THE 11th FLORA OF THAILAND MEETING 1999 LEIDEN, THE NETHERLANDS

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The international project Flora of Thailand was initiated in 1967 under Thai-Danish collaboration at the Forest Herbarium, Royal Forest Department. The Editorial Board comprises the senior botanists from the institutoinal collaborations as Department of Systematic Botany, University of Aarhus (AAU); Botanical Museum, University of Copenhagen (C); Royal Botanic Garden, Edinburgh (E); Royal Botanic Gardens, Kew (K); University of Kyoto (KYO); Rijksherbarium, Leiden (L); Museum National d' Histoire Naturelle, Paris (P); Department of Botany, Trinity College, University of Dublin (TCD) and Department of Botany, National Science Musuem, Tsukuba (TNS). They all participate to fulfil the completion of the taxonomic work on the regional Flora. So far almost 35% of the total number species were published, due to the limited manpower resources as well as information sources, such as type specimens, literatures etc.

Every three years collaborators of the project join to discuss their progress. The recent meeting took place at the National Herbarium of the Netherlands, Leiden University Branch, during 10–14 May 1999, after the successful 10th meeting in Phuket, Thailand in 1996. Several reports were presented on various plant families: Apocynaceae, Liliaceae, Rubiaceae, Leguminosae, Annonaceae, etc. This meeting emphasis was given to the Euphorbiaceae of which different aspects like systematics, phylogeny, chromosomes, etc. were discussed; a result of the three year programme to revise this large family with more than 400 species in Thailand (this initiative is funded by the Biodiversity Research and Training Programme, a joint Programme by The Thai Research Fund and the National Center for Genetic Engineering and Biotechnology). Other topics as swidden farming, demonstrations of CD-Roms with botanical revisions (a new development which in the future might replace printing), the Flora of Laos, Cambodia and Vietnam, and the Netherlands type collection on internet were also presented.

Traditionally, half a day was reserved for a meeting of the Flora of Thailand Editorial Board members. Their report showed the successful progress, with a new lay-out attractive issue of Cyperaceae (Flora of Thailand vol. 6 part 4). Following the 11th meeting, volume 7 part 1 (Apocynaceae, Primulaceae and Sapindaceae), was published. Several manuscripts on the remaining families have already been submitted. The Flora of Thailand is now getting ahead of its neighbour, Flora Malesiana (one of the main research topics of the host institute).

Usually none of the presented papers in the Flora of Thailand Meeting is published, but as the contributions are valuable this seems to be a waste of energy and information. Therefore, all contributors were invited to hand in their manuscripts for publication in the Thai Forest Bulletin (Botany). Four of the papers (Adema, Maclin, Sridith, and van Welzen) are published in this volume. Hopefully, in the next Flora of Thailand meeting (2002), many more collaborators will provide their manuscripts for publication.

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THAI FOR. BULL. (BOT.) 28: 2–16. 2000.

NOTES ON MALESIAN FABACEAE XX. *DERRIS* IN THAILAND AND MALESIA

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ABSTRACT. The relationship between *Derris* Lour. and several related genera [*Aganope* Miq., *Brachypterum* (Wight & Arn.) Benth., *Ostryocarpus* Hook.f., *Paraderris* (Miq.) R. Geesink, *Xeroderris* Roberty] was studied using phylogenetic analysis. The cladistic analysis resulted in a fairly well supported majority rule concensus cladogram, which lead to the recognition of *Aganope*, *Derris*, *Ostryocarpus*, and *Paraderris* as independent genera; *Brachypterum* is reunited with *Derris*, and *Xeroderris* is united with *Aganope*. The species of *Aganope*, *Derris*, and *Paraderris* occurring in Thailand and Malesia are enumerated.

INTRODUCTION

Derris Lour. is a small to medium-sized genus of Asian and African papilionoid legumes. Traditionally, because of its indehiscent pods, the genus has been included in the tribe *Dalbergieae*. However, the close resemblance and relationship to *Millettia* Wright and related genera has often been noticed. Polhill (1981) and Geesink (1981, 1984) transferred several genera with indehiscent pods, including *Derris*, from tribe *Dalbergieae* to tribe *Millettieae* (*Tephrosieae*).

Bentham (1860), in his study of *Dalbergieae*, accepted *Derris* in a rather wide sense, even including some American species. Since then, this last group, usually called "American Derris", has been a point of discussion. Geesink (1983, 1984) placed these species in a separate genus *Deguelia* Aubl. At present, most workers on neotropical floras include "American Derris" in *Lonchocarpus*.

In this paper a brief historical overview of *Derris* will be given, followed by an account of the different ways in which *Derris* may be divided into sections or genera. Some of the characters and the principal groups will be described, followed by a cladistic analysis, discussion, and conclusions, including some nomenclatural notes, especially on new combinations to be made. An enumeration of the species of *Aganope* Miq., *Derris*, and *Paraderris* (Miq.) R. Geesink in Thailand and Malesia will be given.

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HISTORY OF DERRIS

Derris was described by Loureiro (1790) to accommodate two new species: *D. pinnata* Lour. and *D. trifoliata* Lour. However, the genus had already been described several times; Linnaeus (1747) gave it the name *Pterocarpus*, a name he later transferred to another group of Leguninosae. Adanson (1763) described *Salken* and *Solori*, both based on plates in Hortus Malabaricus (Rheede, 1686, 1688). Aublet (1775) described *Deguelia*, a name later used by Taubert (1891–1894) for *Derris* s.l. *Derris* sensu Loureiro is nowadays conserved over all older names, with *D. trifoliata* Lour. as its type species.

In 1834 Wight & Arnott described *Dalbergia* L.f. subgen. *Brachypterum*. Bentham (1837) raised this taxon to generic level. However, in 1860 he reduced it to a section of *Derris*.

In 1855 Miquel described the genus *Aganope* to accommodate several *Derris*-like species with paniculate inflorescences. This genus was reduced to a section of *Derris* by Bentham (1860). Several closely related genera of African plants were described later on: *Ostryocarpus* Hook. (1849), *Ostryoderris* Dunn (1911) and *Xeroderris* Roberty (1954).

In 1855 Miquel also described *Derris* sect. *Paraderris*, which was raised to generic level by Geesink (1984).

DERRIS DIVIDED

From the historical overview presented above there are different views on how to deal with *Derris*-like plants. Two main opinions with totally different solutions were published:

1. Bentham (1860): *Derris* is a rather large, variable genus that can be divided into several sections: *Aganope*, *Brachypterum*, *Dipteroderris*, *Euderris* (= *Derris*, including "American Derris"), and *Paraderris*.

2. Geesink (1984): *Derris* is a much smaller genus and most of Bentham's sections are raised to genus level: *Brachypterum*, *Deguelia* ("American Derris"), *Derris*, *Ostryocarpus* (including *Aganope*, *Ostryoderris*, and *Xeroderris*), and *Paraderris*.

There is a third opinion for the group called *Derris* sect. *Aganope* by Bentham and genus *Ostryocarpus* by Geesink: Polhill (1971) in an account on the Lonchocarpineae discusses the generic limits of some *Dalbergieae*. He unites *Aganope* and *Ostryoderris* in the genus *Aganope*, but he maintains *Ostryocarpus*, and refrains from uniting *Xeroderris* with *Aganope*.

In order to decide how to divide *Derris* for Flora Malesiana I carried out a cladistic analysis to determine if any of these groups is supported by phylogeny. All groups mentioned above are included with one exception: *Deguelia* ("American Derris"), because a trial run with this group included did not result in a meaningful (consensus) cladogram. With *Deguelia* included the computer produced a large number of cladograms (at 2300 trees the memory was full). From this and from observation of individual cladograms I concluded that *Deguelia* is not closely related to *Derris*. The neotropical systematists who include *Deguelia* in *Lonchocarpus* may be correct.

CHARACTERS

Characters used in the phylogenetic (cladistic) study included vegetative as well as generative traits. They were taken from all available plant parts, including habit, leaves, inflorescences, flower parts, and fruits (Table 1). In total 24 characters were used in the analysis. Only two sets will be discussed at some length:

A. Inflorescences

Geesink (1984: 8) discusses three evolutionary lines in the development of inflorescences in Millettieae. For all three lines the (primary) panicle is seen as the basic ("primitive") type of inflorescence. Various steps, such as contractions and reductions of lateral branches and reductions in the number of flowers per lateral branch, lead to racemes, pseudo-racemes, or pseuso-panicles. Further development may lead to secondary panicles (Geesink, 1984: Fig. 1). A special case of pseudo-racemes is mentioned for *Paraderris* and *Lonchocarpus* p.p.: The lateral branches are reduced to slender brachyblasts with three (*Paraderris*) or two (*Lonchocarpus*) flowers at the apex, each flower supported by a bract (Geesink's Fig. 1: 1a–c).

In the group of taxa I mentioned the following inflorescence types (Character 4: Inflorescence; Character 5: Brachyblast) are found.

1. Panicles (Fig. 1): Branched, racemose inflorescences with the flowers solitary along the lateral branches (Character 4, state 0; Character 5, state 0), which is found in the outgroups *Dalbergia* and *Kunstleria* and in the ingroup in *Aganope*, *Ostryocarpus*, and *Xeroderris*. Panicles are also present in *Derris koolgibberah* F.M. Bailey (= *Brachypterum*, following Geesink, 1984). Due to problems in the circumscription of this taxon (it may include several, probably incompletely known, species), this species was left out of the analysis.

2. Pseudo-racemes (Fig. 1): unbranched, racemose inflorescences with the flowers clustered in fascicles at the nodes (= brachyblasts) (Character 4, state 1; Character 5, state 1 or 2). Pseudo-racemes occur in two forms: *a*. Brachyblasts knob-like to ± cylindrical with the flowers scattered over the brachyblasts (Character 5, state 1; Fig. 1 a); *b*. Brachyblasts usually slender with 2 or 3(–5) flowers at the apex (Character 5, state 2; Fig. 1b). Form *a* is found in *Derris* and *Brachypterum*; form *b* is found in *Paraderris* and *Derris* (*Brachypterum*) *robusta* Benth. In the *Derris* group the pseudo-racemes are rarely united into pseudo-panicles.

B. Fruits

The fruits of all taxa in this study are indehiscent pods (Fig. 2). These pods vary widely in shape, size, presence of wings, and presence of so-called seed chambers.

1. Size (Character 19): remarkable are the narrow strap-like pods of *Brachypterum* and the flattened, circular pods of *Ostryocarpus*.

2. Wings (Character 20): pods are either not winged as in *Dalbergia*, *Kunstleria*, *Ostryocarpus*, and one form of *Paraderris malaccensis* (Benth.) Adema; or winged along the upper (dorsal) suture, only in *Aganope heptaphylla* (L.) Polhill (Fig. 2a); or winged along both sutures in all other taxa (Fig. 2b, c).

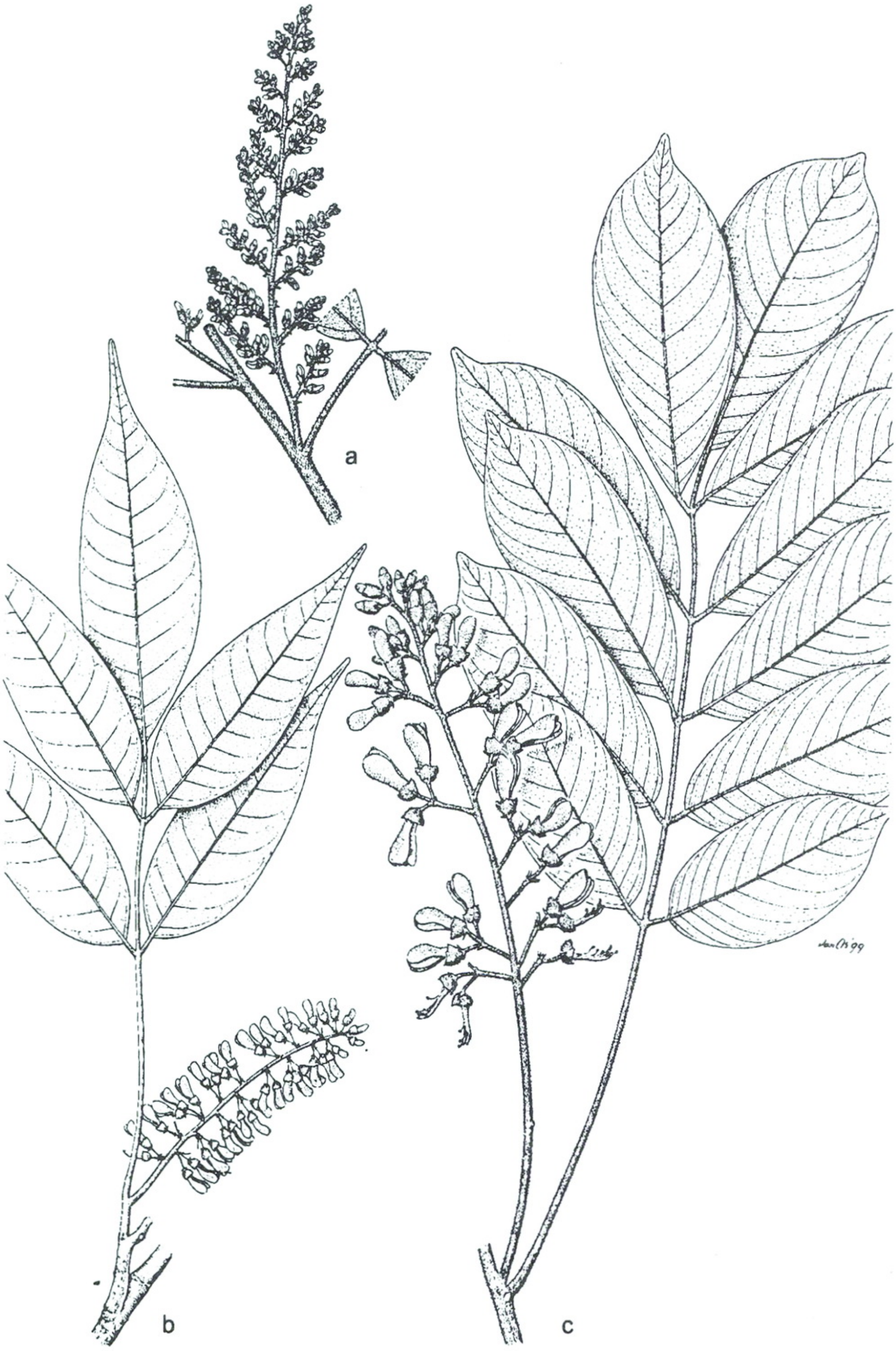

Fig. 1. Inflorescences: a. = *Kunstleria forbesii* Prain; b. = *Derris trifoliata* Lour.; c. = *Paraderris elliptica* (Wall.) Adema.

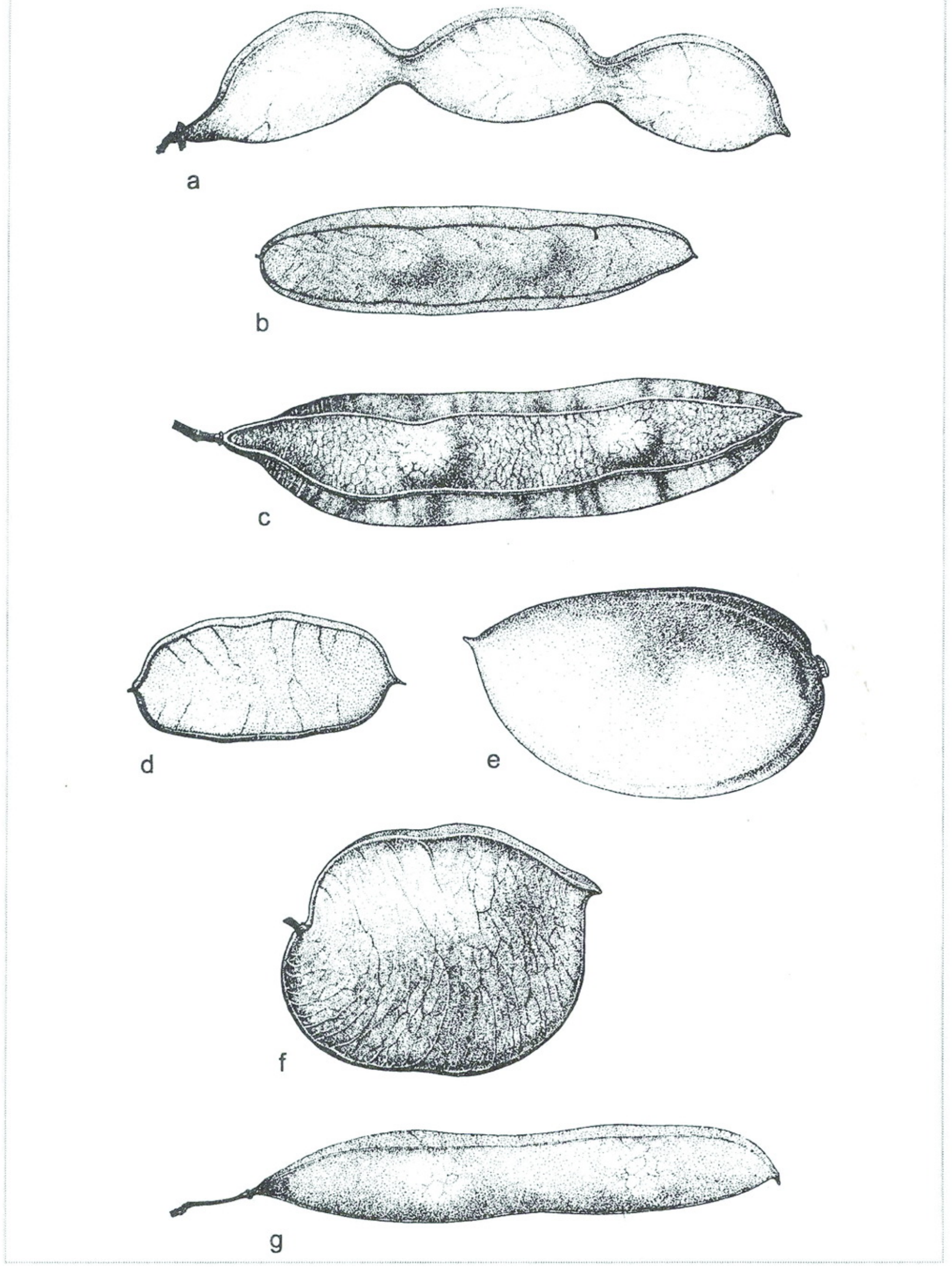

Fig. 2. Pods.: a. = *Aganope heptaphylla* (L.) Polhill; b. = *A. thyrsiflora* (Benth.) Polhill; c. = *A. stuhlmannii* (Taub.) Adema; d. = *Paraderris elliptica* (Wall.) Adema; e. = *P. malaccensis* (Benth.) Adema; f. = *Derris trifoliata* Lour.; g. = *D. scandens* (Roxb.) Benth.

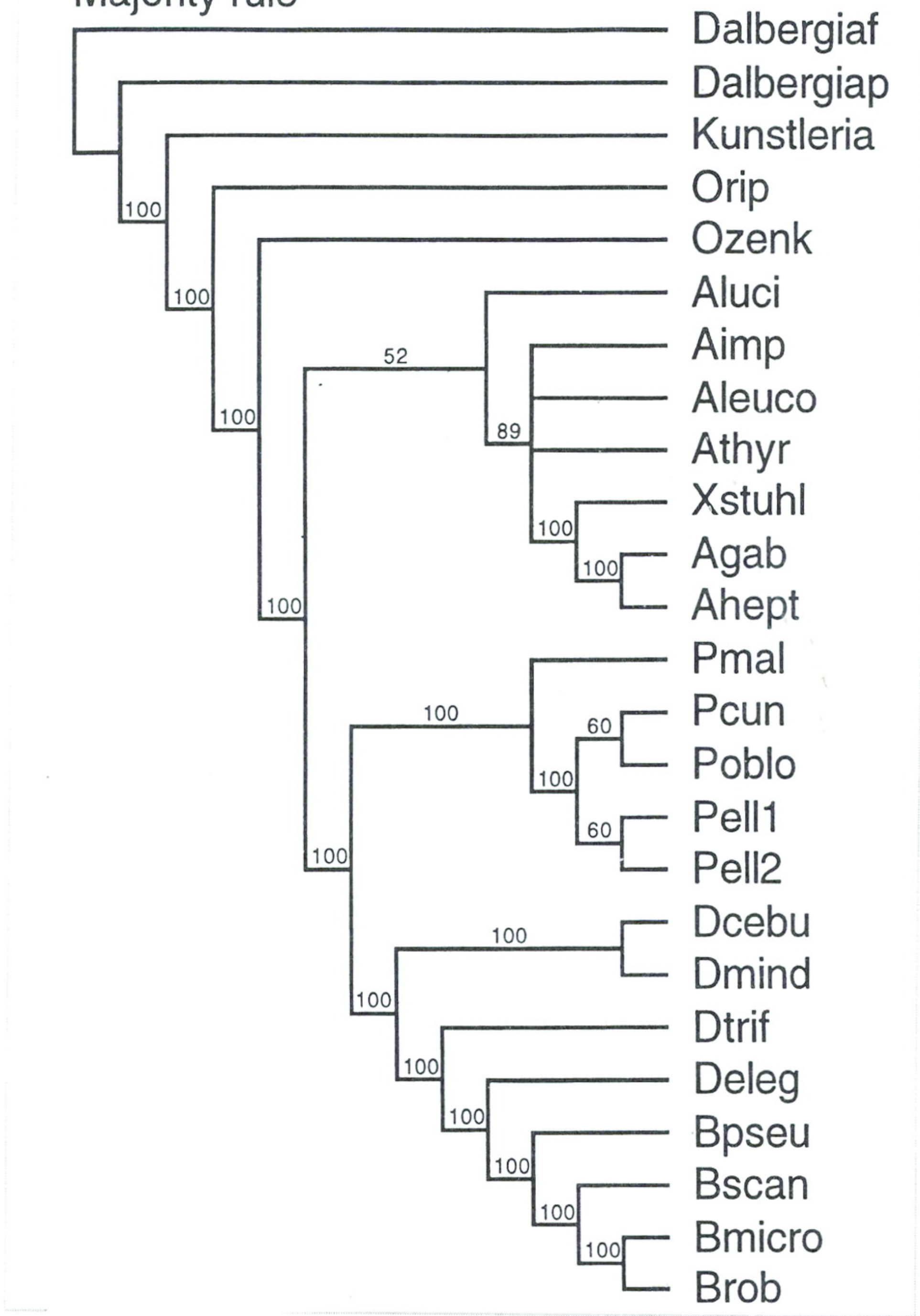

Fig. 3. Majority rule concensus cladogram. For taxon abbreviations see table 2.

3. Seed chambers (character 21): This character was described by Polhill (1981) for *Dalbergia*. Geesink (1984) mentioned it as a special (unique) character for *Brachypterum*. When the taxa for the data matrix was described it was found that such seed chambers occur also in other genera of the *Derris* group (*Aganope*, *Xeroderris*). It was also found that a range of different types of seed chambers can be distinguished in this group: *a*. Only a membranous envelope around the seed is present (Character 21, state 1); this envelope is probably formed by the endocarp. *b*. The mesocarp is (in part) hardened, ?cartilagenous in structure; within the seed chamber the membranous envelope (as in *a*) is usually present (Character 21, state 2); the exocarp is usually not a part of the seed chamber and withers away; the seed chamber with its enclosed seed is probably dispersed as a whole sometimes, if more than one seed is developed, breaking into loments. *c*. The whole pod is lignified; if more than one seed per pod is present, then the pod breaks between the seeds into loments (Character 21, state 3, *Dalbergia falcata* Prain).

INGROUP TAXA

Chracateristics of the ingroup taxa, using Geesink's (1984) and Polhill's (1971) generic names are given:

A. *Aganope* (including *Ostryoderris*), *Ostryocarpus*, *Xeroderris*

This group has several characters in common with the outgroups: the inflorescence is a panicle, the keel and wing petals are free from each other, the stamens are diadelphous and the disc is 5–10-lobed. The last character is sometimes found in the other groups. Other characters: usually lianas, pods winged along both sutures, and the seed with an eccentric hilum (see also Polhill, 1971). *Aganope heptaphylla* has pods winged along the upper suture only. *Xeroderris stuhlmannii* (Taubert) Mendonca & E. P. de Sousa differs only in being a tree. *Ostryocarpus* differs mainly in its pods, which are ?circular in outline and not winged.

B. *Brachypterum*

Differs from the outgroups and the first group in: the inflorescence is a pseudo-raceme, the keel and wing petals are adherent, the stamens are monodelphous, and the disc is usually tubular, rarely lobed. Other characters: liana or tree, stipellae present, calyx glabrous inside, basal callosities absent or small, pods winged along the upper suture only, seeds with a central hilum. *Derris* (*Brachypterum*) *koolgibberah* is not included; most specimens of this species have a paniculate inflorescence.

C. *Derris*

Derris, like *Brachypterum*, differs from the outgroups and the *Aganope*-group in the inflorescences, the keel and wing petals, the stamens and the disc. Other characters: lianas, stipellae present or not, calyx hairy or glabrous inside, pods winged along both sutures or along the upper suture only, seed with a central hilum. *Derris* has several character states in common with either *Brachypterum* or *Paraderris*: stipellae may be

present (*Brachypterum*) or absent (*Paraderris*), the inside of the calyx may be hairy (*Paraderris*) or glabrous (*Brachypterum*), the pods may be winged along both sutures (most *Paraderris*) or along the upper suture only (*Brachypterum*).

D. *Paraderris*

Paraderris differs from the outgroups and the *Aganope*-group in the same way as *Brachypterum* and *Derris*; as in *Brachypterum* the disc is sometimes lobed. Other characters: lianas, stipellae usually absent, brachyblasts slender and 3-flowered at the apex, calyx hairy inside, basal callosities large (small in *P. malaccensis* (Benth.) Adema), anthers hairy, ovary inside with a row of hairs along the ventral suture, pods winged along both sutures (except some specimens of *P. malaccensis* that have unwinged pods, and *P. elliptica* (Wall.) Adema that has pods winged along the upper suture only), seeds with central hilum. The hairy anthers and the hairy inside of the ovary are unique characters within the group of *Derris* related plants. These characters, together with the brachyblasts and the large basal callosities, form a unique combination of characters.

CLADISTIC ANALYSIS

The computer program PAUP 3.1 (Swofford, 1991) was used for the cladistic analysis. All characters were unordered and of equal weight; polymorphisms were treated as real polymorphisms, and a simple random addition sequence was used in a heuristic search.

Table 1 shows the 24 characters and the data matrix can be found in Table 2.

Dalbergia falcata, *D. pinnata* and *Kunstleria* were used as outgroups. *Dalbergia* species were used, because in cladograms that include *Dalbergieae* and *Millettieae* amongst other tribes (see Geesink, 1984, for Millettieae; Lavin and Sousa, 1995, for Robinieae; Lavin et al., 1998, for Phytochrome gene sequence data), the *Dalbergieae* always appear at a lower level in the cladogram than the *Millettieae*; also the groups discussed here were formerly included in *Dalbergieae*. *Kunstleria* is probably a basal genus in *Millettieae*, it performs rather well as an outgroup in several cladistic studies in this tribe (Adema, ms.; Ridder-Numan, 1996).

The analysis resulted in 135 most parsimonious cladograms (MPC) with a length of 85 steps, Consistency Index (CI) = 0.674, Homoplasy Index (HI) = 0.618, Retention Index (RI) = 0.815, Rescaled Consistency index (RCI) = 0.550. The CI, RI, and RC values indicate that the cladograms are well resolved and represent the information content of the data matrix fairly well. the values of CI and HI indicate that the amount of homoplasy is rather high. However, these values are well within the range that may be expected for a data matrix of this size (Sanderson & Donoghue, 1989).

A set of 135 MPCs is still too large to discuss for some length, and, therefore, a majority rule consensus (MRC) tree was calculated and the MRC cladogram is represented in Fig. 4. It is well resolved - only one polytomy - and most groups present in the MRC are also present in the individual cladograms (as indicated by the 100% support of the branches). Several groups are clearly recognisable: At the basal nodes are

the outgroups, followed by *Ostryocarpus* (Orip, Ozenk) as sister groups to all other groups. Then a clade with *Aganope* (Aluci to Ahept, including Xstuhl), which is much less well represented in the individual cladograms (only 52% support). Finally, the sister groups *Paraderris* (Pmal to Pell2) and *Derris/Brachypterum* (Dcebu to Deleg, Bpseu to Brob) in the top of the MRC are found.

DICUSSION AND CONCLUSIONS

1. *Deguelia* ("American Derris") does not belong to *Derris* or one of its closer relatives (see also Introduction and Derris divided). *Deguelia* and Bentham's group *Euderris* Americanae* probably belong to *Lonchocarpus*.

2. *Ostryocarpus* appears in the MRC as two separate 'clades', as a sister group to all other *Derris*-like plants. I accept *Ostryocarpus* as a good genus, especially recognisable by its flattened, circular, unwinged pods. The separate appearance of its two species is probably (in greater part) due to the set of characters that this genus has in common with the outgroup.

3. *Aganope* appears in the MRC as a monophyletic group. However, this group is rather weakly supported, barely passing the treshold for recognition as a clade in a majority rule consensus. In part this may be due to the behaviour of *A. lucida* (Welw. ex Bak.) Polhill, which has some characters in common with *Ostryocarpus*, and, for a greater part, to the presence of a large set of characters in common with the outgroups, just as *Ostryocarpus*. Several versions of the data matrix, as it was developed were analysed, and in all results *Xeroderris stuhlmannii* was always present within the *Aganope* clade. There is no doubt that *X. stuhlmannii* has to be included in *Aganope*, which necessitates the following new synonymy and new combination:

Aganope Miq., Fl. Ned. Ind. 1: 151. 1855.— *Derris* Lour. sect. *Aganope* (Miq.) Benth., Proc. Linn. Soc. London 4, Suppl.: 103. 1860.— *Xeroderris* Roberty, Bull. Inst. fr. Afr. noire, sér. A, 16: 353. 1954. **syn. nov.**

Aganope stuhlmannii (Taub.) Adema, **comb. nov.**— *Deguelia stuhlmannii* Taub. in Engl., Pflanzenw. Ost-Afr. C: 218. 1895.— *Derris stuhlmannii* (Taub.) Harms, Bot. Jarhb. 28: 408. 1901.— *Ostryoderris chevalieri* Dunn, Kew Bull. 1914: 335. 1914.— *O. stuhlmannii* (Taub.) Dunn ex Harms in Engl., Pflanzenw. Afr. 3, 1: 644. 1915.— *O. stuhlmannii* (Taub.) Baker, Leg. Trop. Afr. 2: 563. 1929.— *Xeroderris chevalieri* (Dunn) Roberty, Bull. Inst. fr. Afr. noire Sér. A, 16: 353. 1954.— *X. stuhlmannii* (Taub.) Mendonca & E.P. Sousa, Bol. Soc. Brot. 2A Sér., 42: 273. 1969.

4. *Paraderris* appears as to be a well supported monophyletic group. It has a large set of characters that form a unique combination (see also Ingroup Taxa), including one character that is truly unique in Millettieae: a row of hairs on the inside of the ovary along the upper suture. This group is accepted as a good genus. Geesink (1984) made only a new combination for the type species. Several other new combinations are also needed:

Paraderris elliptica (Wall.) Adema, **comb. nov.**— *Pongamia elliptica* Wall., Pl. As. Rar. 3: 20, t. 237. 1832.— *Derris elliptica* (Wall.) Benth., Proc. Linn. Soc. 4, Suppl.: 111. 1860.

Paraderris malaccensis (Benth.) Adema, **comb. nov.**— *Derris cuneifolia* Benth. var. *malaccensis* Benth., Proc. Linn. Soc. 4, Suppl.: 112. 1860.— *D. malaccensis* (Benth.) Prain, J. As. Soc. Beng. 66: 107. 1897.

Paraderris oblongifolia (Merr.) Adema, **comb. nov.**— *Derris oblongifolia* Merr., Philipp. J. Sc. 7, Bot.: 82. 1912.

5. *Derris* sensu stricto is a paraphyletic group, and together with *Brachypterum* it forms a monophyletic group. This group is accepted as a good genus, which has to be called *Derris*. Two species, *D. cebuensis* Merrill and *D. mindorensis* Perkins, differ from the other species in the absence of stipellae. In *D. trifoliata* stipellae are present or absent. Verdcourt (1978, 1979) described a new subspecies of *D. koolgibberah*: subsp. *pseudoinvoluta*. He suggested that it might be a distinct species. This is true, this taxon to species level:

Derris pseudoinvoluta (Verdc.) Adema, **stat. nov.**— *Derris koolgibberah* F.M. Bailey subsp. *pseudoinvoluta* Verdc., Kew Bull. 32: 469. 1978; Man. New Guinea Leg.: 321. 1979.

DERRIS IN THAILAND AND MALESIA

In Thailand and the Flora Malesiana area the genera *Aganope*, *Derris*, and *Paraderris* are found (Table 3). Endemism seems to be low in Thailand; only *Derris truncata* Craib is a Thai endemic. In Malesia more species are endemic, especially in the Philippines (*Derris cebuensis*, *D. mindorensis*, *Paraderris oblongifolia*) and in New Guinea (*Derris koolgibberah*, *D. pseudoinvoluta*).

In total 24 species are recognised, 16 in Thailand, 17 in Malesia, 9 of which common to both areas. At present it is not clear if *Paraderris cuneifolia* and *P. malaccensis* occur in Thailand; also, the occurrence of *Derris alborubra* Hemsl. in Malesia is questionable. The species that occur in Thailand and which are not found in Malesia, all have a wider distribution in Indo-china; some even reach S. China.

Table 1. Morphological characters used in the phylogenetic analysis of *Derris* Lour. and related taxa.

1. Habit	0 = tree; 1 = liana.
2. Leaflets	0 = alternate; 1 = opposite.
3. Stipellae	0 = present; 1 = absent.
4. Inflorescences	0 = panicle; 1 = pseudo-raceme or pseudo-panicle.
5. Brachyblasts	0 = absent; 1 = knob-like to ? cylindrical, flowered all around; 2 = cylcindrical, 2- or 3(–5)-flowered at apex.
6. Flowers	0 = 1 (no brachyblast, flowers solitary); 1 = 2 or 3 per brachyblast, rarely 4 or 5; 2 = 5–10 or more flowers per brachyblast.
7. Calyx length	0 = 2–4 mm; 1 = 4–6 mm, 2 = 6–9 mm.
8. Calyx inside	0 = glabrous; 1 = hairy.
9. Blade length of standard	0 = (2.5–)5–10 mm; 1 = 10–18 mm.
10. Standard, basal callosities	0 = absent; 1 = large; 2 = small.
11. Keel and wing petals	0 = free or irregularly adherent (slightly adherent at apex); 1 = adherent in lower part, with lateral pockets.
12. Stamens	0 = diadelphous; 1 = monodelphous.
13. Vexillary stamen	0 = free from standard; 1 = adnate to standard.
14. Anther length	0 = 0.2–0.9 mm; 1 = 0.9–2.5 mm.
15. Anther indumentum	0 = glabrous; 1 = hairy.
16. Disc	0 = indistinct or absent; 1 = distinct, ? annular; 2 = distinct, tubular; 3 = distinct, 5–10-lobed.
17. Ovary inside	0 = glabrous; 1 = hairy along upper suture.
18. Number of ovula	0 = 1 or 2; 1 = 3–7; 2 = 7–12.
19. Pod width	0 = 7–15 mm; 1 = 15–40 mm.
20. Pod wings	0 = not winged; 1 = winged along upper suture; 2 = winged along both sutures.
21. Seed chambers	0 = absent; 1 = membranous, formed by endocarp only; 2 = 'hard', formed by ? cartilaginous mesocarp and membranous endocarp.
22. Hilum of seed	0 = eccentric; 1 = central.
23. Rim aril on seed	0 = absent; 1 = present.
24. Seed position in pod	0 = ? in centre; 1 = scattered.

Table 2. Data matrix for cladistic analysis of *Derris* Lour. and related taxa (polymorphism is indicated by character stated separated by a comma, question marks indicate unknown values).

Species	Abbreviation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Dalbergia																									
falcata	(Dalbergiaf)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	0	0,1
pinnata	(Dalbergiap)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	1	0	0
Kunstleria	(Kunstleria)	1	1	0	0	0	0	0	0	0	0	1	0	1	0	0	3	0	0	1	0	0	0	0	0
Aganope																									
gabonica	(Agab)	1	0,1	0	0	0	0	2	0,1	1	0	0	0	0	1	0	3	0	1	1	2	2	0	0	1
heptaphylla	(Ahept)	1	1	1	0	0	0	2	0	1	0	?	0	0	1	0	3	0	1,2	1	1	2	0	0	1
impressa	(Aimp)	1	0,1	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	1	?	2	?	0	?	1
leucobotrya	(Aleuco)	1	0,1	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	1	1	2	?	0	0	1
lucida	(Aluci)	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	3	0	1	1	2	?	0	?	1
thyrsiflora	(Athyr)	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1,2	1	2	2	1	0	0,1
Brachypterum																									
microphyllum	(Bmicro)	0	1	1	1	1	2	0	0	0	2	1	0	0	0	0	2	0	0,1	2	1	2	1	1	1
pseudoinvolutum	(Bpseu)	1	1	1	1	1	2	0	0	0	0	1	0	0	0	0	2	0	1	2	1	2	1	0	0,1
robustum	(Brob)	0	1	1	1	2	1	0	0	0	2	1	0	0	0	0	2	0	0	2	1	2	1	1	1
scandens	(Bscan)	1	1	0,1	1	1	2	0	0	0	0	1	0	0	0	0	2,3	0	0	2	1	2	1	1	0,1
Derris																									
cebuensis	(Dcebu)	1	1	0	1	1	2	0	1	0	0	1	0	0	0	0	0,1	0	1	1	2	0	1	0	0
elegans	(Deleg)	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0,1	1	0	1	0	0
mindorensis	(Dmind)	1	1	0	1	1	2	0	1	0	0	1	0	0	0	0	0	0	1	1	2	?	1	0	0
trifoliata	(Dtrif)	1	1	0,1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	0
Ostryocarpus																									
riparius	(Orip)	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	3	0	1	1,2	0	0	0	?	?
zenkerianus	(Ozenk)	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	3	0	?	1,2	0	?	?	?	?
Paraderris																									
cuneifolia	(Pcun)	1	1	0,1	1	2	1	1	1	1	1	1	0	0	1	0,1	1	1	1	0,1	2	1	1	0	1
elliptica 1	(Pell1)	1	1	0,1	1	2	1	2	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0,1	0	0,1
elliptica 2	(Pell2)	1	1	0	1	2	1	2	1	1	1	1	0	0	1	1	1,3	1	1	1	2	1	1	0	1
malaccensis	(Pmal)	1	1	0	1	2	1	0	1	0	2	1	0	0	0	0	3	1	1	1	0,2	1	1	0	0
oblongifolia	(Poblo)	1	1	0	1	2	1	1	1	1	1	1	0	0	1	0,1	1,3	1	0	1	0	1	1	?	1
Xeroderris																									
stuhlmannii	(Xstuhl)	0	1	0	0	0	0	1,2	1	0	0	0	1	0	1	0	3	0	1	1,2	2	2	0	0	1

Table 3. Species of *Aganope*, *Derris*, and *Paraderris* present in Thailand and Malesia (+ = present, — = absent, E = endemic, ? = questionable).

Species	Thailand	Malesia
Aganope		
heptaphylla	+	+
thyrsiflora	+	+
Derris		
alborubra	+	?
amoena	+	+
cebuensis	—	E
elegans	+	+
ferruginea	+	—
koolgibberah	—.	E
laotica	+	—
marginata	+	—
microphyllum	+	+
mindorensis	—	E
monticola	+	—
pseudoinvoluta	—	E
robusta	+	+
scandens	+	+
thorelii	+	—
trifoliata	+	+
truncata	E	—
Paraderris		
cuneifolia	?	+
elliptica	+	+
malaccensis	?	+
oblongifolia	—	E
spec.	—	+

ACKNOWLEDGEMENTS

The loan of material used in this study from the herbaria: A, K, L, LAE, SING, U, WAG is highly appreciated. I thank the directors and staff of the herbaria of Kew, Utrecht, and Wageningen for the hospitality shown during my visits there. The drawings were made by Mr. J. van Os.

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