II. INSTRUCTIONS FOR COOPERATORS (with 3 appendices)

1. Introduction.

After some preliminary plans in 1932, and in 1936, a more definite scheme for a modern Flora of Malaysia was composed in 1939, forming part of the reorganization of the Botanic Gardens, Buitenzorg, Java. This was approved of by the Netherlands Indian Government, and the National Council at Batavia.

Necessary preparations for this ambitious scheme had started as early as 1930, consisting of the preparation of card indices, and directing the aim of expeditions in the years 1930 - 1940 to neglected regions in order to fill up gaps in our botanical knowledge and collections.

In 1940 the plans for a real start seemed near execution. Several herbaria of the East had agreed to cooperate in the plan, and my learned friend and former colleague, the late Dr. B.H. DANSER, professor at Groningen University had agreed to a joint editorship.

The war intervened in a most disagreeable way, because next to the impossibility to carry out the plans it brought to an unexpected end the lives of two very able Dutch taxonomists, viz. of Dr H. UITTIEN, who was shot by the Germans, and my colleague Dr P.J. EYMA, who died of starvation in a Japanese P.o.W. camp at Palembang. Both were intended to play an important role in Fl. Mal.

The heaviest blow, however, was the untimely death of DANSER.

Next to that the destruction of the Berlin and Manila herbaria is a very serious handicap.

Unaware of this I had an opportunity to continue work for a certain period of the war, and some ideas ripened about the scope and aims of the flora, which I believe represent an advantage over the former ones.

Though, in September 1945, I was much depressed by the news alluded to above, the Director of the Botanic Gardens at Buitenzorg, and the later installed "Commission for Coordination of Science in the Neth. Indies" thought the compilation of Flora Malesiana essential for the rebuilding of science in the SW Pacific in general, and for that of Malaysia in particular.

After I had pointed out the necessity of a grandscale cooperation on an international basis the Government has charged me with the organization and edition of Fl. Mal., and has temporarily stationed me in Europe, onwards of August 1946.

2 Scope of Flora Malesiana

The following series are planned Each series will get a special independent editor-in-chief.

series I.	Spermatophyta	(flowering plants)
series II.	Pteridophyta	(ferns and fern allies)
series III.	Bryophyta	(mosses and hepatics)
series IV.	Fungi & Lichenes	(fungi and lichens)
series V.	Algae	(algae)

The work will be started with the apparently most important and most advanced series I. The approximate duration of the work can hardly be estimated, and even less the number of volumes, as these are dependent on numerous yet unknown factors.

With an optimal cooperation and goodwill of all botanists and institutes concerned, twenty years will certainly represent the minimum period for the completion of the work.

There are an estimated 2400 genera and about 25.000-30.000 species represented in the area as delimited below. On one side the flora must be concise in treatment, and the specific concept must be "moderate" or even be inclined to "slightly large" as the state of taxonomy in Malaysia is still so-called α-taxonomy. On the other hand conciseness must never lead to a degrading of its scientific value The manner of treatment must to a certain degree try to gain the standing of the fine series of colonial floras compiled by HOOKER, BENTHAM, BAKER, TRIMEN &c. Flora Malesiana must be the precursor, but also the backbone of future local critical floras.

The modern, trained botanist, forestry officer, pharmacist, agriculturist &c., many of whom will use this work, ask more of a flora than those of the past. It is for this reason that both ecology and uses of a plant species must be mentioned.

On the last Pacific Science Conference some mention was made of "generic floras" for the Pacific, apparently along similar lines as BOERLAGE followed for his "Handleiding &c." for the Netherlands Indies (1890-1900). These floras, however, can never be the last word, and are hardly the first, as the specific name is the key to all knowledge. It does not interest us much that Agathis occurs in Malaysia, one wants to know which species occur where, and in what abundance, under what circumstances and with which life-history and which identification characters, which products are furnished by which species, &c. No work on useful plants, no forestry, no agriculture, no ecology and plant geography is thinkable without the knowledge of the exact names of the species. The same holds true for Derris, Styrax, Amorphophallus, Sonneratia, Sapotaceae and Ebenaceae, to remember some topics of recent Malaysian technical botany A recommendation based on a wrong specific identification say of some species of Derris to be planted somewhere may cost the community, the factory or shareholders much money.

I believe generic floras to be useful to some extent but they can never replace a regular flora based on the species They are either intended as a preliminary for a specific flora, or represent a cheap manner to avoid difficulties.

Scientifically it is impossible to make a sound generic flora.

before all species have been examined, as in numerous cases generic delimitation is far from satisfactory, and cannot be copied from ENGLER-PRANTL or similar works. This has appeared from the revisions of all larger Malaysian families of plants, cf. LAM on Sapotaceae, DANSER on Loranthaceae &c.

The treatment as is proposed for Fl.Mal. will be clear from the sample treatment of Bignoniaceae as represented in Appendix 3. Technical details will be clear for insiders and cooperators. Some families may need a slightly different scheme of treatment, viz. those with complicated flower structures, dioecious plants &c. However, the authors are invited to stick to the sample as far as is compatible with their work.

3. Co-editors and cooperators.

A long-range work like Fl.Mal. can only be realized through a combined effort on an international basis. There must be an intimate cooperation between all Netherlands taxonomists, specially those of the staffs of the Herbaria at Leyden and Utrecht, in addition to the botanists of the Herbarium of the Botanic Gardens, Buitenzorg, Java. Before the war, the directors of the principal herbaria of the countries surrounding the Netherlands Indies viz. those of Calcutta, Singapore, Manila and Brisbane had already promised their goodwill and cooperation. There is an ultimate necessity to get the goodwill and interest of a much greater number of institutes who are willing to join the effort, which take part in the supervision of the work, and which are materially interested in the outcome of the Fl.Mal. A list is compiled in chapt.VI of this Bulletin.

It is not to be expected, and it is not the intention, that all institutes will take an equal part in the compilation, but all have promised to take their share and promote Flora Malesiana as much as possible, as far as compatible with the working scheme of their institution.

They will furnish direct contributions for Fl.Mal. or will prepare special papers adapted to or serving as precursory treatments for future revisions.

They agree upon mutual cooperation in general, sending on loan material to revisors, and giving help in securing literature and exchange of data.

They promise to stimulate the study of Malaysian plants by their staffs and students.

They have of course full responsibility for the critical standing of the contributions emanating from their institute.

If the regulations of the institute forbid the sending on loan of types or authentic material the co-editors promise to prepare eventually photographs of these sheets, or what is often better have these types examined with the MS of the revisor.

Flora Malesiana is edited on the combined responsibility of the co-editors, i.e. the directors of the above-mentioned herbaria.

Regular cooperators will be next to the editor-in-chief, it is hoped all staff members of the herbaria at Manila, Singapore, Buitenzorg and Leyden.
It is hoped further that in all other institutes mentioned above one member of the staff will be appointed specially as a regular contributor serving as a liaison-botanist for Flora Malesiana.
Next to that recognized monographers will be asked for assistance in special groups.

4. General remarks.

a/ Flora Malesiana is edited under the auspices of the Botanic Gardens, Buitenzorg, by order of the Netherlands Indian Government.

b/ Flora Malesiana will be written in the English language; incidentally revisions in another modern language are permitted.

c) There will be no "system" followed for the sequence of revisions other than opportunity. The work does not aim at a new taxonomic system of plant families or higher units; this falls definitely beyond the scope of the work. The last issued part will contain an index to the groups treated in former volumes and parts; this serves for consultation during the course of the work. Each volume separately will be provided with a full index Very important additions can be inserted in posterior volumes

d) It is proposed to edit Fl.Mal. along the lines of printing of such books as "Vegetation of Latin America", "Bailey's Standard Cyclopaedia of Horticulture" in order to condense the issue in as few as possible handy volumes

e) Flora Malesiana is an anonymous work which will be referred to as "Fl Mal.". The authors remain fully responsible for their contributions backed up by that of the co-editors Reference to their work will run e g. "H.J.LAM, Fl.Mal.I,8 (1947)36" in which the Roman figure represents the series of Fl Mal.

f) MS - revisions can be submitted to the judgement of the co-editors or specialists, in order to get general approvement, and for eventual testing of unrevised material; this will add to improve the usableness of the work.

g) Each volume will be dedicated to a botanist who has taken a most prominent part in unveiling the botanic treasures of Malaysia.

5. Delimitation of the MALAYSIAN REGION.

To insiders it is a wellknown fact that the region as delimited by ZOLLINGER, BECCARI, MERRILL, &c. and called "Malaysia" ("Malesia") is rather sharply demarcated against the bordering continents, and represents a well-marked plant-geographical unit[1]

1) "Malaya" is a restricted term for the Malay Peninsula only.

characterized by a high percentage of endemic and subendemic authochthonous genera. A preliminary analysis has shown relations in its generic constitution:

28,2 % pan-palaeotropical genera.
26,9 % Asia-centred genera.
38,9 % Endemic and subendemic genera.
4,4 % Australia-centred genera.
1,5 % Pacific-centred genera.

From this it is clear that Flora Malesiana will contain a submonographic treatment of nearly 40% of the Malaysian genera.

PHILIPPINES. In these figures those of the Philippines are included, as it has been shown definitely by COPELAND, ROBINSON and MERRILL that the Philippines, though showing a rather high percentage of specific endemism, generically belong to the Malaysian flora. Even the specific endemism is inclined to decrease as it has appeared specially in the last decade that numerous Philippine endemics appear to occur elsewhere in Malaysia. "Priority of description" through the zeal of Philippine botanists is mostly the underlying cause. To this is added that a closer examination of allied endemic species described from other parts of Malaysia often shows them together to belong to wide-spread Malaysian populations racially differentiated. Students must realize that Malaysian tropical botany is still in the initial stage of taxonomy, as one of the few wide spaces of the earth of which no basic botanical compilation is yet accomplished. This vacuum prevents also a closer botanical study along modern lines.

BORNEO. It is clear that the British parts of Borneo must be included in Flora Malesiana; strongly sustained scientific reasons are against an acceptance of political boundaries here.

TIMOR & CHRISTMAS ISLAND. The Portuguese part of Timor, and Christmas Island (S of Java) will be included in Flora Malesiana for the same reasons.

NEW GUINEA. The floras of Papua and the Mandated Territory of New Guinea - as far as the mainland of the island is concerned - cannot be separated botanically from the western portion of the island. Both the highmountain flora and the lowland savannah vegetation are represented in both halves. New Guinea is the most rich but relatively most inadequately explored island of the whole of Malaysia. The species described from the Western part and those known from the Eastern part complete each other.

It is advisable to include in the keys to the genera those genera which are hitherto only known from the Bismarck and Solomon Archipelagos. In my mind a Flora of Micronesia and or Melanesia ought to constitute a separate work; the inclusion of the Melanesian species falls beyond the scope of Flora Malesiana.

MALAY PENINSULA. RIDLEY has found that in the N of the Peninsula there is a sharp floristic demarcation against the Burmese and Siamese floras coinciding approximately with the isthmus. On the other hand the flora of the Malay Peninsula s.str. is so intimately connected with the flora of Borneo and that of Sumatra that it can by no scientific reason be separated from these islands. The Singapore botanists are in full consent to the merging of the Malayan flora into Flora Malesiana.

6. Delimitation of cultivated plants weeds & aliens.

Weeds and aliens will all be included. Numerous of these plants have appeared to be very important for practical agriculture, forestry and pharmacy. A large percentage of the vegetables of the Sundanese people consists of aliens, imported through an unknown agent, or escaped from the Botanic Gardens, Buitenzorg, or from other gardens.

Ornamentals will be included only as far as they are regularly cultivated; treatment of the accidental ornamentals and pot plants would be an unnecessary burden. Rare ornamentals can eventually be mentioned only at the end of the family revision in a special appendix.

Agricultural, commercial and other industrial plants are to be treated fully. However, it is of course impossible to take into consideration the hundreds of exotics which are tried regularly as a preliminary for eventual cultivation, be it as green manures or species for shade in cultures. Both the Forestry Service and Agricultural Experiment stations import yearly novelties; most of these fail to enter practical aims, and are abandoned. As the revisor will be often in doubt in how far a certain plant is established as a cultigen it will be valuable to decide in this matter through the advice of the authorities in Singapore, Java, and Manila, for each family individually.

Cultigens are often badly represented in herbarium collections and it will be useful to ask local authorities for fresh experience. On the whole revisors need not worry too much in this point; the chief-editor will give information.

7. Plan for series I: Spermatophyta.

Series I will be preceded by three general volumes which represent a modern version of the introductory essays in former floras. An important aim is that they can be of help for the revisors.

They are the following:

volume 1) Cyclopaedia of Malaysian botanical collections, by Mrs M.J. van Steenis-Kruseman (compare appendix 1).

This is a cyclopaedia of Malaysian collections of Phanerogams & Pteridophytes. It contains over 3000 names of collectors, with short biographies, carefully

excerpted itineraries, and literature belonging to the collections. Indispensable for localizing herbarium sheets of Malaysian plants, specially those of the older collections. Contains also chapters on methods of collecting in the tropics, hints for travellers, erroneously localized specimens &c. Nearly ready for the press now. Approx. 600 printed pages.

volume 2) Malaysian plant life, by C.C.G.J. van Steenis.
This is a second edition, much enlarged, of "Maleische Vegetatieschetsen" (1935) by the same author. It deals with all vegetation types known of Malaysia, as far as described in literature and reports, or known to the author by personally acquired field knowledge, their status and interpretation, their interrelations, origin, distribution within Malaysia and importance for mankind. Biological phenomena, both explained or yet unexplained, will be briefly touched. This book will be rather richly illustrated. The MS can be expected to be finished in 1948. Approx. 500 printed pages.

volume 3) Malaysian plant geography, by C.G.G.J. van Steenis.
This volume falls into two parts. Part one deals with the floristic plant geography and contains tables in which the distribution of the ca 2200 recognized indigenous genera of Malaysian phanerogams is given, compiled from literature and from the Herbarium. There are further chapters on the history of phytogeographical theories and discussions, a provisional list of the genera with their synonymy, an attempt for dividing the archipelago into phytogeographical districts as based on the hitherto known facts of generic distribution, and a discussion of the phytogeographical character of the islands cq. island groups separately. The MS is far advanced but not yet ready for the press.
Part two will deal with the historical plant geography of the Malaysian region. This is only in the initial stage.

volume 4) Flora Malesiana proper. Onwards of vol.4 the revisions of the families will be printed in the sequence in which they are finished, irrelevant of the allianceship of the concerned groups. Vol.4 will be preceded by an introductory essay containing chapters on the importance of variability of Malaysian plants, special variations with which the Malaysian botanist is confronted in the field and with which he must be acquainted to judge their importance in the scanty specimens he has to work with in the herbaria. Small chapters are added on the history of Malaysian phytography. An annotated list of existing revisions concludes the introduction.
The first part of volume 4 will consist besides of the introductory essay of the following families which are revised:

Aceraceae	Hydrocaryaceae	Sarcospermaceae
Actinidiaceae s str.	Juncaginaceae	Saururaceae
Alangiaceae	Moringaceae	Sphenocleaceae
Ancistrocladaceae	Myoporaceae	Stackhousiaceae
Aponogetonaceae	Nyssaceae	Styracaceae
Burmanniaceae	Philydraceae	Trigoniaceae
Ceratophyllaceae	Podostemonaceae	Zygophyllaceae
Cochlospermaceae	Plumbaginaceae	

Other families which are promised for subsequent parts are enumerated in chapt. VII.
The families mentioned above are revised by a number of botanists from Dutch institutes. Vol. 4, part 1 is now made ready for the press.

8. Text of the revisions.

MS must be written by preference on one side of the paper, if possible, in double-spaced typescript, with a broad margin. AUTHORS names can at once be typed in capitals. Two copies of a MS will be appreciated.

The main rule for descriptions is that they are as concise as possible clear and intelligible. We are inclined to stick to the so-called ten line descriptions for species, that is, we assume that in generdl it will be possible to define a species - provided a key to the species precedes the descriptions - in ten printed lines.

In order to keep Fl. Mal. within reasonable limits of size and handability, extensive bibliographies, discussions, lists of numbers and collections can not be included. Flora Malesiana aims to be a concise report of the essential results of scientific botanical research work. Lists as alluded to can eventually be published in precursory papers if considered worthwhile.

The main principle of conciseness will be for the benefit of the practical use of the work, and will facilitate consultation. In general it can be said that the better a specific population is known the clearer and more concise the diagnostic essential characters can be defined.

There are of course plant types which cannot be characterized in ten lines, and diagnoses of pitcherplants, orchids and bisexual species will be longer, even much longer than those of Amaranthus or Ranunculus.

Long range experience with keys and descriptions has learned that unnecessary long descriptions are often due to either doubtful plants, hesitative or inexperienced work, or artificially distinguished species shielded by long descriptions.

Duplication must be avoided by all means. If a family consists wholly of trees, it is unnecessary to repeat this character both in the generic and specific diagnoses. It does not contain any diagnostic value. It is precisely these endless repeated words of duplication which occupy an astonishing space in some floras.

They prohibit a rapid understanding of the essentials. Clear "telegram style" is mostly sufficient.

It is even not quite necessary to repeat all characters, used in the key to the species, again in the specific diagnosis. In general a flora is consulted by means of the keys, and after that the user will read the additional diagnosis containing e.g. measurements, colours, variability, and characters of minor importance.

Great stress must be laid upon the keys for identification; they must be trustworthy and form the keystone to the work.

Avoiding duplication must never lead to omission of important scientific remarks, or superficiality.

Citations of literature.

For abbreviation of citations appendix 2 can be consulted.

It is unnecessary to cite under each species all literature dealing with the plant in Malaysian literature digested by the author. In the entry "Notes" the main sources of literature serving as a basis for the revision can be enumerated, both under the family diagnosis, and under that of the genus. Only the principal and critical literature is referred to, and the works containing good plates and illustrations. The latter are often not of intrinsic value for the common user, as most of the works containing these illustrations will not be available to the common reader.

Illustrations.

It is proposed to insert figures of plants in Fl.Mal. but to avoid the reproduction of photographs. Even small families ought to be accompanied by at least one plate. Figures relating to different species can be combined into one plate. Draughtsmen are invited to prepare their drawings in accordance with the size of the printed page, for diligence of typography. Of large genera it is advisable to illustrate several species belonging to different sections. It is further advised to select preferably those species which have hitherto never been pictured.

Drawings in general are difficult to get done in Europe and America. If possible the organization of Fl.Mal. will try to get facilities at Buitenzorg, where several able Javanese draughtsmen are present, who, in urgent cases, will make drawings along the directions of the author, under supervision of Buitenzorg botanists.

Maps for indicating peculiar distributions can be included; blanks can be furnished by the editor-in-chief.

Quite a number of published and unpublished drawings are present in the Buitenzorg files. They will be put at the disposal of the revisors together with herbarium sheets.

Literature.

During more a decade the editor-in-chief- has, assisted by Mrs van Steenis, collected nearly 150.000 citations arranged in families, chiefly dealing with Malaysian literature. A copy of

these citations will be put at the disposal of the revisors; it will save them a lot of precious time. This literature is not complete and not annotated, and contains mistakes. Moreover, important and unimportant entries are both included. But there remains a lot of service in it.

It is agreed with the co-editors that all help desired regarding literature will be given mutually; the editor-in-chief can eventually serve as an intermediate. He will also furnish help to foreign botanists if the desired text is written in Dutch; he will try to have this text translated and put at the disposal of the revisor. Photographic reproductions can - in rare works - of course be of much help.

Nomenclature.

It is advised to follow strictly the International Rules of Botanical Nomenclature, for the names of families the list proposed by Lanjouw and Sprague. All names will be written with small specific epithets, in accordance with the conclusion reached at Buitenzorg; decapitalized specific epithets are also used now in the Kew Bulletin, several English ecological papers and journals, and in a number of American periodicals.

9. Flora Malesiana Fund.

There will be, I hope, a "Fund Flora Malesiana"; this will serve to pay expenses which cannot be met along official channels though they are necessary for the execution of the work. A board under presidency of the editor-in-chief will be in supervision of this fund. Expenses falling under this heading are e.g.:

a) Translatory work, correction of proofs, typing work, checking of MS &c.
b) Postage and administration expenses,
c) Administrative help for the liaison in Europe in charge of the card indexes,
d) Appointment of some special draughtsmen in the Herbarium at Buitenzorg or Flora Malesiana,
e) Financial aid to cooperators and other temporary scientific contributors or contributions, and private monographers,
f) Mimeographing of MS and other communications to co-editors and cooperators,
g) Expenses of collecting on expeditions with special aims which cannot be paid from other sources,
h) Eventual support of the edition of those series of Flora Malesiana which are not self-supporting financially,
i) Purchase of reprints of revisions, and some copies of Fl.Mal. for co-editors and cooperators,
j) Promotion of Flora Malesiana where possible.

10. Hints to contributors and for framing of MS.

It is clear that the definite text of the MS-contributions is fixed after the material and pertaining literature within

reach of the revisors has been examined and the sheets have been signed. If the author has then reached a conclusion as to the delimitation of general and species in coordination with his botanical conscience he will have reached that state of knowledge in which the framing of the MS for Fl.Mal. will be a minor effort.

Revisions will be different according to the presence or absence of good precursory work in the group. In some cases of smaller families MS can be framed directly for Fl.Mal.

For the majority of families, however, revisions will be preceded by precursory papers. This is unavoidable in those cases where monographs are old or obsolete. The author must then gradually study the family, he must be able to build up his arguments, discuss old opinions, describe new methods for identification, and propose new divisions and delimitations of genera and species.

Hitherto similar precursory papers were published in a rather small number of journals. It is advised to restrict oneself to these journals which are the following in sequence of their geographic distribution:

Manila, P.I. Philippine Journal of Science, Editor: Dr.E.Q.LSUMBING, Bureau of Science, Manila, P.I.

Buitenzorg, Java: Bulletin of the Botanic Gardens, formerly Bulletin du jardin botanique. Editor: Dr.D.F. van Slooten,

The Gardens' Bulletin, Str.Settlements. Editor: Mr.R.E.HOLTTUM, Director of the Botanic Gardens, Singapore.

Blumea. Editor: Prof.Dr.H.J.Lam, Director of the RijksHerbarium, Leiden, Holland.

Recueil des travaux botaniques néerlandaises, issued by the Roy.Netherlands Botanical Society, Editor: Prof. Dr A.Pulle, Lange Nieuwstraat 109, Utrecht, Holland.

Kew Bulletin: Editor: Sir Edward SALISBURY, Director of the Royal Botanic Gardens, Kew-Surrey, England.

Journal of Botany: Editor: the Keeper of the British Museum, Department of Botany, Mr.J.RAMSBOTTOM, South Kensington, London SW 7, England.

Journal of the Arnold Arboretum. Editor: The Director of the Arnold Arboretum, Jamaica Plain, Mass. U.S.A.

There are some objections against the publishing of Latin diagnosis in Fl.Mal. New combinations and new names are of course fully permitted; new species and genera ought to be published in precursory papers. Descriptions of varieties, races, forms and subspecies can directly be included in the revisions for Fl.Mal.

If the author wishes to express his full responsibility for the sheets and literature examined by him, he is of course free to publish these too in precursory papers.

If, however, as sketched above, the co-editors fully cooperate in the scheme and send on loan all specimens of the concerned group to the revisor, all important specimens will have been signed by the author himself at the time of the completion of the MS. Then there will be hardly any need for compiling and arranging the localities and collectors numbers in the often extensive lists and enumerations, a tedious task taking up much time. In prior papers these lists were mainly intended for the use of foreign herbaria in which duplicates had been deposited which could be thus named in absence of the author by the personnel of these herbaria.

The normal user of a flora or monograph must be able to name his plants without a herbarium for the aim of comparison; if he is need of comparing sheets he will find the named plants signed by the revisor in all cooperating herbaria. The lists, hence, will be of comparatively little value in the future.

A great handicap of these lists is, moreover, that often no habitat is indicated other than altitude, and that in general no summarizing view is given of distribution and ecology, which depreciates their value in relating to the precious space they occupy. A striking example is e.g. the treatment of Hydrocotyle javanica in the excellent revision of the Umbelliferae by BUWALDA in Blumea 2(1936)122-128. More than 100 localities are cited, with collectors, numbers and altitude, but there is no synthesis of the habitat and ecology. From a closer study and mapping it appears, however, that this plant is a beautiful example of a moisture loving plant avoiding semi-arid places, and occurring within the reach of the dry monsoon, only on mountain slopes and summits, near waterfalls and hot springs. The locality Madoera (leg. SAULIÈRE) can, hence, not be right as this island falls within the semi-arid portions of Malaysia. It is an erroneous record, the specimen came from Madura in India. Hydrocotyle javanica is a moisture indicating plant which even may be used as a practical indicator for agriculture.

Such synthesis must be also made for indicating soils, but they are hardly ever made.

It is, for botanists not acquainted with climatic and soil conditions of Malaysia, difficult to draw such conclusions. They will have some help in the maps of the new Atlas of the Netherlands Indies "Atlas van Tropisch Nederland" (1938), and later in the treatment of Malaysian vegetation in volume 2 of Fl.Mal. Moreover, the editor-in-chief will always be glad to give assistance in these matters, the more so as the Dutch-written labels are sometimes not well understandable for foreign contributors.

11. Details for MS - revisions.

In connection with the sample treatment in Appendix 3 the following remarks are made:
a) Diagnosis of the family. Delimitations of families are still not stable. Some botanists prefer to keep them small, others adhere to a large concept (e.g.in Ericaceae, Magnoliaceae, Leguminosae &c). Fl.Mal. does not aim at a new systematic arrangement of families, and it does not aim at dictation or prescription of delimitation. Revisors are free in their opinion, and a decision is left to their knowledge and judgement.
Though I myself am not a promotor of the small family concept there is in my eye some advantage in describing small deviating segregates as separate headings, as the attention is more focussed on the deviating group, and its characters. Possibly Apoia had never been described if Sarcosperma had not been hidden behind the Sapotaceous screen.
Another technical advantage of small families is that some specialists are sooner inclined to revise a small family than a large one. Hence, this is in favour of more rapid publication.

If a family is represented in Malaysia with one genus only, and the type of geographical distribution properly excludes the possibility of the occurrence of other genera, there is no sense in copying some family description; there can hardly be anything new or critical about it. In that case a generic description is sufficient, that of the family wholly superfluous. E.g. in Zygophyllaceae, Acraceae &c.

If in a family only one special group (subfamily, tribe or subtribe) occurs in Malaysia, it is advisable to make mention of this in the family diagnosis. E.g. in Rafflesiaceae, Loranthaceae, Ochnaceae &c.

Under the family description the following entries occur:

Distr.(ibution)
Ecol.(ogy)
Uses:
Vern.(acular)
Notes:

In these entries general particulars on the Malaysian members of the group are given. Compare Appendix 3.

Under Distr. the floristical distribution will given. If a species occurs, in most islands it will be more clear to indicate the islands from which it is hitherto not known.

The entry Ecol. is intended for notes on the ecology and morphology of the species; notes on flower biology, distribution of sexes, dispersal, altitudinal behaviour, external anatomy and morphology are included.

Under Uses the main useful properties as far as yet known are mentioned. Though mainly derived from sources as HEYNE's Nuttige Planten v. Nederlandsch Indie BURKILL's Dictionnary, and BROWN's and OCHSE's works also fresh sources will be welcomed. Technical, medicinal, poisonous and edible properties will be put forward.

The Notes are intended for indicating the principal source of literature, remarks on the affinity of the family and other taxonomical notes, and further hints for collectors, i.e. which parts are most essential for identification.

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b) Key for the genera. In a work like Fl.Mal. keys must excel in clearness and simplicity, and make use as much as possible of easy characters.

A striking example of the contrary are the keys by KOORDERS in his "Flora von Tjibodas", a local work dealing with the flora of Mt Gedeh, West Java. For obscure reasons he copied his keys from ENGLER-PRANTL, Nat.Pfl.Fam.

For the Ranunculaceae he made the following key for the genera:

A. Samenknospe mit nur einem Integument.
1. Samenknospe hängend 1.Clemetis
2. Samenknospe aufrecht 2.Ranunculus
B. Samenknospe mit zwei Integumenten.Honigblätter fehlen.
3. Thalictrum

This is, for a distinction of these genera, in Java, and Malaysia misplaced, and a rather cheap manner in which to deal with his task. The key ought to have run as follows:

Climbing plants with opposite leaves .. .. 1. Clematis
Erect prostrate or ascending herbs.Leaves scattered.
Flowers yellow, bicyclic, 5-oo-merous 2.Ranunculus
Flowers white, often tinged purple.Perianth lobes 4.
3. Thalictrum

It is advised to insert genera which are only known from the Bismarck Arch. in the key to the genera. These are few, but experience has taught us, that species of these genera are often later detected in New Guinea.

If the characters used in the scientific key are easy to use by both non-equipped botanists and educated laymen, no additional artificial key is needed.
If however, the scientific key can only be used by means of microscopical magnifying, an additional artificial key is necessary.

In families consisting of dioecious plants keys for both male and female individuals are needed.

If the author thinks it advisable, the key to the genera can be

preceded by a key to the tribes. For each tribe a separate key for the genera belonging to that tribe can be given. All keys are held together at the head of the revision below the family description.

If - as e.g. in Bignoniaceae - the key to the tribes is unpractical as it is based on the structure of the fruit which is very often absent in herbarium material, the key to the genera must be artificial. In other families, e.g. Acanthaceae, the distunguishing characters of the tribes are difficult to observe. In that case too an artificial key to all genera is indispensable next to the scientific one.

Vegetative characters are generally easiest to observe, and are often of great use for identification of sterile or deficient material. Structure of the twigs and ramification, mode of growth, phyllotaxis, presence, shape and structure of stipules and their scars, nervature, buds, &c. are often of high importance, e.g. in Magnoliaceae, according to DANDY and ENDERT. Broad-leafed Podocarpus species can at once be distinguished in the sterile state from Agathis by means of the shape of the terminal bud. There are numerous examples of this, though in floras these chacracters are often neglected.

The use of vegetative characters in keys may of course never lead to degrading the scientific value of the work, but a cautious use is recommended.

Keys are given in the form of a conspectus which facilitates consultation.

Genera are numbered according to the affinity accepted by the author, thus in systematic sequence. Endemic genera of the Bismarcks are not numbered.

c) Generic description. Of each genus the original description is cited, and eventually emended ones, and monographical or critical treatments. Synonyms used in Malaysian literature are cited too.

Family characters must not be repeated in the generic diagnosis.

The delimitation of genera is for Fl.Mal. of utmost importance, though on the other hand Fl.Mal. does not attempt at presenting a new "Genera Plantarum".

In the past it has appeared that in several families generic limits were very vague, and a renewed study made it necessary to go far beyond the limits of Fl.Mal. in order to establish a reasonable delimitation of the genera, e.g. in Sapotaceae (LAM), Loranthaceae (DANSER) on which families rather extensive precursory papers had to be prepared. Of such families on which no modern revision has been published, the material and descriptions have accumulated, and nobody has a clear vision on real relations in the Augean stables.

In the generic description there must be a fixed sequence in the mentioning of characters similar to that of the families, starting with the habit and vegetative parts, twigs, phyllotaxis stipules and leaves, then inflorescences, flowers, floral parts and ending with fruits, seeds (and eventually seedlings in some families).

Under the generic description the entries Distr., Ecol., Uses, Vern. and Notes are repeated and used according to opportunity.

d) Key for the species. The demands for the specific keys are similar to those for the genera. If a large genus can easily be divided into sections, the key to the sections is followed by those for the species of each section. All keys are kept together and not spread in the text.
Species are numbered according to their systematic alliance-ship.
Flora Malesiana is in need of excellent specific keys. It is not advisable or necessary to mention in each key entry only one differential character. If any doubt can be excluded by copiousness, keys will gain in importance, and be appreciated.

If the author is for some reason of opinion that endemic species from the Bismarcks also occur in New Guinea, he is free to insert the species (not numbered) in the key.

If it is necessary a species name can occur twice or thrice, at different places, in the artificial key to the species.

Races, varieties and subspecies are distinguished in the specific keys. Unimportant varieties (fl. albis &c.) can be mentioned in the text only, or in the entry "notes".

If scientific keys are unpractical in use, a second artificial key can be added to the scientific one.
Structural vegetative characters are important for use in the key to the species, differences in measurements are in general dangerous to use.

e) Specific diagnosis. The same rule for the sequence of characters of the generic diagnosis holds good for the specific diagnosis; first vegetative parts, then flowers, and last fruits and seeds.
As much stress is laid on the complete use of all important differential characters in the key to the species, it is not always quite necessary to repeat all of them. This is different with works like DE CANDOLLE's Prodromus, HOOKER's Flora of British India where keys to the species are absent, and specific diagnosis must be complete.

Specific descriptions in Fl. Mal. are sufficient if all important and sub-important characters, not mentioned in the diagnosis of the family, tribe, genus, subgenus and section, and not used

in the key for the species, are framed into a short additional description, which in general can be accomplished within 10 typed lines.

The aim of avoiding duplication is a clear conciseness.

If the author thinks it advisable, stress can be expressed by printing some words in italics, though in brief descriptions where every word counts italics are hardly necessary.

Specific descriptions in Fl.Mal. ought to represent some control beside the keys.

In measurements one ought to mention first the length (height) of the organ, and then the breadth (diameter). Thus: "leaves 3-7 by 2-5 cm", and "ovary oval 3 by 2 mm ", and "ovary depressed-globose 2 by 3 mm".

All measurements are in μ, mm, cm, or metres, not in lines and inches.

It would have been possible to use, for brevity's sake, only one measurement, e.g. cm, and write: "leaves 2-7 by 3-5, but the use of books in which this method has been employed has not succeeded in making me an admirer of the method.

The words "long" and "broad" can often be omitted; it is clear for everybody what is meant by e.g.: "leaves 7-11 by 3-5 cm" and "tree 13-25 by 3.4-0.9 m."

For literature citations under the species, the same rule holds good as given for the genus.

All synonyms used in Malaysian literature are cited, and next to that the most important monographical or critical revisions, according to the judgement of the author, who can best choose himself the most essential treatments, concerning the status of the species. Papers containing good pictures based on Malaysian material are also cited.

Abbreviations and symbols which can be used are enumerated in Appendix 2. They add to the conciseness of the work.

Exceptional measurements can be indicated between brackets, e.g. "leaves (2-)5-7(-12) cm", from which it appears that the normal variation of the leaf size varies between 5 and 7 cm length; abnormal sizes are possibly due to the accidental occurrence of youth specimens, non-flowering watershoots, &c.

Distribution. In the entry distr. below the specific description first the area outside Malaysia is given, after that the area inside Malaysia. The latter is cited by islands, in the sequence from N and W towards S and E. If the species is common and the area large, it may be convenient to say :"all over Malaysia, not yet known from islands x,y,z" e.g.:
Distr. SE Asia to NW Australia, throughout Malaysia, not yet found in the L.S.I. and S.Moluccas."
L.S.I. is a convenient abbreviation for "Lesser Sunda Islands",

i.e. the series of the garland Bali to Timor.

Ecology. Under this falls the altitudinal distribution. Localities are combined, but eventual abnormalities must not be omitted; it is seldom that a species behaves the same way in all the islands. This may be due to the soil or climate, or other factors not yet known. Streams offer favourable places for descent, be it sometimes only temporary and dependent on continuous dispersal downward. The lowest stations of mountain plants are often situated near streams. Such telescopic distribution is clear from the following example:
"Distr. M-E Java, 1000-2950 m, in the L.S.I. descending to ca 300 m along streams, near a waterfall in Lombok at only 50 m".

One must be on the alert in copying altitudinal data from some labels of expeditions. It is known e.g. that FREY WIJSSLING during his ascent of Mt Kerintji, and ELBERT and TENGWALL during their trip to the summit of Mt Rindjani, Lombok, gave the same altitudinal range to all plants collected during one day, e.g. 800-2500 m. This gives too much range for most of the plants, and are the source of mistakes.

The climate is also of some influence on the altitudinal range of plants, and it is an established fact that quite a number of species are found at lower altitude in dry (i.e. alternatively dry and wet) monsoon areas of M-E Java and the L.S.I., some arts of Celebes and some spots in New Guinea).

The terminology of altitudinal girdles is proposed according to the facts which I have found in my studies of Malaysian mountain plants. They differ slightly from those proposed by JUNGHUHN. They are the following:

0 - 1000 m.	Tropical zone.	
		0-500 m. Tropical subzone.
		500-1000 m. Colline subzone.
1000 - 2400 m.	Montane zone.	
		1000-1500 m. Submontane subzone.
2400 - 4200 m.	Subalpine zone.	
4200 - 4500 m.	Alpine zone.	
above 4500 m.	Nival zone.	

Some errors have crept in data on labels, as e.g. in plants of Mt Lawoe (M. Java) which are labelled "Crater Lawoe, 1433 m". This is, however, the altitude of the village from where the collector A. RANT started; the crater is situated at ca 2200 m.

A good guide is in general the new atlas of the Neth. Indies, published in 1938: "Atlas van Tropisch Nederland".

For the interpretation of labels the revisors must always consult the first volume of Fl. Mal.

In the entry "Ecol." must be enumerated further the habitat and frequency of occurrence, e.g. "scattered to locally abundant, sometimes (W Celebes) gregarious, both on volcanic soils and on

limestone, in thickets and waste places and in young secondary forest, never on inundated soil".

The data for this survey are obtained by digesting the notes on the labels and/or published data by the collectors.

Further items for the entry "Ecol." are e.g. flower- and seed biology, dispersal methods, flowering periods (if there are any) behaviour of the species under special circumstances (landslides, craters, water content of the soil, human interference, fire, grazing, &c.) Rate of growth, germination of seeds and limiting soil conditions can be mentioned too.

Of many species little is known about these intimate data of their biology, but of others useful and instructive compilations can be made. They are important both for science and practice, specially the relations with the soil, the climate, and human interference.

Uses. Under this entry the uses and usefulness of the species is treated in a concise form, and at least the principal use are mentioned.
It is well-known that some species are used, or said to be useful, for all possible aims; the significance of these data is mostly much overrated. On the other hand some recent critical works are important sources for Fl.Mal. such as:

W.H.BROWN, Minor products of Philippine forests.- Bur.of Forestry, Manila, Bull.22. (3 vols)
W.H.BROWN, Useful plants of the Philippines.- Philip.Isl.Dept. Agric. & Comm.Techn.Bull.10.1941.first volume, the work is in course of preparation.
I.H.BURKILL, Dictionnary of the economic products of the Malay Peninsula 1935.(2 vols).
K.HEYNE, De Nuttige Planten van Nederlandsch Indië, 2nd ed.1927 (3 vols)
J.J.OCHSE & R C BAKHUIZEN VAN DEN BRINK, Tropical vegetables 1931.

On the labels of the herbarium sheets several unknown uses are indicated, as not all herbarium is consulted in the compilation of these works. Hardly any of the medicinal uses are ever tried in the laboratories, and critical data are very scarce.

Vernaculars This entry must contain the principal vernacular names known of the concerned plant in Malaysia. This entry will be difficult for all those who are not acquainted with Malaysian native tongues. Moreover, hosts of these names are mentioned on our labels which are hardly of any scientific value. The greatest caution must be applicated for the citation of these names which are often "words noted by a credulous fool from the mouth of a fantast". The interpretation is difficult because of the existence of a very large number of languages and dialects, and the absence of any written language. Names are noted by the collectors phonetically only. Numerous plants are unknown to the Malaysians,

even to their best junglemen of neighbouring villages have their own vocabulary which in itself is fixed and good but only valid within a small area. Even very important timber trees have different names at small distance, and different species sometimes the same name.

It will be very difficult to separate chaff from wheat here and the help of linguists will be needed for correction. On the other hand it is not advisable to omit all vernaculars. The editor in-chief will try to get cooperation of Malaysian residents.

Revisors ought not to worry too much over this entry which in each case will remain a difficult one to accomplish, both for ourselves and for foreigners.

12. Concluding words.

This scheme will be presented to all co-editors and cooperators and some other prominent botanists, urging them for critical remarks in order to draw a fixed frame of definite "instructions" on a common responsibility.

It is highly desirable to make revisions in Fl.Mal. as uniform as possible within the limits of our power. Special plant groups will in each case make deviations from the scheme necessary. Any recommendations are welcomed.

Flora Malesiana will be put available to cooperators and co-editors at a considerably reduced price. It will not be used for exchange purposes; exceptional cases will be considered individually.

Appendix I.

SAMPLE OF TREATMENT OF THE "CYCLOPAEDIA OF COLLECTORS", FLORA MALESIANA VOL. II.

BAILEY, FREDERICK MANSON New Guinea (1898).
(1827, Hackney, Middlesex, England; 1915, Brisbane, Queensland) went with his family to Australia in 1838; he settled at Brisbane in 1861 and was appointed Colonial Botanist of Queensland in 1881. In 1898 he accompanied His Exc. Lord LAMINGTON and Sir HUGH M. NELSON on a tour of inspection of British New Guinea. He is the author of many systematic publications on the flora of Queensland [1]. He was commemorated in Acacia baileyanus F.v.M.

ITINERARY. 1898. East New Guinea. Tour with Lord LAMINGTON[2]: Port Moresby (Apr. 25), Tauko Isl.; Mt Werirata (26); Port Moresby (27); Tupuselei and Kapa-Kapa (28); Vatorata and Aroma (29); Dedele (30); Dufaure Isl. (May 1); Samarai (3); Milne Bay (4); Mita and Awaima (5); Dogura (6), following the NE coast to Phillips Harbour; Porlock Bay (7); mouth of the Mambare (8), going up the river till Tamata Station and past it; back at mouth of the Mambare (11); mouth of the Gira, going upstream (14) till Tabara (16); mouths of the Ope and Kumusi rivers; Bafara (19); mouth of the Musa, going upstream; Port Hennessey (23); Jasa-Jasa (25) Dogura (26); Samarai.
In June he made 3-week-trip by boat visiting the Goode-, Hammond- and Turtle Islands and especially Thursday Island.[3]

COLLECTIONS. Herb. Brisbane; specimens of new species were sent to Herb. Kew.[4] After his own statement the equipment for drying plants on board the "Merrie England" was very poor, owing to that he brought only few duplicates, but made extensive notes of the living plants.

LITERATURE. 1) "Handbook on the Ferns of Queensland" (1874); "The Queensland Flora" (1899-1905, 6 parts); several small articles in Queensl. Agr. Journ. 1898-1914 and in Proc. Roy. Soc. Queensl. 1899 and 1903.

2) cf. Ann. Rep. Br. N.G. for 1897-98, p. 42-45 and 131-133.
"Visit to British New Guinea" (report by the right honourable Sir H.M. NELSON on his) (Queensland, Brisbane 1898).

3) F.M. BAILEY: "Notes on the vegetation of New Guinea" (Proc. R. Soc. Queensl. 14, 1899 p. 14-20); "A few words about the flora of the islands of the Torres Straits and the Mainland about Somerset" (Rep. 7th Meeting Australas. Ass. Adv. of Sci. Sydney 1898, p. 423-454) (n.v.).

4) F.M. BAILEY: "Names of easily recognised plants observed by Lord LAMINGTON's party during New Guinea trip" (Report of visit to Br. N.G., Brisbane 1898, p. 31-32); "Contributions to the flora of New Guinea" (Queensl. Agr. Journ. 3, 1898 p. 154-162, 201-203, 282-283; Ann. Rep. Br. N.G. for 1897/98, p. 137-145) (it is not clear whether the material described in Queensl. Agr. Journ. 1899, p. 41 belong to his own collection).

BIOGRAPHES. New Bull. 1915, p. 356-7; Journ. Bot. 1915, p. 275-6; Proc. Linn. Soc. Lond. 1915/16, p. 55-56; Vict. Naturalist 32, 1915, p. 52; BACHER, Woordenb. 1936.

APPENDIX 2

ABBREVIATIONS AND SYMBOLS.

1. Abbreviation of authors names.

In general abbreviations of authors names are standardized to some extent, the abbreviation mostly being made after the first consonant of the second syllable. In numerous cases other well established abbreviations are used, such as O.K. for O.KUNTZE, LAM. for J.B.DE LA MARCK, SCHLTR. for SCHLECHTER (SCHLECHTEND. being used for SCHLECHTENDAL), RCHB. for REICHENBACH, J.J.S. for J.J. SMITH, H.J.L. for H.J.LAM, L. for LINNE, DC. for the elder DE CANDOLLE's, BL. for BLUME, M.A. for MUELLER ARGOVIENSIS, and F.v.M. for FERDINAND VON MUELLER, &c.

"Von", "Van" and "De" are generally omitted, and must not be abbreviated, such as: "V.SL." which can equally mean "VICTOR SLOOTEN" and "VAN SLOOTEN". An exception is F.v.M.

If names are short (up to ca 6 characters) they ought not to be abbreviated (LINNE, KUNZE, PIERRE, DUBARD, &c).

Unnecessary shortening of names should be avoided, hence, not "LNDL." but "LINDL.", not "LMK." but "LAMK.", not "KDS" but "KOORD".

2. Special abbreviations and symbols.

Quite a number of common abbreviations and symbols are in current use. As they reappear innumerable times in floras they appreciably shorten the text. The following could be proposed for Fl.Mal.:

♂	masculine
♀	feminine
☿	bisexual
♂	absent
∞	indefinite
aff.	allied to
alt.	altitude
cm	centimetre
E	East
e.g.	for instance
f.	forma, a deviating form of a plant species
f.	filius, if after an authors name, the son of: RCHB.f.
fl.	flower, in flower
fls.	flowers
fol.	leaves only
fr.	fruit, in fruit
hab.	habitat
id.	ditto, the same
infl.	inflorescence
km.	kilometre
l.c.	loco citato, see quotation above
m	metre
mm	millimetre
N	North
N.E.I.	Netherlands Indies
L.S.I.	Lesser Sunda Islands
no	numero, number
n.v.	non vidi, not seen by the author
prob.	probabiliter, probably
S	South
s.l.	sensu latissimo, in the wide sense (after a plant name)
s.l.	sine loco, without exact locality
s.n.	sine numero, without a number
s.d.	sine dato, not dated
sp.(spp.)	species, species (plural)
s.sp.	subspecies, race
s.str.	sensu stricto(issimo), in the restricted sense
s.v.	statu vivo, in the living state
var.	varietas, variety
vern.	vernacular name
v.s.	vidi (statu) siccum, seen in the dried state
v.v.	vidi vivum, seen in the living stat
viz.	namely
W	West

APPENDIX 2.
(continued)

3. Abbreviations and citations of periodicals.

In general abbreviations must be at once clear to the intellient reader, but in the case of wellknown and established journals exceptions can be made of the rule to abbreviate after the first consonant of the second syllable. For clearness's sake sometimes two syllables ought to be mentioned, e.g. "Philipp." and "Phil." for respectively "Philippine" and "Philosophical".

In several cases long names can be abbreviated by general consent, e.g. "B.B.C." for "Beihefte zum Botanischen Centralblatt", "Bull.J.B.B." for "Bulletin du jardin botanique de Buitenzorg", "Ber.D.B.G." for "Berichte der deutschen botanischen Gesellschaft" whereas "Journal" can generally be abbreviated as "J.". "Fedde's Repertorium" is now generally abbreviated as "F.R.".

In some cases books have been published as special numbers of journals or serials, and then the name of the book is in general use, though properly the journal ought to be cited. So e.g. "Merrill's, A Bibliographic enumeration of Bornean Plants" is generally cited as "MERR.En.Born.Pl." in stead of "MERR. in J.Str.Br.Roy.As.Soc.Spec.no.", and "Merr.Pl.Elm.Born." for "Merr. in Univ.Calif.Publ.Bot.vol.15" and "Merr.En.Philip.Fl.Pl." for what ought to be officially "Merr.in Govern.Philip.Isl.,Dep.Agric.,Bur.Sci.Publ.no.18".

In citations the volume, year of issue and page ought to be mentioned. In special cases it is also advisable to mention the part. Volume and page are separated by the year put between brackets, e.g. "Bull.J.B.14^2(1937) 139", which means that page 139 is published in part 2 in 1937, volume 14.

It is advised to cite the volume number with Latin figures, even if the original volumes are numbered with Roman figures.

It is intended to make a definite list of abbreviations for Fl.Mal. which will be adhered to. A calculation has shown that in taxonomical papers a considerable number of "pages" is occupied by unnecessarily long citations which reappear a multitude of times. In a voluminous work like Fl.Mal. this must be avoided.

APPENDIX 3.

SAMPLE TREATMENT

BIGNONIACEAE (C.G.G.J.VAN STEENIS)

Trees, shrubs, liana or twining plants (rarely herbs). Leaves opposite, rarely in 3-4-nate whorls, rarely scattered, mostly compound, pinnate or digitate; terminal leaflet sometimes tendril-like; often with glands on undersurface. Stipules absent, sometimes pseudostipules present. Flowers ♂, more or less zygomorphic. Calyx closed or open in bud, truncate, spathaceous or 5-toothed. Corolla mostly imbricate in bud, often bilabiate. Stamens inserted on the corolla, alternate with the lobes, mostly 4 didynamous, or only 2 perfect, rarely 5; cells 2 or 1 reduced; anthers mostly connivent in pairs, opening lengthwise, cells often divergent, staminode(s) often present, sometimes large, sometimes 3 present besides 2 stamens. Disk usually present. Ovary superior, 2-celled, with 2 placentas in each cell, or 1-celled with 2 parietal bifid placentas. Style terminal, 2-lipped. Ovules mostly ∞, rarely only 6 per cell. Fruit capsular, rarely fleshy indehiscent, septicidal (septum parallel to the valves) or loculicidal (septum perpendicular to the valves). Seeds mostly hyaline-winged, rarely corky, without endosperm. Embryo straight.

Distr. Throughout the world, except in Europe, mainly in the tropics, most abundant in America, few in Africa, scarce in Australia, absent from the Central Pacific.

Ecol. Nowhere conspicuous physiognomically except Oroxylum by its gigantic sword-like fruits in secondary growths w Radermachera gigantea sometimes a pioneer shrub or treelet on young volcanic sandstreams and steep deforested slopes (e.g. Java) R. glandulosa common on Krakatoa in 1928.

Several spp. are subdeciduous, and young foliage appears with the fls (Oroxylum, Pajanelia, Jacaranda,); Haplophragma is leaf-shedding but for a rather short period.

Most spp. grow at low or medium altitudes, some species of Campsis are found in subalpine heaths in New Guinea up to 3000 m.

Dispersal is mostly by wind (winged seed), but the corky seeds of Dolichandrone spathacea are certainly adapted to dispersal by seawater and that in tidal creeks.

Fruiting is in many spp. apparently very rare.

Dolichandrone has noctural (large white fragrant) fls, as has Nyctocalos, fit for visits of sphingids. Spathodea, Tecomaria, and probably red-flowered Campsis and orange Pyrostegia are visited by small honey-sucking birds. The flowers of the Crescentieae (Crescentia, Kigelia, Parmentiera), Oroxylum and Pajanelia are visited nocturnally by bats; they all posses a very coarse structure and a peculiar smell.

The calyces of many spp. contain water in bud in which the corolla develops; the water is excreted by glands internally in the calyx and is a little slimy.

Fls and infl. are sometimes shining (polished) by some exuded resin and are a little sticky (Oroxylum, Radermachera &c.); this is specially distinct in the immature state.

Glands are predominant in the family, on calyx and underside of leaves, and are spot- or cuplike or flat.

In some genera domatia occur in the leaf-axils below.

Neosepicaea has peculiar metallic-shimmering leaves.

Uses. Except for Haplophragma macrolobum the wood is of little value technically or of too small dimensions generally. No indigenous species is yet used as an ornamental. The wood of Millingtonia was found good for matches. Though numerous spp. are introduced as ornamentals, none of the indigenous

spp. is as yet tried.
The leaves of Millingtonia are used as a substitute for opium. Oroxylum is medicinal in Java, and it is also used as a vegetable. Pajanelia is also reported to be medicinal.
Notes. Mostly treated after the authors papers in Rec.trav.bot.néerl.24(1927) 767-1049; Nova Guinea 14(1927)292-303;Bull.J.B.B.10(1928)173-290;Proc.R.Soc. Queensl.14(1929)39-58;Bull.J.B.B.inedit.
Hallier f.(Bull.Herb.Boiss.)II,3(1903)194-196) resuscitated the opinion that Wightia belongs to the Bignoniaceae, but the structure of the ovary and fruit shows its alliance with the Scrophulariaceae.
Other ornamentals can be expected to be imported in the future; Chodanthus being the last succesful acquisition for Malaysian gardens.
In the absence of fruits it is often impossible to place a genus in its proper tribe, therefore only an artificial key is given.

Artificial key to the genera.

1 One-jugate leaves with a terminal tendril present.
 2 Leaflets coarsely dentate 3.Macfadyena
 2 Leaflets entire.
  3 Corolla orange lobes valvate in bud 5.Pyrostegia
  3 Corolla purple, lobes imbricate in bud.
   4 Tendril simple. Leaves obovate 6.Arrabidaea
   4 Tendril 3-furcate. Leaves ovate 7.Chodenthus
1 Leaves never 2-foliolate. Tendrils absent.
 5 Leaves simple.
  6 Fls solitary or fasciculate cauliflorous. Leaves scattered or in bundles 23.Crescentia
  6 Fls in panicles, mostly terminal.
   7 Leaves in whorls of 3-4, broad, with conspicuous glands at the underside of the base. Fls yellow. Panicles large. 14.Deplanchea
   7 Leaves opposite, glands very fine, upper surface lepidote. Flowers small 9.Catalpa
 5 Leaves compound.
  8 Lianas or twining plants.
   9 Leaves digitate, mostly 5-foliolate (rarely 3-)..... 12.Neosepicaea
   9 Leaves pinnate, sometimes 3-foliolate.
    10 Corolla tube narrow-tubular, not widened above the calyx. 1.Nyctocalos
    10 Corolla tube distinctly widened above the calyx.
     11 Ovules 2-seriate in each cell, 6 per cell. Corolla tube yellow, limb white to pale lilac ..... 8. Hieris
     11 Ovules oo-seriate in each cell, oo. Fls mostly red or orange. 11.Campsis
  8 Shrubs or trees, erect.
   12 Leaves in whorls of 3.
    13 Infl. very long, pendent, on cordlike peduncles. Fls very large. Fruit sausage-shaped 24.Kigelia
    13 Infl. medium, terminal, not pendent. Fls medium. (17)Stereospermum suaveolens f.verticillatum.
   12 Leaves scattered or subopposite. Petiole winged. 23.Crescentia
   12 Leaves opposite.
    14 Leaves digitate with 3 leaflets and a distinctly winged petiole. Fls solitary or fascicled, cauliflorous.... 22.Parmentiera
    14 Leaves pinnate with at least 5 leaflets.

15 Leaflets small, lateral ones under 1½ cm long. Corolla lilac or violet. Staminode longer than stamens, with thickened apex ... 21. Jacaranda
15 Lateral leaflets longer than 1½ cm. Staminode shorter than the stamens or absent.
16 Leaves 2-3 pinnate.
17 Domatia in the axils of nerves at undersurface. Calyx at most 2-3 mm high. Anthers with 1 fertile cell and 1 reduced spurlike 4. Millingtonia
17 Domatia absent. Calyx at least 6 mm high. Anthers 2-celled
18 Fls and infl. very robust. Stamens 5. Capsule swordlike flat often more than 1 m long ... 2. Oroxylum
18 Fls and infl. medium sized. Stamens 4, didynamous. Capsule terete 18. Radermachera
16 Leaves 1-pinnate (or 2-pinnatifid in Stenolobium).
19 Calyx spathaceous.
20 Fls orange-red, wide campanulate. Domatia absent ... 16. Spathodea
20 Fls white, tubular. Domatia present. Coastal plant ... 15. Dolichandrone
19 Calyx not spathaceous.
21 Leaflets of mature plants crenate to pinnatifid, with domatia. Shrubs. Corolla red or yellow.
22 Fls yellow. Anther-cells pubescent. Leaflets lanceolate, sharply serrate or pinnatifid ... 13. Stenolobium
22 Fls red or orange-red. Anther-cells glabrous. Stamens long-exserted. Leaflets ovate-crenate ... 11. Tecomaria
21 Leaflets of mature plants entire. Trees. Corolla white, pink or purple.
23 Leaves 8-12 - jugate. Base of leaflets very oblique. Capsule winged 20. Pajanelia
23 Leaves 2-5 - jugate. Leaflets at most suboblique. Capsule terete, not winged.
24 Septum rather flat. Seeds narrowly winged ... 19. Haplophragma
24 Septum terete. Seeds broadly winged.
25 Seeds thick, immersed in notches in the septum, 2-seriate in each cell ... 17. Stereospermum
26 Seeds thin, not immersed in the septum, in oo rows 18. Radermachera

TRIBE I. B I G N O N I E A E

Capsule 2-locular, mostly flat, sometimes terete. Valves parallel to the septum always septicidal. (gen. 1-8).

1. NYCTOCALOS

T. & B. ex MIQ. J. de Bot. 1(1864)366; Ann. 1(1864)201; 3(1867)249; STEEN. Rec. trav. bot. neerl. 24(1927)805; Bull. J. B. B. 10(1928)178. Glabrous lianas. Leaves 3-foliolate[1]). Fls in short racemes terminal on short side-branches white or pink fragant. Calyx campanulate truncate or 5-toothed, sometimes provided with 5 teeth below the margin. Corolla medium to large, actinomorphic with a long narr tube enlarged below the throat, lobes 5, subequal, rotundate. Stamens 5, equal, or 2 smaller, or 4 didynamous with a 5th rudiment, inserted in the throat, not exserted. Anthers tortile. Disk fleshy, annular. Style not exserted,

1) N. pinnata STEEN. ined. from Yunnan has 5 leaflets.

with 2 stigmatic lobes. Capsule flat elliptic, with coriaceous valves. Seeds numerous, flat, hyaline-winged.
Distr. Spp. 5, in Assam, Burma, Yunnan, and Malaysia.
Ecol. Rare lianas of primary forests, at low and medium altitudes.
Flowers noctural.
Notes: Allied to Tanaecium SW. from N. Brazil & Antilles.

Key to the species.

1 Corolla 5-7½ cm long, pale pinkish or yellowish, Calyx teeth triangular, acute ..... 1. brunfelsiiflorus
1 Corolla 15-20 cm long, white. Calyx teeth linear, calcariform. 2. cuspidatus

1. Nyctocalos brunfelsiiflorus T.& B. ex MIQ. J. de Bot. 1(1861)367; Choix (1863) t.VII; STEEN. Bull. J.B.B. 10(1928)179.
Leaflets elliptic-oblong, obtuse-acuminate to cuspidate, 9-12 by 4-6 cm. Calyx 5 mm high, truncate with 5 patent teeth, green with purple margin. Corolla white, later yellowish or slightly pink, Stamens hairy near the insertion. Capsule oblong, 12 by 4 cm, cuneate or subacuminate at both ends; valves sulcate.
Distr. Br. N. Borneo (Kew) and SW Java (Wynkoopsbaai).
Ecol. Primary forests at low altitude.

2. Nyctocalos cuspidatus (BL.) MIQ. Ann. 3(1876) t.8B; STEEN. Bull. J.B.B. 10(1928) 180; - Tecoma cuspidata BL. Rumphia 4 (1848)35. - N. macrosiphon T.& B. Cat. inedit. (1856)155, n.nud. - N. brunfelsiiflorus quoad spec. cel. MIQ. Ann. 1(1864)201.
Leaflets elliptic-ovate, acuminate to caudate, 7-16 by 3-8 cm. Calyx 6 mm high, truncate with 5 upcurved teeth inserted below the margin. Corolla pale green in bud, tube 15-17 cm long. Stamens glabrous. Capsule short-stipitate as in prec. sp., 16-24 by 4-5 cm, but with an elevated midrib. Seeds suborbicular, 3-4 cm broad incl. ½-1 cm broad hyaline wing.
Distr. Philippines, Celebes, ?N. Moluccas.
Ecol. In primary forests at low and medium altitude.

2. OROXYLUM.

VENT. Dec. Gen. Nov. (1808)8; STEEN. Bull. J.B.B. 10(1928)181. - Calosanthes BL. Bydr. (1825)760.
Small glabrous trees. Leaves large, 2-3 pinnate, mature leaflets entire. Fls very coarse, stinking, in large terminal racemes Calyx coriaceous, closed in bud, campanulate, margin subentire. Corolla large ventricose-campanulate, lobes 5 subequal. Stamens 5 subequal, anthers

Dubious records

Bignonia comosa ROXB. Fl. Ind. 3(1832)103; DC. Prod. 9 (1845)144; MIQ. F.I.B. 2 (1858)751. - Spathodea comosa G. DON, Syst. 4 (1838)222. - Moluccas. = an Verb.?
Bignonia fraxinioides PERR. Mém. Soc. Linn. Paris 3(1824)102, n.nud. - Java. - Quid?
Bignonia Moluccana DC. Prod. 9(1845)144; MIQ. F.I.B. 2(1856)751. - Bignonia discolor RICH. (non R.BR.) Sert. Astrol. (1834) p.XXIX. - Moluccas (Ambon) = Quid?
Bignonia tripinnata NORONHA, Verh. Batav. Gen. V(1790) ed.I, art.IV 8. - Java = prob. Oroxylum indicum.
Tecoma (Pandorea) sp. B.& H. Gen. 2 (1875) 1045. - Java = Quid ?

Excluded species

Bignonia angustifolia BL. Verh.Batav.Gen.9(1823)194; Cat.Plant. 1823)82 = Trichosporum angustifolium NEES (Gesn.)

Bignonia albida BL. l.c.; STEUD.Nom.ed.II,2(1841)204 = Trichosporum albidum NEES (Gesn.)

Bignonia longiflora REINW. ms.ex DE VRIESE,Pl.Bat.Ind.Or.(1856) 9 = Trichosporum longiflorum O.K. (Gesn.)

Bignonia ternatea REINW. (of Ternate,Moluccas) ex DE VRIESE, Reinw.Reis (1858)495,644 = Dichrotrichum ternateum BL (Gesn.)

?Bignoniaceae gen.nov. ZOLL. Syst.Verz.1(1855)53 (ZOLL.no.2214) = Wightia borneensis HOOK.f. ssp.ottolanderi (KOORD.)STEEN. (Scroph.)

Colea colei (HOOK.)M.L.GREEN, Stand.sp.nom.Cons.(1926)55-63; STEEN. Bull.J.B.B. 10(1928)277.-Bignonia ramiflora DECNE,Herb. Timor.(1835)53. - Colea timorensis.... ex H.PERR.DE LA BATHIE, Ann.Mus.Col.Marseille 46(1938)43;-Colea aberrans BAILL.Bull. Soc.Linn.Paris 1(1889)687, type leg.POIVRE in Herb.Juss. is said to have come from Timor, but represents an erroneous record of a Madagascarian species, and is acc.to PERR.DE LA BATIE l.c.p.28 = Rhodocolea racemosa H.PERR. var.humblotiana H. PERR. (Bign.)

"Hausmannia mollis K.SCH." misprint in Ind.Kew. suppl.1(1906)16; STEEN.Rec.trav.bot.néerl. 24(1927)902 for Hansemannia mollis K.SCH. = Archidendron molle (K.SCH.) DE WIT (Legum.)

Millingtonia (non L.f.) sensu ROXB.,JACK,Mal.Misc.&c . (ferruginea SCHULTES, fragrans JACK, lanceolata SCHULTES, nitida SCHULTES, pinnata KORTH., sambucina JUNGH., sumatrana JACK) = Meliosma spp.(Sabiac.)