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# 論 文 内 容 要 旨

## Introduction

*Dalbergia* is a genus of the tribe Dalbergieae Bronn ex DC. of the Leguminosae subfamily Papilionoideae. It consists of trees, shrubs and lianas and is characterized by small uniform anthers with transverse slits, indehiscent 1 (-few)-seeded fruits with specialized seed-chambers and mostly imparipinnate (very rarely 1-foliolate) leaves. It occurs in tropical and subtropical forests in Asia, Africa and South America, and, according to Index Kewensis (1895) and its supplements 1-19 (1906-1990), includes 185 species. The center of distribution for the genus is considered to be Asia, where 102 species are recorded. With the exception of 1 species (*Dalbergia ecastaphyllum* in Africa and South America), all of the other species are endemic to one geographic region : 102 to Asia, 42 to South America, and 40 to Africa (Fig. 1). In Asia, 69 species are recorded from Malesia. This is the largest number of species of *Dalbergia* from one floristic region in the world.

Malesia is a biogeographical unit of one of the world's floristic regions, comprised of Peninsular Malaysia, Sumatra, Kalimantan, Java and the Lesser Sunda Islands, the Moluccas, Sulawesi, the Philippines and New Guinea (Fig. 2). It is located between Asia and Australia in an area approximately ca. 16° N to ca. 10° S in latitude, and ca. 92° to ca. 155° E in longitude.

The first work on Malesian *Dalbergia* was done by Bentham (1851), but, treated plants only from Java and Sumatra. A comprehensive work on Malesian *Dalbergia* was accomplished by Prain (1904) in his monograph of the Asian species. Succeeding studies on Malesian *Dalbergia* have been locally limited. In Java the genus was treated by Backer & Bakhuizen (1963) and Undang Dasuki (1975), in Peninsular Malaysia by Ridley (1922), in Papua New Guinea by Pulle (1910), Merrill & Perry (1941), Kanehira & Hatusima (1941) and Verdcourt (1979), and in the Philippines by Elmer (1910, 1913, 1915, 1919, 1934) and Merrill (1910, 1915, 1921, 1923).

Increasing botanical exploration throughout Malesia, especially in recent decades, has resulted in the accumulation of many specimens in large herbaria with a long tradition of research on the Malesian flora, including Bogor (BO), Kew (K), and Leiden (L). In the century since Prain's study, the number of herbarium specimens has increased almost 20-fold, and documentation of the diversity within the genus has improved greatly. As a result, a revision of the Malesian species, enumerating the circumscription of the genus as it is known in the region today, is in order. Such a revision would provide the most basic tools for identification of the species and would allow for a much-needed classification.

The purpose of this study is to prepare a new comprehensive revision of Malesian *Dalbergia*.

To date, the author has worked since 1988 to examine every species recorded from Malesia in many parts of Indonesia and in many herbaria in Indonesia, Malaysia, The Netherlands, and the United Kingdom. Based mainly on herbarium specimens he has compared gross morphological characters of every species. The present work is primarily the result of these studies. Moreover, in order to find other taxonomic characters for the infrageneric system of the genus, further morphological studies on floral anatomy, palynology, and embryology were made in this study, because no such studies on Malesian *Dalbergia* existed in these fields.

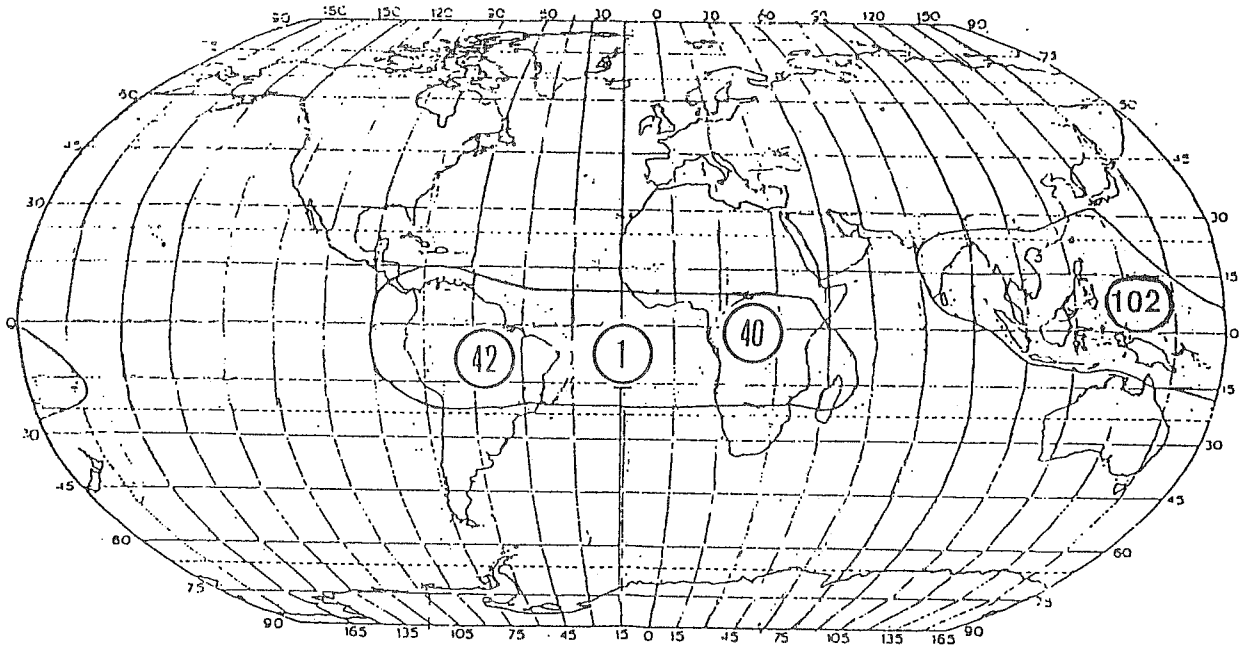


Fig. 1. Distribution map of *Dalbergia*. Figures in the circle are estimated number of the species recorded in the area. Only *D. ecastaphyllum* shows intercontinental distribution between Africa and South America.

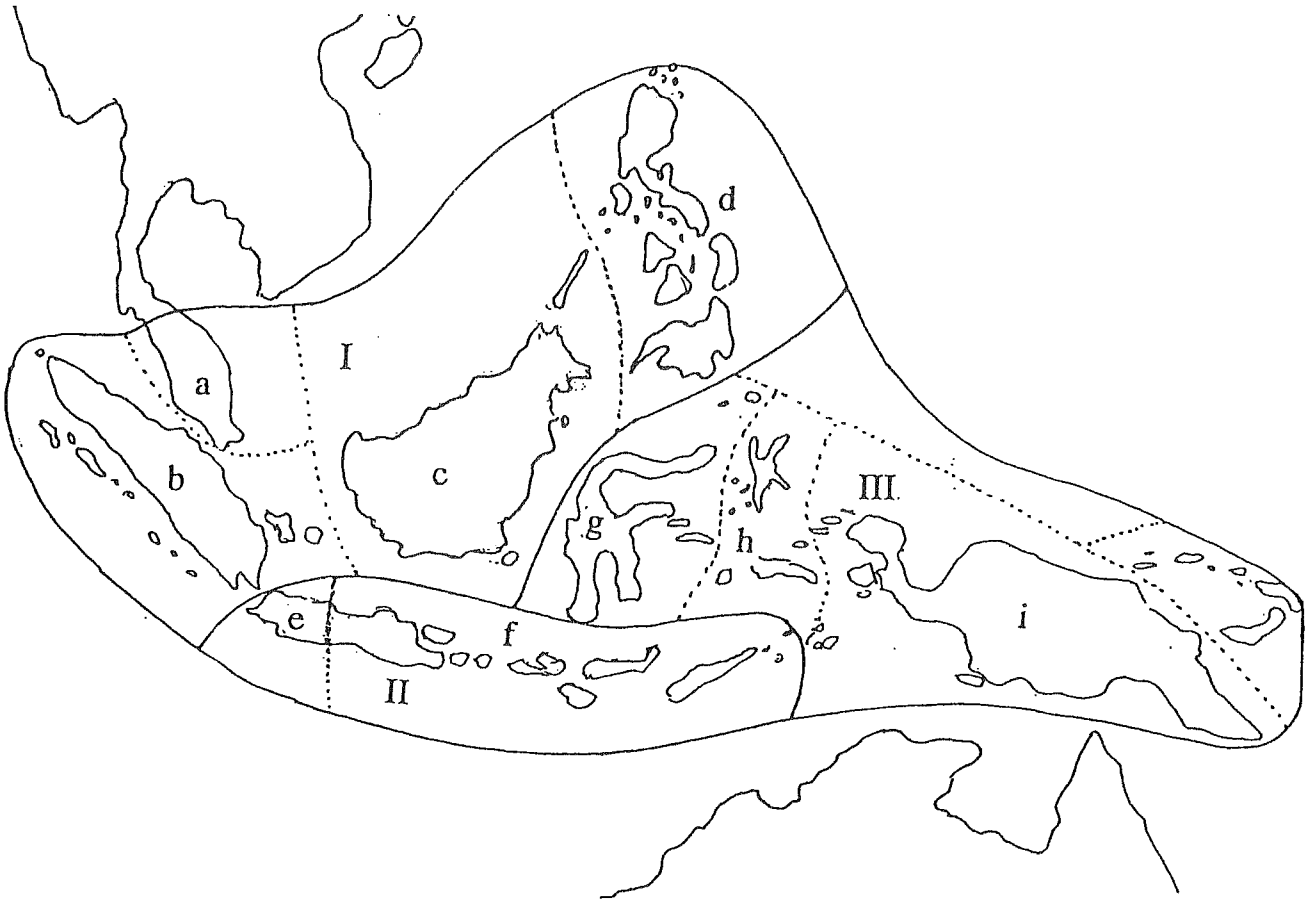


Fig. 2. Malesia showing its floristic provinces and districts : I. Province of West Malesia (a=Peninsular Malesia ; b=Sumatra ; c=Borneo ; d=the Philippines), II. Province of South Malesia (e=West Java ; f=East Java and Lesser Sunda Island), III. Province of East Malesia (g=Sulawesi ; h=Moluccas ; i=New Guinea including Bismark Islands).

**Conclusion**

Although 69 species of *Dalbergia* have been recorded so far in Malesia, 36 are recognized as good species in this study. Based mainly on gross morphology from examination of a number of herbarium specimens, 28 previously recognized species are accepted as valid, while 32 are regarded as synonyms of the accepted taxa, and nine are transferred to other genera, *Derris* or *Millettia*. Eight new species are found in this study. They are *Dalbergia bintuluensis* Sunarno & Ohashi, *D. johorensis* Sunarno & Ohashi, *D. kostermansii* Sunarno & Ohashi, *D. minutiflora* Sunarno & Ohashi, *D. ramosii* Sunarno & Ohashi, *D. richardsii* Sunarno & Ohashi, *D. sandakanensis* Sunarno & Ohashi, and *D. teijsmannii* Sunarno & Ohashi. A key to all the species, the correct name for each species with its synonyms, bibliography, distribution, field notes, habitat and ecology, a list of specimens examined, and taxonomic notes are presented. These species are newly classified into seven sections of two subgenera, *Dalbergia* and *Ecastaphyllum* (Brown) Sunarno & Ohashi, in a system proposed in this work (Tab. 1 & 2).

Analyses of distribution of 33 species of *Dalbergia* (3 introduced species are omitted) indicate that Borneo is the center of distribution, because of the maximum number of species (21 species, that is, about 64% of all species of *Dalbergia* in Malesia) and the presence of the endemic species (eight species, that is, 38% of all Bornean species).

Researches done in this study for the first time on palynology, embryology, vascular anatomy of flowers, pod wall anatomy, and seed coat anatomy, in order to find supporting characters for the taxonomy of Malesian *Dalbergia*, did not provide useful criteria for the proposed system of classification, probably because of the limited materials used in this study. However, pod wall characters may prove to be a useful character once more evidence is accumulated.

Tab. 1. Characters used in the subdivision of Malesian *Dalbergia*.

| Taxa | Pods | Flowers | Vexillum | Styles | Stamens |
|---|---|---|---|---|---|
| Subgen. *Dalbergia* | samaroid | long or short | reflex or erect | slender, long or thickened, short | |
| Sect. *Dalbergia* | samaroid coriaceous, thickened around seeds | long | reflex | slender, long | diadelphous |
| Sect. *Endespermum* | samaroid, coriaceous, thickened around seeds, elliptic to oblong | long | reflex | slender, long | monadelphous |
| Sect. *Miscolobium* | samaroid, coriaceous, not thickened around seeds, oblong | long | reflex | slender, long | monadelphous |
| Sect. *Sissoa* | samaroid, membraneous, thickened around seeds | short | erect | thickened, short | monadelphous |
| Subgen. *Ecastaphyllum* | entirely thickened | long or short | reflex or erect | slender, long or thickened, short | |
| Sect. *Ecastaphyllum* | entirely thickened, round to orbicular | long | erect | slender, long | mona-/diadelphous |
| Sect. *Nummularia* | entirely thickened, broadly oblong to suborbicular or slightly falcate | short | erect | thickened, short | monadelphous |
| Sect. *Selenolobium* | entirely thickened, facate or lunar to semilunar | long | reflex | slender, long | mona-/diadelphous |

Tab. 2. Summarized classification of Malesian *Dalbergia*.

Subgenus *Dalbergia*

Section *Dalbergia* : *D. ferruginea, D. lanceolaria, D. mimosella.*

Section *Endespermum* : *D. densa, D. hoseana, D. jaherii, D. minutiflora, D. pinnata, D. polyphylla, D. rostrata.*

Section *Miscolobium* : *D. borneensis, D. canescens, D. havilandii, D. hullettii, D. johorensis, D. latifolia, D. reticulata, D. richardsii, D. sandakanensis, D. velutina.*

Section *Sissoa* : *D. discolor, D. junghuhnii, D. scortechinii, D. sisoo.*

Subgenus *Ecastaphyllum*

Section *Ecastaphyllum* : (African and South American species).

Section *Nummularia* : *D. albertisii, D. beccarii, D. bintuluensis, D. cumingiana, D. kostermansii, D. parviflora, D. ramosii, D. teijsmannii.*

Section *Selenolobium* : *D. candenatensis, D. falcata, D. kunstlerii, D. menoeides.*

# 論文審査の結果の要旨

スナラノ・バンバン Bambang SUNARNO 提出の学位論文は，これまで分類学上未整理であったマレーシア植物区系地域の *Dalbergia* 属植物を同定し，分類するための基礎的な分類法，学名の整理，および分類体系を作り上げたものである。

本研究では，まず，マレーシア植物区系地域から記録されている *Dalbergia* 属植物全種のタイプ標本を含む多数の押し葉標本が詳細に比較観察され，分類形質として有用な外部形態形質が選び出された。次に，それらの形質を比較して種の異同が詳しく再検討された。マレーシアは世界で最も多くの *Dalbergia* 属植物の記録されている植物区系地域であり，69種が記録されている。しかし，本研究の結果，マレーシアの *Dalbergia* 属は36種に再分類された。36種には 28種の既知種と 8 新種が含まれている。その他の32種は既知種の変異の中に含まれ，また，9 種は別属である *Derris* あるいは *Millettia* に所属するものと判定された。本論文では正しい種と判定した 36種について，同定のための分類群検索表が作成され，各種ごとの正名と異名，形態，分布，生育地と生態などが正確に記録された。

次に，これらの36種を 2 属 7 節に分類する新しい分類体系が本論文で提案された。

さらに，マレーシア植物区系地域の *Dalbergia* 属植物について植物地理学的解析がおこなわれ，36種のうち，21種がボルネオに分布し，さらに 8 種がボルネオ固有種であることが明らかとなり，ここが分布の中心であると推定された。

以上の結果は，マレーシア植物区系地域の *Dalbergia* 属研究の基礎を築き，かつ植物分類学に新たな発展をもたらすものであると評価できる。

以上のように，スナラノ提出の論文は本人が自立して研究活動を行うに必要な高度の研究能力と学識を有することを示している。したがって，博士（理学）の学位論文として合格と認める。