UNIVERSITY OF THESSALY

Softwood identification criteria:

First steps ▪ by George I. Mantanis FIAWS, PhD

Hint: In the identification process of a softwood species, it is suggested to follow specific **steps** in order to make it easier.

InsideWood: https://insidewood.lib.ncsu.edu/menu/type/MS?1

1

Geographical origin: If you know for sure the exact origin of the specimen, please add the right criterion; e.g., if it originates from the central or north Europe, add: 2

In most of the cases, this is not possible; thus, leave it as blank.

	GEOGRAPHICAL LOCATION	
1	Europe and temperate Asia	
2	Europe, excluding Mediterranean	Present
3	Mediterranean including Northern Africa and Middle East	
4	Temperate Asia (China, Japan, Russia)	
5	Central South Asia	
6	India, Pakistan, Sri Lanka	
7	Myanmar	
8	Southeast Asia and Pacific	
9	Thailand, Laos, Vietnam, Cambodia (Indochina)	
10	Indomalesia	
11	Pacific Islands	
12	Australia and New Zealand	
13	Australia	
14	New Zealand	
15	Tropical mainland Africa and adjacent islands	
16	Tropical Africa	
17	Madagascar & Mauritius, Réunion & Comores	
18	Southern Africa (south of the Tropic of Capricorn)	
19	North America, north of Mexico	
20	Neotropics and temperate Brazil	

2

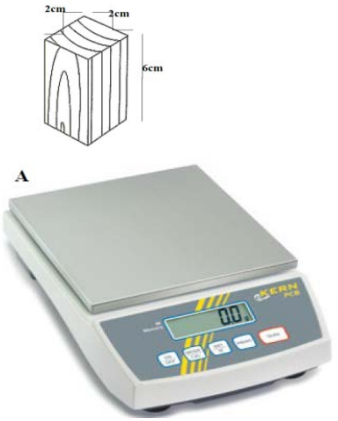
Air-dry density: This is important. Cut carefully a small specimen having normal geometric dimensions. Climatize the wood at normal conditions (20°C/65% RH) until it obtains the air-dry state. Then, estimate its air-dry volume, and its mass.

For instance, if the specimen is *medium* in density, add: 38

Density is the ratio of mass to volume:

$$\rho = \frac{m}{V}$$

ρ – Density (kg m^{-3})
m – Mass (kg)
V – Volume (m^3)



	AVERAGE AIR-DRY DENSITY	
37	Less than 0.48 g/cm3	
38	0.48–0.60 g/cm3	Present
39	Above 0.60 g/cm3	

3

Odor: This needs **specific** experience. A freshly cut specimen may or may not smell. Try to smell if there is any **distinct** odor. Most of the softwood (coniferous) species do smell.

If the wood specimen has *distinct odour*, add 35p. If not, add 35a.

ODOUR		
35	Odour distinct	Present

4

Color of heartwood: In this case, you should add the color(s) of the specimen heartwood. In rare cases, you may add two colors.

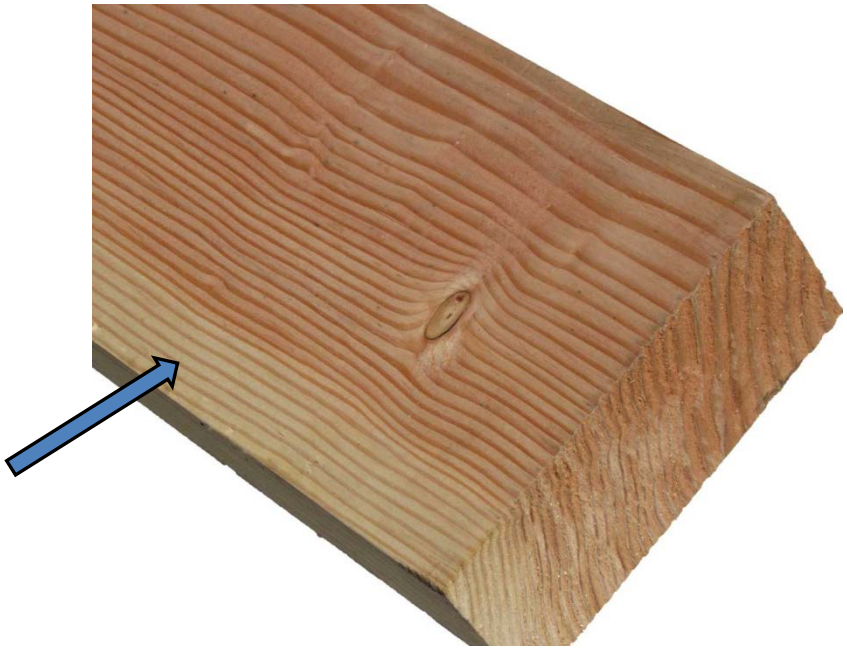
Examples (below): If the wood specimen is *brownish*, add: 26
In case that the specimen is *creamy/whitish*, please add: 29

	HEARTWOOD COLOUR	
26	Brown or shades of brown	Present
27	Red or shades of red	
28	Yellow or shades of yellow	
29	Light coloured (whitish, creamy, gray)	Present
30	Purple or shades of purple	
31	Other than above	

5

Heartwood vs. Sapwood Color: This is easy to distinguish. Check the color difference between the heartwood and the sapwood, if any. In most of the cases, this feature is not possible to evaluate.

Examples (below): if there is a clear color difference, add: 33



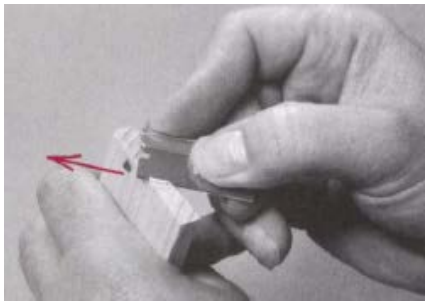
32	Heartwood colour similar to sapwood colour	
33	Heartwood colour distinct from sapwood colour	Present

6

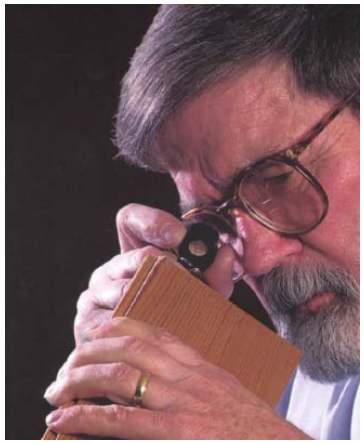
Growth Rings: Cut carefully the specimen in the cross-section by a razor blade or knife. Then, use a hand lens for some observations.

If the specimen appears to have **distinct** rings, add: 40

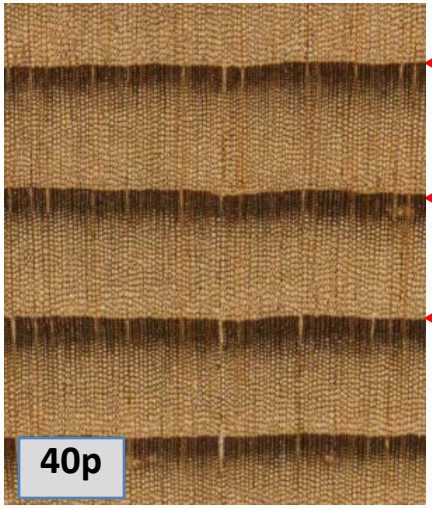
Cutting



Observing



40

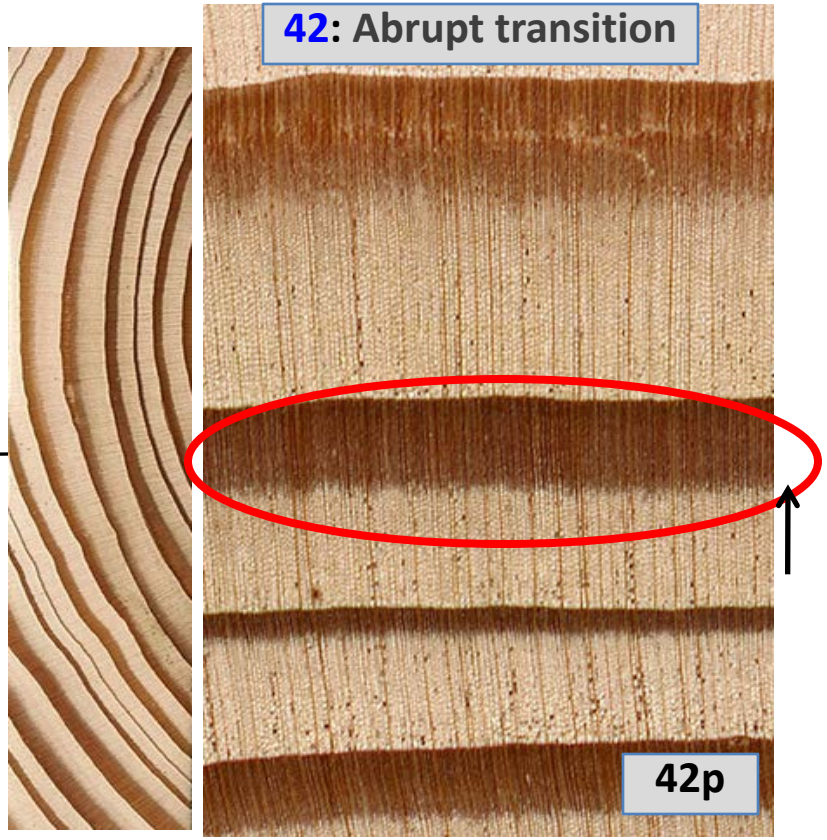


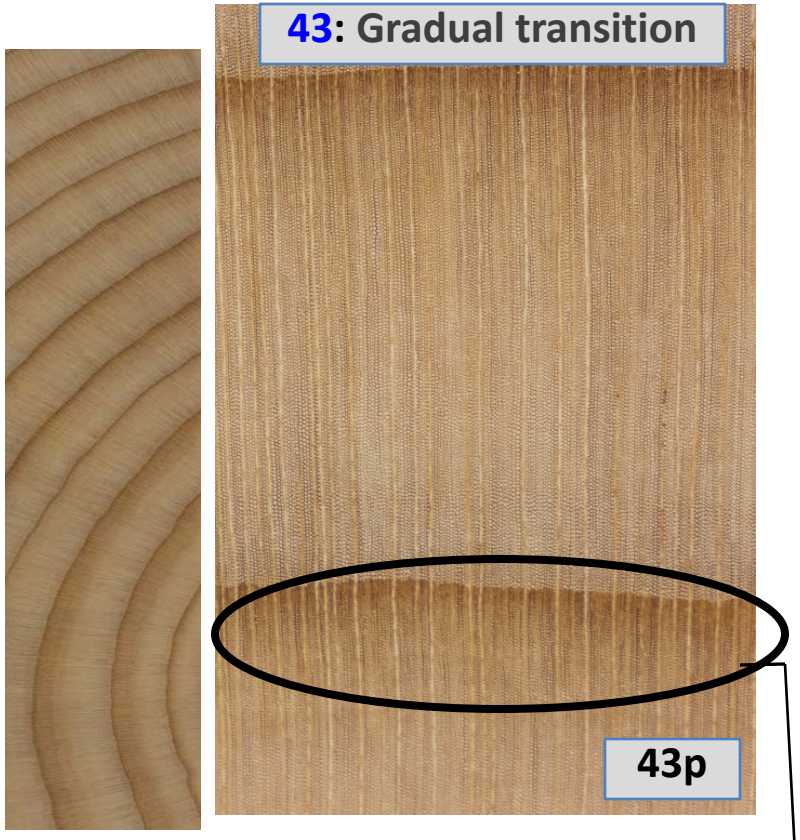
	GROWTH RINGS		
40	Growth ring boundaries distinct	(definition)	Present
41	Growth ring boundaries indistinct or absent	(definition)	

7

Earlywood/latewood transition: This means if it goes gradually or abruptly from the springwood area to summerwood area.

In the left-handed sample, the transition is ***abrupt*** (add 42p).



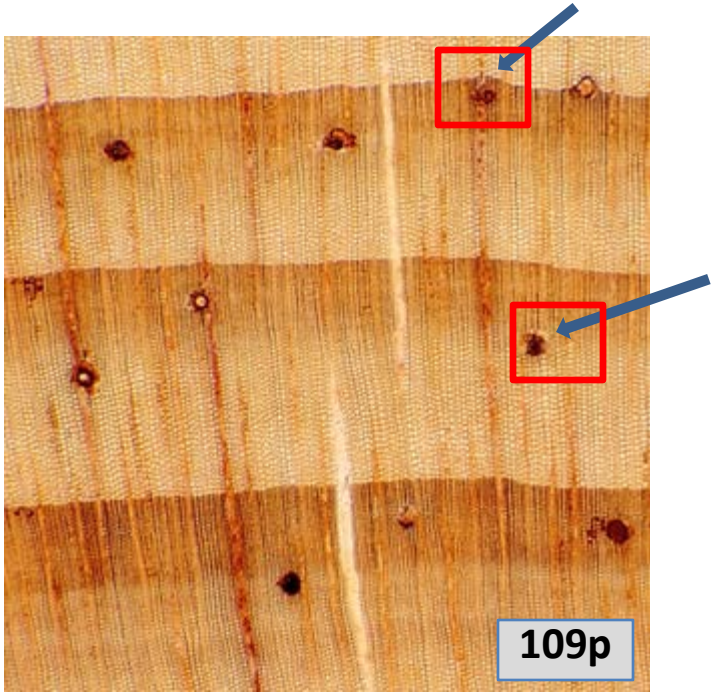


42	Abrupt transition from earlywood to latewood	(definition)	
43	Gradual transition from earlywood to latewood	(definition)	

8

Resin canals: This is easy to distinguish in the cross-section. Typically, the conifer species *Pinus, Picea, Larix, Pseudotsuga* have axial resin canals. If the specimen has resin canals, add 109p

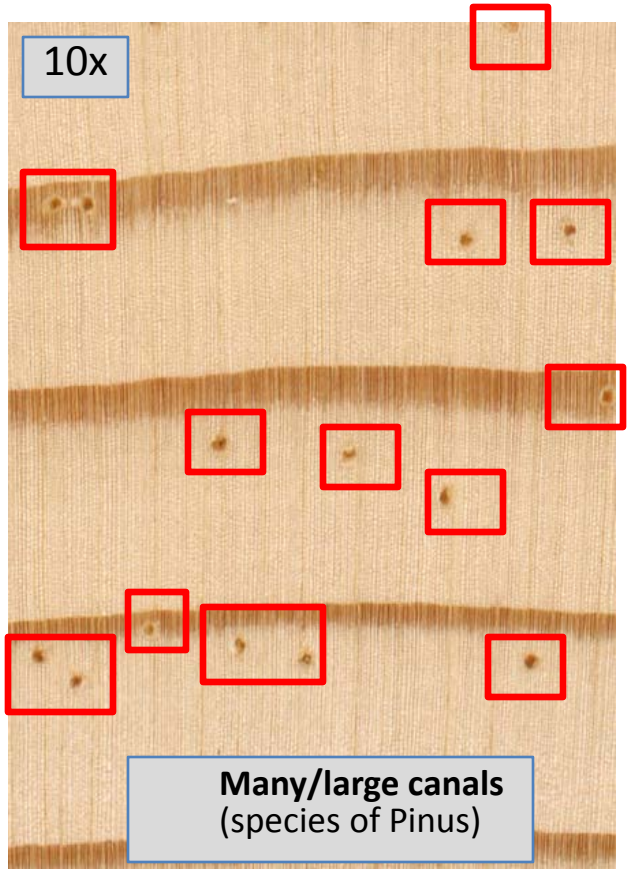
White dots **= Axial resin canals**

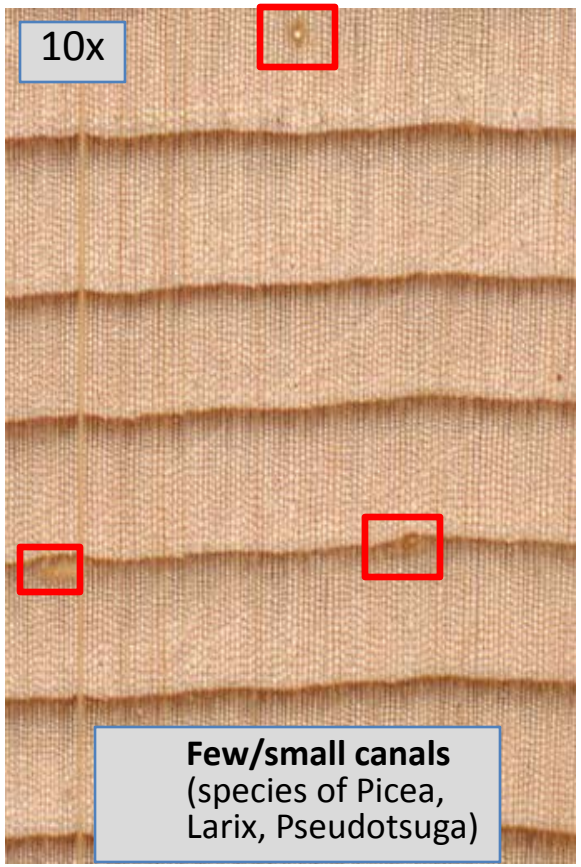


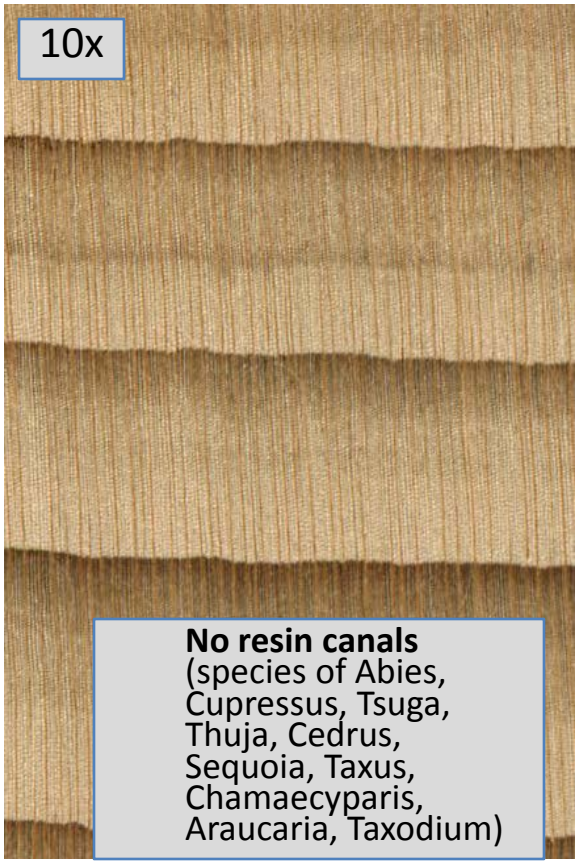
INTERCELLULAR CANALS			
109	Axial canals	(definition)	Present

8a

Number & size of resin canals: **Keep this in mind**. The conifer woods of true *Pinus* species have larger and numerous resin canals. While, the species of *Picea, Larix* and *Pseudotsuga* have fewer and smaller resin canals. Thus, this fact separates softwoods in 3 groups.



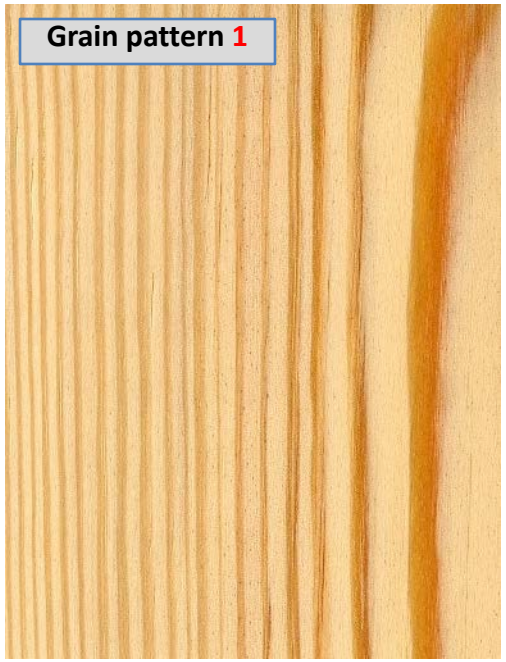




9

Grain pattern ▪ Streaks: This needs **specific** experience. Typically, all softwoods have their own grain pattern. Check carefully the sample and write down your opinion about the type of the grain pattern.

Examine carefully and see if there are any **streaks** on the surface. If the specimen appears to have *streaks* in the heartwood, add: 34

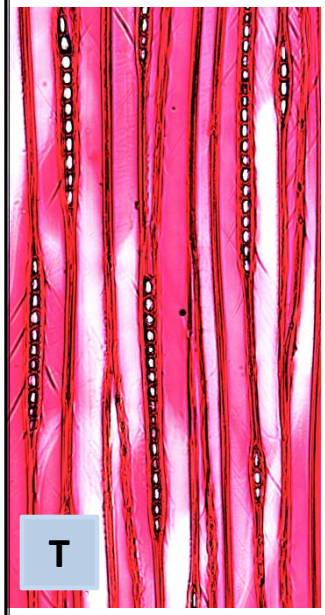


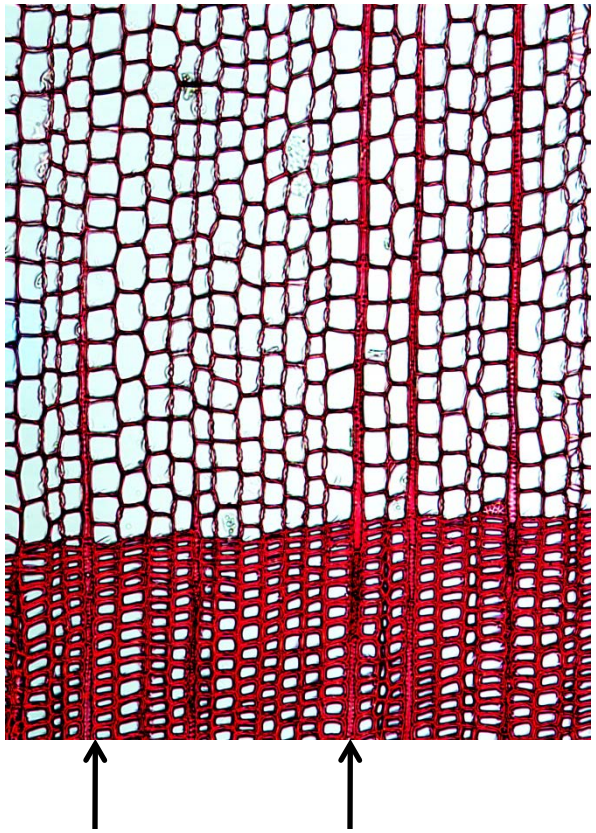
34	Heartwood with streaks	Present

10

Ray width: This feature is related with the average number of ray cells that constitute the rays. In softwoods, **2** categories exist.

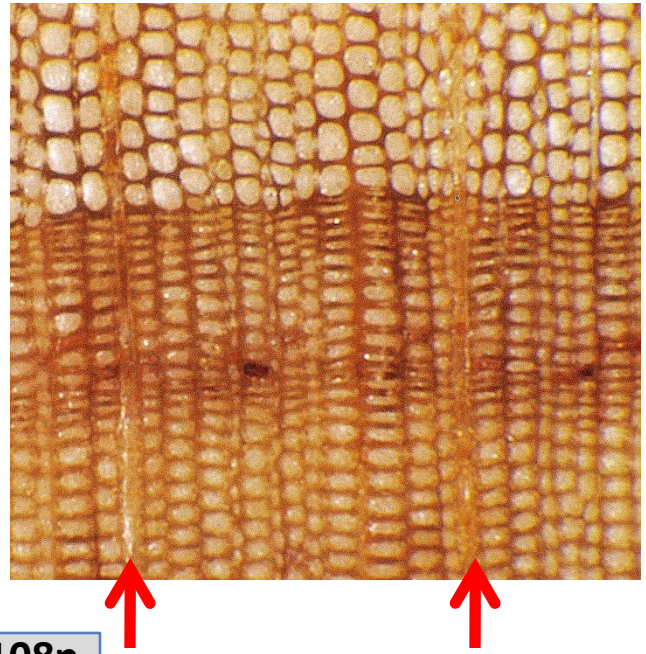
107: Exclusively uniseriate





107p

108: 2-seriate and 3-seriate



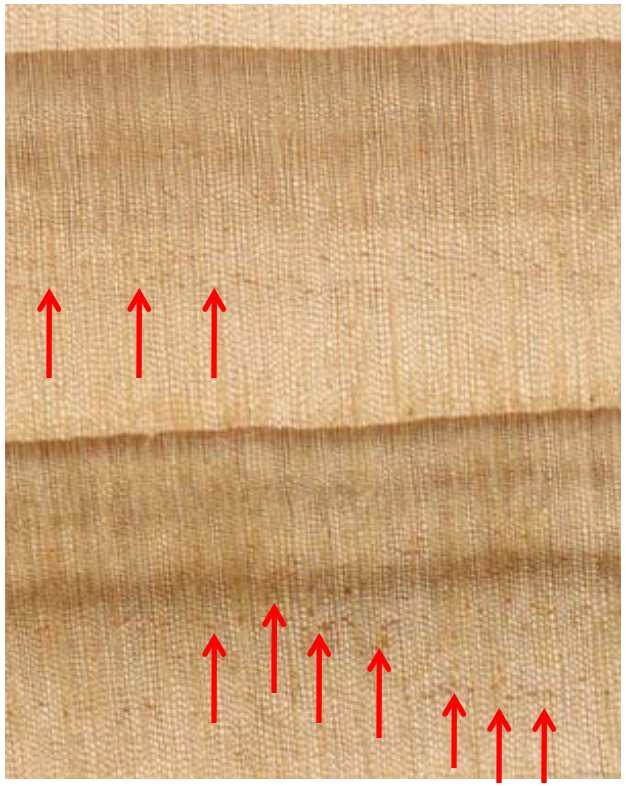
108p

	Ray width (applies to rays without canals)	
107	Rays exclusively uniseriate	
108	Rays 2-3 -seriate in part	

11

Axial Parenchyma: Parenchyma (see: *black dots*) are oriented along the wood length (referred to as *longitudinal* or *axial* parenchyma). In softwoods, these cells have almost the same diameter as the tracheids.

72p: AP present



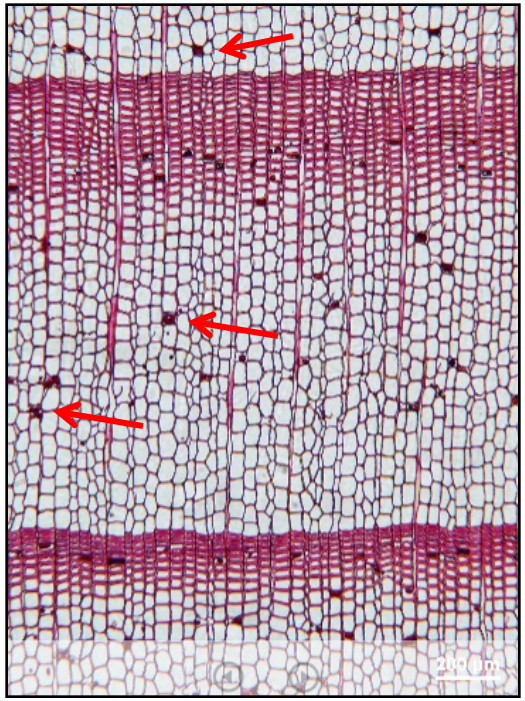
72a: AP absent

72 Axial parenchyma (AP) present — Present

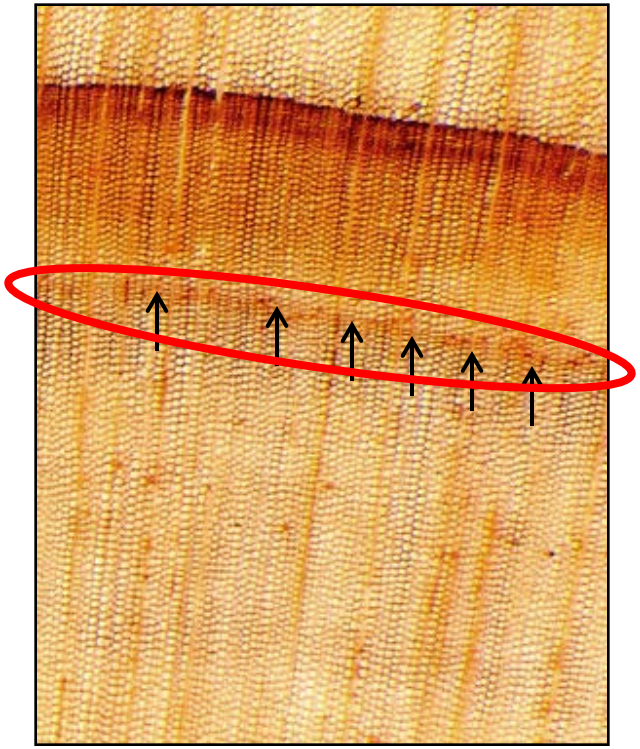
72 Axial parenchyma (AP) present — Absent

12 Types of Axial Parenchyma

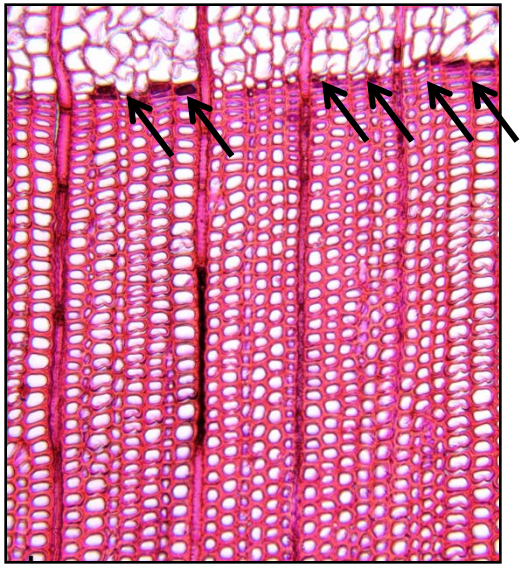
73: Diffuse



74: Zonate



75: Marginal



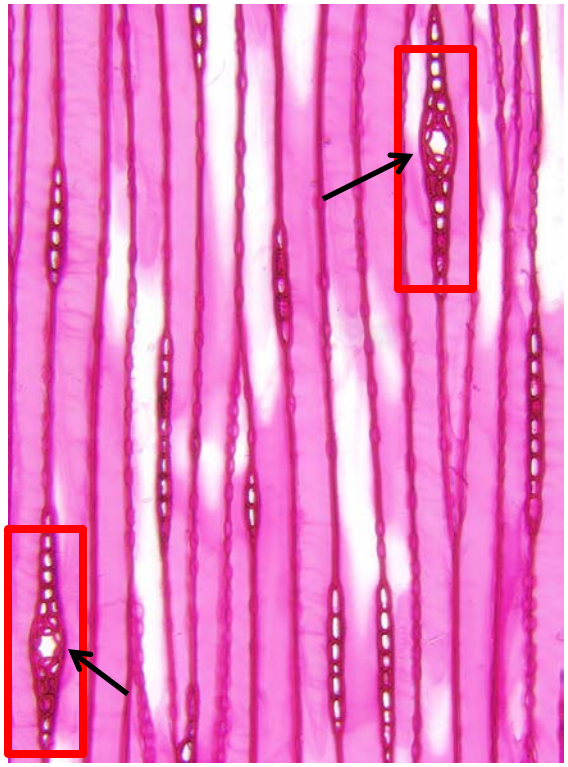
Arrangement of axial parenchyma			
73	Diffuse axial parenchyma	(definition)	
74	Tangentially zonate axial parenchyma	(definition)	
75	Marginal axial parenchyma	(definition)	

13

Radial canals ▪ Traumatic canals: Radial canals may exist exclusively within the rays (*fusiform rays*). Rarely, traumatic canals are present in irregular outlines in several species, even in *Abies, Cedrus, Sequoia* spp.

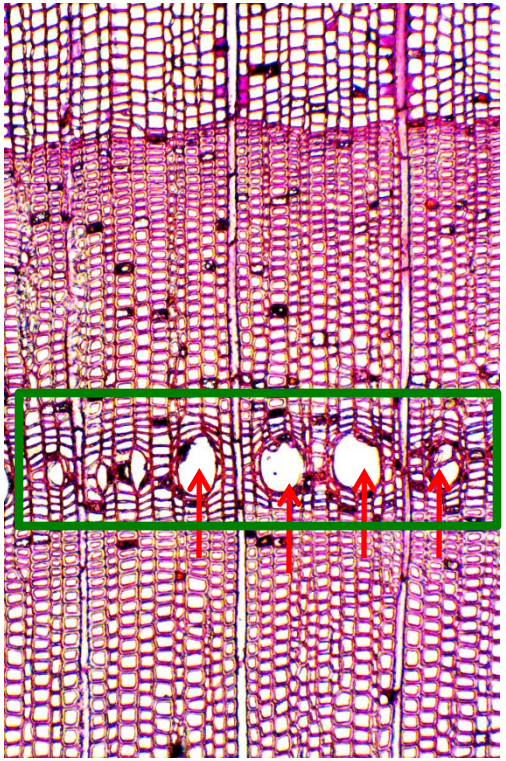
110p: Radial canals

T



111p: Traumatic canals

CS



110 Radial canals (definition) Present

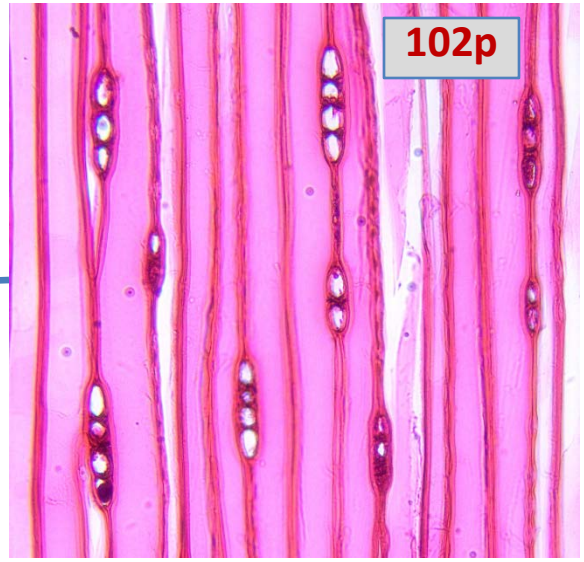
111 Traumatic canals (axial or radial) (definition) Present

14

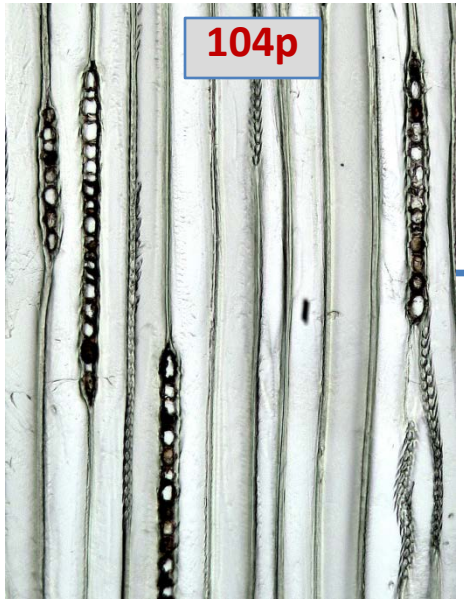
Ray Height: In this feature, at the *tangential* section (T), the mean total number of the cells that constitute each ray, is estimated.

Examples (below): If the species has ca. 1-4 cells, then add: 102
In case that the wood species has a mean no. 16-30 cells, add: 104

T



T



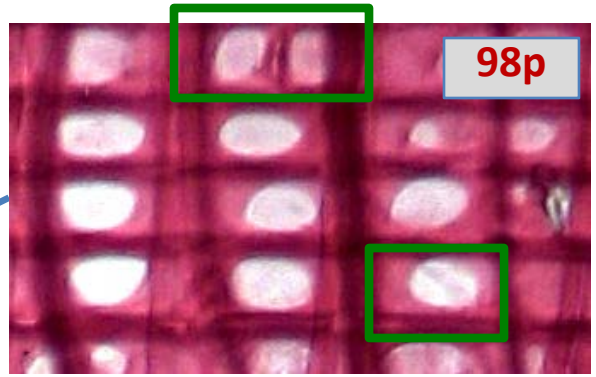
	Ray height (number of cells)	(definition)
102	Average ray height very low (up to 4 cells)	Present
103	Average ray height medium (5 to 15 cells)	
104	Average ray height high (from 16 to 30 cells)	Present
105	Rays very high (more 30 cells) common	

15

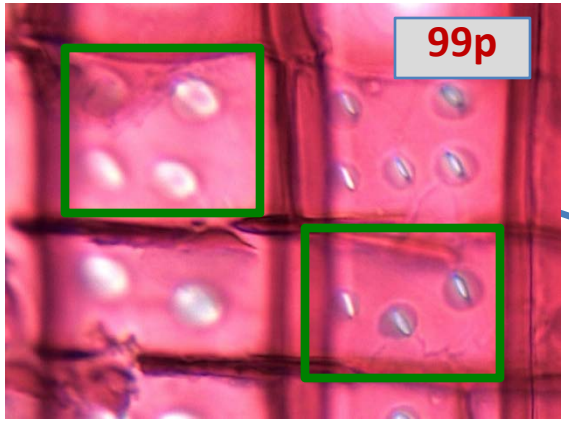
Number of pits per cross-field: In this feature, at the *radial* section, the total number of pits per each cross-field, is estimated.

Examples (below): If the wood species has 3-5 pits, add: 99
In case that the wood species has approx. 1-3 pits, then add: 98

R



R

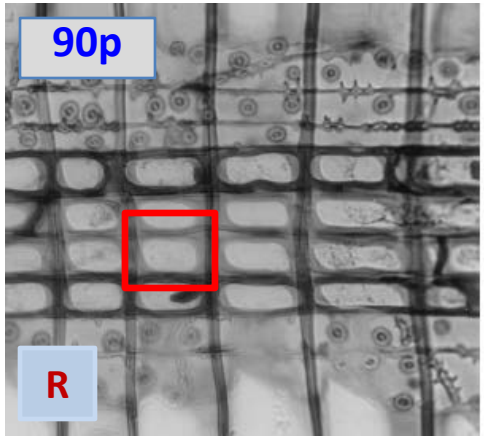


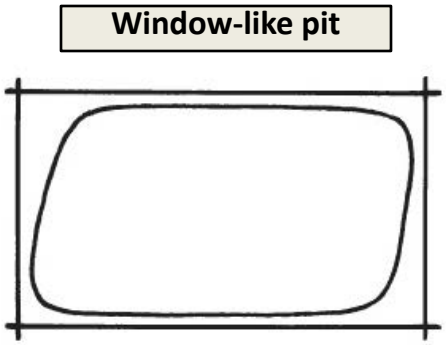
	Number of pits per cross-field (earlywood only)	
97	(large window-like) 1-2 pits per cross-field	
98	1-3 pits per cross-field	Present
99	3-5 pits per cross-field	Present
100	6 or more pits per cross-field	

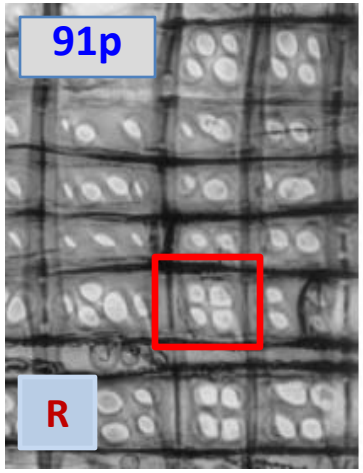
16a

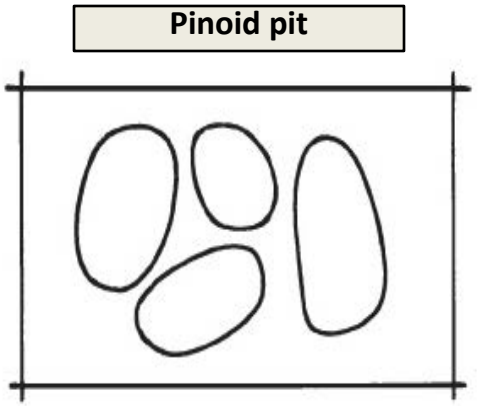
Cross-field pitting: In this important feature, at the *radial* section, the specific **type** of pits in the cross-field, is observed.

Examples (below): If the species has ***window-like*** pits, add: 90
In case that the wood species has ***pinoid*** pits, then add: 91







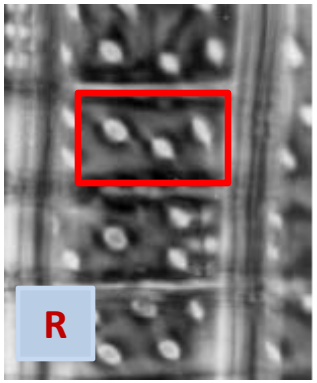


	CROSS-FIELD PITTING (earlywood only)	(definition)	
90	Window-like (fenestriform)	(definition)	
91	Pinoid	(definition)	
92	Piceoid	(definition)	
93	Cupressoid	(definition)	
94	Taxodioid	(definition)	
95	Araucarioid	(definition)	

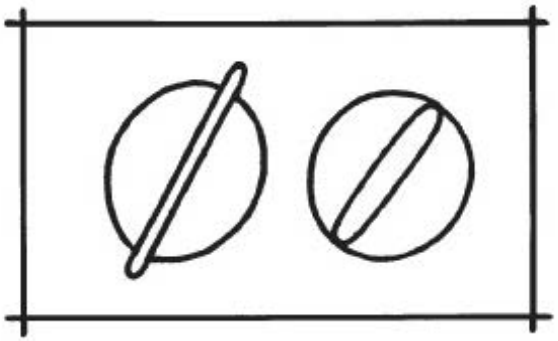
16b

Cross-field pitting: In this important feature, at the *radial* section, the specific **type** of pits in the cross-field, is observed.

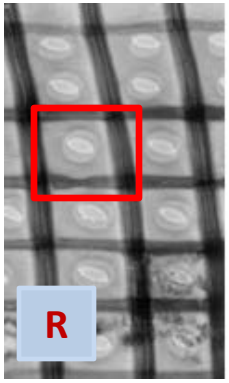
Examples (below): If the species has ***piceoid*** pits, add: 92
In case that the wood species has ***cupressoid*** pits, then add: 93



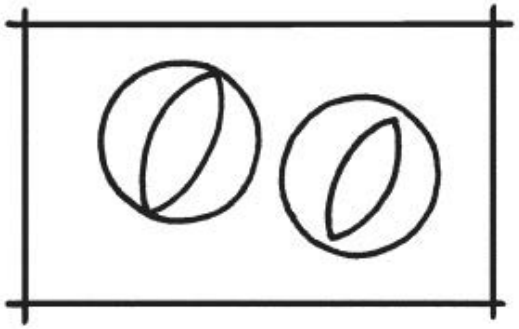
Piceoid pit



92p



Cupressoid pit



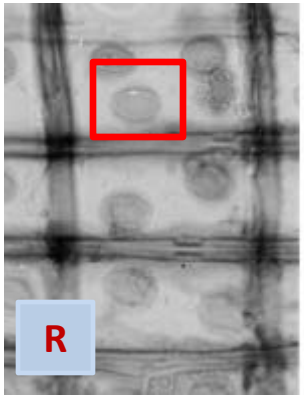
93p

	CROSS-FIELD PITTING (earlywood only)	(definition)	
90	Window-like (fenestriform)	(definition)	
91	Pinoid	(definition)	
92	Piceoid	(definition)	
93	Cupressoid	(definition)	
94	Taxodioid	(definition)	
95	Araucarioid	(definition)	

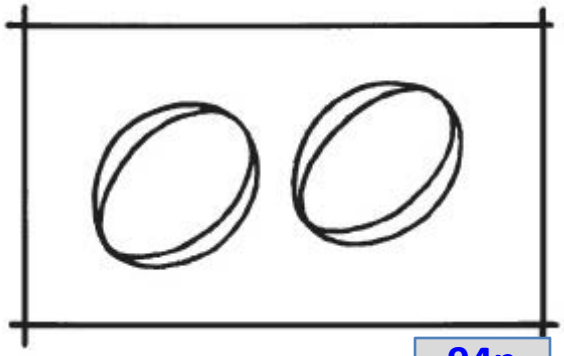
16c

Cross-field pitting: In this important feature, at the *radial* section, the specific **type** of pits in the cross-field, is observed.

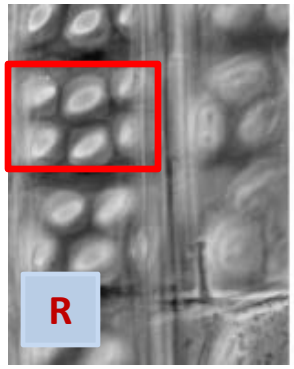
Examples (below): If the species has ***taxodioid*** pits, add: 94
In case that the wood species has ***araucarioid*** pits, then add: 95



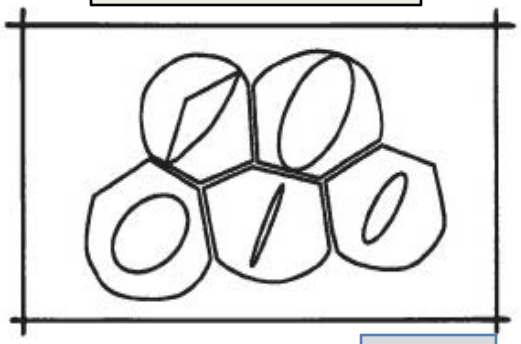
Taxodioid pit



94p



Araucarioid pit



95p

	CROSS-FIELD PITTING (earlywood only)	(definition)	
90	Window-like (fenestriform)	(definition)	
91	Pinoid	(definition)	
92	Piceoid	(definition)	
93	Cupressoid	(definition)	
94	Taxodioid	(definition)	
95	Araucarioid	(definition)	