

# 陝西、云南早寒武世的古介形虫(續志)<sup>1)</sup>

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自从“陝西、云南早寒武世的古介形虫”和“关于我国的古介形虫”两文发表以后,由于一些同志们的注意和采集,使我又掌握并触及不少的完好标本,从而对于开展这一方面的工作获得较好条件。在对这些标本进行了仔细鉴定,并与世界各地所产加以比较后,不仅看出我国这一动物群的丰富程度和独特性质,更重要的是逐渐了解它所具有的准确层位和广泛的地理分布。

这篇论文包括的材料,按照分类系统来看,有的和以前所描述的近似甚至相同,有的却属于一个新的范畴。Alutidae 这个旧科中增添了一个新属 (*Kunyangella*), 而 *Kunmingella* 这个旧属,除了含有一个旧种,还增添了两个新种。此外,另创立了一个新科,作者命名为 Sunelidae, 这个新科根据壳的成分、形相、大小、共生关系和缺乏附肢,应属于古介形虫这个亚纲。可是这个新科很难纳入已有的各个目内,尽管这个新科与有突虫目 (*Ceratiocarina*) 和背板虫目 (*Rhinocarina*), 保持着一定关系。作者认为在材料充足和条件成熟的情况下,可以考虑建立一个新目。

如将先后建立的两科加以综合,不难想到在描述新的属种、校正旧的(前人所定)属种和奠定分类基础等方面,作了一些粗浅的工作;但就我国拥有的丰富材料来看,则感距离很远。因此,在国内各个产地(包括已知和未知的),首先在西南地区进行系统、大量的采集与深入、细致的研究,便成为必要而急迫的任务。目前,四川已有一些产地,贵州也有某些线索,而桂北更有很大的希望,清溪组是值得注意和探求的对象。

描述的化石系采自下寒武统的下部,根据目前掌握的一些事实来看,这是前尖虫科集中分布的一个层位,但本层可能分为不少的古介形虫带。探明上述情况,必须进行准确的编录,并在这个基础上作出不同属种的描述。这就不仅获得它们的层位关系,也会逐渐了解相互之间的演化关系。

标本来源虽仍局限于陕、滇二省,但却增添了许多新的地点。值得重视的是:云南的几个产地,显然具有同属、甚至同种的化石,而陕南和滇东也有非常接近、或者相同的属种。如果能在我国南部开展广泛的采集与研究,一定会在各地找到许多相同的东西,这对利用古介形虫对比地层,将起很大的作用。至于我国北部,按照目前提供的化石线索,寒武系上部甚至早古生代地层中,都有发现更多层位的可能。

1) 1964年3月17日收到

**甲壳綱 Crustacea****古介形虫亞綱 Archaeostraca Stromer****高肌虫目 Bradorina Raymond****前尖虫科 Alutidae Huo****昆明虫属 *Kunmingella* Huo*****Kunmingella douvillei* (Mansuy)**

(图版 I, 图 1)

1912 *Bradoria douvillei* Mansuy, Mem. Serv. Geol., L'Indochine, Vol. 1, p. 22, pl. 1, fig. 8.1931 *Aluta douvillei* (Mansuy), Ulrich and Bassler, Cambrian Conchostraca, p. 61, pl. 4, fig. 17.1956 *Kunmingella douvillei* (Mansuy), Huo, Acta Palaeontologica Sinica, Vol. 4, No. 3, 1956, p. 436, pl. 2, figs. 10—13.

**描述:** 只有一个标本, 而保存甚佳。壳的大小为中等, 呈斜而尖的次卵圆形, 铰合綫远較壳长为短, 与前边构成  $90^\circ$  的交角, 前边略为直綫, 伸至壳高的三分之二处而止, 腹边成长暢之曲綫, 后边平緩, 与铰合綫相遇而成  $125^\circ$  的交角。壳面凸出度較強, 脊状突起綫將铰合綫的两端連接起来。前瘤頗大, 受磨損而形状不清; 后瘤很长, 其頂部为壳的最高峯。前瘤与后瘤間有凹陷存在。各自自由边都有显明的边緣圍繞, 边緣稍高, 且頗均匀。壳为褐灰色, 在高倍放大鏡下呈斑状。

这个仅有的标本, 可度量部分如下: 长度为 3.7 毫米, 最大长度为 4 毫米, 高度为 2.1 毫米, 铰合綫为 3.1 毫米, 一瓣厚度为 1 毫米。

**特征:** (1) 壳的大小为中等, (2) 呈斜而尖的次卵圆形, (3) 脊状突起綫將壳的两端連起, (4) 前瘤与后瘤均甚显著, (5) 两瘤之間有一凹陷。

**产地及层位:** 云南昆阳下寒武统筇竹寺阶。

标本号碼: 0001。

***Kunmingella intermedia* 新种**

(图版 I, 图 2—4)

**描述:** 三个标本出現于同一层面上, 一个完整清楚, 其余較差。壳的大小介于 *Kunmingella parva* 与 *K. douvillei* 間; 壳的形状为半椭圆形与次卵圆形的过渡类型, 这反映于三个种长度与高度的比值, *Kunmingella parva* 为 1, *K. douvillei* 为 1.7, 而 *K. intermedia* 則位于其間 (1.4)。铰合綫較壳长稍短, 平直, 与前边相遇构成約为  $90^\circ$  的交角, 因标本保存不全, 实际看的不够清楚。前边近于直綫, 伸至壳高的五分之三处而止, 腹边为一弯度不大的曲綫, 后边略成直綫, 較前边稍长, 微向后斜, 后背角約  $105^\circ$ 。壳面凸出度不很显著, 脊状突起綫由平坦的边境而緩慢的升起。前瘤为圆形, 內有一小圓球, 反映了眼的位置和大小, 生于前背角的尖端。后瘤很长, 約为铰合綫的二分之一強, 铰合綫与后瘤成  $50^\circ$  的交角, 此瘤向前下方伸展, 前端稍大, 并为壳面的高峯。后瘤的前面为一寬闊而平緩的凹陷。各自自由边均有边緣圍繞 (前部边緣保存不全), 边緣窄而凸出, 发展均匀。壳为黃褐色, 高倍放大鏡下呈斑状。

三个标本中仅有一个較为完整, 其可度量部分数据如下: 长度为 3 毫米, 最大长度为

3.2 毫米,高度为 2.1 毫米,铰合綫为 2.7 毫米,一瓣厚度为 0.5 毫米。

**特征:** 此种所具特点如下: (1) 壳較 *Kunmingella parva* 为大,但較 *K. douvillei* 为小, (2) 壳形为半椭圆形与次卵圆形間的过渡类型, (3) 脊状突起綫緩慢的升起, (4) 前瘤圆形,且頗显著, (5) 后瘤很长,与铰合綫相遇而成  $50^\circ$  的交角, (6) 两瘤間有一寬緩的凹陷, (7) 壳瓣厚度很小。

**产地及层位:** 云南昆阳下寒武統筇竹寺阶。

标本号碼: 正型 0002, 副型 0003, 0004。

### *Kunmingella sui* 新种

(图版 I, 图 5)

**描述:** 只有一个右瓣的内面,近于完整。体稍小,壳形前尖后鈍。铰合綫平直,远較壳长为短,与前边相遇构成  $90^\circ$  甚至更大的交角。前边略为直綫,伸至壳高的半处而止;腹边前緩后陡,甚不一致;后边頗直,显然較前边的长度为大,后背角約为  $120^\circ$ 。壳面凸出度較強,脊状突起綫緩慢升起。前瘤位于前端,頗长,延展方向約与前边平行。后瘤极为显著,长約铰合綫的二分之一強,后瘤与铰合綫略成直角,随即稍現弯曲。后瘤的頂部为整个壳面最高的地方。前瘤与后瘤間有一寬緩的凹陷。各自由边均有凸出而均匀的边緣圍繞。壳为深灰色,高倍放大鏡下呈斑状。

这个唯一的标本其可度量部分数据如下: 长度为 2.7 毫米,最大长度为 3.1 毫米,高度为 2 毫米,铰合綫为 2.4 毫米,一瓣厚度为 1 毫米。

**特征:** 此种特点如下: (1) 为該属各种中較小的一种, (2) 铰合綫远較壳长为短, (3) 后摆显著,体形頗斜, (4) 后瘤頗长且稍弯曲。

**产地及层位:** 云南昆阳下寒武統筇竹寺阶。此种系因采集化石的苏德英先生而得名。

标本号碼: 全型 0005。

### *Kunyangella* 新属

**描述:** 壳长为一毫米,呈次卵圆形。铰合綫平直,較壳长为短,前背角稍大于  $90^\circ$ ,后背角則为鈍角。壳面凸出度頗強,后背部最高。仅有一个瘤子,頗大,靠近铰合綫,瘤的底边与铰合綫略相平行。

**属型:** *Kunyangella cheni*, 新种。

**特征:** 此属只有一个瘤子,靠近铰合綫,与他属极易区别。

### *Kunyangella cheni* 新种

(图版 I, 图 6)

**描述:** 此种仅借一瓣的内面而說明。体小,呈次卵圆形。铰合綫較壳长为短,平直,与前边相遇构成大于  $90^\circ$  的交角。前边近于直綫,甚短,只有壳高的五分之一,腹边为一很长的弧綫,前緩后陡,后边为一不长的直綫,后背角为  $150^\circ$ 。壳面凸出度頗強,后背部最高。后瘤略为一不等边的三角形,底边約与铰合綫平行。各自由边均有边緣圍繞,但发

展不均,前部及腹部边缘似稍宽。壳为黄褐色,高倍放大镜下略呈斑状。

这个唯一的标本,其可度量部分数据如下:长度为1.7毫米,最大长度为2毫米,高度为1.4毫米,铰合线为1.3毫米,一瓣厚度为0.5毫米。

**特征:** 此种特点如下:(1)体小,呈次卵圆形,(2)铰合线较壳长为短,(3)后背角很大,(4)后瘤颇大,且呈三角形,底边略与铰合线平行。

**产地及层位:** 云南昆阳下寒武统筇竹寺阶。此种系因陈澍业先生而得名。

标本号码:全型 0006。

### 梁山虫属 *Liangshanella* Huo

#### *Liangshanella chiehi* Huo

(图版 I, 图 7)

1956 *Liangshanella chiehi* Huo, Acta Palaeontologica Sinica Vol. 4, No. 3, p. 428, pl. 1, fig. 4.

**描述:** 只有一个标本,壳的大小为中等,呈斜而尖的半椭圆形,前部稍有残缺,后部广阔圆滑;铰合线颇短,后背角小而不清,前边似成直线伸至高度的半处而止,腹边为一长缓的曲线达到壳的后端,通过一个钝角转变而为后边,后边短而直,与铰合线相交而成 $140^\circ$ 的后背角。壳面凸出度不大,以靠近中央处为最高,整个壳面没有任何的瘤子、凹陷或脊状突起线。边缘宽而高起,发展较为均匀。壳为黄褐色,高倍放大镜下稍现斑状。

这个标本的可度量部分数据如下:长度为3.7毫米,最大长度为3.8毫米,高度为2毫米,铰合线为2.8毫米,一瓣厚度为0.7毫米。

**特征:** 此种具有壳低,铰合线较短,后背角较大及边缘宽而均匀等特点。

**产地及层位:** 云南昆明太平村东北路上,下寒武统页岩中。

标本号码:全型 0007。

### 系统位置不定的古介形虫

隶于古介形虫亚纲但分类位置尚未确定者有下列的孙氏虫科(Sunellidae),这科的化石按壳质系含有磷酸钙的几丁质、两瓣对称(或近于对称)、与前尖虫科的化石一起出现、未见附肢以及壳不很大这些特征来看,应该属于古介形虫亚纲。这科与同足亚纲的Hymenocarina目在形态上有相似处,但壳一般较后者为小,且无附肢,所以包括于古介形虫亚纲内。这科化石的壳在前部有吻状突起,显与同亚纲内的有突虫目和背板虫目具有一定关系。但这科与上述二目又有显著差别,因此难以列入古介形虫亚纲内已有的某一目内。

### 孙氏虫科(Sunellidae), 新科

壳具较大的两瓣,互相对称或近于对称,后摆不显甚至没有。两瓣的前背端(背部的前端)具尖矛状的吻状突起而向前伸出。壳面平滑,一般不具瘤子等构造。有边缘围绕,边缘宽度不一。其壳质则与前尖虫科同为含有磷酸钙的几丁质。现分三属。

#### *Sunella* 新属

**描述:** 壳大,每瓣长为6—8毫米,略呈半圆形,铰合线长而平直,向前突出并向后延

伸,造成壳的最长部分。前背角约  $20^{\circ}$ , 后背角相若。前边近于直线,其前端与铰合线相交而成吻状突起,腹边成弧形,后边又稍变直。壳面凸出度不大,最高点是在壳面的中央,没有任何的瘤子、凹陷或脊状突起线。边缘颇显,但发展颇不均匀。

**属型:** *Sunella grandis*, 新种。此属系因孙云鑄教授而得名。

**特征:** 壳大,略呈半圆形,铰合线为壳的最长部分,壳的前端具吻状突起。壳面的最高点是中央,无瘤子、凹陷、脊状突起线等,边缘发展不均。

### *Sunella grandis* 新种

(图版 I, 图 8)

**描述:** 该种的标本仅有一枚,且为壳的内面。壳为半圆形,铰合线平直,其与前边的前端所成的前背角约为  $20^{\circ}$ , 前边大致为一直线,通至壳高三分之二处而止,腹边为一很长的弧线,后边又稍变直,颇短,其末端向后弯曲,与铰合线相遇而成不很显著的锐角。壳面凸出度不大,它的中央是最高地方,没有瘤子、凹陷或脊状突起线。各自由边都有明确的边缘,边缘在壳的内面为凹入的条带,但在外面应为隆起的条带,很宽,惟发展不均。壳呈黄褐色,高倍放大镜下稍呈斑状。

仅有的一个标本,其可度量部分如下: 长度为 7.8 毫米,高度为 4.8 毫米,铰合线为 9 毫米,一瓣厚度为 1.3 毫米。

**特征:** 此种具有下列特点: (1) 壳为半圆形, (2) 铰合线为壳的最长部分, 与前边、后边相交,构成很小的前背角及后背角, (3) 壳面的最高点是中央,无瘤子、凹陷、脊状突起线等构造, (4) 边缘很宽而发展不均, (5) 前边的前端呈尖矛状的吻状突起。

**产地及层位:** 陕南汉中梁山下寒武统。

号码: 全型 0008。

### *Sunella nanchengensis* 新种

(图版 I, 图 9)

**描述:** 该种的标本仅有一枚,且为壳的外面。由于保存不全,因而了解较差。壳为半圆形而稍扁,铰合线平直,与前边的前端所构成的前背角约为  $20^{\circ}$ , 前边近于直线,通至壳高的三分之二处而止,腹边为一较长的弧线,后边因标本保存不全,情况未能确知。后边与铰合线的关系不得而知。壳面凸出度不大,最高的地方是在中央,没有瘤子、凹陷、脊状突起线等。边缘颇窄,发展不均。壳呈黄褐色,高倍放大镜下呈斑状。

仅有的一个标本,其可度量部分如下: 长度为 6.4 毫米,高度为 2.4 毫米,铰合线难以确知,一瓣厚度为 1 毫米。

**特征:** 此种具有下列特点: (1) 壳较 *Sunella grandis* 为小, (2) 壳形较 *S. grandis* 稍扁, (3) 边缘较 *S. grandis* 为窄, (4) 在前边的前端,此种与 *S. grandis* 同具吻状突起。

**产地及层位:** 陕南汉中梁山下寒武统。

号码: 全型 0009。

**Luella, 新属**

**描述:** 壳大, 每瓣长 9.4 毫米, 略呈半圆形。铰合綫平直, 向前突出, 为壳的最长部分。前背角约  $30^\circ$ , 后背角略为钝角。前边弯曲并向内凹入, 腹边为一长弧, 后边稍直, 与腹边无明显界限。壳面凸出度不大, 最高点是在壳面的中央, 没有任何的瘤子、凹陷或脊状突起綫。边缘颇显而发展不均。

**属型:** *Luella hanchungensis*, 新种。此属系因卢衍豪教授而得名。

**特征:** *Luella* 和 *Sunella* 的关系很密, 两属的重要性质都很近似, 只是前属的前边呈显著的弯曲并向内凹入。

**Luella hanchungensis 新种**

(图版 II, 图 1, 2)

**描述:** 用以说明这个种的标本, 为壳的外面和它的外模。壳为半圆形, 铰合綫平直, 其与前边的前端所构成的前背角约为  $30^\circ$ , 前边向内弯曲, 颇短, 约达壳高的三分之一, 腹边为一很长的弧綫, 后边稍直, 与腹边无明显界限, 后边的末端与铰合綫相遇而成一不大的钝角。壳面凸出度不大, 它的中部是最高地方, 没有瘤子、凹陷或脊状突起綫。各自由边都有明显而宽大的边缘, 但发展不均, 腹边较宽而且突起程度较大。壳为黄褐色, 高倍放大镜下而呈斑状。

此种可度量部分如下: 长度为 8.8 毫米, 高度为 5.1 毫米, 铰合綫为 9.4 毫米, 一瓣厚度为 1.5 毫米。

**特征:** 此种具有下列特点: (1) 壳为半圆形, (2) 铰合綫为壳的最长部分, (3) 壳面的最高点是在中部, 无瘤子、凹陷、脊状突起綫等构造, (4) 边缘很宽而发展不均, (5) 前边的前端成尖矛状的吻状突起, (6) 前边向内弯曲。

**产地及层位:** 陕南汉中梁山 下寒武统。

号码: 正型 0010, 副型 0011。

**Chiella 新属**

**描述:** 壳大, 有两瓣, 每瓣长 7.6 毫米, 略呈半圆形。铰合綫平直, 保存不全, 有浅沟, 位于铰合綫的两侧, 前背角缺失, 后背角约为  $110^\circ$ , 前边情况不明, 腹边为一平缓的曲线, 后边近于直线。壳面凸出度不大, 最高的地方是在壳的中央。没有瘤子、凹陷或脊状突起綫。边缘颇显。

**属型:** *Chiella shensiensis*, 新种。此属系因已故的计荣森教授而得名。

**特征:** 此属最重要的特点是壳面的前部有浅沟, 位于铰合綫的两侧。

**Chiella shensiensis 新种**

(图版 II, 图 3, 4)

**描述:** 此种可借壳的外面和同一个壳的外模而说明。壳为半圆形, 铰合綫平直, 其与前边的前端所构成的前背角, 因标本残缺, 不得而知, 前边情况不明, 腹边为一平缓的曲

綫,后边近于直綫。后背角約为  $110^{\circ}$ 。壳的前部有浅沟,位于铰合綫的兩側,浅沟与铰合綫相遇,而成  $50^{\circ}$  的交角。壳面凸出度不大,最高的地方是在中央,沒有瘤子、凹陷或脊状突起綫。边缘寬而显著,发展情况不很确知。壳为黄褐色,高倍放大鏡下呈斑状。

此种可度量部分数据如下: 长度为 7.6 毫米(近似值), 高度为 4.1 毫米, 铰合綫难以确知, 一瓣厚度为 1.2 毫米。

**特征:** 此种具有下列特点: (1) 壳为半圓形, (2) 壳的前部(外面)有浅沟, 位于铰合綫的兩側, (3) 浅沟与铰合綫相遇, 构成  $50^{\circ}$  的交角, (4) 壳面最高点在中部, 无瘤子、凹陷、脊状突起綫等构造。

**产地及层位:** 陕南汉中梁山下寒武統。

号碼: 正型 0012, 副型 0013。

## 参 考 文 献

- 卢衍豪, 1963: 扬子区标准化石手册, 古介形虫类。页 28—29, 图版 3。
- 项礼文, 1963: 秦岭化石手册, 古介形虫亚纲。页 36—39, 图版 3。
- 霍世诚, 1956: 陕西云南早寒武纪的古介形虫。古生物学报, 四卷三期, 页 425—445, 图版 1—2。
- , 1957: 关于我国的古介形虫。地质知识, 第十期, 页 27—30。
- , 1962: 陕西寒武纪磷块岩成因问题的初步探讨。地质学报, 四十二卷四期, 页 435—441。
- Barrande, J., 1872: Silurian System du Center Boheme. Vol. 1, Suppl., pp. 466—556, pls. 22—34.
- Cobbold, E. S., 1921: The Cambrian Horizon of Comley and its Brachiopoda, Pteropoda, Gastropoda, etc. Q. J. G. S., London, 76, 325—386, pls. 41—44.
- , 1927: The Stratigraphy and Geological Structure of the Cambrian Area of Comley (Shropshire). Q. J. G. S. London, 83, 551—573.
- , 1936: The Conchostraca of the Cambrian Area of Comley, Shropshire, with a Note on a New Variety of *Atops Reticulatus* (Walcott). Q. J. G. S. London, Vol. 92, pt. 3, pp. 221—235, pls. XIV—XV.
- Henningsmone, G., 1953: Classification of Palaeozoic Straight-hinged Ostracods. Norsk Geologisk Tidsskrift, 31. 187—289. pls. 1—2.
- , 1953: The Middle Ordovician of the Oslo region, Norway. 4. Ostracoda. Norsk Geol. Tidsskr., 32(1). 35—56.
- Kobayashi, T., 1934: A few Ordovician Brachiopods from Manchuria and Chosen, and a new species of Conchostraca from the basal Ordovician of Manchuria. Jap. Jour. Geol. Geogr., 11(3—4), 161—169, 1 pl.
- Mansuy, H., 1912: Etude Geologique du Yun-Nan Oriental. Pt. 2. Paleontologie, Mem. Service Geol. L'Indochine, 1, 1—23, pls. I, IV.
- Poulsen, C., 1932. The Lower Cambrian Faunas of East Greenland. Meddel. on Greenland, 87(6), 24—25, pl. 4, figs. 8—10.
- Raymond, P. E., 1935: Leanochoidea and other Mid-Cambrian Arthropoda. Bull. Mus. Comp. Zool. Harvard College. 76(6), 214—230.
- , 1946: The Genera of Fossil Conchostraca an order of bivalved Crustacea. Bull. Mus. Comp. Zool. (Harvard), 96(3), 304.
- Resser, C. E., 1929: New Lower and Middle Cambrian Crustacea. Proc., U.S. Nat. Mus. Vol. 76, Art. 9, pp. 1—18, pl. 1—7.
- Salter, J. W., 1873: A Catalogue of the Collection of Cambrian and Silurian Fossils. pp. 1—21.
- Saito, K., 1934: Older Cambrian Trilobita and Conchostraca from Northwestern Korea. Jap. Jour. Geol. & Geogr., 11(3—4), 211—237, pl. XXVII.
- Thorslund, P., 1940: Detailed Stratigraphy, Tectonics and Paleontology of the Chasmops Series. Sweden. Sveriges Geol. Unders. S. C., No. 436 (Arsbok 34, No. 6).
- , 1940: On the Chasmops Series of Jemtland and Sodermanland (Tvären), ser. C. No. 436, pp. 161—182, pl. 1—5.

- Thorslund, P. and Westergård, A. H., 1938: Deep Boring through the Cambro-Silurian at File Haidar, Gotland (Preliminary Rep.) Sver. Geol. undersökn (C), No. 415, Årsbok 32 (5), 22, pl. 1.
- Ulrich, E. O. and Bassler, R. S., 1931: Palaeozoic Ostracoda, their Morphology and Occurrence. Silurian Vol., Md. Geol. Surv., pp. 271—391.
- , 1931: Cambrian bivalved Crustacea of the order Conchostraca. Proc., U.S. Nat. Mus., Vol. 78, Art. 4, pp. 1—103, pls. 1—10.
- Vodges, A. W., 1890: A Bibliography of Palaeozoic Crustacea from 1698 to 1889. Bull. U. S. Geol. Surv., No. 63, pp. 13—177.
- , 1891: A Catalogue of North American Palaeozoic Crustacea of the nontrilobitic genera and species. Ann., New York Acad. Sci., Vol. 5, pp. 1—37, pls. 1—2.
- Wiman, C., 1902: Studien über das Nordbaltische Silurgebiet. Bulletin Geological Institute University of Upsala, Vol. 6, pt. 1, No. 11, pp. 45—49, pl. I—III.
- Walcott, C. D., 1911: Middle Cambrian Merostomata. Smithsonian Miscellaneous Collections, Vol. 57, pls. 2—7, pp. 17—40.
- , 1912: Middle Cambrian Branchiopoda, Malacostraca, Trilobita, and Merostomata. Smithsonian Miscellaneous Collections, Vol. 57, Pls. 24—34, pp. 145—228.
- , 1913: The Cambrian Faunas of China. pl. 23, figs. 10—15, pp. 225—228.

## ADDITIONAL NOTES ON LOWER CAMBRIAN ARCHAEOSTRACA FROM SHENSI AND YUNNAN

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After the publication of the writer's "Brief Notes on Lower Cambrian Archaeostraca from Shensi and Yunnan" and "On the Archaeostraca of China", he has obtained many specimens of this fauna. In the study of these fossils which present an unusually numerous and varied groups, their restricted stratigraphic position and wide geographical distribution are made clear.

The main purpose of this work is to describe the fossils, which consist of nine species assigned to six genera, all of which are grouped into two families. One of them, Alutidae, is referred to the order Bradorina; the other, Sunellidae, a new family, is of uncertain taxonomic position within the subclass.

The fossils described in this paper were collected from the lower part of the Lower Cambrian. We may assume with confidence that the fauna is richly preserved in the Chiuinsusze stage. The detailed work is to subdivide this formation into many zones with alutids. The fossils herein described were secured from two widely separated provinces, it is remarkable that some species are common to them. This fact reveals the existence of a parent sea which covered the southwestern area and the narrow belt of South Shensi.

## SYSTEMATIC DESCRIPTION

**Class Crustacea****Subclass Archaeostraca Von Stromer****Order Bradorina Raymond****Family Alutidae Huo****Genus *Kunmingella* Huo*****Kunmingella douvillei* (Mansuy)**

(Pl. I, fig. 1)

1912 *Bradoria douvillei* Mansuy. Mem. Surv. Geol., l'Indochine, Vol. 1, p. 22, pl. 1, fig. 8.1931 *Aluta douvillei* (Mansuy) Ulrich and Bassler, Cambrian Conchostraca, p. 61, pl. 4, fig. 17.1956 *Kunmingella douvillei* (Mansuy) Huo, Acta Palaeont. Sinica, Vol. 4, No. 3, p. 436, pl. 2, figs. 10—13.

**Description:** This species is represented by a single, well-preserved specimen. Carapace of medium size, obliquely acuminate—subovate in outline. Hinge much shorter than the length of the valve, forming an angle of  $90^\circ$  with the anterior margin. Anterior margin almost straight to two-thirds the height of the valve, ventral and posterior margins merged into a long curve, passing to and round the posterior end, and meeting the hinge line at an angle of  $125^\circ$ . Surface of valves strongly convex, ridge-like swelling rising steeply around antero-ventral curve but gently in the posterior part; ocular tubercle large, but indistinct due to abrasion; posterior node very long and prominent; between these two nodes being a narrow depression. Free edges with a well defined rim respectively, convex and uniform in development. Test brownish gray or black, punctate under a strong lens.

Dimensions of the unique specimen: length 3.7 mm, greatest length 4.0 mm, height 2.1 mm, hinge line 3.1 mm, thickness of one valve 1.0 mm.

**Remarks:** This species is characterized by: (1) carapace of medium size and obliquely acuminate—subovate in outline, (2) ridge-like swelling rising steeply around antero-ventral curve but gently in the posterior part, (3) ocular tubercle and posterior node being very prominent, and (4) a narrow depression between the two nodes.

**Locality and horizon:** Kunyang, Yunnan. Chiunzusze stage of Lower Cambrian. No. 0001.

***Kunmingella intermedia* sp. nov.**

(Pl. 1, figs. 2—4)

**Description:** There are three specimens marked as types of this species, one of them is complete and distinct. This species is intermediate between *Kunmingella parva* and *K. douvillei*. Hinge line straight, shorter than the length of the valve, forming an angle of about  $90^\circ$  with the anterior margin. Anterior margin nearly straight to three-fifths the height; ventral margin slightly curved, posterior margin gently convex, a little longer than anterior margin; post-dorsal angle obtuse, about  $105^\circ$ . Surface of valves convex, ridge-like swelling rising gently from the flattened border; ocular tubercle circular in form; in its center situated the eye; posterior node slender, forming an angle of about  $50^\circ$  with hinge, being half the hinge; a wide depression being between the two nodes.

Free edges with a narrow uniform rim respectively. Test yellowish brown, punctate under a strong lens.

Dimensions of the best type specimen: length 3.0 mm, greatest length 3.2 mm, height 2.1 mm, hinge line 2.7 mm, thickness of one valve 0.5 mm.

**Remarks:** The characteristics of this species are: (1) its carapace larger than *Kunmingella parva* but smaller than *K. douvillei*, (2) general aspect of the valves being intermediate between semi-elliptical and subovate, (3) ridge-like swelling rising gently, (4) ocular tubercle prominent, circular in form, (5) posterior node very long, forming an angle of  $50^\circ$  with the hinge, (6) a wide depression between two nodes, and (7) thickness of one valve smaller than that of the other species.

**Locality and horizon:** Kunyang, Yunnan. Chiunzusze stage of Lower Cambrian. No. 0002 (holotype), 0003, 0004 (paratypes).

### *Kunmingella sui* sp. nov.

(Pl. 1, fig. 5)

A single well-preserved specimen represents this species. Carapace of medium size, narrow in front, broadly rounded behind. Hinge straight, much shorter than the length of the valve, forming an angle of  $90^\circ$  or more with the anterior margin. Anterior margin nearly straight to half the height; ventral margin strongly convex posteriorly; posterior margin longer than anterior margin; post-dorsal angle about  $120^\circ$ . Surface of valves convex, rising to the greatest height at the summit of the posterior nodes; ridge-like swelling rising gently from the flattened border and connecting two extremities of the hinge line; ocular tubercle long, situated at the anterior end, extending around the anterior margin; posterior node very prominent, about half the length of the hinge line, forming an angle of  $90^\circ$  with the hinge. A wide depression present between the two nodes. Marginal rim sharply defined and uniform in development. Test dark grey, punctate under a strong lens.

Dimensions of the unique right valve. Length 2.7 mm, greatest length 3.1 mm, height 2.0 mm, hinge line 2.4 mm, thickness of one valve 1.0 mm.

**Remarks:** The characteristics of this species are as follows: (1) parapace smaller than that of other species referred to this genus, (2) hinge much shorter than length, (3) post-dorsal angle rather large, and (4) posterior node long, curved in the lower part.

**Locality and horizon:** Kunyang, Yunnan. Chiunzusze stage of Lower Cambrian. The specific name is given in honour of the collector of this fossil.

No. 0005 (holotype).

### Genus *Kunyangella* gen. nov.

**Description:** Carapace 1 mm in length, subovate in outline. Hinge straight, shorter than the length of the valve. Antero-dorsal angle a little more than  $90^\circ$ , post-dorsal angle obtuse. Surface rather convex, rising to the greatest elevation in the post-dorsal corner; only one long node near and parallel to the hinge.

**Genotype:** *Kunyangella cheni* sp. nov.

**Remarks:** This genus is readily distinguished from other genera by the long node near hinge line.

***Kunyangella cheni* sp. nov.**

(Pl. 1, fig. 6)

**Description:** This species is founded on a single specimen. Carapace comparatively small, subovate in outline. Hinge line straight, shorter than the length of the valve, forming an angle a little more than  $90^\circ$  with the anterior margin. Anterior margin almost straight to one-fifth the height, ventral margin being a long curve, strongly convex posteriorly; posterior margin short; post-dorsal angle  $150^\circ$ . Surface of valves rather strongly convex, rising to the greatest elevation in the post-dorsal corner; posterior node developed, triangular in form, with the base parallel to hinge. Marginal rim defined, thick, convex on the anterior and ventral side, much thinner and comparatively indistinct on the posterior side. Test yellowish brown, covered with shallow punctae.

Dimensions of this unique type specimen: length 1.7 mm, greatest length 2.0 mm, height 1.4 mm, hinge line 1.3 mm, thickness of one valve 0.5 mm.

**Remarks:** This species may be characterized as follows: (1) carapace small and subovate in outline, (2) hinge line shorter than the length of the valve, (3) post-dorsal angle rather large, and (4) only one node (posterior node), very large, with the base parallel to the hinge.

**Locality and horizon:** Kunyang, Yunnan. Chiunzusze stage of Lower Cambrian. No. 0006 (holotype).

**Genus *Liangshanella* Huo*****Liangshanella chiehi* Huo**

(Pl. 1, fig. 7)

1956 *Liangshanella chiehi* Huo, Acta Palaeontologica Sinica, Vol. 4, No. 3, p. 428, pl. 1, fig. 4.

**Description:** Only a single specimen is marked as representing this species. Carapace of medium size, obliquely semi-elliptical in shape, slightly destroyed in front, wide and rounded behind. Hinge rather short. Antero-dorsal angle distinguishable; anterior margin almost straight to half the height of the valve; ventral margin being a long and slight curve, extending to the posterior extremity of the valve, merged into the posterior margin by an obtuse angle; posterior margin short and straight, forming an angle of  $140^\circ$  with the hinge line. Surface of valves moderately convex, rising to the highest elevation near the middle of valve, without any node, depression or ridge-like swelling. Marginal rim wide, convex and uniform in development. Test yellowish brown, punctate under a strong lens.

Dimensions of the unique type specimen: length 3.7 mm, greatest length 3.8 mm, height 2.0 mm, hinge line 2.8 mm, thickness of one valve 0.7 mm.

**Remarks:** This species is readily distinguished from others by the following characteristics: (1) carapace much lower in general aspect, (2) hinge line shorter, (3) post-dorsal angle large, and (4) marginal rim wide, uniform in development.

**Locality and horizon:** In the road northeast of Taipingchung, Kunming, Yunnan, Chiunzusze stage of Lower Cambrian.

No. 0007 (holotype).

**ARCHAEOSTRACA INCERTAE SEDIS**

Included in the subclass Archaeostraca, but of uncertain taxonomic position within the subclass are a group of fossils (Sunellidae) that are equivalved and have phosphatic chitinous shells. They seem to be associated with the Alutidae. The chief characteristics

of the Sunellidae may be compared with those of the Alutidae. The Sunellidae bears certain resemblances to the Hymenocarina, but differs greatly in small size and in lacking appendages. The Sunellidae resembles the Ceratiocarina and Rhinocarina in having rostrum but differs from the latter two in other structures. It seems best to create a new order.

### Family Sunellidae fam. nov.

Bivalved Archaeostraca equivalved or nearly equivalved, carapace much larger than alutids, with rostrum in the antero-dorsal end. Surface of valves smooth, without any node. Marginal rim sharply defined, not uniform in development. Test thin, yellow, phosphatic chitinous in composition. The family Sunellidae is subdivided into three genera.

### Genus *Sunella* gen. nov.

**Description:** Carapace bivalved, rather large, 6—8 mm in length, valve semi-circular in outline, with anterior and posterior ends. Hinge long and straight, forming the full length of the valve. Antero-dorsal angle same as post-dorsal angle, about  $20^\circ$ . Anterior margin nearly straight, its anterior end forming an acute angle (Rostrum) with hinge, ventral margin being a smooth arc, posterior margin almost straight. Surface of valves slightly convex, rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Marginal rim clearly defined, not uniform in development.

**Genotype:** *Sunella grandis* sp. nov.

**Remarks:** Carapace rather large, semi-circular in outline, hinge line forming the full length of valve, with rostrum in the anterior end of valve. Surface rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Marginal rim not uniform in development.

### *Sunella grandis* sp. nov.

(Pl. 1, fig. 8)

**Description:** This species is represented by the inner surface of a complete carapace. Valve semi-circular in outline. Hinge line straight, forming an angle of  $20^\circ$  with the anterior end of anterior margin. Anterior margin nearly straight to two-thirds the height of the valve; ventral margin being a long arc, posterior margin almost straight, rather short, turning posteriorly at the post-dorsal end and forming an acute angle with hinge. Surface of valves slightly convex, rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Marginal rim sharply defined, rather wide, not uniform in development. Test yellowish grey, minutely punctate under a strong lens.

Dimensions of this unique type specimen: length 7.8 mm, height 4.8 mm, hinge line 9.0 mm, thickness of one valve 1.3 mm.

**Remarks:** The characteristics of this species are as follows: (1) valve semi-circular in outline, (2) hinge line forming the full length of valve, (3) surface rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling, (4) marginal rim not uniform in development, and (5) anterior end of valve forming rostrum.

**Locality and horizon:** Liangshan, Hanchung, South Shensi. Lower Cambrian shale.

No. 0008 (holotype).

***Sunella nanchengensis* sp. nov.**

(Pl. 1, fig. 9)

**Description:** This new species is based upon the outer surface of a crushed carapace of which some parts are barely visible. Valve semicircular in outline. Hinge straight, forming an angle of  $20^\circ$  with the anterior end of anterior margin. Anterior margin nearly straight to two-thirds the height of the valve, ventral margin being a very long arc, posterior margin not visible. Surface of valves slightly convex, rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Marginal rim rather narrow, not uniform in development. Test yellowish grey, punctate under a strong lens.

Dimensions of this unique type specimen: length 6.4 mm approximately, height 2.4 mm, hinge incomplete, thickness of one valve 1.0 mm.

**Remarks:** The essential characters of this species are: (1) the size of this species smaller than that of *Sunella grandis*, (2) the ratio of length to height of this species larger than that of *Sunella grandis*, (3) marginal rim of this species much narrower than that of *Sunella grandis*, and (4) rostrum present at the anterior end of anterior margin.

**Locality and horizon:** Liangshan, Hanchung, South Shensi, Lower Cambrian shale. No. 0009 (holotype).

**Genus *Luella* gen. nov.**

**Description:** Carapace large, 9.4 mm in length, semi-circular in outline. Hinge straight, forming the full length of valve. Antero-dorsal angle about  $30^\circ$ , post-dorsal angle obtuse. Anterior margin curved inwardly; ventral margin being a very long arc, merged into the posterior margin by a rounded angle. Surface of valves slightly convex, rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Marginal rim sharply defined, not uniform in development.

**Genotype:** *Luella hanchungensis* sp. nov.

**Remarks:** This genus is closely allied to *Sunella*, but is easily recognized by its inwardly curved anterior margin.

***Luella hanchungensis* sp. nov.**

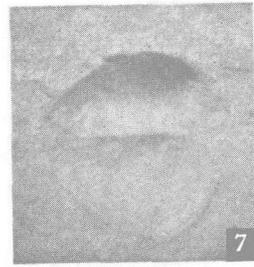
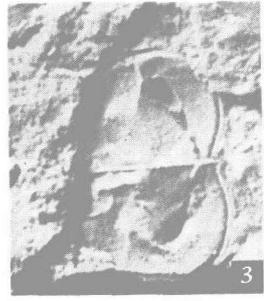
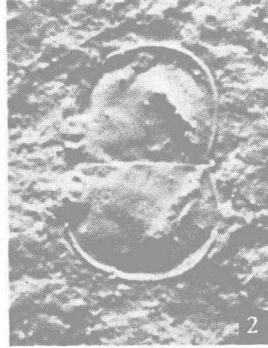
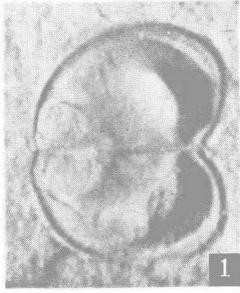
(Pl. II, figs. 1.2)

This species is represented by outer surface and external mould of a carapace. Valve semi-circular in outline. Hinge straight, forming an angle of  $30^\circ$  with the anterior end of anterior margin. Anterior margin curved inwardly, rather short, about one-third the height of the valve; ventral margin being a very long arc, merged into the posterior margin by a rounded angle; post-dorsal angle obtuse. Surface of valves slightly convex, rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Free edges with a wide clear marginal rim respectively, thick and convex on the ventral side, much thinner and comparatively indistinct on the anterior side. Test yellowish grey, punctate under a strong lens.

Dimensions of holotype: length 8.8 mm, height 5.1 mm, hinge 9.4 mm, thickness of one valve 1.5 mm.

## 图 版 I

- 图 1. *Kunmingella douvillei* (Mansuy).  
整壳的外面,  $\times 7$ .  
云南昆阳。
- 图 2—4. *Kunmingella intermedia*, 新种。  
2. 整壳的外面,  $\times 7$ .  
3. 壳(欠完整)的内面,  $\times 7$ .  
4. 壳(欠完整)的外面,  $\times 7$ .  
云南昆阳。
- 图 5. *Kunmingella sui*, 新种。  
右瓣的内面,  $\times 7$ .  
云南昆阳。
- 图 6. *Kunyangella cheni*, 新属, 新种(属型)。  
左瓣的内面,  $\times 7$ .  
云南昆阳。
- 图 7. *Liangshanella chiehi*,  
整壳的外面,  $\times 7$ .  
云南昆明太平村。
- 图 8. *Sunella grandis*, 新属, 新种(属型)。  
整壳的内面,  $\times 7$ .  
陕南汉中梁山。
- 图 9. *Sunella nanchengensis*, 新种。  
整壳的外面,  $\times 7$ .  
陕南汉中梁山。



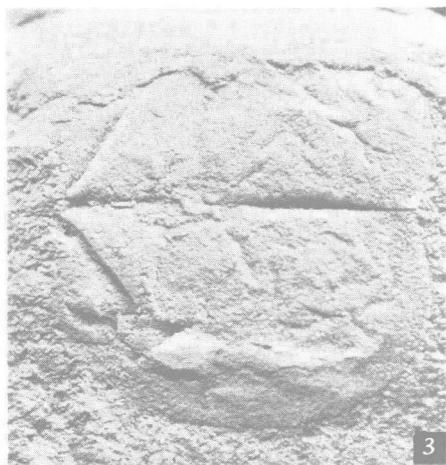


图 1, 2. *Luella hanchungensis*, 新属, 新种(属型)。

1. 整壳的外面,  $\times 7$ 。

2. 整壳的外模,  $\times 7$ 。

陕南汉中梁山。

图 3, 4. *Chiella shensiensis*, 新属, 新种(属型)。

3. 整壳的外面,  $\times 7$ 。

4. 整壳的外模,  $\times 7$ 。

陕南汉中梁山。

**Remarks:** The characteristics of this species are: (1) valve semi-circular in outline, (2) hinge forming the full length of valve, (3) surface rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling, (4) marginal rim wide, not uniform in development, and (5) anterior margin curved inwardly.

**Locality and horizon:** Liangshan, Hanchung, South Shensi. Lower Cambrian shale.

No. 0010 (holotype), 0011.

### **Genus *Chiella*, gen. nov.**

**Description:** Carapace bivalved, rather large, 7.6 mm in length, semicircular in outline. Hinge straight, beside it being a shallow groove. Antero-dorsal angle not visible, post-dorsal angle about  $110^\circ$ . Anterior margin crushed, ventral margin being a long smooth curve, posterior margin almost straight. Surface of valves slightly convex, rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Marginal rim clearly defined.

**Genotype:** *Chiella shensiensis* sp. nov.

**Remarks:** This genus is readily distinguished from the other members of the family by the shallow groove beside the hinge.

### ***Chiella shensiensis* sp. nov.**

(Pl. II, figs. 3,4)

This species is represented by the outer surface and the external mould of a carapace. Valve semi-circular in outline. Hinge straight. Anterior margin and antero-dorsal angle not visible, ventral margin being a smooth curve, posterior margin almost straight. Post-dorsal angle about  $110^\circ$ . In the anterior of valve there is a shallow groove beside the hinge, the angle between groove and hinge being  $50^\circ$ . Surface of valves slightly convex, rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling. Marginal rim wide and clear. Test yellowish grey, punctate under a strong lens.

Dimensions of holotype: length 7.6 mm approximately, height (incomplete) 4.1 mm, thickness of one valve 1.2mm.

**Remarks:** The characteristics of this species are: (1) valve semi-circular in outline, (2) a shallow groove beside hinge in the anterior of valve, (3) the angle between shallow groove and hinge being  $50^\circ$ , and (4) surface rising to the greatest elevation in the middle of valve, without any node, depression or ridge-like swelling.

**Locality and horizon:** Liangshan, Hanchung, south Shensi. Lower Cambrian shale.

No. 0012 (holotype), 0013.