A NEW FOSSIL LAND TURTLE FROM HONAN

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The present specimen was loaned to me for investigation by my friend, Dr. W. H. Wong, Director of the Geological Survey of China. It was collected from Fan Chuang (范莊) of Si Chuan Hsien (浙川縣), Honan Province by Mr. C. Li (李捷), who conducted a geological surveying trip in 1928 in Hupei under the supervision of Director J. S. Lee of the Geological Institute of the National Research Institute. The locality, where the specimen was secured, is near the border of Chieh Chia Chi (賈家集) of Chün Hsien (均縣), Hupei Province, where Mr. Li's party happened to go across the boundary line between the two provinces while surveying. At Fan Chuang he found, together with this specimen a broken mammalian jaw, which not preserved in perfect conditions. The best preserved of the teeth, which hower, has a part broken off, has been examined by Pére Teilhard de Chardin, who recognizes it to be the right third molar of a small Perissodactyle. As the imperfect condition enhances the difficulties in determination, it is impossible at present to tell to what exact species it belongs, but he informs me that the features of the tooth show it to be probably of the genus, *Lophioletes* or *Caenolophus*, either of which has been described from the Upper Eocene of Mongolia by Matthew and Granger, 1925.

The specimen of a land turtle which has come into my hands, consists only of the shell; neither the bones of the head, neck, or tail, nor any of the limbbones of the animal are present. The shell is filled with grayish sandstone; both the anterior and the posterior portions of the carapace are broken off, and large and small depressions are found on the dorsal surface of the shell, due either to injuries or to erosion on the carpapace, while the periphery of the plastron is likewise not preserved intact, its anterior margin having suffered a great deal of damage, and its posterior margin less so. The ventral surface of the shell has also two depressions, of which the one near the right margin of the shell evidently a recent injury to the specimen, besides some markings due to erosion. The ventral surface of the plastron is markedly concave in the middle region and this concavity is situated rather toward the right half of the animal.

In spite of the imperfection of preservation, the shell shows some important features of the animal. Both the carapace and plastron show most of the bony sutures to a recognizable degree, and most of the sulci of the horny shield of the carapace are very distinct and well preserved. The left axillary and right inguinal buttresses are also observable.

I desire to express my indebtedness to Dr. W. H. Wong for loaning me the specimen and furnishing me informations in regard to the locality and the geological age of the formation, to Dr. A. W. Grabau and Père Teilhard de Chardin for valuable advice and criticism during the investigation, to Mr. K. H. Hsu for making the photographs and to Mr. C. R. Feng and Mr. C. J. Sheng for drawing the text-figures.

DESCRIPTION.

Genus **SINOHADRIANUS** Ping, (gen. nov.)

Neural plates comparatively narrow, mostly hexagonal, with short anterolateral surfaces; first one somewhat ovoid, fourth octagonal; first four costal plates without alteration of length at inner and outer extremities; last four slightly with such tendency. Plastron extensively united to the carapace by suture, with short axillary and inguinal buttresses within the first and fifth costals respectively. Entoplastron wholly in front of the pectoral scutes, hinder lobe of plastron notched.

GENOTYPE: *Sinohadrianus sichuanensis.*

HORIZON: Only known species from the Upper Eocene of Honan Province.

Sinohadrianus sichuanensis Ping, (sp. nov.)

Shell ovoid, carapace considerably vaulted, *First* neural plate elongated oval; *Second*, hexagonal: anterolateral margin shortest; posterolateral longest; anterior greatly concave, fitting with the rounded posterior end of the first one; posterior margin slightly convex; anterior portion broader than posterior; *Third* similar in outline to second, posterior margin more convex. *Fourth* octagonal: right anterolateral shorter than posterolateral; left anterolateral about equal to posterolateral, lateral longest; posterior margin concave; anterior portion about equal to posterior in width. *Fifth* somewhat hexagonal: posterolateral sides shortest, but the right one not so distinct as the left; lateral margins longest; posterior slightly convex; posterior portion slightly broader than anterior. *Sixth* hexagonal: anterolateral margin shortest posterior margin almost straight; right anterolateral angle extending more forward than the left one. *Seventh* hexagonal, similar in outline to sixth, but

much shorter. *Eighth* hexagonal, larger than seventh; anterolateral margin comparatively long, but still shorter than posterolateral; anterolateral angles more prominent, especially the left one. The neural plates measure as follows (in mm.):

	Length along median line	Length along margins		Width along anterior margin
		right	left	
Neural I	25.4±	—	—	—
II	19.6	19.9	21.4	13.4
III	19.5	19.8	19.0	13.5
IV	17.5	20.6	21.0	13.7
V	17.7	14.5	15.7	13.0
VI	11.3	13.0	12.1	13.6
VII	9.4	10.0	9.0	16.0
VIII	13.4	13.4	13.5	12.0

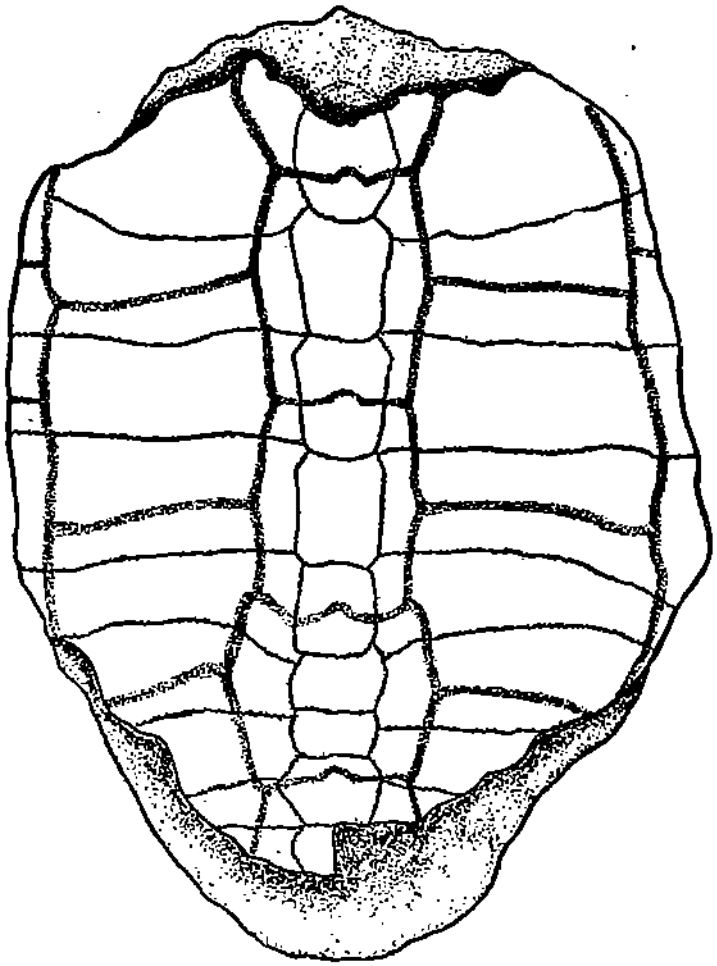

Fig. 1. *Sinohadrianus sichuanensis* Ping, sp nov. Carapace 5/6×

The anterior portion of the *first costal plate* is broken, so that it is not possible to determine which one of two extremities is longer, and after the usual manner, this plate is longer than any of the following ones. *Second costal plate* with its medial extremity shorter than lateral, and connected with posterolateral margin of second neural; sutures of marginal plates not clear, so that it is not possible to observe with which ones the lateral extremities of the costal plates are connected. Two extremities of *third costal* about equal to each other, its medial one connected with third neural entirely. *Fourth costal* with its medial extremity slightly shorter than lateral and connected with anterolateral and lateral of fourth neural. Posterior margin of right fourth costal slightly more concave than of left one. *Fifth costal* much smaller than any of preceding ones, its medial extremity much longer than lateral, connected with posterolateral of fourth neural, lateral and posterolateral of fifth, and anterolateral of sixth. Posterior margins of both right and left fifth costals decidedly concave, thus making their lateral extremities much shorter. *Sixth costals* with lateral extremities not completely preserved, but apparently its medial extremity shorter than lateral, connected with lateral of sixth neural and anterolateral of seventh. Medial extremity of *seventh costal* shorter than lateral as indicated by the increase in size laterally, in spite of the fact that the lateral portions of the plates on both sides are broken off; connected with lateral of seventh neural and anterolateral of eighth. Probably the medial extremity of *eighth costal* longer than lateral, and connected with only the lateral of eighth neural. The costal plates measure as follows (in mm.):

	Length of extremity		width
	medial	lateral	
Costal I right	—	—	47.3
left	—	—	48.8
Costal II right	16.4	25.1	52.4
left	18.2	24.5	56.1
Costal III right	19.3	16.5	54.1
left	18.7	16.5	58.0
Costal IV right	18.6	24.3	55.4
left	18.3	22.5	58.7
Costal V right	17.8	9.2	56.5
left	19.8	10.3	58.0
Costal VI right	15.3	—	54.0
left	11.9	—	52.8
Costal VII right	12.1	—	—
left	8.4	—	—
Costal VIII right	—	—	—
left	9.4	—	—

Marginal plates with dorsal surfaces narrower than ventral, the bony sutures of costal plates extending through them are recognizable, while others are not clear.

Bony sutures of *plastron* very faintly visible. Posterior portion of *entoplastron* preserved: its outline almost circular as far as the posterior third of the plate shows. *Epiplastron* with its anterior portion broken on each side. Suture between epiplastron and *hyoplastron* not traceable. Lateral margins of hyoplastron and *hypoplastron* not distinct, those between hyoplastron and *hypoplastron*, and between hypoplastron and *xyphiplastron* recognizable; medial suture well preserved, somewhat zigzag in its anterior half. In general, hyoplastron about equal to hypoplastron in size. Caudal margin of plastron broadly concave.

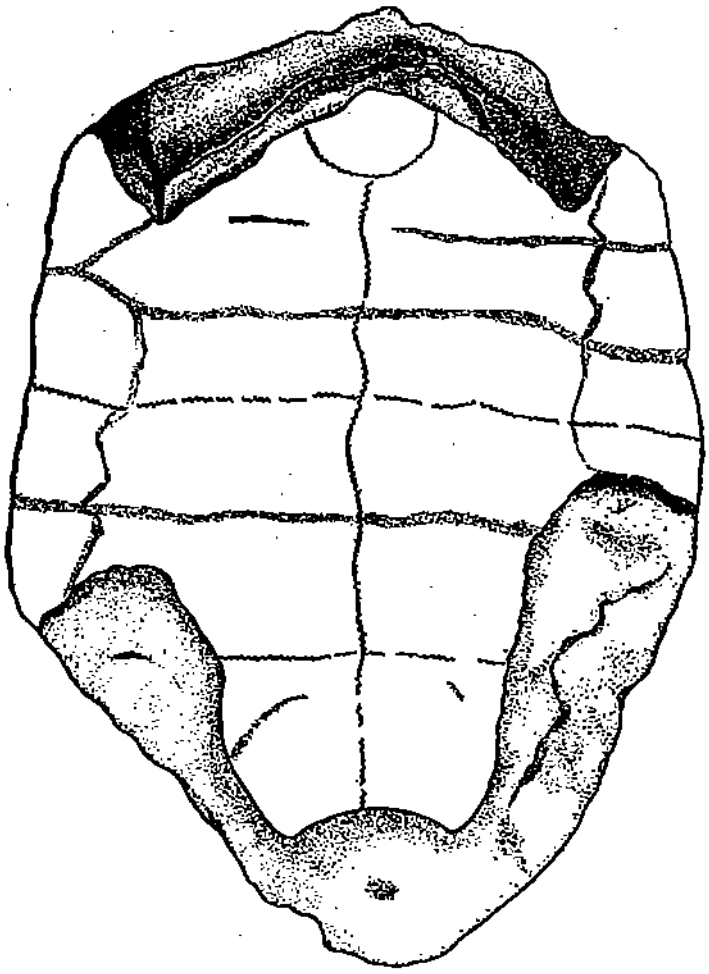

Fig. 2. *Sinohadrianus sichuanensis* Ping, sp. nov. Plastron 5/6×

The horny shields are very distinct on the carapace. *First vertebral scute* probably hexagonal, as shown by the remaining part in the specimen; broader than either of the second or third. *Second vertebral* scute also hexagonal, longer than broad. *Third vertebral scute* similar in outline to the second, but slightly smaller in size and with lateral angles less prominent. *Fourth vertebral scute* hexagonal, broader than the preceding one, both its anterior and posterior margins concave. *Fifth vertebral scute*, which has only its anterior portion preserved in the specimen, probably similar in outline to the preceding one, but smaller. Anterolateral margins of second, third and fourth vertebral scutes all slightly shorter than respective posterolateral. Each of the second, third, fourth and fifth vertebral scutes, with its anterior margin bulging into a small convexity at the middle. The vertebral scutes measure as follows (in mm.):

		Length	Length along borders		Width	Width along anterior border
			right	left		
Vertebral	I	—	—	—	36.6+	—
	II	38.3	38.2	39.5	30.9	26.7
	III	37.5	35.6	34.0	30.9	24.5
	IV	31.5	34.0	36.9	39.7	29.3
	V	—	—	—	—	28.7

First costal scute probably irregularly hexagonal and longer than broad as shown by the larger remaining portion in the specimen. Second and third costal all rhomboid in shape, former slightly larger than latter, fourth with only a small portion preserved, probably smaller than third. The costal scutes measure as follows (in mm.):

	Length along median border	Length along lateral border	Width	Width along posterior border,
Costal I right	—	—	45.4	45.0
left	—	—	45.0	45.0
Costal II right	38.6	41.3	51.2	48.6
left	36.3	35.4	52.7	50.0
Costal III right	34.7	32.8±	51.4	—
left	36.6	33.3±	51.2	40.0±
Costal IV right	—	—	—	—
left	—	—	—	—

Like the peripheral bones, the *margin scutes* on both the carapace and the plastron are not distinguishable.

Length including the sandstone mould 163 mm., width across the middle of the shell 122 mm., height 68 mm.

HORIZON AND LOCALITY: Upper Eocene of Fan Chuan, Si Chuan Hsien, Honan Province. Coll. Mr. C. Li.

So far as records show, the most closely related form is *Hadrianus corsoni* (Leidy), but the outlines of the neural plates distinguish the American form from the present one at once. The first neural plate of our species lacks the pointed angles on its lateral margins; the sixth and seventh neural plates are not so short; and the lateral angles of any of the plates between the first and the sixth are not so distinct and sharp as in the case of *Hadrianus corsoni*. On the plastron the suture between the epiplastron and hyoplastron is quite a distance behind the entoplastron, which feature also differentiates the present form from the American species. Furthermore the Chinese species is much smaller than the American one.

In certain respects the present form resembles somewhat *Echmatemys wyomingensis* (Leidy), particularly in the general shape of the vertebral scutes. But the outlines of the vertebral plates differ strongly in the two forms; and furthermore the coincidence of the suture between the costal and marginal bones with that between the corresponding shields makes our species not identifiable with the above mentioned one. The discrepancy in the sizes of the two forms is again much too great.

Matsumoto described a new species, *Geoemyda takasago*, from the Eocene of Kyūshū. The general shape and size of that form are quite comparable with the present one. As a further similarity the present form also possesses a concavity on its plastron. In spite of these features, the Chinese form can be distinguished from the Japanese one by the comparatively long and narrow third and fourth vertebral plates, and second and third vertebral scutes. Besides that, the anterior margin of the second vertebral scute traverses almost the middle of the first vertebral plate, while that of *Geoemyda takasago* passes exactly between the first and second vertebrals.

As this form of the family, Testudinidæ, is decidedly different generically and specifically from the ones which are considered to be comparatively similar to it, it is impossible to place it with any of them on record. Hence it is given the above new generic and specific names.

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Explanation of

Plate I

PLATE I

Fig. 1. *Sinohadrianus sichuanensis* Ping, sp. nov., Dorsal view 5/6.
Type, G.S. China Mus.
Upper Eocene, Fan Chuan, Si Chuan Hsien, Honan Province

Fig. 2. Same as figure 1.
Lateral view. Anterior of the shell toward right.

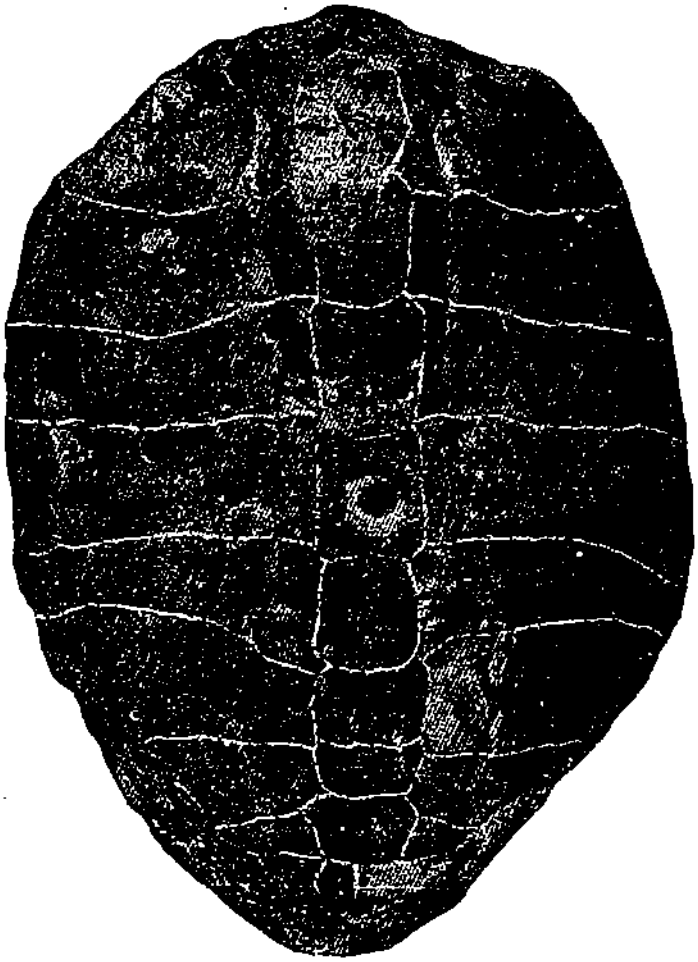

Fig. 1

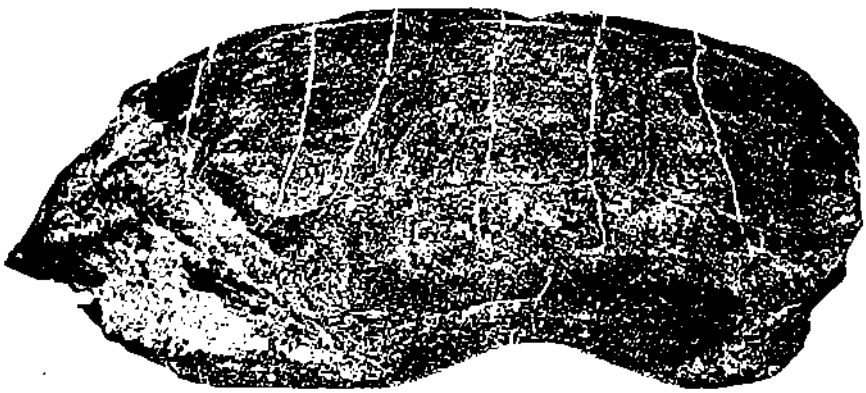

Fig. 2

Explanation of Plate II

PLATE II

Fig. 1. *Sinohadrianus sichuanensis* Ping, sp. nov., Dorsal view 5/6.

Fig. 1

A NEW XENOXYLON FROM NORTH CHINA

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(Professor at the Central University, Nanking)

With seven text-figures and one plate

INTRODUCTION

As far as the writer is aware, no Chinese fossil wood, or any other petrified plant material showing structures has been sectioned and studied, although plant impressions have been to some extent worked by paleobotanists, notably Halle and Florin (1, 7, & 8). It is with a view to studying sectionable plant materials yielded by fossil-bearing beds of China, that this initial investigation has been undertaken.

The material for this paper is a fossil taken from a collection made at Hsia Chia Kou (夏家溝), Cho Lou Hsien (涿鹿縣), in the Province of Hopei (formerly Chihli), in 1927 by Mr. H.S. Wang (王恒升) of the Geological Survey of China. The specimen bearing the field number 188 is probably a fragment of the trunk of a tree. It is 7½ cm. high and semicircular in outline, the largest diameter measuring 30 cm. It is completely devoid of pith and cortex. Chips for sectioning were taking from the youngest and oldest parts obtainable; i.e., from two places, one nearest the pith, other farthest away from it. For the sake of convenience the former wood will be called proximal wood and the latter, distal wood. The former as well as the latter consists of secondary wood solely

Of the thin sections nine were cut by the technician of the Geological Survey, and the rest were prepared by myself.

From records of other fossils, Mr. Wang believes that the fossil-bearing stratum belongs in the Upper Jurassic—a determination to which, as we shall see, our specimen lends support.

DESCRIPTION

Condition of preservation. The wood is silicified and generally colored brown, though in places it is almost hyaline. Dark masses of magnetite occur locally. The condition of preservation is in general excellent showing minute details in most places. But the spring wood is, as a rule, more or less crushed (Plate I, Fig. 1) due no doubt to the previous attack of a fungus, the hyphae

of which are easily seen especially along the lignified walls of the tracheids, which the hyphae generally followed, though in places they penetrated the tracheids for long distance (Plate I, Fig. 2).

Growth rings. The annual rings are distinct. The width of the rings of the proximal wood measure 5 mm. each, while annual increments of the distal wood average 1 mm. only. False annual rings occur occasionally. The summer wood is narrow consisting of, on the average, four elements in the radial direction, though in one ring it runs up to nine elements.

The tracheids. The caliber of wood cells is large, and there is marked difference in size between the cells of the distal and those of the proximal wood. The following averages from a large number of measurements give an idea of the difference:

	Tangential diameter	Radial diameter
Cells of proximal wood	30.0 *μ*	43.0 *μ*
Cells of distal wood	39.7 *μ*	50.2 *μ*

These measurements are taken from the spring wood and are limited to those patches the cells of which are not distorted by decay or fossilization. There is little difference in the radial diameters of summer elements of the two regions, the average for both being 13-14*μ*. The tangential diameter, as one would expect follows closely that of the spring wood of the same year's growth. The average diameter is 32.6*μ* for tracheids proximal to the pith and 40.0*μ* for distal elements. In Penhallow's terminology (12), the structure of the wood would be characterized as open.

The bordered pits on tracheids are very large and generally vertically flattened. They are frequently so crowded as to leave no space between two adjacent pits. Round and isolated pits, however, also occur. (Figs. 6 and 7; Plate I, fig. 4). The following measurements in microns give an idea of the size and shape of the bordered pits:

40×38, 39×20, 33×20, 30×20, 36×26, 28×26,

24×24, 23×23, 20×20.

The pits occupying most of the breadth of the radial wall of the tracheid are arranged in a single row. In a few places, however, a double row of pits may be seen. In the latter case, the arrangement is opposite, though in places, there is a tendency to alternation (Fig. 1).

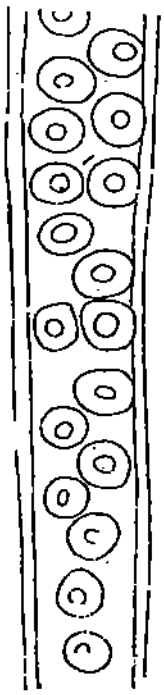

Fig. 1. Radial view of a tracheid showing a double row of bordered pits. 300×.

Bars of Sanio are clearly observable in places. They occur, as a rule among crowded pits. In places, the pits are so close to each other, that the intervening bars are, as if it were, "pinched" in two (Fig. 2).

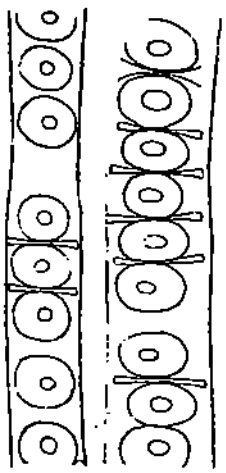

Fig. 2. Radial view of tracheids showing Bars of Sanio. 355×.

Great pains were taken to look for tangential pitting. The transverse are too thick to show pits well. In the tangental view pits are often seen, but since the crushing of the spring wood had the effect of flattening out the elements so that often a radial view of tracheid walls is present in tangential sections, it makes diagnosis from this view uncertain. To be sure, tangential pits in Conifers are, as a rule, smaller than the radial ones, but in our specimen, the latter varies too much in size to make it alone a good criterion.

The radial sections were, therefore, most carefully examined for tangential pitting. In one place in the summer wood, tangential pits are unmistakably present. They are very much smaller and spaced at great ntervals (Fig. 3).

Fig. 3. Radial section of summer tracheids showing tangential pits. 575×.

Wood parenchyma. Resin canals are totally absent from the wood, but resin parenchyma cells are present and well scattered in wood. The walls of these cells are thin and smooth and due to the great length of the cells, the end walls which are square (Fig. 4), are not often seen.

Fig. 4. Radial view of parenchyma cells 210×.

The resin cells are usually filled with a dark brown substance in the form of lumps or small granules. It is probably some resinous substance which, as we know, is very resistant to change.

Rays. The rays are fairly numerous in this wood (Plate I, fig. 3). Frequently a tracheid is flanked with rays on either side. The height of the ray is exceedingly varied from one cell to as many as 65 cells in height, though the usual range is from 10-20. The length of a ray cell generally covers 3-4 tracheids; in the late-formed of the season it may tally with five or even six elements. A remarkable feature of the ray is the narrowness of its cells. Seen side by side with wide tracheidal elements, their narrowness is very striking (Plate I, figs. 1 & 2). The heights of the ray cell averages 20 μ, while the width is only 10 μ. In extreme cases the width does not exceed 4 μ. Under low power of the microscope these very narrow rays appear to be a thin line between two tracheids.

The rays are one-cell wide, but in a few places biseriate rays are seen (Fig. 5a), or a double of one or a few cells in height may occur in an otherwise

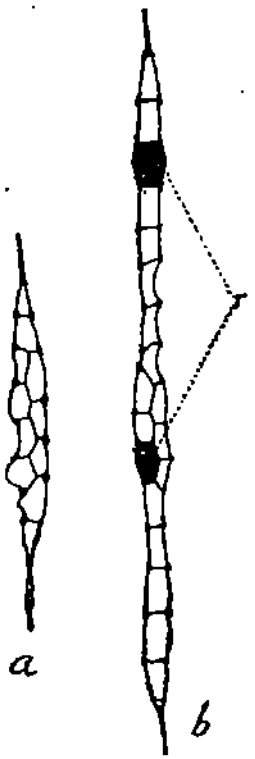

Fig. 5 a & b. Tangential sections of biseriate rays. r. resinous cells. 300×.

uniseriate ray (Fig. 5b). Unlike biseriate rays in Angiosperms, the arrangement of cells here is very irregular. The walls of ray cells are fairly thin and perfectly smooth. On the horizontal and tangential walls, pits are totally absent. Thus abietinous pitting of Gothan (3) is absent in this specimen. The radial walls are covered with large, ovate simple pits ("Eiporen" of the German writers). Each cross-field contains only one such pit which practically covers it, except places where a ray cell happens to end in the middle of the field. In that case, there are in the field generally two, more or less rounded pits (Fig. 7; Plate I, fig. 4).

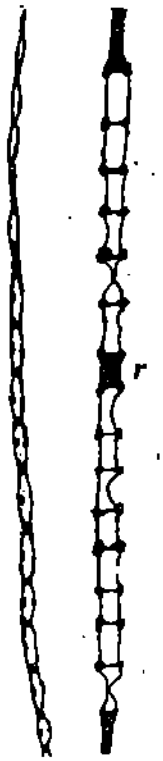

Fig. 6. Tangential section showing a ray and row of bordered pits. 300×.

The nature of ray pitting is better seen in transverse sections of the wood (Plate I, fig. 2). From that view it may be noticed that the secondary wall of the tracheid next to ray cells is almost totally lacking except along the horizontal walls of the ray cells and around the corners of the cross-field. In the region of the summer wood due to the narrowness of the tracheids, the pits are generally circular.

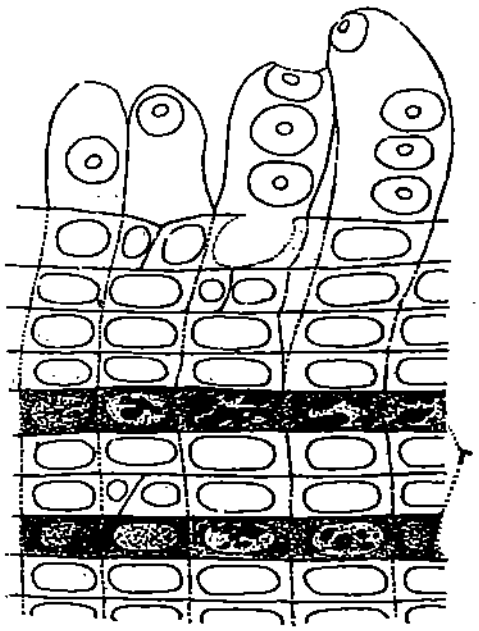

Fig. 7. Radial section showing a portion of a ray. r. resinous cells. 610X.

Embedded in rays are cells containing a dark brown substance. These cells generally occur in uniseriate horizontal rows (Fig. 7, Plate I, fig. 4). That substance is identical with the contents of wood parenchyma in appearance and most likely in nature viz., resin.

DISCUSSION

That we have before us a Coniferous wood goes without saying. By its important characters—the large bordered pits, generally compressed and often contiguous, the narrow rays with very large solitary pits—this wood identifies itself with Gothan's genus *Xenoxylon* (3 and 4). In these features, it resembles strikingly *X. phyllocloides*.

Our specimen differs from the described species of *Xenoxylon* in the presence of the following characters; wood parenchyma, Bars of Sanio, resinous cells in rays, and an occasioal biseriate ray. The most important difference is, perhaps, the occurrence of wood parenchyma which is unknown in all species that have been described. I believe, however, that the inclusion of our type in *Xenoxylon* does not do violence to Gothan's genus. In fact, Gothan himself is opposed to founding a new genus solely on

the presence or absence of that character. In discussing Caspary's genus *Araucariopsis macraetis*, he supports Schenck in contending that the occurrence creating a new genus (6).

By Jeffrey and others (2, 9, 11,) Bars of Sanio are regarded as a very important character in separating all other Conifers from the Araucarians, from the vegetative parts of which these bars are normally absent. It is mainly on account of their absence that Holden (10) places *Xenoxyla* under the Araucarineae. Whatever importance these structures may possess in the determination of living specimens, their diagnostic value in fossil wood is deminished by the fact that conditions of preservation may not render these delicate marks always observable. In other words, their invisibility is not a conclusive proof of their non-existence. The writer is not disposed to create a new genus out of present specimen on their account.

Though I am of the opinion that there are not sufficient grounds for making a new genus out of our wood, it is clear that it possesses a number of characters which mark it off from all known *Xenoxyla*. I name it.

Xenoxylon hopeiense nov. sp.

Diagnosis. Coniferous wood without abietinous pitting and resin passages. Wood parenchyma scattered. Bordered pits strikingly large often vertically compressed and sometimes contiguous, arranged in one row, occasionally in two rows, with pits generally opposite. Bars of Sanio present. Rays 1-65 cells in height, very narrow. Ray pits simple and very large, one in a field, which it practically fills. Ray cells somewhat resinous.*

Thus far *Xenoxyla* have been found with certainty only in the upper strata of the Jurassic, Fliche's *X. conchylianum* from Trias having been questioned (12). From the abundant occurrence in that system, Gothan believes that *Xenoxyla* may be considered an index fossil for the Jurassic strata. This gives support to the assignment of the fossil bed from which our specimen was collected to the Upper Jurassic period.

I take pleasure in acknowledging my indebtedness to Dr. W.H. Wong, Director of the Geological Survey, who kindly put the material used for this paper and the facilities of the Survey at my disposal. Thanks are also due to Dr. Wong's associates for their helpfulness and to Prof. Li, mineralogist of the University for mineral determinations.

Type slides are deposited with the Geological Survey.

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Explanation of

Plate I

PLATE I.

Fig. 1. Trans. section showing narrow rays and crushed spring wood. about 70×.

Fig. 2. Trans. section showing the nature of ray pitting. f. hypha of a fungus. about 170×.

Fig. 3. Tang. section showing rays. The black dots are resinous cells. about 90×.

Fig. 4. Radial section, showing bordered pits, ray pits, and resinous cells. about 120×.

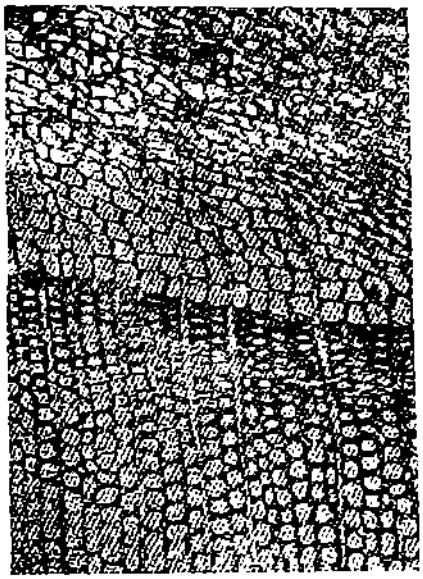

Fig. 1

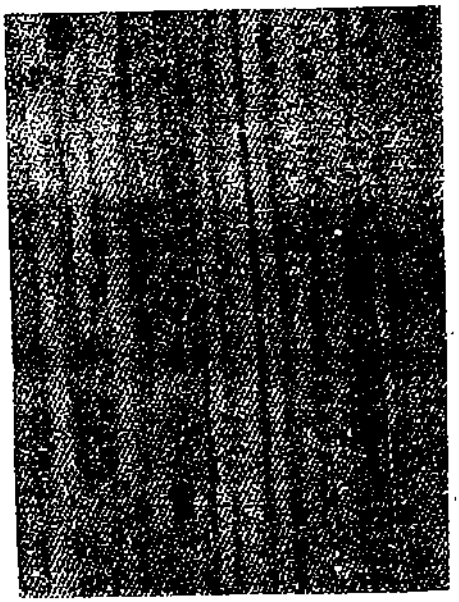

Fig. 3.

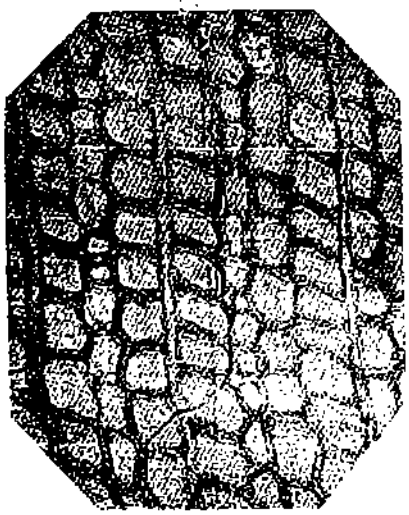

Fig. 2.

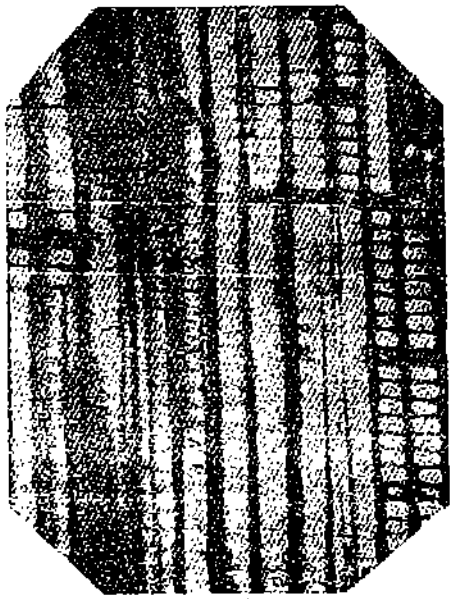

Fig. 4.

河北異木之新種

張景鉞

硅化木一塊發現於河北涿鹿縣夏家溝木之結構保存甚佳其最要之特徵爲假導管上紋孔大而扁鬚線細胞極狹有卵形紋孔斷爲松柏科之異木屬 (Xenoxylon) 名定爲河北異木 (Xenoxylon hopeiense) 是屬化木在歐洲各處發現甚多而皆在上侏羅紀夏家溝載此化石之地層或亦屬於是紀也

趙予仁先生遺像

Portrait of late Mr. Yatseng T. Chao