

黔东玉屏上寒武紀三叶虫^{*}

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(附 1 圖版)

在貴州和湖南交界地区,由貴州三穗經玉屏、晃縣、銅仁、鳳凰、乾城至永綏等縣,寒武紀地層分布面積很廣,其走向大致作北东—南西方向(參閱百万分之一中國地質圖桂林幅及長沙幅)。这一区以產汞礦著称,大部分汞礦即產于寒武紀地層內,一部分亦見于奥陶紀。根据田奇瑞报告,自 1918 年起,即有不少地質学家前往調查。虽然各篇报告中大部分篇幅都以討論汞礦为主,但对于寒武紀地層也有扼要叙述。在 1940 年田奇瑞的論文中(頁 288),田氏划分該区寒武紀地層自下而上为六个單位,即: Cm1, Cm2, Cm3, Cm4, Cm5 及 Cm6。Cm1 为深灰至灰黑色頁岩,風化后外表呈黃色, Cm2 为灰黑色頁質石灰岩,常夾黑色頁岩,含球狀化石。Cm3 为灰黑色或黑色頁岩,一部分常含鈣質。Cm4 为灰黑至黑色薄層狀頁質石灰岩,內常夾灰黑色頁岩或鈣質頁岩。Cm5 为淡灰色砂化条狀石灰岩。Cm6 又分为三層,下部兩層为黑或灰黑色頁岩与石灰岩互層,上部一層为黑色薄層狀石灰岩与頁岩互層。以上岩層由 Cm1 至 Cm6 共厚約五百米。在 Cm6 的下部,田奇瑞、刘國昌曾采獲 *Agnostus*, *Damesella*, *Blackwelderia* 等三叶虫化石(見“貴州省溪万山場汞礦报告”,仿湖南省地質調查所簡报)。1945 年刘國昌根据晃縣酒店塘剖面,又划分寒武紀地層为七个單位,即 €1 至 €7。其中 €1—€5 五个單位与田奇瑞所分的 Cm1—Cm5 各層的岩石性質無多大出入,但厚度互有不同,个别岩層厚度变化相差可达一半, €1 至 €7 总厚度共七百三十余米。在刘氏以前,王作宾,賈福海在晃縣酒店塘及玉屏万山場一帶工作,如同田奇瑞氏意見,他們亦分該区寒武紀为六層,总厚度八百十余米。其所采化石曾交本文筆者研究,其中除 Cm1 盛產下寒武紀三叶虫如 *Arthricocephalus*, *Redlichia* 等外, Cm2 至 Cm6 的下部各層所含化石亦頗丰富,已初步鑒定的有三叶虫 *Ptychagnostus*, *Hypagnostus*, *Dorypyge*, *Solenoparia*, *Amphoton* (*Fuchonia*), *Dorypygella* 等屬。以上屬群,包括田奇瑞和刘國昌二氏在万山場所發現的在內,絕大部分是中寒武紀的產物,僅有 *Blackwelderia* 和 *Dorypygella*

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兩屬有上寒武紀的可能。這一動物群是中國南部中寒武紀最豐富的動物群之一，尤其重要的是這一動物群和華北及東北中寒武紀動物群有很多地方極為類似，同時一部分和澳洲東北部及歐洲的動物群也有關聯。可惜的是上寒武紀化石很少，因此任何上寒武紀化石的發現對於黔東湘西區來說都是很重要的。

1954 年西南地質局 505 隊在貴州東部玉屏一帶作普查，劃分此區寒武紀為以下七個單位：

€7: 砂質石灰岩及普通石灰岩	200 米
€6: 純石灰岩, 竹葉狀石灰岩夾頁岩	180—200 米
€5: 白雲質石灰岩及砂質石灰岩互層	100 米
€4: 純石灰岩夾頁岩	80—100 米
€3: 黑灰色頁岩	30—40 米
€2: 純石灰岩夾頁岩	80—100 米
€1: 灰綠色頁岩	180—200 米

該隊在 €1, €6 和 €7 都曾找到了化石。€1 黃綠色頁岩(產地萬山鎮梅子溪)中所產的是 *Redlichia*, 可確定為下寒武紀。€6 灰黑色石灰岩(萬山鎮毛筆山, 張家坪及馬家坳三處)所產的為 *Ptychagnostus atavus* Tullberg, 這一個種是瑞典和澳洲中寒武紀的標準化石, 因此 €6 的時代亦無問題, 可以確定為中寒武紀。€7 所產的化石, 即本文所描述的三葉蟲, 全部均系采自萬山鎮龍田沖, 其時代屬於上寒武紀。計有新屬一, 新種二及不能鑑定種名和屬名尚有疑問的各一種, 其種名如下：

1. *Pseudagnostus* sp.,
2. *Eugonocare* (?) sp.,
3. *Prochuangia granulosa* Lu (sp. nov.),
4. *Yüpingia niobiformis* Lu (gen. et sp. nov.).

這個三葉蟲標本的数量不多, 所代表的種類也很少, 因此要和中國南部已發現的上寒武紀三葉蟲動物群作詳細的比較, 還存在着相當困難, 但從其相近的屬群的关系推測, 可以得出下述三點初步結論: (1) 由於此動物群具有 *Eugonocare* (?) sp. 一種的存在, 因此它可能似與澳洲東北部上寒武紀 *Eugonocare* Stage 的動物群互有聯系。*Eugonocare* 是澳洲東北部 *Eugonocare* Stage 的標準化石 (Whitehouse, 1939, 頁 264, 267), 玉屏所產的 *Eugonocare* (?) sp. 因保存不佳, 某些特征也不完全相同 (例如具有頸疣或頸刺), 是否即與澳洲所產者同為一屬, 目前尚難確定, 但與該屬較為接近則似無可疑。從整個三葉蟲動物群的組成分子分析, 澳洲 *Eugonocare* Stage 的重要屬群有 *Pseudagnostus*, *Eugonocare*, *Rhodonaspis*, *Corynexochus*, *Charchagia*, *Loymorites* 及

Proceratopyge 等。其中 *Charchagia* 曾在浙西及貴州發現，*Lopnorites* 在皖北和浙西也很多，*Proceratopyge* 在湖南沅陵和遼寧遼東半島都已發現，因此 *Eugonocare* 在中國南部的發現亦非沒有可能。(2) 是 *Prochuangia* 在玉屏的發現也頗具地層上和地理分布上的意義。*Prochuangia* 曾在遼東太子河流域、南朝鮮及越南等處發現，其層位是在長山統的下部。在太子河流域，此屬為長山統下部白山層產物(王鈺等 1954, 頁 60); 在南朝鮮此屬產于上寒武紀花折統 (Kasetsu Group) 的下部 *Prochuangia* 帶及 *Chuangia* 帶 (Kobayashi 1935, 頁 185—189); 在越南，此屬的層位大致也與 *Chuangia* 帶相當 (Kobayashi, 1944, 頁 122)。(3) 為新屬 *Yüpingia* 的古生物方面的意義。此屬可置于 *Asaphidae* 科之內。*Asaphidae* 科三葉蟲在世界各處寒武紀地層中均極為少見，據筆者所知，目前可以歸入此科的寒武紀三葉蟲除 *Ogygopsis* Walcott 1888 和 *Eoasaphus* Kobayashi 1936 兩屬尚有疑問不能完全確定外，確實無疑屬於此科的只有 *Niobella* Reed 1931, *Charchagia* Troedsson 1937 和 *Promegaspides* Westergård 1939 三個屬。因此 *Yüpingia* 的發現，在三葉蟲的系統演化進程上，具有相當重要的意義。

玉屏上寒武紀三葉蟲動物群的时代可以確定屬於上寒武紀。因為這個動物群有 *Prochuangia* 一屬的存在，所以大致可以和東亞的長山統的下部 *Chuangia* 帶對比。但是 *Chuangia* 帶的標準化石 *Chuangia* 還沒有在玉屏發現，而玉屏出現最多的 *Yüpingia* 或與此屬接近的種類也未在華北或東北的長山統中尋獲，因此這兩個動物群的生物組成和它地理分布與自然環境的研究，仍有待於更多新材料的發現。另外，玉屏動物群和貴州三都動物群(盧衍豪，1954) 以及和安徽滁縣上寒武紀動物群也不完全相同。由於中國南部上寒武紀三葉蟲動物群垂直分布和地理分布的情況還不夠明了，因此這些不同的原因究係由於它們的时代有異或由於它們的生活環境特殊，目前尚難決定。

科 *Agnostidae* McCoy, 1846

亞科 *Pseudagnostinae* Whitehouse, 1936

屬 *Pseudagnostus* Jaekel, 1909

Pseudagnostus sp.

(圖版 I, 圖 1, 2)

手中标本只有一个破損的头部和一个不完整的尾部的外模印。头部向前輕微縮小，前側端及前端均圓滑。头鞍向前收縮，前端圓潤，因為背溝明顯，所以头鞍的外形也非常清楚。第一头鞍溝短，略向后弯曲，在此溝之后有一長条形中疣，其位置在第二头鞍叶節的前方。第二头鞍溝亦短，其位置在左側边仍可辯見，系在头鞍的中部。基底叶

小,作三角形。前头鞍中溝略下凹,由头鞍之前伸达前邊緣板。頰部向平的邊緣板方向徐徐傾斜,邊緣板在头部的后側角处最狭,向前略变寬。尾部的輪廓因标本保存不完整,已不能確認,由于尾部的后端已完全破損。但此尾部有向后收縮的傾向則無可置疑。中軸兩側成为鋸齒狀,后端为一橫溝所切。背溝明顯。中軸具有一个明顯的中疣,此疣由中軸的前部向后延長伸入假叶節之內。肋部由中軸强烈向下傾曲,直达于邊緣板,与假叶節的分界綫为一傾斜的附加溝,此附加溝系由中軸的兩后側角伸出,在到达邊緣之前消失不見。邊緣板在兩側的很狭,其后端則未保存。

比較: 此标本的头与澳洲东北部上寒武紀下部 *Eugonocare* Stage 所產的 *Pseudagnostus vastulus* (Whitehouse 1936, pp. 99—100, pl. 10, figs. 3—4) 相似,例如前头鞍中溝均微弱,基底叶小,頰部向兩側傾斜等等,但此标本因具有輕微呈現的第一头鞍溝,向前收縮的头外部形,較長的尾部和尾部各种溝都比較明顯,因此容易与澳洲种区别。又此标本也和北美上寒武紀所產的 *P. convergens* (Palmer 1955, pp. 96—97, pl. 19, figs. 14, 15) 类似,兩者的尾部外形大致相同,均向后收縮,但北美种的中軸較狭,肋叶較寬較短。

科 Elviniidae Kobayashi 1935, emend. Hupé 1955

亞科 Elviniinae Kobayashi 1935, emend. Hupé 1955

屬 *Eugonocare* Whitehouse, 1939

***Eugonocare* (?) sp.**

(圖版 I, 圖 3, 4)

标本僅有一个已破碎的头盖外模。头鞍外形作切錐形,具有兩对不联接的头鞍溝和極明顯的頸溝。內邊緣相当寬,平緩凸起,其上有極清楚的放射狀綫紋。外邊緣狭,凸起,它和內邊緣之間有一極明顯的、几乎完全成一直綫的邊緣溝。頸環節具有一中疣或中刺(因标本系一外模,無法确定究为中疣或中刺)。眼叶中等大小,約为头鞍長度的三分之一,眼叶与头鞍之間有一明顯的眼脊相銜接。面綫前支切于前邊緣,約成一直角。

此标本与澳洲东北部上寒武紀 *Eugonocare* Stage 所產的 *Eugonocare* Whitehouse 一屬大致可以比較,例如兩者的头盖外形相似,內邊緣均有綫紋,各有兩对头鞍溝,但此标本因僅系一碎片,因此欲确实鑒定其屬于何屬亦甚困难。因 *Eugonocare* 具有較大的眼叶,亞長方形的头鞍,頸環節上無中疣或中刺。以上特征均为本标本所無。

科 *Leiostegiidae* Bradley, 1925亞科 *Mansuyinae* Hupé, 1955屬 *Prochuangia* Kobayashi, 1935*Prochuangia granulosa* Lu (新種)

(圖版 I, 圖 5)

描述：尾部外形作半圓形，長度約為寬度的二分之一。中軸凸起、柱錐形，向后極緩收縮并伸至一圓潤的末端，末端與后邊緣之間的距離極近。中軸為橫溝分為六節及一個半橢圓形的關節半環。肋部平緩凸起，與其前的關節葉節之間有一深而寬的前邊緣溝。第一對肋節極大，和它之后的肋部之間有一不甚明顯的淺肋溝。第一肋節向后側方伸出一對長刺，長刺由側边的中部自該肋節伸出，其間無邊緣板或邊緣溝。殼面具有兩種小突起：一種極小，但數量極多；一種較大，數量很少，散布于小突起之間。

注釋：代表此新種的僅有圖版 I，圖 5 所示的一個正型標本。此新種可視為標準的 *Prochuangia* Kobayashi，其特征為殼面有小突起。這種特征為同屬中其他各種所無，但不能僅僅根據這一特征作為建立新屬的根據，除非將來有完全和 *Prochuangia* 不同的頭部發現。此標本和越南上寒武紀早期及南朝鮮 Sai-sho-ri *Chuangia* 帶所產的 *Prochuangia* 的屬型 *Prochuangia mansuyi* (Kobayashi, 1935, pp. 185—187, pl. 10, figs. 1—7, pl. 8, figs. 8) 較相似，但其中軸上的橫溝較深較寬。與遼寧遼陽長山統下部白山層所產的 *Prochuangia inamuri* (Endo 1944, pp. 69—70, pl. 10, fig. 12) 比較，此新種的中軸寬度顯然較大，側刺也較長。

科 *Asaphidae* Burmeister, 1843屬 *Yüpingia* Lu (新屬)

定義：頭鞍大，明顯，亞長方形，前端圓潤，后部具有一個小的中疣。頸溝微弱。前頭鞍邊緣下凹。眼葉大，約為頭鞍長度的一半，位于頭蓋的中部。固定頰狹，其寬度小於頭鞍在兩眼葉之間寬度的一半。面綫前支成一圓潤曲綫切于頭部的前側角，面綫后支略作曲尺形拱曲。活動頰狹，具頰刺。尾部中軸分為 5—6 個軸環節，肋部分為 3—4 個具有微弱淺溝的肋節。邊緣板下凹。唇板未發現。

屬型：*Yüpingia niobiformis* Lu (新種)

地質時代及地理分布：目前所發現的僅有屬型一種，產于湘黔邊境上寒武紀。

討論：此新屬因具有頭鞍中疣，狹的固定頰，寬闊的尾部腹邊緣以及由于其前頭鞍邊緣外形與許多 *Asaphids* 類似，因此可放置 *Asaphidae* 科之內。此屬最重要特征之

一为眼叶較大,这是其他 Asaphids 类較为少見的。

和 1937 年 Troedsson 所建立的 *Charchagia* 相同,此新屬是属于比較原始的 Asaphidae 科的类型的,因为它是具有很清楚的和長方形的头鞍,背溝也較明顯,这是此科原始类型的表示。这兩屬的主要区别如下:(1) *Yüpingia* 的头鞍較寬,(2)头鞍上有一中疣,(3)眼叶較大并接近背溝,(4)尾部中軸較寬,邊緣板略下凹而不平緩凸起。

此新屬三叶虫和瑞典上寒武紀發現的一个 Asaphid,即 *Promegaspides* Westergård 1939 也可以作一比較。这兩屬相同之点为:(1)头鞍大,作長方形;(2)头鞍都具有中疣;(3)固定頰狹;(4)头鞍之前的邊緣板狹并下凹。这兩屬所不同的,是新屬的面綫是 Niobiform 型式的(即兩面綫的前支切于头盖前緣的兩側,即眼部的前上方),而不是 Isoteliform 型式的(即兩面綫前支在背殼上沿着头盖的前緣遇于头鞍的前上方,会合成一單綫轉向腹部伸达腹邊緣),眼叶較大,無头鞍溝,亦無頸环兩側的一对三角形边叶。尾部方面, *Yüpingia* 的肋溝也較不明顯。

又 *Yüpingia* 和 Reed 1913 所創立的 *Niobella* 也有些相似,特別是和瑞典上寒武紀所產的一个种——*Niobella aurora* Westergård (1939, pp. 7—9, pl. II, figs. 1—2, pl. III) 最接近,但后者的头鞍中部是收縮的,眼叶也較小。

另一屬三叶虫可以和新屬 *Yüpingia* 作比較的是 *Eoasaphus* Kobayashi 1936 (= *Anorina* Whitehouse 1936)*。 *Eoasaphus* 的屬型 *Liostracus* (?) *superstus* Linnarsson (1875) 是瑞典上寒武紀 *Orusia lenticularis* 帶**的產物。从尾部比較,除了 *Yüpingia* 的中軸較寬外,兩屬并無多大区别。但从头部比較,此兩屬区别則較大,特别是头鞍, *Eoasaphus* 是切錐形的,头鞍上也沒有中疣,另外, *Eoasaphus* 的头鞍溝甚明顯,外邊緣板也較寬。

此外, *Yüpingia* 也具有某些奥陶紀底部所產的三叶虫、特別如 *Hemigyraspis* Raymond 和 *Norinia* Troedsson 的綜合性的特征。但 *Hemigyraspis* 除了眼部較小外,它的頸环節是和头鞍完全融合的,兩者無法区辨。 *Norinia* 除眼叶較小外,它的面綫是 Isoteliform 型式的,头鞍上并有头鞍溝。因此这兩屬和 *Yüpingia* 也都有不同。

Yüpingia 的祖先可能与 Dolichometopinae 亞科中的某些屬群(如中寒武紀的 *Anphoton*, *Sunia* 等)有关,而其后代則可能傳至下奥陶紀 Asaphid 科中的亞科 Ogy-

* *Eoasaphus* Kobayashi 和 *Anorina* Whitehouse 都是 1936 年同样以 *Liostracus* (?) *superstus* Linnarsson (1875) 作屬型分別創立的新屬,但 *Eoasaphus* Kobayashi (1936 年 3 月)的創立較 *Anorina* Whitehouse (1936 年 4 月)为早,因此 *Eoasaphus* 这一屬名可以有优先权得以成立,而 *Anorina* 屬名則須廢弃。

** 根据 Westergård (1947, pp. 20—21), 瑞典上寒武紀可分为 6 个三叶虫帶和 23 个亞帶, *Orusia lenticularis* 帶是由下向上第三帶的帶化石。位于 *Olenus* 帶之上, *Leptoplastus-Eurycare* 帶之下。

giocarinae 的某數屬如 *Hemigyra*, *Norinia*, *Niobe* 等。在此一系列的群體演化過程中，長方形的頭鞍及凹陷的前邊緣變化不大，但眼葉則逐漸縮短，頭鞍溝、頸溝及尾部的軸節溝、肋溝等亦趨于逐步消失。因此 *Yüpingia* 一屬在三葉蟲演化史上具有聯系種族間發育過程的重要意義，從其出現的時代（上寒武紀）而言，亦完全與演化過程相符合。

Yüpingia niobiformis Lu (新種)

(圖版 I, 圖 6—13)

描述：頭蓋外形作亞梯形。頭鞍大而長，作亞長方形，向前方極輕微的收縮。頭鞍不論由前至後或由左至右都是強烈凸起的，其長約占頭蓋全長三分之二，前端圓潤，在其後部約等於全長三分之一處並具有一個小的中疣。背溝甚明顯，因此頭鞍的輪廓不論在兩側或前端均極明顯。頸溝淺而微弱，強烈向後拱曲。頸環節光滑，寬度均勻。頭鞍之前的邊緣板凹陷，向前邊緣卷曲撓起。眼葉大，強烈彎曲成一半圓曲綫，其長約為頭鞍全長的一半，位於頭蓋前邊緣及後邊緣之間的中間位置，並靠近背溝。固定頰光滑，平坦，狹小，其寬度小於頭鞍在兩眼葉之間的寬度的一半。固定頰的後側翼作亞三角形，其寬度約為頸環寬度的三分之二。後邊緣板明顯；後邊緣溝寬而深。面綫前支較短，由眼葉的前末端向前伸出切於外邊緣板的前側邊，成一近於半圓形曲綫。面綫後支向後外彎切於後邊緣板。

尾部外形成半橢圓形，寬度大於長度，其長度約等於尾部在前端的寬度的一半。中軸凸起，錐形，約占尾部全部寬度的四分之一；具 5—6 個軸環節，其中前三個軸環節較清楚。肋部為微弱的肋溝分為四個肋節，間肋溝在殼面較微弱。邊緣板輕微下凹，寬度均勻。腹邊緣較邊緣板略寬，其上有與邊緣平行的同心圓細綫紋。

圖版 I, 圖 10 是一個未成年的小頭蓋，其長約 2.2 毫米。此標本的一般特徵與成年標本並無多大區別，但其邊緣溝極發育，此溝將邊緣板分成一個平坦的內邊緣板 and 一個凸起的外邊緣板。

圖版 I, 圖 13 是一個具有大眼的小活動頰。此活動頰的邊緣板略凸，寬度均勻。因保存關係，頰刺未獲見。但在另一破碎的大的活動頰上（圖版 I, 圖 12），可以得知其頰刺強壯，甚長。

圖版 I, 圖 11 是一個小尾部，其前附着一個胸節。此尾部之長僅達 1.2 毫米，寬 2.2 毫米。此小尾與成蟲的尾部最主要區別是它不具任何明顯的邊緣板，另外並具有 8—9 節軸環節。其所附着的胸節的軸環節較肋部為狹。肋節末端平切，肋節上有橫伸的狹的

肋溝。

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AN UPPER CAMBRIAN TRILOBITE FAUNULE FROM EASTERN KUEICHOU

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(Summary)

The trilobites described in this paper were obtained by the members of 505 Party of the Geological Bureau of Southwestern China at the locality Lungtienchung, Wanshanchieng of Yüping district, eastern Kueichou. The fossils were believed to be of Upper Cambrian in age. The whole sequence of the Cambrian strata exposed in the Yüping area can be subdivided into seven units in ascending order:-

- | | |
|--|-----------|
| €1. Greyish green shale | 180-200 m |
| €2. Limestone and shale | 80-100 m |
| €3. Black shale | 30-40 m |
| €4. Pure limestone interbedded with shales | 80-100 m |
| €5. Intercalations of dolomitic limestone and siliceous limestone | 100 m |
| €6. Pure limestone and edgewise conglomeratic limestone
with shales | 180-200 m |
| €7. Siliceous limestone and deep gray pure limestone | 200 m |

Fossils have been found from €1, €6 and €7 in different localities of the Yüping area. *Redlichia* cf. *chinensis* Walcott occurs in the greyish green shales of €1 at Meitzechieh of Wanshanchieng. In the pure limestone and edgewise conglomeratic limestone series of €6 at Maopeshan, Changchiaping and Machiaao, many beautifully preserved specimens of *Ptychagnostus atavus* (Tullberg) have been found. This species is the index fossil of the Middle Cambrian *Tomagnostus fissus-Ptychagnostus atavus* zone of Scandinavia (Westergård, 1946); it has been recorded by Whitehouse (1936, 1939) from the *Dinesus* and *Aagnostus seminula* Stages of NE Australia.

The faunule described here was collected from the deep grey limestone of €7, the highest unit of the Cambrian strata in the Yüping region. All the fossils came from a single bed; they are fairly common, though rather fragmentary. Only a few specimens could be determined. They include the following species:-

Pseudagnostus sp.

Eugonocare (?) sp.

Prochuangia granulosa Lu (sp. nov.)

Yüpingia niobiformis Lu (gen. et sp. nov.)

The genus *Pseudagnostus*, as now generally delimited, is of worldwide distribution. It is widespread in the Upper Cambrian of China. In the present collection, it is represented by only two fragmentary specimens. The general aspect of the specimens is more closely related to *Pseudagnostus convergens* Palmer of the Pogonip limestone of North America and to *P. vastulus* of the *Eugonocare* Stage of NE Australia rather than to any other known species.

As far as the writer can ascertain, *Eugonocare* is known only from two species, namely, *E. tessellatum* Whitehouse (genotype) and *E. propinquum* Whitehouse, both from the *Eugonocare* Stage of NE Australia. One badly preserved specimen from E. Kueichou is here provisionally placed under this genus. This form bears an occipital node (or occipital spine) which is not present in the typical species from Australia.

Prochuangia, of which only two species are known, is abundantly represented in the Paishan Formation (*Chuangia* zone) of the Changshan Series of South Manchuria, in the *Prochuangia* zone of the Kasetsu Group of South Korea and in the *Prochuangia* bed of Dong-van section of Haut-Tonkin. In the present collection, there is a pygidium which can be referable to this genus. The species differs however in certain respects from those found from Manchuria, Korea and Indo-China.

Yüpingia is a new genus of the family Asaphidae. This genus bears close affinity with the Cambrian *Charchagia* Troedsson, *Promegaspides* Westergård as well as with the Ordovician *Hemigyaspis* Raymond and *Norinia* Troedsson.

All things considered, it is clear that the trilobite faunule from the deep grey limestone of E7 of the Yüping region has close relationships with the *Prochuangia* and *Chuangia* faunas of S. Manchuria, South Korea and Haut-Tonkin on one side, and with the *Eugonocare* fauna of NE Australia on the other. The evidence now available is in favor of an early Upper Cambrian age.

Identical faunules are not known from other localities in South China. A faunule described by the writer in 1954 from southeastern Kueichou is characterized by dominant forms of *Hedinaspis*, *Charchagia*, *Lotagnostus*, etc. This faunule is more closely related to the Torsuq tagh fauna of eastern Tienshan. The Yüping faunule is also very different from the early Upper Cambrian fauna of Chuhsien, N. Anhwei*, where the dominant trilobite is *Lopnorites*. Since the vertical and

* The palaeontological result of the Chuhsien fauna is published in the same volume of this journal (pp. 267-283).

geographical distribution of the Upper Cambrian trilobite faunas of South China is hitherto insufficiently known, it is difficult to decide whether the faunal differences of these regions are due to their difference in geological age or due to their difference in physical environment.

Family Agnostidae McCoy, 1846

Subfamily Pseudagnostinae Whitehouse, 1936

Genus *Pseudagnostus* Jaekel, 1909

***Pseudagnostus* sp.**

Pl. I, Figs. 1, 2

Specimens are represented by a broken cephalon and an external mould of incomplete pygidium. The cephalon tapers slightly forwards, rounded both at anterolateral corners and at front. The glabella is convergent anteriorly, well-defined by dorsal furrows and rounded in front. First glabellar furrow is shallow, slightly curving backwards, behind this is an elongated median tubercle on the second glabellar lobe. Second glabellar furrow is short, marked on the left side of middle of glabella. Basal lobe small, triangular. Preglabellar median furrow faintly impressed, extends from the front of glabella to the border. Cheeks slope gently towards the flat border which is narrowest at the posterolateral corners of the head and widens considerably forwards. The shape of the pygidium cannot be outlined because the posterior portion was destroyed, but the sides are certainly convergent rearwards. Axial lobe well-defined laterally by indentated dorsal furrows and posteriorly by transverse furrow. The axial node is prominent, extending backwards from the anterior portion of the axial lobe onto the pseudolobe. Pleural platform slopes strongly downwards from the axial lobe to the border and separated from the pseudolobe by diagonal accessory furrows which extend from the posterolateral edges of the axial lobe and die out until they reached the border. Border narrow at sides.

The form described above belongs certainly to the genus *Pseudagnostus*. On account of the bad state of preservation, any definite specific identification cannot be made for present. In cephalon, it is similar to some extent to *Pseudagnostus vastulus* Whitehouse (1936, pp. 99-100, pl. 10, figs. 3-4) from the lower Upper Cambrian *Eugonocare* Stage of NE Australia in its weakly marked preglabellar median furrow, the small basal lobes and inflated cheeks, but it is easily distinguished by the faintly defined first glabellar furrow, the forward tapering cephalon and by the longer pygidium and more pronounced pygidial furrows. The present

form recalls also *P. convergens* Palmer (1955, pp. 96-97, pl. 19, figs. 14, 15) from the Upper Cambrian of North America, the pygidium of these two forms has a general outline with the sides convergent posteriorly, but the axial lobe of the American species is relatively narrower and the side lobes are wider and shorter.

Family Elviniidae Kobayashi 1935, emend. Hupé, 1955

Subfamily Elviniinae Kobayashi 1935, emend. Hupé, 1955

Genus *Eugonocare* Whitehouse, 1939

***Eugonocare* (?) sp.**

Pl. I Figs. 3, 4

The specimen is represented by a fragmentary external mould of cranium. The glabella is truncato-conical in outline, with two pairs of discontinuous glabellar furrows and well-marked occipital furrow. The brim is of moderately breadth, gently convex and strongly marked by radiating nerve lines. The border is narrow, convex and distinctly separated from the brim by an almost straight marginal furrow. The occipital ring provides a node (or spine). Palpebral lobe of median size, about $\frac{1}{3}$ the length of the glabella, connected with the glabella by well-defined ocular ridge. Anterior branch of facial sutures cuts the anterior margin more or less at right angle.

The present form resembles *Eugonocare* Whitehouse from the Upper Cambrian *Eugonocare* Stage of Australia in the general outline of the cranium, the wrinkled brim, and two pairs of glabellar furrows, but the specimen is too fragmentary to warrant even for a generic reference.

Family Leiestegiidae Bradley, 1925

Subfamily Mansuyinae Hupé, 1955

Genus *Prochuangia* Kobayashi, 1935

***Prochuangia granulosa* Lu (sp. nov.)**

Pl. I, Fig. 5

Description: Pygidium semicircular in outline, with a length of about $\frac{1}{2}$ its greatest width. Axis convex, cylindro-conical, gradually tapering rearwards to a rounded terminal end which stands at a short distance from the posterior margin, separated by six transverse furrows into six rings and a semi-elliptical articulating half-rings. Pleural portions gently convex, sharply defined by a deep and wide anterior marginal furrow from the articulating segment; first segment large, faintly marked by a shallow furrow, extending posterolaterally into a pair of lateral spines

from the middle of the lateral margin without any border or furrow. Surface marked by very faint granules and large pustules scatteredly distributed between.

Remarks: Only the holotype is present. This form is a typical *Prochuangia* Kobayashi, but differs from all other known species of this genus in its surface sculptures. It is rather similar to *P. nansuyi* Kobayashi, the genotype, from the *Prochuangia* zone of Sai-sho-ri of South Chosen and from the early Upper Cambrian of Haut-Tonkin (Kobayashi, 1935, pp. 185—187, pl. 10, figs. 1—7; pl. 8, fig. 8), but the transverse furrows on axial lobe are more deeper and wider and there are 6 axial rings instead of 5 in that species. From *Prochuangia inamurai* Endo (1944, pp. 69—70, pl. 10, fig. 12) of Paishan formation (lower part of the Changshan series of Liaoyang, Liaoning), our form is distinguished by a wider axial lobe and by the longer lateral spines.

Family Asaphidae Burmeister

Genus *Yüpingia* Lu (gen. nov.)

Diagnosis: Glabella large, well defined, subrectangular, rounded in front, with a small median tubercle on the lower half portion. Occipital furrow weak. Preglabellar field concave. Palpebral lobes large, about one-half the length of the glabella, situated at the mid-length of the cranium. Fixed cheek narrow, less than one-half the breadth of the glabella between the palpebral lobes. Anterior branches of facial sutures cutting the anterior edge of the head in a rounded curve, posterior branches sigmoid. Free cheek narrow, with genal spines. Pygidium with 5—6 axial rings and 3—4 faintly furrowed pleural ribs. Marginal border concave. Hypostoma unknown.

Genotype: *Yüpingia niobiformis* Lu (sp. nov.)

Remarks: The presence of a median tubercle, the narrow fixed cheek, the outline of the prelabellar field and the broad pygidial double range this genus with the family Asaphidae. The large palpebral lobe is a more important distinguishing feature which seems to be little known from other typical asaphids. It might be descended from the Middle Cambrian forms of the subfamily Dolichometopinae, such as *Amphoton* or *Suria* by the reduction of the palpebral lobes and by the obsolescence of furrows both on cephalon and pygidium.

Like *Charchagia* Troedsson 1937, the genus is primitive on account of its subrectangular glabella and distinct outline formed by well-defined dorsal furrows; the differences being mainly the following. In *Yüpingia* the glabella is relatively broader and has a distinct median tubercle, the palpebral lobe is large, placed closer to the dorsal furrows, and in the pygidium the axis is broader and the marginal

border is slightly concave instead of gently convex.

This trilobite resembles also the genus *Promegalaspides* Westergård 1939, a Swedish Cambrian asaphid, in the large and subrectangular glabella, in the presence of a median tubercle, in the narrow fixed cheek, and in the narrow and concave anterior border in front of the glabella. It differs in the niobiform instead of isoteliform facial sutures, in the large palpebral lobes, in the absence of glabellar furrows and a pair of triangular lobes at both sides of the occipital ring, and in the pygidium which has less well-marked pleural furrows.

In general aspect *Yüpingia* is allied to *Niobella* Reed 1913, especially ally *Niobella aurora* Westergård (1939) from the Upper Cambrian of Sweden, in which the glabella is slightly contracted at the middle and the palpebral lobes are small.

Still another allied Upper Cambrian genus is *Eoasaphus* Kobayashi 1936 (= *Anorina* Whitehouse 1936), whose genotype, *Liostracus*(?) *superstus* Linnarsson (1875), was recorded from the *Orusia lenticularis* zone of Sweden. In pygidium, the genus *Eoasaphus* agrees fairly well with our new genus *Yüpingia*, except the latter has a broader axis. As regards the cephalon the differences are conspicuous, especially in the glabella which is truncato-conical and the median tubercle is absent in the Swedish genus. Furthermore, *Eoasaphus* has well-defined glabellar furrows and a comparatively wider anterior border.

The present genus also displays characteristics appearing in various combinations in some basal Ordovician genera particularly in *Hemigyraspis* Raymond and *Norinia* Troedsson. Except their small palpebral lobe, the occipital ring of *Hemigyraspis* is entirely coalesced with the glabella, and *Norinia* is distinguished by its isoteliform facial sutures and by the presence of glabellar furrows.

***Yüpingia niobiformis* Lu (sp. nov.)**

Pl. I, Figs. 6—13

Description: Cranidium subtrapezoidal in outline. Glabella large, long, subrectangular, very slightly tapering anteriorly, strongly convex both from back to front and from side to side, occupying more than two-thirds the total length of the cranidium, rounded in front and provided a small median tubercle at the lower third of its length. Dorsal furrows well-marked, the glabella being well-defined laterally and at front. Occipital furrow shallow, faint, strongly bending backwards. Occipital ring smooth, uniform in breadth. Anterior border in front of the glabella concave, turning upwards towards the frontal margin. Palpebral lobes large, strongly curve to form a half circle, about one-half the length of the glabella, situated at an

equal distance from the frontal and posterior margins of the cranidium and close to the dorsal furrows. Fixed cheek smooth, flattened, narrow, less than one-half the width of the glabella between the palpebral lobes. Posterior limb of the fixed cheek subtriangular, about two thirds as wide as the occipital ring. Posterior border sharply defined by a wide and deep marginal furrow. Anterior branches of the facial sutures comparatively short, running from the anterior end of the palpebral lobe to cut the antero-lateral margin of the anterior border in a more or less semi-circular curve; posterior branches bending outwards and backwards to the posterior margin.

Pygidium semi-elliptical in outline, broader than long, with a length about one-half the breadth in frontal portion. Axis convex, conical, occupied one-fourth the total width of the pygidium, with 5—6 rings of which only the three anterior are well defined. Lateral lobes with 4 ribs separated by faint pleural furrows; rib furrows weak on the outer surface of the test. Marginal border slightly concave, of uniform breadth. Doublure somewhat broader than the marginal border, marked with fine concentric terraced lines parallel to the margin.

A small immature cranidium with a length of about 2.2 mm is depicted in Fig. 10 on Pl. I. In general aspect, the specimen is the same type as the adult forms, but the marginal furrow is definitely defined with the formation of a flat brim and a convex anterior border.

Pl. I, Fig. 13 shows a small free cheek with large eye. The marginal border is slightly convex and of uniform breadth. The genal spine is not preserved. But in a large fragmentary free cheek (Pl I, Fig. 12), the genal spine is long and strong.

A small pygidium with one thoracic segment attached is shown on Pl. I, Fig. 11. The pygidium, 1.2 mm long and 2.2 mm wide, differs from the adult forms in the absence of a well defined border and in having 8—9 axial rings. The thoracic segment has its axial ring narrower than the pleurae. The pleural segment is truncated at the terminal end and is marked by transverse, narrow pleural furrow.

圖 版 說 明

圖版 I

本圖版所有標本均系采自貴州玉屏萬山鎮龍田沖。各圖片均為劉雪筠同志所攝,未加任何潤飾。

圖 1—2. *Pseudagnostus* sp.

1. 頭部,放大 $\times 6$. 登記號碼: 8643.
2. 尾部外模印,放大 $\times 8$. 登記號碼: 8644.

圖 3—4. *Eugonocare* (?) sp.

3. 頭蓋,放大 $\times 2$. 登記號碼: 8645.
4. 同上,放大 $\times 2$.

圖 5. *Prochuangia granulosa* Lu (新種)

尾部,放大 $\times 5$. 正型標本. 登記號碼: 8646.

圖 6—13. *Yüpingia niobiformis* Lu (新屬,新種)

6. 頭蓋,放大 $\times 8$. 正型標本. 登記號碼: 8647.
7. 頭蓋,放大 $\times 8$. 登記號碼: 8648.
8. 尾部,放大 $\times 3$. 登記號碼: 8649.
9. 不全的尾部,放大 $\times 6$. 登記號碼: 8650.
10. 小頭蓋,放大 $\times 8$. 登記號碼: 8651.
11. 小尾部,附着一胸節,放大 $\times 8$. 登記號碼: 8652.
12. 活動頰碎片,顯示頰刺,放大 $\times 3$. 登記號碼: 8653.
13. 小活動頰及眼部,放大 $\times 8$. 登記號碼: 8654.

EXPLANATION OF PLATE I

All specimens are preserved in limestone. They originate from the Upper Cambrian (Є7) at Lung-tienchung of Yüping, eastern Kueichou and belong to the Institute of Palaeontology, Academia Sinica. Photographed by S.Y. Liu.

1—2. *Pseudagnostus* sp.

1. Cephalon, $\times 6$. Cat. No. 8643.
2. External mould of pygidium, $\times 8$. Cat. No. 8644.

3—4. *Eugonocare* (?) sp.

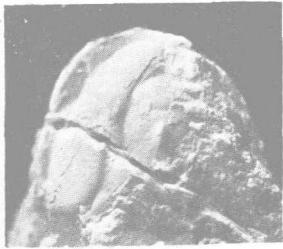
3. Cranidium, $\times 2$. Cat. No. 8645.
4. The same $\times 2$.

5. *Prochuangia granulosa* Lu (sp. nov.)

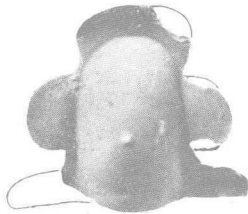
Pygidium, $\times 5$. Holotype. Cat. No. 8646;

6—13. *Yüpingia niobiformis* Lu (gen. et sp. nov.)

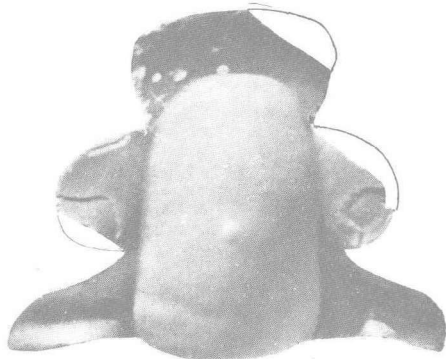
6. Cranidium, $\times 8$. Holotype. Cat. No. 8647.
7. Cranidium, $\times 8$. Cat. No. 8648.
8. Pygidium, $\times 3$. Cat. No. 8649.
9. Incomplete pygidium, $\times 6$. Cat. No. 8650.
10. Small cranidium, $\times 8$. Cat. No. 8651.
11. Small pygidium with a thoracic segment attached, $\times 8$. Cat. No. 8652.
12. Fragment of free cheek, showing genal spine, $\times 3$. Cat. No. 8653.
13. Small free cheek, $\times 8$. Cat. No. 8654.



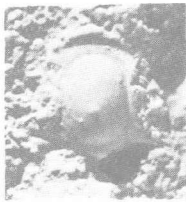
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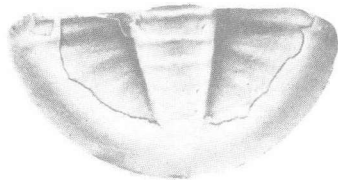
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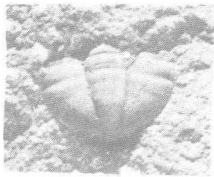
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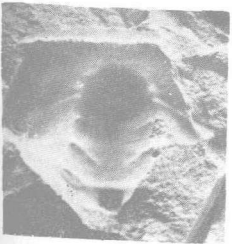
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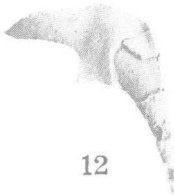
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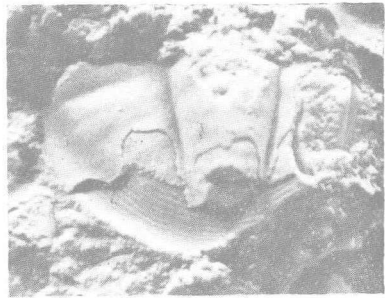
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3



12



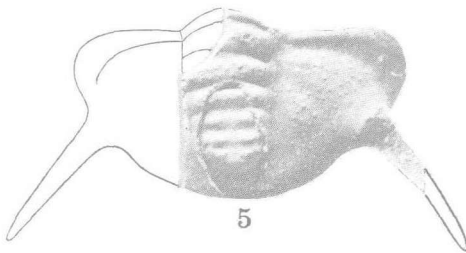
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13



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