

甘 肅 固 原 延 長 層 的 發 現*

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这一篇短文是报告在甘肅省的固原縣于最近發現上三疊紀的延長層及其植物群的事实。化石是西北地質局第 633 隊在 1956 年所發現的。詳細地層剖面表并未寄來。但很可能的在这一帶地区上三疊紀的延長層也是直接位在侏羅紀的煤系地層之下的。因为在这來鑒定的材料中，我們也發現若干侏羅紀下部至中部的植物化石如 *Phoenicopsis* 及 *Cladophlebis* 等等。这一个地点所發現的延長層植物包括下列数种：

Neocalamites sp. (Pith-casts)*Cladophlebis shensiensis* P'an*Cladophlebis szeiana* P'an*Cladophlebis ichūnensis* Sze*Cladophlebis stenophylla* Sze*Cladophlebis* sp.*Bernoullia zeilleri* P'an*Drepanozamites* cf. *nilssonii* (Nathorst) Harris*Glossophyllum?* *shensiense* Sze

在最近出版的一本中國古生物志(总号 139 册, 新甲种第 5 号, 1956) 定名为“陝北中生代延長層植物群”的論文中, 筆者曾經描述了一个極富科学意义及兴趣的新种 *Glossophyllum?* *shensiense* Sze。根据叶的形态及体積以及叶脉, 并且根据枝軸的体積及枝軸上及很細如眼睛狀的叶痕的形态, 陝北延長層所發現的标本实在很接近欧洲奧國 Lunz 上三疊紀中部的一屬植物, 最先經 Kräusel 教授定其屬名为 *Glossophyllum*, 并且定其种名为 *G. florini* Kräusel 的 (Kräusel 1943, 第 61—72 頁)。Lunz 的标本是保存有炭質薄膜的。Kräusel 教授經用“浸解方法”研究其表皮及小气孔的構造知其和銀杏目很为接近的。很可能的 Lunz 的化石所謂 *G. florini* 是屬於銀杏目的。支持 *G. florini* 一种化石是屬於銀杏目的, 还有一个重要的証据, 即此种狹細如柄的叶的基

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部最初是僅有兩條葉脈由枝軸穿進葉基的。陝北延長層的化石都是保存黃灰色或綠灰色的砂岩中的；所有標本未曾保存炭質薄膜，因此不能利用浸解方法研究其表皮的構造，同時多數標本，葉基的保存亦不完善。將陝北的化石定其屬名為 *Glossophyllum*，我們實在不得不採取相當的保留態度的。筆者當時決定陝北的化石為 *Glossophyllum? shensiense*，這就是說此種化石是接近於 Lunz 的植物的，是否真屬於這一個屬名，是還有相當的疑問的。當開始研究當前的甘肅固原縣新發現的材料時，筆者覺得中國上三疊紀的一個新種是真的十分接近於奧國 Lunz 上三疊紀中部的 *G. florini* 的。在當前的材料中，我們發現一塊化石上面保存着三枚巨大的葉，其中有一枚葉保存着狹細如柄的葉基（本文圖版 I，圖 1）和 Lunz 的化石是完全相同的。關於 *Glossophyllum* 的“屬的特征”，Kräusel 教授曾發表於他的 1943 的論文第 71 頁。為參考方便起見，筆者特將其中重要的一部分譯述於下：“枝干部所着生的葉是作螺旋狀排列的；葉堅強，皮革狀，全緣形，或多或少成舌形，直或微彎成鐮刀形，其最寬處在其中部，頂端鈍而圓，葉向下部緩緩地狹細，最後幾乎狹細如柄狀，基部微微地較凸，在此處有兩條葉脈穿進，脈在葉的下半部分叉後，繼續地分叉，最後造成很多或多或少互相平行的平行脈。……”

本文圖版 I，圖 1 所表示的標本，其右邊的一枚葉，葉的下半部也是漸漸地向狹基狹細的，最後也是狹細成為葉柄的形態的。葉基的寬度不過 1 毫米左右。葉的頂端也是作鈍圓形的。這一個形態和 Lunz 的 *Glossophyllum* 的“屬的特征”幾乎是完全相一致的。這一枚葉的長度為 19.2 厘米，其最寬處在葉的上半部，寬度約為 2.3 厘米。葉脈為平行脈，在葉的各處繼續地分叉數次，每一厘米有脈 17—20 條。是否在葉的基部，是僅有兩條葉脈穿進的，因為保存狀況的關係，我們還不敢作最後的決定，但其可能性是很大的。上面已經提及，當前的化石葉基的寬度不過 1 毫米左右，那末在我們的種，和 Lunz 的種一樣，在其基部是僅有兩條葉脈，不是完全不可能的。當前的化石我們也曾作過浸解方法但未曾成功；因為受葉的保存狀況的限制。最後我們覺得當前的化石其表皮及小氣孔的構造還未曾明了，完全定其屬名為 *Glossophyllum* 是還須加以保留的態度的，因為在中生代的地層中外表形態大致相同的葉部化石實在是很多的。在 Kräusel 教授最近發表的一篇論文（1956，第 17—21 頁，插圖 9）中，敘述了很多在瑞士 Basel 上三疊紀中部的葉部化石。這些葉部化石其外表形態幾乎是完全和 Lunz 的同時代的地層所發現的 *G. florini* 是相同的；但其表皮構造是接近於松柏目的。Kräusel 因此定 Basel 的標本為 *Desmiophyllum imhofi* (Heer) Florin。我們實在看不出所謂 *D. imhofi* 如果僅僅根據葉的外表形態和 *G. florini* 有多少區別的。

當前的地點所發現的 *Drepanozamites* cf. *nilssonii* (Nathorst) Harris 甚為重要，因

为这一个种在陕北延長層中迄今还未曾發現。这一个种和陕北所發現的 *Drepanozamites? p'ani* Sze 的最重要的区别是在其每一个裂片中并没有一条中脉的。它的叶脉是标准的扇狀脉,因此比較接近于瑞典及格陵蘭的种。因为标本僅找到一塊,并且保存太为破碎,筆者暫加一个 cf. 的符号于种名之前。

在材料中,我們曾找到很多种 *Cladophlebis*, 这些种都是标准的陕北延長層的化石,如: *Cl. saeiama*, *Cl. ichimensis*, *Cl. stenophylla*……等等。*Cl. shensiensis* 在材料中,僅僅找到一塊很小的碎片,不易攝影,但其叶脉甚为标准。圖版 II, 圖 7 所發現的另一塊碎片其叶脉也接近于 *Cl. shensiensis* 的,但其小羽片的形态不够标准,我們暫定为 *Cladophlebis* sp.

Neocalamites 僅發現髓部石核,其形态和体積和陕北延長層所發現的,尤其和最近發表的中國古生物志总号 139 册圖版 VII, 圖 1, 1a; 2, 2a 所表示的标本完全相同。

在陕北延長層植物群中的許多最具特征的并且最重要的植物之一是一种蕨类名 *Bernoullia zeilleri* P'an. 这一种植物在当前的材料中發現很标准的裸羽片(本文圖版 II, 圖 11) 和实羽片化石(本文圖版 II, 圖 10)。

在 1951 年發表的一篇論文中斯行健和李星学 (Sze & Lee 1951, 第 86—91, 圖版 I, 圖 1—9, 插圖 1) 曾报告了在甘肅东部的華亭縣及西部的武威縣發現延長層及其植物群的重要意义。在这篇論文中,斯和李也曾發表一个華亭縣城附近的地層剖面,在这个剖面中,下侏罗紀的煤系地層所謂安口窑煤系的繼續地几乎是整合地复在延長層之上,其情况和陕西北部完全相同。甘肅所發現的延長層植物群,經斯行健和李星学所鑒定者有下列各种:

Danaeopsis fecunda Halle

Bernoullia zeilleri P'an

Cladophlebis shensiensis P'an

Cladophlebis grabauiana P'an

Cladophlebis cf. *roesserti* Zeiller (= *Cl. shensiensis* P'an)

Neocalamites carrerei (Zeiller)

Equisetites sp.

Taeniopteris sp.

Desmiophyllum sp.

最重要的事实是在甘肅东部,上三叠紀的延長層和复在其上的下侏罗紀的安口窑煤系的繼續沉積的情况和陕北完全相同。在陕北方面直复在延長層之上的地層是瓦窑

堡煤系(狭义的)。甘肃东部的安口窑煤系,其时代显然是和陕北瓦窑堡煤系完全相等的。上面已经提及,在甘肃固原一带我们还未曾得到一个详细的地层剖面,但在此一带直复在延長層之上的地层也显然是一个属于下侏罗纪(至中侏罗纪)的煤系地层,因为在材料中我们也会找到几块侏罗纪的标准化石、*Phoenicopsis* 和 *Cladophlebis*, 在原来的标签上,采集者自己也定为是属下侏罗纪的。甘肃固原一带的下侏罗纪煤系地层,其时代也显然是和甘肃东部华亭一带的所谓安口窑的时代是大致相等的。

延長層在甘肃一带的分布显然是很广的。我们在最近寄来鉴定的属于甘肃北部景泰县的材料中,找到了几块 *Danaocopsis fecunda* 的实羽片和裸羽片化石以及 *Neocalamites* 等化石。*D. fecunda* 的实羽片及裸羽片化石我们特表示于本文图版 II, 图 10—11 上。此种实羽片化石其形态及孢子囊的保存状况和甘肃西部武威县所发现的,曾经斯行健和李星学在 1951 年所发表的是完全相同的。就甘肃而言,我们已经知道延長層的分布由东部,北部而直至西部,经华亭西至固原又西北至景泰再西至武威。可能其他地点还会继续发现延長層及其植物群。至于前宁夏省(现大部分已划归甘肃省),阿拉善旗的发现厚达 1000 米以上的不含煤系的陆相地层,根据岩石性质及其所含的植物化石是属于延長層的事实,已经周志炎和张善楨报道过了(1955, 第 53—60 页,图版 I, 图 1—8)。

最有意义的是在最新寄来鉴定的一批材料中,我们已经证明在新疆准噶尔盆地也发现延長層及其标准植物化石,并且我们还能够证明在此一带直复在延長層之上的也是属于下侏罗纪至中侏罗纪的煤系地层的。因此上三叠纪的延長層的横的分布,我们现在已经知道可自苏联的哈萨克盆地西部经过新疆西北部的准噶尔盆地东至甘肃西部、北部、东部及前宁夏省的阿拉善旗至陕西的北部而至山西及陕西的边境。本文作者将为此种发现另作一文发表于下期古生物学报中。

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ON THE OCCURRENCE OF THE YENCHANG FORMATION IN KUYÜAN DISTRICT, KANSU PROVINCE

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(Summary)

The present brief communication is published in order to demonstrate a small florule recently found from the Yenchang Formation in the Kuyuan district of the Kansu province. No data of stratigraphical sequence of this region are readily available for the present. It seems however possible that the Yenchang Formation of this region is also overlain by a coal series of the Liassic-Dogger Age, because several fragments of *Phoenicopsis* and *Cladophlebis* of the Jurassic type are present in the material sent to the writer for determination. The Yenchang florule consists of the following forms:

Neocalamites sp.

Cladophlebis shensiensis P'an

Cladophlebis szeiana P'an

Cladophlebis ichiuenensis Sze

Cladophlebis stenophylla Sze

Cladophlebis sp.

Benoullia zeilleri P'an

Drepanozamites cf. *nilssoni* (Nathorst) Harris

Glossophyllum? *shensiense* Sze

When the writer undertook the study of the flora of the Yenchang Formation in Northern Shensi, which culminated in *Palaeontologia Sinica*, Whole Series 139, New Series A, No. 5, Academia Sinica, a new species of *Glossophyllum?* *shensiensis* Sze was figured and described. In the size, in the general shape of leaves and in

venation as well as in the shape and size of the twigs, the specimens found from the Yenchang Formation of Northern Shensi bear indeed a considerable resemblance to those found from the Middle Keuper of Lunz in Australia, which were originally described by Prof. Kräusel (1943, p. 61-72) as a new genus *Glossophyllum*. Since the characteristic cuticular structure of our specimens is unknown and the preservation of most specimens is very unsatisfactory, the assignment of our specimens to the genus *Glossophyllum* must accept with a considerable reservation. The writer brought the specimens of Northern Shensi into comparison with the genus of Kräusel and named them *Glossophyllum? shensiense* sp. nov. awaiting better material from the localities. In the study of the present material, it became obvious that the Chinese species is really closely allied to the species of Lunz, because in the present material there is a specimen (Pl. 1, fig. 1 in the present paper) which shows the very characteristic narrow and slender leaf base of the Lunz specimens. The generic diagnosis of *Glossophyllum*, as defined by Kräusel, is as follows: "Triebe mit spiralig stehenden Blätter, diese steif, lederig, ganzrandig, ± zungenförmig, gerade bis sichelförmig gekrümmt, im mittleren Teil am breitesten, an der Spitze gerundet, im unteren Teil allmählich schmaler werdend und schliesslich fast stielartig verschmälert, am Grunde leicht angeschwollen, hier von zwei Bündeln durchzogen, deren im unteren Teil stattfindende Gabelteilungen schliesslich eine mässige Anzahl ± paralleler Bündel ergeben....." As shown on Pl. 1, fig. 1 in the present paper, a detached leaf attains a length of 19.2 cm and breadth of 2.3 cm. The lamina tapers very gradually to a very narrow and slender stalk-like base (ca. 1 mm in breadth) and is rapidly contracted to a broadly rounded apex. It is characterized by longitudinal veins which are about 17-20 in number to 1 cm, and bifurcate in several times at various points of the lamina. Whether there are also only two veins placed side by side entering the stalk-like leaf-base is difficult to decide, owing to the state of preservation. Macerations of the fossil material were attempted without success. The possibility of an affinity of our species to the Lunz plant cannot be denied; but since the cuticular structure is unknown, the generic reference of our species to *Glossophyllum* is still not warranted. There are a great number of more or less similar band-shaped leaves scattered throughout the Mesozoic formations. And from the Basler Keuper of Neuwelt in Switzerland, Prof. Kräusel (1955, p. 17-29, text fig. 9) described very recently many similar leaves under the name of *Desmiophyllum imhoffi* (Heer) Florin, which differs very little from *Glossophyllum florini* in the shape and size of the leaves (Prof. Kräusel himself said: "Im ganzen ist das gleiche

Gestalt, wie sie auch *Glossophyllum florini* besitzt.") The stomatal structure of that form is, however, according to Kräusel, more closely allied to the conifers.

The occurrence of *Drepanozamites* cf. *nilssoni* (Nath.) Harris in the present material is of interest. This species differs from *Drepanozamites?* *p'ani* Sze from the Yenchang Formation of Northern Shensi in the complete absence of a midrib in the segments.

In the material, there occur many characteristic species of *Cladophlebis* of the Yenchang Formation of Northern Shensi, namely, *Cl. szeiana*, *Cl. ichünensis*, *Cl. stenophylla*, etc. A small specimen of *Cl. shensiensis* P'an is too fragmentary to be figured.

Several specimens of pith-casts of the *Neocalamites*-type are also present in the material; the specimens are identical in all respects with those found from the Yenchang Formation of Northern Shensi figured by the writer in Pl. VII, figs. 1, 1a, 2, 2a in the memoir published in July, 1956.

One of the most characteristic species of the Yenchang Formation of Northern Shensi is *Bernoullia zeilleri* P'an which is represented in the present material by both sterile and fertile specimens.

The occurrence of the Yenchang Formation in the Hwating District of Eastern Kansu and in the Wuwei District of Western Kansu has been announced by Sze and Lee in the paper published in 1951. The following species are discriminated:

Danaeopsis fecundula Halle

Bernoullia zeilleri P'an

Cladophlebis shensiensis P'an

Cladophlebis grabauiana P'an

Cladophlebis cf. *roesserti* Zeiller (= *Cl. shensiensis* P'an)

Neocalamites carrerei (Zeiller)

Equisetites sp.

Tacniopteris sp.

Desmiophyllum sp.

Of special importance is the fact that the stratigraphical sequence of Eastern Kansu is exactly similar to that of Northern Shensi. In the geological section published by Sze and Lee (1951, p. 90) in the Hwating District of Eastern Kansu, the continuous succession of the overlying lower Jurassic Coal Series and the underlying Upper Triassic plant-bearing Yenchang Formation is clearly illustrated. As has already been mentioned, there are several specimens of *Phoenicopsis* and *Cladophlebis* of the Jurassic type present also in the material. It seems therefore highly

possible that in this region, too, the Upper Triassic Yenchang Formation is overlain by a Jurassic Coal Series which in age, corresponds in a general way with the so-called Ankouyao Coal Series of Eastern Kansu as well as with the Wayaopu Coal Series (sens. restr.) of Northern Shensi. The Yenchang Formation seems to be very widely spread in the Kansu province. In the material recently discovered from the Tsintai District of Northern Kansu, the writer noticed a few specimens which definitely belong to the Yenchang Formation. The interesting fragments of both fertile and sterile pinnae of *Daraeopsis fecunda* Halle found from this region is figured in the present paper (Pl. II, figs. 10-11). The Yenchang Formation is thus rather widely spread in the Kansu province from the Wuwei District in the west, through Tsintai and Kuyüan Districts eastwards to the Hauting District. The occurrence of the Yenchang Formation of the former Ninghsia province in Inner Mongolia has been reported by Chow & Chang (1956, p. 53-60, Pl. 1, figs. 1-8) in a paper published in *Acta Palaeontologia Sinica*. The great part of this region now belongs to the Kansu province.

Finally, it should be of special interest to point out that in the material recently discovered from the Dzungaria Basin in North-western Sinkiang, the present writer found many interesting and characteristic fossils plants of the Yenchang Formation. Also in this region the Yenchang Formation is overlain by the Liassic-Dogger coal-bearing series. The Yenchang Formation thus extends from Western Karakatan (U.S.S.R.), through the Dzungaria Basin in Northwestern Sinkiang to Kansu, Ninghsia, Northern Shensi, as far as the Shensi-Shansi border. The writer will report and describe the interesting occurrence of the Yenchang flora in the Dzungaria Basin with special reference to its stratigraphical and geographical significance in a separate paper, which will be published in Vol. 4, No. 4 of the *Acta Palaeontologia Sinica*.



圖版 II

圖 1—3. *Bernoullia zeilleri* P'an

圖 1. 裸羽片化石 (Sterile specimen)

圖 2—3. 实羽片化石 (Fortile specimens)

地点: 甘肅固原納水峽 (Loc. Jui-shui-hsia, Kuyüan District)

地層: 延長層, 可能为上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2568—2569。

圖 4. *Cladophlebis szeiana* P'an

实羽片化石 (Fertile specimen)

地点: 甘肅固原納水峽 (Loc. Jui-shui-hsia, Kuyüan District)

地層: 延長層, 可能为上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2570。

圖 5. *Cladophlebis ichüensis* Sze

裸羽片化石 (Sterile pinna)

地点: 甘肅固原納水峽 (Loc. Jui-shui-hsia, Kuyüan District)

地層: 延長層, 可能为上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2571。

圖 6. *Cladophlebis stenophylla* Sze

裸羽片化石 (Sterile pinna)

地点: 甘肅固原安口窰西南 (Loc. SW. from An-kou-yao, Kuyüan District)

地層: 延長層, 可能上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2572。

圖 7. *Cladophlebis* sp.

裸羽片化石 (Sterile pinna-fragments)

地点: 甘肅固原納水峽 (Loc. Jui-shui-hsia, Kuyüan District)

地層: 延長層, 可能为上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2573。

圖 8. *Drepanozamites* cf. *nilssoni* (Nath.) Harris

地点: 甘肅固原納水峽 (Loc. Jui-shui-hsia, Kuyüan District)

地層: 延長層, 可能为上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2574。

圖 9. *Neocalamites* sp.

髓部石模 (Pith-cast)

地点: 甘肅固原納水峽 (Loc. Jui-shui-hsia, Kuyüan District)

地層: 延長層, 可能为上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2575。

圖 10—11. *Danaeopsis fecunda* Halle

圖 10. 实羽片化石 (Fertile pinna)

圖 11. 裸羽片化石 (Sterile pinna-fragments)

地点: 甘肅景泰羅家灣西南約 2 公里的苦水溝 (Loc. Ku-shui-kou, Tsintai District)

地層: 延長層, 可能为上部 (Yenchang Formation, probably upper part)

登記號碼: PB 2576, 2577。

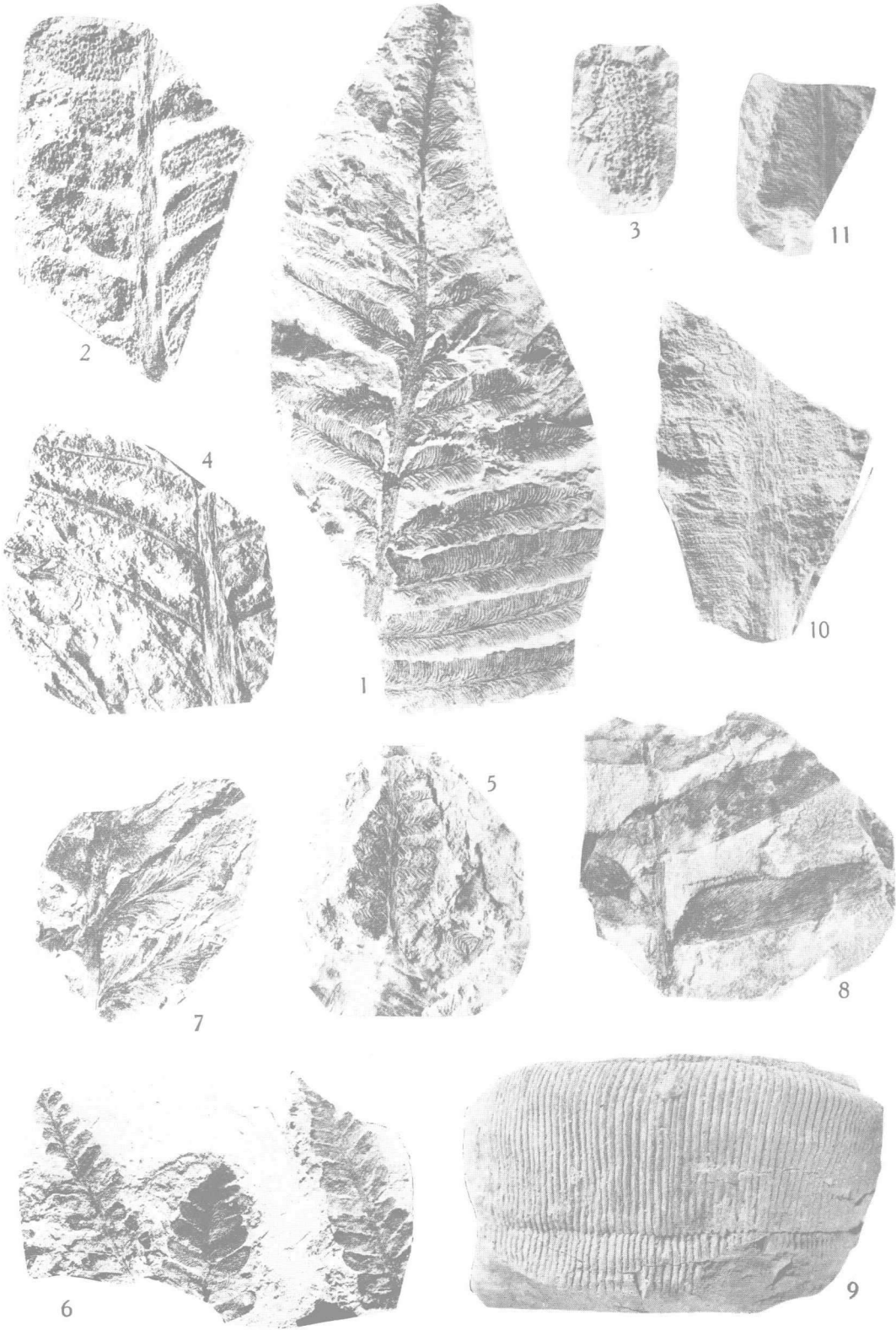


圖 版 說 明

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圖版 I

圖 1. *Fistulipora cf. irregularis* Yang

- 1a. 弦切面, 表示虫室形狀不一, 大小不勻, 體壁上顏色淡的地方是月牙構造。泡狀組織的形狀和大小不規則, $\times 20$ 。
- 1b. 弦切面, 同一標本局部放大, 更清楚的表示月牙構造比體壁的顏色淡, $\times 35$ 。
- 1c. 縱切面, 虫管內具稀而細的橫板; 管壁一邊直, 另一邊彎曲, $\times 20$ 。

登記号 8069, 采集号 BE 233。

圖 2. *Fistulipora frondosa* Yang (新种)

- 2a. 弦切面, 表示室壁有加厚現象, 管內具彎曲橫板; 泡狀組織的形狀小; 月牙構造小, 顏色較體壁深, $\times 20$ 。
- 2b. 同一弦切面, 局部放大, $\times 35$ 。
- 2c. 縱切面, 虫管內橫板及彎曲橫板的數目較其他种多, $\times 20$ 。
- 2d. 同一縱切面局部放大, $\times 20$ 。

登記号 8041 (全型), 采集号 BE 232。

圖 3. *Fistulipora leei* Yang (新种)

硬体原大 (全型), 登記号 8045, 采集号 BE 233a。