		SERVICE Wood Biology
OUR REFERENCE exp_434	YOUR REFERENCE ODILON	DATE 31-07-2023
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CONCERNS EXPERTISE		

ENFORCE – Centre for Forensic Wood Research

Report Expertise

This report concerns the macro- and microscopic wood identification of a sample (wooden table) with references listed below.

Reference: exp_434
Date of arrival: 29-06-2023
Date of report: 31-07-2023

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Sample Description

Table “ODILON” 78 cm x 120 cm x 40 cm. Declared as *Picea* spp. with origin China.
This table is composed of 13 possible different species, therefore 13 samples were taken and visible in the following picture.

Treatment

A small cube of around 1 cm^3 was taken from each of the 13 sampled parts of the table and softened in a heating plate with magnetic stirrer (ref. Lab Protocol). Thin sections were made in transversal, tangential and radial plane using a microtome. These were stained with Safranine 0 and Alcian Blue. The anatomical features (ref. IAWA List) were studied with an optical microscope. These features were compared with reference material online (ref. InsideWood), reference literature on Chinese wood and with samples of the concerned species in the Xylarium of the Service of Wood Biology.

Anatomical Features

Listing of the wood anatomical features for each of the 13 parts, using the IAWA list of softwood (numbers 1 and 2) hardwood (numbers 3 to 13) features. At the end of this chapter, results are listed based on these 13 descriptions.

1.

N° (IAWA)	Presence*	Feature Description
40	p	Growth ring boundaries distinct
42	v	Abrupt transition from earlywood to latewood
44	p	IT pitting (predominantly) uniseriate
79	p	Ray tracheids commonly present
82	p	Dentate ray tracheid cell walls
85	p	Smooth (unpitted) end walls of ray parenchyma cells
87	p	Smooth (unpitted) horizontal walls of ray parenchyma cells
90	p	Window-llike (fenestriform)
97	p	(large window-like) 1-2 pits per cross-field
103	p	Average ray height medium (5 to 15 cells)
107	p	Rays exclusively uniseriate
109	p	Axial canals
117	p	Thin-walled epithelial cells

*(p = present, a = absent, v = variable)

2.
Similar anatomy to n°1

3.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
5	p	Wood diffuse-porous
9	p	Vessels exclusively solitary (90% or more)
12	p	Solitary vessel outline angular
14	p	Scalariform perforation plates
17	p	Scalariform perforation plates with 20 - 40 bars
30	p	Vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell
36	p	Helical thickenings in vessel elements present
40	p	Mean tangential diameter of vessel lumina <= 50 µm
49	p	40 - 100 vessels per square millimetre
62	p	Fibres with distinctly bordered pits
63	p	Fibre pits common in both radial and tangential walls
64	p	Helical thickenings in ground tissue fibres
66	p	Non-septate fibres present
69	p	Fibres thin- to thick-walled
76	p	Axial parenchyma diffuse
77	p	Axial parenchyma diffuse-in-aggregates
92	p	Four (3-4) cells per parenchyma strand
97	p	Ray width 1 to 3 cells
100	p	Rays with multiseriate portion(s) as wide as uniseriate portions
105	p	All ray cells upright and / or square
107	p	Body ray cells procumbent with mostly 2-4 rows of upright and / or square marginal cells
108	v	Body ray cells procumbent with over 4 rows of upright and / or square marginal cells
116	p	Rays per millimetre >= 12 /mm

*(p = present, a = absent, v = variable)

4.

N° (IAWA)	Presence*	Feature Description
2	p	Growth ring boundaries indistinct or absent
5	p	Wood diffuse-porous
22	p	Intervessel pits alternate
26	p	Medium intervessel pits - 7 - 10 µm
30	p	Vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell
31	p	Vessel-ray pits with much reduced borders to apparently simple: pits rounded or angular
42	p	Mean tangential diameter of vessel lumina 100 - 200 µm
47	p	5 - 20 vessels per square millimetre
66	p	Non-septate fibres present
69	p	Fibres thin- to thick-walled
78	p	Axial parenchyma scanty paratracheal
79	p	Axial parenchyma vasicentric
91	p	Two cells per parenchyma strand
92	p	Four (3-4) cells per parenchyma strand
93	v	Eight (5-8) cells per parenchyma strand
97	p	Ray width 1 to 3 cells
106	p	Body ray cells procumbent with one row of upright and / or square marginal cells
115	p	Rays per millimetre 4-12 / mm

*(p = present, a = absent, v = variable)

5.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
5	p	Wood diffuse-porous
12	p	Solitary vessel outline angular
14	p	Scalariform perforation plates
18	p	Scalariform perforation plates with >= 40 bars
21	p	Intervessel pits opposite
30	p	Vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell
40	p	Mean tangential diameter of vessel lumina <= 50 µm
50	p	>= 100 vessels per square millimetre
63	p	Fibre pits common in both radial and tangential walls
76	p	Axial parenchyma diffuse
77	p	Axial parenchyma diffuse-in-aggregates
97	p	Ray width 1 to 3 cells
102	p	Ray height > 1 mm
108	p	Body ray cells procumbent with over 4 rows of upright and / or square marginal cells
109	p	Rays with procumbent, square and upright cells mixed throughout the ray
113	p	Disjunctive ray parenchyma cell walls
116	p	Rays per millimetre >= 12 /mm

*(p = present, a = absent, v = variable)

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6.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
5	p	Wood diffuse-porous
13	p	Simple perforation plates
22	p	Intervessel pits alternate
24	p	Minute intervessel pits - <= 4 µm
25	p	Small intervessel pits - 4 - 7 µm
30	v	Vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell
31	v	Vessel-ray pits with much reduced borders to apparently simple: pits rounded or angular
41	p	Mean tangential diameter of vessel lumina 50 - 100 µm
48	p	20 - 40 vessels per square millimetre
49	p	40 - 100 vessels per square millimetre
56	v	Tyloses common
61	p	Fibres with simple to minutely bordered pits
69	p	Fibres thin- to thick-walled
75	v	Axial parenchyma absent or extremely rare
76	p	Axial parenchyma diffuse
92	p	Four (3-4) cells per parenchyma strand
97	p	Ray width 1 to 3 cells
105	v	All ray cells upright and / or square
106	p	Body ray cells procumbent with one row of upright and / or square marginal cells
113	p	Disjunctive ray parenchyma cell walls
115	p	Rays per millimetre 4-12 / mm

*(p = present, a = absent, v = variable)

7.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
5	p	Wood diffuse-porous
9	p	Vessels exclusively solitary (90% or more)
12	p	Solitary vessel outline angular
14	p	Scalariform perforation plates
15	v	Scalariform perforation plates with <= 10 bars
16	p	Scalariform perforation plates with 10 - 20 bars
20	p	Intervessel pits scalariform
32	p	Vessel-ray pits with much reduced borders to apparently simple: pits horizontal (scalariform, gash-like) to vertical (palisade)
40	p	Mean tangential diameter of vessel lumina <= 50 µm
49	v	40 - 100 vessels per square millimetre
50	p	>= 100 vessels per square millimetre
62	v	Fibres with distinctly bordered pits
63	p	Fibre pits common in both radial and tangential walls
66	p	Non-septate fibres present
69	p	Fibres thin- to thick-walled
76	p	Axial parenchyma diffuse
77	v	Axial parenchyma diffuse-in-aggregates
93	p	Eight (5-8) cells per parenchyma strand
96	p	Rays exclusively uniseriate
106	p	Body ray cells procumbent with one row of upright and / or square marginal cells
107	p	Body ray cells procumbent with mostly 2-4 rows of upright and / or square marginal cells
109	p	Rays with procumbent, square and upright cells mixed throughout the ray
113	p	Disjunctive ray parenchyma cell walls
115	p	Rays per millimetre 4-12 / mm

*(p = present, a = absent, v = variable)

8.
Similar anatomy to n°10

9.
Similar anatomy to n°10

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10.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
5	a	Wood diffuse-porous
8	p	Vessels in dendritic pattern
22	p	Intervessel pits alternate
32	p	Vessel-ray pits with much reduced borders to apparently simple: pits horizontal (scalariform, gash-like) to vertical (palisade)
47	p	5 - 20 vessels per square millimetre
48	p	20 - 40 vessels per square millimetre
60	p	Vascular / vasicentric tracheids present
66	p	Non-septate fibres present
79	p	Axial parenchyma vasicentric
86	p	Axial parenchyma in narrow bands or lines up to three cells wide
92	p	Four (3-4) cells per parenchyma strand
96	p	Rays exclusively uniseriate
104	p	All ray cells procumbent
106	p	Body ray cells procumbent with one row of upright and / or square marginal cells
113	p	Disjunctive ray parenchyma cell walls
114	a	Rays per millimetre <= 4 / mm

*(p = present, a = absent, v = variable)

11.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
7	p	Vessels in diagonal and / or radial pattern
9	p	Vessels exclusively solitary (90% or more)
22	p	Intervessel pits alternate
32	p	Vessel-ray pits with much reduced borders to apparently simple: pits horizontal (scalariform, gash-like) to vertical (palisade)
60	p	Vascular / vasicentric tracheids present
86	p	Axial parenchyma in narrow bands or lines up to three cells wide
99	p	Larger rays commonly > 10-seriate
102	p	Ray height > 1 mm
103	p	Rays of two distinct sizes
104	p	All ray cells procumbent

*(p = present, a = absent, v = variable)

12.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
5	p	Wood diffuse-porous
14	p	Scalariform perforation plates
15	p	Scalariform perforation plates with <= 10 bars
22	p	Intervessel pits alternate
25	p	Small intervessel pits - 4 - 7 µm
31	p	Vessel-ray pits with much reduced borders to apparently simple: pits rounded or angular
32	v	Vessel-ray pits with much reduced borders to apparently simple: pits horizontal (scalariform, gash-like) to vertical (palisade)
41	p	Mean tangential diameter of vessel lumina 50 - 100 µm
47	p	5 - 20 vessels per square millimetre
66	p	Non-septate fibres present
69	p	Fibres thin- to thick-walled
82	v	Axial parenchyma winged-aliform
83	v	Axial parenchyma confluent
86	p	Axial parenchyma in narrow bands or lines up to three cells wide
93	p	Eight (5-8) cells per parenchyma strand
97	p	Ray width 1 to 3 cells
106	p	Body ray cells procumbent with one row of upright and / or square marginal cells
107	p	Body ray cells procumbent with mostly 2-4 rows of upright and / or square marginal cells
109	p	Rays with procumbent, square and upright cells mixed throughout the ray

*(p = present, a = absent, v = variable)

13.

N° (IAWA)	Presence*	Feature Description
1	p	Growth ring boundaries distinct
5	p	Wood diffuse-porous
9	p	Vessels exclusively solitary (90% or more)
14	p	Scalariform perforation plates
16	p	Scalariform perforation plates with 10 - 20 bars
20	p	Intervessel pits scalariform
32	p	Vessel-ray pits with much reduced borders to apparently simple: pits horizontal (scalariform, gash-like) to vertical (palisade)
36	v	Helical thickenings in vessel elements present
38	v	Helical thickenings only in vessel element tails
40	p	Mean tangential diameter of vessel lumina <= 50 µm
48	p	20 - 40 vessels per square millimetre
49	p	40 - 100 vessels per square millimetre
62	p	Fibres with distinctly bordered pits
63	p	Fibre pits common in both radial and tangential walls
66	p	Non-septate fibres present
69	p	Fibres thin- to thick-walled
76	p	Axial parenchyma diffuse
77	p	Axial parenchyma diffuse-in-aggregates
97	p	Ray width 1 to 3 cells
100	p	Rays with multiseriate portion(s) as wide as uniseriate portions
106	p	Body ray cells procumbent with one row of upright and / or square marginal cells
107	p	Body ray cells procumbent with mostly 2-4 rows of upright and / or square marginal cells
109	p	Rays with procumbent, square and upright cells mixed throughout the ray
115	p	Rays per millimetre 4-12 / mm
116	p	Rays per millimetre >= 12 /mm

*(p = present, a = absent, v = variable)

Results

Code	Family	Genus	Species
exp_434_1	*Pinaceae*	*Pinus**	spp.
exp_434_2	*Pinaceae*	*Pinus**	spp.
exp_434_3	*Symplocaceae*	*Symplocos*	spp.
exp_434_4	*Lauraceae*	cfr. *Machilus*	spp.
exp_434_5	*Viburnaceae*	*Viburnum*	spp.
exp_434_6	*Lauraceae*	cfr. *Machilus*	spp.
exp_434_7	*Theaceae*	*Schima*	cfr. *crenata*
exp_434_8	*Fagaceae*	*Castanopsis*	spp.
exp_434_9	*Fagaceae*	*Castanopsis*	spp.
exp_434_10	*Fagaceae*	*Castanopsis*	spp.
exp_434_11	*Fagaceae*	*Quercus*	spp.
exp_434_12	*Juglandaceae*	*Engelhardia*	spp.
exp_434_13	*Theaceae*	cfr. *Schima*	spp.

*Subgenus *Pinus*, section *Pinus*, subsection *Pinus*. (Ref: Atlas de bois résineux). The *Pinus* species in this subsection are mostly Eurasian with two or three needles per fascicle.

Conclusion

Instead of only one declared species, this wooden table is composed of **at least eight different genera**. Identification up to species level is complex as genera often contain multiple species with minimal differences in wood anatomical features. Therefore, we focus on **reliable identifications of the genus**. In ten out of 13 samples, we identified the genus level successfully. In three cases, we added "cfr." in front of the name. This means that wood anatomical features strongly resemble the mentioned genus but 100% certainty is not guaranteed. However, the **family** level is also certain for these cases.

The table **top** is not made out of spruce (*Picea* spp.) but out of **pine** wood (*Pinus* spp.). The **base** of the table is made out of a **mixture** of several genera, often smaller trees or shrubs. Based on the next paragraph, it might be possible that wood for top and base originate from the same region. However, more information – especially on the exact species of *Pinus*- is needed before drawing firm conclusions.

Regarding the identification of the table base, we observe a lot of members of the families *Lauraceae*, *Theaceae* and *Fagaceae*. These families are the main representatives of the so-called "**Northern Indochina Subtropical Forests"**, an ecoregion defined by Olson et al. (2001), extending across the highlands of northern **Myanmar, Laos, and Vietnam** and also includes most of southern **Yunnan Province (China).** Open-canopy pine forests occur in the higher elevations, and patches of tropical forests grow in the moist valleys. Little of these broadleaf evergreen forests remains intact today, largely driven by land use changes (e.g., conversion of natural forest in Laos into rubber plantations (Warren-Thomas et al., 2021), providing inputs for the automotive industry).

Based on our results, we **cannot conclude on the legality of exploitation or the exact location of the wood**, we can only mention that there is a risk of imported deforestation due to clearcuttings in these forests.

References

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