

浙江下白垩纪 *Paraclupea* 属鱼化石*

孙菱璘

(中国科学院古脊椎动物研究室)

关于中国的鲱鱼科化石,过去秉志教授和閻敦建曾記述过浙江寿昌的中鲱鱼 *Mesoclupea*; 杜恒儉(1950)曾初步报导过產自浙江寧海的新属新种——*Paraclupea chetungensis* 但尚未見到正式报告發表。

1955年,古脊椎动物研究室收到浙江回浦中学周質义同志寄來属于 *Paraclupea chetungensis* 鲱鱼化石三塊。

这一篇短文在寫作过程中,筆者得到刘憲亭先生的指導,楊鍾健、周明鎮、刘东生、朱元鼎、徐仁等先生的帮助,以及周質义、杜恒儉先生等的支持,筆者在此一并致謝。

目 *Isospondyli*科 *Clupeidae*属 *Paraclupea* Du, 1950

属的特征:中等深体形。体高約为全長的 $\frac{1}{3}$ 。具有背棱鳞和腹棱鳞。背棱鳞呈寬的心臟形,長度稍小于寬度。腹棱鳞为典型的鲱鱼型。脊椎数目 38 上下。肋骨細密,几乎圍繞胸腹腔。背鳍起点位于头枕部与尾基部之間的前三分之一处。腹鳍小,起点后于背鳍起点。臀鳍短,鳍条 12 上下。

属的成分: *Paraclupea* 只包括一种, *Paraclupea chetungensis*。

种 *Paraclupea chetungensis* Du

材料:新型标本,除背部未保存,腹部及尾部稍欠缺外,其余部分較完整,唯头部保存不好。标本编号 *V816*。其他参考标本兩塊 *V816.1*、*V816.2*。因为杜恒儉先生研究的 *Paraclupea chetungensis* 的正型标本已經遺失,只存有照片一張,可供参考。

* 1956年5月21日收到

產地：浙江臨海縣城西北約 18 公里山头何及嶺下陈，化石系由回浦中学学生所采集，詳細确切的地点不明。浙江寧海也產此类化石。

时代：下白堊紀。

描述：中等深体形。体長 66—92 毫米。体高約为全長之 $\frac{1}{3}$ 。头略呈三角形，头長約占全長的 $\frac{1}{4}$ 。眼圓形，位置靠上。下顎骨長度約占头長的 $\frac{1}{3}$ 。下顎与头骨接連处位于眼的前半部下方。上颌骨大。在顎骨上沒有發現牙齒，鰓盖骨略呈長方形。

身体腹部凸起，前后呈弧形。腹部邊緣自突起最大处顯著斜向后上方，至尾柄处，高度僅为最大体高的 $\frac{1}{5}$ 。腹緣有腹棱鱗，腹棱鱗从头后喉部一直連續到臀鰭前。腹棱鱗的大小，向后遞增。

背緣在背鰭起点处向上稍成一尖狀突起，尖端前后略成角度。从 V816.1 标本在头后枕部与背鰭起点之間見有被冲散的背棱鱗片。背棱鱗形狀为寬的心臟形，寬度較大于長度。（見圖 1）

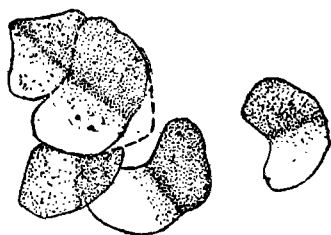


圖 1 *Paraclupea chetungensis* 的背棱鱗片(V816.1)

脊椎 38。体椎 22，尾椎 16。尾脊柱末端稍向上歪。肋骨細而密，共 22 对，几乎包圍胸腹腔。

背鰭位置較靠前，起点在头后枕部至尾基部之間的前三分之一处。背鰭鰭条 14—18。胸鰭位置高，鰭条 7—9。腹鰭很小，位于胸鰭和臀鰭起点之間的中部，腹鰭起点稍后于背鰭起点。臀鰭小，鰭条 12。尾深叉形。

討 論

1. 杜恒儉在訂这个屬名时，并未考慮到这类魚与 *Diplomystus* 屬和 *Knightia* 屬的关系，而只把它与 *Mesoclupea* 及 *Clupea* 作了比較，故命名为后鱗魚——*Paraclupea*。經過比較仔細的觀察后，發現这类魚与鲱魚屬 (*Clupea*) 有很大的区别。背棱鱗的存在使它接近于 *Diplomystus* 与 *Knightia* 这两屬。所以 *Paraclupea* 这个屬名是非常不恰当的。

2. Cope 在 1877 年把 Clupeidae 科中具有背棱鱗的一类归入一新屬——*Diplomystus*。以后他發現这一屬中根据背棱鱗的形狀可以分成兩組：一組長度大于寬度；另一組寬度大于長度，有时后緣有鋸齒形的缺刻。1907 年，Jordan 从 *Diplomystus* 中把前者分出一独立的屬，命之为 *Knightia*。Jordan 在提到兩者之間的区别时，除背棱鱗形狀以外，还有如下的区别：

	<i>Diplomystus</i>	<i>Knightia</i>
体形	深体形	较细长
鳞	鳞小, 60 排以上	鳞大, 35 排
臀鳍	长, 鳍条 30—40	短, 14
脊椎数目	41	35
口裂	倾斜	较不倾斜

1947 年 Schaeffer 在研究巴西的鱼化石时, 根据背棱鳞的形状对 *Diplomystus* 和 *Knightia* 的各种作了比较详细的系统关系研究。在提到 *Diplomystus* 属的特征 (Genotype: *D. longicostatus*) 时他把 *Diplomystus* 属的脊椎数列为 36, 臀鳍条数目列为 8。

Paraclupea chetungensis 的背棱鳞宽度较大于长度, 从这一点出发, 似乎应该把它归入 *Diplomystus* 属。但一般 *Diplomystus* 属各种的背棱鳞两翼伸展成翼状, 而且有的有很复杂的锯齿形后缘。如果根据 Jordan 所描述的两者之间的区别, 从臀鳍的大小来看, 应该归于 *Knightia* 属。但在另一方面它与 *Knightia* 在背棱鳞形状上也有区别; 从脊椎数目来说, 则处于两者之间 (*Knightia*, 36 以下; *Diplomystus*, 39 以上; *Paraclupea*, 38 上下)。所以从背棱鳞形状与脊椎数目来看 *Paraclupea* 正介于两者之间。

Paraclupea 在时代上与其他两者也有着区别。*Knightia* 属的时代不早于始新世或白垩纪上部; *Diplomystus* 属最早发现于上白垩纪, 而 *Paraclupea* 的时代则为下白垩纪*。

由以上看来 *Paraclupea* 可以独立成一属。

3. Schaeffer 曾提到过 *Diplomystus* 与 *Knightia* 属的共同祖先应该追溯到下白垩纪。*Paraclupea chetungensis* 的时代为下白垩纪, 而且从其本身来看, 背棱鳞形状的简单, 显然是一种原始的性质, 即从其体形和臀鳍的大小上来看, 也不如有些 *Diplomystus* 种类那样特化。因此这一类鱼可能接近于 *Diplomystus* 和 *Knightia* 的共同祖先, 是与主干很接近的一旁枝。

4. *Diplomystus* 属包括的种类较多, 特征也较复杂, 其共同特征似乎只有一点, 即背棱鳞宽度大于长度。从其他特征来看, 与 *Knightia* 之间很难区别。但是从 *Diplomystus* 属中各个种类来看, 根据背棱鳞的形状, 似乎又可以分为两类: 背棱鳞简单无复杂后缘的和背棱鳞复杂有锯齿形后缘的。Schaeffer 在系统分类图中也曾把 *Diplomystus* 分为二类, 其中有一类即包括 *D. brevissimus* 和 *D. longicostatus*, *D. goodi* 也

* 经徐仁先生对 *P. chetungensis* 同产出的植物化石的鉴定, 其中含有下白垩纪的 *Sphenolepidium* sp. 与 *Brachyphyllum* sp. 根据 *Paraclupea* 本身来看也存在着某种较原始的性质。

可能包括在这组内。从它们的背棱鳞形状上来看,是属于简单无锯齿形后缘的,与 *Paraclupea* 很接近。如果把 *Paraclupea* 的范围扩大,以背棱鳞长度小于宽度以及形状简单无锯齿形后缘列为它的特征的话,那末 *Diplomystus* 的这三种似乎也能归入 *Paraclupea* 这一属。除此以外,可能与脊椎数目较少(在 39 以下)臀鳍较短等特性相符合。但因手头文献所限,不能作肯定的结论。

5. 由以上看来, *Paraclupea*, *Diplomystus* 与 *Knightia* 这三属间有着系统发育上的紧密联系。从下白垩纪开始 *Paraclupea* 这类鱼向着两个方向发展。而且也可能这一大类鱼是从亚洲大陆分布出去的。它们的栖息地很广,在淡水、咸水,海水中均有,因此分布范围几乎到达了全世界。

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PARACLUPEA—A GENUS OF DOUBLE-ARMORED HERRINGS FROM CHEKIANG

SUN AI-LING

Laboratory of Vertebrate Paleontology, Academia Sinica

(Summary)

In China, the double-armored herrings was first found in Lin-Hai, Chekiang, belonging to the genus *Paraclupea* of the family Clupeidae. The generic name was proposed in a preliminary note by H. C. Du in 1950 (in Chinese), but the final report has not been seen yet.

Family Clupeidae

Genus *Paraclupea* Du, 1950

Genotype: *Paraclupea chetungensis*.

Diagnosis of genus: Moderately deep-bodied, body depth one third of the total length. With ventral and dorsal scutes. Dorsal scutes broadly cordate in shape, a little wider than long; ventral scutes as in the typical herrings. Vertebrae about 38 in number. Ribs thin and long, almost embracing the entire abdominal cavity. Pelvic fin small, its origin is behind that of the dorsal fin. Anal fin short, about 12 fin rays.

Paraclupea chetungensis Du

Figs. 1, Pl. 1, figs. 1-4

Material: Neotype, V 816. An almost complete skeleton, the dorsal border was not preserved. Skull bones indistinct. Cotypes: V816.1 and V816.2.

Locality and Horizon: Shao-Ty-Ho and Lin-Sha-Chin, 18 km N.W. of Lin-Hai, Chekiang Province. Lower Cretaceous.

Description: Moderately deep-bodied. Total length 66-92 mm. Head somewhat triangular, length about one fourth that of the total length. Eye round, situated at the upper part of the head. Maxilla large, no teeth was found. Operculum rectangular.

Ventral border moderately convex. Ventral scutes continued from the position of the throat to the origin of the anal fin. Size of the ventral scutes is larger toward the posterior.

An apex rises on the dorsal margin at the origin of the dorsal fin. From V816.1, there are some fragments of dorsal scutes, broadly cordate, slightly wider than long (fig. 1).

Vertebrae 38: abdominal 22, caudal 16. Ribs 22 pairs. Number of fin rays: dorsal, 14-18; pectoral, 7-9; anal, 12. Caudal fin deeply forked.

Discussion:

(1) The generic name, *Paraclupea* was proposed by H. C. Du without regarding its relationship to *Diplomystus* and *Knightia*. He only compared it with *Clupea* and *Mesoclupea*. Through the study of the new specimens from Lin-Hai, it is found that the presence of the dorsal scutes indicates that it is more closely related to *Diplomystus* and *Knightia*. Therefore, *Paraclupea* is not the proper name for the genus.

(2) The classification of double-armored herrings is mainly based upon the shape of the dorsal scutes which, in *Paraclupea* is a little wider than long. From this point of view, the Chekiang specimens seem to belong to the genus *Diplomystus*. But the dorsal scutes of the latter are more transversal, with two lateral wings and usually with pectinated posterior border. The dorsal scutes of *P. chetungensis* are very simple and without pectinated posterior border. It differs from that of *Knightia* in this respect, too. They are ovate and cordate, not wider than long in the latter genus.

According to Jordan (1907), the differences between *Diplomystus* and *Knightia* are also shown in the length of the anal fin, the number of vertebrae, etc. The number of vertebrae in *Paraclupea* is intermediate between the two. The length of the anal fin is like that in *Knightia*.

The geological age of *Paraclupea chetungensis* is older than the other two genera. It is of lower Cretaceous, confirmed by the presence of the fossil plants—*Sphenolepidium* sp. and *Brachyphyllum* sp. in association.

With these points of view, it is considered to represent a separated genus, of which the name *Paraclupea* of Du has the priority.

(3) It seems that the *Diplomystus* group may be divided into two sections: those in which the dorsal scutes have pectinated posterior border; and those in which the dorsal scutes are simple and have no pectinated posterior border. Schaeffer had divided the double-armored herrings into three phylogenetic trends, one of them includes *D. brevissimus*, *D. longicostatus* and possibly *D. goodi*. These are species with simple dorsal scutes, and very close to *Paraclupea*. If we extend this to consider that the characteristic feature of the dorsal scutes (wider than long, without pectinated posterior border) as the diagnosis of *Paraclupea*, then these three species of *Diplomystus* may well be grouped under the same genus.

(4) In his review of the classification and systematic relationship of the different species of the genera *Diplomystus* and *Knightia*, Schaeffer considered that the primitive ancestors of these two genera may be traced back to lower Cretaceous. In view of the primitive character of the shape of the dorsal scutes, its earlier geological age, *Paraclupea* may be closer to the group from which all the other double-armored herrings had derived.

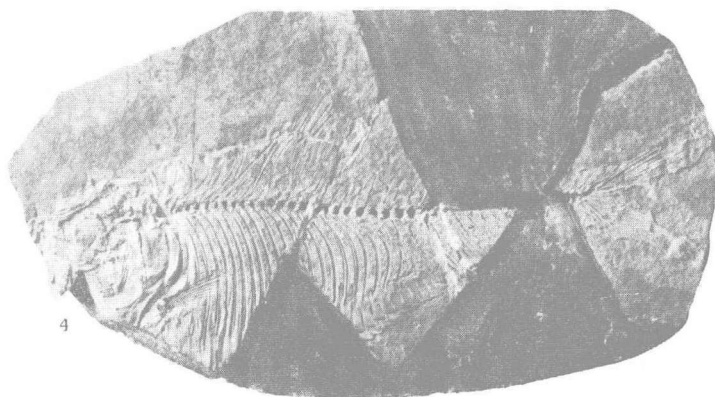
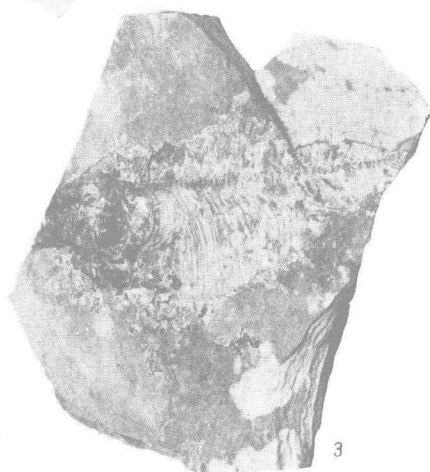
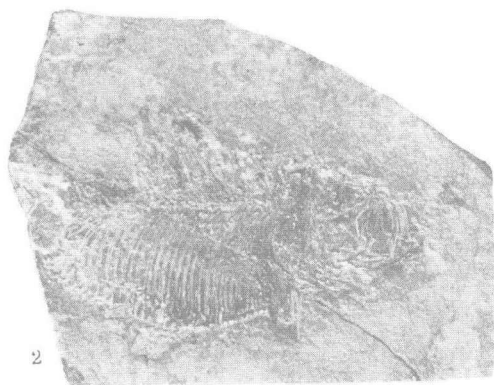
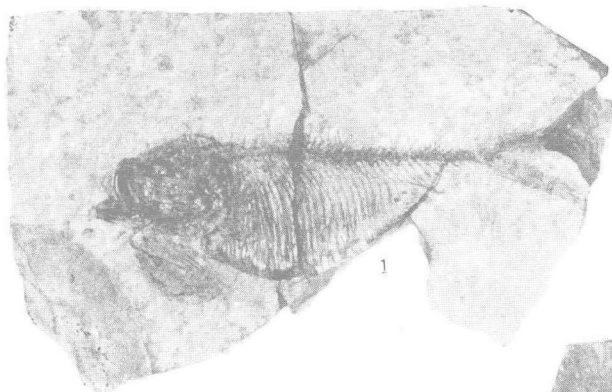


圖 版 說 明

Paraclupea chetungensis Du.

圖 1. 左側視, 原大 (古脊椎室編號 V. 816)

圖 2. 右側視, 原大 (V. 816.1)

圖 3. 左側視, 原大 (V. 816.2)

圖 4. 左側視, 原大, 此系杜恒儉在訂新屬新種時所根據的正型標本的照相, 因原標本已遺失, 本文圖版由照片翻印