THE VARIABILITY OF THE WOOD-ANATOMY IN LARGE AND SMALL GENERA

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In the "Mikrographie des Holzes der auf Java vorkommenden Baumarten" I described 991 kinds of wood. Several of these belong to large genera, the majority to small. I found remarkably wide variations in the wood-anatomy of several specimens belonging to a single species of a large genus. These intraspecific differences in large genera are generally larger than interspecific differences in small genera.

When identifying species by means of wood-anatomical characters, the wide intraspecific variability in large genera obstructs identification whereas in small genera identification is usually relatively easily executed. As a result, it is much easier to compose a key to the species in a small genus than in a large one. In my key to the Javan woods (Anatomische Bestimmungstabelle für die javanischen Hölzer, 1940, 83) it is repeatedly demonstrated; also in Mikrographie passim that taxonomic relationships are often blurred by this peculiar circumstance.

Several recent authors, when describing Malaysian species as a morphological group, pay considerable attention to intraspecific variability, but from their studies it does not become apparent that the intraspecific variability of large genera is often so strikingly wider than it is in small ones. It seemed useful to summarise the data now found scattered in the "Mikrographie".

Dysoxylon and *Aglaia* (*Mel.*; cf. Mikrogr. 2, p. 119, § 2). I examined 21 species and varieties of *Dysoxylon*. I observed that the individual wood samples differed among each other nearly as much as the species. I examined 16 species and varieties of *Aglaia* and found that the distribution of metatracheal wood parenchyma (an important characteristic of various groups) varies as widely among the several wood samples of a single species and even in different parts of the same sample as is found elsewhere among species. Koorders & Valeton comment hardly on the variability in *Dysoxylon* and not at all in *Aglaia* (Bijdragen 3, 1896, 31—97 and 125—178).

Of *Eugenia* (*Myrt.*), a very large genus, I examined 44 species and varieties. Koorders & Valeton found that several species vary strongly, are polymorphic and form a "congregatio" (Bijdragen 6, 1900, 43—164). I found as a rule that the wood-anatomy varied accordingly (cf. Mikrographie 3, p. 396, § 2).

Regarding the species of *Myrsine* (*Myrs.*), another large genus, I stated after the examination of 4 species, that the several wood samples of one species were often more different from each other than the samples of different species (Mikrogr. 4, p. 299, § 2). This is in agreement with the results of Koorders & Valeton.

In *Laurineae* (Mikrogr. 5, p. 94, § 2), I found the same phenomenon in the larger genera. Of *Litsea,* I examined 25 species and varieties and samples of a single species were often nearly as different as samples relating from different species. Koorders & Valeton partly support this (Bijdragen 10, 1904, 123—192).

In *Euphorbiaceae* the woods of *Glochidion* proved to be intraspecifically so widely different that it became impossible to subdivide this large genus into smaller groups. J. J. Smith (in Koorders & Valeton, Bijdragen 12, 1910, 106) found *Glochidion* one of the most difficult genera of Indo-Malayan *Euphorbiaceae* because the species were so widely variable and their characteristics so difficult to define.

Of *Ficus* (*Urtic.*) I examined 43 species and varieties. The number of septate and non-septate libriform fibres is widely variable within these species (Mikrogr. 6, p. 98—232). I attached little weight to this character and 42 of the 43 kinds of *Ficus* are found in 2 places of my key (cf. Anat. Best. tab. jav. Hölz., also footnote 3, p. 61) owing to the division made under Number 216. Koorders & Valeton comment on the variability of only a few species and think it of small importance (Bijdr. 9, 1906, 31—274).

When summarising my results in *Quercus* (*Cupul.*) I noted (Mikr. 6, p. 371) that the 25 species and varieties I examined could not be arranged into distinct groups for wood-anatomical reasons. I found that the differences in wood-structure between species were often small, and the differences among samples within one species were very large. Koorders & Valeton hardly find a similar variability (Bijdr. 10, 1904, 12—65).

In *Engelhardtia* (*Jugl.*), of which I studied 2 species and 3 varieties, I observed a similar variability as that occurring in many large genera. Koorders & Valeton (Bijdr. 5, 1900, 162—177) more or less support my views (cf. l. c., p. 164!).

It appears now that all these variable species belonging to large genera have a similar type of wood structure. The ground mass is libriform, often septate, fibres having either simple and numerous pits or bordered and few pits. The division walls of the vessels are generally only little slanting; in the majority of the species they show all simple perforations, in the rest next to simple perforations also some with scalariform perforations. The number of cells composing the wood parenchyma strands is nearly always much larger than four.

American authors, in particular, have connected phylogeny with wood anatomy (cf. e. g. O. Tippo in Amer. Midl. Nat. 36, 1946, 362—372 and Trop. Woods 89, 1947, 66). These larger genera, according to these views, would show a less primitive wood-structure.

It may be suggested, as has actually been done, that the larger genera are more recent than the small, and that the former are so much

more variable because no (or few) linking forms and species are extinct, whereas in the latter case many intermediate species have disappeared. It is difficult to imagine why this should have happened; species having practically the same structure seem to be best suited to survive together, if surviving at all.