthropoda Siebold and Stan-
nius, 1845**

纲未定 **Class Uncertain**

高肌虫目 **Order Bradoriida Raymond, 1935**

蒙古管科 **Family Mongolitubulidae Topper, 2013**

蒙古管属 **Genus Mongolitubulus Missarzhevsky, 1977**

鳞状蒙古管 **Mongolitubulus squamifer Missarzhevsky,
1977**

(插图 3A—E)

1977 *Mongolitubulus squamifer* Missarzhevsky, p. 13, pl. 1,
figs. 1—2.

2001 *Mongolitubulus squamifer*, Skovsted and Peel, p. 137,
fig. 2.

2002 *Mongolitubulus squamifer*?, Landing *et al.*, p. 301,
fig. 4.19.

2004 *Mongolitubulus squamifer*, Wrona, p. 43, figs. 23A—
H, 24.

2007 *Mongolitubulus squamifer*, Topper *et al.*, p. 76, fig. 5A—H.

2009 *Mongolitubulus squamifer*, Wrona, p. 367, fig. 13A—B.

特征 长管状,微弯,向前略收缩变细,横截面为圆形,壳体可见三层结构(插图 3D),管体末端未保存原始化石特征。壳体内层为未见有明显纹饰的空圆柱体,外层薄层装饰有鳞片状纹饰。同一根化石不同部分的纹饰略有不同。纹饰主要为排列较规则的斜菱形、鳞片状突起,表面光滑,其末端平滑地伸入管状化石的表面。较粗一端的鳞片状纹饰小且排列不规则,向较细一端逐渐过渡为较圆滑且对称排列的鳞片状纹饰,较细一端为较规则的、呈螺旋状向顶端减少的较圆滑的三角形鳞片状纹饰。

比较 “清虚洞组”发现的标本与 *Mongolitubulus squamifer* 最为相似,外形都为微弯的长管状,近三角形鳞片状的壳饰排列相对规则且大致等距。而与 *M. henrikseni* (Skovsted and Peel, 2001, p. 140, fig. 3) 相比,后者的纹饰形状与前者较粗一端相似,排列也更为随机一些。相较于 *M. unispinosa* (Topper *et al.*, 2007, p. 78, fig. 6), 后者的标本除了有发现与宏体部分相连外,壳饰也略有不同,主要为短刺状突起和菱形的鳞状装饰,且壳饰的密度随着所处位置而有所变化。与 *M. unialata* (Zhang, 2007, p. 145, pl. 17, figs. 1—8) 相比,后者的刺更短一些,且表面主要为瘤状装饰。“清虚洞组”的标本与 *M. aspermachaera* (Topper *et al.*, 2013, p. 77, fig. 4-5) 相比,在外形上都为微弯的长管

状长刺,但后者主要为突起的、亚圆形壳饰。与 *M. reticulatus* (Kouchinsky *et al.*, 2011, p. 166, figs. 33—34) 相比,后者壳形较为相似,但其表面主要为网状纹饰,且壳体为双层结构。与澳大利亚的 *M. tunperei* (Smith *et al.*, 2014, p. 243—246, figs. 7—8) 相比,后者的末端为弯钩状,长刺上的装饰为微小的斜长方形,且其壳体保存不止一个长刺状结构。与澳大利亚的 *M. anthelios* (Betts *et al.*, 2014, p. 435, fig. 8) 相比,后者的管状长刺更弯一些,长刺上的装饰为较大的斜方形,与“清虚洞组”标本相区别。与同样报道于澳大利亚的 *M. descensus* (Betts *et al.*, 2017, p. 273, fig. 19. N—S) 相比,后者可能由于处理原因,长刺总体上较光滑,偶见小的疱状突起,与剑河标本明显不同。

时代和分布 寒武纪第二世至苗岭世;蒙古、哈萨克斯坦、南极洲、格陵兰岛、澳大利亚和中国。

门、纲、目未定 **Phylum, Class, Order uncertain**

鞘状螺科 **Family Coleolidae Fisher, 1962**

鞘状螺属 **Genus Coleoloides Walcott, 1889**

模式种 *Coleoloides typicalis* Walcott, 1889

属征 双侧对称或两侧辐射对称,无固着器,构造细长、微弯,横截面呈圆形。壳体表面有密集排列的纤细纵脊。

时代和分布 寒武纪第二世;纽芬兰岛、美国、英国、中国、格陵兰岛。

鞘状螺(未定种) *Coleoloides* sp.

(插图 3G—H, 3N)

描述 壳体管状,细直而长,为磷质管体的内膜,表面饰以多条浅的、大致平行于中轴的纵脊(插图 3 N)。最外部钙质壳体表面被醋酸溶蚀,管体底部未见固着器保存。标本 JHQB-169-11 长 0.764 mm,较细一侧直径为 0.136 mm,另一侧直径为 0.167 mm。标本 JHQB-169-12 长 5.56 mm,较细一端直径为 0.690 mm,较粗一端直径为 0.803 mm,纵脊的间距为 0.0916 mm。

比较 本标本与格陵兰岛的 *Coleoloides prindlei* Lochman, 1956 (Skovsted, 2006, p. 23, figs. 10. 22—23) 比较相似,都具有与中轴大致平行的纵脊,且横截面的直径也比较相似,但后者的纵脊更密集一些。

似软舌螺目 **Order Hyolithelminthida Fisher, 1962**

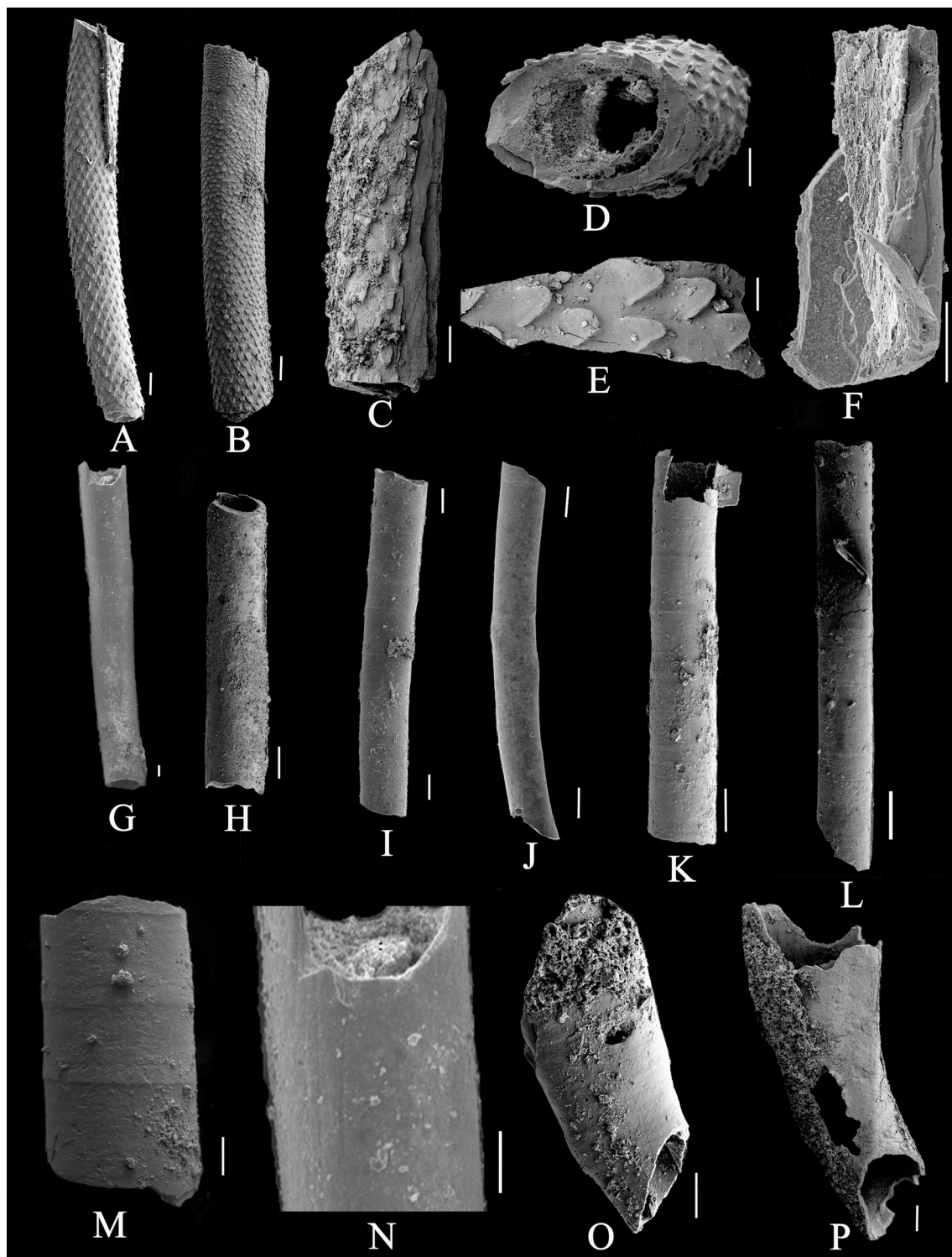


插图3 “清虚洞组”(寒武系第二统)管状微体化石

Tubular skeletal microfossils from the “Tsinghsutung Formation” (Series 2, Cambrian)

A—E. 鳞状蒙古管 *Mongolitubulus squami fer* Missarzhevsky, 1977, 编号: A. JHQH-193-1, B. JHQH-163-5, C. JHQH-169-6, D. JHQH-169-7, E. JHQH-193-2; G—H, N. 鞘状螺未定种 *Coleoloides* sp., 编号: G. JHQH-169-12, H. JHQH-169-11, N 为 G 的局部放大; F, I—M. 云母似软舌螺相似种 *Hyolithellus* cf. *micans* (Billings), 1871, 编号: F. JHQH-169-13, I. JHQH-163-7, J. JHQH-169-15, K. JHQH-169-16, L. JHQH-169-14, M. JHQH-163-8; O—P. 小钻孔螺未定种 *Torelrella* sp., 编号: O. JHQH-169-9, P. JHQH-169-10. 比例尺均为 100 μm

A—E. *Mongolitubulus squami fer* Missarzhevsky, 1977, Collection No.: A. JHQH-193-1, B. JHQH-163-5, C. JHQH-169-6, D. JHQH-169-7, E. JHQH-193-2; G—H, N. *Coleoloides* sp., Collection No.: G. JHQH-169-12, H. JHQH-169-11, N. Enlarged view of G; F, I—M. *Hyolithellus* cf. *micans* (Billings), 1871, Collection No.: F. JHQH-169-13, I. JHQH-163-7, J. JHQH-169-15, K. JHQH-169-16, L. JHQH-169-14, M. JHQH-163-8; O—P. *Torelrella* sp., Collection No.: O. JHQH-169-9, P. JHQH-169-10. Scale bars=100 μm

似软舌螺科 **Family Hyolithellidae Walcott, 1886**

似软舌螺属 **Genus Hyolithellus Billings, 1872**

模式种 *Hyolithellus micans* Billings, 1871

属征 壳体为略锥状直管,微有弯曲,表面饰有圆形的生长环纹,底部未见固着器保存。

时代和分布 寒武纪第二世至苗岭世;澳大利亚、美国、加拿大、瑞典、蒙古、南极洲、格陵兰岛。

云母似软舌螺(相似种) *Hyolithellus cf. micans* (Billings), 1871

(插图 3 F, 3I—M)

1871 *Hyolithes micans* Billings, p. 215, fig. 3a, non 3b.

2002 *Hyolithellus micans* (Billings), Landing *et al.*, fig. 4. 11.

2004 *Hyolithellus micans* (Billings), Wrona, p. 46, fig. 25e.

2006 *Hyolithellus micans* (Billings), Skovsted, p. 49, pl. 10., figs. 4—6.

2010 *Hyolithellus cf. micans* (Billings), 汪洋等, p. 521, pl. 2, figs. 7—10.

描述 壳体管状,长直,横切面呈圆形。壳体为三层结构,外层具有环形的生长纹,中间层无明显装饰,内层呈纤维状结构(插图 3F)。表面较光滑,装饰有明显且等距分布的生长环纹,生长环纹为不等距分布,范围从 100—180 μm 不等。

比较 本标本与格陵兰岛东北部的 *Hyolithellus micans* (Billings), 1871 (Wrona, 2004, p. 46, fig. 25e) 相比,管体都略有弯曲,且有朝一端逐渐变细的趋势,但后者的生长环纹为等距分布。与加拿大西北部早寒武纪(寒武纪第二世) *Hyolithellus isiticus* Missarzhevsky, 1969 (Pyle, 2006, p. 822, fig. 8. 6—7) 的区别为前者生长环纹的间距较后者的更长。寒武纪该类型管状化石的分类主要基于壳体表面的形态及纹饰,Skovsted (2006) 结合直与微弯形态的标本和生长环纹均匀分布(时)这一现象,认为其可能是同一物种。其生长环纹的变化有可能是为了与沉积物表面垂直而进行调整生长的过程 (Skovsted and Peel, 2011)。而其与软舌螺之间共同的破损和磨损的证据 (Malinky and Skovsted, 2004) 表明,在标本表面的差异是由于埋藏造成的。

小钻孔螺科 **Family Torelledidae Holm, 1893**

小钻孔螺属 **Genus Torelleda Holm, 1893**

模式种 *Hyolithus laevigatus* Linnarson, 1871

属征 壳体窄,横切面为透镜状。壳体直或微有弯曲,表面光滑或饰有生长线、环脊或环沟等横向纹饰。

时代和分布 寒武纪第二世至苗岭世;西伯利亚、欧洲、中国。

小钻孔螺(未定种) *Torelleda* sp.

(插图 3O—P)

描述 壳体呈三角状的圆锥形,微弯。标本保存不全,皆为中段壳管,未见始端和壳口端,横截面呈圆梯形。壳的两个宽面凸度略有差异,一面呈较明显的圆弧状,另一面则稍显扁平,两侧为扁平的弧状过渡。壳体表面光滑,无明显的纹饰。从断面来看,壳体较薄,应为单层结构。标本 JHQB-169-9 长 0.340 mm,一侧的直径为 0.064 mm,另一侧较粗,直径为 0.146 mm,标本 JHQB-169-10 长 2.771 mm,较细一侧直径为 0.666 mm,另一侧直径为 0.971 mm。

比较 *Hyolithus laevigatus* 最早报道于瑞典 Lugnäs Västergötland 的地层中,之后 Holm 将其修正为 *Torelleda laevigata* (见 Malinky and Berg-Madsen, 1999),“清虚洞组”发现的 *Torelleda* sp. 与 *Torelleda bisulcata* Li, 2004 (李国祥, 2004, p. 574, 图版 I, 图 1—4, 6) 的形态较为相似,但前者保存不完整且缺少横向纹线或凹沟,仅见微微凸起的纵脊;与报道于格陵兰岛的 *T. laevigatus* Linnarson, 1871 (Skovsted, 2006, p. 19, fig. 10. 7—8.) 也较为相似,表面都较光滑,无明显的纹饰,但后者壳体为微弱双凸形结构,两宽面凸度相近与“清虚洞组”两宽面凸度不同相区别。由于“清虚洞组”中该标本保存不完整,因此作未定种处理。

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TUBULAR SKELETAL MICROFOSSILS FROM THE CAMBRIAN “TSINGHSUTUNG FORMATION” OF GUIZHOU, CHINA

WANG Yuan¹⁾, YANG Xing-lian^{1, 2)}, ZHAO Yuan-long¹⁾ and CAO Peng¹⁾

1) College of Resources and Environment Engineering, Guizhou University, Guiyang 550025, China, yangxinglian2002@163.com;

2) State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology,
Chinese Academy of Sciences, Nanjing 210008, China

Key words *Mongolitubulus*, microfossils, “Tsinghsutung Formation”, Cambrian, Jianhe, Guizhou Province

Abstract

Diverse early Cambrian skeletal microfossils have been discovered from South China, which has provided an excellent evidence for solving the affinity of some problematic microfossils and understanding the evolution of early Cambrian metazoan. Recently, we found some tubular skeletal microfossils from the “Tsinghsutung

Formation” in Jianhe, Guizhou Province, which belong to *Torellella*, *Hyolithellus*, *Coleoloides* and scaly ornament tubular microfossils *Mongolitubulus squamifer*. *M. squamifer* has a wide distribution. We assumed that *M. squamifer* might be the carapace spines of the Bradiriida crustaceans based on the features of microfossils from “Tsinghsutung Formation” in comparing with the variety of *Mongolitubulus* described in the literature.