

陕北的弓鲛化石二新种

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1961 年秋, 著者在陕北延长县延长组下部的黑色頁岩中发现了几个弓鲛 (*Hybodus*) 牙齿化石, 保存的尚称完好。另外由肖和钟同志送交著者鉴定的少許标本中, 也找到一个弓鲛牙齿化石, 化石保存在一钻井岩心中, 地点为延安以西約 40 公里砖窑湾西方, 层位属于安定组下部的油頁岩层。弓鲛化石在云南昆明上三迭統杂色层中, 四川广元系上部, 以及甘肃永登的煤系中都曾发现过, 不过全是背刺部分, 至于牙齿的化石, 这次还是首次发现, 这对了解該类魚的分布及其系統关系, 含魚化石地层的对比上, 都有一定的意义, 兹記述如下。

著者对肖和钟同志提供研究标本; 周明鎮、刘东生二先生校閱文稿, 并提出宝贵意見; 王哲夫先生摄制图影, 在此一并致以謝意。

标本記述

弓鲛科 *Hybodontidae*

弓鲛属 *Hybodus* Agassiz, 1837

安定弓鲛(新种) *Hybodus antingensis*, sp. nov.

(图版 1, 1)

正型标本: 一个保存完好的牙齿, 标本登記号 V. 1041。

产地及层位: 陝西安塞砖窑湾以西約 10 公里; 安定组下部。

特征: 牙齿中等大, 齿冠較低, 表面具有显明的縱直脊紋, 由齿冠基部延伸到齿尖頂端。

标本描述: 这一牙齿保存在黑灰色油頁岩中, 齿冠完整, 齿根未保存。齿冠低, 除主尖外, 兩側各有次尖两个。主尖大, 圓錐形, 頂端鈍圓, 基部寬大, 其高与寬的比为 2:3。次尖低而小, 形状相似, 大小相称, 以靠外側的較小一些。次尖的基部膨大, 向尖端急剧收攏, 形成頂尖。整个齿冠如复山字形(图版 1, 1), 其表面布有縱直脊紋, 脊紋間距均匀, 且延至頂端合攏。各齿尖在基部互相愈合, 形成寬厚的齿冠基底。齿根未保存, 形状不明。齿根与齿冠相接綫平直, 略向上拱, 但不显著。

比較: 这一标本的齿冠形状与齿尖排列形式与 *Hybodus delabechei* Charlesworth (L. Lias) 有些近似, 但在主次尖的大小比例, 主尖与相邻次尖的間距, 均有不同。它与在以下描述的新种楊氏弓鲛更为近似, 但也有以下几点区别, 如 1) 齿冠較楊氏弓鲛的为低, 2) 齿冠主次尖表面的脊紋一致伸达齿尖頂端, 3) 各齿尖基部互相連接, 形成較寬的齿冠基部。現以标本发现的层位命名为安定弓鲛 (*Hybodus antingensis*, sp. nov.)。

楊氏弓鲛(新种) *Hybodus youngi*, sp. nov.

(图版 I, 2—3)

正型标本: 一较完整牙齿, 次尖有缺失, 标本登记号 V. 1042.1。

副型标本: 两个牙齿, 次尖不全, 其中一个牙齿仅保存有一个次尖。

产地及层位: 陕西延长张家滩西; 延长组下部。

特征: 牙齿较硕大, 齿冠高, 主尖高大, 齿尖彼此分离较显著, 其表面布有显明的纵直脊纹。主尖基部的脊纹多而密, 只有少数伸达顶部。

标本描述: 齿冠相当硕壮。主尖高大, 呈角锥状, 靠近基部略拱出(图版 I, 2), 略倾斜, 其基部密布着纵直脊纹, 大多数脊纹伸达不到主尖高的一半处, 仅少数脊纹达至顶部。顶端钝圆, 光坦(V. 1042.2)。主尖侧方有 2 至 3 个次尖。在 V. 1042.1 号标本的主尖侧方可见到 3 个次尖(图版 I, 3 左)。各次尖形状相同, 由内向外逐次变小, 以外侧的一个最小。各齿尖彼此分离较显著。次尖表面的脊纹均达至顶端。齿冠基部很窄。齿根保存不佳, 但可看出齿冠与齿根相接成一直线。

比较: 延长层的标本与上述的安定弓鲛(*Hybodus antingensis*, sp. nov.) 比较, 显有差别, 在讨论安定弓鲛时已然指出, 这里不再重复。就齿尖的排列及分离的情况, 主尖近基部膨大情况(图版 I, 2), 可与任何已知种区分。就齿冠下部的脊纹多而密来论, 与斯匹兹贝耳根(Spitzbergen) 早三迭世的 *Hybodus sasseniensis* Stensjö 有些相象, 但后者的脊纹更多而密, 次尖的排列也不相同。著者拟将该种名赠与我国最先研究该类鱼化石的古脊椎动物学家杨鍾健教授, 定名为楊氏弓鲛(*Hybodus youngi*, sp. nov.)。

楊氏弓鲛的牙齿, 在主次尖的轮廓与排列形式, 脊纹的分布与显明程度等, 与其他种比较起来, 还是与安定弓鲛有一定程度的近似, 说明两者的关系较为密切。再者两者产出的层位相当明确, 楊氏弓鲛的层位较安定弓鲛的低。由上述两种弓鲛牙齿的特征来看, 牙齿形状的演变, 似乎是齿冠由高变低, 表面脊纹由密变疏, 各齿尖的基部由彼此较为分离到逐渐愈合。这种现象是否为有规律的变化, 还有待于更多的标本来证实, 若是如此, 将对含鱼地层时代的对比更有意义。

弓鲛为三迭侏罗纪分布较广, 且相当繁盛的软骨鱼类, 常与角齿鱼(*Ceratodus*) 化石在同一层位中发见, 说明两者在生活环境上有其共同性, 如在我国广元系上部就存在着这两类鱼化石。弓鲛化石在欧洲, 北美发见的较多, 北非、澳洲和亚洲也有发见, 过去在我国发见的材料仅由背刺来代表, 且残缺不全, 今陕北的弓鲛均以牙齿为代表, 故彼此难于联系。陕北的标本与云南、四川和甘肃的标本, 目前不能进行比较, 也就是这种原因。

陕北中生代地层的划分, 详略不一, 本文所涉及的地层, 延长组和安定组, 是大家一致公认的, 且继续被采用的地层单位, 由上述地层中所含鱼化石的性质看, 安定层的沉积时代应为中侏罗世, 当时这一地区的水, 广阔而较深, 因为除了发见有弓鲛化石和大量鱼粪化石外, 还有很多个体较大的叉鳞鱼类, 如安定贝莱鱼(*Baleiichthys antingensis* Liu) 等, 也有龟化石, 以破碎甲片为代表。

此次在延长组下部的黑色頁岩中除找到了弓鲛牙齿化石外, 也发见有较原始的软骨硬鳞鱼类, 还有无脊椎动物及植物化石, 遗憾的是, 此次未在含鱼层中采到可以鉴定的无

脊椎动物化石,植物化石又全是碎片。但就所含鱼化石的种类看,延长组下部的地质时代似应较早于晚三迭世,这自然还有待进一步研究。

我們此次虽然未在上述含弓鲛化石的层位中发见角齿鱼化石,但过去石油队的同志曾在陕北神木相当于瓦窑堡煤系的地层中,找到过角齿鱼(*Ceratodus shenmuensis* Liu et Yeh)的齿板化石。由分析安定组中粪化石得知,其中除了弓鲛粪外,还有的是属于肺鱼的。这说明在我們调查地区的中生代沉积中,也有角齿鱼化石,只是还没有被发见。此点也由弓鲛与角齿鱼常在同一地点同时存在所证实。尽管目前由于在云南等地发见的标本与陕北的标本不能作具体比较,但由于均存在有同类鱼化石,说明可能当时上述地区的自然条件相近似。

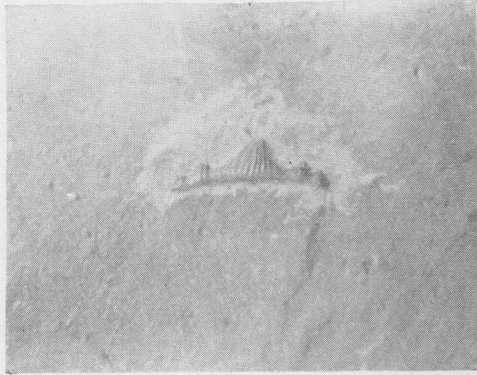
弓鲛化石在世界各地一般发见于海相地层中,在我国发见弓鲛化石的地层系属陆相沉积。这一问题值得从沉积物的性质和需要更多的化石材料来作进一步研究。

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图 版 說 明

1. 安定弓鮫(新种)(*Hybodus aningensis*, sp. nov.)的牙齿, ×3. 标本登記号 V. 1041。
2. 楊氏弓鮫(新种)(*Hybodus youngi*, sp. nov.)的牙齿, ×3. 标本登記号 V. 1042.2。
3. 楊氏弓鮫(新种)(*Hybodus youngi*, sp. nov.)的两个牙齿, ×3. 标本登記号 V. 1042.1 (左), 1042.3 (右)。



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2



3

TWO NEW *HYBODUS* FROM NORTH SHENSI, CHINA

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(Summary)

In Autumn, 1961, the writer had the opportunity of making a field investigation of Mesozoic strata of Northern Shensi. Hybodont teeth were discovered from two fish-bearing beds. In N. Shensi about four Mesozoic fish-bearing beds are known, the hybodont teeth were discovered from the first and the third, which belong to Triassic and Jurassic in age respectively. In China, this kind of fish had been formerly discovered from Yunnan, Szechuan and Kansu provinces, and studied by C. C. Young (1941, 1942), but all of those were merely represented by fin-spines. The discovery of the teeth in the above formations is of considerable interest, it represents the first occurrence of hybodont teeth in China. There are also plant-remains, ostracods, brachiopods and fragments of turtles in our collection. Only the fish specimens are described here by the writer.

DESCRIPTION OF SPECIMENS

Family Hybodontidae

Genus *Hybodus* Agassiz, 1837

Hybodus antingensis, sp. nov.

Type: A detached tooth, IVPP, Cat. No. V.1041. (Plate I, fig. 1).

Horizon and Locality: Lower part of Anting formation, Middle Jurassic; Chuan-yaoan, Ansai, N. Shensi.

Diagnosis: Teeth moderate in size, with a low crown, and strongly marked by vertical superficial wrinkles which extend to the apex.

Description: The crown of teeth is relatively low. In addition to the median principal cone there are two lateral cones on either side which diminished outwards. All the cones are strongly marked by vertical superficial wrinkles. The principal cone is the largest and broadest, and blunted apically. The superficial coronal wrinkles are acute and evenly spaced, which often extend downwards from the summits. Base is rather depressed.

The principal cone measures 2 mm. in height, and 3 mm. in breadth at the base.

Remarks: This specimen differs from the other known species by its prominent wrinkles covering the whole crown and by the arrangement of cones. It differs from the new species, *Hybodus youngi* described below in: 1) the crown is lower than that in the latter; 2) superficial wrinkles of principal cone extend to the apex; and 3) lateral cones not well separated with principal one, and each other.

***Hybodus youngi*, sp. nov.**

Type: A detached tooth, IVPP, Cat. No. V.1042.1 (Plate I, fig. 3).

Paratypes: Two detached teeth, IVPP, Cat. No. V.1042.2—3 (Plate I, figs. 2, 3).

Horizon and Locality: Lower part of Yenchang formation, Triassic; Changchiantan, Yenchang, N. Shensi.

Diagnosis: Teeth large, with a relatively high crown, strongly marked by vertical wrinkles, and two or three well separated lateral cones on each side.

Description: Teeth are very robust, with a relatively high crown. The principal cone is very strong, tapering to a very blunt point and slightly bent backwards. It is marked on the basal part with numerous vertical superficial wrinkles of which only a few extend to the apex of the cone, the others rarely extend more than half the height of the principal cone. The lateral cones are cuspidate, less elevated and more rounded than the principal, but sharply pointed. All of the cones are well-separated, therefore, the base of crown is very depressed.

Remarks: These specimens evidently differ from the above species by their specific characters as stated above, especially in the arrangement of the cones, which are well-separated from each other. This point can be distinguished it from all of the known forms. The writer likes to name it as *Hybodus youngi*, (sp. nov.) in honour of Prof. C. C. Young, the pioneer in the study of hybodonts in China.

In Anting formation, beside hybodonts, there are also many ganoid fishes (*Baleiichthys antingensis* Liu) and numerous coprolites. The writer had described a *Ceratodus* from Wayaopo coal series (Liu et Yeh, 1960), but it is not represented in this collection. There are abundant coprolites associated with hybodonts in Anting formation and also in Yenchang formation. Basing upon the texture of coprolites it is inferred that a considerable number of them belong to hybodonts doubtlessly.

According to the study of the fossil fishes the writer considers the geological age of the Anting formation as Middle Jurassic or even earlier. And the sediments were deposited in a deep and calm water body of fairly large extent. The more exact age of the Wayaopo formation and the Yenchang formation remains to be a problem which need further elucidation. According to the opinion of the present writer the age of fish-bearing stratum of Yenchang formation might be somewhat earlier than Late Triassic.