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THREE NEW LEGUMINOUS WOODS FROM THE CUDDALORE SERIES NEAR PONDICHERRY

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ABSTRACT

Three new leguminous woods have been described from the Cuddalore Series near Pondicherry. They show close resemblance with those of *Albizia*, *Cassia* and *Pericopsis* respectively, and hence named as *Albizinium pondicherriensis* sp. nov., *Cassinium arcotense* sp. nov. and *Pericopsoxylon indicum* gen. et sp. nov.

Key-words — Fossil woods, Leguminosae, Miocene-Pliocene, Cuddalore Series (India).

साराँश

पाँडिचेरी के समीपस्थ कुडलोर श्रेणी से लेग्यूमिनोसी कुल के तीन नये काष्ठाश्म – नीलाम्बर अवस्थी

पाँडिचेरी के समीपस्थ कुडलोर श्रेणी से लेग्यूमिनोसी कुल के तीन नये काष्ठाश्मों का वर्णन किया गया है। ये क्रमशः ऐल्बिज़िया, केसिया तथा पेरिकॉप्सिस से घनिष्ठ समानता दर्शाते हैं और इसीलिये इनको ऐल्बिज़िनियम पाँडिचेरियेन्सिस न०जा०, केसोनियम ऑरकोटेन्से न०जा० तथा पेरिकॉप्साक्सिलॉन इन्डिकम् न० प्रजाति व जाति से नामांकित किया गया है।

INTRODUCTION

LEGUMINOSAE is the second largest family of the dicotyledons. In the Indian Tertiary rocks the plants of this family, especially the petrified woods, are found in abundance, but they are most common in the Neogene deposits. In a review of the Neogene angiospermous woods from India, Awasthi (1974) has already listed all the leguminous woods described till then. In addition, Prakash (1975) and Awasthi (1975a, 1977) have described some more leguminous woods from the Lower Siwalik beds of Nalagarh, Himachal Pradesh and Murattandichavadi near Pondicherry respectively.

Investigations of fossil woods collected from Murattandichavadi area near Pondicherry have further yielded many new taxa. Three of them have been found to belong to the family Leguminosae showing closest resemblance with those of *Albizia*, *Cassia* and *Pericopsis* respectively. They have been described here in detail.

DESCRIPTION AND AFFINITIES

Genus — *_Albizinium_ Prakash, 1975

1. *Albizinium pondicherriensis* sp. nov.

Pl. 1, figs 1, 3; Pl. 2, figs 5-7

Material — Three small pieces of fairly well-preserved silicified wood.

Topography — Wood diffuse-porous (Pl. 2, fig. 5). *Growth rings* not visible to the naked eye, traceable under the microscope, delimited by thin lines of terminal parenchyma. *Vessels* visible to the naked eye as black dots, small to large, mostly medium-sized, solitary and in radial multiples of 2-6, mostly 2-3 (Pl. 1, fig. 1), sometimes in clusters, evenly distributed, about 3-5 vessels per sq mm; tyloses not seen; vessels empty or filled with dark contents (Pl. 2, fig. 5). *Parenchyma* abundant, paratracheal, vasi-

*Originally spelt as *Albizzinium* which has now been changed to *Albizinium*, since the spelling *Albizia* is now accepted in preference to *Albizzia* (Recommendation 73H, Article 73, ICBN, 1972).

centric, usually aliform to confluent, enclosing several vessels, or uniting with those of other vessels; apotracheal parenchyma represented by thin terminal lines (Pl. 1, fig. 1; Pl 2, fig. 5), often merging with aliform confluent parenchyma; diffuse parenchyma occasionally present, appearing as whitish dots due to their crystalliferous nature (Pl. 1, fig. 1). *Rays* fine, 1-3 seriate (Pl. 1, fig. 3; Pl. 2, fig. 6), 12-40 μ in width, 10-15 rays per mm, each separated by 2-8 tangential rows of fibres; ray tissue homogeneous; rays homocellular, composed wholly of procumbent cells (Pl. 2, fig. 7), short, about 4-15 cells and 80-300 μ in height. *Fibres* aligned in radial rows between two consecutive rays.

Elements — Vessels circular to oval in cross-section (Pl. 1, fig. 1), t.d. 45-285 μ, r.d. 45-240 μ, moderately thick-walled, common walls 8-10 μ in thickness; perforations simple; vessel-members short, 95-450 μ in height, with usually truncate ends; inter-vessel pits small to moderately large, 8-10 μ in diameter, oval through horizontal plane, bordered, alternate, vestured, with lenticular horizontal orifices; pits leading to contiguous parenchyma and ray cells similar to intervessel pits. *Parenchyma cells* oval to angular, 12-40 μ in diameter, thin-walled; crystalliferous parenchyma strands present, mostly diffuse, containing solitary crystals in each locule. Procumbent *Ray cells* 10-16 μ in tangential height, 20-120 μ in radial length, infiltration dark. *Fibres* small, circular to oval, 8-20 μ in diameter, septate, thin-walled, common walls 2-3 μ, pits not seen.

Comparison with the Modern Woods

The important anatomical features exhibited by the fossil wood are (i) vessels small to large, solitary and in radial multiples of 2-5, perforations simple, intervessel pits vestured, (ii) parenchyma paratracheal, vasicentric to aliform, and aliform-confluent, terminal parenchyma lines thin, delimiting the growth rings, (iii) xylem rays 1-3 seriate, short, homogeneous, and (iv) fibres septate.

Taking into consideration the above important anatomical features collectively it shows affinities with the woods of Leguminosae (Metcalfe & Chalk, 1950).

In the family Leguminosae, there are several genera which show resemblance with our fossil in gross anatomical structure. Among them the important ones are *Albizia*, *Afzelia*, *Intsia*, *Tamarindus*, *Cassia*, *Acacia*, *Parkia*, *Saraca*, *Macrolobium*, *Pithecellobium* and *Cylicodiscus*. The woods of all these genera resemble the present fossil in the nature and distribution of vessels and parenchyma. However, some of these can be easily distinguished from the present fossil wood in the nature of rays. In *Cylicodiscus* the rays are always 2-4 seriate, while in *Pithecellobium* and *Macrolobium* they are comparatively higher. Moreover, in *Macrolobium* the rays are usually exclusively uniseriate and thin-walled. In *Parkia* and *Saraca* the rays are heterogeneous. Similarly most of the woods of *Acacia* also show similarity with the present fossil in the type and distribution of vessels and parenchyma. However, the rays of such acacias are comparatively broader and the fibres are nonseptate. The genus *Cassia* although resembles the present fossil in having fine and short rays and septate fibres, differs in having usually banded parenchyma in addition to aliform confluent. In *Tamarindus*, the rays are comparatively higher and the fibres are nonseptate.

The woods of *Afzelia* and *Intsia* also show resemblance with the present fossil in the nature and distribution of parenchyma. However, the latter can be differentiated from the former living genera in having septate fibres and comparatively narrower and shorter rays.

The hitherto described anatomical characters of the fossil are met with in the woods of *Albizia* Durraz. Detailed comparison of the fossil was made with the thin sections of about 26 species of *Albizia* and also with many other species from their descriptions and figures (Desch, 1957, vol. I, pp. 254-260; Kribs, 1959, p. 64, fig. 396; Moll & Janssonius, 1914, pp. 193-195; Normand, 1950, vol. I, pp. 98-142, pls 24-54; Pearson & Brown, 1932, pp. 402, 471, figs 155-160; Reyes, 1938, pp. 117-118, pl. 16, fig. 1; Schneider, 1916, pp. 116-118, pl. 2, fig. 15). This study has shown that the closest resemblance of the fossil is with the wood of *Albizia amara* Boivin. Apart from their similarity in shape and size of the vessels, and the type and distribution of parenchyma, the rays in both are 1-3 (1-2) seriate and short, i.e. 4-15 cells in height.

Comparison with the Fossil Species

Till recently the fossil woods resembling *Albizia* were used to be placed under the genus *Albizzioxylon* Nikitin (1935). However, Müller-Stoll and Mädel (1967) considered *Albizzioxylon* as 'genus dubium' because it does not show sufficient characters of *Albizia*. Prakash (1975) created another genus '*Albizinium*' for the fossil woods resembling *Albizia* when he described a new fossil wood from Nalagarh, Himachal Pradesh as *Albizinium eolebbekianum*. This is the only species of fossil wood of *Albizia*. The other two species described earlier as *Albizzioxylon sahnii* Ramanujam (1960) from near Pondicherry and *Albizzia vantagiensis* Prakash & Barghoorn (1961) from the Columbia Basalts, U.S.A. have been transferred to *Pahudioxylon sahnii* Ghosh & Kazmi by Awasthi (1975b) and *Tetrapleuroxylon vantagiensis* (Prakash & Barghoorn) by Müller-Stoll and Mädel (1967) respectively.

The present fossil differs from *Albizinium eolebbekianum* particularly in the height and width of rays which are mostly fine and short.

Since the present fossil shows close resemblance with the woods of *Albizia* it is placed under the genus *Albizinium* Prakash and named as *Albizinium pondicherriensis* sp. nov.

The genus *Albizia* Durraz. consists of about 150 species (Willis, 1973, p. 38) of trees and shrubs, widely distributed throughout the tropics and sub-tropics of Asia, Africa and Australia; one species is found in Mexico. About 16 species are indigenous to India and Burma. *Albizia amara* Boivin, the nearest modern equivalent of the present fossil, is presently found in dry forests of the Indian Peninsula from Khandesh in the west to Visakhapatnam in the east, extending towards in the west coast in dry forests of Travancore and also in Sri Lanka (Gamble, 1902).

Diagnosis

Albizinium pondicherriensis sp. nov.

Wood diffuse porous. *Growth rings* delimited by narrow or thin lines of 1-3 cells wide terminal parenchyma. *Vessels* small to large, t.d. 45-285 μ, r.d. 45-240 μ, 3-5 vessels per sq mm; perforations simple; intervessel pits moderately large, about 8-10 μ in diameter, oval through the horizontal plane, alternate, vestured. *Parenchyma* paratracheal and apotracheal; paratracheal parenchyma vasicentric, forming wide sheath around the vessels, usually aliform to aliform-confluent; apotracheal parenchyma represented by thin lines delimiting the growth rings; diffuse crystalliferous cells present. *Xylem rays* fine, 1-3 seriate; rays homocellular, consisting of procumbent cells, short, about 4-15 cells in height. *Fibres* 8-20 μ in diameter, septate, thin-walled.

Holotype — B.S.I.P. Museum no. 33702.

Locality — Murattandichavadi near Pondicherry.

Horizon & Age — Cuddalore Series, Miocene-Pliocene.

Genus — *Cassinium* Prakash, 1975

2. *Cassinium arcotense* sp. nov.

Pl. 2, figs 8, 9; Pl. 3, fig. 10

Material — Single piece of fairly well-preserved silicified wood.

Topography — Wood diffuse-porous. *Growth rings* present, delimited by fine, continuous lines of parenchyma which often merge with paratracheal parenchyma (Pl. 2, figs 8, 9), about 4-8 lines per cm. *Vessels* visible to the naked eye as small dots, small to moderately large, mostly medium, solitary and in radial multiples of 2-4 (mostly 2), uniformly distributed, about 4-6 vessels per sq mm; tyloses absent. *Parenchyma* abundant, paratracheal, mostly aliform, as 'eyelets' round the vessels (Pl. 1, figs 8, 9), aliform to confluent, connecting two or more adjacent vessels; in addition, 1-3 continuous or discontinuous confluent parenchyma bands or lines also present, up to 16 cells wide, fine lines of apotracheal parenchyma present, delimiting growth rings (Pl. 1, fig. 8). *Rays* 1-4 (mostly 2-4) seriate (Pl. 3, fig. 10), ray tissue homogeneous; rays homocellular, composed wholly of procumbent cells, up to 25 cells in height and 5-7 rays per mm in cross-section. *Fibres* aligned in radial rows between two consecutive rays.

Elements — Vessels nearly circular, those in radial multiples flattened at places of contact, t.d. 60-280 μ, r.d. 40-280 μ, common walls about 8-12 μ in thickness; perforations simple, nearly horizontal to oblique; vessel-

members truncate, 150-1500 μ in height; intervessel pits medium, 6-8 μ in diameter, alternate, bordered, vestured, with linear orifices. *Parenchyma cells* 3-4 per strand, angular, about 20-32 μ in diameter, crystalliferous strands present with many locules, each containing solitary crystal. Procumbent *ray cells* 8-20 μ in tangential height, 20-160 μ in radial length. *Fibres* small, 10-20 μ in diameter, angular, probably septate, moderately thick-walled, common walls 2-4 μ in thickness.

Comparison with the Modern Woods

The above characters of the fossil wood indicate that it is a legume. The family Leguminosae consists of a large number of woody plants having varied wood structure. On the basis of variation in the distribution of parenchyma, Ramesh Rao and Purkayastha (1972, p. 5) have placed the Indian leguminous woods into six broad groups. Under the group II and IV they have included all those genera having woods with aliform confluent to confluent parenchyma bands. Since the nature and distribution of parenchyma in the present fossil is also of the above type, it can be compared with those included in the group II and IV. Amongst them, *Cassia* is one which shows close similarity with the present fossil.

The woods of *Cassia* are also variable in structure, particularly in the nature and distribution of parenchyma. The parenchyma varies from predominantly aliform confluent to broad aliform confluent bands and predominantly broad bands. On the basis of this some of its species can be easily distinguished from each other. As regards its affinities with the modern *Cassia*, after examination of quite a number of available thin sections of the woods of this genus as well as their published descriptions and illustrations, the fossil was found in all the anatomical details very similar to *Cassia javanica* L.

Comparison with the Fossil Species

For naming the fossil woods resembling modern woods of *Cassia*, Felix (1882) created the genus *Cassioxylon*. Later, a few more fossil woods were also placed under this genus. In 1967, Müller-Stoll and Mädel found after critical re-examination of the type material of *Cassioxylon anomalum* on which the genus is based that it does not show any affinity with *Cassia* and not even with any other genus of the Leguminosae. Therefore, they considered it as an invalid genus. On the other hand, they created a new genus *Peltophoroxylon* for the fossil woods resembling modern *Cassia*, *Peltophorum* and *Xylia* which they found anatomically inseparable from each other. Consequently, they transferred all the species of *Cassioxylon* to *Peltophoroxylon*.

Agreeing with the above view Prakash and Awasthi (1970) and Prakash (1973) also used the genus *Peltophoroxylon* to accommodate the fossil woods resembling *Cassia*. However, recently Prakash (1975) has found after critical examination of thin sections of a large number of the woods of *Cassia*, *Peltophorum* and *Xylia* that most of the woods of *Cassia* can be separated from those of *Xylia* and *Peltophorum*. Hence, he proposed a new generic name *Cassinium* to designate the fossil woods resembling those cassias which can be differentiated anatomically from *Peltophorum* and *Xylia*, and transferred all the species of *Peltophoroxylon* to *Cassinium*. They have been listed below.

Name of fossil	Affinities with modern species
1. *Cassinium variegatum* (Ramanujam) Prakash, 1975 *Cassioxylon variegatum* Ramanujam, 1960 *Peltophoroxylon variegatum* (Ramanujam) Müller-Stoll & Mädal, 1967	*Cassia* spp. in general
2. *Cassinium borooahii* (Prakash) Prakash, 1975 *Cassioxylon borooahii* Prakash, 1967 *Peltophoroxylon borooahii* (Prakash) Prakash & Awasthi, 1970	*Cassia siamea* Lam.
3. *Cassinium cassioides* (Prakash & Awasthi) Prakash, 1975 *Peltophoroxylon cassioides* Prakash & Awasthi, 1970	*Cassia fistula* L.
4. *Cassinium cassinodosum* (Prakash) Prakash, 1975 *Peltophoroxylon cassinodosum* Prakash, 1973	*Cassia nodosa* Ham.
5. *Cassinium prefistulai* Prakash, 1975	*Cassia fistula* L.
6. *Cassinium arcotense* sp. nov.	*Cassia javanica* L.

In gross features the present fossil shows similarity with all the species of *Cassinium* listed above. However, considering the

distribution of parenchyma and rays it shows some significant differences from the above species. In *Cassinium variegatum* the confluent parenchyma bands are rare. In *Cassinium cassioides* and *C. prefistulai* the aliform-confluent parenchyma is abundant but regular bands being uncommon. Moreover, these fossils show closest similarity with *Cassia fistula* L. *Cassinium borooahii* differs in having predominantly regular bands of parenchyma. *Cassinium cassinodosum* is also different from the present fossil in the distribution of parenchyma and in having fine (1-2 seriate) rays.

Since the present fossil wood is quite different from all the species of *Cassinium*, it is therefore named as *Cassinium arcotense* sp. nov.

Cassia javanica L. with which the present fossil resembles most is indigenous to Java and Sumatra.

Diagnosis

Cassinium arcotense sp. nov.

Wood diffuse-porous. *Growth rings* present, inconspicuous, delimited by narrow lines of parenchyma which often merge with aliform confluent parenchyma. *Vessels* small to large, mostly medium, solitary as well as in radial multiples of 2-4 (mostly 2), circular to oval, t.d. about 60-280 μ, r.d. 40-280 μ, about 4-6 vessels per sq mm; intervessel pits medium to large, 6-8 μ in diameter, alternate, vestured. *Parenchyma* paratracheal, aliform confluent with continuous to discontinuous confluent bands, crystalliferous strands present. *Xylem rays* 1-4 (mostly 2-4) seriate, homogeneous, consisting of procumbent cells, up to 25 cells in height. *Fibres* semilibriform, moderately thick-walled, probably septate.

Holotype — B.S.I.P. Museum no. 35304.

Locality — Murattandichavadi near Pondicherry.

Horizon & Age — Cuddalore Series, Miocene-Pliocene.

Genus — *Pericopsoxylon* gen. nov.

3. *Pericopsoxylon indicum* sp. nov.

Pl. 3, figs 11-14

Material — Two pieces of fairly well-preserved petrified wood.

Topography — Wood diffuse-porous. *Growth rings* not seen. *Vessels* medium to large, mostly solitary and also in radial multiples of 2-4, almost uniformly distributed, about 3-6 vessels per sq mm; tyloses not seen. *Parenchyma* paratracheal, aliform, forming conspicuous 'eyelets' round the vessels or vessel groups, often confluent, joining two or more adjacent vessels or vessel groups tangentially as well as obliquely (Pl. 3, figs 13, 14). *Rays* 1-3 (mostly 2-3) seriate, occasionally uniseriate; ray tissue homogeneous; rays homocellular, consisting of procumbent cells, 5-21 cells in height, 8-12 per mm, storied with vessel-members and parenchyma strands (Pl. 3, fig. 12). *Fibres* aligned in radial rows between two consecutive rays in cross section. *Ripple marks* present, seen in tangential longitudinal section due to storied arrangement of vessel-members, parenchyma strands and xylem rays (Pl. 3, fig. 11), about 2 storeys per mm.

Elements — *Vessels* circular to oval, often radially flattened or compressed, t.d. 100-280 μ, r.d. 80-360 μ, common walls 6-10 μ in thickness; perforations simple, nearly horizontal to oblique; vessel-members truncate, about 375-630 μ in height, storied; intervessel pits large, 8-12 μ in diameter, alternate, bordered, vestured with linear to lenticular orifices. *Parenchyma cells* 3-4 per strand, 20-48 μ in diameter, crystals present in the outermost cells of aliform-confluent parenchyma. Procumbent *ray cells* 10-20 μ in tangential height, 40-140 μ in radial length. *Fibres* non-libriform, 12-32 μ in diameter, thick-walled, walls 3-6 μ, nonseptate, pits not seen.

Comparison with the Modern Woods

Presence of ripple marks is one of the most important features of this fossil which are formed due to storied arrangement of vessel-members, parenchyma strands and xylem rays. Taking into consideration the other important characters, such as aliform to confluent parenchyma, vestured intervessel pits and 1-3 seriate homogeneous rays, the fossil appears to be a leguminous. In the family Leguminosae, there are quite a large number of genera having ripple marks, which can be considered for comparison of the present fossil. Amongst them the important genera are: *Bauhinia*, *Caesalpinia*,

Dalbergia, *Dialium*, *Koompassia*, *Millettia*, *Ougeinia*, *Pericopsis*, *Pongamia* and *Pterocarpus*. Excepting *Ougeinia*, *Pericopsis* and *Koompassia* (in part) all the remaining genera possess apotracheal or aliform confluent parenchyma bands which vary from fine to broad. Since in the present fossil wood the parenchyma is aliform to aliform-confluent, it is most appropriate to compare it with those of *Ougeinia*, *Pericopsis* and a few species of *Koompassia* (e.g. *K. malaccensis*). Taking into consideration all the anatomical features collectively the present fossil wood shows closest resemblance with that of *Pericopsis mooniana* Thw. and differs from *Koompassia malaccensis* and *Ougeinia*. In *Koompassia* including *K. malaccensis* the xylem rays are heterocellular and irregularly storied as against the present fossil in which they are homocellular and regularly storied.

Ougeinia although resembles the fossil in most of the features, differs from it particularly in having prominent lines of apotracheal parenchyma delimiting the growth rings and extremely low xylem rays. Besides the above genera, it was also compared with a large number of other available leguminous woods, but none of them shows close similarity with our fossil.

Because of the close resemblance of the fossil wood with the wood structure of *Pericopsis*, a new genus *Pericopsoxylon* is instituted to designate the present fossil. It is specifically named as *Pericopsoxylon indicum* sp. nov.

The genus *Pericopsis* Thw. consists of 6 species, of which 5 are known to occur in tropical Africa and 1 species (*Pericopsis mooniana* Thw.)in Sri Lanka (Willis, 1973, p. 873) in the moist low country to about 300 m, especially along the river banks.

Generic Diagnosis

Pericopsoxylon gen. nov.

Wood diffuse-porous. *Growth rings* not seen. *Vessels* medium to large, solitary as well as in radial multiples of 2-4; perforations simple; vessel-members storied; intervessel pits large, alternate, vestured. *Parenchyma* paratracheal, aliform, often confluent, connecting two or more vessels or vessel groups tangentially or obliquely, strands storied, crystals present. *Rays* 1-3 seriate, short to medium in height, storied; ray tissue homogeneous, composed wholly of procumbent cells. *Fibres* non-libriform, thick-walled, nonseptate. *Ripple marks* present on the tangential longitudinal plane due to storied arrangement of vessel-members, rays and parenchyma strands.

Genotype — *Pericopsoxylon indicum* sp. nov.

Specific Diagnosis

Pericopsoxylon indicum sp. nov.

Vessels medium to large, t.d. 100-280 μ, r.d. 80-360 μ, mostly solitary, and also in radial multiples of 2-4, about 3-6 vessels per sq mm; vessel-members about 375-630 μ in height, storied; intervessel pits about 8-10 μ in diameter, alternate, vestured, with linear to lenticular orifices. *Parenchyma* paratracheal, aliform to confluent, enclosing two or more adjacent vessels or vessel groups tangentially or obliquely; crystals present in the outer most cells of aliform-confluent parenchyma, strands storied. *Xylem rays* 1-3 (mostly 2) seriate, homocellular, composed wholly of procumbent cells, about 5-21 cells in height, storied. *Fibres* non-libriform, thick-walled, nonseptate. *Ripple marks* present due to storied arrangement of vessel members, parenchyma strands and rays.

Holotype — B.S.I.P. Museum no. 35305.

Locality — Murattandichavadi near Pondicherry.

Horizon & Age — Cuddalore Series, Miocene-Pliocene.

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EXPLANATION OF PLATES

PLATE 1

Albizinium pondicherriensis sp. nov.

1. Cross section showing vessels and parenchyma. × 43. B.S.I.P. Museum slide no. 5614.

Albizia amara Boivin

2. Cross section showing similar vessels and parenchyma as in *Albizinium pondicherriensis*. × 43.

Albizinium pondicherriensis sp. nov.

3. Tangential longitudinal section showing rays. × 43. B.S.I.P. Museum slide no. 5615.

Albizia amara Boivin

4. Tangential longitudinal section showing rays similar in width and length as in *Albizinium pondicherriensis*. × 43.

PLATE 2

Albizinium pondicherriensis sp. nov.

5. Cross section under low magnification showing general shape, size and distribution of vessels and parenchyma. × 12. B.S.I.P. Museum slide no. 5614.
6. Tangential longitudinal section magnified to show rays. × 120. B.S.I.P. Museum slide no. 5615.
7. Radial longitudinal section showing homocellula rays. × 150. B.S.I.P. Museum slide no. 5616.

Cassinium arcotense sp. nov.

8. Cross section showing nature and distribution of vessels and parenchyma. × 8. B.S.I.P. Museum slide no. 5617.
9. Cross section magnified to show shape and size of vessels and distribution of parenchyma. × 30. B.S.I.P. Museum slide no. 5617.

PLATE 3

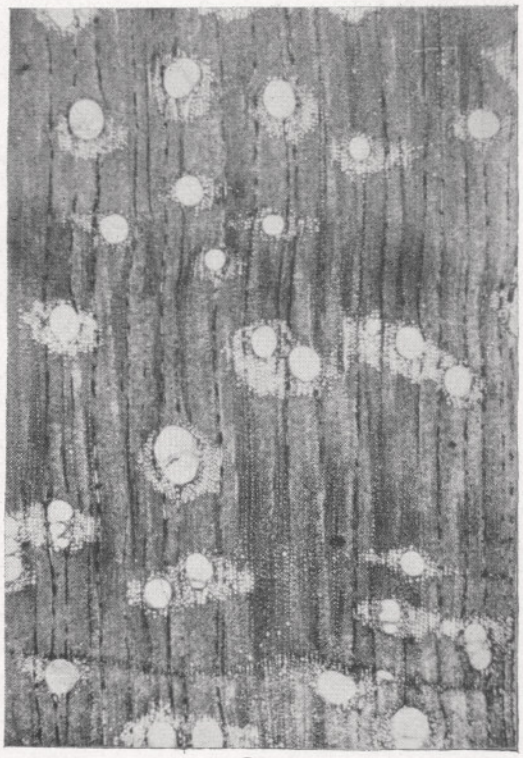
Cassinium arcotense sp. nov.

10. Tangential longitudinal section showing rays. × 90. B.S.I.P. Museum slide no. 5618.

Pericopsoxylon indicum gen. et sp. nov.

11. Tangential longitudinal section showing rays (storied). × 30. B.S.I.P. Museum slide no. 5620.
12. Tangential longitudinal section magnified to show rays. × 90. B.S.I.P. Museum slide no. 5620.
13. Cross-section showing nature and distribution of vessels and parenchyma. × 8. B.S.I.P. Museum slide no. 5619.
14. Cross-section magnified. × 30. B.S.I.P. Museum slide no. 5619.

1



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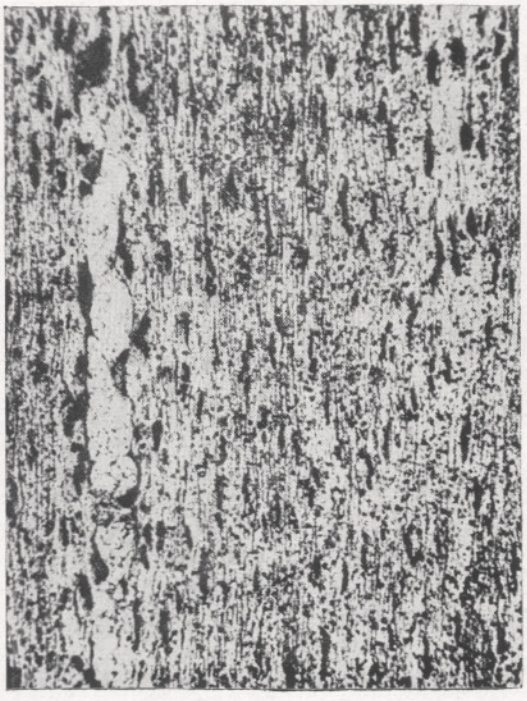

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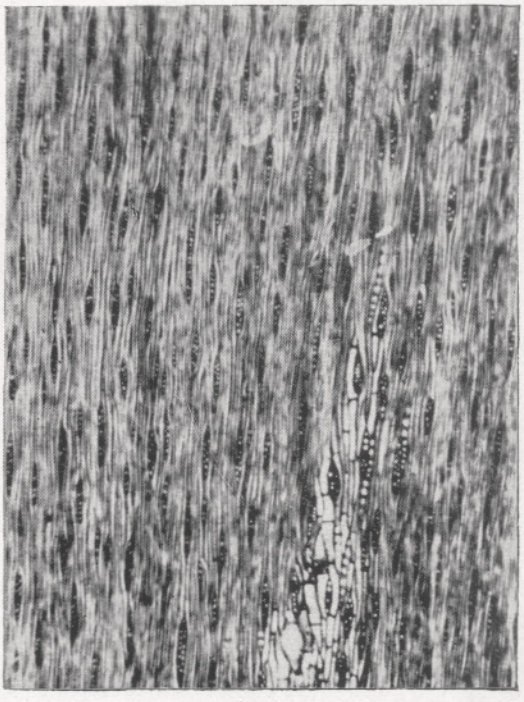

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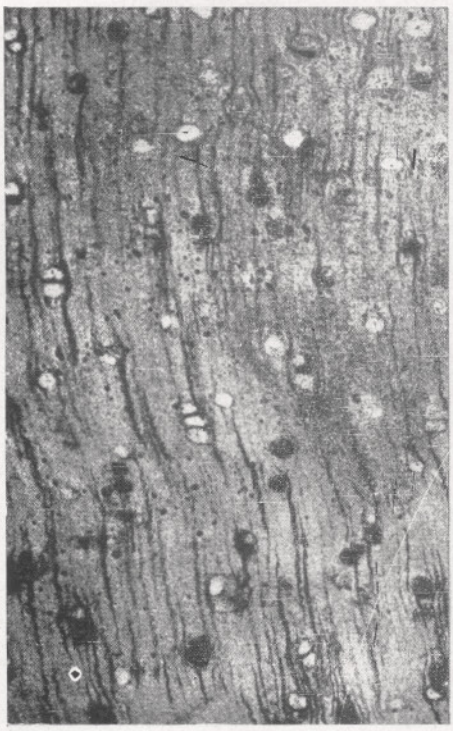
PLATE 1



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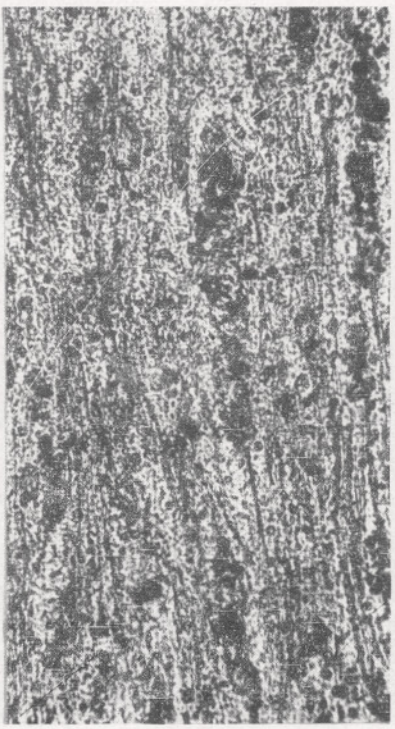

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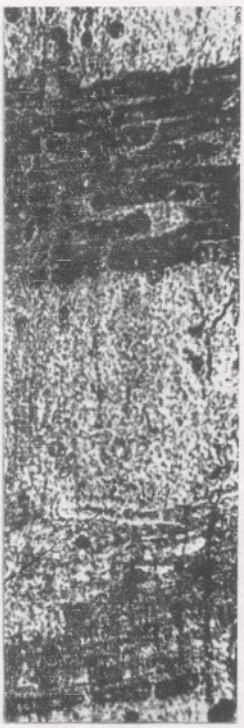

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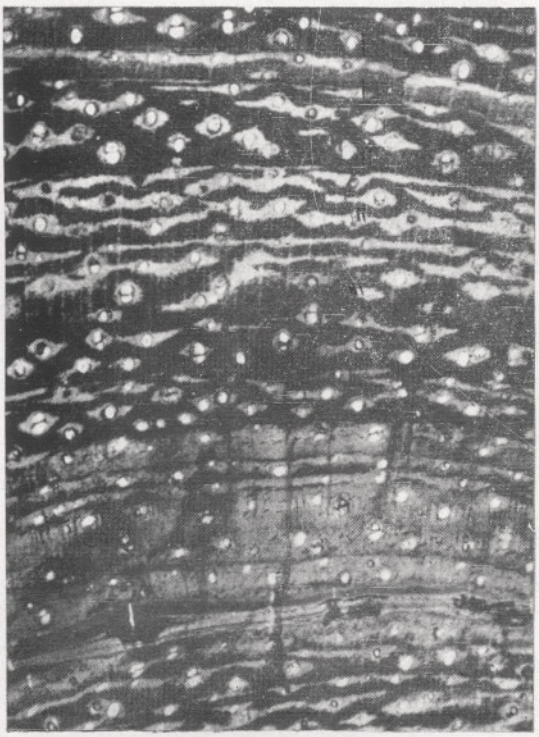

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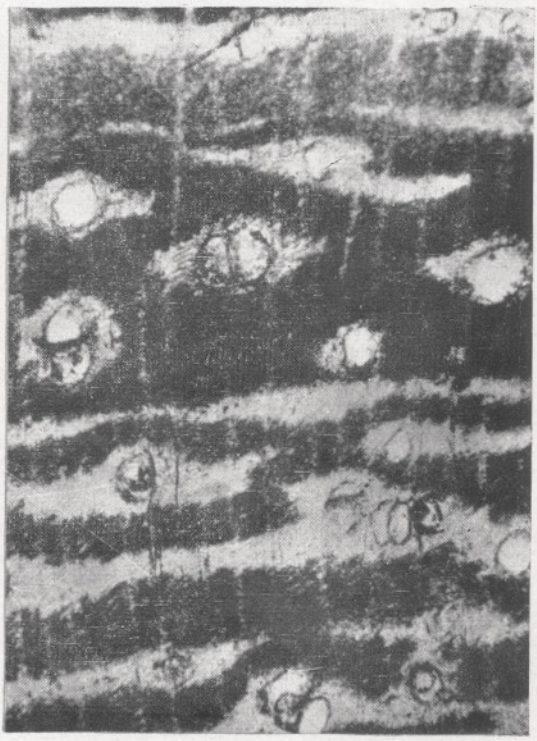

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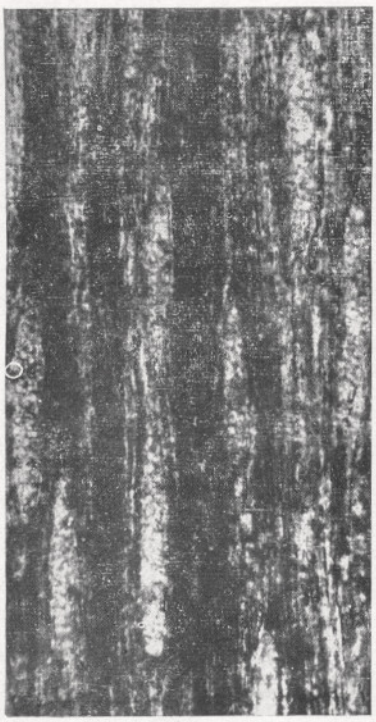
PLATE 2



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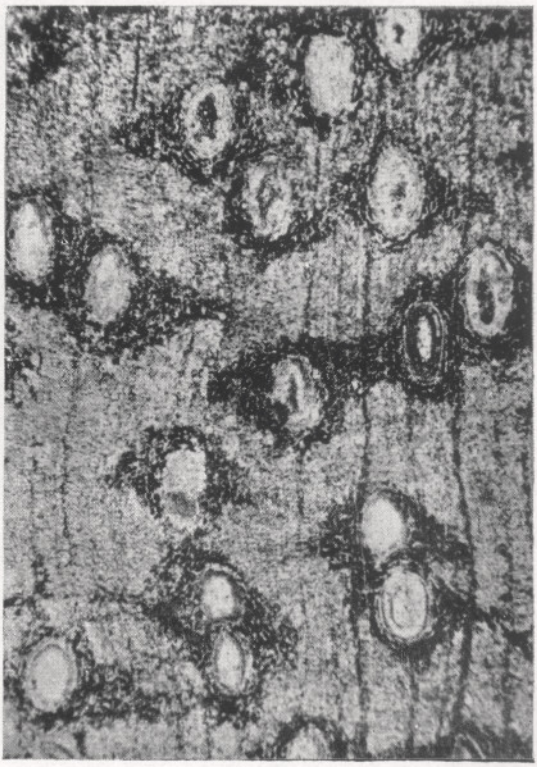

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PLATE 3