

KEY TO LAURACEOUS WOODS FROM JAVA

BY

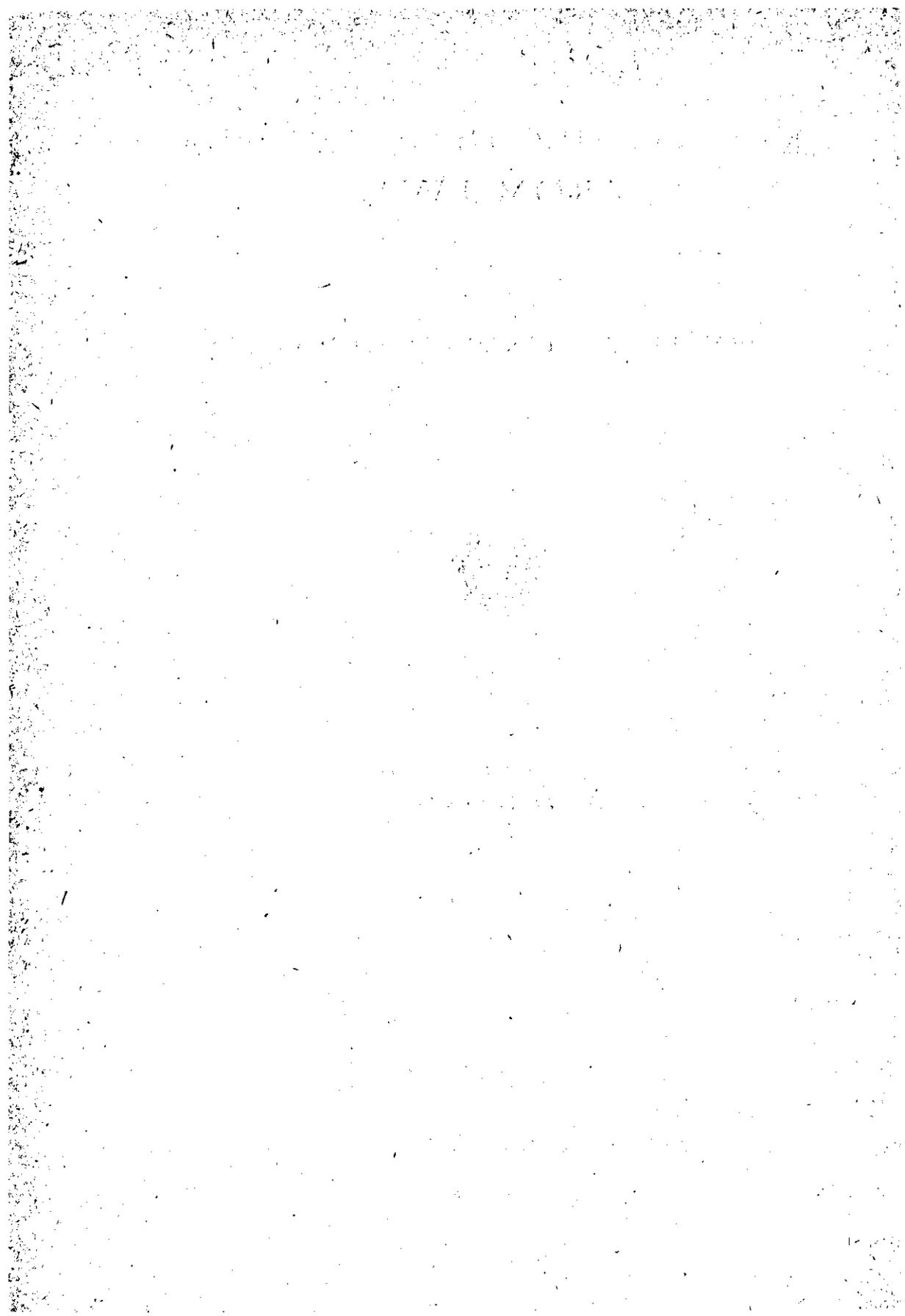
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*Mededelingen van de Landbouwhogeschool
Deel 49 - Verhandeling 1*

H. VEENMAN & ZONEN — WAGENINGEN — 1948

422171



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(Received for publication on January 10th 1948)

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I. INTRODUCTION

JANSSONIUS devoted his whole life to the descriptions of the wood specimens collected more than fifty years ago by KOORDERS and VALETON (5) in Java. The results have been published in a standard work of six volumes containing fully detailed descriptions of the anatomical structure of woods to the number of 991 (6). The work was started in 1904, the first volume issued in 1906, the sixth in 1936. In these thirty years a most outstanding and unique work was done. As far as I know there is no book on wood anatomy dealing with so large a number and treating each one so elaborately. KOORDERS's wood collection, the base of this work, was up till 1935 in the „Koloniaal Instituut” (now rebaptized into „Indisch Instituut”) at Amsterdam. In that year each specimen of the Amsterdam-collection described by JANSSONIUS has been divided into two parts and one set of these has been sent to the Yale School of Forestry, New Haven Conn., (U.S.A.) and was deposited there as a separate collection.

In Vol. I of the work (6) MOLL, at that time Professor of Botany in Groningen, who had the work carried out under his direction by his former student JANSSONIUS, wrote an introduction on wood anatomy and on material and methods used. Who wants to know more details about this and about the history and progress of the work, him I refer to nrs 1, 9 and 11 of the literature references at the end of this contribution. In later years the work was carried through and extended beyond the original scope by JANSSONIUS alone, without MOLL's supervision.

An analytical key for distinguishing the species was added under each family in „*Mikrographie des Holzes*” (Micrography of woods), but JANSSONIUS thought his task not finished without the addition of a general key, not only to families, but also to genera and even to species.

This was JANSSONIUS's main object since and even before the issue of the last volume of the „*Mikrographie*”. It (4) was published in 1940 as: Dr H. H. JANSSONIUS: „*Anatomische Bestimmungstabelle für die javanischen Hölzer*” (in *Anschluß an Mikrographie des Holzes der auf Java vorkommenden Baumarten*). I had the opportunity of watching almost step by step the progress of this work and thus I am able to appreciate perhaps more than any other can, the tiresome trouble and difficult and nearly exhausting task JANSSONIUS had set himself to perform. I cannot but congratulate Dr JANSSONIUS on the splendid result.

Nevertheless there are some minor details, but also more important ones, especially the entries to a part of the *Laurineae*, I did not agree about with Dr JANSSONIUS. I waited seven years hoping Dr JANSSONIUS would give a revision of these entries. But since he did not and the key is decidedly wrong here, I now feel obliged to give it myself.

JANSSONIUS, see (4) p. 32 note 1, (6) vol. V, p. 87, p. 105 and (3), has found the *Laurineae* to vary widely in various features especially with regard to idioblasts of oil or mucilage nature. Some of the specimens examined had no idioblasts whatever. Nevertheless JANSSONIUS believes the absence of idioblasts in those specimens not to be a fixed feature of the species.

For this reason he thought preparing an artificial key where all wood specimens without idioblasts are placed not only under the head „without” but also under the head „with idioblasts” absolutely indispensable.

So far there is nothing wrong. On the contrary. The more entries to a species, the better. But let us see how JANSSONIUS has tried to attain his end.

To this purpose we have to turn up p. 30 of his Bestimmungstabelle (key) (4) and read nr 155; here we have to choose between:

155 Oil- or mucilage idioblasts, or both, present	156
Oil- and mucilage idioblasts absent	216

So, if we have a specimen with oil cells, we are directed to 156. Let us suppose now we are trying to determinate one of the *Laurineae* species originally found by JANSSONIUS without idioblasts as e.g. *Litsea chinensis*. Let us further suppose this particular specimen to possess oil idioblasts. Then we have realised the possibility JANSSONIUS foresaw and tried to intercept. We go to nr 155 with this *Litsea* in hand. There we have no other choice than 156. By 158 we arrive at 167 and have to choose 168.

At 168 we have — to our astonishment — to choose again between:

168 Oil- and mucilage idioblasts absent	169
Such idioblasts present	175

Since we had already this same choice at nr 155, there will be no doubt what to choose at nr 168; our choice can be no other one than nr 175. But following up nr 175 we do not find *Litsea chinensis*, because it is not listed there by JANSSONIUS and only accessible along the feature „idioblasts absent” of nr 168.

It is apparent that JANSSONIUS has put in between the nrs 170 and 174 all the *Laurineae* wood specimens found by him to be without idioblasts. In a note on the same page he gives his arguments, the arguments I already referred to: the necessity of classifying woods without idioblasts also under the head: with-idioblasts... this head is nr 155. By this nr we reach nr 168. But within the group... „present” it is not possible to give a second choice between... „present” and... „absent” and then have „absent” chosen. This JANSSONIUS did not realize.

If these species are to come also in the group „with idioblasts”, the only way is to cancel nr 168 and to give these species an entry from 167 to nr 175, the same entry as has the group „idioblasts present”. As these, they have to be placed between the nrs 175 and 215. These species are:

Headaphne confusa
Lindera bibracteata
Litsea diversifolia
Litsea chinensis
Litsea chinensis var. littoralis
Litsea tomentosa
Actinodaphne macrophylla var. angustifolia
Litsea citrata

To avoid all misunderstanding, these species are also to be identified according to the feature: *absence* of idioblasts. Therefore they are segregated at nr 100, from which nr they reach nr 169 and are listed between this nr and 174 (inclusive). I shall speak about this in due course on p. 11.

Since wood anatomists belong chiefly to the english speaking area I preferred to give the text in english, although JANSONIUS's key was written in german. As much as possible I used the terms of the GLOSSARY (2) and those of RECORD (7) and RECORD and CHATTAWAY (8), especially where no deviations from the elder european literature e.g. SANIO (10), MOLL and JANSONIUS (6) and REINDERS (9) occur. With regard to the classification of rays the european method is used. So a homogeneous ray can be a ray of procumbent but also of upright or square cells. JANSONIUS distinguishes two kinds of rays, the first kind built up of upright (square) cells, the second kind comprising both homogeneous rays of procumbent cells and heterogeneous rays. These two kinds will mostly but not always correspond with the distinction into two sizes in american literature; sometimes a ray of the first kind may be more than one cell wide and the reverse may happen to the second kind. I prefer, for reasons I cannot give here, JANSONIUS's terminology.

The subsequent revision of p. 32-40 of JANSONIUS's key will do.

Because of the discussed cancelling of nr 168, the entry at nr 167 should be changed into 175. From here on until nr 215 for reasons of convenience the full text shall be given, also when it has not been changed.

II. KEY TO REPLACE JANSONIUS'S KEY ON P. 32-40, COMPRISING SPECIES WITH IDIOBLASTS

- 167 More than 3 pores per sqmm. Always two kinds of rays. Pits on radial walls of libriform fibers less abundant, on walls of ray cells less tall. 175
- 175 Mucilage cells in parenchyma; other idioblasts absent.
Cinnamomum iners, vol. V, p. 193.
- Oil cells or oil cells and mucilage cells in parenchyma only or in both wood parenchyma and rays. 176
- 176 Oil cells in parenchyma; other idioblasts absent 177
- Oil cells and other idioblasts present 187
- 177 Rays of second kind up to 5- or 6-seriate. 178
- Rays of second kind not more than 4-seriate 180
- 178 Growth ring sometimes distinct, due to an initial band of parenchyma
Litsea Sebijera, vol. V, p. 305.
- An initial parenchyma band absent 178a
- 178a Pores 20-30 per sq. mm
Litsea chinensis, vol. V, p. 267 ¹⁾
- Litsea chinensis*, var. *littoralis* ¹⁾, vol. V, p. 276
- Pores less than 20-30 per sq. mm 179
- 179 Pores 7-12 per sq. mm. Height of homogeneous rays of second kind 6-35, often ca 15-25 cells.
Litsea confusa ²⁾, vol. V, p. 314.

¹⁾ See also nr 172, 184a, 190a and 283.

²⁾ See also nr 203.

- Pores ca 20 per sq. mm. Height of homogeneous rays of second kind 5-60, often ca 30 cells.
Litsea brachystachya, vol. V, p. 300.
- 180** Pores up to 10 per sq. mm **181**
Pores up to 15 per sq. mm **182a**
Pores up to 30 per sq. mm **184**
Pores 35-40 per sq. mm.
Iteadaphne confusa ¹⁾, vol. V, p. 345.
- 181** Wood medium hard and of medium dense texture, not very durable.
Litsea mappacea, vol. V, p. 295.
Litsea resinosa ²⁾, vol. V, p. 278.
Wood medium soft and of medium open texture, perishable . . . **182**
- 182** Ash white. Sp. gr. 0,4.
Litsea angulata, vol. V, p. 308.
Ash grey. Sp. gr. 0,3.
Litsea robusta, vol. V, p. 283.
- 182a** Rays on radial surface reddish brown **183**
Rays on radial surface yellow or yellowish brown **183a**
- 183** Ash grey.
Litsea velutina, vol. V, p. 325.
Ash white or slightly reddish.
Litsea resinosa ³⁾, vol. V, p. 278.
- 183a** Ash white or grey.
Litsea citrata ⁴⁾, vol. V, p. 333.
Ash grey, nearly black.
Litsea tomentosa ⁵⁾, vol. V, p. 302.
- 184** Rays of second kind not or rarely more than 2 cells wide **185**
Rays of second kind often more than 2 cells wide **184a**
- 184a** Parenchyma sparingly paratracheal and only one cell wide, on outer side of pore not more abundant than on inner side.
Lindera bibracteata ⁶⁾, vol. V, p. 369.
Parenchyma usually sparingly and unilaterally paratracheal in a sheath 1-3 cells wide, sometimes vasicentric-confluent joining two or more pores.
Litsea pubescens affinis cassiaefolia ⁷⁾, vol. V, p. 311.
Litsea sumatrana, vol. V, p. 321.
Litsea fulva, vol. V, p. 298.
Litsea chinensis ⁸⁾, vol. V, p. 267.
Litsea chinensis ⁸⁾, var. *littoralis*, vol. V, p. 276.
Litsea diversifolia ⁹⁾, vol. V, 323.
- 185** Ash white. Content of oil cells not readily and not wholly soluble in

¹⁾ See also nr 171, 194a, 207a and 209a.

²⁾ See also nr 183 and 201.

³⁾ See also nr 181 and 201.

⁴⁾ See also nr 174, 197a, 201b and 354.

⁵⁾ See also nr 173, 196a and 283.

⁶⁾ See also nr 171, 194a and 308.

⁷⁾ See also nr 196.

⁸⁾ See also nr 172, 178a, 190a and 283.

⁹⁾ See also nr 172, 201b, 357b.

- alcohol 96 %. Oil cells not always confined to the margins of the paratracheal parenchyma.
- Litsea ferruginea*, vol. V, p. 330.
- Ash not white. Content of oil cells readily and wholly soluble in alcohol 96 %. Oil cells confined to the margins of the paratracheal parenchyma 186
- 186 Ash nearly black.
- Litsea triplinervia*, vol. V, p. 338.
- Ash brownish.
- Litsea chrysocoma*, vol. V, p. 341.
- 187 Oil cells present; mucilage cells absent 188
- Not only oil-cells but also mucilage cells present 204
- 188 Wood highly aromatic, although scent not always equally strong. Paratracheal parenchyma often aliform and rather often aliform-confluent joining two or more pores or pore multiples.
- Cinnamomum Parthenoxylum*, fig. 304, vol. V, p. 182.
- Wood not aromatic or anyhow without distinct scent. Paratracheal parenchyma vasicentric, never or nearly never aliform, or slightly aliform and then sometimes joining two or more pores or pore multiples 189
- 189 Colour usually greenish-yellow or yellowish-green 190
- Colour usually yellow or yellowish-brown, sometimes — in some species of *Phoebe* and in *Headaphne confusa* — also somewhat green. 193
- 190 Metatracheal parenchyma always absent. Perforation plates simple 190a
- Metatracheal parenchyma of some length sometimes present; bands 2 to 4 cells wide and sometimes joining two or more pores or pore multiples. Perforation plates simple and scalariform.
- Dehaasia microcarpa*, vol. V, p. 170.
- 190a Pores 20–30 per sq. mm.
- Litsea chinensis* ¹⁾, vol. V, p. 267.
- Litsea chinensis* var. *littoralis* ¹⁾, vol. V, p. 276.
- Pores 10–18 per sq. mm. 191
- 191 Thin splinters of wood cannot be contorted 192
- Thin splinters of wood can be contorted.
- Dehaasia caesia*, fig. 302; vol. V, p. 159.
- 192 Thin splinters glowing untill all is burnt.
- Dehaasia acuminata*, vol. V, p. 172.
- Thin splinters not glowing or only for a short time.
- Dehaasia pugerensis*, vol. V, p. 168.
- 193 Ash black.
- Litsea polyantha*, vol. V, p. 289.
- Ash not black 193a
- 193a Burning part of a thin splinter usually contorted to the right . . . 194a
- Burning part of a thin splinter usually not contorted to the right . 194
- 194 Sp. gr. 0,6–0,8 195
- Sp. gr. up to 0,55, only rarely more than 0,4. 200
- 194a Wall of ray cells slightly lignified. Ash white.
- Headaphne confusa* ²⁾, fig. 310; vol. V, p. 345.

¹⁾ See also nr 172, 178a, 184a and 283.

²⁾ See also nr 171, 180, 207a and 209a.

- Wall of ray cells lignified to a higher degree. Ash reddish.
Lindera bibracteata ¹⁾, vol. V, p. 369.
- 195 Rays at the utmost 8 rows of fiber width apart 196
 Rays often more than 8 rows of fiber width apart 197
- 196 Multiples as frequent as solitary pores.
Litsea cassiaefolia, vol. V, p. 286.
Litsea pubescens affinis cassiaefolia ²⁾, vol. V, p. 311.
Litsea amara, vol. V, p. 292.
 Multiples usually less frequent than solitary pores 196a
- 196a Initial parenchyma band often present in a sheath 4-10 cells wide.
 Parenchyma strands rather often with only one sept.
Litsea tomentosa ³⁾, vol. V, p. 302.
 Initial parenchyma band absent. Parenchyma strands with 1-7 septa.
Phoebe declinata, vol. V, p. 244.
- 197 Pores 8-12 per sq. mm 197a
 Pores always more than 12 per sq. mm 198
- 197a Homogeneous rays of second kind 2-6 seriate. Perforation plates
 sometimes with scalariform perforations.
Phoebe excelsa, vol. V, p. 241.
 Homogeneous rays of second kind 2-3 seriate, more often 2- than
 3-seriate.
 Perforation plates with circular perforations.
Litsea citrata ⁴⁾, vol. V, p. 333.
- 198 Prismatic solitary crystals 6 μ wide and 5-25 μ long, especially in
 procumbent ray cells.
Phoebe lanceolata, vol. V, p. 235.
- No such crystals in the ray cells. 199
- 199 Wood fibers in inner part of growth ring as abundant as elsewhere. Oil
 cells not scattered between the wood fibers.
Phoebe opaca, vol. V, p. 226.
 Wood fibers in inner part of growth ring sometimes absent or very
 sparse.
 Oil cells also scattered between the wood fibers.
Phoebe macrophylla, vol. V, p. 238.
- 200 Homogeneous rays of second kind not over 4 cells wide 201
 Homogeneous rays of second kind also 5 or 6 cells wide 203
- 201 In rays of second kind some large radial interstitial spaces present.
Lindera pentantha ⁵⁾, vol. V, p. 364.
Litsea resinosa ⁶⁾, vol. V, p. 278.
 In rays of second kind such large radial interstitial spaces absent 201a
- 201a Sometimes spiral thickenings on vessel walls present 202
 Spiral thickenings on the vessel walls always absent 201b
- 201b Pores more than 20 per sq. mm.
Litsea diversifolia ⁷⁾, vol. V, p. 323.

¹⁾ See also nr 171, 184a and 308.

²⁾ See also nr 184a.

³⁾ See also nr 173, 183a and 283.

⁴⁾ See also nr 174, 183a and 354.

⁵⁾ See also nr 203.

⁶⁾ See also nr 181 and 183.

⁷⁾ See also nr 172, 184a and 357b.

- Pores less than 20 per sq. mm.
*Litsea citrata*¹⁾, vol. V, p. 333.
- 202 Ash white.
Lindera polyantha, vol. V, p. 352.
 Ash grey.
Lindera lucida, vol. V, p. 367.
- 203 Initial parenchyma band often present
Litsea javanica, vol. V, p. 335.
 Initial parenchyma band absent.
*Litsea confusa*²⁾, vol. V, p. 314.
*Lindera pentantha*³⁾, vol. V, p. 364.
- 204 Paratracheal parenchyma vasicentric but often or nearly always distinctly aliform and often aliform confluent joining two or some pores 205
 Paratracheal parenchyma vasicentric, usually somewhat aliform and at the utmost rather often aliform confluent joining two or some pores 207
- 205 Idioblasts in wood parenchyma containing mucilage, rarely oil. Wood when soaked in water enveloped in a mucilage sheath some mm thick.
Cinnamomum javanicum, vol. V, p. 196.
 Idioblasts in wood parenchyma usually containing oil. Wood when soaked in water enveloped in a thin mucilage sheath or not enveloped in mucilage 206
- 206 Homogeneous rays of second kind 2 to 4 seriate. Sp. gr. 0,7.
 Thin splinters can be contorted. Wood, when soaked in water enveloped in a thin mucilage sheath. Ash grey or brownish grey.
Cinnamomum Burmanni, vol. V, p. 199.
 Homogeneous rays of second kind 2 to 6 seriate. Weight light; thin splinters of wood can not be contorted; wood, when soaked in water not enveloped in mucilage. Ash black.
Cinnamomum Sintok, vol. V, p. 202.
- 207 Mucilage cells as abundant or more abundant than the oil cells (this perhaps not so in *Headaphne confusa*). Paratracheal parenchyma somewhat more abundant 207a
 Mucilage cells not as abundant as the oil cells. Paratracheal parenchyma somewhat less abundant 209
- 207a Pores more than 30 per sq. mm.
*Headaphne confusa*⁴⁾, vol. V, p. 345.
 Pores less than 30 per sq. mm 208
- 208 Thin longitudinal splinters of wood can be contorted.
Notaphoebe umbelliflora, vol. V, p. 214.
 Such splinters can not be contorted.
Notaphoebe spathulata, vol. V, p. 224.
- 209 Libriform fibers all or nearly all septate 209a
 Libriform fibers not septate or only rarely 210

¹⁾ See also nr 174, 183a, 197a and 354.

²⁾ See also nr 179.

³⁾ See also nr 201.

⁴⁾ See also nr 171, 180, 194a, 209a and 308.

- 209a Pores 35-40 per sq. mm.
*Headaphne confusa*¹⁾, vol. V, p. 345.
 Pores about 14 per sq. mm.
Machilus rimosa, vol. V, p. 204.
- 210 Pores 20-30 per sq. mm.
Actinodaphne Sphaerocarpa, vol. V, p. 264.
 Pores less abundant 211
- 211 Oil cells and mucilage cells absent in the rays 212
 Oil cells and mucilage cells present in the rays 215
- 212 Burning longitudinal splinter usually contorting itself to the right.
Actinodaphne glabra, vol. V, p. 260
 Such a splinter not contorting itself to the right 213
- 213 Large radial interstitial spaces sometimes in the rays of second kind. Ash grey.
Litsea accedentoides, vol. V, p. 317.
 No such spaces in the rays of second kind. Ash white, faintly grey or faintly reddish 214
- 214 Homogeneous rays of second kind 2-4, very often 3 or 4 seriate. Oil and mucilage cells mostly scattered between the libriform fibers 214a
 Only a part of oil- and mucilage cells scattered between the libriform fibers.
Litsea Noronhae, vol. V, p. 328.
- 214a Sp. gr. 0,55-0,6. Pores ca 15 per sq. mm; spiral thickenings on the walls sometimes rather conspicuous.
Actinodaphne macrophylla, vol. V, p. 255.
 Sp. gr. 0,7. Pores ca 18 per sq. mm; spiral thickenings on the walls rarely rather conspicuous.
Actinodaphne macrophylla var. *angustifolia*²⁾, vol. V, p. 258.
- 215 Mucilage cells in wood parenchyma rather abundant. Contents of oil cells as a rule yellow or yellowish-brown, sometimes deep reddish brown. Wood yellowish white or faintly yellow. Ash nearly white.
Actinodaphne procera, vol. V, p. 247.
Actinodaphne macrophylla var. *angustifolia*³⁾.
 Mucilage cells in the wood parenchyma rare or absent. Contents of oil cells colourless or faintly yellow. Wood brownish yellow. Ash deep grey.
Actinodaphne glomerata, vol. V, p. 262.

III. CHANGES IN JANSSONIUS'S KEY ON PP. 16, 18, 20 AND 71

A careful reading of the key of JANSSONIUS (4) shows another variable feature to be taken by him into consideration, the perforation plate of the vessels. Both simple and scalariform perforations occur in the same specimen, or simple perforations only. Therefore at nr 12 in JANSSONIUS's key both lines are followed up and lead

1. For species with idioblasts, to nr 175, the same nr being the entry to species with simple perforations only or with both simple and scalariform perforations, but this nr arrived at along different paths.

¹⁾ See also nr 171, 180, 194a, 207a and 308.

²⁾ See also nr 174, 215 and 357b.

³⁾ See also nr 174, 214a and 357b.

2. For species without idioblasts. If only simple perforations present: to different nrs after nr 216. If both simple and scalariform perforations are present: to nr 169.

Ad 1. We had to cancel (see p. 4 and 5) nr 168 on the way to nr 175. This is in the group: idioblasts and simple perforations. Following up the key shows that such a canceling should be done as well in the group idioblasts and both simple and scalariform perforations; but fortunately it causes less disturbance. The presence-absence feature of idioblasts enters here at nr 89 and again at nr 96, which is not allowed for the same reason as explained on p. 4. Everything will be all right if we only cancel nr 89 and change the reference 89 at nr 82 into 90. As a consequence the reference to *Dehaasia microcarpa* is lost at nr 89, but this does not matter, because this species, due to the presence of idioblasts appears in the group 175-215 (at 190).

Ad 2. JANSSONIUS certainly investigated the possibility of preparing one and the same entry for „simple perforations” and „both simple and scalariform” within the second group (i.e. idioblasts absent), as he was able to do for the first group. But this was impossible. So the two subgroups had to be entered at different numbers.

Subgroup „idioblasts absent and simple and scalariform perforations” goes from 12-82-90-96-97-99-100 to 169 (the reference 168 at nr 100 changed by the present author into 169, because nr 168 was cancelled) and ends at nr 174 (inclusive). See also p. 5 of this paper.

Subgroup „idioblasts absent and simple perforations” goes from 12-104-149-155 to 216. According to JANSSONIUS six of the eight species of p. 4 of the present paper belong to this group. They come at different nrs after 216 (see the notes at the foot of p. 33 of JANSSONIUS's key). There seems to me no obvious reason why the other 2 species should have no entry after 216. They have the same perforation feature as found by JANSSONIUS in e.g. *Iteadaphne conjusa*. If this species and others should be classified as if they might be found with simple perforations, *Litsea diversifolia* and *Actinodaphne macrophylla* var. *angustifolia* should also have an entry at 216. It was possible to classify them at a new number 357b.

This causes only slight alterations on p. 71. From the third line on, this page has to be read as follows:

	Pores less often on both radial walls touching the rays. Radial rows of upright cells only on well defined spots of the rays present or absent. Crystalliferous cells in the rays absent	357a
357a	Pore width R 40-160, T 50-120 μ	357b
	Pore width large: R 100-270, T 80-220 μ .	
	Fam. LXIX <i>Urticaceae</i> .	
357b	Pores 20-30 per sq. mm	358
	<i>Litsea diversifolia</i> , vol. V, p. 323.	
	Pores 18 per sq. mm.	
	<i>Actinodaphne macrophylla</i> , var. <i>angustifolia</i> , vol. V, p. 258.	

IV. SUMMARY

A key is proposed to replace part of the key to the *Laurineae*, p. 32-40, of JANSSONIUS in: *Anatomische Bestimmungstabelle für die javanischen Hölzer*, Brill, Leiden (The Netherlands) 1940 (4). The reason of this substitution is fully explained.

Less radical alterations are necessary on p. 16, 18, 20 and 71.

As did JANSSONIUS, the author used the features mentioned in the descriptions of the wood specimens in MOLL and JANSSONIUS: *Mikrographie des Holzes der auf Java vorkommenden Baumarten*, Vol. V.

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