

云南曲靖附近胴甲鱼 (Antiarchi) 化石

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云南曲靖附近产 Antiarchi 化石早有报导,然而关于古生物描述方面的文章迄今未见发表。1961 年作者自曲靖附近廖角山¹⁾山麓采得鱼化石甲片若干,其中有两块属星鳞鱼目 (Asterolepiformes) 的头甲保存完好,初步鉴定系一新属新种 (*Yunnanolepis chii* gen. et sp. nov.)。该项发现对了解该类鱼化石在我国西南地区的分布和对云南泥盆纪鱼化石的研究是颇有意义的,故记述于此。

本文承刘东生、刘宪亭两位先生指导,作者深为感谢。王哲夫先生、沈文龙同志分别代为摄影绘图,亦于此向他们致谢。

新 种 记 述

胴甲鱼纲 Antiarchi

星鳞鱼目 Asterolepiformes

科 Pterichthyodidae?

属 *Yunnanolepis* Liu 新属 (gen. nov.)

属型 *Yunnanolepis chii* Liu 新种 (sp. nov.)

特征: 头甲呈六边形。前缘凸出,侧缘较短,关节缘 (obstantic margin) 长,且对着后侧方。中颞片呈皇冠状,伸长,长与宽之比率达 0.9。中颞片不与眼孔接触。后缘片位置较向前移,其后侧角远离头甲后缘。侧片略呈六边形。眼孔小,较接近头甲前缘。耳枕凹较窄而浅。眶后嵴通过后松果片,而不伸向中颞片。

种 计氏云南鱼 *Yunnanolepis chii* Liu 新种

(插图 1; 2; 图版 I)

特征: 见属的描述。

材料: 一个腹面保存完好的头甲及其印模,古脊椎动物与古人类研究所登记号 V.2690.1; V.2690.2。

产地及时代: 云南曲靖城西南约 1 公里廖角山北坡,早泥盆世。

头甲的一般描述: 头甲保存很完整,腹面呈六边形,长 37 毫米,宽 53.6 毫米,长与宽之比为 $37.0/53.6 = 69.4\%$ 。

1) 该山以其附近居民以廖姓者居多得名,“角”当地读音作 guo, 以前被地质工作者误称为“妙高山”乃音讹之故。

两前侧角间的吻缘 (rostral margin) 向前突, 无缺刻。吻缘短于后缘。

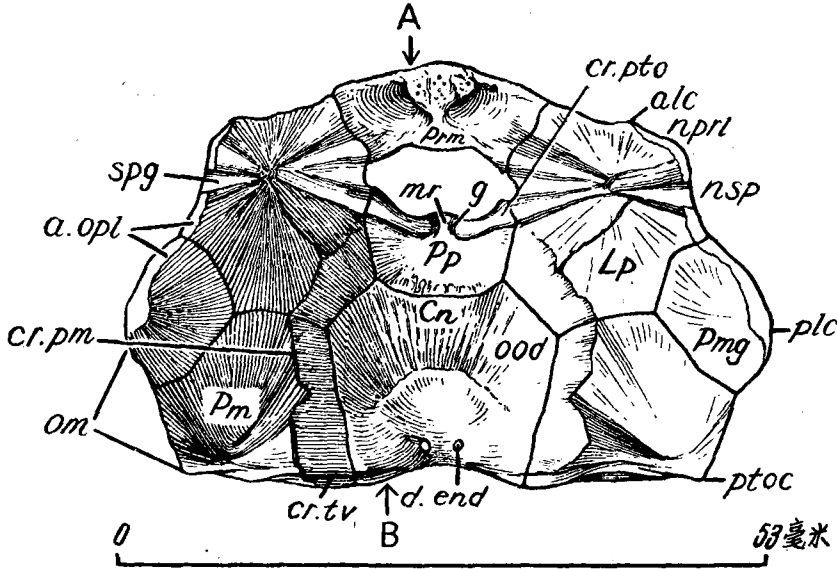


图1 *Yunnanolepis chii* gen. et sp. nov. 头甲腹面观 V. 2690.1

al——前侧角; a. opl——外侧区; Cn——中额片; cr. pm——耳枕凹侧缘嵴; cr. pto——眶后嵴; cr. tv——横额嵴; d. end——内淋巴腹孔; g——后松果片腹沟; Lp——侧片; mr——后松果片腹突; nprl——前侧刻; nsp——上喷水刻; om——头甲关节线; ood——耳枕凹; plc——后侧角; Pm——副额缘片; Pmg——后缘片; Prm——前中片; Pp——后松果片; ptoc——头甲后关节角; spg——喷水沟。

侧缘 (lateral margin) 较短, 如同 *Bothriolepis*: 与头甲的长和宽比, 所占比率小。上喷水突 (supraspiracular process) 不如 *Bothriolepis* 发育, 因此上喷水突之前的前侧凹 (prelateral notch) 和上喷水突之后的上喷水凹 (suprespiracular notch) 不十分显著。喷水沟 (spiracular groove) 在上喷水突略后, 较短, 不及下眼孔至头甲侧缘距离之半, 该沟远侧端宽于近侧端。沿着整条侧缘腹面分别为前侧片和外侧片固着的关节面, 即前侧区 (prelateral area) 和外侧区 (extralateral area), 狭窄, 但极清楚。

关节线 (obstantic margin) 也如同 *Bothriolepis* 那样, 在比例上显著地长于 *Pterichthyodes*, *Gerdalepis*, *Asterolepis* 以及 *Sinolepis* 和 *Remigolepis*, 略内凹, 向后中倾斜, 对着后侧方, 而不呈倒 V 字形。

后缘 (posterior margin) 由头甲腹面观察中部略凹, 但是从头甲的纵断面 (图 2) 可以看到头甲背面于后缘显著向后伸展, 因此, 如果从背面观察, 后缘可能是直的或者略向后突。

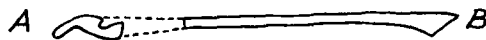


图2 *Yunnanolepis chii* gen. et sp. nov. 通过眼孔的纵切面

在本文描述的标本中, 头甲腹面保存得很完好。下眼孔 (suborbital fenestra) 很小, 并且从头甲的横断面可以看出下眼孔略小于眼孔。由下眼孔中心至头甲前缘之距短于至头

甲后缘之距, 其比率前者为后者的 40%。下眼孔中轴长为 5.5 毫米, 与头甲长之比为 $5.5/37.0 = 14.8\%$; 下眼孔横轴长为 13.3 毫米, 与头甲宽之比为 $13.3/53.6 = 25\%$ 。

眶前凹 (preorbital recess) 由头甲纵断面观察, 仅略发育。

耳枕凹 (otico-occipital depression) 为在下眼孔之后, 头甲腹面的大而低的凹区。该凹区浅而窄, 范围在上底眶感觉沟之内, 其宽与头甲宽之比所占比率小, 为 54%。耳枕凹主要部分在下眼孔之后, 其一对前侧角在本文描述的标本中不甚清晰, 似乎不很发育, 颇类似 *Remigolepis* 的情况。范围耳枕凹前缘的眶后嵴 (Postorbital crista) 紧临下眼孔后缘, 将耳枕凹与下眼孔分开。该嵴隆起较高而宽, 几乎是横平的, 因此向后中伸入后松果片, 而不到达中颞片。在两条后眶嵴之间具一小的突起, 形成后松果片的中隆起 (median elevation)。在该突起的两侧各有一条短而浅的小沟 (g), 沟通耳枕凹和下眼孔。范围耳枕凹侧缘的侧缘嵴低而且近于与头甲顶板垂直, 只有在耳枕凹侧角以后的部分显著高于甲片基准面。范围耳枕凹后缘的后缘嵴接近头甲的后缘。耳枕凹的后部, 中颞片之下, 具清楚的上耳隆起 (supraotic thickening)。隆起由后而前逐渐减低、变窄, 前部表面粗糙, 呈海绵状, 为不连续的向前辐射的疣突。后部隆起较高; 呈三角形的台。穿过中颞片的内淋巴管内孔 (internal openings of canal for ductus endolymphaticus) 可以清晰地观察到, 其前内侧为半月形的嵴包围。

前中片的腹面中部具一纵行隆起, 由头甲前缘伸延至下眼孔后缘, 此隆起两侧各具一深的横沟。

甲片描述: 前中片 (premedian plate) 呈四边形, 宽大于长, 其长与宽之比率为 52.4%。前缘宽于后缘。前缘较薄, 中部前突。侧缘与侧片相邻, 稍向后中契合, 中部略凸。后缘形成眼孔前缘, 基本上向前凹, 但中部略向后凸。

侧片 (lateral plate) 形状大致呈不规则的六边形。前缘略凹构成头甲前缘的侧部。侧缘构成头甲侧缘前部, 前部突出为上喷水突, 后部略凹, 形成喷水凹, 是喷水孔向外开口处。除喷水孔开口处外, 沿着整条侧缘腹面为前侧片和外侧片固着的光滑而狭窄的关节面。内缘前部分与前中片, 后部分与后松果片接触, 此两部之间为一小的缺刻, 形成眼孔的侧缘。后缘分为三部分, 外侧部分与后缘片相邻, 中部与副颈缘片相邻, 内侧部分与中颞片相邻。由于眼孔所占比率小, 侧片相应地增宽, 于后眶角至前后缘角 (anterior post-marginal corner) 间最宽, 为 17.5 毫米, 前中角至后角间长为 19.8 毫米, 其宽与长之比率为 $17.5/19.8 = 88\%$ 。其宽与头甲宽之比为 $17.5/53.6 = 33\%$ 。

后松果片 (postpineal plate) 位于眼孔与中颞片之间, 呈四边形, 较长, 但宽大于长。前缘略凹, 而中部稍向前凸, 构成眼孔后缘。侧缘与侧片相邻, 略向后中契合。后缘与中颞片相邻, 略凸, 几乎近于平直。

中颞片 (centro-nuchal plate) 呈皇冠状, 由于眼孔小且位置前移, 中颞片显著引长, 其长为 17.8 毫米, 宽为 19.8 毫米, 长与宽之比为 $17.8/19.8 = 89.5\%$ 。

中颞片可分为六条边缘; 前缘与后松果片相邻, 略向后凹, 但不形成深的内角。侧缘由侧角分为前侧缘和后侧缘两部分, 自侧角分别向前中和后中契合。前侧缘与侧片相邻, 显著短于后侧缘。后侧缘与副颈缘片相邻, 较直, 近后端无明显向内收缢的缺刻。后缘中部向前凹, 但从纵断面上观察, 后缘如由背面视, 可能平直或略向后凸。

副頸緣片 (paranuchal marginal plate) 呈五边形, 在头甲上所占比率较大。前緣略凸, 与側片相邻。側緣略凹, 与后緣片毗連。內緣最长, 較直, 与中頸片相邻。关节緣 (obstantic margin) 形成头甲关节緣的后部, 与 *Bothriolepis* 除外的 *Antiarchi* 各属比較, 相对的长, 对着后側方。后緣构成头甲后緣的外側部分。

后緣片 (postmargina plate) 近于菱形。前緣与側片相邻, 略凸, 同后緣約等长。中緣 (內) 与副頸緣片相邻, 与側緣約等长且近于平行, 长于前緣。側緣构成头甲側緣的后段, 略凸, 沿着側緣腹面为狹窄的关节面, 为外側片固着处。后緣构成头甲关节緣的一部分, 对着側后方。

由于头甲背面为岩石掩盖, 仅一小部分出露, 紋飾由极細小的疣突組成, 这些小突起既无彼此愈合的現象, 也不成有規律的排列。

关于感觉沟系統还不清楚, 但是出露出来的上底眶感觉沟, 位置相当向中軸綫靠近。

比較討論: 头甲的一般形态特征以及后緣片的存在, 本文描述的云南标本显然属于星鱗魚形目。

与星鱗魚形目中已知属的比較, 本文所記述的标本眼孔比較小并且位置靠近头甲前緣, 因此, 中頸片相应的引长, 側片展寬 (參見表 1)。

本文所描述标本的头甲形态特征以及发育的头甲关节緣与 *Bothriolepis* 极其相近。但是, 由于中頸片不伸达眼孔而不同于后者, 这一重要特征与 *Bothriolepis* 的不同, 排除了

表 1 計氏云南魚和星鱗魚形目不同属的头甲測量以及眼孔、中頸片、側片的长/寬比率
Table 1. Measurements and length/width ratio of the orbital fenestra and centro-nuchal plate and lateral plate of *Yunnanolepis chii* and various forms among the *Asterolepiformes*.

	头甲眶前区长 头甲眶后区长	中頸片长度 中頸片寬度	头甲寬 眼孔寬	側片最大寬度 側片最大长度	备 注 After
	Length of preorbital division of head	Length of centro-nuchal plate	Width of head orbita fenestra	Maximum width of lateral plate Maximum length of lateral plate	
<i>*Yunnanolepis chii</i>	$\frac{10.5}{26.5}=0.40$	$\frac{17.8}{19.8}=0.90$	$\frac{53}{13}=4.1$	$\frac{17.5}{19.8}=0.88$	V. 2690
<i>Bothriolepis canadensis</i>	$\frac{14.4}{15.2}=0.95$	$\frac{12}{20}=0.6$	$\frac{51}{15}=3.4$	$\frac{19}{27}=0.7$	Stensiö R. H. 1948, fig. 127
<i>Pterichthyodes milleri</i>	$\frac{9}{10.5}=0.86$	$\frac{7}{13}=0.54$	$\frac{28}{12}=2.3$	$\frac{6}{14}=0.4$	Traquair, R. H. 1894, fig. 37
<i>Gerdalepis rhenana</i>	$\frac{7.2}{27.3}=0.25$	$\frac{17}{27}=0.7$	$\frac{51}{28}=1.8$	$\frac{14}{26}=0.54$	Gross, 1941 fig. 7
<i>Asterolepis maximes</i>	$\frac{6.7}{11.7}=0.57$	$\frac{8}{13}=0.6$	$\frac{30}{12}=2.5$	$\frac{7}{14}=0.5$	Traquair, R. H. 1894, fig. 34
<i>Sinolepis macrocephala</i>	$\frac{12.2}{27.2}=0.45$	$\frac{2}{3}=0.66$	$\frac{55}{11}=5$	$\frac{9}{8}=1.12$	Liu, T. S. 1958, fig. 5

* 除 *Yunnanolepis chii* 的測量是依据头甲腹面外, 其余各种皆依据头甲背面。Measurements are took from ventral side of head shield.

所描述标本属于 *Bothriolepidae* 的可能性。

在后松果片、中颞片的特征方面与 *Asterolepis*, *Pterichthyodes*, *Gerdalepis* 和 *Sinolepis* 頗相近, 但是諸如六边形的头甲, 后緣片位置远向前移等特征, 明显地不同于后四个属。

根据以上所述, 本文所描述的标本显然为 *Asterolepiformes* 中一新的类型, 作者訂名为 *Yunnanolepis chii*, gen. et sp. nov., 因該魚化石首次发现于云南省, 种名为紀念最早描述我国泥盆紀魚化石的已故古生物学家計荣森先生。

Yunnanolepis 在 *Asterolepiformes* 已知种类中代表着原始的一类, 本文虽将其列入 *Pterichthyodidae* 中, 但只是暫时的, 关于其确切系統位置留待以后討論。

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ON THE ANTIARCHI FROM CHUTSING, YUNNAN

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It was reported long time ago that in neighborhood of Chutsing, Yunnan the Siluro-Devonian bed yielded fishes. But up to the present no palaeontological description of this fauna has been published. In 1961, the author collected some fish plates from Liao-jiaoshan (previously mistaken for Miaokaoshan by V. K. Ting and Y. L. Wang) near the Chutsing city. Among them two well preserved head shields in ventral side belong to the *Asterolepiformes*. A preliminary study of the material shows that these shields may represent a new form of the *Pterichthyodidae* (?). A new genus and species (*Yunnanolepis chii* gen. et sp. nov.) was established. This discovery increases our knowledge about the distribution of the pterichthyodid fish in southwestern China, and may also throw some

light on the study of the Devonian fishes in Yunnan. A brief description is given below.

Order Asterolepiformes

Family Pterichthyidae (?)

Genus *Yunnanolepis* Liu (gen. nov.)

Genotype *Yunnanolepis chii* Liu (gen. et sp. nov.)

Diagnosis: An Asterolepiformid fish. Head shield hexagonal in shape. Anterior margin of the head shield convexed medially, lateral margin rather short. The obstantic margin long and directed postero-laterally. The centro-nuchal plate crown-shaped, greatest length and width ratio reaches 0.9. The centro-nuchal plate is completely bounded off from orbital fenestra by reduction of its lateral wings of the anterior margin. The postmarginal plate situated more forward and the postero-lateral corner of this plate shifted to a more anterior position from the posterior margin of shield. The lateral plate hexagonal in shape, much shortened due to the lengthening of the centro-nuchal plate. The orbital fenestra small, situated nearer to the anterior margin of the shield. Otic-occipital depression narrow and shallow. The postorbital crista reaching the postpineal plate and not to the centro-nuchal plate.

Yunnanolepis chii Liu (sp. nov.)

Material: A complete head shield preserved ventrally and its mould, Cat. No. V.2690.1, V.2690.2.

Horizon and Locality: Lower Devonian; Liaojiaoshan, about 1 km west of the city Chutsing, Yunnan.

Diagnosis: As that for genus.

General description of the head shield.

The head shield is well preserved, with its ventral surface exposed. Its general outline in ventral aspect is fundamentally six sided as that of *Bothriolepidae* (*Bothriolepinae* and *Microbrachinae*), differed from the nearly four-sided head shield of *Pterichthyodes*, *Gerdalepis*, *Asterolepis* and *Remigolepis* & *Sinolepis* (Stensiö 1948, Liu et P'an 1958). The length of head shield is 37 mm, breadth is 53 mm.

The unpaired rostral margin bounded on each side by antero-lateral corner (alc). This margin is strongly convex instead of notched. It is shorter than the posterior margin.

The lateral margin as that of *Bothriolepis* is short in proportion to the length and breadth of the head shield. The supraspiracular process is not as developed as *Bothriolepis*, and consequently the prelateral notch (nprl) and the supraspiracular notch (nsp) are not very indistinct. The spiracular groove which situates a little behind the supraspiracular process is well observed. The prelateral area and the extralateral area (a.opl) are narrow and indistinct throughout their length.

The obstantic margin (om) is also similar to that of the *Bothriolepis* but much longer than that of *Pterichthyodes*, *Gerdalepis*, *Asterolepis*, and *Remigolepis* or *Sinolepis*.

The posterior margin as observed from the ventral side of the shield is slightly concave at the medial portion. From the section of the head shield (fig. 2), it show that

the dorsal surface at the posterior margin is much extended towards behind, therefore the posterior margin might be straight or somewhat convex on dorsal aspect.

The lower (internal) side of the shield is well displayed in this specimen. The suborbital fenestra is small and situated much anterior on the shield. The distance from the center of suborbital fenestra to anterior margin of the shield is shorter than that to posterior margin, being 40% of that length. The length of medial axis of suborbital fenestra to that of head shield ratio is 14.8%, while the breadth of suborbital fenestra to that of the shield ratio is 25%.

The preorbital recess as observed from the section of the shield, is slightly developed.

Posterior to the suborbital fenestra beneath the lower side of head shield a larger depression known as the otico-occipital depression (ood) is observed. This depression is shallow and considerably narrow in proportion to the breadth of head shield as in *Bothriolepis*. It is situated chiefly behind the suborbital fenestra; no distinct paired antero-lateral corner can be observed from this specimen. The otico-occipital depression lies mainly underneath the postpineal and centro-nuchal plate, but also underneath part of the lateral and paranuchal plate adjoining to centro-nuchal plate. The depression just mentioned is mainly like centro-nuchal plate in shape, but proportionally larger than the plate. The postorbital crista (or.pto), by which the anterior margin of otico-occipital depression is bounded anteriorly, is strikingly high and broad. This crista is almost transverse therefore, postero-medially it passes to the anterior margin of postpineal plate. The paramarginal crista is low and descends mainly vertically from the skull roof. The transverse nuchal crista (cr.tv) is very near the posterior margin of head shield and medially concave. On the postero-medial part of otico-occipital depression the supraotic thickening which is situated beneath the ventral side of the centro-nuchal plate is rather clear. The posterior part of this thickening is triangular in shape. The internal openings of canal for ductus endolymphaticus through centro-nuchal plate (d.end) are well displayed in the specimen.

Between the postorbital crista there is a small protuberance, which forms the median elevation of postpineal plate (mr). On either side of the elevation there presents a shallow groove (g), which communicates with orbital fenestra anteriorly.

On the median part of ventral face of premedian plate there is a rostral elevation extending from the anterior margin of the suborbital fenestra to the very anterior margin of the premedian plate. By either side of the elevation there is a transverse deep groove underneath lower face of premedian plate.

In this specimen the dorsal side of head shield is embedded in the matrix, only very small area has been exposed for observation. From the exposed area the ornament is composed of minute tubercles which appears to be scarcely fused with each other or arranged in any direction.

The sensory canal system is very imperfectly known. However, the posterior part of the upper infraorbital sensory canal groove is disclosed. It is situated comparatively medially.

Comparison and Discussion: From the general characteristics of the head shield and the presence of the postmarginal plate on the above described specimen, it is evidently a form of the *Asterolepiformes*.

A comparison of this specimen with the better known genera of *Asterolepiformes* shows that the orbital fenestra of this form is rather small and situated much nearer to

the anterior margin of head shield. Consequently the centro-nuchal plate is lengthened, and the lateral plate is widened.

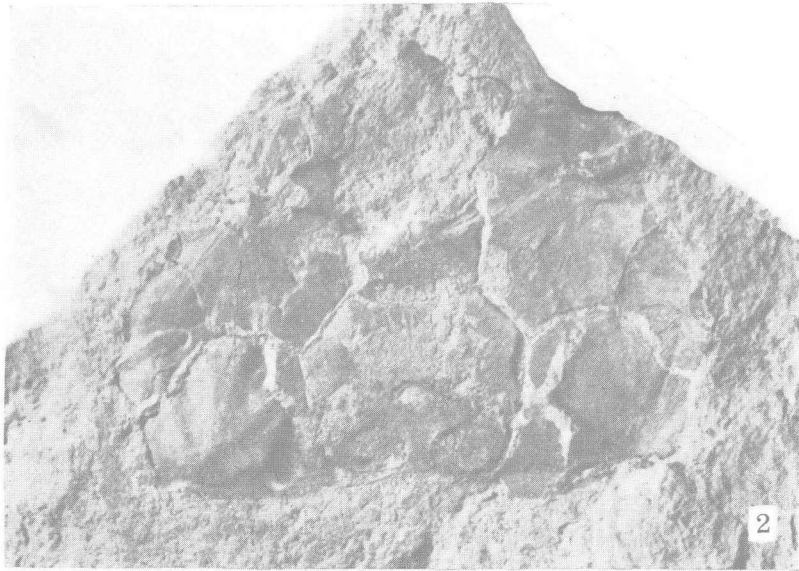
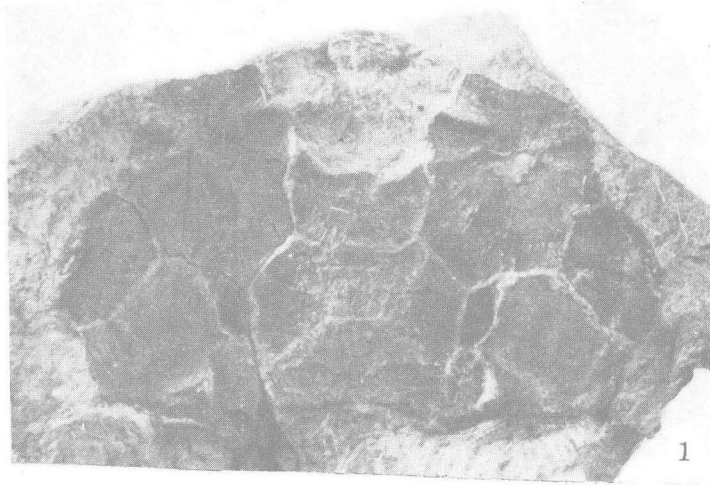
From the measurements (see Table 1) it is evident that the here described specimen obtained a rather larger length/width ratio of the centro-nuchal plate.

This form greatly resembles *Bothriolepis* in generally characteristics of the head shield and the well developed obstantic margin, but it differs from *Bothriolepis* by that the centro-nuchal plate does not reached the orbital fenestra. From this important feature, the possibility, the here described form to be a *Bothriolepidae* is excluded.

The form of the postpineal plate and the centro-nuchal plate of the here described form though similar to that of the *Asterolepis* and *Pterichthyodes Gerdalepis* and *Sino-lepis* but it differs from the latter forms by quite distinct characteristics, such as the six sided outer margin of the head shield, and the much forward position of the postmarginal plate.

Therefore it is evident the here described specimen is a new form among the *Asterolepiformes*. A new genus *Yunnanolepis* is proposed. The genus name is to Yunnan province, where the fish is first discovered, and the species name *chii* is in memory of Mr. Chi Yung-sen, Chinese palaeontologist who first dealt with Devonian fishes.

However, the *Yunnanolepis* is a rather primitive form among the known formes of *Asterolepiformes*, here is temporarily placed to *Pterichthyodidae*.



1) *Yunnanolepis chui* gen. et sp. nov. 头甲腹面视 V.2690.1 \times 1.5。

2) *Yunnanolepis chui* gen. et sp. nov. 头甲腹面印模 V.2690.2 \times 1.5。