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甘肃东部下石炭紀植物群*

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本文所描述的材料，系石油工業部地質調查队最近采集的。标本产于甘肃东部中衛及景泰二县之間，詳細地層狀况，我們还不明白，但根据其产有 *Sphenopteris* (*Rhodea?*) sp., *Triphyllopteris collumbiana* Schimper 和 *Cardiopteridium spetsbergense* Nathorst 等植物的事实，我們相信这一个含植物化石的地層是屬于下石炭紀的。

Sphenopteris (*Rhodea?*) sp.

（圖版 I，圖 1，1a）

在圖版 I，圖 1，1a 所表示的一塊 *Sphenopteris* 型的碎片是非常别致的。这一塊碎片可能代表着一个三次羽狀分裂的"蕨叶"的一部分。中軸弯曲，纖細，寬約 1 到 1.5 毫米。最后倒数第二次的羽片互生，与中軸垂直。小羽片与叶軸斜交，排列很稀，深裂而为狹細如綫的裂片。裂片的頂端尖鋭，每一裂片中間都有一条叶脉。

斯行健教授于中宁县中石炭紀所描述的一塊 *Sphenopteris* sp. b. 或多或少地和当前的标本是有些相似的。

Triphyllopteris collumbiana Schimper

（圖版 I，圖 2—4）

这一个頗具意义的种，在当前的材料中，仅發現若干碎片。小羽片互生，梨形至卵形，清楚地分成三个裂片，叶脉分叉数次，直达羽片的边緣。就一般的形态，羽片的分裂狀况及叶脉之型式而言，我們的标本極象一个著名的德国种，即 Schimper 于 Burbach 地方下石炭紀所描述的 *Triphyllopteris collumbiana* Schimper 唯一的不同之点是：当前的标本的小羽片似較德国的标本为小，这一点微小的差别，似乎是不足以当作分"种"的区别的。

这一个种曾为 Jongmans 教授(1954，第 214 頁，圖版 26 圖 40—42)描述于南美秘

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鲁国的下石炭紀中。根据 Jongmans 的意見，Read (1938)所定为 *Adiantites peruianus* 和 *A. bassleri* 的标本也是屬于 *T. collumbiana* Nathorst 的。

Cardiopteridium spetsbergense Nathorst

(圖版I，圖5—8)

屬于这一个种的标本，仅只采集到一些單独保存的，脫落的小羽片。但从它們的形狀，大小和从叶基發出的，不断地分叉的，纖細的叶脉等特征看来，即使如目前这样的碎片，还是能够鑒定的，因为它們几乎和 Nathorst 教授在斯匹茨貝根島下石炭紀植物群中所描述的很多标本完全相同。

斯行健教授所描述的，采自廣东北部測水煤系，并且暫时定名为 *Psygmophyllum?* sp.(斯行健，1943，144 頁，圖版 I，圖 12)的标本，保存很不完全，是不能作正确鑒定的。在那篇論文中(斯行健，1943，144 頁)，斯行健教授曾經指出：这一塊标本，可能是下石炭紀的一屬 *Cardiopteris* 的一枚碎片。Jongmans 在今年 2 月 6 日，致斯行健教授的一封信中說，这一塊标本很可能是屬于 *Cardiopteridium* 的。

当前的材料虽然頗为貧乏，植物化石方面的証据，都明显地直指着这一个地層是屬于下石炭紀的。*Triphyllopteris* 一屬及其标准种 *T. collumbiana* 是下石炭紀时的一种标准化石，它們曾于世界各处發現过。*Cardiopteridium* 也是下石炭紀时分布很广的一屬植物。在本文中所鑒定为 *C. spetsbergense* 的化石，和 Nathorst 教授在斯匹茨貝根島的下石炭紀地層中所描述的标本是完全相同的。*Sphenopteris* (*Rhodea?*) sp. 虽然保存非常破碎，不能作确切的鑒定，但根据它的小羽片及其裂片之形态而言，它和下石炭紀的各种是很接近的。

下石炭紀的陆相地層及其植物群的發現，迄至今日还未見报道于关于中国北方及西北部的地質文献中。所以这一个以完全欧洲型的下石炭紀份子所組成的小植物群，最近在甘肃东部之發現，是頗有重要意义的。我們希望在不久的將来，能对中国北方及西北部之石炭紀地層，作較有系統的研究，并大規模地采集植物化石，以便能对該地区的下石炭紀陆相地層的分布情况，及其植物群有更进一步的了解。

最近数年来，在前宁夏省的中宁县一帶(現屬于甘肃省)，上泥盆紀(斯行健，1954)及中石炭紀(土坡煤系屬于 Westphalian 期)(斯行健 1956，斯行健和李星学 1945)的陆相地層及其植物群，陆續地有所發現。当前的發現地点，离中宁县不过数十里左右。下石炭紀的陆相地層及其植物群的在此發現，更值得令人异常重視。显然，前宁夏省古生代的含有植物化石的地層，是从上泥盆紀开始經过下石炭紀、中石炭紀及上石炭紀而

直达二叠紀的(斯行健，1956 a，129 頁；1956 b，368—369 頁)。我們希望在宁夏省及其附近一帶，將来会找到一个自上泥盆紀至二叠紀的完整的、連續的地層剖面。同样的意見，曾为斯行健教授在他的最近的論文中說过(斯行健 1956a，129 頁；1956b，368—369)。

本文是在斯行健教授的鼓励和指导之下完成的，草成后又承仔細修改文稿，笔者謹在此致以衷心的感謝。石油工業部西北 102 地質調查队惠予标本，笔者也在这里表示感謝之忱。

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A CULM FLORULE FROM EASTERN KANSU

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The material upon which the present paper is based was collected from the localities near the boundary of Chungwei and Chingtai districts of Kansu province by a geological party of the China Petroleum Administration. The districts, Chungwei and Chingtai, belonged to the former Ninghsia province of Inner Mongolia. No stratigraphical data are readily available. The plant-bearing bed is believed to be Lower Carboniferous in age, because it yields the following char-

acteristic forms: *Sphenopteris* (*Rhodea?*) sp., *Triphyllopteris collumbiana* Schimper and *Cardiopteridium spetsbergense* Nathorst.

Sphenopteris (*Rhodea?*) sp.

Pl. I, figs. 1, 1a.

In Pl. I, figs. 1, 1a are shown a fragment of a sphenopteroid form which seems to represent a very characteristic type. It represents a tripinnate pinnae with delicate pinnules of which the lamina is strongly reduced. Its rachis is geniculate, slender, about 1 to 1.5 mm broad, from which the penultimate pinnae are alternately given off at a right angle. The pinnules or laciniae are very distant, oblique, linear, with the apex acute. Nervation is rather simple: each segment receives a single vein.

A more or less similar specimen has been recently described by Dr. Sze as *Sphenopteris* sp. b. from the Westphalian of Chungning district, Kansu province.

Triphyllopteris collumbiana Schimper

Pl. I, figs. 2-4, 2a, 4a

This very interesting species is represented by a few fragments. The pinnules are alternately disposed, pyriform or ovate, distinctly cleft into three lobes. Their veins are dichotomously forked and radiate evenly throughout the pinnules. As regard the general appearance and lobation of the pinnules and the pattern of venation, it strongly recalls the well known German species, *Triphyllopteris collombiana* Schimper, from the Culm of Burbach. The pinnules of Chinese specimens seem to be a little bit smaller than those of the German representatives (Schimper 1869—1874, Pl. 107, fig. 13).

This species has recently been described by Prof. Jongmans from Lower Carboniferous of Peru. According to Prof. Jongmans (1954, p. 214), the specimens figured by Read (1938) as *Adiantites peruianus* and *A. bassleri* belong also to this species.

Cardiopteridium spetsbergense Nathorst

Pl. I, figs. 5-8, 5a, 7a

Only a few detached pinnules of this form were gathered. They are recognizable even in small fragments because of the characteristic shape and size of the pinnules and the fine dichotomously divided veins radiating from the base. These specimens agree almost in every respect with the original material described by Prof. Nathorst from the Culm flora of spitzbergen.

A single detached pinnule described by Dr. Sze as *Psygmophyllum?* sp. (Sze, 1943, p. 144, Pl. I, fig. 12) from the Tseshui Coal Series of Kuangtung is too fragmentary preserved to be determined. Sze pointed out that the specimen might be a 'Bruchstuck' of *Cardiopteris*. In a letter to Dr. Sze dated on Feb. 6, 1956, Prof. Jongmans stated that this specimen may belong to *Cardiopteridium*.

Though the material is as yet very meagre, the evidence of fossil plants points as distinctly as possible to a Culm, i. e. a Lower Carboniferous age. The genus *Triphyllopteris*, with its type species *T. collumbiana*, is one of the most characteristic elements during the Culm time; it has been discovered from various parts of the world. The genus *Cardiopteridium* is also widely spread in the Lower Carboniferous. The specimens here determined as *Cardiopteridium spetsbergense* Nathorst agree fairly well with the original material described by Prof. Nathorst in the Culm of Spitzbergen. *Sphenopteris* (*Rhodea?*) sp. is too fragment to permit a definite determination, but in regard to the shape and the dissection of the pinnules, it is closely allied to the Lower Carboniferous forms.

The Culm flora is hitherto unknown in North and Northwestern China. The presence of a small florule of typical European aspect in Eastern Kansu is thus a matter of considerable importance. It is therefore to be hoped that an extensive search for plant fossil remains in the Culm strata of North and Northwestern China will be carried out in the near future.

In recent years, many interesting fossil plants of the Upper Devonian and Westphalian ages have been discovered (Sze and Lee, 1945; Sze 1956) from the Chungning district which is not very far from the present localities. The discovery of the Culm flora in this region deserves therefore special notice. It appears evident that the Palaeozoic plant-bearing horizons in the former Ninghsia province range from the Upper Devonian throughout the Culm, Westphalian, Stephanian or higher still into the Permian (see Sze, 1956, pp. 368-369). It is desired, therefore, to have a complete succession of these beds which may be exposed somewhere in this province and in the adjacent regions. The same view has been expressed by Dr. Sze (1956 p. 369) in one of his very recent publications.

The writer is greatly indebted to Dr. Sze for his cordial encouragement and guidance throughout this work and for the critical reading of the manuscript.

Explanation of Plate

All the figured specimens were collected by a geological party of the China Petroleum Administration from the Culm of Eastern Kansu. The illustrations are photographs by Messrs. L. H. Liu and M. F. Pang, reproduced without any retouching. If not otherwise stated, the figures are in natural size. All the specimens are kept in the Institute of Palaeontology, Academia Sinica.

Fig. 1. *Sphenopteris* (*Rhodea?*) sp.
Loc. Machang, Chingtai district.

Fig. 1a. Part of the same specimen, showing the shape and the dissection of the pinnules, ca.×3.5

Figs. 2-4. *Triphyllopteris collumbiana* Schimper
Loc. K'ushinkou, Chingtai district.

Figs. 2a, 4a. The same specimens shown in figs. 2, 4 respectively, showing the characteristic veins and pinnules that are cleft into three lobes, ca.×2.5

Figs. 5-8. *Cardiopteridium spetsbergense* Nathorst
Note the leaf-stalks of the specimens shown in figs. 5,7 and 8.
Loc. Machang, Chingtai district.

Figs. 5a, 7a. The same specimens shown in figs. 5 and 7, ca.×2.5

圖 版 說 明

所有的圖影都未加任何潤飾，攝影者刘雪筠、龐茂芳同志。假使沒有特别符号标出，所有的圖影，都是从标本原大攝取的。

圖 1. *Sphenopteris* (*Rhodea?*) sp.
地点 甘肃，中衛县，馬厂西南小溝 層位 下石炭紀。 登記号碼 *PB 2601*。

圖 1a. 自圖 1 放大，約×3.5，表示小羽片的形狀及其分裂狀况。

圖 2—4. *Triphyllopteris collumbiana* Schimper.
地点 甘肃，中衛县，馬厂西南小溝。 層位 下石炭紀。 登記号碼 *PB 2602–2604*。

圖 2a,4a. 自圖 3 及 4 放大約×2.5，表示叶脉型式，及分裂成 3 个裂片的小羽片的形态。

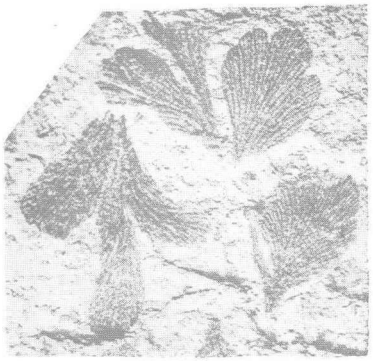
圖 5—8. *Cardiopteridium spetsbergense* Nathorst
注意圖 5,7 及 8，小羽片的"柄"。
地点 甘肃景泰苦水溝。 層位 下石炭紀。 登記号碼 *PB 2605–2608*。

圖 5a,7a. 自圖 5 及 7 放大約×2.5。表示叶脉型式。

2a ×25

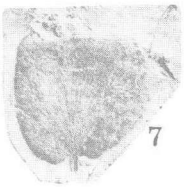
5

6



4a ×25

2



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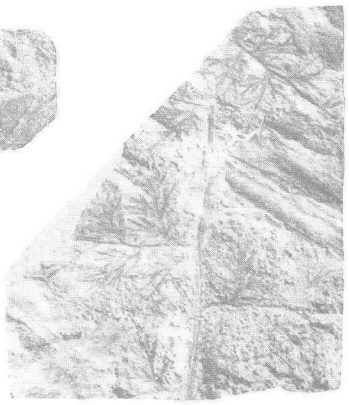

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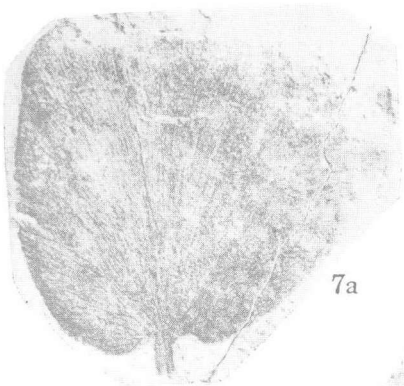

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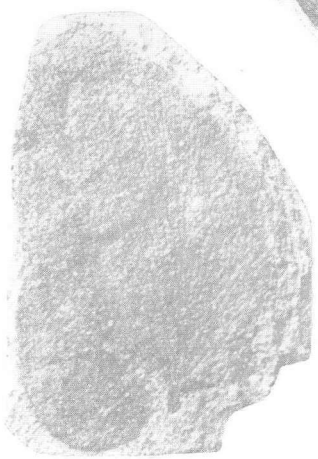

5a ×25

8

1a ×35