

## Palæozoic Plants from China.

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*With 7 plates.*

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The Palæozoic plants treated of in the present paper are those which were mostly collected by our geologists in Southern Manchuria, during the Japanese occupation of that country in the late Russo-Japanese war, together with those of the Mesozoic on which I published a memoir<sup>1)</sup> in this journal, more than a year ago. A few of them, however, are from other parts of China, also brought back by our countrymen, during the war.

The plants distribute themselves in the following localities:

### I. Yen-tai, Shêng-ching-Shêng.<sup>2)</sup>

This is a well known coal-field in Southern Manchuria, north of Liao-yang and east of the South-Manchurian Railway. M. ZALESSKY<sup>3)</sup> of the Geological Survey of Russia had already studied the plants of this place collected by EDELSTEIN in 1903, and distinguished the following species:

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1) Mesozoic Plants from China. Art. 9, Vol. XXI.

2) 盛京省煙臺

3) Michael Zalesky. Notiz über die obercarbonische Flora des Steinkohlenreviers von Jantai in der südlichen Mandshurei. Verh. Kais. Russ. Mineral. Gesells., II. Serie, Bd. XLII.

1. *Odontopteris Reichiana* GUTB. .
2. *Callipteridium gigas* GUTB.
3. *Pecopteris cyathea* (SCHLOTH.).
4. *Calamites* SP.
5. *Sphenophyllum oblongifolium* (GERM.).
6. *Lepidodendron oculis-felis* (ABB.).
7. *Stigmaria ficodes* STERNB.
8. *Cordaites principalis* (GERM.).
9. *Plagiozamites Planchardi* (REN.).

According to ZALESSKY, these plants were obtained from shales and shaly sandstones between the so called No. 6 and No. 7 coal-layers of the place.

Our specimens brought back by MESSRS. OGAWA and FUKUCHI consist of the following forms :

1. *Calamites* SP.
2. *Calamites* ? SP.
3. *Annularia stellata* (SCHLOTH.).
4. *Neuropteris flexuosa* STERNB.
5. *Neuropteris Scheuchzeri* HOFFM.
6. *Pecopteris cyathea* (SCHLOTH.).
7. *Lepidodendron oculis-felis* (ABB.).
8. *Sigillaria* SP.
9. *Cordaites principalis* GERM.

The fossil-bearing rocks are with one exception a black carbonaceous shale. The exception is a yellowish weathered sandstone with an impression of a *Lepidodendron*<sup>1)</sup> with I have determined as probably belonging to *L. oculis-felis* (ABB.).

Of the six determinable species above mentioned, three are

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1) Fig. 1, pl. III.

not in ZALESSKY'S collection. They are *Annularia stellata*, *Neuropteris flexuosa* and *Neuropteris Scheuchzeri*.

ZALESSKY has already arrived at the conclusion that the Yen-tai flora is Stephanian or Upper Carboniferous, and that the occurrence of such forms as *Plagiozamites Planchardi* and *Lepidodendron oculis-felis* points to the uppermost part of the above named stage. The newly found *Annularia stellata* which ranges between Westphalian or Middle Carboniferous and Permian greatly favours this view; while the two forms of *Neuropteris*, *N. flexuosa* and *N. Scheuchzeri* which are both found in the Westphalian as well as in the Stephanian, but do not go higher than the lower part of the latter, seem not in perfect harmony with it. But it must be remembered that our materials were obtained from the waste scattered near the mouth of the shaft, and it is not known whether they belong to the same horizon as those of ZALESSKY, or even, whether they are from a single horizon or not. The presence of the yellowish plant-bearing sandstone above mentioned shows that there are at least two such horizons. Under these circumstances, I deem it advisable at present to consider our plants as simply Stephanian.

## II. Pen-hsi-hu, Shêng-ching-Shêng.<sup>1)</sup>

This is a coal-field of Southern Manchuria, west of Liao-yang<sup>2)</sup> and not far to the north of the river T'ai-tzu.<sup>3)</sup> The plants of this place had been collected long ago by RICHTHOFEN and studied by SCHENK who distinguished the following species:

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- 1) 盛京省本溪湖
  - 2) 遼陽
  - 3) 太子河

1. *Neuropteris flexuosa* STERNB.
2. *Tæniopteris multinervis* WEISS.
3. *Pecopteris arborescens* (SCHLOTH.).
4. *Callipteridium orientale* SCHENK.
5. *Lepidophyllum* SP.
6. *Cordaites principalis* (GERM.).
7. *Samaropsis affinis* SCHENK.
8. *Pterophyllum carbonicum* SCHENK.

I obtained only four plants, all contained in a dark micaceous shaly sandstone or sandy shale; viz.,

1. *Calamites Cistii* BRGT.
2. *Annularia stellata* (SCHLOTH.).
3. *Pecopteris arborescens* (SCHLOTH.).
4. *Cordaites principalis* GERM.

SCHENK took the Pen-hsi-hu plants as somewhat younger than those of the other places in China then studied by him, and seems to have meant by it the Upper Carboniferous. ZEILLER, however, who considers SCHENK'S *Neuropteris flexuosa* as belonging to *Neuropteris Matheroni* ZEILL., a species found only in the uppermost Stephanian, is of opinion<sup>1)</sup> that the flora of Pen-hsi-hu is probably Permo-Carboniferous. In this he relies, among others, on *Tæniopteris multinervis*, form hitherto found not lower than the lowest Permian. The two forms newly added by our collection have nothing against this assumption. *Calamites Cistii* which is found in the Westphalian as well as in the Stephanian goes up to the highest part of the latter, while *Annularia stellata*, as already mentioned, is Permian as well as Carboniferous. Therefore respecting the age of the Pen-hsi-hu flora, I follow the opinion of the learned French palæobotanist above mentioned.

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1) Note sur la Flore Houiller du Chansi, Annales des Mines, Livr. d'Avril, 1901.

### III. Ta-p'u Ching-ching-Ting, Shêng-ching-Shêng.<sup>1)</sup>

The coal-field of Ta-p'u is situated about 11 kilom. west of the town of Hsien-ch'ang<sup>2)</sup> in the south-eastern part of Shêng-ching. According to Mr. OINOUE who collected the plants, the coal-bearing series is made up of grey shales and sandstones, underlaid by a brown-coloured sandstone below which there is a dark limestone, and overlaid by a conglomerate. The coal-seams are only two, the upper measuring about 0.6 m and the lower 1-1.2 m in thickness. The coal is said to be a sort of readily friable anthracite.

The plants occur in a dark grey shale, and consist of a few fragments of a *Calamite* which presents some resemblance to *Calamites Suckowi* Brgt. of the Stephanian. But whether they are Stephanian or Permo-Carboniferous like those of Pen-hsi-hu, it is at present not possible to determine.

### IV. Ssu-ping-chieh, Ching-ching-Ting, Shêng-ching-Shêng.<sup>3)</sup>

About 23 kilom. east of Hsien-ch'ang, there is a place called Ssu-ping-chieh near which there are two seams of semi-anthracitic coal, 0.4 m and 1.2-1.5 m in thickness. They are in a series consisting of sandstones and shales covering a dark limestone. The sandstones are described as brown-coloured, while the shales are said to be either grey or purplish-red.

The plants which I received from Mr. OINOUE, who visited

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1) 盛京省興京廳大堡 (田子付溝ノ一小地)

2) 城廠

3) 盛京省興京廳四平街

the place, are contained in a dark-greyish, micaceous, shaly sandstone, having a slight purplish tint. They are very numerous, but all belong to the single species of *Cordaites principalis* GERM. From this, I can only infer that the age is either Westphalian or, more probably, Stephanian. But it is also not impossible that the plant-bed is Permo-Carboniferous, as the above species also occurs at Pen-hsi-hu.

#### V. Ching-ching, Tung-kuan, Chih-li-Shêng.<sup>1)</sup>

Prof. YAMASAKI of the Tokyo Higher Normal School who visited China in 1905 brought from the above place a piece of a light grey to whitish, micaceous, fine-grained, platy sandstone and several small pieces of weathered shales, in the former of which there is an impression of the so-called *Knorria Sellonii* STERNB. In the shales there are many indistinct remains of leaf-fragments, among which I believe I discern a species of a *Pecopteris*-like fern, which is however quite indeterminable.

As *Knorria* is now generally acknowledged to be only a state of subepidermal preservation of *lepidodendroid* plants such as *Lepidodendrons* and *Bothrodendrons*, the age of the fossil can only be said to be Palæozoic from Devonian upward.

#### VI. Hsiang-t'ang, Fêng-chêng-Hsien, Nan-ch'ang-Fu, Chiang-hsi-Shêng.<sup>2)</sup>

A piece of a sandstone brought from the coal-field of the above place by Mr. Y. ISHII shows an imperfect impression of a

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1) 直隸省東關井陘

2) 江西省南昌府豐城縣鄉塘

*Lepidodendron*-like plant which is quite indeterminable. But so far we may be sure, that it belongs to the upper half of the Palæozoic, and very likely either to the Carboniferous or to the Permo-Carboniferous.

Tabular View of the Fossil Plants.

SPECIES OF PLANTS.	Yen-tai.	Pen-hsi-hu	Ta-p'u	Ssu-ping-chieh	Ching-ching	Hsiang-t'ang	Carboniferous			Permian
							Lower	Middle	Upper	
EQUISETACEÆ.										
1. <i>Calamites Cistii</i> BRGT.		+						+	+	
2. <i>Calamites</i> SP.			+							
3. <i>Calamites</i> SP.	+									
4. <i>Calamites?</i> SP.	+									
5. <i>Annularia stellata</i> (SCHLOTH.).	+	+						+	+	+
FILICES.										
6. <i>Neuropteris flexuosa</i> STERNB.	+							+	+	
7. <i>Neuropteris Scheuchzeri</i> HOFFM.	+							+	+	
8. <i>Pecopteris cyathea</i> (SCHLOTH.).	+								+	
9. <i>Pecopteris arborescens</i> (SCHLOTH.).		+							+	
LYCOPODIACEÆ.										
10. <i>Lepidodendron oculis-felis</i> (ABR.).	+								+	
11. <i>Lepidodendron</i> SP.						+				
12. <i>Lepidodendron?</i> SP.					+					
13. <i>Sigillaria</i> SP.	+									
CORDAITEÆ.										
14. <i>Cordaites principis</i> (GERM.).	+	+	+	+				+	+	

## DESCRIPTION OF THE SPECIES.

## I. Yen-tai, Shêng-ching-Shêng.

## 1. CALAMITES SP.

Pl. II. Figs. 6.

Fragments of an equisetaceous plant, probably of a *Calamite*.

The one represented on the right side of the figure is a stem 30 mm broad, with almost flat ribs which measure 1–2 mm in breadth and are separated by shallow, but distinct, grooves. The stem to the left of the above seems to belong to the same plant, though its breadth is not quite 20 mm.

The form of the ribs reminds us of those of *Calamites Suckowi* BRGNT. of the Upper Carboniferous.

## 2. CALAMITES? SP.

Pl. I. Figs. 1, 2.

Fig. 1 represents a piece of stone with two fragments of stems, one of which measures 170 mm in length and 62 mm in greatest breadth. The nodes are wanting in both.

The ribs, where they are well preserved, are convex, about 4 mm. broad and furnished with coarse, unequal longitudinal striations, 5–6 in number.

Fig. 2 shows a smaller specimen which presumably belongs to the same plant. The ribs are indistinct, but the striations are coarse and distinct.



**3. ANNULARIA STELLATA** (SCHLOTH.).

Pl. III. Figs. 4, 6.

*Annularia stellata* ZEILLER, Explication de la Carte Géologique de la France, vol. IV, part 2, p. 26, pl. CLX, figs. 2-3. KIDSTON, Catalogue of the Palæozoic Plants in the Department of Geology and Palæontology, British Museum, p. 45.

*Annularia longifolia* BRONGNIART, Prodrome, p. 156. RENAULT, Cours de Botanique Fossile, p. 126, pl. XX, fig. 1.

Very frequent, although in a fragmentary state.

This species is characterized by long narrow pointed leaves, up to 2 mm in breadth and numbering, as ZEILLER says, 24-30 in a verticill. The verticills are close together.

The species occurs in Europe not only in the Coal-Measures, but also in the Permian.

**4. NEUROPTERIS FLEXUOSA** STERNB.

Pl. II. Figs. 1, 1a, 2, 3, 7a. Pl. III. Fig. 3a.

*Neuropteris flexuosa* STERNBERG, Versuch einer geog. botan. Darst. d. Fl. d. Vorw., fasc. IV, p. 16. BRONGNIART, Hist. Végét. I, p. 239, pl. LXVIII, fig. 2, LXV, 2, 3. SCHENK, Richthofen's China, vol. IV, p. 217, pl. XLIII, fig. 1-18, p. 237, pl. XXXI, fig. 3 df, XXXII, 1-3.

This fern which has been already described by SCHENK from Pen-hsi-hu in Shêng-ching, Kai-ping<sup>1)</sup> in Chih-li and Lui-pa-kou in Hu-nan<sup>2)</sup> is very frequent at Yen-tai, although in a more or less fragmentary state.

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1) 直隸省開平

2) 湖南省 (ルイパーコウの漢字不明)

The pinnules are oblong, obtuse or rounded at the apex ; often a little falcate, and generally about twice as long as they are broad. They are very close together, even overlapping a little. The basal ears which are slightly unequal are more or less distinct. The terminal pinnule which is preserved only in a single specimen (fig. 2.) is cuneate at base, while anteriorly it narrows abruptly. The apex is unfortunately lacking.

The venation with the exception of the midrib in most of the pinnules is indistinct. But by a proper illumination, one can observe the finer veins arranged in the typical "*Neuropteris*" style.

One of the specimens, also from Yen-tai and described by ZALESKY as *Odontopteris Reichiana* GUTB. (Notiz üb. d. Obercarb. Flora v. Jantai, p. 389, fig. 1.) seems to me to belong to this species.

A lacinated leaf represented in fig. 3, pl. II is an *Aphlebia* probably belonging to the above species, having been found amongst the frond-fragments of the latter.

##### 5. **NEUROPTERIS SCHEUCHZERI** HOFFM.

Pl. II. Fig. 7b.

*Neuropteris Scheuchzeri* HOFFMANN in KEFERSTEIN'S *Teutschland geogn.—geolog. dargest.*, vol. IV, p. 157, pl. 1b, figs. 1-4. ZEILLER, *Bassin Houiller de Valenciennes*, p. 251, pl. XLI, figs. 1-3.

*Neuropteris angustifolia* BRONGNIART, *Hist. Végét. Foss.*, I, p. 231, pl. LXIV, figs. 3, 4.

A single, isolated pinnule lacking both apex and base. But from its lanceolate shape, apparently acuminate apex and the characteristic venation, there is hardly any doubt about its belong-

ing to the above named species. The bristles which are said to be so characteristic of this plant are not clearly seen, although in some parts of the pinnule, there are indistinct objects which may be regarded as such.

## 6. *PECOPTERIS CYATHEA* (SCHLOTH.).

Pl. II. Figs. 5.

*Pecopteris cyathea* ZALESSKY, Notiz. üb. d. Obercarbon. Flora d. Steinkohlenrev. v. Jantai in der südlich. Mandshurei, p. 391, fig. 5. ZEILLER, Expl. d. la Carte Géol. d. la France, vol. IV, part 2, p. 82, pl. CLXIX, figs. 5a, 6. BRONGNIART, Hist. Végét. Foss., I. p. 307 pl. CI.

*Filicites cyatheus* SCHLOTHEIM, Petrefaktenkunde p. 403. Flora der Vorwelt, pl. VII.

There is only a single fragment of a pinna with about 6 pinnules, all on one side of a rachis, to which they are attached by the whole base and at a very broad angle. These pinnules are close together, finger-like in shape, about 8 mm long and 2 mm broad, and obtuse at apex. The venation is indistinct, yet so far as can be made out with a lens, the secondary veins which are given off at a very wide angle from the midrib are dichotomous. I believe that this fern, fragmentary as it is, belongs to the above named species already described by ZALESSKY from the same place.

## 7. *LEPIDODENDRON OCULIS FELIS* (ABBADO.).

Pl. III. Figs. 1, 5.

*Lepidodendron oculis felis* ZALESSKY, Notiz über die Obercarbon. Flora des Kohlenreviers von Jantai, p. 393, text-figs: 7-9. ZEILLER, Note sur la Flore Houillère du Chansi, p. 434, pl. VII, figs. 1-6.

*Sigillaria oculi felis* ABBADO, Contributo alla Flora Carbonifera della Cina, p. 141, pl. V, figs. 1, 2.

*Sigillaria Fogoliana* ABBADO, l.c. p. 136, pl. III, figs. 1-3.

*Sigillaria polymorpha* ABBADO, l.c. p. 139, pl. IV, figs. 1-4.

The specimen shown in fig. 5, in spite of its being a small fragment is, I believe, a part of a stem belonging to the above species already described by ZALESKY as from the same place. The form as well as the size of the leaf-cushions most resembles fig. 7 of the same author. The cicatrices are not well preserved, still so far as can be seen from our specimen, they are also similar to those of ABBADO's species.

Fig. 1 represents a cast of the decorticated specimen of a *Lepidodendron* also found at Yen-tai. The cushions are represented by rhombic depressions, a little broader than high, and with a median longitudinal groove corresponding to the shorter diagonal of the rhomb. The specimen looks like fig. 9 of ZALESKY, although the rhombs are smaller and more crowded. Still, I presume, it belongs to the same species.

## 8. SIGILLARIA SP.

Pl. II. Fig. 4.

A fragment of a *Sigillaria* whose specific determination is not possible. It is an impression of a stem consisting of flat, indistinct, parallel ribs which are generally about 2 mm broad, and furnished with fine, straight, longitudinal striations. On these ribs, there are small distant pits and tubercles whose distribution is not quite regular. It is probably the *Sigillaria*, in a subepidermal state of preservation commonly known under the name of *Syringodendron*.

**9. CORDAITES PRINCIPALIS (GERM.).**

Pl. III. Fig. 1b.

*Cordaites principalis* ZALESSKY, Notiz üb. d. Obercarb. Fl. d. Steinkohlenrev. v. Jantai, p. 398, fig. 11. ZEILLER, Note s. l. Fl. Houillère d. Chansi, p. 16, pl. VII, fig. 10. SCHENK, Richthofen's China IV, p. 213, pl. XLIV, figs. 3, 3a, p. 228, XXX, 11,12, p. 239, XXXIV, 3, XXXV, 2-4.

*Flabellaria principalis* GERMAR, Verstein. d. Steinkohlenform. v. Wetten u. Löbejün, p. 55, pl. XXIII, figs. A,B.

Fragments of two leaves which are side by side and lacking both apex and base. The longer one is about 170 mm long and 20 mm broad, slightly narrowing towards the base. More splendid examples occur at Ta-p'u hereafter to be described.

**II. Pen-hsi-hu, Shêng-ching-Shêng.<sup>1)</sup>****1. CALAMITES CISTII BRONGN.**

Pl. IV. Figs. 2, 3.

*Calamites Cistii* BRONGNIART, Hist. d. Végét. Foss., I. p. 129, pl. XX. ZEILLER, Expl. d. l. Carte Géol. d. l. France, p. 14. Flore Foss. Bass. Houiller d. Valenciennes, p. 342, pl. LVI. fig. 1, 2.

This is a species hitherto not described from China. There are two fragments of it, the larger (fig. 2) of which is a part of a flatly pressed stem, nearly 100 mm. in diameter, with an internode 90 mm long. Ribs, though mostly crushed, present a median ridge in well preserved portions. They are about 1 mm. broad, furnished with fine longitudinal striations, and separated from one another by shallow grooves. Mamelons of the nodal portion are indistinct, owing to their imperfect preservation.

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1) 盛京省本溪湖

**2. ANNULARIA STELLATA** (SCHLOTH.).

Pl. IV. Figs. 5, 6.

This species has already been described from Yen-tai in the preceding pages.

A specimen shown in fig. 6 has two verticills preserved, both consisting of at least 20 leaves which are 2 mm broad and more than 15 mm long, with the apices broken off, but probably acute. Fig. 5 represents an imperfect specimen probably belonging to the same species.

**3. PECOPTERIS ARBORESCENS** (SCHLOTH.).

Pl. IV. Fig. 4.

*Pecopteris arborescens* BRONGNIART, Hist. d. Végét. Foss., p. 310, pl. CII, pl. CIII., figs. 2, 3. ZEILLER, Expl. d.l. Carte Géol. d.l. France, p. 81, pl. CLXIX, fig. 4.

*Cyatheites arborescens* SCHENK, Richthofen's China, vol. IV, p. 212, pl. XLV, figs. 14-16, p. 229, pl. XLV, fig. 13.

A single specimen. Although the venation is imperfectly preserved, I have no doubt that it belongs to the species already described by SCHENK from the same place and also from Lang-tien in Ho-nan.

**4. CORDAITES PRINCIPALIS** (GERM.).

Pl. IV. Fig. 1.

Only a single fragment of a leaf, about 10 mm., belonging to the basal portion. The veins are very distinct with 2 or 3 interstitial ones.

III. Ta-p'u, Shêng-ching-Shêng.<sup>1)</sup>

## CALAMITES SP.

Pl. V. Figs. 3, 4, 5.

Three fragments of an equisetaceous plant which probably belongs to a *Calamites*. The ribs are straight, almost flat, 1-1.5 mm broad and separated by shallow but distinct grooves. In one specimen (fig. 4) the node is preserved, but in such a bad state that it is not possible to see whether the ends of the ribs are rounded or angular.

Among the species of *Calamites* which can be compared with ours is *C. Suckowii* BRGT (Hist. d. Végét. Foss. I, p. 124, pl. XIV, fig. 6, XV, 1-6, XVI), to which indeed the Chinese specimens show a great resemblance.

What is highly interesting in these specimens is the presence of circular flower-like disks sitting on their surfaces. In one of them (fig. 5) there are two disks one above the other and close together, and apparently a little above a node. In another one (fig. 3) we see only a single disk. Such disks have already been observed in species of *Phyllothea* and also in *Equisetum laterale* PHIL. of the English Oolite (SEWARD'S Fossil Plants I, p. 275, fig. 63), and are generally considered to be nodal diaphragms pressed out of the stem in process of fossilization. Our disks are not quite circular which may be due to distortion. Their diameter varies between 6 and 8 mm. The central portion is somewhat sunken and more or less smooth, and from it radiate straight, spoke-like ribs which immediately or soon subdivide into two and go over the slightly elevated rims to the periphery.

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1) 盛京省大堡

Their number may be about forty, and the general appearance of the disks resembles the chrysanthemum crests of our Imperial Family.

**IV. Ssu-ping-chieh, Ching-ching-Ting, Shêng-ching-Shêng.<sup>1)</sup>**

**CORDAITES PRINCIPALIS (GERM.).**

Pl. V. Figs. 1, 2. Pl. VI.

We have many fragments of the leaves of a *Cordaites* which, I believe, are to be identified with the above named species. They are much larger than those already described from Yen-tai and Pen-hsi-hu in the preceding pages.

Fig. 1, pl. VI. represents the apical portion of a leaf, which is 220 mm. long and 60 mm. in the broadest part. The veins are all very fine and numerous, and parallel to the margins, with finer interstitial ones. The distance between any two veins is not constant, but is about  $\frac{1}{2}$  mm on the average, while the number of interstitial veins which are not always distinct, is about 4 or 5.

**V. Ching-ching, Tung-kuan, Chih-li-Shêng.<sup>2)</sup>**

**LEPIDODENDRON ? SP.**

Pl. III. Fig. 2.

The only specimen at hand is in the form of *Knorria*, and indeed, of the so-called *Knorria Selloni*, in which the elongated protuberances are quite distant from one another. Our specimen looks very much like that represented in fig. 2, pl. X of HEER'S

1) 盛京省興京廳四平街

2) 直隸省東關井陘



“Fossile Flora der Bäreninsel” and called by him *Knorria imbricata*. That the *Knorriae* represent subepidermal states of preservation of lepidodendroid plants is a fact long known to palæobotanists.

Together with this *Knorria*, there was found a small imperfect fragment of a fern, apparently of a *Pecopteris*, but which is hardly worth figuring.

VI. Hsiang-t'ang, Fêng-chêng-Hsien, Nan-ch'ang-Fu,  
Chiang-hsi-Shêng.<sup>1)</sup>

LEPIDODENDRON SP.

Pl. VII.

A slab of a weathered fine-grained sandstone bears an impression of the inner surface of the cortex of a plant which is probably a *Lepidodendron*. The print consists of numerous shallow rhombic depressions, mostly covered with a coaly crust, and now and then showing a slight protuberance at their centres which may be looked upon as the bundle-trace. The diameters of the rhombs measure 10–15 mm. and 5–8 mm.

The preservation is such as does not allow any precise determination.



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1) 江西省南昌府豐城縣鄉塘

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(The species described are in italics).

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<i>Filicites cyatheus</i> .....	11	<i>Sigillaria Fogoliana</i> .....	12
<i>Flabellaria principalis</i> .....	13	<i>Sigillaria oculis-felis</i> .....	12
		<i>Sigillaria polymorpha</i> .....	12
 <b>K.</b>		<i>Sigillaria sp.</i> .....	12
<i>Knorria Selloni</i> .....	16	<i>Syringodendron</i> .....	12

**M. YOKOYAMA.**  
**PALÆOZOIC PLANTS FROM CHINA.**

**PLATE I.**

**Plate I.**

Figs. 1, 2. *Calamites?* sp. Yen-tai.



*Fig. 1.*

*Fig. 2.*

**M. YOKOYAMA.**  
**PALÆOZOIC PLANTS FROM CHINA.**

**PLATE II.**

## Plate II.

### Yen-tai.

- Fig. 1. *Neuropteris flexuosa* STERNB.
- Fig. 1a. A pinnule of the same magnified.
- Fig. 2. *Neuropteris flexuosa* STERNB.
- Fig. 3. *Aphlebia*-leaf probably of the above species.
- Fig. 4. *Sigillaria* sp.
- Fig. 5. *Pecopteris cyathea* (SCHLOTH.).
- Fig. 6. *Calamites* sp.
- Fig. 7a. *Neuropteris flexuosa* STERNB.
- Fig. 7b. *Neuropteris Scheuchzeri* HOFFM.

Fig. 1.



Fig. 3.



Fig. 1a.



Fig. 2.

Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



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**PLATE III.**

Plate III.

- Fig. 1. *Lepidodendron oculis-felis* (ABB.). Yen-tai.  
Fig. 2. *Lepidodendron?* sp. in the form of *Knorria Selloni*. Ching-ching.  
Fig. 3a. *Neuropteris flexuosa* STERNB. Yen-tai.  
Fig. 3b. *Cordaites principalis* (GERM.). Yen-tai.  
Fig. 4. *Annularia stellata* (SCHLOTH.). Yen-tai.  
Fig. 5. *Lepidodendron oculis-felis* (ABB.). Yen-tai.  
Fig. 6. *Annularia stellata* (SCHLOTH.). Yen-tai.

Fig. 1.

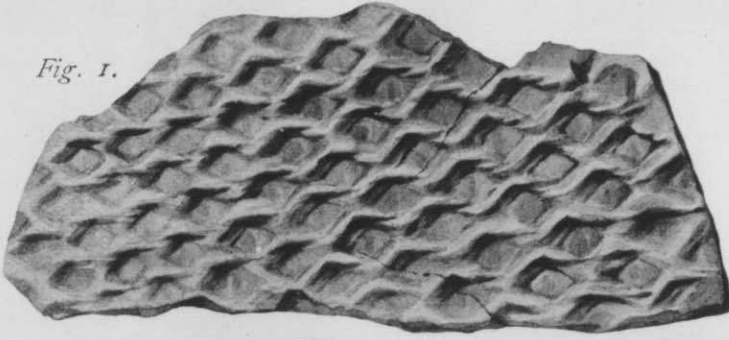


Fig. 2.

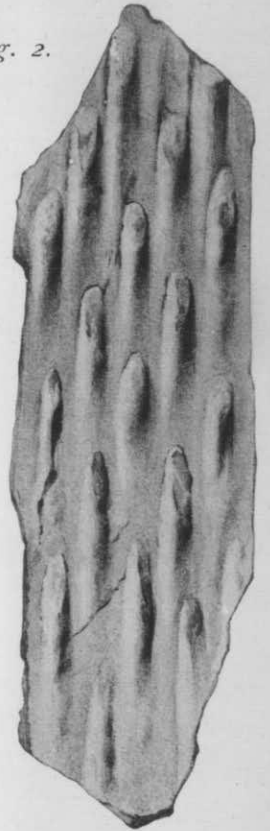


Fig. 4.



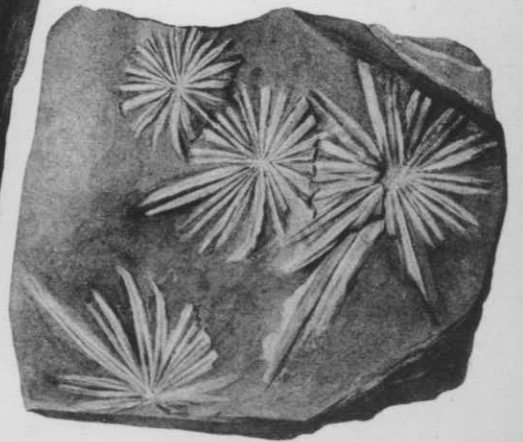
Fig. 3.



Fig. 5.



Fig. 6.



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PLATE IV.

**Plate IV.**

**Pen-hsi-hu.**

- Fig. 1. *Cordaites principalis* (GERM.).  
Figs. 2, 3. *Calamites Cistii* BRGT.  
Fig. 4. *Pecopteris arborescens* (SCHLOTH.).  
Figs. 5, 6. *Annularia stellata* (SCHLOTH.).

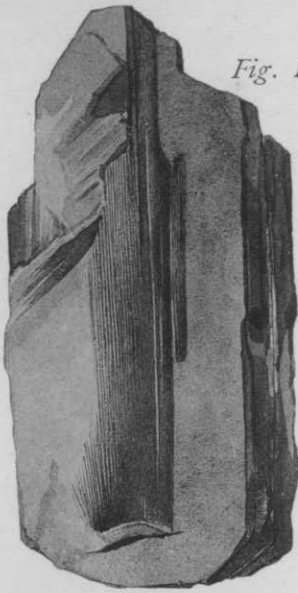


Fig. 1.

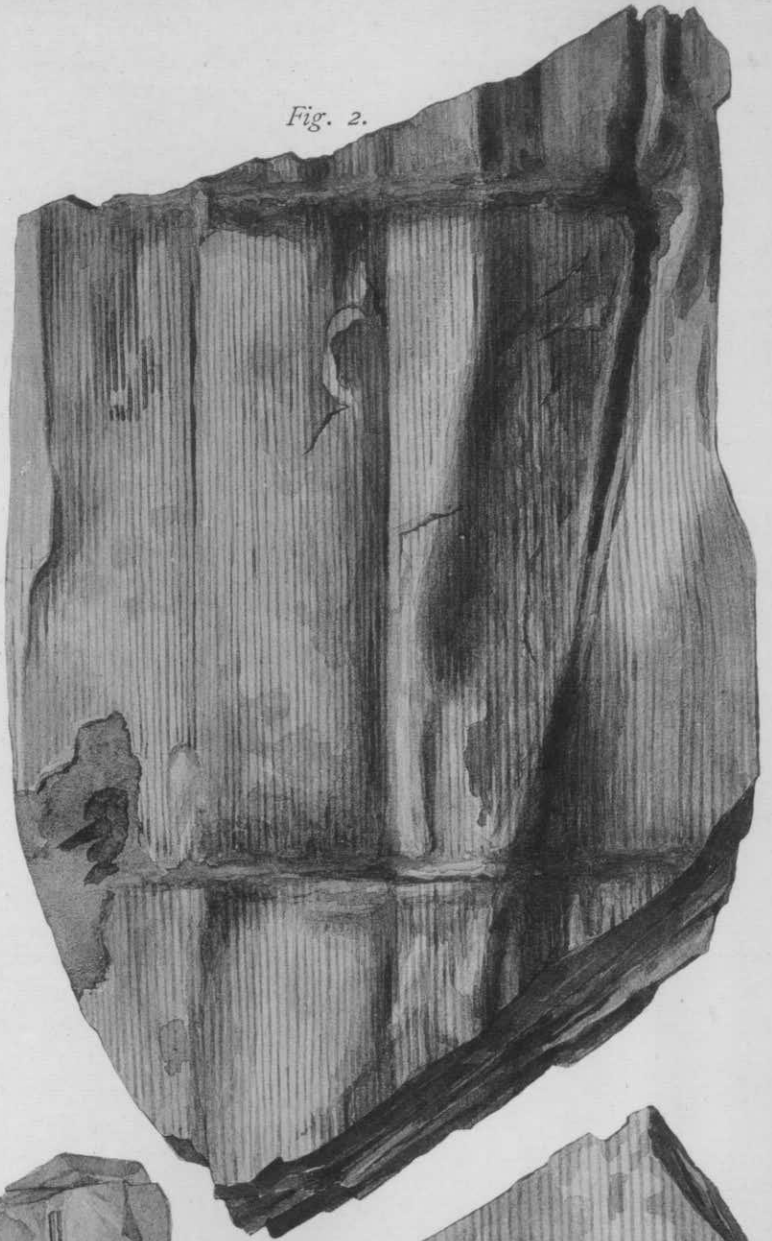


Fig. 2.

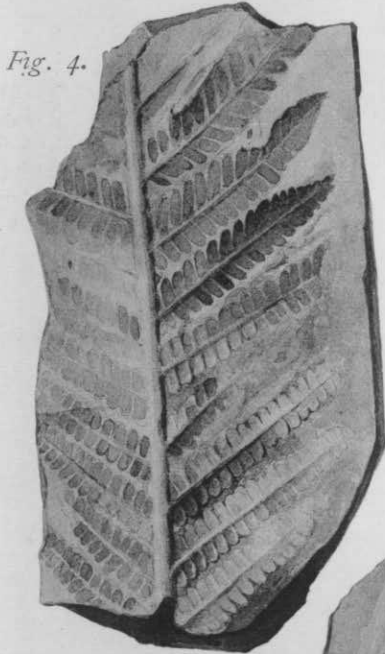


Fig. 4.

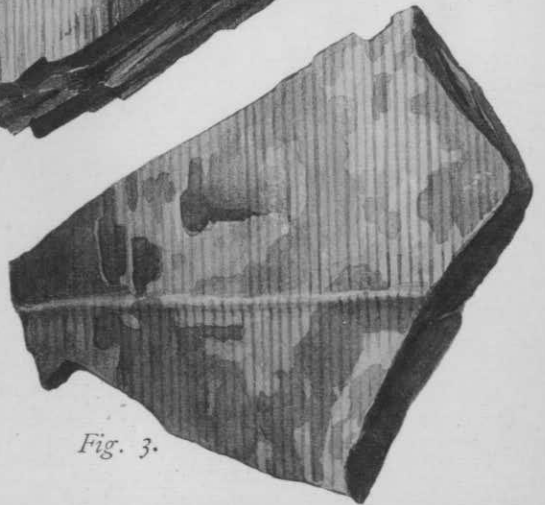


Fig. 3.



Fig. 5.



Fig. 6.

**M. YOKOYAMA.**  
**PALÆOZOIC PLANTS FROM CHINA.**

**PLATE V.**

**Plate V.**

Figs. 1, 2. *Cordaites principalis* (GERM.). Ssu-ping-chieh.  
Figs. 3, 4, 5. *Calamites* sp. Ta-p'u.



*Fig. 1.*



*Eig. 2.*



*Fig. 3.*



*Fig. 4.*



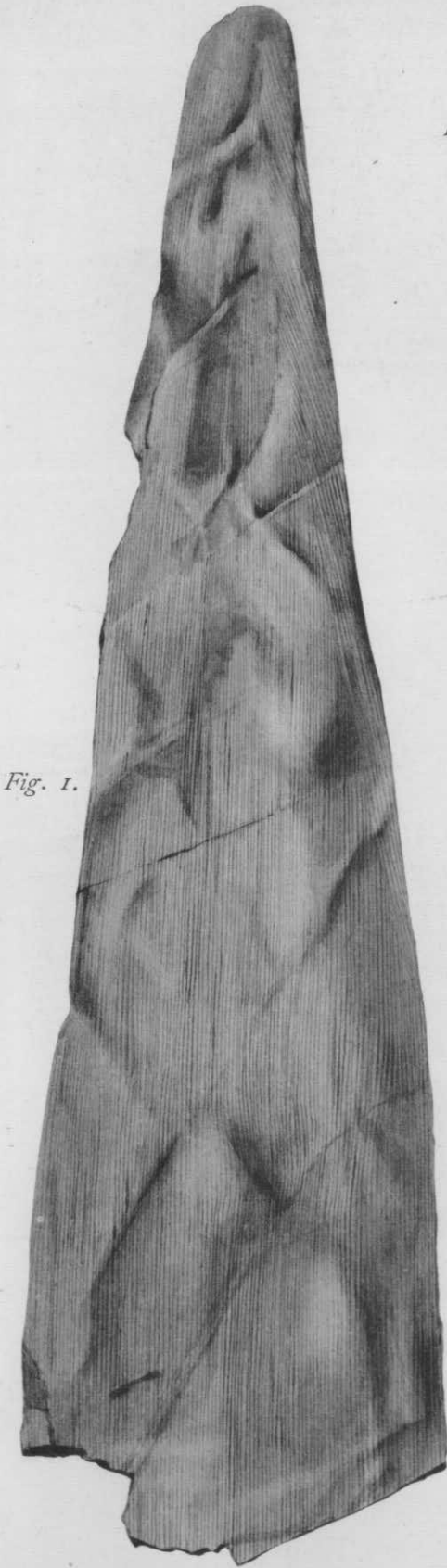
*Fig. 5.*

**M. YOKOYAMA.**  
**PALÆOZOIC PLANTS FROM CHINA.**

**PLATE VI.**

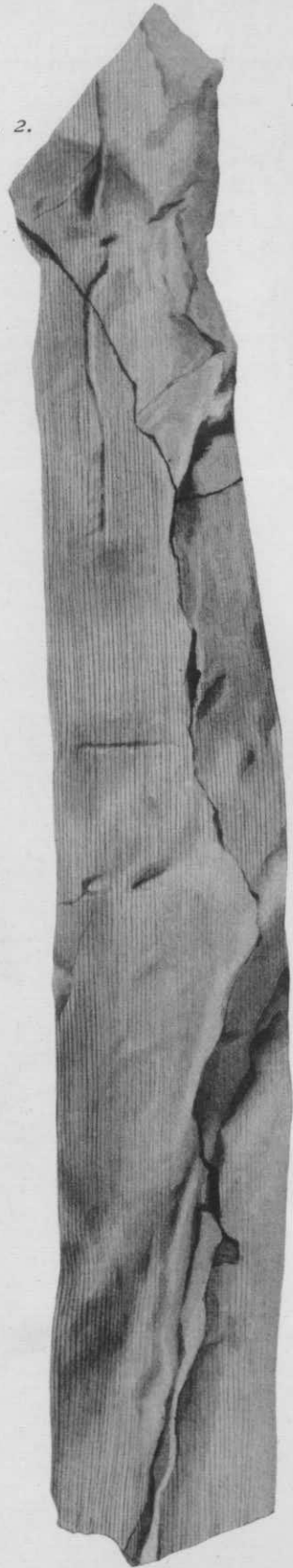
**Plate VI.**

Figs. 1, 2. *Cordaitea principalis* (GERM.). Ssu-ping-chieh.



*Fig. 1.*

*Fig. 2.*



**M. YOKOYAMA.**  
**PALÆOZOIC PLANTS FROM CHINA.**

**PLATE VII.**

**Plate VII.**

*Lepidodendron* sp. Hsiang-t'ang.

