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FLORA MALESIANA

SERIES I - SPERMATOPHYTA

Flowering Plants

Vol. 6, part 6

INDEX TO REVISED FAMILIES

Aceraceae . . . 4: 3, 592
Actinidiaceae s.str. . 4: 37
Aizoaceae . . . 4: 267
Alismataceae . . . 5: 317
Amaranthaceae . 4: 69, 593
Ancistrocladaceae . 4: 8
Aponogetonaceae 4: 11, 7: 213
Basellaceae . . . 5: 300
Batidaceae . . . 5: 414
Betulaceae . . . 5: 207
Bixaceae s. str. . . 4: 239
Burmanniaceae . 4: 13, 592
Burseraceae . . . 5: 209
Butomaceae . . . 5: 118
Byblidaceae . . . 7: 135
Callitrichaceae . . 4: 251
Campanulaceae . . 6: 107
Cannabinaceae . . 4: 223
Capparidaceae . . 6: 61
Caprifoliaceae . 4: 175, 598
Cardiopteridaceae . 7: 93
Celastraceae . . 6: 227, 389
Centrolepidaceae . 5: 421
Ceratophyllaceae . 4: 41
Chenopodiaceae . 4: 99, 594
Clethraceae . . . 7: 139
Cochlospermaceae . 4: 61
Combretaceae . . 4: 533
Connaraceae . . . 5: 495
Convolvulaceae . 4: 338, 599
Corynocarpaceae . 4: 262
Crassulaceae . . . 4: 197
Datiscaceae . . . 4: 382
Dichapetalaceae . . 5: 305
Dilleniaceae . . . 4: 141
Dioscoreaceae . . 4: 293
Dipsacaceae . . . 4: 290
Droseraceae . . . 4: 377
Elatinaceae . . . 4: 203
Epacridaceae . . . 6: 422
Ericaceae 6: 469
Erythroxylaceae . . 5: 543
Ficoidaceae . . . 4: 267
Flacourtiaceae . . 5: 1
Flagellariaceae . . 4: 245
Geraniaceae . . . 6: 445
Gnetaceae 4: 336
Gonystylaceae . . 4: 349
Goodeniaceae . . 5: 335
Haemodoraceae . . 5: 111
Haloragaceae . . 7: 239
Hamamelidaceae . . 5: 363
Hippocrateaceae . . 6: 389
Hydrocaryaceae . . 4: 43
Hydrocharitaceae . . 5: 381
Hydrophyllaceae . . 4: 207
Icacinaceae . . . 7: 1
Juglandaceae . . . 6: 143
Juncaceae 4: 210
Juncaginaceae . . . 4: 57
Lemnaceae . . . 7: 219
Loganiaceae . . . 6: 293
Lophopyxidaceae . 7: 89
Malpighiaceae . . 5: 125
Martyniaceae . . . 4: 216
Molluginaceae . . 4: 267
Moringaceae . . . 4: 45
Myoporaceae . . . 4: 265
Myricaceae . . . 4: 277
Najadaceae . . . 6: 157
Nyctaginaceae . . 6: 450
Nyssaceae 4: 29
Ochnaceae . . . 7: 97
Oxalidaceae . . . 7: 151
Papaveraceae . . . 5: 114
Pedaliaceae . . . 4: 216
Pentaphragmataceae . 4: 517
Pentaphylacaceae . . 5: 121
Philydraceae . . . 4: 5
Phytolaccaceae . . 4: 229
Pittosporaceae . . 5: 345
Plumbaginaceae . . 4: 107
Podostemaceae . . 4: 65
Polemoniaceae . . 4: 195
Pontederiaceae . . 4: 255
Portulacaceae . . 7: 121
Primulacea . . . 6: 173
Proteaceae . . . 5: 147
Punicaceae . . . 4: 226
Restionaceae . . . 5: 416
Rhizophoraceae . . 5: 429
Salicaceae 5: 107
Salvadoraceae. . . 4: 225
Sarcospermaceae . . 4: 32
Saururaceae . . . 4: 47
Scyphostegiaceae . . 5: 297
Simaroubaceae . . 6: 193
Sonneratiaceae . 4: 280, 513
Sparganiaceae . . 4: 233
Sphenocleaceae . . 4: 27
Stackhousiaceae . . 4: 35
Staphyleaceae . . 6: 49
Stylidiaceae . . . 4: 529
Styracaceae . . . 4: 49
Thymelaeaceae 4: 349, 6: 1
Trigoniaceae . . . 4: 59
Turneraceae . . . 4: 235
Typhaceae . . . 4: 243
Umbelliferae . . 4: 113, 595
Valerianaceae . . . 4: 253
Violaceae . . . 7: 179
Xyridaceae . . 4: 366, 598
Zygophyllaceae . . 4: 64

TAXONOMICAL REVISIONS

REPUBLIK INDONESIA
REPUBLIC OF INDONESIA
LEMBAGA ILMU PENGETAHUAN INDONESIA (L.I.P.I.) /
INDONESIAN INSTITUTE OF SCIENCES

FLORA MALESIANA

BEING
AN ILLUSTRATED SYSTEMATIC ACCOUNT OF THE MALESIAN FLORA /
INCLUDING KEYS FOR DETERMINATION / DIAGNOSTIC DESCRIPTIONS /
REFERENCES TO THE LITERATURE / SYNONYMY / AND DISTRIBUTION /
AND NOTES ON THE ECOLOGY OF
ITS WILD AND COMMONLY CULTIVATED PLANTS

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AND VARIOUS PROMINENT BOTANISTS

FOR THE PROMOTION OF
BOTANICAL SCIENCE AND THE CULTURAL ADVANCEMENT OF
THE PEOPLES OF SOUTH-EASTERN ASIA TO
THE SOUTHWEST PACIFIC REGION

SERIES I
SPERMATOPHYTA

VOLUME 6

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DIRECTOR OF THE FOUNDATION 'FLORA MALESIANA'

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CONTENTS

Page

Title-page . . . . . (3)

Contents . . . . . (5)

Dedication . . . . . (7)

Abbreviations and signs . . . . . (17)

TAXONOMICAL REVISIONS

in alphabetical sequence

Campanulaceae by B. Moeliono & P. Tuyn 107

Capparidaceae by M. Jacobs 61

Celastraceae-I by Ding Hou 227

Celastraceae-II by Ding Hou 389

Epacridaceae by H. Sleumer 422

Ericaceae by H. Sleumer 469

Geraniaceae by R. C. Carolin 445

Juglandaceae by M. Jacobs 143

Loganiaceae by P. W. Leenhouts 293

Najadaceae by W. J. J. O. de Wilde 157

Nyctaginaceae by J. F. Stemmerik 450

Primulaceae by P. A. J. Bentvelzen 173

Simaroubaceae by H. P. Nooteboom 193

Staphyleaceae by B. L. van der Linden 49

Thymelaeaceae by Ding Hou 1

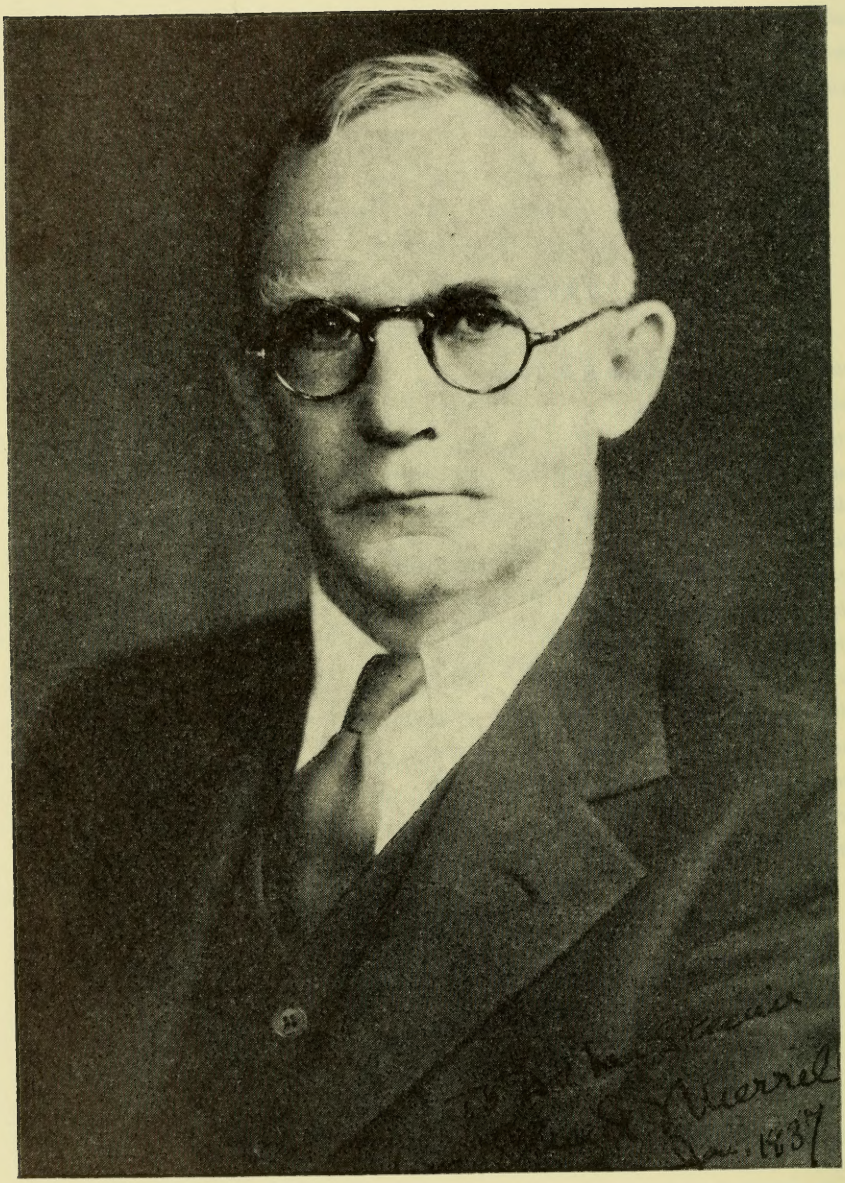
ADDENDA

to volumes 4, 5 and 6

Addenda, corrigenda, et emendanda by C. G. G. J. van Steenis and collaborators 915

INDEX

Index to scientific plant names by M. J. van Steenis-Kruseman 985



Dedicated to the memory of
ELMER DREW MERRILL

DEDICATION

The completion of the sixth volume of this Flora gives me the privilege to dedicate this to the memory of ELMER DREW MERRILL, a man who has achieved more for the knowledge of the Malesian flora than any other individual botanist.

It is neither my intention to give nor is it the proper place for a full biography of this most distinguished American scientist, as it would for the greater part be duplication of his own 'Autobiographical' (1953), the scholarly essay by ROBBINS (1958), and the vivid life sketch by SCHULTES (1957), which together give the story of his life, his ambitions, his personality, his immense drive, his multiple interests, his capacity for establishing botanical periodicals as well as successfully filling the posts of Dean of a Faculty of Agriculture, director of the Bureau of Science at Manila, director of the New York Botanical Gardens, and administrator of Botanical Collections of Harvard University.

It is my purpose to review MERRILL's aims and vision, ambitions and achievements in the light of his time, to explain the value of his pioneer works for Indo-Malesian botany, how he used opportunities and had to bow to unforeseen events and circumstances which in no mean way influenced his career. Naturally MERRILL's personality pervades the story, that of a straightforward, righteous person, unbiassed in scientific matters, appreciating any progress in biological science. It is of course especially his great achievements with regard to the knowledge of the Malesian flora which are the main theme and I will try to elucidate several aspects which he pursued.

A glance through his immense bibliography, containing some 550 entries, among which ten very large books, reveals his fantastic productivity, largely centered on the flora of Malesia, East Asia and the Pacific.

Scanning the herbarium one becomes aware of the fact that during his lifetime he must have pre-identified, named or definitely identified over half a million specimens from the East, including the Philippines, Sumatra, Borneo, Amboyna, New Guinea, Melanesia, Micronesia, southern China (including Hainan), Indo-China and Burma, made possible by his unequalled knowledge of forms, his cast-iron memory and his zealous devotion.

It is with awe that one observes such a great achievement and then one wonders how one man could find time to do all this. The answer is given by SCHULTES who wrote that 'his reaction to added work was to lengthen the day'.

As ROBBINS wrote, 'he was a man in a hurry who saw clearly a program of research which absorbed him, but which was greater than any individual could complete within the limits of a single life-time. The demands of this program possessed him. It led him to make various innovations and modifications of convential procedures in herbarium methods with increased efficiency in the use of this, for him, essential tool and to advocate briefer citations, one-name periodicals, and other means of economizing time and effort. It induced him, at least in part, to make quick decisions without long considerations of pros and cons and to act at times without regard to the feelings of others.'

'In spite of his absorption with his speciality MERRILL was not a recluse. Nothing pleased him more than to light his pipe and sit down to talk with a group of gardeners or with a student or his colleagues, mainly, of course, about plants. He played an active part in many organizations and valued the associations he made in them. He joined the Masonic order and eventually became a thirty-third degree Mason. He enjoyed an evening cocktail in his later years, and loved to have visitors and dinner guests. Though he had no hobbies outside his profession, he was interested in sports, especially baseball, football, and tennis. The 'Autobiographical' accounts of his adventures in collecting in the Philippines and in China reveal some of the human aspects of his character.'

Such human aspects became evident to us very shortly after the war as he sent food parcels to his German colleagues and distributed amongst other botanical material on loan or for gift to colleagues in other freed countries envelopes with pounds of tobacco labelled with dry humour *Nicotiana tabacum* L. in parcels marked as 'botanical specimens for scientific study only'.

'His energy was boundless. It was his habit, at the University of California, to arrive at the herbarium at 6:00 a.m. and work on shipments of plants until he left for the Dean's office at 9:00 a.m.; he continued at noon after office hours, or on sundays and holidays' (ROBBINS, 1958).

As will appear later, his drive was probably born from the challenge he had to face in the Philippines in his early days and which activated his innate energy: it became a life-long habit.

MERRILL was born in East Auburn, Maine, October 15, 1876. His parents were of limited means and belonged to the industrious people of New England. One of his ancestors was NATHANIEL MERRILL who immigrated in 1635 and was of Huguenot descent (originally DE MERLE). In his family there was also English and Scottish blood, a 'melting pot' feature not unusual in the United States. As a young boy he was interested in natural history, in birds, rocks, minerals, fungi, and local woods; before reaching highschool age he became interested in collecting and naming plants, but he went in for engineering in 1894 in Maine State College at Orono which in his senior year became the University of Maine. He took the general science course, but remained interested in biological work, particularly in the classification of plants and worked under Prof. F. L. HARVEY especially on cryptogams; he attended, however, only two semesters on botany. His private herbarium contained some 2000 specimens. In 1898 he got his B.Sc. and became assistant in natural history. While working for his M.Sc. he accepted a post as assistant-agrostologist in the U.S. Department of Agriculture, Washington, as assistant to F. LAMSON-SCRIBNER, then the leading authority on North American grasses, composing amongst others a Manual of the Grasses of Alaska.

In 1902, following the establishment of the sovereignty of the United States over the Philippines, his chief accepted a post as director of the newly established Department of Agriculture in Manila. LAMSON-SCRIBNER was obviously so very satisfied with MERRILL's person and capacity that he asked him to become botanist in his department. MERRILL, however, was completely satisfied with being an agrostologist in his own country and refused twice, arguing that he knew nothing about tropical plants from the East. Finally SCRIBNER convinced him that 'nobody in the United States knew anything about the Philippine flora and that he had as good a chance as any one'. He accepted on Monday afternoon, February 20, 1902, and had to agree to be ready to sail from New York at 1:00 p.m. February 22! He nearly missed the boat because of a heavy sleet storm delaying the train from Washington D.C. to New York, but he made it. He, least of all, could not anticipate that he would remain for twenty-two years in the Philippines. Slightly over two months later he reached Manila where the new personnel had to start work in a vacant building, 'without a chair or table, much less a botanical publication or a botanical specimen'.

With a huge program before him MERRILL started energetically: one month after arrival he made a six weeks trip, partly under military guard, and during his first years he spent approximately one half of his time in the field; in the next twenty-two years he explored in almost all parts of the extensive archipelago.

In September 1902 he paid a two-months visit to the Herbarium Bogoriense, taking with him his botanical specimens, for no trustworthy work could be done in Manila in the complete absence of authentically named material. Here he became acquainted with the literature of Malesia of which he acquired an excellent working knowledge. He himself said that it was of infinite value for building up the botanical library at Manila. He wrote also an extensive report

on this visit explaining the methodologies of collecting, forest plotting, numbering of trees in forest reserves, herbarium methods and techniques, *etc.* used in Java, which served as a model for the work in the Philippines.

At that time the responsibility for taxonomical research work in the whole of Malesia virtually hinged on two systematists, RIDLEY in Malaya and VALETON at Bogor who collaborated with KOORDERS, the organiser of the collecting; to these MERRILL was now added as a third.

In comparison with Malaya and Java, work in the Philippines had the great disadvantage of having a much less solid basis; this consisted only of BLANCO's, FERNÁNDEZ-VILLAR's and VIDAL's early works, and at Manila there were no voucher specimens of these authors' collections, nor of the vital collections of CUMING and HAENKE for comparison.

This vacuum led him to realize that he had to start from scratch and had to build up a collection and library, to interpret plants from older works, enabling the description of new plants and accounts of collections, that it would be compulsory to ask assistance from foreign botanical specialists in various groups, that he had to stimulate interest in the botany of the Philippines by distributing duplicates on a large scale and by bringing Philippine plants into 'circulation', and that he had to bring into being a publication medium for scientific results and for the correlation of Philippine botany with that of adjacent countries.

This clear vision of the items of the enormous amount of pioneer work ahead would have discouraged any average scientist, but to MERRILL it meant a great challenge, to create a centre from scratch.

It became almost a one man show. In the course of twenty years he had never a permanent collaborator, except two honorary collaborators, *viz* E. B. COPELAND for the Pteridophytes and OAKES AMES for the *Orchidaceae*. Another honorary American collaborator, Miss JANET PERKINS, started a series of publications under the name 'Fragmenta Florae Philippinae'; she settled at Berlin where she worked in conjunction with OTTO WARBURG who had made large Philippine collections himself. These collections, together with those of MERRILL and Capt. AHERN formed her basic material, but after 3 fascicles (1904-1905) this promising series was abandoned. Another American botanist who later joined the Bureau of Science at Manila and was employed for three years (1908–1911) was CHARLES BUDD ROBINSON, a critical, promising botanist. He returned in 1912 for another period, but unfortunately met a premature death in 1913 on the island of Amboyna while re-collecting Rumphian plants.

MERRILL of course worked in close collaboration with the members of the staff of the Forestry Institute. They were mostly collectors describing forest composition and timbers, such as H. N. WHITFORD, H. M. CURRAN, and others. An exception was F. W. FOXWORTHY who actually served for some years as botanist at the Bureau of Science and who took care of a revision of Philippine *Dipterocarpaceae*, the most important timber family.

An American botanist of great impact on the development of Philippine botany was ADOLPH DANIEL EDWARD ELMER (1870–1942). He was originally in the employ of the Bureau of Science in Manila (1904–1905), but settled later as a professional free-lance plant collector and collected over 20.000 numbers in the Philippines in a large number of sets. ELMER published lavishly in a series of his own, the 'Leaflets of Philippine Botany', ten volumes, together covering 3936 pages in print, among which descriptions of over 1500 new species. What MERRILL's relation to ELMER was and whether he appreciated him or not are not clear, as he does not mention him in his 'Autobiographical'. At the time of his stay in Leyden, where I had the privilege to have him as our guest, Oct.–Nov. 1951, I omitted to unearth this. I can hardly believe that ELMER's superficial uncorrelated descriptions can have been very welcome. In *Ficus* MERRILL reduced 31 of the 70 described species by ELMER before 1923 and of the total of 85 novelties of ELMER's *Ficus* only

13 are still accepted in CORNER's monograph. MERRILL had to tolerate ELMER's work because the latter was an entirely independent man whose virtue lies mainly in his profuse collecting.

Why MERRILL never had a larger permanent staff of at least 2–3 qualified botanists is another question left unanswered. He could easily have claimed staff for the Phanerogams as besides his collecting work, he had curatorial and organisational tasks. Since 1912 he also had an associate professorship in the University of the Philippines and served as head of the Department on a half-time basis and without additional compensation *(sic)*, 'which until 1918 seriously interfered with productive work in systematical botany'. To make botany popular and to frame a textbook of systematic botany for both residents and students, he had already prepared a 'Flora of Manila' (1912), still a very useful book, covering some thousand species. During the academic year his teaching duties never occupied less than eighteen hours per week, and during certain semesters even thirty-six. It is amusing to read in his 'Autobiographical' how he got rid of it, early in 1919, 'his full time being for the first time in many years available for what he most desired to do'. But after two weeks he was appointed as director of the Bureau of Science, a post neither sollicited nor desired, but which he could not refuse under the circumstances, it being an order.

In passing I remark that of the Filipino students he taught not one specialized in plant systematics as far as I know. Those with a biological tendency probably all went in for more applied branches, such as pharmacy, entomology, agriculture, forestry, fisheries, *etc.*, so that when MERRILL left the Bureau of Science in 1923 he had no immediate successor as botanist. It was five years later when Dr. E. QUISUMBING was engaged as such. He had received his primary education at the College of Agriculture, University of the Philippines and at Chicago University. He worked together with MERRILL, then Dean of the Faculty of Agriculture, University of California at Berkeley, for two years, 1926–1928, from which a joint paper 'New Philippine Plants' emanated; from this it appears also that MERRILL was quite capable of making botanical drawings. The main thing was that MERRILL induced him in these two years to start revisional work for the initiation of a 'Flora of the Philippines' and along this line QUISUMBING elaborated the first sample, Philippine *Piperaceae*, while at Berkeley, under MERRILL's supervision, as a final coaching and a start towards this new goal.

Notwithstanding the time-consuming handicaps connected with education and administration MERRILL poured all his available energy into the botanical aims set forth above. He had by necessity been induced to take on administrative duties in the Philippines and had shown his capacity to meet this challenge. This experience served him later enabling him to fulfill other administrative duties in California, New York and Harvard in a successful way. That he could pursue his own botanical work simultaneously in free time and leisure hours is due to the fact that his heart was in botany and that he regarded work in plant systematics and floristics as his 'safety valve' 'when he could immediately forget his administrative problems'. The taking of vacations was rather foreign to him and in the entire period in the Philippines, from 1902 to 1923, he only took vacation in 1905, while in other years he used his annual month's leave for making collecting trips, mainly in China.

He built up a collection, personally, with various famous skilled Filipino collectors (RAMOS, EDAÑO, SULIT and many others) from all parts of the Philippines (the Bureau of Science = B.S. series), acquiring huge collections from private collectors (ELMER, Mrs. CLEMENS, WENZEL, LOHER, VANOVERBERGH, *etc.*) and from the Forestry Service officers (the F.B. series). Besides this he acquired large collections from surrounding regions, Guam, China, Indo-China, Amboyna, and in addition very large sets of duplicates in exchange for the material which he widely distributed 'on a free exchange basis', that is, the liberal but in the long run profitable principle of sending out duplicates as many as each institution has available, thus not on a precise 1 : 1

specimen basis. He estimated that in 1922 he had sent out more than 500.000 duplicates, the reference collection at Manila amounting to *c.* 275.000 mounted specimens, containing representatives of practically all Philippine species, in the form of types, isotypes, fragments of types, material critically compared with originals, photographs of types and sketches.

The library, similarly built up from scratch, was after a decade admittedly ranked on the same level with those at Bogor and Calcutta and far larger than the one at Singapore.

He had also to provide for a publication medium and was instrumental in founding the Philippine Journal of Science, Botany Supplement, which was filled mostly by his own contributions but also served for revisions prepared by his associates, Philippine and foreign.

Interpreting the older works he found a great necessity, both for botanical and nomenclatural reasons. He started with the work of BLANCO, for which purpose he had special collections made in Blanco's classical areas, from which emanated his 'Species Blancoanae' (1918), followed by a similar key work on 'Rumphius' Herbarium Amboinense' (1917), both unrivalled for their critical standard. He tried to correlate both interpretations with material from the locus classicus. Only first-class botanists with a very wide knowledge of plants are capable of composing such works. In 1921 he published an evaluation of BURMAN's 'Flora Indica', but this was not sustained by a study of the types at Geneva; unfortunately BURMAN's herbarium is dispersed through the general Herbarium by HOCHREUTINER. For his 'Commentary on Loureiro's Flora Cochinchinensis' (1935) he had at his disposal earlier collections made by Mrs. CLEMENS in the locus classicus near Hué; he also tried to locate types of LOUREIRO in the Herbarium of the British Museum, London. At the end of his life he was working on a very large work on the location and evaluation of the ROXBURGH plants, the MSS for which are left unfinished (a complete copy has been deposited in the Arnold Arboretum, a less complete one at Leyden). We would have preferred that he had started this work earlier instead of his immense evaluation of the works of RAFINESQUE which occupied him for several years onwards of 1940. Admittedly the location and evaluation of the ROXBURGH types could only be performed by prolonged visits to European herbaria, which were impossible during the war and which, moreover, MERRILL could not make while he was Administrator of the Harvard Collections. All these works are extremely important for typification and nomenclature, often of very common tropical plants as many errors or omissions were made in their former interpretation, if indeed any was ever made.

MERRILL contributed lavishly to describing new species — some 4000, of which 3000 from the Philippines — and several new genera of plants. They were partly published in a series of New and Noteworthy Philippine Plants (18 numbers, 1904–1922), partly in accounts of particular collections from certain islands, districts or mountains. It is quite certain that only a fraction of these will stand the test of time. To understand this we must consider his vacuum position and the dilemma with which he was faced, either to do critical-botanical work or to do the best he could in determining plants by reading descriptions, comparisons with available material and if nothing fitted to describe the plant as new. Critical-botanical work of course goes slowly, at a rate of some 20–100 accepted species a year depending on the group and the botanist's capacities and zeal; it also requires that one has access to a large library and can borrow types and authentic material. The absence of the latter facility is the greatest handicap for monographic work in the tropics, as the largely European-centred 'type herbaria' are not prepared, and rightly so, to make large loans to the tropics, an affair which is too risky in several respects. This necessitates that workers in the tropics, after having prepared preliminary MSS, must pay prolonged visits to these institutions for checking type and authentic material and establish identities and names. And although MERRILL gradually assembled at Manila a huge herbarium and photographs or fragments of types from European herbaria, and attached figures, descriptions, notes, pencil

sketches, carbon leaf impressions, *etc.* to the sheets, framing in this way a new tool of information, a sort of combined plant file and library, he had little of this during the first decade of his work at Manila. At that time he had to be content to study descriptions, an art which he fully mastered, an art which is gradually becoming extinct among contemporary botanists who adhere to the examination of type specimens. Moreover, the incoming Philippine material was overwhelming, all completely unnamed. To cope with this he asked the co-operation of all available specialists in the world to elaborate certain groups. The bulk he had to name himself and this could be done only in a superficial way, thus it amounted to mere floristic name-giving and was not truly systematic, comparative, either regional or semi-monographic. Besides all the already mentioned handicaps to work of lasting value, the Philippine flora offers an additional complication in its specific variability, which is in part certainly a consequence of the archipelagic conditions due to fragmentation of once continuous populations before the block-sinking disrupted these in past geologic time. With scanty material a botanist will under such circumstances be inclined to describe more species than there really are. It must be admitted, however, that the specialists to whom he entrusted the work on as many groups as possible were faced by exactly the same difficulty and their work suffers from the same evil. By working on this level MERRILL certainly created problems for others to solve. I have not scanned families on that point, but the six sedges he described as new are now all in the synonymy.

He himself was of course fully aware that there were far less species in the Philippine flora than listed at the time of his enumeration (1923), and being honest and wise to a high degree, he frankly admitted during a discussion on the virtue of different policies for unravelling the botanical treasures of Malesia, that 'many of my new species, and even new genera, were optimistically proposed', adding that he had seen no other way to create a botanical basis.

Of course nowadays, half a century later, 'collection description' is an obsolete procedure, detested as an inferior sort of botany creating unnecessary duplication and spending valuable time in a useless way. Nowadays it is clear that thorough work is needed and this can be done because in general collections have accumulated sufficiently to provide a solid basis, which we hope is about as good as, or slightly better, than the basis collections which were used for the compilation of the 'Flora of British India'. Fortunately collections are becoming more ample every year due to enthousiasts in Malaya, Sarawak, Sabah, the Philippines, and Lae, to whom we cannot be thankful enough. In MERRILL's 'period' the time was simply not ripe for launching comprehensive botanical works. To have a fair judgement of his pioneer work the commentary just given should be considered.

Several facets of his work were intended to cope with the urgencies of the 'vacuum position', *e.g.* the building up of collections, the library, a publication medium, the nomenclatural evaluation of old works, the description of supposed novelties, the framing of enumerations, as precursors to Floras, and bibliographies. Having a vast knowledge of the literature he was in the latter extremely successful, in accuracy and completeness. His enumerations of the floras of Borneo, Hainan, Banguey I., Guam, and some others are basic for later work, especially that of Borneo.

After the passing of Taft's Law (1917) it was American policy to prepare the Philippines for independence and MERRILL foresaw that his future career would not allow him to compile his ultimate goal, a 'Flora of the Philippines' for which his 'Flora of Manila' had served as a model — actually in 1922 although he was director of the Bureau of Science he was on a year-contract, without pension and could be dismissed with a year's salary as bonus *(sic)* — so he prepared his 'Enumeration of Philippine Flowering Plants', to synthesize what was achieved and leave a basis. This is still a most useful work, without which we would be much the poorer. The introductory

essays are a masterpiece of work, the enumeration is complete, and the bibliography is still a reliable source of information. Of equal value are his bibliographies of Borneo, the Pacific, and East Asia.

MERRILL's ability of mastering and analyzing literature entailed of course changes in name-giving according to the principle of priority and typification. As a good botanist of course he favoured stability of nomenclature, which cannot always be realized, however, particularly not at species level. He listed especially, in his works on LOUREIRO and RAFINESQUE, the cases where conservation of generic names was necessary.

A corollary of his bibliographic interest was establishing new journals; he was instrumental in founding the 'Philippine Journal of Science' and many others, later pointing out the virtue of one-name periodicals of which he founded several, a procedure later widely accepted (Blumea, Willdenowia, Persoonia, Adansonia, *etc.*).

Shortly after the war he also started a promising offset reprinting of rare early works, the desirability of which probably emanated from his study of the rare works of RAFINESQUE. He told me that with a subscription of 150 copies this could be done without loss at a very low cost on a non-profit basis. It is a pity that this was not continued by somebody for the benefit of botany, as there was and is a need for such inexpensive reprints. Before the war I had already tried to raise the interest of Chronica Botanica for such a purpose and later made similar proposals to the I.A.P.T., but found no sympathy for the idea. The result is that large firms nowadays produce such offset prints at prohibitive prices on a profit basis, a most undesirable situation for botany in general and the Philippines especially as the reprints of the 'Flora Manila' and the 'Enumeration' fall entirely beyond the financial capacity of most Philippine residents for whom they are intended. That a low-price large sale is still possible is apparent from the excellent offset reprinting in Formosa for educational purposes.

Another corollary which proved to be of great scientific interest was his careful recording of vernacular plant names, an intricate affair because of the many dozens of native languages in the Philippines. He examined these names together with linguists and found that several of them were corrupted Spanish names; thus he contributed to both linguistic and botanic science. He found also that many early plant introductions had never spread and still retained station in the coastal hinterland of Cagayan Bay where the Spanish galleons had anchored. This, combined with the vernacular names, brought him to a consideration of early post-Columbian transtropical transport of cultivated plants and aliens. In this, he found that a clear distinction must be made between the galleon routes of the Portuguese from Brazil to Goa and Macao and that of the Spanish from Acapulco in West Mexico to Manila via Guam. Both galleon routes proved very important indeed, as they persisted for centuries. In this way he was able to unearth the origin of a number of plants on which there was no unanimity of opinion, including such important crops as maize, and of sweet potato and tobacco in the New Guinea highlands. Later he was able to check this in the herbarium by studying the lists of the early BANKS & SOLANDER collections made during the first of COOK's voyages in the Pacific. On this subject he published a book which, notwithstanding acid criticisms on 'certain diffusionists', is a magnificent source on the subject of ethnobotany affecting all tropical botany. In passing I remark that a similar study should still be made on the COMMERSON collections, as a second proof for his theory.

I do not know of course what MERRILL's reaction would have been to a dedication of a volume of our Flora to him. In comparison with the great many honours fallen to him, honorary doctorates and honorary memberships, memberships of academies of science, the gold medal of the French Ministry of Agriculture, the gold medal of the Linnean Society of London, the Geoffrey St. Hilaire medal, Officer of the Netherlands Order of Oranje Nassau, and so forth, our dedication

is only a very small one. Still, I feel certain that it would have ranked very high with him, because it lies precisely in the field of botany in which he spent probably the best years of his life, and which intrigued him most of all.

He had never any intention to join in our work by personal contributions. Apart from the fact that the Flora started when he was already well in his seventies, he had used his capacities primarily in making tools for botanical workers, such as his critical evaluations of basic early works (BLANCO, RUMPHIUS, BURMAN, LOUREIRO, and in his last years ROXBURGH), enumerations of the flora of local areas (the Philippines, Borneo, Hainan, Guam, Banguey I.), the elaboration of large single collections from various parts of the East (Burma, Sumatra, NE. Borneo, New Guinea, together with Miss Dr. L. M. PERRY) and in compiling valuable bibliographies (the Pacific, East Asia, the Philippines, Borneo). Through his immense knowledge of plants and books he could produce such works at a speed at which normally large teams of workers would have been necessary.

By necessity there is a certain restriction of purpose and objects in making such tools, several were also called 'bibliographical enumerations', indicating that they were not critical and that he was not responsible for the correctness of the names. To expect or request this is of course completely unfair and unjust; they were intended as tools, and this purpose was accomplished.

There was a similar restriction in his systematical work, as he confined his revisions mostly to limited areas, many in the Philippines (*Syzygium*, grasses, *Leguminosae*, *etc.*), Borneo or New Guinea. Nevertheless it was an immense achievement, but at a certain level, as good as it could be under the circumstances, but largely floristic and not critical. He did not contribute essays on theoretical systematics.

Quoting ROBBINS, 'it has been said that MERRILL seldom went far below the surface, and that he was content in most cases to classify the plants with which he dealt'. ROBBINS defended MERRILL in commenting: 'This type of research was proper for the region he studied and was the only procedure which permitted him to do what he did in his lifetime. It is exactly this characteristic ability to deal superficially with extraordinarily large numbers of plants that makes so apt the epithet 'the American Linnaeus' which has been applied to him. Actually, however, MERRILL did go below the surface. He recognized that classification was prerequisite for other investigations and the magnitude of the job he set for himself left little time to pursue anything else. But his studies of the floristic and faunistic relationships of the Philippines to other Malesian areas, of the significance of vernacular plant names, and of the origin of cultivated plants are examples of 'below the surface' investigations carried out by MERRILL.' I may add his excellent synthesis of the distribution of the *Dipterocarpaceae* which induced him to make a rough outline of the phytogeography of Malesia, and especially its relation to the Formosan flora, in the light of correlating biological distribution with geological history.

To be fair, we should always keep in mind that during the period in which he achieved his great contributions to Malesian botany, that is 1902–1923, he started without a predecessor from absolute scratch, without personnel, without a book or collection, in an almost unexplored very rich archipelago covered largely by primary forest. Later too he had to work under scientific vacuum conditions in that he had almost no colleagues around him in Manila, there were hardly any botanists in the whole of Malesia — except for VALETON and J. J. SMITH in Bogor and RIDLEY in Singapore — while the floras of the islands surrounding the Philippines (Borneo, Celebes, the Moluccas and New Guinea) were botanically only known in the most fragmentary way.

If he had aimed at a critical systematical study of the Philippine flora in 1902, he would have had to wait for half a century for publication and could never have composed the major tools which now belong to our standard bibliographical equipment.

Even in the Netherlands Indies, which had an infinitely better botanical basis, TREUB had at the turn of the century concluded that a composition of a comprehensive Flora would be entirely premature because of the primitive state of exploration and publication and that only the framing of the very local 'Flore de Buitenzorg' (from Batavia to the peak of Mt Gedeh, W. Java) could be realized as a cautious approach to later projects of large size. Even for this very restricted Flora the volume on Phanerogams never appeared, except for the Orchids. And that was for Java, botanically the best known island in the whole archipelago with a proportionally poor flora compared with the true Malesian element in the Larger Sunda islands. Even a dozen years later BACKER spent three years in the field to get an overall coverage of the Javanese flora!

This illustrates the desperate position MERRILL had to face, a position that contemporary botanists working on the Malesian flora do not always realize. I have sometimes traced arrogance in the rejection by a few contemporary, 'angry' youngsters of MERRILL's floristic methods and premature publication of novelties. It also is for their education that I have in some detail accounted for MERRILL's work and life, projected on the background of the state of Malesian botany in the first decades of this century, with full exposure of the then prevailing conditions in the hope that they will reach a better understanding of the level at which MERRILL had to work by necessity. I have also pointed out what our present-day knowledge owes to his collecting drive and to the pioneer works, bibliographies and other tools which are in our constant use and which he had created from scratch. Possibly they may ask themselves what they would have achieved had they stood in MERRILL's shoes in 1902.

Naturally it is a blessing to be able to work now in well-equipped centres provided with ample facilities, under social security and pension conditions, at leisure on a regional-monographic basis. But let us remember that we harvest what others have sown during the past seven decades.

Among those who paved the way MERRILL was the outstanding figure, a man of boundless energy and vision, a great organisator and a great botanist. It is for these reasons that we dedicate this volume with due respect to the memory of this prominent American scientist.

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C. G. G. J. VAN STEENIS

acc. = according
Ak. Bis. = Aklan Bisáya (Philip. language)
Alf. Cel. = Alfurese Celebes (language)
alt. = altitude
Anat. = Anatomy
Ap. = Apáyao (Philip. language)
app. = appendix, appendices
appr. = approximate
Apr. = April
Arch. = Archipelago
atl. = atlas
auct. div. = *auctores diversi*; various authors
auct(t). mal. = *auctores malayenses*; authors dealing with Malesian flora
auct(t). plur. = *auctores plures*; several authors
Aug. = August
Bag. = Bagóbo (Philip. language)
basionym = original name of the type specimen; its epithet remains permanently attached to the taxon which is typified by it provided it is of the same rank
Bg. = Buginese (language)
Bik. = Bikol (Philip. language)
Bil. = Bilá-an (Philip. language)
Bill. = Billiton
Bis. = Bisáya (Philip. language)
Bon. = Bontók (Philip. language)
Born. = Borneo
Bt = Bukit; mountain
Bug. = Buginese (language)
Buk. = Bukidnon (Philip. language)
c. = *circiter*; about
C. Bis. = Cebu Bisáya (Philip. language)
cf. = *confer*; compare
Chab. = Chabecáno (Philip. language)
citations = see references
cm = centimetre
c.n. = see *comb. nov.*
comb. nov. = *combinatio nova*; new combination
c.s. = *cum suis*; with collaborators
cum fig. = including the figure
cur. = *curante*; edited by
D (after a vernacular name) = Dutch
Daj. = Dyak (language)
Dec. = December
D.E.I. = Dutch East Indies
descr. added behind a reference = means that this contains a valid description
diam. = diameter
Distr. (as an item) = Distribution
Distr. (with a geographical name) = District
ditto = the same, see *do*
Div. = Division, or Divide
div. = *diversus* (masc.); various
do = *ditto* (Ital.); the same
Dum. = Dumágat (Philip. language)
dupl. = duplicate
E = east (after degrees: eastern longitude)
E (after a vernacular name) = English
Ecol. = Ecology
ed. = edited; edition; editor
e.g. = *exempli gratia*; for example
elab. = *elaboravit*; revised
em(end). = *emendavit*; emended
em(erg). ed. = emergency edition
Engl. = English
etc., &c. = *et cetera*; and (the) other things
ex auctt. = *ex auctores*; according to authors
excl. = *exclusus* (masc.); excluding, exclusive of
ex descr. = known to the author only from the description
f. (before a plant name) = *forma*; form
f. (after a personal name) = *filius*; the son
f. (in citations) = figure
fam. = family
Feb(r). = February
fide = according to
fig. = figure
fl. = *flore, floret (floruit)*; (with) flower, flowering
For. Serv. = Forest Service
fr. = *fructu, fructescit*; (with) fruit, fruiting
Fr. (after a vernacular name) = French
G. = Gunung (Malay); mountain
Gad. = Gaddáng (Philip. language)
gen. = *genus*; genus
genus delendum = genus to be rejected
Germ. = German
geront. = Old World
haud = not, not at all
holotype = the specimen on which the original description was actually based or so designated by the original author
homonym = a name which duplicates the name of an earlier described taxon (of the same rank) but which is based on a different type species or type specimen; all later homonyms are nomenclaturally illegitimate, unless conserved
I. = Island
ib(id). = *ibidem*; the same, in the same place
Ibn. = Ibanág (Philip. language)
ic. = *icon, icones*; plate, plates
ic. inedit. = *icon ineditum, icones inedita*; inedited plate(s)
id. = *idem*; the same
i.e. = *id est*; that is
If. = Ifugáo (Philip. language)
Ig. = Igorot (Philip. language)
Ilg. = Ilongót (Philip. language)
Ilk. = Ilóko (Philip. language)
in adnot. = *in adnotatione*; in note, in annotation
incl. = *inclusus* (masc.); including, inclusive(ly)
indet. = indetermined
Indr. = Indragiri (in Central Sumatra)
inedit. = *ineditus* (masc.); inedited
in herb. = *in herbario*; in the herbarium
in litt. = *in litteris*; communicated by letter
in sched. = *in schedula*; on a herbarium sheet
in sicc. = *in sicco*; in a dried state
in syn. = *in synonymis*; in synonymy
Is. = Islands
Is. (after a vernacular name) = Isinái (Philip. language)
Ism. = Isámal (Philip. language)
isotype = a duplicate of the holotype; in arboreous plants isotypes have often been collected from a single tree, shrub, or liana from which the holotype was also derived
Iv. = Ivatán (Philip. language)

J(av). = Javanese (language)
Jan. = January
Jr = Junior
Klg. = Kalinga (Philip. language)
Kul. = Kuláman (Philip. language)
Kuy. = Kuyónon (Philip. language)
Lamp. = Lampong Districts (in S. Sumatra)
Lan. = Lánao (Philip. language)
lang. = language
l.c. = *loco citato*; compare reference
lectotype = the specimen selected *a posteriori* from the authentic elements on which the taxon was based when no holotype was designated or when the holotype is lost
livr. = livraison, part
ll.cc. = *l.c.* (plur.)
m = metre
M = Malay (language)
Mag. = Magindanáo (Philip. language)
Mak. = Makassar, Macassar (in SW. Celebes)
Mal. = Malay(an)
Mal. Pen. = Malay Peninsula
Mand. = Mandáya (Philip. language)
Mang. = Mangyán (Philip. language)
Mar. = March
Mbo = Manóbo (Philip. language)
Md. = Madurese (language)
Minangk. = Minangkabau (a Sumatran language)
min. part. = *pro minore parte*; for the smaller part
mm = millimetre
Mng. = Mangguángan (Philip. language)
Morph. = Morphology
ms(c), MS(S) = manuscript(s)
Mt(s) = Mount(ains)
n. = *numero*; number
N = north (after degrees: northern latitude); or New (*e.g.* in N. Guinea)
NE. = northeast
nec = not
neerl. = Netherlands, Netherlands edition
Neg. = Negrito (Philip. language)
N.E.I. = Netherlands East Indies
neotype = the specimen designated to serve as nomenclatural type when no authentic specimens have existed or when they have been lost; a neotype retains its status as the new type as long as no authentic elements are recovered and as long as it can be shown to be satisfactory in accordance with the original description or figure of the taxon
N.G. = New Guinea
N.I. = Netherlands Indies
no = *numero*; number
nom. = *nomen*; name (only) = *nomen nudum*
nom. al. = *nomen aliorum*; name used by other authors
nom. alt(ern). = *nomen alternativum*; alternative name
nom. cons(erv). = *nomen conservandum, nomina conservanda*; generic name(s) conserved by the International Rules of Botanical Nomenclature
nom. fam. cons. = *nomen familiarum conservandum*; conserved family name
nom. gen. cons. = see *nomen conservandum*
nom. gen. cons. prop. = *nomen genericum conservandum propositum*; generic name proposed for conservation
nom. illeg(it). = *nomen illegitimum*; illegitimate name
nom. leg(it). = *nomen legitimum*; legitimate name
nom. nov. = *nomen novum*; new name
nom. nud. = *nomen nudum*; name published without description and without reference to previous publications
nom. rej(ic). = *nomen rejiciendum*; name rejected by the International Rules of Botanical Nomenclature
nom. seminudum = a name which is provided with some unessential notes or details which cannot be considered to represent a sufficient description which is, according to the International Rules of Botanical Nomenclature, compulsory for valid publication of the name of a taxon
nom. subnudum = *nomen seminudum*
nom. superfl. = a name superfluous when it was published; in most cases it is a name based on the same type as an other earlier specific name
non followed by author's name and year, not placed in parentheses, and put at the end of a citation = means that this author has published the same name mentioned in the citation *independently*. These names (combinations) are therefore homonyms.
Compare p. 111 under *Wahlenbergia* lines 6 & 7 where there appear to be three different genera all called *Lightfootia* by three different authors, and belonging to three different families. The same can happen to taxa of lower ranks, for example species; compare p. 129*b* lines 7 & 8 under *Lobelia heyniana*, where it appears that there are two different species of *Lobelia* named *L. decurrens, viz* by ROTH and by CAVANILLES in which the latter antedates the former
(*non* followed by abbreviation of author's name) before a reference (citation) headed by an other author's name = means that the second author has misinterpreted the taxon of the first author. Compare for example p. 126*b* under *Lobelia alsinoides* lines 7 & 8 the synonym name *L. filiformis*; CAVANILLES misapplied in his description and figure the name LAMARCK had given to another species through an erroneous identification. The sense CAVANILLES gave to the Lamarckian plant name does not invalidate the latter: CAVANILLES's use of the name also does not represent a proper synonym; his name has no status and its mention serves only to indicate the identity of his text and plate
non al. = *non aliorum*; not of other authors
non vidi = not seen by the author
nov. = *nova* (femin.); new (species, variety, *etc.*)
Nov. = November
n.s. = new series
n. sp. = *nova species*; new species
n. (sp.) prov. = *nomen (specificum) provisorium*; provisional new (specific) name
n.v. = *non vidi*; not seen
NW. = northwest
Oct. = October
op. cit. = *opere citato*; in the work cited

p. = *pagina*; page
P. = Pulau, Pulu (in Malay); Island
Pal(emb). = Palembang
Pamp. = Pampángan (Philip. language)
Pang. = Pangasinán (Philip. language)
paratype = a specimen cited with the original description other than the holotype
part. alt. = for the other part
P. Bis. = Panay Bisáya (Philip. language)
P.I. = Philippine Islands
pl. = plate
plurim. = *plurimus*; most
p.p. = *pro parte*; partly
pr. max. p. = *pro maxima parte*; for the greater part
pro = as far as is concerned
prob. = *probabiliter*; probably
prop. = *propositus*; proposed
Prov. = Province
pr.p. = *pro parte*; partly
pt = part
quae est = which is
quoad basionym, syn., specimina, *etc.* = as far as the basionym, synonym(s), specimen(s), *etc.* are concerned
references = see for abbreviations the list in vol. 5, pp. cxlv-clxv
Res. = Residency
resp. = respective(ly)
S = south (after degrees: southern latitude)
S (after a vernacular name) = Sundanese (language)
Sbl. = Sambáli (Philip. language)
SE. = southeast
sec. = *secus*; according to
sect. = *sectio*; section
sens. ampl. (ampliss.) = *sensu amplo (amplissimo)*; in a wider sense, in the widest sense
sens. lat. = *sensu lato*; in a wide sense
sens. str. (strictiss.) = *sensu stricto (strictissimo)*; in the narrow sense, in the narrowest sense
Sept. = September
seq., seqq. = *sequens, sequentia*; the following
ser. = series
s.l. = *sensu lato*; in a wide sense
S.-L. Bis. = Samar-Leyte Bisáya (Philip. language)
Sml. = Sámal (Philip. language)
s.n. = *sine numero*; (specimen) without the collector's number
Sp. = Spanish (language)
sp(ec). = *species*; species
specim. = specimen(s)
sphalm. = *sphalmate*; by error, erroneous
spp. = *species*; species (plural)
Sr = Senior
s.s. = see *sens. str.*
ssp. = *subspecies*; subspecies
s.str. = see *sens. str.*
stat. nov. = *status nova*; proposed in a new rank
Sub. = Subánum (Philip. language)
subg(en). = *subgenus*; subgenus
subsect. = *subsectio*; subsection
subsp. = *subspecies*; subspecies
Sul. = Súlu (Philip. language)
Sum. E.C. = Sumatra East Coast
Sum. W.C. = Sumatra West Coast
Suppl. = Supplement
SW. = southwest
syn. = *synonymum*; synonym
synonyms = the names of taxa which have been referred to an earlier described taxon of the same rank and with which they have been united on taxonomical grounds or which are bound together nomenclaturally
syntypes = the specimens used by the original author when no holotype was designed or more specimens were simultaneously designated as type
t. = *tabula*; plate
Tag. = Tagálog (Philip. language)
Tagb. = Tagbanúa (Philip. language)
Tagk. = Tagaká-ólo (Philip. language)
Tapan. = Tapanuli (in NW. Sumatra)
taxon = each entity throughout the hierarchic ranks of the plant kingdom which can be described and discriminated from other taxa of the same rank
Taxon. = Taxonomy
Tg = Tandjung (Malay); cape
Ting. = Tinggián (Philip. language)
Tir. = Tiruraí (Philip. language)
transl. = translated
type = each taxon above the rank of a species is typified by a type belonging to a lower rank, for instance a family by a genus, a genus in its turn by a species; a species or infraspecific taxon is typified by a specimen. The name of a taxon is nomenclaturally permanently attached to its type; from this it cannot be inferred that the type always represents botanically the most typical or average structure found in the circumscription of the taxon
type specimen = the specimen or other element to which the name of a species or infraspecific taxon is (nomenclaturally) permanently attached; botanically a type specimen is a random specimen on which the name was based by description. Therefore, it does not need to represent the average or most typical representative of a population. See holotype, isotype, lectotype, syntype, paratype, and neotype
typ. excl. = *typo excluso*; type exluded
typ. incl. = *typo incluso*; type included
typus = see type and type specimen
var. = *varietas*; variety
var. nov. = *varietas nova*; new variety
Vern. = Vernacular
vide = see
viz = *videlicet*; namely
vol. = volume
W = west (after degrees: western longitude)
Yak. = Yakán (Philip. language)
± = about
& = and
⌀ = diameter
♂ = male (flower, *etc.*)
♀ = female (flower, *etc.*)
☿, ⚥ = bisexual (flower)
(♂)(♀) = dioecious with unisexual flowers
(♂♀) = monoecious with unisexual flowers

(♂☿) = polygamous
(☿♀) = polygamous
∞ = many
$>$ = more than (in size, number, *etc.*)
$<$ = less than (size, number, *etc.*)
$\times 2/5 = 2/5$ of natural size
$\times$*montana* = means that the epithet *montana* is that of a hybrid

ADDENDA, CORRIGENDA ET EMENDANDA

As was done in the preceding volumes, it seemed useful to correct some errors which have crept into the text of volumes 4, 5 & 6 as well as to add some additional data, new records, and new species or other taxa which came to our knowledge and are worth recording.

Additions of the *Amaranthaceae* I owe to Dr. R. C. BAKHUIZEN VAN DEN BRINK *f.* and Mr. J. F. VELDKAMP, of the *Alismataceae* and *Hydrocharitaceae* to Dr. C. DEN HARTOG, of the *Celastraceae* and *Thymelaeaceae p.p.* to Dr. DING HOU, of the *Malpighiaceae* to Dr. M. JACOBS, of the *Burseraceae p.p.* to Dr. C. KALKMAN, of the *Caprifoliaceae* to Dr. J. H. KERN, of the *Burseraceae p.p.*, *Connaraceae*, *Dichapetalaceae*, *Goodeniaceae* and *Loganiaceae* to Dr. P. W. LEENHOUTS, of the *Gnetaceae* to Dr. F. MARKGRAF, of the *Simaroubaceae* to Mr. H. P. NOOTEBOOM, of the *Convolvulaceae* to Dr. S. J. VAN OOSTSTROOM, of the *Thymelaeaceae p.p.* to Mr. H. K. AIRY SHAW, of the *Ericaceae* and *Flacourtiaceae* to Dr. H. SLEUMER.

Printing errors have only been corrected if they might give rise to confusion.

Volume and page number are separated by a colon. Page numbers provided with either *a* or *b* denote respectively the left and right columns of a page.

Aceraceae

4: 3–4, 592*ab* *Acer laurinum* HASSK. Add to Distr.: Rare in Borneo and the few localities at unusual lowland altitude; now also found on Mt Kinabalu at *c.* 1000 m (SAN 38438); probably also in the mountains of N. Thailand, as E. MURRAY merged (*in sched.*) *A. garrettii* CRAIB, Kew Bull. (1920) 301, with it.

Aizoaceae

4: 269*a* *Glinus lotoides* L. Add to synonymy: *Holosteum hirsutum* L. Sp. Pl. (1753) 88. Holotype from India. *Cf.* STEEN. Blumea 13 (1965) 167.

4: 274*a* *Trianthema triquetra* ROTTL. *ex* WILLD. Add to Distr.: Philippines (Mindanao). *Cf.* STEEN. Blumea 12 (1964) 320.

Alismataceae (DEN HARTOG)

5: 327 Bottomline, replace '6. *S. sagittifolia ssp. leucopetala*' by: **6. S. trifolia.**

5: 332*b* Replace the name *Sagittaria sagittifolia ssp. leucopetala* (MIQ.) HARTOG by: **6. Sagittaria trifolia** LINNÉ, Sp. Pl. 2 (1753) 933, and add the subspecific name to its synonymy. There is no change in the text.

5: 333*b* In text line 3 from bottom, replace '*S. sagittifolia ssp. leucopetala*' by: *S. trifolia.*

5: 334*b* Add to the Notes: This taxon cannot be maintained as a subspecies of *S. sagittifolia*, as the sepals in the mature ♀ flowers are reflexed. For this reason it belongs to another species group within the genus.

Amaranthaceae
(BAKHUIZEN VAN DEN BRINK, VAN STEENIS & VELDKAMP)

4: 79*b* *Amaranthus dubius* MART. Add to Distr.: Central Java (Mt Lawu, Temanggung: LÖRZING 346), Lesser Sunda Is. (Alor: JAAG 413), New Guinea (West: Star Mts, Sibil Valley, KALKMAN 4556, cultivated, a recent introduction; Morobe Distr., Bulolo, NGF 7384). All identifications by SAUER, 1971.

4: 79*b* Change the name of species 8 into: **8. Amaranthus hybridus** L. *ssp.* **incurvatus** (GREN. & GODR.) BRENAN *var.* **paniculatus** (L.) MANSF. See MANSFELD, Die Kulturpfl. Beih. 2 (1959) 54, and BRENAN, Watsonia 4 (1961) 268.

4: 91 Emend the key to the species of *Alternanthera* as follows, second entry of fork under 3:

3. Three outer tepals in their lower $^1/_3$–$^1/_2$ distinctly 3-nerved, their bases at least indurate. Anthers 5. Pseudo-staminodes well-developed, wider than long to ligular, lobed or fimbriate. *Hairs dentate.*

3a. Leaves mucronate, often coloured. Anthers linear, $^3/_4$–1 mm long; pseudo-staminodes ligular, apex fimbriate, as long as to longer than the stamens. Pistil bottle-shaped, apex not emarginate. Apparently never setting seed in *Malesia.*
3. A. ficoidea

3a. Leaves acute, not mucronate (in *Malesia*). Anthers reniform to ellipsoid, $^1/_3$–$^2/_5$ mm long; pseudo-staminodes wider than long, with 3–4 ± triangular lobes, reaching the base of the anthers or shorter. Pistil broadly obcordate. Seeds usually developed, (broadly) obcordate, narrowly winged.
3a. A. paronychioides

4: 93*a*, 594*b* *Alternanthera ficoidea* (L.) R.BR. *ex* R. & S. 1819, *non A. ficoides* P. BEAUV. Fl. Oware & Benin 1818. As these are homonyms (Code Art. 75) this specific name is illegitimate.

We are, however, not certain of its full synonymy and for this reason tentatively refrain from making new combinations both for the species and the variety. It may be that *Telanthera manillensis* WALP. 1843 contains the oldest basionym.

To avoid this difficulty we accept tenta-

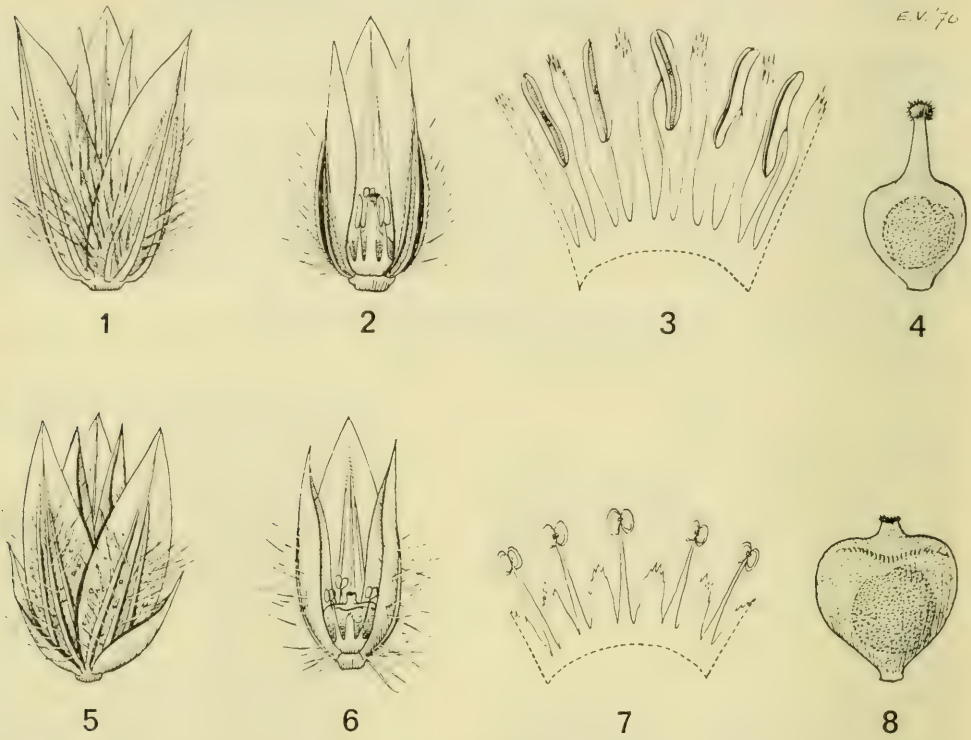

Fig. 1. *Alternanthera bettzickiana* (REGEL) NICHOLS. *1.* Flower, abaxial, without bract and bracteoles × 12, *2. ditto*, without abaxial tepals, × 12, *3.* staminal tube, × 24, *4.* young fruit, × 24. — *A. paronychioides* ST. HIL. *var. paronychioides. 5.* Flower, abaxial, without bract, × 12, *6. ditto*, without bracteoles and abaxial tepals, × 12, *7.* staminal tube, × 24, *8.* young fruit (*1–4* CAYOSA 75, *5–8* CAYOSA 104).

tively specific status for this taxon in Flora Malesiana:

Alternanthera bettzickiana (REGEL) NICHOLS. Ill. Dict. Gard. 1 (1884) 59 ('*bettzichiana*'); VOSS in Vilmorin's Blumengärtn. ed. 3 (by SIEBERT & VOSS), 1 (1895) 69 (*non vidi, ex* Ind. Kew.); ASCHERS. & GRAEBN. Synopsis 5, 1 (1914) 365. — *Telanthera bettzickiana* REGEL, Gartenflora 11 (1862) 178, *descr.*; Ind. Sem. Hort. Petrop. (1862) 28 (*non vidi*). — **Fig. 1.**

VELDKAMP (Blumea 19, 1971, 169) assumes the addition by NICHOLSON 'Brasilia, 1862' to be a very indirect reference to REGEL's basionym with which I can agree. VELDKAMP, *l. c.*, also indicated that *var. versicolor* (REGEL) BACKER, sometimes regarded as a separate species, must be regarded as a synonym of *A. bettzickiana.*

4: 93*b* Add the following species:

3a. Alternanthera paronychioides ST. HIL. Voy. Brésil 2, 2 (1833) 43; DULTA & MITRA, Ind. Forester 87 (1961) 304, f. 2; PEDERSEN, Darwiniana 14 (1967) 437; VELDKAMP, Blumea 19 (1971) 167, f. 6–8. *var.* **paronychioides — Fig. 1.**

Prostrate, branched annual. Branches up to 70 cm, rooting at the nodes, angular and villose at apex, becoming terete and glabrous at base, indument only persistent at the nodes. Hairs dentate. *Leaves* spathulate-oblong to -lanceolate, up to 7 by 2 cm, acute, never mucronate, base cuneate, narrowed into the petiole, moderately appressed-pubescent to glabrous, usually tufted under the inflorescences. *Spikes* sessile, apical on short axillary branches, subglobose to shortly cylindric, up to 2 by 1 cm. Bracts, bracteoles scarious, white. Bracts ovate-oblong, $2^1/_4$–3 by $1^1/_4$–$1^1/_2$ mm, acuminate, glabrous, ± convex, $^2/_3$–$^3/_4$ times as long as tepals, longer than bracteoles. Bracteoles ovate-oblong, $1^3/_4$–$2^1/_2$ by $^3/_4$ mm, acute to acuminate, glabrous, ± falcately folded along midrib. *Tepals* oblong to lanceolate, acute to mucronulate, in lower half 3-nerved and sparsely strigose, upper half stiff, but not coriaceous. Adaxial tepal 3–4 by $^4/_5$–$1^1/_4$ mm, flat; abaxials $3^1/_4$–4 by 1–$1^1/_4$ mm, flat; laterals $2^1/_4$–$3^1/_4$ by 1–$1^1/_4$ mm, folded

along midrib. *Stamens* 5, all fertile (in the material seen); filaments at base united into a *c.* 1/4 mm high cup, free parts *c.* 1/2 mm long, filiform; anthers reniform to ellipsoid, 1/3–1/4 mm long, yellow; pseudo-staminodes wider than long, with 3–4 ± triangular lobes, reaching the base of the anther or shorter. *Pistil* broadly obcordate with a short, stout style in the notch; stigma capitate, papillose. *Utricle* broadly obcordate to obcordate, up to 1 3/4 by 1 1/4 mm, narrowly winged, brown; the plants seem to fructify during drying; so young fruits are usually present, contrary to the situation in *A. ficoidea ssp. bettzickiana*, where they have never been observed in Malesia.

Distr. Native of tropical America, introduced as an alien in other countries, including Europe and Indo-Malesia, India, Thailand; in *Malesia*: West-Java, Philippines (Luzon: Manila, Quezon City; Guimaras I.; Mindanao).

Ecol. Disturbed places, railway tracks, banks of rivers and lakes, up to 250 m.

Vern. & Uses. *Simsim* (Bis.), used for feeding hogs (Mindanao).

Note. By BACKER confused with *A. ficoidea ssp. bettzickiana* and in habit difficult to discern from it, but distinctly different in the structure of the filaments, pseudo-staminodes, and anthers.

4: 96*b*, *Gomphrena celosioides* MART.

594*b* Add to references: STEEN. Nova Guinea, Bot. 23 (1965) 495.
The spreading of this weed continues steadily eastwards and has now reached Timor, Papua, and Micronesia. It was also found in Goodenough I., off NE. Papua, along an old military road (BRASS 24432).

Batidaceae

5: 415*a* *Batis argillicola* VAN ROYEN.
Add to Distr.: It also occurs in Northern Queensland. *Cf.* S. T. BLAKE, Proc. R. Soc. Queensl. for 1961, 73 (1963) 61. It occurs there in Burke Distr., near Karumba, at the mouth of the Norman R., on clay-pans adjacent to the shore, in exactly the same habitat as near Merauke.

Betulaceae

5: 207*b* The basionym of *Alnus maritima* (MARSH.) NUTTALL is *Betula-Alnus maritima* MARSHALL, Arb. Am. (1785) 20. Though not noted, I had not seen this work and depended on authority. Dr. BAKHUIZEN VAN DEN BRINK saw it at Paris, in 1959, and reported that the only description or distinction mentioned by MARSHALL is 'leaves long and narrow'. This, I believe, cannot be accepted even as a specific diagnosis, and the name I regard as an invalid *nomen seminudum*. The proper name for this species is: **Alnus japonica** (THUNB.) STEUD.

5: 208 Legend fig. 1: Change *Alnus maritima* (MARSH.) NUTT. into *Alnus japonica* (THUNB.) STEUD.

Burseraceae

(LEENHOUTS, *Dacryodes* and *Santiria* in co-operation with KALKMAN)

5: 210 Add to Dispersal, 2nd paragraph: In Java, fruits of *Canarium* are occasionally eaten by bats (see VAN DER PIJL, Acta Bot. Neerl. 6, 1957, 299).
Add to Wood anatomy: BURGESS, Timbers of Sabah (1966) 60–70, f. 11.
Insert after the section on Wood anatomy:
Phytochemistry. See HEGNAUER, Chemotaxonomie 3 (1964) 310–318, 647, 669.

5: 211 Add to Morphology, 3rd paragraph: See for a more detailed discussion on the *stipules* of the *Burseraceae* and some related families WEBERLING & LEENHOUTS, Abh. Ak. Wiss. Lit. Mainz M.-N. Kl. 1965, *n.* 10 (1966) 495–584.

5: 214*a* *Protium javanicum* BURM. *f.*
Add to description under *Branches*, before 'spines': sometimes branched.
Add to Distr.: Flores.

5: 215*a* *Protium macgregorii* (F. M. BAIL.) LEENH.
In description delete after '*Flowers*': (♀ unknown). Insert after '*Pistil*': in ♂ flowers.
Add to Distr.: Also in Normanby I.
Add to Ecol.: also in swamps. Change highest altitude into 1100 m.

5: 218*a* *Garuga floribunda* DECNE.
Add to description, 1st sentence: deciduous.
Add to Distr.: Malay Peninsula.

5: 220 *Dacryodes* VAHL.
Add to Distr.: According to NORMAND, Comptes Rendus IVe Réun. A.E.T.F.A.T. (1962) 291, the number of African species is about 10.
Replace the Key to the species by the following one:

1. Leaf-bearing branchlets *c.* 2 cm thick. Leaves 6–8-jugate; petiole *c.* 20 cm long; leaflets 20–60 cm long, with 18–38 pairs of nerves. Inflorescence 35–120 cm long, the main branches up to 55 cm long . . . **5. D. kingii**
1. Leaf-bearing branchlets up to 1 1/2 cm thick. Leaves rarely more than 4-jugate; petiole mostly up to 15 cm long; leaflets mostly less than 20, rarely up to *c.* 40 cm long, with usually less than 15, rarely up to 25 pairs of nerves. Inflorescences

mostly shorter, their main branches up to 30 (♀) or 40 (♂) cm long.
2. Lowermost pair of leaflets more or less stipule-like, often caducous. Inflorescences 10–140 cm long, their main branches up to 30 (♀) or 40 (♂) cm long . . . . . **4. D. laxa**
2. Lowermost pair of leaflets not much different from the others, not caducous. Inflorescences mostly less than 30, rarely up to 60 cm long, their main branches up to *c.* 25 cm long.
3. Indumentum at least partly consisting of minute, stellate hairs. **16. D. nervosa**
3. Indumentum consisting of simple hairs only.
4. Nodes of leaf-rachis distinctly swollen.
5. Leaflets when dried greenish above. Inflorescences mostly axillary, together sometimes pseudoterminal, rarely terminal. Calyx sparsely hairy, corolla (sub)glabrous. Fruits distinctly bulging on one side . . **1. D. rugosa**
5. Leaflets when dried brown above. Inflorescences terminal. Flowers densely tomentose. Fruits not bulging . . **7. D. rubiginosa**
4. Nodes of leaf-rachis not or hardly swollen.
6. Inflorescences terminal (vegetative terminal bud absent), moreover sometimes in the upper leaf-axils.
7. Pith of branchlets without vascular strands.
8. Inflorescences densely woolly; calyx slightly pubescent, corolla (sub)glabrous. **2. D. costata**
8. Inflorescences densely minutely tomentose, including the flowers . . **6. D. incurvata**
7. Pith of branchlets with vascular strands.
9. Leaf-bearing branchlets $^1/_4$-$^1/_2$ cm thick, pith with some to many vascular strands. Petiole 3–15 cm long, pith with some to many vascular strands; leaflets glabrous, with 6–18 pairs of nerves. Peduncle 0–6 cm long.
Fruits $1^1/_2$–3 by $^3/_4$–$1^3/_4$ cm. **6. D. incurvata**
9. Leaf-bearing branchlets *c.* $^1/_2$ cm thick, pith with some vascular strands. Petiole 3–9 cm long, pith with some vascular strands; leaflets beneath on midrib and nerves densely pubescent, with 7–13 pairs of nerves. Inflorescences branched from the base.
Fruits 2–$2^1/_2$ by 1–$1^1/_4$ cm. **7. D. rubiginosa**
9. Leaf-bearing branchlets *c.* 1 cm thick, pith with many vascular strands. Petiole 9–15 cm long, pith with many vascular strands; leaflets glabrous, with 13–18 pairs of nerves. Peduncle $^3/_4$–2 cm. Fruits 4–$4^3/_4$ by 2–$2^1/_2$ cm . . **8. D. elmeri**
6. Inflorescences axillary (vegetative terminal bud present), sometimes together pseudoterminal.
10. Leaflets pubescent beneath.
11. Leaves 1–4-jugate. Inflorescences short-peduncled. **3. D. puberula**
11. Leaves 7–9-jugate. Inflorescences long-peduncled. **9. D. rostrata** *f.* **pubescens**
10. Leaflets glabrous or only hairy on the midrib beneath.
12. Pith of branchlets with some to many, pith of petiole with several vascular strands.
13. Branchlets densely minutely villous. Leaves 3–4-jugate; petiole strongly flattened at base, 9–15 cm long; leaflets 12–22 cm long, brown above when dry, shortly acuminate, with 13–18 pairs of nerves, reticulation inconspicuous above. Inflorescences 17–45 cm long, peduncle $^3/_4$–2 cm. Stamens unknown. Fruit 4–$4^3/_4$ by 2–$2^1/_2$ cm . **8. D. elmeri**
13. Branchlets glabrous except the tip. Leaves 2–10-jugate; petiole terete to strongly flattened at base, 3–26 cm long; leaflets 3–25 cm long, brownish to greenish above when dry, mostly rather long and slender acuminate, with 5–20 pairs of nerves, reticulation manifest above. Inflorescences 5–35 cm long, peduncle 0–15 cm. Stamens adnate to the disk. Fruit $1^3/_4$–4 by $^3/_4$–$2^1/_4$ cm. **9. D. rostrata**
13. Branchlets glabrous except the tip. Leaves 3–4-jugate; petiole strongly flattened at base, $4^1/_2$–10 cm long; leaflets 5–$12^1/_2$ cm long, greenish above when dry, shortly acuminate, with 10–13 pairs of nerves, reticulation manifest above. Inflorescences $7^1/_2$–10 cm long, peduncle $3^1/_2$–5 cm. Stamens free

from the disk. Fruit unknown . **10. D. crassipes**

12. Pith of branchlets without, pith of petiole with few vascular strands.

14. Petiole terete to slightly flattened at base. Wall of fruit kernel thick and hard. **12. D. expansa**

14. Petiole strongly flattened to channelled at base. Wall of fruit kernel very thin.

15. Leaflets 3–6 times as long as wide; leaves 3–15-jugate, the petiole 2–20 cm long, leaflets 6–42 cm long. **14. D. longifolia**

15. Leaflets up to 3 times as long as wide; leaves up to 5-jugate, the petiole up to 8 cm long, leaflets up to 17 cm long.

16. Base of leaflets often oblique. Peduncle 0–4 cm long. Calyx 3 mm high. Fruit $2^1/_4$–$3^1/_2$ by $1^1/_4$–2 cm . **11. D. macrocarpa**

16. Base of leaflets not oblique. Peduncle $^1/_2$–1 cm long. Calyx smaller. Fruit 16–18 by 9–11 mm. **15. D. breviracemosa**

5: 221*b* *Dacryodes rugosa* (BL.) H. J. LAM.
Change in description: *Branchlets* . . .; pith without or with many peripheral vascular strands . . . *Petioles* terete to distinctly flattened at base.

5: 222*a* Add to Ecol.: Also in secondary forests.

5: 222*b* *Dacryodes costata* (BENN.) H. J. LAM.
Change in description: *Leaves* . . ., glabrous to densely pubescent . . .; nerves up to 17 or 18 pairs. *Fruits* sometimes ellipsoid.
Add to Ecol.: Also in secondary forests.

5: 224*a* *Dacryodes laxa* (BENN.) H. J. LAM.
Description: add to 1st sentence: small buttresses sometimes present. *Branchlets* . . .; pith sometimes with a closed cylinder of many small vascular strands.

5: 224*b* *Dacryodes kingii* (ENGL.) KALKMAN.
Change in description, 1st sentence '12 m' into: 20 m. *Branchlets* . . .; pith with some peripherally arranged to several, partly peripheral, partly scattered small vascular strands. *Petiole* up to 28 cm. *Leaflets* . . .; apex up to 2 cm blunt-acuminate. *Fruits* oblong or ovoid, . . ., more or less oblique.
Dacryodes incurvata (ENGL.) H. J. LAM.
Add to literature: ANDERSON, Gard. Bull. Sing. 20 (1963) 164.

5: 225*a* Description: Change greatest height of tree into 40 m. *Leaves* 1–5-jugate. ♂ *Panicles* may be up to 30 cm long. *Fruits* ovoid to ellipsoid, up to $3^1/_2$ cm long, said to be orange when ripe.
Add to Ecol.: SAN 25326 and 29004 are collected at 1400 and 1500 m altitude resp. *Fl.* Jan.–Aug.
Add: Uses. Fruits edible.

5: 226*a* *Dacryodes rostrata* (BL.) H. J. LAM.
Description: Change greatest height of tree into 45 m. *Branchlets* exceptionally up to 15 mm ∅. *Petioles* terete to strongly flattened at base, . . . *Leaflets* up to 25 cm long. Sometimes all nerves looped and joined near the margin.

5: 226*b* Add after *Fruits*: yellow to purple when ripe.
Add to Uses: In Brunei cultivated by the Kedayans for the fruits, the pulp of which is eaten.

5: 227*a* *Dacryodes macrocarpa* (KING) H. J. LAM.
Change in description, 3rd line, 'glabrous' into: hairy at the tip only.

5: 227*b* Line 4 from top, add after '*Fruits* ovoid': to ellipsoid.

5: 228*a* *var. macrocarpa.*
Add to literature: ANDERSON, Gard. Bull. Sing. 20 (1963) 164.
Ecol.: Change highest altitude into 1400 m.
var. kostermansii (KALKM.) KALKMAN.
Add to Distr.: N. Borneo.
Dacryodes expansa (RIDL.) H. J. LAM.
Add to literature: SMYTHIES, Common Sarawak Trees (1965) t. 8.
Change in description line 4: *Petioles* $2^1/_2$–$9^1/_2$ cm. Change in line 9 'not arching' into: arching or not. Change dimensions of *fruits* into: $3^1/_2$–5 by 2–$3^1/_2$ by $2^1/_2$–3 cm; add: rosy apple-red when ripe.

5: 228*b* Change Uses: Only the pulp of the fruits is eaten.
13. *Dacryodes papuana* HUSSON.
This turned out to be synonymous with *Scutinanthe brevisepala* LEENH.; *cf.* LEENH. Blumea 12 (1964) 19.
Dacryodes longifolia (KING) H. J. LAM.
Description: Add after tree: 10 m by 30 cm. Line 2, after 'glabrous' add: apart from the tip. Add to *fruits*: red when ripe.
Add to Distr.: Philippines (Mindanao).

5: 229*a* *var. longifolia.*
Change in description: 4–15-jugate.
Add to Distr.: Philippines.
In Ecol. change as follows: *Fr.* Nov. (Mal. Pen.), May (Philippines).

5: 229*b* Add after 15. *Dacryodes breviracemosa*:

16. Dacryodes nervosa (H. J. LAM) LEENH. Blumea 12 (1964) 19. — *Santiria nervosa* H. J. LAM, Ann. Jard. Bot. Btzg 42 (1932) 206, t. 11 f. 65; Bull. Jard. Bot. Btzg III, 12 (1932) 387, t. 6 f. 29; KALKMAN, Blumea 7 (1954) 539; LEENH. Fl. Mal. I, 5 (1956) 233.

Tree, 12–30 m by 20–100 cm, with up to $2^1/_2$ m high buttresses which are $1^1/_2$ m

spreading. *Branchlets* 4–8 mm thick, the tips ferrugineous-tomentose; terminal bud $^1/_2$–1 cm long; pith without vascular strands. *Leaves* 1–4-jugate. *Petioles* 4–9 (–14) cm, slightly to strongly flattened at the base; pith with few vascular strands. *Leaflets* oblong to ovate (to suborbicular), $5^1/_2$–17 (–22) by 3–$7^1/_2$ (–$10^1/_2$) cm, upper surface greenish when dried, lower surface pubescent to glabrous, indumentum partly or entirely consisting of minute stellate hairs; base broadly cuneate to rounded; apex subabruptly, bluntly acuminate; nervation rather prominent beneath; nerves 10–15 (–18) per side, more or less curved, mostly not distinctly looped and joined except towards base and apex; reticulations minute, hardly or not conspicuous above. *Panicles* axillary, often on short, leafless lateral shoots with a terminal bud, narrow, $1^1/_2$–$5^1/_2$ (–20) cm long, ferrugineous-tomentose; peduncle up to 10 cm long. *Flowers c.* 2 mm long, sessile to shortly pedicelled, glabrous or stellate-tomentose and glabrescent. *Calyx* $1^1/_2$ mm. *Petals* outside glabrous or hairy. *Stamens* free from the disk. *Disk* thick-annular or (♀) cupular, radially furrowed and with undulate rim. *Pistil* in ♂ flowers moderately reduced. *Infructescences* up to *c.* 5 cm long, ferrugineous-tomentose, with a few fruits. *Fruits* ellipsoid, immature ones *c.* $1^1/_2$ by 0,9 cm.

Distr. *Malesia*: Sumatra, Banka, Malay Peninsula, and Borneo.

Ecol. Primary and secondary forests, up to 60 (–750) m. *Fl.* Febr.–March, June, Oct.

Vern. *Bantan burung*, *kedondong tundjuk*, *sisip banièng*, Sum., *asam-asam*, Banka, *kedudong*, Mal. Pen., *engai*, *mendjelih*, *selada*, Borneo.

Note. Originally, KALKMAN already inclined towards inclusion of this species in the genus *Dacryodes*, as appears from his identification labels, but finally he decided to leave it in *Santiria* by lack of evidence. Only when fruiting material became available the generic identity became sufficiently clear.

5: 229 *Santiria* BL.

Replace the Key to the species by the following one:

1. Petiolules 3–$3^3/_4$ cm long. **6. S. ridleyi**
1. Petiolules up to 3 cm long.
2. Bract-like cataphylls between the leaves present. Leaves (60–)80–135 cm long . . . **10. S. megaphylla**
2. No bract-like cataphylls between the leaves. Leaves rarely more than 60 (up to 85) cm long.
3. Anthers adnate (mostly also visible under the fruit).
4. Pith of branchlets with vascular strands. Flowers 4–10 mm long, calyx 3–7 mm high, ♂ flower with 6 fertile stamens. Stigma on fruit *c.* 90° excentric . **11. S. griffithii**
4. Pith of branchlets without vascular strands. Flowers 2–3 mm long, calyx 1–$2^1/_2$ mm high, ♂ flower with 3 fertile stamens and sometimes up to 3 staminodes. Stigma on fruit less than 90° excentric. **12. S. rubiginosa**
3. Anthers basi- to dorsifixed.
5. Calyx at anthesis $1^1/_2$–3 mm high.
6. Pith of branchlets with rather many vascular strands. **2. S. mollis**
6. Pith of branchlets without vascular strands.
7. Terminal bud 2–3 cm long. Flowers 4–$4^1/_2$ mm long, calyx $2^1/_2$–3 mm high. **3. S. grandiflora**
7. Terminal bud up to 2 cm long. Flowers 2–4 mm, calyx 1–2 mm high.
8. Terminal bud 1–2 cm long. Stigma on fruit less than 90° excentric . **5. S. oblongifolia**
8. Terminal bud $^1/_2$–1 cm long. Stigma on fruit usually more then 90° excentric. **9. S. apiculata**
5. Calyx at anthesis up to $1^1/_2$ mm high.
9. Pith of branchlets with vascular strands.
10. Flowers (♂) 3–4 mm, calyx $1^1/_2$–$2^1/_2$ mm high. **2. S. mollis**
10. Flowers 2 mm, calyx $^1/_2$–$^3/_4$ mm high . . **4. S. laevigata**
9. Pith of branchlets without vascular strands.
11. Mature leaves beneath hairy at least on midrib and nerves, mostly also on the veins.
12. Calyx in anthesis $^1/_2$–1 mm high. Stigma on fruits less than 90° excentric. **1. S. tomentosa**
12. Calyx in anthesis 1–$1^1/_2$ mm high. Stigma on fruits 90° or more excentric. **9. S. apiculata**
11. Mature leaves beneath glabrous or only hairy on midrib.
13. Calyx during anthesis $^1/_2$–$^3/_4$ mm high.
14. Stigma on the fruits up to 90° excentric . **4. S. laevigata**
14. Stigma on fruits more than 90° excentric . **7. S. conferta**
13. Calyx during anthesis 1–2 mm high.
15. Terminal bud 1–2 cm long.

Stigma on fruit less than 90° excentric.

5. S. oblongifolia

15. Terminal bud $^1/_2$–1 cm long. Stigma on fruit usually more than 90° excentric.

9. S. apiculata

5: 231*a* *Santiria tomentosa* Bl.
Add to literature: Anderson, Gard. Bull. Sing. 20 (1963) 165.
In description, line 4, add after 'pubescent': to tomentose. Add under *petioles*, after 'flattened': or channelled.

5: 231*b* Add to Distr.: Philippines (Mindanao).
Add to Ecol.: also in secondary forests.

5: 232*a* *Santiria grandiflora* Kalkman.
Add to Distr.: several new collections from Brunei.
Santiria laevigata Bl.
Add to literature: Anderson, Gard. Bull. Sing. 20 (1963) 164.
Add to description: *Branchlets* thin-hairy when young. *Leaflets* beneath sometimes sparsely hairy on midrib and nerves; base not rarely somewhat oblique; apex acutely to bluntly short-acuminate.

5: 232*b* Add to Distr.: Philippines (Mindanao).

5: 233*a* *Santiria oblongifolia* Bl.
Add to description: Buttresses up to 2 m high. *Petioles* sometimes narrowly grooved at base. *Fruits* red when ripe.

5: 233*b* *Santiria conferta* Benn.
Change in description: Tree, 4–35 m by up to 70 cm ∅, with up to $1^1/_2$ m high buttresses. *Infructescences* to 30 cm long. *Fruits* to $1^3/_4$ cm long, stigma lateral to near the pedicel.
Add to Distr.: N. Borneo, at 1500–1800 m alt.
Delete 8. *Santiria nervosa* H. J. Lam.

5: 234*b* *Santiria apiculata* Benn.
In description add at end of sentence on *calyx*: to sepals less than $^1/_2$ connate. *Petals* inside glabrous or sparsely hairy.
Add under *fruits*: red when ripe.
Insert before the Key to the varieties:
Note. A great part of the material can easily be subdivided into the following three varieties; however, some specimens show characters of more than one variety.
var. apiculata.
Change Ecol. highest alt. into 1500 m.
var. rubra (Ridl.) Kalkman.
Add. to Ecol.: Primary and secondary forests up to 1600 m.

5: 236*a* *Santiria megaphylla* Kalkman.
In description, add at end of 1st sentence: by 45 cm ∅. Change in line 2 '$1^1/_2$' into: 1, and in line 4 '5' into: 8.

5: 236*b* Line 8, after 'part' add: to all looped and joined. Delete after *panicles* '(♂ unknown)', the same after *flowers*. Insert before '*Infructescences*': Pistillode in ♂ flowers minute.
Add to Distr.: Brunei.
Add to Ecol.: In primary Dipterocarp forest on damp to swampy, shallow clay soil, 0–150 m.

5: 236*a* *Santiria griffithii* (Hook. *f.*) Engl.
Add to synonymy: *Amoora aphanamixis Auct. non* R. & S.: Miq. Sum. (1861) 196.
Change in description: *Leaves* exceptionally to 15-jugate. *Petioles* sometimes strongly flattened at base. *Leaflets* exceptionally also hairy on midrib above and on veins beneath.

5: 236*b* *Calyx* (*in vivo*) olive to red. *Petals* (*id.*) yellowish-white.
Change in Ecol. highest alt. into 700 m.
Add to Notes: The collections For. Dept. Sarawak 12745 and 15613 represent a strongly pubescent form with flattened petioles.

5: 237*b* *Santiria rubiginosa* Bl.
Change in description: Tree not always buttressed. *Branchlets* mostly glabrous.
Add to Distr., under New Guinea: Vogelkop Peninsula.
var. rubiginosa.
Add to literature: Anderson, Gard. Bull. Sing. 20 (1963) 164.

5: 246 *Scutinanthe* Thw.
Line 2 from bottom, delete 'pilose'.

5: 247 Key: A further difference between the two species is in the fruits, these being densely pubescent in *S. brunnea*, glabrous in *S. brevisepala*.

5: 247*a* *Scutinanthe brunnea* Thw.
Add to literature: Wyatt-Smith & Kochummen, Mal. For. Rec. 17, rev. ed. (1965) 348.
In description, add: Sometimes the *leaves* are fully glabrous. Change: *Fruits* finally glabrescent, yellow.

5: 247*b* Add to Ecol.: In Sarawak at *c.* 800 m, in Sabah at *c.* 1200 m alt.

5: 247*b*, 567*ab* *Scutinanthe brevisepala* Leenh.
Add to literature and synonymy: Leenh. Blumea 12 (1964) 19. — *Dacryodes papuana* Husson, Blumea 7 (1952) 167, f. 1; Leenh. Fl. Mal. I, 5 (1956) 228.
Add to description: Tree up to 35 m high, 43–55 cm ∅, sometimes buttressed up to 3 m. *Branchlets* not always conspicuously lenticellate. *Leaflets* lanceolate to broad-elliptic or subovate, up to 10 cm wide, coriaceous or pergamentaceous to chartaceous, the base broadly cuneate to subcordate, mostly slightly oblique. *Inflorescences* axillary on short axillary shoots the vegetative terminal bud of which usually develops later on. *Ovary* (2–)3-celled. Mature *fruits* slightly oblique, ovoid to ellipsoid, constricted or shortly stalked at the base, pointed at the apex, $2^1/_4$–3 by $1^1/_2$–$1^3/_4$ cm, glabrous. *Seed* 1.

5: 251 *Canarium* Stickm.
Add to Distr.: The genus can be subdivided into 3 subgenera: *subg. Canarium*,

comprising the sections *Canarium* and *Pimela*; *subg.* **Africanarium** LEENH. *nov. stat.* (*Canarium sect. Africanarium* LEENH. Blumea 13, 1966, 396), monotypic, W. Africa; *subg. Canariellum.*

In Key to the species, add to couplet 5, 2nd lead: (in *C. album* sometimes papillose, then stamens connate halfway up or more, pistil pilose, and fruits white when ripe).

5: 252, 253 Replace couplets 14 to 19 incl. by the following:

14. Stipules fugacious, present only in the terminal bud, even the scars nearly invisible.
15. Leaflets equal-sided at base. Pith of branchlets always with central vascular strands. Fruit very peculiar (see fig. 21k, in vol. 5), 4–4 1/2 by 2 1/2–2 3/4 by *c.* 1 1/2 cm. **48. C. cestracion**
15. Leaflets oblique at base. Pith of branchlets mostly without central vascular strands. Fruit ovoid to spindle-shaped, round in cross-section, 2 1/2–3 1/2 by 1 1/2–2 cm. **53. C. album**
14. Stipules persistent to caducous, scars well visible.
16. Infructescences (sub)spicate, often with many fruits; fruits ovoid to subglobose, rather small (9–14 by 4–11 mm) . . **51. C. asperum**
16. Infructescences racemoid to thyrsoid, mostly with few fruits; fruits mostly relatively longer and always bigger.
17. Vascular strands in pith of branchlets all peripherally arranged; twigs long remaining densely hairy (rarely, only one of these characters holds good).
18. Indumentum pilose. Flowers long and slender, corolla more than two times as long as the calyx; filaments in ♀ flowers nearly completely connate. Fruits usually prismatic, blunt 3-angular in cross-section, at apex mostly truncate and 'shouldered', (sub)glabrous. **33. C. pilosum *ssp.* pilosum**
18. Indumentum tomentose to velvety. Corolla less than two times as long as the calyx; filaments in ♀ flowers free. Fruits ellipsoid, usually velvety. **49. C. vrieseanum**
17. Vascular strands in pith of branchlets only partly peripherally arranged; twigs soon glabrescent.
19. Stipules inserted on the petiole up to 3 cm from its base. Fruits fusiform, 4 by 2 cm. **52. C. vitiense**
19. Stipules inserted on the twig at the base of the petiole. Fruits ellipsoid, up to 3 1/2 by 2 cm.
19A. Leaflets rounded at base. Fruits 3–3 1/2 by 1 1/2–2 cm, pyrene smooth, sterile cells moderately reduced. **44. C. macadamii**
19A. Leaflets cuneate at base. Fruits 2 by 3/4 cm, pyrene irregularly grooved, sterile cells nearly completely reduced. **45. C. chinare**

5: 254, 255 Replace couplets 44 to 50 incl. by the following:

44. Inflorescences axillary.
45. Stipules rather caducous, roundish, ± herbaceous . **17. C. luzonicum**
45. Stipules persistent, linguiform, stiff-coriaceous . . **18. C. ovatum**
44. Inflorescences terminal (lower branches often in the upper leaf axils).
46. ♂ Flowers with 3 stamens.
47. Vascular strands in pith of branchlets all peripheral. Stipules caducous, *c.* 2 mm ∅. **5. C. caudatum *f.* caudatum**
47. Vascular strands in pith of branchlets partly central. Stipules subpersistent, *c.* 15 by 10 mm. **54. C. reniforme**
46. ♂ Flowers with 6 stamens.
48. Stipules (rather) persistent, attached on the petiole 1/2–1 1/2 cm from its base . . . . **10. C. lamii**
48. Stipules caducous, mostly attached on the twig at or partly, exceptionally fully, on the base of the petiole.
49. Stipules oblong, 1–5 by 1/2–1 3/4 cm; scar linear, *c.* 1/2 cm long. **14. C. vulgare**
49. Stipules reniformous, much smaller; scar elliptic to drop-shaped, 1–2 mm long.
50. ♂ Inflorescences very lax, branches long and patent. ♂ Flowers 13 mm long. **6. C. divergens**
50. ♂ Inflorescences not very lax. ♂ Flowers *c.* 8 mm long.
50A. Veins and reticulations more or less prominulous and well-visible on the under surface of the leaflet; nerves 11–15 pairs, mutual distance along the midrib usually less than 1 cm . **1. C. littorale**
50A. Veins and reticulations nearly invisible in dried specimens; nerves 5–10–15 pairs, mutual distance along midrib 1–1 1/2 cm . **4. C. patentinervium**

5: 255 Replace 63 1st lead and couplet 64 by the following:

63. Filaments at least nearly halfway connate.
64. Branchlets long remaining densely ferruginous-woolly. Leaves up to 8-jugate; nerves 14–17 pairs. Fruiting calyx *c.* 5 mm ∅. **40. C. kipella**
64. Branchlets glabrous or puberulous at the tip only. Leaves up to 6-jugate; nerves mostly less than 14 pairs. Fruiting calyx 8–11 mm ∅.
64A. Leaflets lanceolate. Pith of branchlets always with central vascular strands. **39. C. intermedium**
64A. Leaflets (oblong to) broad-elliptic (to suborbicular). Pith of branchlets mostly without central vascular strands . **55. C. pimela**

5: 256*a* *Canarium littorale* Bl.
Add to literature: Leenh. Blumea 9 (1959) 337; Back. & Bakh. *f.* Fl. Java 2 (1965) 115; Meijer, Bot. Bull. Herb. Sandakan 11 (1968) plate between p. 111 and 112 (seedling).

5: 258*a* Add in Notes to the area of *f. pruinosum* (Engl.) Leenh.: Brunei and Sabah.
Canarium latistipulatum Ridl.
Add to literature: Leenh. Blumea 9 (1959) 341.

5: 258*b* Add to description: *Fruits* spindle-shaped, ± round in cross-section, 7 by $2^1/_4$ cm, glabrous; pyrene smooth, rounded triangular in cross-section, the lids intruded, lids *c.* 3–4 mm thick. *Seeds* 2, sterile cell moderately reduced.
Canarium perlisanum Leenh.
Add to literature: Leenh. Blumea 9 (1959) 342.

5: 259*a* *Canarium patentinervium* Miq.
Add to literature: Leenh. Blumea 9 (1959) 342, f. 15.
Add to description: Tree sometimes buttressed. *Infructescences* sometimes glabrescent.
Add to Ecol.: also in secondary and swamp forests.

5: 259*b* *Canarium caudatum* King.
Add to literature: Leenh. Blumea 9 (1959) 343.

5: 260*a* Add to Notes *sub f. auriculiferum* Leenh.: also known from the Malay Peninsula.
Canarium divergens Engl.
Add to literature: Leenh. Blumea 9 (1959) 346.
Canarium kinabaluense Leenh.
Add to literature: Leenh. Blumea 9 (1959) 346.

5: 260*b* Add to description: *Inflorescences* terminal, laxly thyrsoid, *c.* 4–6 cm long, few-flowered, minutely tomentose, glabrescent. *Flowers* (♀) 1 cm long. *Calyx* 5 mm, minutely tomentose. *Stamens* 6, glabrous, inserted on the rim of the disk. *Disk* glabrous, adnate to the receptacle. *Pistil* glabrous.
Add to Distr.: East Borneo.
Add to Ecol.: down to 450 m.
Canarium maluense Laut.
Add to literature: Leenh. Blumea 9 (1959) 347.
ssp. maluense.
Add to description, 1st sentence: up to 60 m high, with up to $1^1/_2$ m high buttresses.

5: 261*a* Add to Distr.: Louisiade Arch.
Add: Uses. Timber for construction.
Canarium megacarpum Leenh.
Add to literature: Leenh. Blumea 9 (1959) 351.

5: 261*b*, *Canarium lamii* Leenh.
567*a* Add to literature: Leenh. Blumea 9 (1959) 351.
The following changes should be made in the description: Tree up to 42 m by 66 cm, sometimes with buttresses and stiltroots. *Leaves* 3–4-jugate. *Stipules* subpersistent or more or less caducous, inserted $^1/_2$–$1^1/_2$ cm from the base of the petiole. *Leaflets* up to 22 by 10 cm, base rounded to cordate; nerves 10–15 pairs. *Inflorescences* (♀) remotely spicate, densely tomentose. *Flowers*: old ♀ known. *Calyx* 7 mm high, the lobes $1^1/_2$ mm; outside tomentose, inside appressed short-hairy, densest near base and margin. *Corolla*: petals $7^1/_2$ by 5 mm, outside densely appressed short-hairy in the upper half mainly along the midrib, inside glabrous, *in vivo* orange to red. *Staminodes* 6, inserted on the disk, *c.* $3^1/_2$–4 mm long, glabrous. *Disk* adnate to the hollowed receptacle, free rim $^1/_2$–$^3/_4$ mm high, fleshy, glabrous. *Pistil* glabrous; ovary 3 mm; style $1^1/_4$ mm, thick; stigma globular, 1 mm ∅. *Infructescences* with 1 or few fruits, rusty tomentose; calyx to $2^1/_2$ cm ∅, densely rusty tomentose when young.
Add: Ecol. Primary and secondary forests up to *c.* 1250 m.
Canarium sylvestre Gaertn.
Add to literature: Leenh. Blumea 9 (1959) 352.
Add to description, 1st sentence: sometimes with stiltroots.

5: 262*a* Add to Ecol.: also in secondary forests.

5: 262*b* *Canarium piloso-sylvestre* Leenh.
Add to literature: Leenh. Blumea 9 (1959) 353, f. 16.
Add to description: Acumen of leaflets blunt to acute. *Calyx* $2^1/_2$–4 mm high, outside sometimes slightly pubescent towards the apex. *Disk* 3–6-lobed.

5: 263*a* Add to Ecol.: In seasonally inundated primary forest.
Canarium salomonense B. L. Burtt.
Add to literature: Leenh. Blumea 9 (1959) 353.
Change in description: Tree up to *c.*

40 m by 80 cm, mostly with buttresses.
Canarium vulgare LEENH.
Add to literature: LEENH. Blumea 9 (1959) 358; BACK. & BAKH. *f.* Fl. Java 2 (1965) 115.

5: 265*a* Add to Distr.: New Guinea.

5: 265*b* Add to Ecol.: Alt. up to 1200 m.

5: 266*b* *Canarium indicum* L.
Add to literature: LEENH. Blumea 9 (1959) 359; BACK. & BAKH. *f.* Fl. Java 2 (1965) 115.

5: 269*b* *Canarium kaniense* LAUT.
Add to literature: LEENH. Blumea 9 (1959) 362.

5: 270*b* *Canarium luzonicum* (BL.) A. GRAY.
Add to literature: LEENH. Blumea 9 (1959) 363.
Add to Distr.: Mindanao.

5: 271*a* *Canarium ovatum* ENGL.
Add to literature: LEENH. Blumea 9 (1959) 364.

5: 271*b* *Canarium odontophyllum* MIQ.
Add to literature: LEENH. Blumea 9 (1959) 365.

5: 272*a* Add to Uses: In Sarawak grown for its fruits.
Canarium denticulatum BL.
Add to literature: LEENH. Blumea 9 (1959) 367; BACK. & BAKH. *f.* Fl. Java 2 (1965) 115.

5: 274*a* *ssp. kostermansii* LEENH.
Add to Distr.: Sabah.
Canarium karoense H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 370.
Canarium megalanthum MERR.
Add to literature: LEENH. Blumea 9 (1959) 370, f. 17; MEIJER, Bot. Bull. Herb. Sandakan 11 (1968) plate between p. 111 and 112 (seedling).
Add to description: Sometimes with up to 1 m high buttresses. *Stipules* sometimes caducous, sometimes inserted on the base of the petiole or even slightly on the twig. *Leaflets* often chartaceous, base sometimes nearly equal-sided, margin sometimes serrulate near the apex.

5: 274*b* *Canarium pseudopatentinervium* H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 385.
Add to description: Buttresses sometimes present. *Leaflets*: apex shortly blunt- to acute-acuminate; nerves not to distinctly looped and joined. ♂ *Inflorescences* with up to 10 cm long lower branches, these as well as the main axis laxly set with subsessile glomerules of flowers. ♂ *Flowers* 3–4 mm long pedicelled. *Disk* in ♂ flowers cushion-shaped, *c.* 1 mm high, densely hairy, without rudimentary pistil.

5: 275*a* *Canarium grandifolium* (RIDL.) H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 386, f. 21, *non* BAILLON *ex* DE LANESSAN, Pl. Utiles Col. Franç. (1886) 309, *nom. nud.*
Add to description: Pith of branchlets dark- to light-brown, either with peripherally arranged, or with scattered vascular strands.
Add to Distr.: Borneo, Sabah (Beaufort Distr., Ulu Lumat, SAN 44543).
Add to Ecol.: Primary forest.
Canarium apertum H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 386.

5: 275*b* Incertae sedis: The systematic position of *C. pseudodecumanum* and *C. decumanum* remains uncertain, even with growing knowledge. The blastogeny is in full accordance with *sect. Canarium*, the ontogeny of the stipules of *C. decumanum* with *sect. Pimela*, however.

5: 276*a* *Canarium pseudodecumanum* HOCHR.
Add to literature: LEENH. Blumea 9 (1959) 388; MEIJER, Bot. Bull. Herb. Sandakan 11 (1968) plate between p. 111 and 112 (seedling).

5: 277*a* *Canarium decumanum* GAERTN.
Add to literature: DOUGLAS & BAAS BECKING, Bull. Bot. Gard. Btzg III, 17 (1947) 295–296, t. 11; LEENH. Blumea 9 (1959) 389; BACK. & BAKH. *f.* Fl. Java 2 (1965) 114; MEIJER, Bot. Bull. Herb. Sandakan 10 (1968) plate between p. 138 and 139.
Add to Distr. under New Guinea: Japen I.

5: 278*a* *Canarium oleosum* (LAMK) ENGL.
Add to literature: LEENH. Blumea 9 (1959) 391.
Add to description, 1st sentence: Tree up to 50 m high.

5: 278*b* Add to Distr. under Lesser Sunda Is.: Sumbawa.

5: 279*a* *Canarium balsamiferum* WILLD.
Add to literature: LEENH. Blumea 9 (1959) 392.

5: 279*b* Add to Distr.: Lesser Sunda Is. (Sumbawa).

5: 280*a* *Canarium trigonum* H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 393.
Canarium euryphyllum PERK.
Add to literature: LEENH. Blumea 9 (1959) 394.

5: 280*b* Add to description: *Corolla* reported to be yellowish red.

5: 281*a*, 567*b* *Canarium kostermansii* LEENH.
Add to literature: LEENH. Blumea 9 (1959) 398, f. 23.
Add to description: *Leaflets*: acumen acute to bluntish; nerves 20–25 pairs.
Add: Ecol. Primary forest.

5: 281*b* *Canarium pilosum* BENN.
Add to literature: LEENH. Blumea 9 (1959) 398.

5: 282*a* *ssp. borneensis* LEENH.
Add to Distr.: Sarawak (G. LAMBIR).

Add to Ecol.: from the lowland up to *c.* 1500 m.
Canarium merrillii H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 402.

5: 282*b* *Canarium gracile* ENGL.
Add to literature: LEENH. Blumea 9 (1959) 396, f. 22.
Add to description: The *flowers* are said to be purplish, the *fruits* first red, when ripe black.

5: 283*a* *Canarium dichotomum* (BL.) MIQ.
Add to literature: LEENH. Blumea 9 (1959) 423.
Add to description: *Leaflets* sometimes beneath rather densely appressed short-hairy; acumen sometimes slender and acute. ♀ *Inflorescences* up to 35 cm long.

5: 283*b* Add to Ecol.: Sometimes also in secondary forests. Alt. up to 1000 m.
Canarium fusco-calycinum RIDL.
Add to literature: LEENH. Blumea 9 (1959) 424.
Add to description: Nerves geniculate or looping near the margin.
Add to Ecol.: Primary lowland Dipterocarp forest at 100 m.

5: 284*b* *Canarium australianum* F.v.M.
Add to literature: LEENH. Blumea 9 (1959) 421; SPECHT, Rec. Am. Austr. Exp. Arnhem Land 3 (1958) 460.

5: 285*a* Add to description: *Leaflets* sometimes oblong.
Add to Distr. under Australia: the northern part of W. Australia.

5: 285*b* *Canarium intermedium* H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 419, f. 29.
Canarium kipella (BL.) MIQ.
Add to literature: LEENH. Blumea 9 (1959) 419; BACK. & BAKH. *f.* Fl. Java 2 (1965) 115.

5: 286*a* *Canarium pseudosumatranum* LEENH.
Add to literature: LEENH. Blumea 9 (1959) 431.
Change in description: *Leaves* 6–9-jugate; leaflets 7–20 by 3–6 cm. *Inflorescences* 20–30 cm long.

5: 286*b* *Canarium sumatranum* BOERL. & KOORD.
Add to literature: LEENH. Blumea 9 (1959) 432, f. 31.
Add to description: *Leaflets* up to 23 cm long, rough above; nerves up to more than 30 pairs. ♀ *Inflorescences* like the ♂ ones. ♀ *Flowers* 6 mm long, the calyx $2^1/_2$ mm.

5: 287*a* *Canarium hirsutum* WILLD.
Add to literature: LEENH. Blumea 9 (1959) 424, f. 30; BACK. & BAKH. *f.* Fl. Java 2 (1965) 115.

5: 289*a* *Canarium hirsutum* WILLD. *var. hirsutum.*
Add to Distr.: Solomon Is.

5: 289*b* *Canarium macadamii* LEENH. — **Fig. 2.**
Add to literature: LEENH. Blumea 9 (1959) 448.
Add to description: Tree 30–40 by $^3/_4$–1 m. *Leaflets* 10–20 cm long. ♀ *Inflorescences* 8–10 cm. ♀ *Flowers* 7 mm; calyx 4 mm; petals outside sparsely hairy; staminodes confluent with the disk; disk glabrous, protruded into 6 tongue-shaped, fleshy, 2 mm long lobes alternating with and nearly equalling staminodes. *Infructescences* 8–15 cm long; calyx 5–7 mm ⌀.
Add to Ecol.: Alt. 1100–1500 m. *Fl.* Febr.
Add: Uses. Seeds edible.
Canarium chinare GRUTTERINK & H. J. LAM.
Add to literature: LEENH. Blumea 9 (1959) 449.

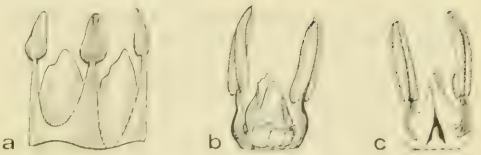

Fig. 2. *Canarium macadamii* LEENH. *a.* Staminodes and disk of ♀ flower from outisde, *b.* & *c.* stamens and disk of ♂ flower from outisde (*b*) and on longitudinal section (*c*: mind the tiny pistillode), all × 6 (*a* NGF 21682, *b–c* MACADAM 206).

5: 290*a* *Canarium rigidum* (BL.) MIQ.
Add to literature and synonymy: LEENH. Blumea 9 (1959) 434, f. 32. — *C. polyphyllum* K. SCH. in K. Sch. & Hollr. Fl. Kais. Wilh. Land (1889) 63; LEENH. Fl. Mal. I, 5 (1956) 290, f. 20 d; Blumea 9 (1959) 434, f. 33.
Add to description: Tree up to 30 m by 40–45 cm. ♀ *Inflorescences* 8–9 cm long, the partial inflorescences *c.* 2 cm long, with 1 or 2 flowers. ♀ *Flowers* $7^1/_2$ mm long, the calyx $4^1/_2$ mm high, outside densely appressed pubescent; staminodes free outside the disk, 2 mm long; disk faintly lobed, *c.* 1 mm high, long-hairy towards the margin; pistil glabrous.
Add: Uses. Reported to be used for buildings proas.
Canarium polyphyllum K. SCH.
With new collections that became available it became more and more clear that the present species and *C. rigidum* represented only extremes as to hairiness, leaf ratio, and sculpture of fruit kernel, but could not well be demarcated. Hence, *C. polyphyllum* had to be reduced to *C. rigidum.*

5: 290*b* *Canarium cestracion* LEENH.
Add to literature: LEENH. Blumea 9 (1959) 436.
Change in description: Vascular strands in pith of *branchlets* may also be mainly peripherally arranged. *Infructescences*

3–20 cm long. *Fruits*, if 1-seeded, much flattened in cross-section.

5: 291*a* Add to Distr.: A second collection (NGF 25654) from Morobe Distr., at 30 m alt.

Canarium vrieseanum ENGL.
Add to literature: LEENH. Blumea 9 (1959) 437.

5: 291*b* *Canarium acutifolium* (DC.) MERR.
Add to literature: LEENH. Blumea 9 (1959) 445.
var. acutifolium.
Change in description: Tree 13–45 m. *Leaflets* up to 40 by 15 cm. *Fruiting calyx* up to $7^1/_2$ mm ∅. *Fruits* up to $17^1/_2$ by $12^1/_2$ (1-seeded) or $17^1/_2$ (2-seeded) mm. *Seeds* exceptionally 2.
Add to Distr.: New Britain.

5: 293*a* *Canarium asperum* BENTH.
Add to literature: LEENH. Blumea 9 (1959) 439; BACK. & BAKH. *f.* Fl. Java 2 (1965) 115.

5: 295*b* *ssp. asperum var. asperum.*
Add to Uses: On wood see SCHNEIDER, Bull. Bur. For. Philip. 14 (1916) 129.

5: 296*a* Replace the heading of 52. *Canarium schlechteri* LAUT. by the following:
52. Canarium vitiense A. GRAY, U.S. Expl. Exp. Bot. 1 (1854) 373; LEENH. Blumea 9 (1959) 451; Blumea 13 (1965) 166. — *C. samoense* ENGL. in DC. Mon. Phan. 4 (1883) 134; LEENH. Blumea 9 (1959) 452. — *C. schlechteri* LAUT. Bot. Jahrb. 56 (1920) 328; LEENH. Fl. Mal. I, 5 (1956) 296, f. 20 e; Blumea 9 (1959) 444. — *C. smithii* LEENH. Bish. Mus. Bull. 216 (1955) 12, f. 6; Blumea 9 (1959) 450. — *C. bacciferum* LEENH. Bish. Mus. Bull. 216 (1955) 19, f. 9. Add to description: ♀ *Inflorescences* racemose, 6–9 cm long, tomentose. ♀ *Flowers* 1 cm long, less slender than ♂ ones, subsessile; calyx 4 mm; staminodes 3 mm, connate for less than 1 mm; disk annular, low, long-ciliate; pistil 4 mm, glabrous, ovary tapering into the style.

5: 296*b* Replace Distr. by: *Malesia*: eastern half of New Guinea, Louisiade Arch., Admiralty Is., Bismarck Arch., Solomons, Fiji, Samoa, and Tonga.

5: 296*b* After species 52 the following species should be added:

53. Canarium album (LOUR.) RAEUSCH. Nomencl. ed. 3 (1797) 287; HANCE, J. Bot. 9 (1871) 38; GUILLAUMIN, Bull. Soc. Bot. Fr. 55 (1908) 617, t. 19 f. 1; HAYATA, J. Coll. Sc. Imp. Univ. Tokyo 30 (1911) 52; MERR. Int. Rumph. (1917) 304; WALKER, Imp. Trees Ryukyu (1954) 148, f. 82; LEENH. Blumea 9 (1959) 402, f. 24; BARANOV, Quart. J. Taiw. Mus. 20 (1967) 367, *cum fig.*; *non* BLCO, Fl. Filip. (1837) 793 (= *C. luzonicum* A. GRAY). — ? *C. sinense Cana* RUMPH. Herb. Amb. 2 (1741) 154. — *Pimela alba* LOUR. Fl. Coch. (1790) 408.

Tree, up to 30 m by $1^1/_2$ m ∅. *Branchlets* 5–6 mm ∅, the young parts fulvous tomentose, older parts sometimes gnarly by the strongly prominent scars of leaves and inflorescences; pith with a peripheral cylinder of small vascular strands, rarely moreover some strands in the central part. *Leaves* 3–6-jugate. *Stipules* present in the bud only, inserted on the twig next to the petiole, even the scar usually nearly invisible. *Leaflets* usually distinctly sinuous, especially the basal pairs, lanceolate or elliptic (to ovate), $6^1/_2$–14 by 2–$5^1/_2$ cm, chartaceous to coriaceous, glabrous or with some scattered bristles on the nerves below, lower side often minutely verrucose; base oblique, cuneate to rounded; margin entire; apex tapering to subabruptly acuminate, acumen up to 2 cm long, blunt; nerves 12–16 pairs, angle to midrib 65–75°, straight to faintly curved in the broader, strongly curved in the narrower side of the leaflet, more or less distinctly looped and joined near the margin; intercalary veins sometimes distinctly developed; reticulation dense. *Inflorescences* axillary, tomentellous to glabrous, ♂ thyrsoid, 15–30 cm long, many-flowered, ♀ racemoid, 3–6 cm long, with up to 12 flowers. *Flowers* sparsely tomentose to glabrous, ♂ $5^1/_2$–8 mm long, ♀ *c.* 7 mm. *Calyx* $2^1/_2$–3 mm, in ♀ flowers subtruncate. *Stamens* 6, glabrous, the filaments more than halfway (in ♀ flowers up to nearly completely) connate. *Disk* ♂ globular to cylindrical, 1–$1^1/_2$ mm high, slightly 6-lobed, solid or with a central canal, the upper side with some bristles; in ♀ flowers annular, faintly 3-lobed, 1 mm high, thick and fleshy, pilose on the inner surface. *Pistil* densely short-pilose, in ♂ flowers minute or none. *Infructescences* up to 15 cm long with up to 6 fruits; calyx flat, 3-lobed, $^1/_2$ cm ∅, the lobes recurved. *Fruits* ovoid to spindle-shaped, round in cross-section, $2^1/_2$–$3^1/_2$ by $1^1/_2$–2 cm, glabrous, *in vivo* white when ripe; pericarp rather thick; pyrene acuminate, rounded (to 6-angular) in cross-section, with a distinct groove between the blunt angle-ribs and the lids, the latter with a faint median rib, surface furthermore slightly undulated; lids $1^1/_2$–2 (–3) mm thick. *Seeds* 1 or 2, the sterile cell(s) slightly reduced, round in cross-section.

Distr. Annam (from about 16° N northwards), Tonkin, southern China (up to about 27° N), and Hainan; as the species is much cultivated, mainly in the same region, it is sometimes difficult to decide whether in some part of the area it is wild or naturalized, or even planted. In

Malesia: Sumatra, East Coast (Medan, planted in and naturalized near a park: LÖRZING 16519, 17240).

Ecol. In light to dense forests on dry to moist soils, usually at medium altitude (400–1200 m).

Uses. Especially in SE. China commonly planted for ornament and as a fruit tree. The fruits, of which the pulp as well as the seeds are eaten, prepared in several ways, are highly esteemed by the Chinese. Furthermore, the wood and the resin are sometimes used.

Note. *C. album* belongs to *sect. Pimela*, to the relationship of *C. pilosum*, and seems to be nearest to *C. pimela*.

54. Canarium reniforme KOCHUMMEN & WHITMORE, Gard. Bull. Sing. 24 (1969) 2.

Tree, up to 18 m by 30 cm ⌀. *Branchlets* 5–7 mm ⌀, long remaining fulvous-tomentellous; pith with many vascular strands, partly peripheral. *Leaves* 2–4-jugate. *Stipules* attached on the base of the petiole, mostly partly on the twig, oblong to reniform, 15–25 by *c.* 10 mm, rather stiff, persistent. *Leaflets* ovate to ovate-oblong or elliptic, $3^1/_2$–16 by $1^1/_2$–10 cm, stiff-coriaceous, beneath thinly puberulous, further glabrous; base of laterals slightly oblique, cuneate to rounded, margin entire, apex rather abruptly, bluntly to acutely acuminate; nerves 7–14 per side, angle to midrib *c.* 60–70°, nearly straight to curved, looped and joined near the margin, veins and veinlets much more slender, but well-visible on both sides. *Inflorescences* terminal, *c.* 25 cm long. *Flowers*: ♀ unknown. *Calyx* 5 mm high, outside puberulous, inside glabrous. *Petals* outside hairy in the central part. *Stamens* 3, adnate to the disk. *Disk* solid, globular, tapering into a 'style', glabrous. *Infructescence* *c.* 10 cm long, glabrous; calyx flat, orbicular, 1–$1^1/_2$ cm ⌀, with inside an annular, not-lobed, glabrous disk. *Fruits* ovoid to ellipsoid, 5–$5^1/_2$ by *c.* $2^3/_4$ cm, in cross-section blunt-triangular; pyrene rather smooth; lids 3–4 mm thick. *Seed* 1, the fertile cell orbicular in cross-section, the sterile ones nearly completely reduced.

Distr. *Malesia*: the Malay Peninsula (Perak).

Ecol. Understorey of primary hill-forest at *c.* 300 m alt. *Fr.* June.

Note. *C. reniforme* belongs to *sect. Canarium* and is closely allied to *C. patentinervium* and *C. caudatum*. With the latter it shares the number of 3 stamens, with the former the general habit, apart from the peculiar stipules.

55. Canarium pimela LEENH. Blumea 9 (1959) 406, f. 25. — ? *C. sinense Tsjacana* RUMPH. Herb. Amb. 2 (1741) 154. — *Pimela nigra* LOUR. Fl. Coch. (1790) 407. — *C. pimela* KOEN. Ann. Bot. 1 (1805) 361, t. 7, f. 1, *nom. illeg.*; HANCE, J. Bot. 9 (1871) 38; FORB. & HEMSL. J. Linn. Soc. Bot. 23 (1886) 113; MERR. Int. Rumph. (1917) 304; MERR. & CHUN, Sunyatsenia 2 (1935) 253; MERR. Comm. Lour. (1935) 227; *non* BL. Bijdr. (1826) 1162 (= *C. kipella*), *nec* SPAN. Hook. Comp. Bot. Mag. 1 (1835) 346 (= *C. oleosum*), *nec* BLCO, Fl. Filip. (1845) 545 (= *C. asperum*).

Tree, up to 30 m by $1^1/_2$ m ⌀. *Branchlets* 7–10 mm ⌀, glabrous; pith with a peripheral cylinder of vascular strands and sometimes a few in the central part. *Leaves* 4–6-jugate, glabrous. No *stipules*. *Leaflets* oblique, often distinctly falcate, broad-elliptic (to ovate or suborbicular, rarely oblong), 6–17 by 2–$7^1/_2$ cm, chartaceous to coriaceous; base acute, often decurrent; margin entire; apex rather abruptly acuminate, acumen short, broad, and blunt; nerves (8–) 11 (–15) pairs, angle to midrib 70–75°, straight to faintly curved, looped and ± joined near the margin; veins and veinlets coarsely reticulate. *Inflorescences* axillary, glabrous, laxly thyrsoid (♂) to racemoid (♀), 15–40 cm long, ♂ many-, ♀ few-flowered. *Flowers* (sub)glabrous, ♂ 7 mm long, slender, ♀ 9 mm long. *Calyx* in ♂ flowers $2^1/_2$ mm, distinctly lobed, in ♀ flowers $3^1/_2$–4 mm, subtruncate. *Corolla* in ♀ buds characteristically conical. *Stamens* 6, glabrous (except 2 rows of bristles on the anthers in ♀ flowers), in ♂ flowers nearly halfway, in ♀ flowers slightly more than halfway connate. *Disk* annular, $^1/_2$–1 mm high, fimbriate, in ♂ flowers thick-fleshy with a narrow central canal, in ♀ flowers thin, slightly 6-lobed. *Pistil* glabrous, in ♂ flowers absent. *Infructescences* 8–35 cm long, lax, with 1–4 long-stalked fruits; calyx nearly flat, faintly triangular to suborbicular, 8–10 mm ⌀. *Fruits* narrowly ovoid, 3–4 by $1^1/_4$–2 cm, round to slightly triangular in cross-section; pericarp thin; pyrene smooth or with a faint median rib on the lids; lids *c.* 3 mm thick. *Seeds* 1 or 2; fertile cell(s) usually with a distinct adaxial rib, sterile cells moderately reduced.

Distr. SE. China (from about 27° N southwards), Hainan, and Indo-China; as the species is much cultivated, especially in southern China and Tonkin, it is not well possible to draw the natural limits of its present area of distribution. In *Malesia*: Borneo (Sarawak, near Belaga, JACOBS 5239).

Ecol. In dense to open forests, usually at medium altitude; in *Malesia* in primary

hill-forest below 500 m. *Fl.* Aug.

Uses. Planted as an ornamental and especially as a fruit tree. The fruits are highly esteemed among the Chinese; they are comfited or pickled. Only the pulp is eaten. The wood and resin are sometimes used, but are of no great value.

Notes. *C. pimela* belongs to *sect. Pimela*, to the relationship of *C. pilosum*, with *C. album* and *C. parvum* LEENH. (N. Vietnam) as its possibly nearest allies.

For the complicated nomenclature of the present species see LEENH. *l.c.*

5: 296 Add to Excluded genera:
Nothoprotium MIQ. Sum. (1861) 527 = *Pentaspadon* (*Anacardiaceae*); reduction already made by MARCHAND, Rév. Anacard. (1869) 90, 183.

Campanulaceae

4: 27*b* *Sphenoclea zeylanica* GAERTN.
Add. to Distr.: Northern Territory of Australia. *Cf.* BLAKE, Austr. J. Bot. 2 (1954) 137.

6: 121*b* *Codonopsis lancifolia* (ROXB.) MOELIONO *ssp. lancifolia*.
Add to synonymy: *Canarina moluccana* ROXB. [Hort. Beng. 87] Fl. Ind. ed. Carey 2 (1832) 173; ed. Clarke (1872) 298. *Cf.* STEEN. Nova Guinea, Bot. 12 (1963) 191.

No specimens or drawing could be traced, but the brief description is clear. ROXBURGH had this species twice in his Flora, but the Moluccan one had 6-merous flowers and was therefore arranged in another Linnean class.

In his monograph of *Canarina*, HEDBERG erroneously dismissed the ROXBURGH name as a *nomen nudum* (Svensk Bot. Tidskr. 55, 1961, 19).

6: 122 Add to the species of *Lobelia*:

Lobelia donanensis VAN ROYEN, Kew Bull. 20 (1966) 305, f. 1.

Small herb, with a glabrous, up to 12 mm long stem. *Leaves* alternate, $1^1/_2$–$2^1/_2$ cm long; limb ovate or ovate-elliptic, 7–12 by 5–7 mm, rounded or broadly cuneate at base, wavy along margins and with distinct, pear-shaped glands, obtuse or rounded at apex, coriaceous when alive, glabrous on either side, pilose along margin; petiole up to 11 mm, pilose in apical part only. *Flowers* chocolate-coloured, axillary and terminal; pedicels up to 6 mm, glabrous. *Calyx* $2^1/_2$–3 mm long; lobes lanceolate-linear, 1–$1^1/_2$ mm long, usually with 3 glands on the teeth along the margin, pilose on outside. *Corolla* 5–6 mm long; tube 2–$2^1/_2$ mm, pilose on outside, dorsally split to 1 mm from the base; free part of all lobes *c.* 3 by 3 mm, acutely acuminate; ventral lobes on inside with dark purple papillae and near the throat also with 3 or 4 longitudinal crests. *Stamens c.* 3 mm, entirely connate; filaments glabrous; anterior anthers $1^1/_2$ mm long, the posterior ones *c.* 1 mm; all connectives papillate, not barbate at tips. *Ovary* globose, *c.* 1 mm ∅, glabrous; style glabrous; stigmas dark purple, papillate along the margins. *Capsule* globose, $2^1/_2$–3 mm ∅, glabrous, thin-walled. *Seeds* obovoid, *c.* 0.7 mm long, subtriangular in cross-section, smooth.

Distr. *Malesia*: East New Guinea (Milne Bay Distr., Maneau Range, Mt Donana), one collection.

Ecol. Between dead moss in open grassland on limestone, 2250 m. *Fl. fr.* Aug.

Notes. According to the author allied to *L. archboldiana*, but differing in the gland-bearing leaf margin, the corolla lobes which are papillose inside and with longitudinal crests near the tube, the papillose connective, and glabrous ovary.

At Leiden we have no material of either species and these data are not checked.

6: 133*b* *Lobelia borneensis* (HEMSL.) MOELIONO.
Add to Distr.: Also in Flores (Lesser Sunda Is.). *Cf.* STEEN. Blumea 15 (1967) 153.

6: 137 Replace *Phyllocharis* DIELS, 1917, *non* FÉE, 1824, by: **Ruthiella** STEEN. Blumea 13 (1965) 127, and the species names of the four species of this Papuan genus on p. 137–139 by:
1. Ruthiella oblongifolia (DIELS) STEEN. *l.c.*
2. Ruthiella schlechteri (DIELS) STEEN. *l.c.*
3. Ruthiella subcordata (MERR. & PERRY) STEEN. *l.c.*
4. Ruthiella saxicola (VAN ROYEN) STEEN. *l.c.*

6: 141 Bottom line: Replace *Legousia speculum-veneris* (L.) FISCH. by: *Specularia speculum-veneris* (L.) CARUEL (1888).

The generic name *Specularia* HEIST. *ex* FABR. Enum. Pl. Hort. Helmst. (1759) 151, *nom. valid.*; ed. 2 (1763) 225, *descr.*, has distinct priority over *Legousia* DURAND, Fl. Bourg. 1 (1782) 37; 2 (1782) 26.

Caprifoliaceae (VAN STEENIS & KERN)

4: 175 In this family we have omitted to mention any cultivated species, as none were known outside scientific botanic gardens, as far as collections were made. It was overlooked that in the former century KORTHALS had collected one which was described by MIQUEL as a new species from Java. Add to:

4: 194 Formerly cultivated

Weigelia coraeensis THUNB. Trans. Linn. Soc. 2 (1794) 331; HARA, En. Sperm. Jap. 2 (1952) 63; STEEN. Blumea 13 (1965) 167. — *Weigelia fallax* MIQ. Fl. Ind. Bat. 2 (1856) 128. — *Diervilla fallax* (MIQ.) BOERL. Handl. Fl. Ned. Ind. 2 (1891) 6.

Note. Native in Kyushyu I., Japan, but rare in cultivation. This may well have been an original import by the East India Company, via the Dutch Settlement in Deshima, in VON SIEBOLD's time. In the Catalogue of TEYSMANN & BINNENDIJK (1866) two *Diervillas* are mentioned to be cultivated, but this was apparently unsuccessful and the genus is absent in the Catalogue of the Bogor Botanic Gardens of 1930.

4: 178*a* *Lonicera malayana* HENDERSON.

Of this extremely rare species two new collections have come in, both collected on the Selangor/Pahang Gentinh new access road, on steep hillside, 1000 m (FRI 3882 & 4519 WHITMORE, *fl.* and *fr.* respectively).

Add to description: Big woody climber, stem $2^1/_2$ cm ∅, reaching to 20 m up a tree; leafy branches scattered all the way up. *Fruit* globular, *c.* 5–8 mm ∅, black, juicy. *Seeds* 1–4, *c.* 4 mm long, ± convex, surface wrinkled.

Note. In both specimens the condensed inflorescence is terminal, without axillary stalks.

4: 181 Line 35 from bottom. Delete from the species of which the flowers are unknown *V. amplificatum* and *V. clemensae*.

4: 182 Replace lines 5–26 and complete the key for flowering specimens as follows:

11. Corolla not distinctly tubular, tube less than 3 times as long as lobes, the latter often more than 1 mm long.
14. Inflorescence shortly pyramidal, paniculate. Filaments 1–3 mm long. Tube of corolla $^1/_4$–1 mm long.
15. Leaves entire, glandular-pitted beneath in the axils of the primary and secondary side-nerves. **14. V. clemensae**
15. Leaves crenate-dentate.
16. Leaves thinly coriaceous. Corolla 2–$2^1/_2$ mm long. Filaments inserted at the base of the corolla. (Between 500 and 1500 m altitude, sometimes up to 2300 m.) **10. V. lutescens**
16. Leaves manifestly coriaceous. Corolla 3 mm long. Filaments adnate to the corolla $^1/_2$–1 mm above the base. Without fruits hardly distinguishable from *V. lutescens*. (Altitude at least 2300 m.) . . . **11. V. junghuhnii**
14. Inflorescence corymbiform. Filaments at least 6 mm long. Tube of the corolla usually exceeding 1 mm.
17. Filaments in bud with inflexed top, 6 (–7) mm long.
18. Corolla broadly tubular, obovoid in bud, tube about $2^1/_2$ mm, lobes about $1^1/_2$ mm. Leaves obtuse or shortly and bluntly acuminate. **3. V. glaberrimum**
18. Corolla shortly tubular-turbinate, globular in bud, tube about 2 mm, lobes $1^1/_2$–2 mm. Leaves gradually long-acuminate. **4. V. platyphyllum**
17. Filaments serpentine in bud, (7–) 8–10 mm long.
19. Underside of leaves with distinct glandular pits at the base on both sides of the midrib and often smaller ones in higher nerve-axils. Corolla turbinate, tube $2^1/_2$–3 mm, lobes $1^1/_2$–2 mm. **9. V. vernicosum**
19. Leaves without glandular pits. Corolla rotate-cupular, tube 1 (–$1^1/_2$) mm.
20. Leaves up to 26 by 14 cm, glabrous to softly villous beneath. Corolla lobes $1^1/_2$ mm long . . **12. V. amplificatum**
20. Leaves 12–17 by 8–9 mm, hispidulous beneath. Corolla lobes 2–$2^1/_2$ mm long. **8. V. hispidulum**

4: 188*b* **12. Viburnum amplificatum** KERN, Reinw. 1 (1951) 150, f. 8; Fl. Mal. I, 4 (1951) 188; Sarawak Mus. J. 9 (1960) 679, f. 1. — *Descr. emend.* — **Fig. 3.**

Small tree up to 15 m, sometimes shrub-like. *Leaves* more or less coriaceous, dull, dark olivaceous above, brownish green or brown beneath, glabrous above, glabrous to softly villous with simple, forked, and stellate hairs beneath, neither glandular-pitted at the base nor bearded in the nerve-axils, elliptic-oblong, ovate or obovate, up to 26 by 14 cm; apex abruptly short-acuminate (acumen rather blunt, $^1/_2$–1 cm); base cuneate to somewhat rounded, slightly decurrent on the petiole; margin entire, sometimes remotely and obscurely undulate; nervation indistinct above, prominent beneath; primary nerves 4–7 on either side of the midrib, anastomosing; petioles 2–4 cm. *Inflorescence* umbellate, corymbiform, up to 20 cm across; axes stellately pubescent to subglabrous; peduncle stout, up to 10 cm; primary rays up to 8, up to 10 cm. *Flowers* small, *c.* 4 mm wide. Calyx-limb distinctly 5-lobed; lobes triangular, glandular-ciliolate, *c.* 1 mm. Corolla globular in bud, rotate-cupulate, glabrous, white; tube 1 mm, lobes ovate, *c.* $1^1/_2$ mm. Stamens inserted at the base

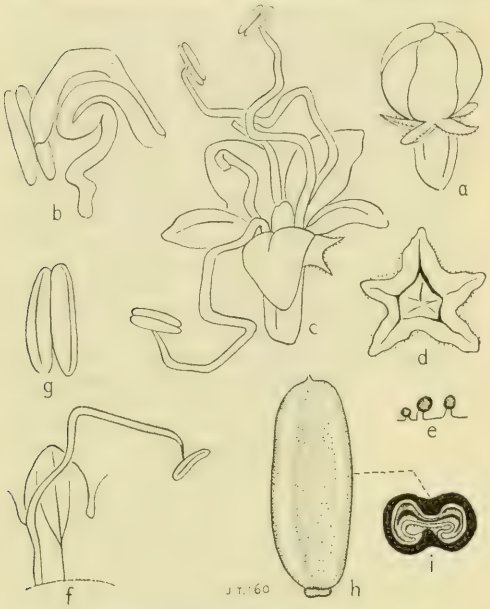

Fig. 3. *Viburnum amplificatum* KERN. *a.* Flower bud, ×5, *b.* stamen in bud, ×13, *c.* expanding flower, ×6 1/2, *d.* calyx, *e.* glands on margin of calyx lobe, *f.* part of corolla with stamen, ×5, *g.* anther, ×13, *h.* fruit, ×2, *i. ditto*, in cross section (*a–i* KOSTERMANS 13864).

of the corolla, much exserted; filaments serpentine in bud, 7–8 mm; anthers oblong, 1 mm. Ovary cylindrical, glabrous, 1 1/2 mm. *Drupe* oblong, sometimes very slightly dilated upwards, much flattened, with a distinct groove on both sides, at first green, twining black, 15–16 by 6–7 mm. Endocarp with a broad longitudinal groove on the dorsal side, the incurved edges forming a deep, broad, in cross-section bilobed furrow on the ventral side.

Distr. *Malesia*: N. and E. Borneo.

Ecol. Primary forests, up to 600 m.

Celastraceae (DING HOU)

6: 230 Add before Taxonomy:

Palynology. An important study of the pollen of seven genera of Malesian *Celastraceae* was published by DING HOU, Blumea 17 (1969) 97–112, 1 fig., 8 pl., of which the main results with relation to affinity and generic distinction are the following:

(i) The distinction of *Kokoona* and *Lophopetalum* is corroborated by the difference in pollen types.

(ii) In *Lophopetalum* at least four pollen subtypes can be distinguished.

(iii) Pollen of *Sarawakodendron*, described below, shows a great resemblance to that of the related genera *Kokoona* and *Xylonymus*.

(iv) Pollen of *Hedraianthera* and *Brassiantha* resemble that of the three latter genera but shows also resemblance to that of the African genus *Salacighia*.

6: 231, 232 Unfortunately the numbering of the genera is erroneous; in the sequence of the first key it must be:

9. *Bhesa*, 1. *Celastrus*, 2. *Maytenus*, 3. *Xylonymus*, 12. *Perrottetia*, 8. *Microtropis*, 4. *Euonymus*, 5. *Glyptopetalum*, 6. *Kokoona*, 7. *Lophopetalum*, 10. *Cassine*, 11. *Pleurostylia*.

6: 241*b* *Maytenus emarginata* (WILLD.) DING HOU.

Add to Distr.: Lesser Sunda Is. (Flores).

6: 243*a* *Maytenus diversifolia* (MAXIM.) DING HOU.

Add to Distr.: Flores.

6: 248*ab* *Euonymus cochinchinensis* PIERRE.

Add to Distr.: Burma, Formosa, and Flores.

6: 256 *Glyptopetalum* THW.

Add to Distr. (in China); Kweichow. *Cf.* DING HOU, Blumea 12 (1963) 59.

6: 260, 264 BALAN MENON (Mal. For. 27, 1964, 18–21) confirmed the generic difference between *Lophopetalum* and *Kokoona* on their wood anatomy.

6: 264 *Lophopetalum* WIGHT *ex* ARN.

Add to Distr.: A new species of the genus, the first from Australia, has been discovered by Mr. BYRNES in the Kimberley District; it is related to the West Malesian species.

6: 266*b* *Lophopetalum floribundum* WIGHT.

Add to Distr.: Two additional collections from Johore (FRI 8843) and Pahang (FRI 8147).

6: 268*b* *Lophopetalum macranthum* (LOES.) DING HOU.

Add to Distr.: A good flowering specimen collected from East New Guinea (Morobe Distr.: NGF 37402).

6: 391 The new genus *Sarawakodendron* (recently found in Borneo) keys out for flowering material to *Salacia*.

6: 392 For fruiting material *Sarawakodendron* keys out at fork 8, which can be improved as follows:

8c. Fruits spindle-shaped, 3-angled, 3-celled, 3-valved. Seeds with a caruncle-like aril surrounded by many filamentous, fringed appendages. **3a. Sarawakodendron**

6: 392

3a. SARAWAKODENDRON

DING HOU, Blumea 15 (1967) 141. — **Fig. 4.**

Small tree, containing kautchuk, *Leaves* alternate. Stipules small, caducous. *Inflorescences* solitary, axillary, simple, pe-

Fig. 4. *Sarawakodendron filamentosum* Ding Hou. *a*. Habit, × 2/3, *b*. inflorescence, ×4, *c*. flower, ×2, *d*. flower with petals removed, ×3, *e*. stamen, ×8, *f*. longitudinal section of flower shown in *d*, ×3, *g*. longitudinal section of ovary, ×8, *h*. cross section of ovary with position of stamens indicated, ×8, *i*. fruit ×2/3, *j*. dehiscent fruit with one valve showing scars of seed attachments, ×2/3, *k*. one fruit valve with attached descendent seeds, ×2/3, *l*. seed, ×1, *m*. basal part of seed seen from beneath, ×2, *n*. cotyledons, ×2 (*a–h* Ding Hou 333, *i* Jugah Anak Kudi S 24897, *j–n* Jugah Anak Kudi S 24898).

duncled, few-flowered, the axis of the racemes densely set with imbricate, decussate, persistent bracts. *Flowers* bisexual, solitary, pedicelled. *Sepals* 5, imbricate. *Petals ditto*. *Disk* extra-staminal, fleshy, flattened. *Stamens* 3, extrorse, transversely dehiscing. *Ovary* partly immersed in the disk, 3-celled, with 3 stigmatic lobes; no style; ovules *c.* 8 in each cell. *Capsule* ellipsoid, pointed to both ends, hard, 3-gonous, with 3 thick valves, dehiscing to the base. *Seeds* descending, narrowly elliptic, with a fleshy orbicular aril provided with numerous filiform, fringy appendages.

Distr. *Malesia*: Borneo: Sarawak. Monotypic.

Note. Allied to *Salacia*, *Lophopetalum*, *Kokoona*, and *Polycardia* of Madagascar.

1. Sarawakodendron filamentosa DING HOU, Blumea 15 (1967) 141, f. 1. — **Fig. 4.**

Tree, 7–12 m, 10–15 cm ⌀, the vegetative parts containing yellow kautchuk particles and resinous threads. Stipules $^1/_2$ mm, ± erose. *Leaves* oblong to lanceolate, acuminate, 10–25 by 4–10 cm, subentire; nerves 6–7 pairs; petiole 2/3–1 cm. *Inflorescences* 1–2$^1/_2$ cm; pedicels articulated near base, 1$^1/_2$–2 cm. *Sepals* 1$^1/_2$–2 by 1 mm, semi-orbicular. *Petals c.* 5 mm ⌀, pale-orange. *Disk c.* 4 mm ⌀. *Stamens* reflexed at anthesis. *Capsule* 6–8$^1/_2$ by 2–3 cm. *Seeds* 2–2$^1/_2$ by $^1/_2$ cm, albuminous; aril 5–7 mm ⌀, the chalazal filaments 1$^1/_2$–2 cm long; embryo narrow-lanceolate, 18 by 4 mm; cotyledons foliaceous.

Distr. *Malesia*: Borneo (Sarawak).

Ecol. Understorey tree in lowland kĕrangas forest.

Note. Its position exactly links the families *Celastraceae* and *Hippocrateaceae* in their former circumscription.

6: 397*b* *Siphonodon peltatus* DING HOU.
Add to Distr.: A second collection is HARTLEY 13179 with flowers in anthesis.

6: 404 *Salacia* L.
Line 1 literature: replace (1767) by (1771).
Add to synonymy: *Annulodiscus* TARDIEU BLOT, Bull. Soc. Bot. Fr. 95 (1948) 264; Fl. Gén. I.-C. Suppl. 1 (1948) 812.

6: 410*a* *Salacia sororia* MIQ.
Add to Distr.: Now also found in the Solomons (Guadalcanal, BSIP 9152).

6: 410*b* *Salacia forsteniana* MIQ.
Add to Distr.: Now also found in the Solomons (Wagnia & SE. New Georgia Is.: BSIP 5436, 5985).

6: 413*b* *Salacia grandiflora* KURZ.
Add to synonymy following NG, Blumea 18 (1970) 412: *Maba hierniana* K. & G. J. As. Soc. Beng. 74, ii (1905) 203. — *Diospyros hierniana* (K. & G.) BAKH. Gard. Bull. S. S. 7 (1933) 173.

6: 415*a* *Salacia verrucosa* WIGHT.
Add to synonymy: *Annulodiscus nigricans* TARDIEU BLOT, Bull. Soc. Bot. Fr. 95 (1948) 264; Fl. Gén. I.-C. Suppl. 1 (1948) 812.

6: 419*a* *Salacia chinensis* L.
Line 1 literature: replace (1767) by (1771).

Chenopodiaceae

4: 595*a* **Chenopodium pumilio** R. BR. Prod. (1810) 407; BLACK, Fl. S. Austr. 2 (1948) 289; AELLEN in Hegi, Ill. Fl. Mitt.-Eur. 3, 2 (pt 2) (1960) 578, 597, f. 255 D-E; STEEN. Blumea 15 (1967) 154.

Small, soft, prostrate aromatic herb, with green flowers. Easily distinct from *C. carinatum* R. BR. by narrow, not crested perianth segments, the nut being discernible between them.

Distr. New Zealand and Australia, apparently recently introduced in *Malesia*: New Guinea: Morobe Distr. (B.G.D. Leron Cattle Station: E. E. HENTY NGF 16668, Aug. 1, 1963).

Ecol. Bare patch in browsed grassland, at 150 m.

Combretaceae

4: 533 Due to the interest and activity of the Division of Botany, Lae, many additions must be made to the *Combretaceae* of New Guinea, two papers on which appeared by M. J. E. COODE, in the 'Manual of the Forest Trees of Papua and New Guinea', Port Moresby 1964, *n.* 1, 45 pp., 25 pl., and in a much revised edition of this, 1969, 86 pp., 32 pl., 8 maps. Herein one named and three unnamed new New Guinean species are distinguished, besides some of the Solomons and New Ireland and full keys are given. A formal treatment will soon appear.

It has also been found that within *Terminalia* occur at least four distinct types of germination, a character which may add to the systematy of the genus. COODE's paper also adds considerably to our understanding of the ecology of the species and provided numerous field notes. The reader is referred to COODE's paper for details.

4: 569*a* *Terminalia crassifolia* EXELL.
Add to Distr.: This Papuan endemic now also recorded from Australia: Northern Territory, Fletcher Creek, Wearyan R.; *cf.* Muelleria 2 (1971) 135.

4: 584*b* Add to Insufficiently known species:

Terminalia macrantha ROJO, Blumea 17 (1969) 93, f. 1.

Tree, *c.* 18–20 m, 40 cm ⌀. Indumentum

of simple, brown, sericeous hairs. Young branchlets *c.* 1–2$^1/_2$ cm ∅, glabrescent. *Leaves* densely crowded at the very ends of branchlets, chartaceous, rather laxly hairy, above shiny, verruculose, glabrescent except on the main nerves, beneath persistently hairy, obovate-oblong, 12–31 by 5–12 cm, generally widest at about $^3/_4$ of the length, top rounded or sometimes emarginate, base narrowly cuneate or sometimes decurrent, glandless; midrib prominent on both sides, densely hairy; nerves on both sides rather widely spaced, hairy, the upper 3 or 4 pairs arcuating towards the top but not anastomosing at the margin, connected by thin veins in a more or less scalariform pattern with some interconnections between them, domatia none; petiole 8–24 mm, densely to sparsely hairy, without glands. *Spike* axillary, *c.* 13–25 cm, lower *c.* 7–8 cm flowerless; densely hairy. Bracts ± obovate-oblong to ± linear, *c.* 3 mm. *Flowers* sessile, densely hairy, greenish yellow, fragrant. Part of the flowers, scattered in the inflorescence, with rudimentary style and somewhat smaller. In the bisexual ones, the lower receptacle (ovary) 3–6 mm; upper receptacle funnel-shaped, 2–3 by 3$^1/_2$ mm. Calyx lobes deltoid, 2 mm, sparsely hairy inside. Filaments 9–11 mm, glabrous; anthers 2/3 mm. Disk sparsely set with rather lax hairs. Style simple, terete, 9–10 mm, glabrous. Ovules 2, pendulous.

Distr. *Malesia*: Philippines (Samar: Mt Calbiga, Wright), once collected (PNH 6409).

Ecol. On top of flat ridge, 300 m, locally common.

Vern. *Bongoran*, S. L. Bis.

Note. For lack of fruit its affinity cannot well be established. There is some resemblance to *T. zollingeri*, which has coriaceous leaves, more nerves, a smaller upper receptacle, and shorter filaments, and also with *T. darlingii*, which has also more nerves, subopposite glands at the base or top of the lamina, larger bracts, a shorter lower receptacle, and longer filaments.

Connaraceae (LEENHOUTS)

5: 495 Add to Ecology: *Cf.* H. G. BAKER, Bot. Gaz. 123 (1962) 206–211, on heterostyly and pollination; he also confirms the seed dispersal by birds.

5: 496 Add to Morphology, paragraph on the *arilloid*: *Cf.* CORNER, Phytomorphology 3 (1953) 471, for a different opinion as to the morphological nature of the aril-like structures.

After Morphology add:

Phytochemistry. *Cf.* HEGNAUER, Chemotaxonomie 3 (1964) 545–546, 673.

Add to Taxonomy, paragraph on *affinity with other families*: On embryological grounds, MAURITZON, Act. Un. Lund N.S. 35, *n.* 2 (1939) 13 & 39, points to a possible relationship with the *Cunoniaceae*; GUTZ-WILLER, Bot. Jahrb. 81 (1961) 38–39, gives a not convincing argumentation for the inclusion of the family in the *Sapindales*; HUTCHINSON, Gen. Pl. 1 (1964) 162, derives the family from the *Dilleniaceae*; HEGNAUER, Chemotaxonomie 3 (1964) 546, finds some phytochemical support for a position near the *Leguminosae*; LEINFELLNER, Oest. Bot. Z. 118 (1970) 542–559, from a study of the gynoecium, also concluded to a closer relationship with the *Leguminosae*.

5: 499*a* *Cnestis palala* (LOUR.) MERR.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 13, t. 1 f. 1–9; CORNER, Life of Plants (1964) t. 23.

5: 499*b* Add to Distr. of *ssp. diffusa*: Erroneously cited by VIDAL, *l. c.*, from Sumatra, the Malay Peninsula, and Borneo.

5: 502*a* *Agelaea macrophylla* (ZOLL.) LEENH.
Add to synonymy: *Myristica laurina* (*non* BL.) HOCHR. Candollea 6 (1936) 459.

5: 502*b* *Agelaea trinervis* (LLANOS) MERR.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 18, t. 1 f. 10–20.

5: 504*a* Add to Uses: In Vietnam, an oil from the seeds is used for lighting (VIDAL, *l.c.*).

5: 505*a* *Agelaea borneensis* (HOOK. *f.*) MERR.
Add to Ecol. as exceptional highest altitude: (–1300) m.

5: 505*b* *Agelaea insignis* (SCHELLENB.) LEENH.
Change description as follows: after *Branchlets*, 'probably' should be omitted. *Leaflets*, 5th line, add after tomentose: above glabrescent. Include before *Fruits*: *Infructescences* solitary or fascicled, cymose, up to 5 cm long, fulvous-velutinous. Add at the end of the description of the *fruits*: via greenish-chocolate to red.

5: 505 *Roureopsis* PLANCH.
Change the date of publication of B. & H. Gen. Pl. 1 (*sub Taeniochlaena*) into: 1862.

5: 506*a* *Roureopsis asplenifolia* SCHELLENB.
Add to literature: CORNER, Life of Plants (1964) t. 23.

5: 507*b* Insert after 1. *Roureopsis asplenifolia* SCHELLENB.:

1a. Roureopsis stenopetala (GRIFF.) SCHELLENB. Kew Bull. (1927) 375; CRAIB, Fl. Siam. En. 1 (1928) 362; SCHELLENB. Pfl. R. Heft 103 (1938) 110; VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 23, t. 2 f. 1–6. — *Cnestis stenopetala* GRIFF. Notul. 4 (1854) 433, t. 611 f. 2 ('*steriopetala*'). — *R. incurva* PIERRE, Fl. Coch. 5 (1898) t. 379 A.

Liana. Branchlets fulvous-tomentose when young, glabrescent. *Leaves* 5–10-jugate, leaflets mostly opposite or nearly so, the petiole and the rachis tomentose. *Leaflets* subsessile, the lateral ones (lower- and uppermost excepted) distinctly asymetric, $1^1/_2$–3 by $^1/_4$–$1^1/_2$ cm, basal ones broad-ovate, up to $1^3/_4$ by $1^1/_4$ cm, terminal leaflet elliptic or oblong, 2–$3^1/_4$ by $^1/_4$–$1^3/_4$ cm, all stiff-chartaceous to subcoriaceous, midrib puberulous at both sides, furthermore glabrous; base rounded to (terminal) cuneate; apex blunt to rounded, emarginate; nerves 4–5 pairs, the lowermost at the broader acroscopic side ascending, all looped and joined, veins about as strongly developed as the nerves. *Inflorescences* racemose, umbelliform, with up to *c.* 6 flowers, *c.* $1^1/_2$–2 cm long, bracts tomentellous, furthermore glabrous; rachis *c.* 4 mm, pedicels slender, *c.* 1 cm long or more. *Flowers* 5-merous. *Sepals* linear-lanceolate, 3–5 by 1 mm, blunt, glabrous but for the tomentose outer side of the tip. *Petals* linear, *c.* 8 mm long, puberulous at the tip. *Stamens* confluent at base. *Fruits* 1 (?) per flower, *c.* $1^1/_2$ cm long, glabrous.

Distr. Burma, Thailand, Cambodia, Laos, and *Malesia*: Malay Peninsula (Ranong, Phangnga).

Ecol. Primary and secondary forests at low altitude. *Fl.* Febr.

Note. Nearest to *R. asplenifolia* SCHELLENB. as already mentioned under that species (5: 507*b*). The main differences are the usually smaller number of slightly bigger and stiffer leaflets which are not hairy along the margin and have the base mostly rounded, the much longer pedicels, and especially the long and narrow sepals in the present species.

5: 508*a* *Roureopsis emarginata* (JACK) MERR.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 24, f. 2 f. 7 & 8.
Add to Distr.: Laos.

5: 509 *Sect. Taeniochlaena* LEENH.
Change the year of publication of B. & H. Gen. Pl. 1 into: 1862.

5: 509*a* *Roureopsis acutipetala* (MIQ.) LEENH.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 26, t. 2 f. 9–11.
Line 4 literature: change 1865 into: 1862.

5: 509*b* *ssp. borneensis* (SCHELLENB.) LEENH.
Add to Distr.: According to VIDAL, *l.c.*, also in S. Vietnam.

5: 510 *Rourea* AUBL.
The first citation for *Jaundea* should be changed as follows: *Jaundea* GILG in E. & P. Nat. Pfl. Fam. 3, 3 (1894) 388.

5: 512 Add to *Sect. Palliatus*: *Cf.* LEENH. in Steen. Pac. Pl. Areas 1 (1963) 278, map 17.

5: 513*a* *Rourea oligophlebia* MERR.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 31, t. 3 f. 1–4.

5: 514*a* *Rourea minor* (GAERTN.) LEENH.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 34, t. 4 f. 1–10; W. R. SYKES, Fl. Niue (1970) 70, f. 4.

5: 515*a* Add to literature *sub Rourea acropetala* PIERRE: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 32, t. 3 f. 5–7.

5: 515*b* Add to synonymy, after *Santaloides cordatum*: *Santaloides ovale* SCHELLENB. Bot. Jahrb. 59 (1924) Beibl. *n.* 131, p. 29.
Add to synonymy, after *Santaloides luzoniensis* SCHELLENB.: *Connaropsis rubescens* RIDL. J. Bot. 62 (1924) 295; *cf.* LEENH. Blumea 12 (1963) 20.
Add to synonymy, after *Santaloides elmeri* SCHELLENB.: *Rourea ovale* LEENH. Fl. Mal. I, 5 (1958) 520; *cf.* LEENH. Blumea 12 (1963) 21.
Add to Distr.: Solomon Is., Tonga, Niue I.

5: 517*a* VIDAL, *l.c.*, distinguished the three groups cited as subspecies as follows: *ssp. microphylla* (HOOK. & ARN.) VIDAL for the small-leaved category, *ssp. minor* for the intermediates, and *ssp. monadelpha* (ROXB.) VIDAL for the group with few, relatively large leaflets. I had refrained from giving such a subdivision as these groups are neither morphologically, nor geographically sharply delimited. Furthermore, VIDAL excluded *R. acropetala* PIERRE from the synonymy. That species should mainly differ from *R. minor* by the reduction of the terminal leaflet and by the distinctly mucronate apex of the leaflets.
Add to the 4th paragraph, on more or less intermediate forms: *R. ovale* (Borneo).

5: 517*b* *Rourea mimosoides* (VAHL) PLANCH.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 41, t. 3 f. 8–12.

5: 519*a* Add to Distr.: Vietnam.
Add to Ecol.: peat-swamp.
f. mimosoides. Add to literature: ANDERSON, Gard. Bull. Sing. 20 (1963) 172.
Omit under Distr.: Sumatra excepted.

5: 520*a* *Rourea prainiana* TALBOT.
Sometimes a big climber.
Add to Distr.: Ceylon (acc. to TALBOT).
Add after Malay Peninsula: also Pahang (G. Benom).
Under Incertae sedis: Drop *R. ovale* (SCHELLENB.) LEENH. as ripe fruits showed that this is identical with *R. minor*.
Add under Incertae sedis:

Rourea pinnata (MERR.) VELDKAMP, Blumea 15 (1967) 543. — *Sarcotheca pinnata* MERR. J. Str. Br. R. As. Soc. 86 (1922) 314; KNUTH, Pfl. R. IV, 130 (1930) 426.

Liana. Twigs subglabrous. *Leaves*

3–4-jugate; lateral petiolules 4–5 (–7) mm long. *Leaflets* elliptic to oblong, 12–27 by $4^1/_2$–11 cm, thin chartaceous, shining above, rather dull beneath, minutely hairy on midrib and nerves beneath; base equilateral, in lateral leaflets rounded (to subcordate), in the terminal leaflet broadly cuneate; apex tapering acuminate, acumen short, broad, and blunt; nerves 10–12 (–15) per side, pinnate, ascending, slightly curved, only the uppermost ones joined, intermediate veins often nearly as strongly developed as the nerves, veins and veinlets scalariform, beneath much better visible than above. *Inflorescences* axillary, solitary or 2 collateral ones together, up to 7 cm long, sparsely branched, rather densely minutely hairy. *Calyx* $2^1/_2$–$2^3/_4$ mm high, outside densely appressed hairy, margin densely ciliolate, inside glabrous. *Corolla* (not yet fully developed) $3^3/_4$ mm long. *Ovary* and lower half of the style sparsely woolly. *Fruit* unknown.

Distr. *Malesia*: North Borneo (once collected at Batu Lima near Sandakan).

Ecol. On dry forested slopes at low altitudes. *Fl.* Oct.

Note. As the fruit is still unknown it is not well possible to include this species into one of the subgenera or sections. The key in Fl. Mal. I, 5 (1958) 513, leads to *R. minor*. It is distinctly different from that species, however, in the following characters: greater number of nerves, nervation open and — by the intermediate veins — seemingly very dense, venation distinctly scalariform (in *R. minor* mostly laxly reticulate), inflorescences puberulous, calyx outside densely hairy.

5: 521*a* *Ellipanthus tomentosus* KURZ.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 46, t. 4 f. 11–14.

5: 521*b* Add to first sentence of description: up to 40 m high, sometimes buttressed.

5: 523*a* *ssp. tomentosus*. Add to literature: ANDERSON, Gard. Bull. Sing. 20 (1963) 172.

5: 523*b* *var. tomentosus*.
Add to Uses: According to VIDAL, *l.c.*, the wood is soft and not durable.

5: 524*b* *Ellipanthus beccarii* PIERRE.
Add to literature: MEIJER, Bot. Bull. Herb. Sandakan 10 (1968) pl. between p. 104 and 105.
Add to Ecol.: peat swamp forests.

5: 526 Key to the species.
Lead 10(b), add to length of petals: (–5) mm.
Lead 16(a), insert between 'dry' and 'blackish-verrucose': mostly.

5: 528a *Connarus euphlebius* MERR.
var. bullatus LEENH. Replace '*in the press*' by: 106.
ssp. moluccanus LEENH. Replace '*in the press*' by: 106.

5: 531*b* *Connarus villosus* JACK.
Add to Distr.: N. Borneo (P. Gaya).
Add to Ecol.: Altitude up to 500 m.
Connarus culionensis MERR.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 54, t. 5 f. 13 & 14.

5: 533*a* Add to Distr.: Sarawak, Sabah, S. Vietnam (VIDAL).
var. culionensis.
Add to Distr.: According to VIDAL, *l.c.*, also in S. Vietnam.
var. stellatus (MERR.) LEENH.
Delete in description the sentence 'Fruit unknown.' (The fruit is not different from that of the type variety.)

5: 533*b* *Connarus odoratus* HOOK. *f.*
Add to Note: The delimitation of *C. villosus*, *culionensis*, and *odoratus* has to be studied anew when more material will be available. Especially in northern Borneo, where the three species overlap, the identification is often uncertain.
Connarus paniculatus ROXB.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 55, t. 6 f. 1–10; ANON. Ic. Roxb. (1970) t. 28.
Add to Distr.: Burma.

5: 534*a* Add to Notes: VIDAL, *l.c.*, separates the species into two varieties: *var. paniculatus* and *var. hainanensis* (MERR.) VIDAL. Among the Indo-Chinese material of the former of these he distinguishes 3 formae. According to him, the material of the Malay Peninsula belongs to *var. paniculatus*.
Connarus semidecandrus JACK.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 51, t. 5 f. 1–12; ANDERSON, Gard. Bull. Sing. 20 (1963) 172.

5: 535*a* Add to Distr.: Sumbawa, Flores; according to HOSOKAWA, J. Jap. Bot. 13 (1937) 275, also Truk I.

5: 535*b* VIDAL, *l.c.*, distinguishes among the Indo-Chinese material, here all included in group β, 3 forms, exclusively on leaf characters.

5: 536*a* *Connarus cochinchinensis* (BAILL.) PIERRE.
Add to literature: VIDAL, Fl. Camb. Laos & Vietn. 2 (1962) 58, t. 6 f. 11–18.
Connarus lamii LEENH.
Replace '*in the press*' by: 106.

5: 538*a* *Connarus monocarpus* L.
Add to literature: CORNER, Life of Plants (1964) t. 23.

5: 538*b* Description of the fruit, 3rd line, read: in the latter case usually distinctly shortly stipitate.

5: 539*a* *Connarus lucens* SCHELLENB.
Start description with: Liana, up to 10 m.

5: 539*b* Add to Distr.: Now collected in some parts of Sarawak.
Add to Ecol.: Clayey river bank, peri-

odically flooded, up to 250 m.

5: 540*a* *Connarus winkleri* SCHELLENB. *ssp. philippinensis* LEENH.
Replace '*in the press*' by: 106.

5: 540*b* *Connarus schumannianus* GILG.
The head should be changed as follows:

18. Connarus conchocarpus F. v. M. Fragm. 5 (1866) 105; SCHELLENB. Pfl. R. Heft 103 (1938) 228.

ssp. **schumannianus** (GILG) LEENH., *nov. stat.* — *C. schumannianus* GILG in K. Sch. & Laut. Fl. Schutzgeb. (1900) 341; SCHELLENB. Pfl. R. Heft 103 (1938) 253; LEENH. Fl. Mal. I, 5 (1958) 540, f. 11 j.
Add to Notes: *Ssp. conchocarpus* from NE. Queensland differs from *ssp. schumannianus* in the following points: branches more densely lenticellate; leaves more often 2-jugate; leaflets thicker, mostly at base more acute and less peltate, midrib often above flat rather than sunken, nervation and venation more coarse and more prominent beneath; inflorescences apparently usually axillary; fruits hardly curved, smaller ($2^1/_4$ by $1^3/_4$ cm).
The relationship is doubtless with *C. pickeringii* A. GRAY (Fiji, Solomon Is.) and with *C. salomoniensis*.

5: 540*b* *Connarus salomoniensis* SCHELLENB.
Add to description of *Petals*, after '$2^1/_2$ by $1^1/_2$ mm': or linear-lanceolate, 5 by 1 mm.

5: 541*a* Replace the 1st paragraph of the Notes by:
The present species is doubtless related to *C. conchocarpus* and to *C. pickeringii* A. GRAY from Fiji and the eastern Solomon Is. (San Christobal, Vanikoro I.). From the former it is distinctly different in its flowers and fruits, but hardly so in the leaves. *C. pickeringii* differs constantly by the on both surfaces hairy petals and the smaller fruits (up to *c.* 3 by $2^1/_2$ cm); moreover, the leaflets of the latter species are as a whole narrower (up to $7^1/_2$ cm) and hardly, if all, ovate. I should not be surprised, however, if these differences should fade away when more material from the Solomon Is. comes available. The only reason that I not yet reduce *C. salomoniensis* to *C. pickeringii* is that the character 'glabrous petals' respectively 'hairy petals' seems as a whole to be important in this genus.
If *C. salomoniensis* and *C. pickeringii* should be combined, no reason would be left to keep *C. peekelii* upright as a species.

Convolvulaceae (VAN OOSTSTROOM)

4: 390 In Key line 18 from top read instead of '6. Styles 2, free or united near the base':
6. Styles 2 or 1, in the latter case 2-branched with the branches distinctly visible.
Replace forks 7 and 8 bij the following:
7. Style 1, with 2 branches.
7a. Flowers in a long racemose inflorescence, each flower inserted on a large, elliptic, white bract. Corolla to $1^1/_2$ cm long. Ovary glabrous; stigmas horse-shoe-shaped. **5a. Neuropeltopsis**
7a. Flowers in an umbelliform cyme, not inserted on the bracts. Corolla 3–5 cm long. Ovary hairy; stigmas globose-peltate . . **4. Bonamia**
7. Styles 2, free.
8. Each style forked and with 2 filiform or slightly clavate stigmas. Corolla-limb nearly entire. Small herbaceous plants . . . . . **3. Evolvulus**
8. Styles not forked; stigmas capitate or kidney-shaped. Corolla-limb distinctly lobed.
8a. Large woody twiners. Bracts much enlarged in fruit, elliptic, scarious. Stigmas kidney-shaped. **5. Neuropeltis**
8a. Low perennials. Bracts unaltered in fruit. Stigmas capitate. **3a. Cressa**

4: 392 Line 1 from top: the correct name for 1. *Subgenus Grammica* is: **1. Subgenus Cuscuta.**

4: 398 Insert above 4. *Bonamia*:

3a. CRESSA

LINNÉ, Sp. Pl. ed. 1 (1753) 223; Gen. Pl. ed. 5 (1754) 104; R. BR. Prod. 1 (1810) 489; BTH. Fl. Austr. 4 (1869) 437; F. M. BAILEY, Queensl. Fl. 4 (1901) 1074. — **Fig. 5.**

Low, much-branched, grey-pilose, perennial plants, often suffrutescent at the base. *Leaves* small, sessile, entire. *Flowers* small, shortly pedicelled or subsessile in the upper leaf-axils, in terminal clusters or spikes; bracteoles 2, small, at the base of the calyx. *Sepals* 5, subequal, obovate, imbricate, about as long as the corolla-tube, not enlarged in fruit. *Corolla* regular, funnel-shaped, white or rose; lobes 5, spreading or reflexed, about as long as the tube, pilose outside. *Stamens* 5, exserted; filaments adnate to the corolla-tube, filiform, glabrous; pollen globular, smooth. *Ovary* hairy, 2-celled, 4-ovuled; styles 2, exserted, free, filiform, each with a capitate stigma. *Capsule* exceeding the calyx, opening by valves, usually 1-seeded; seed smooth, glabrous.

Distr. A genus with a small number of closely related species, considered by some authors as a single one (for example CHOISY and BENTHAM), occurring in the warm temperate and tropical regions of both hemispheres in sandy, maritime

or saline circumstances; in *Malesia*: Lesser Sunda Is. (Timor).

Ecol. Generally in sandy, maritime or saline terrain.

1. Cressa cretica LINNÉ, Sp. Pl. (1753) 223; CHOISY in DC. Prod. 9 (1845) 440; BTH. Fl. Austr. 4 (1869) 437; F. M. BAILEY, Queensl. Fl. 4 (1901) 1074. — *C. australis* R. BR. Prod. (1810) 490. — **Fig. 5.**

Fig. 5. *Cressa cretica* L. *a*. Habit, $\times {}^{2}/_{3}$, *b*. flower, ×4, *c*. calyx, supported by 2 bracteoles, ×4, *d*. pistil, ×6 (*a–d* CINATTI 339, Port. Timor).

An erect or diffuse, much-branched perennial, sometimes almost woody at the base, *c*. 20 cm, strigose appressed-hairy all over. *Leaves* subsessile to shortly petioled, elliptic-oblong or slightly oblong-obovate, acutish, 5–9 by 3–4 mm. Bracteoles ovate-oblong. *Flowers* sessile, in terminal heads. *Sepals* broadly obovate, obtuse, ciliate, $3^{1}/_{2}$ mm long. *Corolla* shortly exceeding the calyx, hairy outside, $5^{1}/_{2}$–6 mm long. *Anthers* oblong, *c*. $1^{1}/_{3}$–$1^{1}/_{2}$ mm long.

Distr. As the genus; in *Malesia*: Lesser Sunda Is. (Portuguese Timor: Batugadé, lagoon of Bé-Malai, CINATTI 339), once collected.

Ecol. At 100 m from the sea in a pure stand in the shade of the mangrove tree *Avicennia marina*. *Fl.* Aug. 1962.

Note. The Timor material exactly matches specimens from tropical Australia, which form BENTHAM referred to *C. cretica sens. lat.*, observing that the flowers of tropical Australian specimens are larger than those in the European typical form. In the latter the bracteoles are mostly linear, the sepals *c*. 3 mm long, the corolla *c*. 4 mm, the anthers 1 mm.

4: 402 Insert above 6. *Porana*:

5a. NEUROPELTOPSIS

OOSTSTR. Blumea 12 (1964) 365, f. 1. — **Fig. 6.**

Differs from *Neuropeltis* by the longer and less dense racemose inflorescences, the already at flowering time large, white bracts, the broader glabrous wings at both sides of the hairy midpetaline areas of the corolla, the filaments almost wholly adnate to the corolla, and the style with 2 short branches, each bearing a horse-shoe-shaped stigma.

Distr. Monotypic, endemic in *Malesia*.

1. Neuropeltopsis alba OOSTSTR. Blumea 12 (1964) 365, f. 1. — **Fig. 6.**

A woody twiner. Young branches tomentellous, adult ones glabrescent or glabrous. *Leaves* elliptic, *c*. 8–12 by 4–7 cm, rounded at the base or very shortly attenuate into the petiole, abruptly acuminate and mucronulate at the apex, glabrous or nearly so above, rather densely pilose beneath; lateral nerves 5–6 on either side of the midrib; petiole *c*. 2–3 cm long. *Inflorescences* from the leaf-axils, exceeding the leaves, *c*. 18–20 cm long; pedicels 2–8 mm long. Bracts white, elliptic to broadly elliptic, at the base very shortly attenuate into the petiole, abruptly acuminate and mucronulate at the apex, bearing the flower a little below their centre, *c*. 4 by 2–$2^{1}/_{2}$ cm, shortly pilose, mainly on the midrib and at the margins. *Sepals* *c*. 3 mm long, two outer ones elliptic, obtuse, three inner ones broader than long, *c*. 4 mm broad. *Corolla* funnel-shaped, *c*. 12–13 mm long, 5-lobed, the lobes a little shorter than the glabrous tube, broadly ovate, the midpetaline areas pilose outside, the glabrous wings irregularly dentate. Filaments pilose at the base. Ovary glabrous; style 1, with 2 short branches; stigmas horse-shoe-shaped, papillose.

Distr. *Malesia*: E. Borneo (Sangkulirang Distr., Karangan R., NW. of Sangkulirang, KOSTERMANS 13588).

Ecol. On sandstone, at *c*. 20 m altitude. *Fl.* Aug.

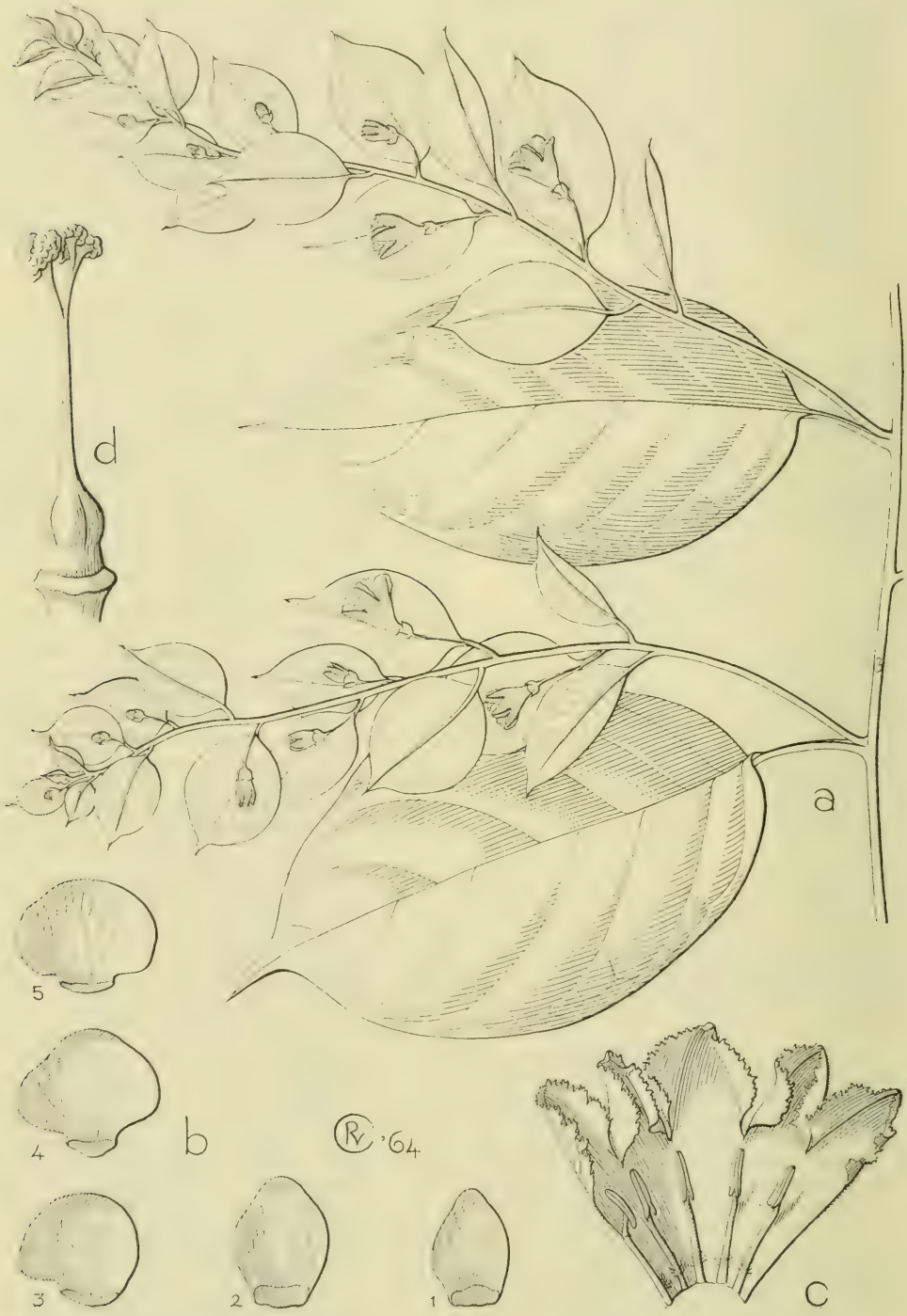

Fig. 6. *Neuropeltopsis alba* OOSTSTR. *a*. Flowering branch, ×2/3, *b*1–5. sepals 1–5, ×6, *c*. corolla with stamens, ×3, *d*. pistil, ×6 (*a–d* KOSTERMANS 13588).

4: 431 *Jacquemontia* CHOISY.
Line 5 from bottom, after 'lanceolate' add: to linear.

4: 435*a* *Jacquemontia browniana* OOSTSTR.
Line 2 from top, after 'with' add: greyish, pale brown or.
Line 4 from top, after 'lanceolate' add: to linear.
Line 4 & 5 from top, alter the sizes as follows: $2^1/_2$–7 cm by 2–10 mm.

4: 440 *Merremia* DENNSTEDT.
Change in the Key forks 13 & 14 (lines 20–22 & 51 from top) as follows:

13. Sepals partly or all attenuate-acuminate towards the acute apex.
13a. Leaves entire. Sepals 12–15 mm long, the outer ones verruculose and sparsely hairy. Ovary hairy. **6a. M. aniseiifolia**
13a. Leaves generally dentate near the base. Longest sepals to 7 mm, rarely to 10 mm long, smooth and glabrous. Ovary glabrous. **6. M. tridentata**
13. Sepals obtuse or rounded at apex.
14. Sepals 10 mm long or mostly shorter.
15. Twining or prostrate herbs . . . *etc.*
14. Sepals longer than 10 mm.
20. Sepals at most 12 mm long . . . *etc.*

4: 441 Line 1 from top: the correct name for 1. *Section Eu-Merremia* is: **1. Section Merremia**.

4: 444*a* *Merremia emarginata* (BURM. *f.*) HALLIER *f.*
As already stated in my monograph of the genus *Evolvulus* (Thesis Utrecht, 1934, 245; Med. Bot. Mus. Herb. Utrecht 14, 1934, 245) *Evolvulus gangeticus* (L.) L. Sp. Pl. ed. 2 (1762) 391 (= *Convolvulus gangeticus* L. Amoen. Acad. 4, 1756, 306) belongs to the Menispermaceous *Cocculus hirsutus* (L.) DIELS (= *Cocculus villosus* DC.), such in agreement with HALLIER *f.* (Bull. Herb. Boiss. 6, 1898, 720, 723). VERDCOURT (in Hubbard & Milne-Redhead, ed., Fl. Trop. East Afr., Convolv., 1963, 55) who could study the type in the Linnean Herbarium, also arrived at this conclusion. The statement by CUFODONTIS (Bull. Jard. Bot. Brux. 31, Suppl., 1961, 743) that the correct name for *M. emarginata* should be *M. gangetica* (L.) CUF. (also based on *Convolvulus gangeticus* L.) is therefore untenable.

4: 445*b* *Merremia tridentata* (L.) HALLIER *f.*
Line 4 from top: the correct name is: *ssp.* **hastata** OOSTSTR. Blumea 3 (1939) 317, *f.* 2–0, because the synonym *Convolvulus hastatus* DESR. in LAMK, Enc. 3 (1789) 542, *non* FORSK. 1775, is *nom. illeg.* This is in accordance with Art. 72, note, of the International Code.

4: 446*b* Insert before 7. *Merremia quinquefolia*:

6a. Merremia aniseiifolia OOSTSTR. Blumea 12 (1964) 363, f. 1. — **Fig. 7.**

A herbaceous twiner (or prostrate ?). Stems slender, sparsely pilose, glabrescent. *Leaves* sparsely pilose, lanceolate to linear-lanceolate or sometimes oblong, ($2^1/_2$–) 5–7 cm by 6–10 mm, rounded at the base, acute and mucronulate at the apex, entire, adpressed-pilose at the margins, otherwise sparsely pilose to glabrous; lateral nerves 4–6 on either side of the midrib; petiole 3–5 mm long. *Flowers* in 1-flowered cymes. Peduncles axillary, 2–4 (–6) cm long, slender, sparsely pilose to glabrous; pedicels thickened towards their top, minutely warty, 6–10 mm long. Bracts minute, subulate. Flower-buds conical, acute. *Sepals* equal in length or the inner ones a little shorter, 12–15 mm long, the two outer ones rather thick, ovate-lanceolate to narrowly ovate, attenuate or acuminate towards the acute apex, minutely warty and sparsely short-pilose, the three inner ones membranaceous, oblong, cuspidate, smooth and glabrous or only the third sepal warty at the base. *Corolla* funnel-shaped, probably *c.* 2–$2^1/_2$ cm long, glabrous, yellow. Stamens included; filaments inserted *c.* $2^1/_2$ mm above the corolla-base, 6–7 mm long, shortly hairy at the base. Ovary pilose; style included, *c.* 8–10 mm long, glabrous.

Distr. *Malesia*: West New Guinea (BW 9511 MOLL).

Ecol. In grassland, at *c.* 600 m altitude.

4: 447*a* The correct reference for species 8 is: **8. Merremia quinata** (R. BR.) OOSTSTR. J. Arn. Arb. 29 (1948) 417, not Nova Guinea n.s. 5: 22. This combination antedates that made by KERR, Fl. Siam. En. 3, 2 (1954) 106.

4: 451*b* *Merremia borneensis* MERR.
Add to Distr.: E. Borneo (KOSTERMANS 10035).

4: 452*b* *Merremia peltata* (L.) MERR.
Line 15 from bottom, after 'petioles' add: rarely on the whole surface.

4: 457*b* *Operculina riedeliana* (OLIV.) OOSTSTR.
A specimen from the Malay Peninsula (Negri Sembilan), taken by RIDLEY (Fl. Mal. Pen. 2, 1923, 459) for *Merremia crispatula* PRAIN, belongs to *O. riedeliana*. RIDLEY misquoted both collecting site and collector. Mr. H. M. BURKILL (*in litt.*) was so kind to indicate the right collecting site as Bukit Dusun Paya and the collector as ALVINS (*n.* 1181). See my paper in Blumea 3 (1939) 368, line 1 from top.

4: 458 Line 12 from bottom, replace '*I. ochroleuca*' by: *I. ochracea.*

4: 459 Line 13 from bottom, replace '6. *I. congesta*' by: **6. I. acuminata.**
Bottomline, replace '31a. *I.* ×*sloteri*' by:

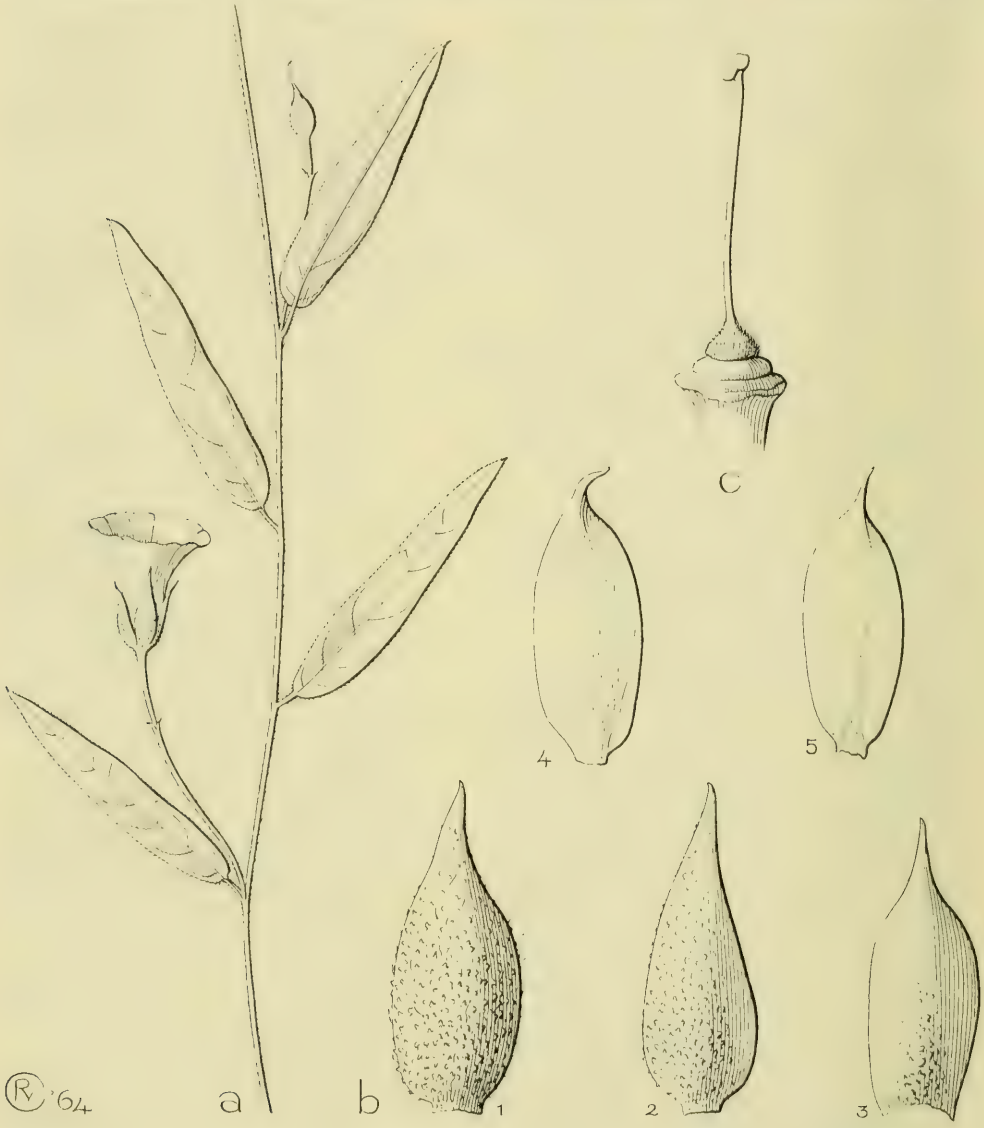

Fig. 7. *Merremia aniseiifolia* OOSTSTR. *a.* Flowering stem, ×⅔, *b*¹⁻⁵. sepals 1–5, ×3, *c.* pistil, ×4 (*a–c* MOLL BW 9511).

31a. I. ×multifida.

4: 460 Line 9 from top, replace '32. *I. digitata*' by: **32. I. mauritiana.**
Line 21 from bottom, replace '18. *I. maxima*' by: **18. I. sepiaria.**

4: 461 Line 7 from top, replace '14. *I. gracilis*' by: **14. I. littoralis.**
Line 13 from bottom, replace '35. *I. riparia*' by: **35. I. rubens.**

4: 462 Line 2 from top, replace '6. *I. congesta*' by: **6. I. acuminata.**

4: 464*a* *Ipomoea plebeia* R. BR.
Add to Distr.: Also in tropical Africa (*ssp. africana* MEEUSE) and India (*ssp. indica* VERDC.). The specimens from Malesia and Australia belong to *ssp. plebeia*. See VERDCOURT in Hubbard & Milne-Redhead (ed.), Fl. Trop. East Afr., Convolv. (1963) 94.

4: 464 Line 14 from bottom: the correct name for 2. *Section Pharbitis* is: **2. Section Ipomoea.**

4: 465*a* The correct name for species 4 is:
4. Ipomoea purpurea ROTH, Bot. Abh. (1787) 27, because the synonym *Convolvulus purpureus* L. Sp. Pl. ed. 2, 1 (1762) 219 is *nom. illeg.* This is in accordance with Art. 72, note, of the International Code.

4: 465*b* The correct name for species 6. *Ipomoea congesta* R. BR. is:
6. Ipomoea acuminata (VAHL) R. & SCH. Syst. 4 (1819) 228, based on *Convolvulus acuminatus* VAHL, Symb. Bot. 3 (1794) 26. *I. acuminata* RUIZ & PAV. Fl. Peruv. 2 (1799) 11 & pl. 120 f. b is not valid, because it was published as a superfluous name for *I. angulata* ORTEGA, Hort. Matr. Dec. 7 (1798) 83.

4: 470*a* The correct name for species 14. *Ipomoea gracilis* R. BR. is:
14. Ipomoea littoralis BL. Bijdr. (1826) 713. *I. gracilis* R. BR. appears to be a distinct species, apparently rare and local, and confined to the north coast of Australia (STONE, Micronesica 1, 1964, 126; FOSBERG, *ibid.* 2, 1966, 151–152).

4: 472*a*, 5: 561*a* The correct name for species 16. *Ipomoea ochroleuca* SPANOGHE is:
16. Ipomoea ochracea (LINDL.) G. DON, Gen. Syst. 4 (1837) 270, based on *Convolvulus ochraceus* LINDL. in Edwards, Bot. Reg. 13 (1827) t. 1060.

4: 472*b*, 5: 561*b* Add to Distr.: Also in tropical Africa and perhaps in tropical America. See VERDCOURT in Hubbard & Milne-Redhead (ed.), Fl. Trop. East Afr., Convolv. (1963) 115–116.

4: 472*b* The correct name for species 18 is:
18. Ipomoea sepiaria KOEN. *ex* ROXB. Fl. Ind. ed. Carey & Wall. 2 (1824) 90. *I. maxima* (L. *f.*) DON *ex* SWEET (*Convolvulus maximus* L. *f.*) is a distinct species. For the typification of the latter, see VERDCOURT, Kew Bull. 15 (1961) 7.

4: 473*b* Add to Distr.: Also in tropical Africa.

4: 475*b* The correct reference for species 20 is:
20. Ipomoea pes-caprae (L.) R. BR. in Tuckey, Narr. Exp. Zaire (March 1818) 477, *non* (L.) SWEET, Hort. Suburb. Lond. (July 1818) 35. See STEARN, Taxon 10 (1961) 237–238.

4: 483*a* The correct name for the hybrid 31a is:
31a. Ipomoea × multifida (RAFIN.) SHINNERS, Sida 2 (1966) 265.
The correct name for species 32 is:
32. Ipomoea mauritiana JACQ. Collect. 4 (1791) 216; Pl. Rar. Hort. Schoenbr. 2 (1797) 39, t. 200. *I. digitata* L. is a distinct species, endemic in the West Indies, the name of which was long used for *I. mauritiana*.

4: 484*b* The correct name for species 35. *Ipomoea riparia* G. DON is:
35. Ipomoea rubens CHOISY, Mém. Soc. Phys. Genève 6 (1834) 463. See VERDCOURT, Webbia 13 (1958) 324 and *do* in Hubbard & Milne-Redhead (ed.), Fl. Trop. East Afr., Convolv. (1963) 134.

4: 487*a* *Ipomoea tuba* (SCHLECHTEND.) G. DON.
Add to Distr.: Thailand (PUT 4326).

4: 488*a* Line 24 from top: the correct name for *Ipomoea dasysperma* JACQ. Eclog. Pl. 1 (Aug. 1816) 132, t. 89 is:
Ipomoea tuberculata KER-GAWL. in Edwards, Bot. Reg. 1 (Febr. 1816) t. 86. See VERDCOURT in Hubbard & Milne-Redhead (ed.), Fl. Trop. East Afr., Convolv. (1963) 123.

4: 495 Line 16 from bottom, replace '17. *A. capitata*' by: **17. A. capitiformis.**

4: 502*a* The correct name for species 17. *Argyreia capitata* (VAHL) CHOISY (1833), based on *Convolvulus capitatus* VAHL (1794), *non* DESV. 1792, *nec* CAV. 1793, is:
17. Argyreia capitiformis (POIR.) OOSTSTR. *nov. comb.*, based on *Convolvulus capitiformis* POIR. in LAMK, Encycl. Suppl. 3 (1814) 469.

4: 510*a* *Argyreia congesta* OOSTSTR.
Add to description: Fruit ellipsoid, 10–12 mm long, red (MUKMIN AMIR in herb. Sandakan, *n.* 35633).

Corynocarpaceae

4: 264*b*, 5: 557*b* *Corynocarpus cribbianus* (F. M. BAILEY) L. S. SMITH.
Add to Distr.: This species is also found in several of the Solomon Is.

Dichapetalaceae (LEENHOUTS)

5: 305 *Dichapetalum* THOU.
Change the year of publication of THOUARS into 1806. Add to literature: HUTCHINSON, Gen. Pl. 1 (1964) 216.
Add to genus diagnosis: The fruits of at least some species are apparently dehiscent (*D. papuanum*, *D. helferianum*, *D. gelonioides*, *cf.* KANJILAL & DAS, Fl. Assam 1, 1937, 246), exposing the orange-coloured to scarlet, thin mesocarp.
Include after Wood anatomy:
Phytochemistry. See HEGNAUER, Chemotaxonomie 4 (1966) 14–17.

5: 307 Insert in the Key after fork 8 2nd lead:
8A. Inflorescences scorpioid.
16. D. scorpioideum
8A. Inflorescences not scorpioid.
Insert in the Key after fork 15 2nd lead:
15A. Fruits 3 cm long.
17. D. grandifolium
15A. Fruits up to *c.* $1^1/_2$ cm long.

5: 307*b* *Dichapetalum timoriense* (DC.) BOERL.
Omit the questionmark before *D. peekelii* KRAUSE.

5: 309*a* Add to Distr.: New Britain, Solomon Is.
Add to Ecol.: Stems sometimes hollow and inhabited by ants.
Notes, 3rd paragraph: From the additional notes in PEEKEL's MS flora of the

Bismarck Archipelago it is clear that *D. peekelii* is synonymous with *D. timoriense*.

5: 309*b* *Dichapetalum papuanum* (BECC.) BOERL. Omit from synonymy: *D. grandifolium* RIDL.
Omit the headline of *ssp. papuanum*.

5: 310*a* The entry on *D. papuanum ssp. borneense* LEENH. should be replaced by the following:

17. Dichapetalum grandifolium RIDL. Kew Bull. (1930) 373; LEENH. Blumea 12 (1963) 21. — *D. papuanum* (BECC.) BOERL. *ssp. borneense* LEENH. Reinw. 4 (1956) 81; Fl. Mal. I, 5 (1957) 310.

Dioecious liana. *Branchlets* glabrous, purple-brown, later on greyish. *Petioles* $^1/_2$–$1^1/_2$ cm long, glabrous. *Leaves* elliptic to oblong, 13–25 by 6–12 cm, chartaceous, glabrous; glands few, small, scattered all over the lower surface of the leaf; base acute, slightly decurrent; apex more or less abruptly acuminate, acumen short and broad, blunt to acute, mucronulate; nerves 7–10 pairs, curved, most of them distinctly looped and joined. *Inflorescences* (♀ unknown) 1–4 cm long, distinctly stalked, repeatedly branched, with several flowers. *Flowers* (♂) $5^1/_2$ mm long. *Petals* obovate, halfway incised, glabrous. *Disk lobes c.* $^1/_2$–$^3/_4$ mm, 2-lobed, glabrous. *Pistillode* densely tomentose. *Infructescences* small, short-stalked, with 1–2 fruits. *Fruits* 2–3-lobed, *c.* 3 cm long, $2^1/_2$–3 cm wide, smooth, shortly and densely fulvous-tomentose, with distinct, narrow sutures.

Distr. *Malesia*: Borneo (Sarawak and North Borneo).

Ecol. In primary forests at low alt. *Fl.* June, July, Nov., *fr.* Nov.

Note. Possibly nearest allied to *D. papuanum* which it distinctly resembles especially vegetatively and in the flowers (apart from the larger dimensions). Well characterized by the exceptionally large fruits.

5: 310*b* *Dichapetalum gelonioides* (ROXB.) ENGL. Add to literature: KANJILAL & DAS, Fl. Assam 1 (1937) 245, and *sub Chailletia sumatrana* MIQ.: TALBOT, For. Fl. Bombay Pres. 1 (1909) 253, f. 151.

5: 311*b* *ssp. tuberculatum* LEENH. Add to Distr.: Sumatra.

5: 312*a* *ssp. pilosum* LEENH. Add to Distr.: Malay Peninsula (Selangor).

5: 312*b* Add to Notes: The fruits are sometimes reported as being poisonous.
Dichapetalum tricapsulare (BLCO) MERR. After the entry on *D. glabrum* ELM. add: *non D. glabrum* (VAHL) PRANCE (1968), *nom. illeg.*

5: 313*a* *Dichapetalum griffithii* (HOOK *f.*) ENGL. Change in description the minimum number of nerves into 8.

5: 313*b* *Dichapetalum setosum* LEENH. Add to Ecol.: Altitude up to 360 m.
Dichapetalum steenisii LEENH. Add to description: Sometimes a shrub. Leaf base acute to blunt.
Add to Distr.: E. Borneo (*ssp. steenisii*).

5: 314*ab* *Dichapetalum longipetalum* (TURCZ.) ENGL.
Add to literature: CHUN & CHANG, Fl. Hainan 2 (1965) 203, f. 407, and *sub D. hainanense* ENGL.: CHUN & HOW, Act. Phytotax. Sin. 7 (1958) 16.

5: 314*b* Change in description: *Branchlets* sometimes nearly terete. *Leaves* ovate- to obovate-elliptic to -oblong, above sometimes glabrous.

5: 315*a* Line 15 from top, replace '1 (–2) –lobed' by: 1 (–3) -lobed.
Add to Distr.: S. China, SE. Thailand.

5: 315*b* *Dichapetalum helferianum* (KURZ) PIERRE. Add to Distr. after Malay Peninsula: Peninsular Thailand.
Dichapetalum laurocerasus (HOOK. *f.*) ENGL.
Change in description: *Leaves* up to 15 cm long, thin-coriaceous to chartaceous; acumen short to rather long; nervation mostly inconspicuous.
Dichapetalum sessiliflorum LEENH.
Replace the description by the following: Dioecious liana, shrub, or up to *c.* 5 m high treelet. *Branches* densely fulvous-tomentose to -velutinous when young, glabrescent, greyish to purplish brown. *Leaves* elliptic to lanceolate, 9–28 by 3–11 cm, pergamentaceous to chartaceous, above glabrous to hairy on midrib and nerves, beneath sparsely to densely appressed-pilose at least on midrib and nerves; glands few, on the lower side, mainly near the base; base acute to rounded; margin minutely crenulate to entire; apex acuminate, acumen short, broad, and blunt to long, slender, and acute; nerves 7–16 pairs, slightly to strongly curved, at least the upper ones distinctly looped and joined. *Flowers* (only ♂ buds known) axillary, 1 or 2, subsessile, or in short-stalked, few- to several-flowered glomerules, *in vivo* pale pink. *Calyx* densely ferruginous-tomentose. *Petals* ovate, slightly emarginate, outside (margin excepted) and inside at the base long-pilose. *Disk* annular, adnate to the stamens. *Pistillode* patently stiff-pilose. *Fruits* solitary, short-stalked, triangular-ovoid, *c.* 3 by $2^1/_2$–3 cm, smooth to tuberculate, densely and shortly ferruginous-tomentose, glabrescent, without sutures, *in vivo* orange when ripe, 3 (–1) -celled; stones free, woody, strongly corrugated.

5: 316*a* Add to Distr.: Vogelkop Peninsula, New Britain, Solomon Is. (Three Sisters I., BSIP 17224).
Change in Ecol. altitude: from sea-level to 1800 m. Add: *Fl.* Febr., Oct.-Nov., *fr.* March-April, Oct.-Nov.
Add: Uses. The leaves are medicinally used ('chewed and the extract spat onto wounds to relieve soreness'; FRODIN, New Britain); the fruits are edible.
Dichapetalum tenerum LEENH.
Add to Ecol.: *Fr.* July-Aug.
Add after 15. *Dichapetalum tenerum* LEENH.:

16. Dichapetalum scorpioideum LEENH. Blumea 13 (1965) 162.

Dioecious (?) liana. *Branchlets* densely fulvous-tomentose, glabrescent, purple-brown, sparsely lenticellate. *Leaves c.* 1 cm long petioled, blade elliptic, 16–20 by 9–11 cm, chartaceous, when young fulvous-hairy mainly on midrib and nerves, later subglabrous, lower surface with scattered small glands mainly in the basal part; base rounded, slightly attenuate; apex rather gradually, shortly, broadly, and bluntly acuminate; nerves 6–8 per side, curved, only the upper 2 or 3 more or less distinctly looped and joined near the margin. *Inflorescences* shortly ($2^1/_2$–5 mm) and thickly peduncled, with 2 spirally recurved, *c.* $1^1/_2$ cm long, densely and shortly fulvous-hairy cincinni which are densely covered on one side with two rows of alternating flowers, on the other side with the bracts. *Flowers* seen in bud only, ♂ unknown. *Petals* rather deeply bifid, outside sparsely appressed-hairy. *Disk lobes* low, broad, slightly bi- to trifid, long woolly-ciliate. *Ovary* densely fulvous woolly, 2-celled; style 1, cylindrical, short, with 2 spreading stigmas. *Fruits* about semi-elliptic, flattened, 20 by 13 by 9 mm, densely fulvous-velvety; pericarp with broad suture; 1-seeded.

Distr. Solomon Is. (Treasury Group, Mono I.).

Ecol. Secondary forest on rocky sandstone slope. *Fl. fr.* April.

Note. The relationships of this species are uncertain. The kind of inflorescence, its most distinctive character, is unique among the Asiatic and Pacific species, but is known from some African species.

Droseraceae

4: 379*a* *Drosera petiolaris* R. BR.
Of this rare species a second collection was made in the Western District, T.N.G., in an open grass-sedge plain, growing on sand over clay, rosettes over 14 cm ⌀, locally common *c.* 1 mile south of Morehead Patrol Post, along track to Tonda, Aug. 8, 1967, R. PULLEN 7139.

4: 379*ab* *Drosera spathulata* LABILL.
This species has for the second time been found at low altitude in Malesia, *viz* in Sarawak, near Telok Asam, Bako National Park, 120 m, by Prof. PURSEGLOVE, on mud by sides of streams. Bako National Park is situated on generally poor, podsolized soils carrying heath forest. The size of the flower dissected is slightly smaller than described in Fl. Mal.: sepals 2 mm, petals pink, nearly 2 mm; but otherwise the specimen shows no deviations.

Epacridaceae

6: 423 Line 8 from top, replace 'R. BR.' by '(R. BR.) SPR.'.

6: 426*b* *Styphelia malayana* (JACK) SPR.
Add to synonymy: *Leucopogon ophirensis* GRIFF. J. As. Soc. Beng. 23, ii (1854) 638.

Ericaceae (SLEUMER)

6: 469 Line 13 from bottom replace '*Wirtgenia*' by: *Andresia.*

6: 474 In Key to the genera (line 9) replace '**2. Wirtgenia**' by: **2. Andresia**.

6: 474 *Rhododendron* L.
It has appeared that there are still new species of *Rhododendron*, amongst others from Borneo and New Guinea. I am planning to give a supplement in future but not of other Ericaceous genera.

6: 480 Line 2 from top replace '3. *Subg. Pentanthera sect. Pentanthera*' by: 3. SUBG. ANTHODENDRON *sect.* **Anthodendron**.
Line 16 from top, omit '(BL.)'.
Line 18 from top, after ('*Vireya*'), insert: *non* RAFIN. 1814.
Line 18 from top, omit '(BL.)'.

6: 661 Replace the infrageneric epithet 3. Subgenus *Pentanthera* by: **3. Subgenus Anthodendron** (RCHB.) ENDL. *ex* WILS. & REHDER, Monogr. Azaleas (1921) 115.
Replace the infrageneric epithet 1. Section *Pentanthera* by: **1. Section Anthodendron** (RCHB.) ENDL. Gen. (1839) 759.

6: 662 In Key to the species line 8 read: **283. R. macrosepalum**.

6: 663*a* Replace the name 283. *Rhododendron linearifolium* S. & Z., *non* POIR. in LAMK, Encycl. 6 (1804) 267, by: **283. Rhododendron macrosepalum** MAXIM.

Flacourtiaceae (SLEUMER)

5: 8 *Scolopia* SCHREB.
I am engaged in a new revision of this genus. It has appeared that the new record of *S. kermodei* C.E.C. FISCHER

(hitherto known from Burma and Andamans) from Malaya (*cf.* Blumea 17, 1969, 270), has proved to belong to an undescribed species.

5: 14*a* *Paropsia vareciformis* (GRIFF.) MAST. Add to synonymy: *Alsodeia chrysodasys* MIQ. Fl. Ind. Bat. Suppl. 1 (1861) 390; Ann. Mus. Bot. Lugd.-Bat. 5 (1869) 215. *Cf.* JACOBS, Blumea 15 (1967) 137; SLEUM. Bull. Jard. Bot. Brux. 40 (1970) 67, f. 5 (distr.).

5: 35*b*, 565*a* *Scaphocalyx spathacea* RIDL. Add to Distr.: E. Borneo (Berao).

5: 39*a* *Trichadenia philippinensis* MERR. Add to synonymy: The plant distributed under the name *Neotrewia arborea* ELM. *nomen in sched.*, which was referred by MERRILL to *Neotrewia cumingii* (M.A.) P. & H. (*cf.* MERR. En. Philip. 2, 1923, 437), has appeared to belong to *T. philippinensis*.

5: 51 Line 17 from bottom replace '*Sect. Pythagorea*' by: SECT. BLACKWELLIA.

5: 52 Line 14 from bottom replace 'Subgenus *Pythagorea* (LOUR.) SLEUM.' by: **Subgenus Blackwellia** (LAMK) WARB.
Line 8 from bottom replace 'Section *Pythagorea* (LOUR.) O.K. 'by: **Section Blackwellia** BENTH.

5: 65*b* *Bennettia papuana* GILG is reduced to *Blumeodendron papuanum* P. & H. (*Euphorbiaceae*). *Cf.* AIRY SHAW, Kew Bull. 16 (1963) 349.

5: 65*b*, 566*a* *Hemiscolopia trimera* (BOERL.) SLOOT. Add to Distr.: Peninsular Thailand (Nakon Srithamarat).

5: 68*b* Add after 3. *Xylosma luzonense* (PRESL) CLOS, *etc.*:

3a. Xylosma palawanense MENDOZA, Philip. J. Sc. 93 (1964) 514, f. 2.

Shrub or tree, up to 7 m, glabrous, whether or not armed. *Leaves* broadly ovate, apex subacuminate, base truncate, rounded or slightly cordate, coriaceous, finely reticulate, crenate, 6–11 by 4–8 cm, with 1 or 2 small glands at base near the apex of the petiole, the latter slender, 1–1 1/2 cm. *Racemes* 4–8-flowered, rachis (5 mm or less) and pedicels (1 1/2–2 mm) puberulent. Perianth segments 4, suborbicular-ovate, puberulent outside, ciliate, *c.* 2 mm. Disk shortly 8-lobed. ♂ *Flowers*: stamens *c.* 25, exserted; filaments unequal, 2–2 1/2 mm; ovary rudimentary, 0.7 mm. ♀ *Flowers*: ovary ovoid, attenuate at apex, glabrous, 2–3 mm; stigmas 2, sessile. *Fruit* not known.

Distr. *Malesia*: Philippines (Palawan), twice found.

Ecol. On limestone hill.

Note. *X. palawanense* is distinguished from *X. luzonense* by the broadly ovate, at base truncate, rounded or slightly cordate leaves, which bear 2 basal pairs of lateral nerves.

5: 80 Under Fig. 35*b* read ♂ instead of ♀.

5: 95*a* *Casearia grewiaefolia* VENT. Replace the epithet *var. deglabrata* K. & V. by: *var.* **gelonioides** (BL.) SLEUM. *comb. nov.*

5: 98*b* *Casearia pallida* CRAIB. Add to Distr.: Malay Peninsula (Selangor).

5: 105 Under Excluded: *Dovyalis macrodendron* GILG, which was already tentatively removed from *Flacourtiaceae*, has appeared to belong to *Suregada* ROTTL. (*Gelonium*) of the *Euphorbiaceae*. *Cf.* STEEN. Nova Guinea, Bot. *n.* 12 (1963) 190.

Gnetaceae (MARKGRAF, Zürich)

4: 337 Add before Vern.:
Palynology. ERDTMAN (Bot. Notis. 1954, 80) has found that the subdivisions of the genus have separate pollen types.

4: 338 Replace the keys by the following:

KEY TO MALE PLANTS

1. Trees or shrubs, only occasionally and partly climbing. Leaves thin, yellowish when dried. Inflorescence yellowish; collars flat, almost always conspicuously distant from each other. *Sect. Gnetum subsect. Eugnemones.*
2. Trees. Sterile ♀ flowers ovate, long-beaked; beak finely velvety, whitish. **2. G. costatum**
2. Trees or shrubs. Sterile ♀ flowers globose, tipped (only in *var. griffithii* beaked), the tip neither velvety nor whitish . . . . . **1. G. gnemon**
3. Shrub. Inflorescence simple, slender, its axis scarcely 1/2 mm thick, flower clusters up to 2 mm ⌀ . . . . . *var.* **tenerum**
3. Trees or shrubs. Inflorescence simple or branched, thick, its axis 1 mm thick, flower clusters up to 5 mm ⌀.
4. Trees. Inflorescences almost always branched, all collars distant . . . . *var.* **gnemon**
4. Shrubs. Inflorescences always simple, often only the lowermost collars distant (inflorescence unknown in *var. gracile*).
5. All collars distant. Sterile ♀ flowers beaked (oblong, glabrous) . . . *var.* **griffithii**
5. Collars at least partly contiguous. Sterile ♀ flowers shortly acuminate.
6. Only the uppermost collars contiguous. Sterile ♀ flowers globose with short tip. *var.* **brunonianum**

6. All collars contiguous or only the two lowermost distant. Sterile ♀ flowers tapering. *var.* **ovalifolium**

1. Lianas. Leaves brown or black when dry, coriaceous (thin only in 6. *G. neglectum* and 3. *G. tenuifolium*). Inflorescence not yellowish, its collars always fairly approaching each other (the axis never visible between them), their edges bent upward[1]. *Sect. Cylindrostachys* MARKGR.
7. Collars of inflorescence dish-like, the flowers coming out freely.
8. Leaves with numerous spicular cells parallel to the secondary nerves, therefore silky above when dry. Stamen with one microsporangium only . . . . . **11. G. gnemonoides**
8. Leaves with few or no spicular cells. Stamen with two microsporangia.
9. Leaves thin, green when dry, large, elliptic. Inflorescence simple (rarely once branched), slender (3 mm broad), spike itself 2 cm long . . . . . **3. G. tenuifolium**
9. Leaves coriaceous. Inflorescence always branched.
10. Leaves small, obovate and tailed, distinctly reticulate, black when dry, striate above by spicular cells. Inflorescence once branched, slender (3 mm broad), spike itself 1–1 1/2 cm long . . . . . **5. G. arboreum**
10. Leaves often large and broad, not striate, mostly black when dry and inconspicuously reticulate. Inflorescence branched several times, thicker (4 mm broad), spike itself up to 4 cm long . . . . . **4. G. latifolium**
11. Leaves elliptic, brown when dry, distinctly reticulate, secondary nerves distinctly joined . . . . . *var.* **funiculare**
11. Dry leaves nigrescent, inconspicuously reticulate, secondary nerves ending open.
12. Leaves almost orbicular . . . . . *var.* **laxifrutescens**
12. Leaves elliptic.
13. Leaves small, up to 9 cm. Spike short, 1 1/2 cm long . . . . . *var.* **minus**
13. Leaves large, up to 20 cm. Spike 2–4 cm long . . . . . *var.* **latifolium**
7. Collars of inflorescence cylindric, keeping the flowers enclosed.
14. Inflorescence branched, mostly large, with often very long stalks. Exserted part of the stamen longer than the perianth.
15. Dried leaves black, with narrowed base, relatively rich in fibres. Inflorescence 15–20 cm long, catkins twice the length of their stalks. Sterile ♀ flowers obliquely conical. **9. G. ridleyi**
15. Dried leaves brown, with rounded base, without conspicuous fibres. Inflorescence 30 cm long (in *var. abbreviatum* 4–6 cm), catkins as long as their stalks. Sterile ♀ flowers ovate, straight . . . . . **16. G. leptostachyum**
16. Catkins at most 3 mm broad and 4 cm long.
17. Leaves large, up to 30 by 12 cm. Inflorescence 30 cm long, catkins 3–4 cm long. *var.* **leptostachyum**
17. Leaves small, not more than 12 by 6 cm. Inflorescence 4–6 cm long, catkins 1 1/2 cm long. *var.* **abbreviatum**
16. Catkins at least 4 mm broad and up to 6 cm long . . . . . *var.* **robustum**
14. Inflorescence unbranched (once branched in 6. *G. neglectum*), often cauline. Exserted part of the stamen shorter than the perianth.
18. Leaves thin, tapering at both ends. Inflorescence slender (3 mm). **6. G. neglectum**
18. Leaves coriaceous. Inflorescence thick (4–5 mm).
19. Inflorescences 6 cm long, drooping (unknown in 8. *G. klossii* from Borneo, but its rough ♀ one is of this type). Flowers numerous, imbedded in many hairs. **7. G. cuspidatum**
19. Inflorescence short, mostly erect (2–3 cm).
20. Inflorescence very thick (7 mm). Leaves large.
21. Leaves oblong-obovate, somewhat silky above by spicular cells. Flowers immersed between few hairs . . . . . **10. G. loerzingii**
21. Leaves elliptic, not silky. Flowers immersed between numerous long hairs. **13. G. macrostachyum**
20. Inflorescence moderately thick (4 mm), shortly stalked, mostly erect. Leaves small, up to 15 cm long.
22. Leaves firm (not fleshy), with distinct nervation, not glaucous, not cuneate. Inflorescence 3 cm long . . . . . **12. G. diminutum**
22. Leaves fleshy, with indistinct nervation, more or less glaucous. Inflorescence 1 1/2–2 cm long.
23. Leaf base mostly acute, leaves often lanceolate. Collars of inflorescence with angular lower edge. Fruit short-acuminate . . . . . **14. G. microcarpum**

(1) ♂ Inflorescence unknown in 10a. *G. raya* MARKGR., 11a. *G. globosum* MARKGR., and 7a. *G. acutum* MARKGR.

23. Leaf base mostly rounded. Collars of inflorescence with vaulted lower edge. Fruit long-acuminate . . . . . **15. G. oxycarpum**

KEY TO FEMALE PLANTS

1. Trees and shrubs, only occasionally or partly climbing. Leaves thin, yellowish when dry. Inflorescence yellowish, collars flat. Fruit almost velvety. *Sect. Gnetum subsect. Eugnemones.*
2. Tree. Flowers ovate, long-beaked; beak finely velvety, whitish . . . . **2. G. costatum**
2. Tree or shrub. Flowers globose, shortly tipped (only in *var. griffithii* beaked), the tip not velvety nor whitish . . . . . **1. G. gnemon**
3. Collars of inflorescence remote.
4. Flowers globose. Fruit ovate, obtuse.
5. Tree. Inflorescence mostly branched, all its internodes long (1/2–1 cm). Fruit large (2 cm long) . . . . . *var.* **gnemon**
5. Shrub. Inflorescence simple, at least its two lowermost internodes long, all others short and hidden. Fruit small (1 cm long), inserted on a thickened rachis. *var.* **brunonianum**
4. Flowers oblong, beaked (unkown in *var. gracile*). Fruit acute.
6. Fruit oblong. Axis of inflorescence thick (1 mm); internodes 1/2 cm long. *var.* **gracile**
6. Fruit ovate. Axis of inflorescence slender (1/2 mm); internodes 1 1/2 cm long. *var.* **tenerum**
3. Collars of inflorescence contiguous. Inflorescence short. Flowers acute.
7. Flowers globose, beaked. Fruit globose . . . . . *var.* **griffithii**
7. Flowers ovate, acuminate. Fruit ovate, long-acute . . . . . *var.* **ovalifolium**
1. Lianas. Leaves coriaceous, brown or black when dry (thin only in 6. *G. neglectum* and 3. *G. tenuifolium*). Inflorescence not yellowish. Collars dish-like. Fruit smooth or warty, not velvety. *Sect. Cylindrostachys* MARKGR.
8. Inflorescence branched (unknown in 5. *G. arboreum*, but the ♂ one branched, small).
9. Leaves obovate-cuneate, tailed, small, distinctly nerved below, densely striate by spicular cells above. Fruit long-stalked . . . . . **5. G. arboreum**
9. Leaves broadest in or below the middle, mostly large, not densely striate above.
10. Leaves brown when dry, secondary nerves distinctly joining.
11. Nerves all remote, arcuate. Inflorescence rich and spreading, often 30 cm long, in *var. abbreviatum* much shorter. Flowers globose, shortly tipped, embedded in dense hairs. Fruit sessile . . . . . **16. G. leptostachyum**
12. Leaves large, up to 30 by 12 cm. Infructescence 20–40 cm long, its internodes 8–12 mm long.
13. Infructescence 20–25 cm long. Fruit ellipsoidal, 2 by 1 1/2 cm. Internodes 12 mm long. *var.* **leptostachyum**
13. Infructescence 30–40 cm long. Fruit broad-ellipsoidal, 1.8 by 1.3 cm. Internodes 8 mm long . . . . . *var.* **robustum**
12. Leaves small, not more than 12 by 6 cm. Infructescence 10 cm long, its internodes 5 mm long. Fruit 2 1/2 by 1 1/2 cm. . . . . *var.* **abbreviatum**
11. Secondary nerves at the leaf base approaching each other, all with a straight lower part. Inflorescence not so rich, 15 cm long. Flowers obliquely beaked, conical, embedded in few hairs. Fruit stalked . . . . . **4. G. latifolium** *var.* **funiculare**
10. Leaves black when dry, secondary nerves indistinctly joining.
14. Leaves with conspicuous spicular cells, though not striate. Flowers embedded in numerous hairs. Fruit very large (6 cm), obtusely turbinate, sessile . . **9. G. ridleyi**
14. Leaves without conspicuous spicular cells. Flowers not embedded in numerous hairs. Fruit elliptic, up to 2 1/2 cm long, stalked. . . . . **4. G. latifolium**
15. Leaves almost or quite orbicular. Fruit oblong-obovate, rather long-stalked. *var.* **laxifrutescens**
15. Leaves elliptic. Fruit stalk thick.
16. Leaves small (not longer than 9 cm). Fruit ovate, small (1 1/2 cm long) *var.* **minus**
16. Leaves large. Fruit large, 2–2 1/2 cm, broadly ovate, long- or short-stalked. *var.* **latifolium**
8. Inflorescence simple (exceptionally once branched in 6. *G. neglectum*).
17. Leaves thin, tapering at both ends. Secondary nerves straight and broken.
18. Secondary nerves remote but not extremely so. Spike short (4 cm). Collars contiguous. Fruit 2 cm long, longitudinally furrowed, acute, with a long, slender stalk. **3. G. tenuifolium**
18. Secondary nerves extremely remote (up to 3 cm). Spike long, 8 cm. Collars not contiguous. Fruit small, brownish yellow, sessile, smooth, obtuse, 1 1/2 cm long. **6. G. neglectum**
17. Leaves coriaceous, secondary nerves bent, not broken.
19. Leaves silky above by numerous parallel spicular cells. Flowers obtuse. Fruit obtuse, large, warty . . . . . **11. G. gnemonoides**

20. Tertiary nervation of leaves indistinct. Fruit smooth.
21. Leaves elliptic, 15 by 7 cm. Fruit ellipsoidal, 5 by 3 cm . . . . . **10a. G. raya**
21. Leaves lanceolate, 8–9 by $2^1/_2$ cm. Fruit globose, $4^1/_2$ cm ∅. **11a. G. globosum**
20. Tertiary nervation of leaves distinct below. Fruit verrucose, 5–6 by 2–3 cm. **11. G. gnemonoides**
19. Leaves not silky by spicular cells. Flowers acuminate. Most inflorescences cauline.
22. Leaves fleshy, with indistinct nervation, more or less glaucous.
23. Flowers ovate. Fruit more or less obtuse, yellow, 2 cm long. **14. G. microcarpum**
23. Flowers oblong-conical. Fruit long-acuminate, $2^1/_2$ cm long, pink. **15. G. oxycarpum**
22. Leaves firm, not fleshy, not glaucous, with distinct nervation.
24. Leaves obovate-cuneate, striate above by spicular cells. Flowers obtuse, not embedded in thick hair masses. Fruit obtuse, 4 cm long . . . . . **10. G. loerzingii**
24. Leaves elliptic, not striate above. Flowers embedded in thick hair masses.
25. Leaves broad-elliptic. Fruit large, acute, rough . . . . . **8. G. klossii**
25. Leaves twice as long as broad. Fruit not rough.
26. Collars contiguous, their hair tufts enormous. Fruit small, up to 2 cm long, almost globose . . . . . **13. G. macrostachyum**
26. Collars remote, hair tufts large, but not enormous.
27. Leaves large. Inflorescence elongate, fruiting 9–15 cm long. Fruit $2^1/_2$–$3^1/_2$ cm long.
28. Fruit shining, broad-ovate, obtuse, $2^1/_2$ by $1^1/_2$ cm . . . . **7. G. cuspidatum**
28. Fruit opaque, fleshy, acute, slightly bent upward, $3^1/_2$ by 1.8 cm. **7a. G. acutum**
27. Leaves small. Inflorescence short. Fruit small, elliptic, $1^1/_2$ by 0.8 cm. **12. G. diminutum**

4: **340** Line 13 from top replace '*Section Gnemonomorphi*' by: **Section Gnetum**.

4: 343*a* *Gnetum neglectum* Bl.
Add to literature: Markgr. Blumea 10 (1960) 431; *ibid.* 19 (1971) 108.
Add to description: ♂ *Inflorescence* often cauliflorous, branched once, its branches slender, 2–4 cm by 1 mm; catkins 3–5 cm by 3 mm. Collars cylindric-infundibuliform, 3 mm high. ♂ *Flowers* numerous, obconical, 2 mm high; stamen bilocular, cells white, splitting on their top. *Sterile* ♀ *flowers* 4–6, ellipsoidal, short-acute, $1^1/_2$ mm long; involucre chartaceous; ovule obliquely ovoid, gradually acuminate, 1 mm high.
Add to Distr.: Borneo (Brunei, S 5752; Sarawak, S coll. 202; Sabah, SAN 28459).

4: 343*a* *Gnetum cuspidatum* Bl. — **Fig. 8**.
Add to literature: Molesworth Allen, Mal. Nat. J. 18 (1964) 168–169, 3 photogr. (finely illustrated description of ♂ inflorescence).

4: 344*a* **7a. Gnetum acutum** Markgr. *nom. nov.* — *G. acutatum* Markgr. Blumea 13 (1966) 404, *non* Miq. 1860.
Large liana, 25 m by $2^1/_2$ cm ∅; stems sulcate and densely lenticellate; twigs terete, smooth. *Leaves* glabrous, elliptic, acuminate, 11–17 by 6–$7^1/_2$ cm, firmly chartaceous; nerves 9 pairs, arcuate, united before the margin, prominent beneath; petiole 12 mm. ♀ *Inflorescence* cauliflorous, not branched, in fruiting state 9 cm, rachis 5 mm ∅; peduncle 8 mm; collars initially infundibuliform, later 1 cm wide. ♂ *Flowers* unknown. ♀ *Flowers* immersed in a dense hair-cushion, cream flushed with pink, acute-ovoid, apex upcurved; external involucre fleshy, 4 by 2 mm, $^1/_2$ mm thick, median one conical, thin, 2 by 1 mm, internal one chartaceous, ampullaceous, $1^1/_2$ by 0.8 mm, lengthened into a thin apical tube 2 mm exserted, fid at apex. *Fruit* acute-ovoid, slightly curved, $3^1/_2$ by $1^3/_4$ cm; external involucre fleshy, 1 mm thick, median one hard, glossy and fibrous, internal one chartaceous, glossy; nucellus with embryo $2^1/_2$ by $^3/_4$ cm, acute-ovoid.
Distr. *Malesia*: West Borneo: Sarawak (Rejang delta, Ashton S 17804).
Ecol. Alluvial forest.
Vern. *Layah*, Iban.
Note. Allied to *G. cuspidatum* by the simple, cauliflorous inflorescence with thick axis and densely hairy pulvini, fruit-size and leaf-shape. Differs by the acute fruit with dull, fleshy external involucre; also by more acute ♀ flowers, farther exserted micropylar tube, and obviously thinner leaves.

4: 344*a* *Gnetum ridleyi* Gamble *ex* Markgr.
Add to literature: Blumea 12 (1963) 78.
Add to description: ♂ *Inflorescence* 15 cm (or longer), widely divaricate-branched; fertile parts 3–5 cm, twice as long as peduncle; collars numerous, 2 by 4 mm, cylindric. Flowers interspersed with numerous hairs; ♂ *flowers* obconical, much narrowed to base, $1^1/_2$ by $^3/_4$ mm; sporophyll thin, 2 mm exserted; sporangia 2, ovoid. *Sterile* ♀ *flowers* 6, obliquely conical, $1^1/_2$ by 1 mm, external and internal involucre strongly fibrous (E. Malay Peninsula, P. Tioman, Kadim & Noor 644).

4: 344*b* **10a. Gnetum raya** Markgr. Blumea 14 (1966) 284.

Fig. 8. *Gnetum cuspidatum* BL. Abundant setting of seed, in Sarawak, near Bintulu; × 1/10 (DING HOU 321).

Large, glabrous liana, 20 m; twigs terete, smooth, lenticellate below the thicker nodes. *Leaves* elliptic, coriaceous, at base narrowed into petiole 1 cm, at apex short-acuminate, up to 15 by 7 cm, with parallel fibres visible on upper surface, grey-shining; nerves 6–8 pairs, arcuate-joining 1 cm from margin, prominent beneath, veins indistinctly reticulate. ♂ Unknown. *Fruiting* ♀ *inflorescences* often several at one node, 3–4 cm by 4–5 mm, collars dish-like, 6–8 mm ∅. *Fruit* immersed into cushions of short hairs, ellipsoidal, obtuse, 5 by 3 cm, attenuated at base into a hollow pseudostipe 5–10 by 8 mm, opaque, finely punctulate, grey-green, inside with a sour smell. Outer involucre fleshy, 2 mm thick, fibrous at the inner surface, middle one coriaceous, longitudinally sulcate, inner one chartaceous. *Seed* (unripe) oblong, 30 by 8 mm.

Distr. *Malesia*: Central Borneo (Upper Kapuas, Bt Raya, Sibu, S 23801); Sarawak (Kuching, near Matang, 500 m, mixed Dipterocarp forest, S 25646).

Ecol. On sandy clay, 200 m.

Vern. *Akar těngang*, Iban.

Notes. Allied to the Sumatran *G. loerzingii* MARKGR., with which it shares a large-fruited group with fibrous leaves and fruits (*G. klossii* MERR., *G. ridleyi* GAMBLE, *G. gnemonoides* BRONGN., *G. cuspidatum* BL.). The peculiar smell of the seed is also found in *G. loerzingii*. This species differs by obovate-cuneate leaves and by a rough fruit surface.

4: 344*b* **11a. Gnetum globosum** MARKGR. Blumea 19 (1971) 108.

Liana with terete, smooth twigs. *Leaves* coriaceous, light brown when dry, lanceolate, 8–9 by 2-2 1/2 cm; nerves straight, at an angle of 30° with the midrib, arcuate-joining 1/2 cm before the margin, hidden among numerous parallel fibres on either surface; petiole 1/2 mm. ♂ *Inflorescence* unknown. *Fruiting* ♀ *inflorescence* axillary, simple, peduncle 7 mm, rachis 13–23 by 3 mm, with 6–8 mm long joints; collars dish-like, 1 by 4 mm. *Fruit* globose, smooth, grey-green, 4 1/2 cm, contrasted at base; outer involucre rather fleshy, 2 mm thick, fibrous inside; middle one 1/2 cm thick, outside fibrous, inside smooth; inner one chartaceous, outside sparsely fibrous, inside smooth. *Seed* globular, 2 1/2 cm ∅.

Distr. *Malesia*: Malay Peninsula (Pahang: Ulu Sat, FRI 15262), one collection.

Ecol. Riverside forest, 120 m. *Fr.* July.

Note. Approaching *G. ridleyi* GAMBLE from Pahang by its rather large fruit and fibrous leaves; *G. ridleyi* differs by much larger and less fibrous leaves, by ramified inflorescences and larger, spindle-shaped fruits. *G. gnemonoides* BRONGN., of the same group, has lenticellate fruits and leaves that beneath are not fibrous but reticulate.

4: 346*b* *Gnetum leptostachyum* BL.

Add the following variety:

var. **abbreviatum** MARKGR. Reinwardtia 1 (1952) 462.

Leaves up to 12 by 6 cm, coriaceous, beneath distinctly reticulate-veined. ♂ Inflorescence 4–6 cm, branched. ♂ Catkins 1 1/2 cm by 3 mm. Infructescence up to 10 cm (internodes 5 mm). Fruit large, 2 1/2 by 1 1/2 cm.

Distr. *Malesia*: N. Borneo, Mt Kinabalu, 1200–1800 m (CLEMENS 32990, type; 32276, 32475, 32488, 32601, 32698, 32991).

Note. Some inadequate specimens I have identified formerly as *G. diminutum* MARKGR.; the branched inflorescences, however, prove them to belong to *G. leptostachyum*. It is a mountain variety with reduced size of leaves and inflorescences, combining the narrow, short ♂ catkins of the lowland variety *leptostachyum* with the short-jointed, large-fruited ♀ catkins of the lowland variety *robustum*.

Goodeniaceae (LEENHOUTS)

5: 335 Add to family diagnosis: Leaves sometimes verticillate.

Under Distribution the number of Malesian species of *Scaevola*, apart from the littoral *S. taccada*, should be changed into 5.

Add to *Pollination*: See also CAROLIN, Proc. Linn. Soc. N.S.W. 85 (1960) 197–207. G. W. GILLETT, in a letter dated 1-9-1964, on Hawaiian *Scaevola* informed me: 'Incidentally the *S. taccada* populations around here are strictly inbreeders, the indusium being filled with pollen before the corolla opens, after which the indusium closes over the pollen-filled stigma so that there is no chance that foreign pollen could ever make contact with the stigmatic surface. I have checked this in a very large number of flowers in widely separated populations. Our Hawaiian endemics do not behave this way.'

Add to Anatomy: CARLQUIST, Ann. Mo. Bot. Gard. 56 (1970) 358–390 (moreover a very interesting general paper).

Add after Anatomy:

Phytochemistry. See HEGNAUER, Chemotaxonomie 4 (1966) 212–215.

5: 336 Add to the introduction to the family:
Morphology. CAROLIN, Proc. Linn. Soc. N.S.W. 84 (1959) 242–255, on the anatomy and especially vasculation of the flowers. CAROLIN, *ibid.* 91 (1966) 58–83, on the morphology of fruit and seed as well as on the systematics of the family in general.
Cytology. See PEACOCK, Proc. Linn. Soc. N.S.W. 88 (1963) 8–27.
Velleia J. E. SMITH.
Add to literature: CAROLIN, Proc. Linn. Soc. N.S.W. 92 (1967) 51.

5: 336*a* *Velleia spathulata* R. BROWN.
Add to literature: CAROLIN, Proc. Linn. Soc. N.S.W. 92 (1967) 51.
Description, line 3, replace 'herbaceous' by: fleshy.

5: 336 *Goodenia* J. E. SMITH.
Distr., change to: three species known from outside Australia/Tasmania.
Add the following key:

KEY TO THE SPECIES

1. Plant 20–60 cm high. Leaves linear-lanceolate, up to 22 cm long. Inflorescences many-flowered. **3. G. purpurascens**
1. Plant up to 10 cm high. Leaves ovate or obovate, up to $6^1/_2$ cm long. Flowers solitary.
2. Plant glabrous. Leaves coarsely dentate . . **1. G. koningsbergeri**
2. Plant densely hairy. Leaves entire. **2. G. pumilio**

5: 337*b* After *Goodenia koningsbergeri* add:

2. Goodenia pumilio R. BROWN, Prod. (1810) 579; BANKS & SOLAND. Bot. Cook's Voy. 2 (1901) t. 177 f. A; KRAUSE, Pfl. R. Heft 54 (1912) 93; RIDSDALE, Trans. Papua N.G. Sci. Soc. 9 (1968) 18. — **Fig. 9**.

Erect or prostrate, fairly densely stellate-hairy, annual or perennial herb. *Leaves* radical-rosulate; (broad-)ovate to spathulate, up to 6 by 3 cm but usually much smaller, herbaceous, attenuate at base; margin entire; apex blunt. *Flowers* solitary, axillary, 4–5 mm long, hairy; pedicel *c.* 1 cm long; bracteoles 0. *Corolla c.* 3 mm long, dark reddish. *Capsules* (ovoid-)oblong, 3–4 mm long. *Seeds* many, orbicular, small.

Distr. Australia (Northern Terr., Queensland) and *Malesia*: New Guinea (Papua, Western Distr., near Weam, RIDSDALE & GALORE NGF 33733; Bula village, PULLEN 7009).

Ecol. Savannah grassland, *c.* 10–35 m. *Fl. fr.* Aug.

Note. We owe the identification of this and the following species to Prof. R. C. CAROLIN, Sydney.

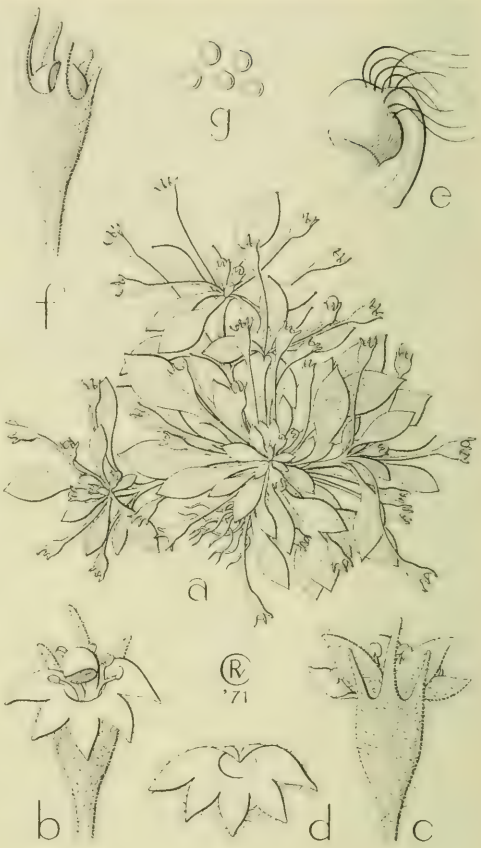

Fig. 9. *Goodenia pumilio* R.BR. *a.* Habit, ×2, *b–c.* flower, ×10, *d.* corolla, from above, ×10, *e.* style and stigma, ×20, *f.* calyx with fruit, ×10, *g.* seeds, ×8 (*a–g* PULLEN 7009).

3. Goodenia purpurascens R. BROWN, Prod. (1810) 578; KRAUSE, Pfl. R. Heft 54 (1912) 91; F. M. BAILEY, Compr. Cat. Queensl. Pl. (1913) f. 254.

Erect, sparsely hairy to subglabrous, annual or perennial herb. *Leaves* mainly radical rosulate; linear-lanceolate, up to 22 by $^1/_4$–$1^3/_4$ cm (the few cauline ones much shorter), somewhat fleshy, sessile with a slightly narrowed base; margin subentire, with a few minute teeth; apex acute. *Inflorescences* terminal, up to 25 by *c.* 5 cm, thyrsoid, repeatedly laxly branched and many-flowered. *Flowers* 10–15 mm long, thin-hairy to nearly glabrous; pedicel *c.* $^3/_4$ cm long; bracteoles 0. *Corolla c.* $^3/_4$–$1^1/_4$ cm long, pink to purple. *Capsules* ovoid, 3–4 mm long. *Seeds* many, lenticular, minute.

Distr. Australia (Northern Terr.,

Queensland) and *Malesia*: New Guinea (Papua, Western Distr., Wassi Kussa R., HENTY & KATIK NGF 38744).

Ecol. Savannah, in shallow water; alt. a few metres. *Fl.* July.

5: 338*b* *Calogyne pilosa* R. BROWN.
Add to Distr.: Now known from several localities in both eastern and western parts of New Guinea.
Add to Ecology: Also collected in marshy places. Change highest altitude to 250 m.

5: 338*b* *Lechenaultia filiformis* R. BROWN.
Add to 1st sentence of description: sometimes woody at base, hence apparently perennial, up to *c.* 50 cm high (NGF 38778).

5: 339*b* Line 1, replace '650' by : 850.

5: 339 *Scaevola* L. Add: *nom. cons.*
Description line 1, after 'opposite' add: or whorled.
Distr., last line: the number of Malesian species '1' should be changed into 3.
Replace the Key to the species by the following one:

1. Leaves opposite, not tufted. Scrambling or climbing shrubs. Flowers yellow. **3. S. oppositifolia**
1. Leaves either spirally arranged, or verticillate, usually tufted at the ends of the branches. Erect shrubs. Flowers not yellow.
2. Leaves in whorls of four. **S. verticillata**
2. Leaves spirally arranged.
3. Calyx-lobes usually $2^1/_2$ mm or more. Flowers 2–$2^1/_2$ cm long. Plant from the beach **1. S. taccada**
3. Calyx-lobes 1 mm long or calyx not distinctly lobed. Flowers 1–$1^1/_2$ cm long. Mountain plants.
4. Leaves petioled, $3^1/_2$–20 by $1^1/_2$–8 cm, flat. Flowers arranged in inflorescences, 1 cm long; calyx distinctly lobed . **2. S. micrantha**
4. Leaves subsessile, $2^1/_2$–$4^1/_2$ by $^1/_2$–$^3/_4$ cm, with revolute margins. Flowers solitary, $1^1/_2$ cm long; calyx not distinctly lobed. New Guinea (Fl. Mal. 5: 567) . **S. pauciflora**

5: 339*a* Replace the name *Scaevola sericea* VAHL by:

1. Scaevola taccada (GAERTN.) ROXB. Hort. Beng. (1814) 15, based upon *Lobelia taccada* GAERTN. Fruct. 1 (1788) 119, t. 25 f. 5. The vernacular name *taccada*, used as specific epithet, must be accepted as an indirect reference from ROXBURGH to GAERTNER's name.
This is strengthened by the direct reference of both to *Béla-Mòdagam* RHEEDE, Hort. Malab. 4 (1673) 119, t. 59, as well as by the reference in ROXB. Fl. Ind. 2 (1824) 146 to GAERTNER. See H. ST. JOHN, Taxon 9 (1960) 200–208; FOSBERG, Taxon 10 (1961) 225–226.
The synonym *Scaevola lobelia* MURR. Syst. Veg. ed. 13 (1774) 178 is illegitimate by the citation of *Lobelia plumierii* L. Sp. Pl. (1753) 929 as a synonym. Moreover, *Scaevola plumierii* as well as *S. taccada* are included, hence it has partly to be excluded from the Malesian flora.

5: 340*a* Line 3 from top replace '12–26 by 5–10' by: 39 by 13.

5: 341*a* Add to Distr.: E. Africa (Kenya).

5: 341*b* Add to 1st paragraph: For dispersal see also G. L. LESKO & R. B. WALKER, Ecology 50 (1969) 730. According to these authors the fruits, which remain viable for a long time, float in sea-water but germinate in fresh water only, that means after having been drifted ashore and after rain.

5: 342*a* *Scaevola micrantha* PRESL.
Add to 1st sentence of description: or treelet to 10 m by 5 cm.
Add to Distr. after Borneo: Mt Meliau, Mt Tavau. Add at the end of Distr.: Cited from Botel Tobago (near Taiwan) by HATUSIMA, Mem. Fac. Agr. Kagosh. Un. 7 (1970) 327.

5: 342*b* After *Scaevola micrantha* PRESL add:

Scaevola verticillata LEENH. Blumea 12 (1964) 317, f. 1. — **Fig. 10.**

Shrub. *Branchlets* ± terete, woolly tomentose; leaf-axils provided with a tuft of *c.* $1^1/_2$ cm long, isabelline, sericeous hairs, in older leaves forming a kind of papyraceous ligule. *Leaves* whorled in fours, ± tufted at the end of the branches; petiole *c.* $^3/_4$–1 cm long, grooved above, densely woolly; blade obovate-oblong, $5^1/_2$–7 by $2^1/_2$–3 cm, chartaceous, apparently convex with recurved margins, fairly densely shortly tomentose above, glabrescent, densely woolly tomentose beneath; base cuneate, slightly attenuate; margin minutely serrate towards the apex; apex acute; midrib slightly sunken above, prominent beneath; nerves *c.* 10–12 pairs, prominulous above, invisible beneath. *Inflorescences* condensed, few-flowered, peduncle short; bracts relatively large. *Flowers* 14 mm long. *Calyx* lobes different, dorsal one narrowly deltoid, acute, $2^1/_2$ mm, the others ovate, rounded, ventral one 1 mm, laterals $^3/_4$ mm, all outside (as well as the ovary) fairly densely, inside sparsely woolly. *Corolla* tube inside densely woolly, more sparsely so in the basal $^1/_4$ of the lobes, outdise densely woolly-tomentose but for the basal half of the tube; membranous margins of the lobes broad and crispy in the upper half, in the lower half narrowed and with some long and stiff marginal

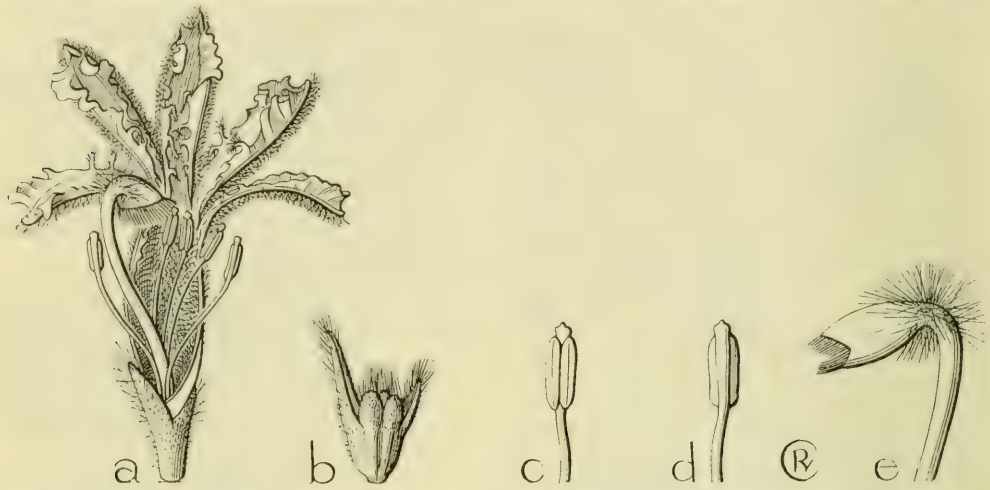

Fig. 10. *Scaevola verticillata* LEENH. *a*. Flower, ×4, *b*. calyx, ×4 (note the three different kinds of lobes!), *c*. & *d*. anther from in- and outside resp., ×8, *e*. indusium, ×8 (showing the spreading hairs at its base) (*a–e* W. MEIJER SAN 28818).

hairs and 2 or 3 lengthened teeth crowned with a brush-like bundle of hairs. *Style* with a few woolly hairs in the basal half and a collar of long, stiff, spreading hairs just under the indusium. *Fruits* unknown.

Distr. *Malesia*: Borneo (Mt Tambuyokon near Mt Kinabalu).

Ecol. Subalpine vegetation, on serpentine, 2500 m. *Fl.* July.

Note. Nearest allied to *S. micrantha* and *S. pauciflora*. Especially characterized by the whorled leaves and the heterosepalous calyx.

5: 342*b* *Scaevola oppositifolia* R. BROWN.
Line 21 from bottom, add after 'acute': or sometimes rounded, truncate, or even subcordate.
Line 7 from bottom, add after 'Style glabrous': to sparsely pilose.

5: 344*a* Add to Distr.: Ferguson I., Normanby I., and Goodenough I.

Hamamelidaceae

5: 369 *Distylium* SIEB. & ZUCC.
The genus *Distylium* was also recorded from Central America with 2–3 *spp.* Recently ENDRESS (Bot. Jahrb. 89, 1969, 355) has referred these American species to a separate genus *Molinadendron* ENDRESS, which he even says stands very remote and does not belong in the same tribe. The arguments for this seem to me, however, to be of more trivial nature and I do not agree with their inflation to generic rank.

5: 370 *Sycopsis* OLIVER.
Recently ENDRESS (Bot. Jahrb. 90, 1970, 30) has from the genus *Sycopsis* split off 4 Sino-Malesian *spp.* to represent a separate genus *Distyliopsis* ENDRESS, which the author maintains close to *Sycopsis*. To this also belongs the single Malesian species *S. dunnii* HEMSL. The arguments on which this distinction is based are partly due to a theoretical explanation of inflorescences, partly certainly not of generic rank (degree of connation of sepals) and partly of no value whatsoever (almost replacing ranges). I am not prepared to accept this as a distinct genus.

5: 371*b* *Sycopsis dunnii* HEMSL.
Add to Distr.: Now also found in North Borneo (Mt Kinabalu, Mesilau R., RSNB 7022) (add to fig. 5).

Hydrocaryaceae, see **Trapaceae**

Hydrocharitaceae (DEN HARTOG)

5: 381 A monograph has appeared by DEN HARTOG, The Seagrasses of the World, Verh. Kon. Ned. Akad. Wet. A'dam, afd. Natuurk. ser. 2, 59[1] (1970) 1–275, 63 fig., 31 pl., and furthermore world maps of distribution of seagrasses in Pacific Plant Areas 2 (Blumea, Suppl. 5) (1966) 208–219. Both contain a wealth of new data of various kind.

5: 393*a* *Blyxa novoguineensis* HARTOG.
Add to Distr.: It has probably also been found in the Philippines (Luzon) by JACOBS, but unfortunately the specimen is sterile.

5: 402*a* The authority of *Enhalus acoroides* is: (L. *f.*) ROYLE Ill. (1840) 453. This publication antedates STEUDEL's Nom.

Bot. ed. 2, 1 (1840) 554 by a few months.

5: 408 In Key, line 7, replace '2. *H. minor*' by: **2. H. ovata.**

5: 410*a* The correct name of 2. *Halophila minor* (Zoll.) Hartog is: **2. Halophila ovata** Gaud. in Freyc. Voy. Bot. (1827) t. 40, f. 1. In the latter published text of the same work, *l.c.* 430, Gaudichaud added as a synonym *Caulinia ovalis* R.Br., which would make his own name illegitimate; but his earlier published plate is validly published. *Cf.* Hartog (1970) 251.

5: 411*a* *Halophila decipiens var. pubescens* Hartog is no longer recognized. *Cf.* Hartog (1970) 254.

5: 412*a* *Halophila beccarii* Aschers.
Add to Distr.: Found abundantly in the Malay Peninsula. *Cf.* Hartog (1970) 262.

Juglandaceae

6: 153*a* *Engelhardia spicata* Lechen. *ex* Bl.
Replace the name *var. colebrookeana* (Lindl. *ex* Wall.) O.K. by:
var. **integra** (Kurz) Manning, *comb. nov.* — *E. villosa* Kurz *var. integra* Kurz, For. Fl. Burma 2 (1877) 492.

Juncaceae

4: 211*b* *Juncus effusus* L.
Add to Distr.: Malay Peninsula (Pahang, Cameron Highlands, G. Batu Brinchang, 2 clumps along roadside, *c.* 1 mile from summit, *c.* 2000 m, J. Sinclair 9956 (SING), Nov. 4, 1958).
Widely distributed in Malesia. In the Malayan specimen the inflorescence is up to 18 cm, due to elongated branchings. The fact that this species was found so late in Malaya and along a roadside in the newly opened Cameron Highlands is no proof at all that it is not native. In these forested mountains *Juncus* could originally equally well have been very scarce because of its heliophilous ecology, but extended after man artificially opened the forest. This happened also in Cameron Highlands with *Juncus prismatocarpus* R.Br., first collected in 1958. *Cf.* Kern, Gard. Bull. Sing. 17 (1958) 91–92. The like happens frequently; for example on Mt Diëng, in Java, *Gentiana quadrifaria* is a common weed on paths, though doubtless native and scarce before this mountain was deforested.

4: 215*b* Add to Excluded:
Luzula silvatica (Huds.) Gaudin, Agrost. Helvet. 2 (1811) 240; Buch. Pfl. R. Heft 25 (1906) 55. — *Juncodes silvaticum* (Huds.) O.K. Rev. Gen. Pl. 2 (1891) 725.
This was recorded by O. Kuntze from Central Java: Diëng Mt (O. Kuntze 5715b, Buch. *l.c.*). Though I have not seen the specimen there is presumably not the slightest doubt about Buchenau's identification. Dr. Bassett Maguire wrote me (26-2-60) that is it not in the New York Bot. Gard. Herbarium with Kuntze's collection. The species is not known to occur outside Europe. It is also strange that it is a b-number, which might suggest that it was mixed with something else. Could it have happened that Kuntze brought along old drying paper which he had used in Europe and in this way transported a European herbarium specimen to Java? This has occurred before, and by miracle also with a plant from Mt Diëng, *viz Luronium natans* (L.) Rafin., *cf.* Fl. Mal. I, 5 (1957) 334*b*. This mislocation could be proved by means of using diatoms adhering to the plant as tracers (*cf.* Steen. Taxon 5, 1956, 157–158) by Van der Werff (Blumea 7, 1954, 599–601). If we had Kuntze's specimen we could probably apply this method with success. Another solution to the mystification could be that a European collection got mixed with Javanese collections after Kuntze had returned to Europe; a similar thing happened with Ridley's Javanese collections which contain a few European *Carices*.
It is said that *L. silvatica* is sometimes dispersed outside its natural habitat with grass-seed in Holland, but this cannot have happened in Kuntze's time to Java. It certainly does and did not occur in Java.

Loganiaceae (Leenhouts)

6: 294 Add to Phytochemistry: *Cf.* Hegnauer, Chemotaxonomie 3 (1964) 307–310, 647.

6: 295 Insert before Delimitation and subdivision:
Cytology. *Cf.* Gadella, Act. Bot. Neerl. 11 (1962) 51–55.
Palynology. *Cf.* Punt & Leenhouts, Grana Palynologica 7 (1967) 469–516.

6: 296 Add to the discussion on the position of the *Buddlejeae*: W. Troll, Jahrb. 1965 Akad. Wissensch. Lit. Mainz (1966) 128, on arguments derived from the morphology of the inflorescence, also concludes to a closer relationship with the *Loganiaceae*.
Add to (4) *Peltanthera*: Revision: Leeuwenberg, Act. Bot. Neerl. 16 (1967) 143–146.
Add to (8) *Gomphostigma*: Revision: Verdoorn, Fl. S. Afr. 26 (1963) 168–171.
Add to (10) *Emorya*: See: Norman & Moore, Southwestern Naturalist 13 (1968) 137–142.
Add to (11) *Adenoplusia* and (12) *Adenoplea*: Both reduced to *Buddleja* by Leeuwenberg, Act. Bot. Neerl. 16 (1967) 143.

Add to (13) *Bonyunia*: 4 or 5 *spp.* Revision: LEEUWENBERG, Act. Bot. Neerl. 18 (1969) 152–158.
Add to (16) *Usteria*: Revision: LEEUWENBERG, Act. Bot. Neerl. 12 (1963) 112–118.
Insert before **E. Strychneae: D'. Plocospermeae.**
(18a) *Plocosperma.* Monotypic; Central America. Revision: LEEUWENBERG, Act. Bot. Neerl. 16 (1967) 56–61.

6: 297 Add to *Desfontainea*: Revised and placed in a separate tribe **Desfontaineae** by LEEUWENBERG, Act. Bot. Neerl. 18 (1969) 669–679.
Add to *Retzia*: Revised and placed in a separate tribe **Retzieae** by LEEUWENBERG, Act. Bot. Neerl. 13 (1964) 333–339.

6: 300 Add to Dispersal, 1st sentence, after 'bats': and by *Viverridae* ('*luwaks*'), *cf.* DOCT. v. LEEUWEN, Trop. Natuur 21 (1932) 142.
Add to Anat.: See SINGH, Gard. Bull. Sing. 22 (1967) 193–212, for sclereids; BURGESS, Timbers of Sabah (1966) 385–388, for wood-anatomy.

6: 302 Add to 22, 2nd lead: (Confusion is possible with specimens of *F. auriculata ssp. borneensis* with very faint auricles and 1–3–flowered inflorescences.)

6: 303*a* *Fagraea elliptica* ROXB.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 211.

6: 304*b* *Fagraea fragrans* ROXB.
Add to literature: TROUP, Silvic. Ind. Trees 2 (1921) 676; MITCHELL, Mal. For. 27 (1964) 127; BACK. & BAKH. *f.* Fl. Java 2 (1965) 211; SMYTHIES, Common Sarawak Trees (1965) 87; KENG, Malayan Seed Plants (1969) f. 140–141.

6: 308*a* Add to Distr. 2nd paragraph: MIQUEL's citation from the Moluccas is apparently based upon DE FRETES 5742 from Ambon (U).

6: 308*b* Insert under Uses before 'A decoction . .': see SCHNEIDER, Bull. Bur. For. Philip. 14 (1916) 202, f. 71.

6: 311*a* *Fagraea racemosa* JACK *ex* WALL.
Add to literature: ANDERSON, Gard. Bull. Sing. 20 (1963) 192; BACK. & BAKH. *f.* Fl. Java 2 (1965) 211.

6: 315*a* *Fagraea ceilanica* THUNB.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 211.

6: 316*b* Add (*sub F. litoralis* BL.): DOCT. v. LEEUWEN, Trop. Natuur 21 (1932) 142; ANDERSON, Gard. Bull. Sing. 20 (1963) 192.

6: 317*b* Add to Distr.: Bougainville (NGF 31290, '*ternatana*'), Solomon Is. (New Georgia: WHITMORE R.S.S. 6361, '*ternatana*'; Guadalcanal: R.S.S. 86, '*litoralis*', R.S.S. 98, '*ternatana*').

6: 318*a* 3rd paragraph, '*F. oblonga*', add to distribution: Borneo (Sarawak).

6: 320*a* *Fagraea acuminatissima* MERR.
Add to Ecol.: also on coastal rocks.

6: 320*b* *Fagraea ridleyi* K. & G.
Add to description, 1st sentence: or treelet (5 m).
Add to Ecol. 3rd line, after 'sandstone': and limestone.
Fagraea blumei G. DON.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 211.

6: 323*a* *ssp. blumei.*
Add to Ecol., after altitude: on Mt Kinabalu up to 3000 m.

6: 324*a* *Fagraea fastigiata* BL.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 211.

6: 327*b* *Fagraea auriculata* JACK.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 211.

6: 328*a* Add to Distr.: Sumbawa, Flores.

6: 328*b* *ssp. auriculata.*
Add to Distr.: Sumbawa, Flores.
ssp. borneensis (SCHEFF.) LEENH.
Read Inflorescences: (1–)3–7– flowered.

6: 332*b* *Fagraea gracilipes* A. GRAY.
Add to literature: PARHAM, Pl. Fiji Is. (1964) 176, f. 64.

6: 333*a* *Fagraea gracilipes* A. GRAY.
Add to Distr. *sub* Solomon Is.: Choiseul.

6: 335*a* *Fagraea berteriana* A. GRAY *ex* BTH.
Add to literature (*sub F. schlechteri* GILG & BENED.): GUILL., THORNE & VIROT, Un. Iowa Stud. Nat. Hist. 20, 7 (1965) f. 15 (p. 55).

6: 335*b* Ecol.: Change highest altitude into 1700 m. Add: Flowers open in the morning, drop off in mid-afternoon.

6: 336 *Buddleja* HOUST. *ex* LINNÉ.
Replace 'Spelled *Buddleia* by most authors' by: Incorrectly spelled *Buddleia* by most authors; *cf.* Int. Code of Bot. Nomencl. (1961) Appendix II, Nomina Familiarum conservanda, *sub Buddlejaceae.*
Add to synonymy: *Toxina* NOROÑA, Verh. Bat. Gen. 5 (1791) 4, *nom. nud.*

6: 337*b* *Buddleja asiatica* LOUR.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 212.

6: 340*a* *Buddleja davidii* FRANCH.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 212.

6: 343 *Gelsemium* JUSSIEU.
Add to literature: DUNCAN & DE JONG, Sida 1 (1964) 346–357; ORNDUFF, J. Arn. Arb. 51 (1970) 1–17.
Add to description: Seeds not winged in *G. rankinii.*
Strychnos L.
Add to literature: KRUKOFF, Mem. N.Y. Bot. Gard. 12, 2 (1965) 1–94; LEEUWENBERG, Med. Landb. Hogesch. Wageningen 69 (1969) 1–316.

6: 345 Add to Distr.: *Cf.* VAN BALGOOY, Blumea Suppl. 5 (1966) 256, map 141.

6: 346 Add to Taxonomy: A new subdivision has been proposed by LEEUWENBERG, *l.c.*,

who distinguishes between 12 sections. As far as the Malesian species are concerned, these are the following:
Sect. Strychnos: *S. angustiflora*, *S. ignatii*, *S. kerrii*, *S. lucida*, and *S. nux-vomica*.
Sect. Penicillatae: *S. axillaris*, *S. ridleyi*, and possibly *S. melanocarpa*.
Sect. Brevitubae: *S. flavescens*, *S. luzonensis*, and *S. vanprukii*.
Sect. Lanigerae: *S. borneensis*, *S. curtisii*, *S. lanata*, *S. lanceolaris*, *S. ledermannii*, *S. maingayi*, *S. minor*, *S. oleifolia*, *S. ovata*, *S. polytrichantha*, *S. thorelii*, *S. villosa*, and possibly *S. rufa*.
Key to the species:
Replace couplet 3, as follows:
3. Petiole 2–4 mm. Inflorescences few-flowered. Style glabrous. Fruits 2–2$^1/_2$ cm ∅, pedicels only slightly thickened. **3. S. lucida**
3. Petiole 4–11 mm. Inflorescences many-flowered. Style thin-woolly. Fruits 3–6 cm ∅, pedicels thickened.
3A. Leaves elliptic-oblong, 2–3 times as long as wide, shining green when dry. Calyx glabrous; corolla 14–15 mm long, inside woolly at the mouth; anthers 1 mm. Fruit thick-walled. Paired tendrils frequent (always a liana) . **23. S. kerrii**
3A. Leaves broad-ovate to elliptic, *c.* 1$^1/_4$–1$^1/_2$ times as long as wide, dull green when dry. Calyx outside pubescent; corolla 10–12 mm long, inside woolly in the lower half of the tube; anthers 1$^3/_4$ mm. Fruit thin-walled. No tendrils (mostly a tree) . . . . **2. S. nux-vomica**
Insert between 6 and 7:
6A. Twigs sharply quadrangular, branches often rounded quandrangular. Dried leaves beneath mostly yellowish brown to copper-red. Anthers glabrous . . . **12. S. vanprukii**
6A. Twigs and branches terete. Dried leaves beneath either dark brown or greenish. Anthers hairy.
Add to 8, 2nd lead, at end of 1st sentence: (exceptionally glabrous).
6: 347 Replace couplet 12, as follows:
12. Corolla 9–10 mm long.
12A. Leaves elliptic, *c.* 2$^1/_2$ times as long as wide, base cuneate, apex mostly distinctly acuminate. Calyx outside glabrous, sepals rounded to nearly truncate; corolla inside densely woolly from slightly above the base to halfway the lobes; pistil fairly densely hairy from about halfway the ovary upwards. **13. S. borneensis**
12A. Leaves mostly ovate to broad-ovate, 1–2 times as long as wide, base (obtuse to) rounded to cordate, apex not to shortly acuminate. Calyx outside puberulous, sepals acute; corolla inside woolly in the mouth and on the lower part of the lobes; pistil glabrous . . **22. S. angustiflora**
12. Corolla up to 6$^1/_2$ mm long.
Replace in 14, 1st lead, '*S. colubrina*' by: **S. minor.**
Add to 14, 2nd lead, after 'Anthers subsessile': or filaments short.
15, 2nd lead, 2nd sentence, read: Leaves 3–5-plinerved.
Insert after the key to the species the following:
With the key as published originally in the Flora Malesiana, only flowering material could be identified. Four species the flowers of which were known too incompletely or not at all (*S. melanocarpa*, *S. quandrangularis*, *S. rufa*, and *S. thorelii*) could then not be included. Out of these four, one (*S. quadrangularis*, now *S. vanprukii*) could be added in the above Addenda to the key as in the mean time the flowers became known. But fruiting and sterile material, more than half the collections coming in, could still not be named. For that reason I have compiled the following *synoptic key* to all Malesian species, making use of all main characters. This is a multiple entry key, which means that one can start with every character, and can make use of all characters available in the material. The numbers after each lead represent the species showing that character state; species in which that character is still unknown are included with a question mark. The best way to work with this key is first to try whether the specimen to be identified shows one or more 'rare' characters, to note down all numbers of species that may show that character (including those with a question mark), and, with each following character, to narrow down this series of possibilities. Finally, this will lead to one or a few species; comparison with the descriptions and with material will mostly be conclusive. If identification in this way does not lead to any species, you may try what species shows the smallest number of differences: it may be that your specimen represents a species not included in the key, but it is also possible that it shows a character state not yet known from one of the species. The numbers of the species are in accordance with the following enumeration.
1. Twigs
a. glabrous: 1. 3. 4. 5. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 18. 22. 23. 24.
b. hairy (mostly slightly and early glabrescent): 2. 3. 5. 6. 14. 16. 17. 18.

19. 20. 21. 22.
2. Thorns or spines
a. present: 2. 3. 18. 22.
b. absent: all species.
3. Leaves, shape (irrespective of place of greatest width)
a. rhomboid: 18.
b. suborbicular (about as long as wide): 2. 3. 11. 18. 22.
c. elliptic (± 1½ times as long as wide): 1. 2. 3. 4. 5. 6. 7. 8. 11. 12. 13. 14. 16. 18. 20. 22. 23. 24.
d. oblong (± 2½ times as long as wide): 1. 4. 5. 6. 8. 9. 10. 11. 12. 13. 14. 16. 17. 18. 19. 20. 21. 22. 23. 24.
e. lanceolate (3 or more times as long as wide): 1. 4. 8. 9. 11. 12. 15. 16. 18. 21. 22.
4. Leaves, place of greatest width
a. about the middle: 1. 2. 3. 4. 5. 6. 7. 8. 10. 11. 12. 13. 14. 15. 16. 18. 19. 20. 21. 22. 23.
b. distinctly below the middle: 1. 2. 3. 5. 6. 8. 9. 10. 11. 12. 14. 16. 17. 18. 19. 20. 21. 22. 23. 24.
c. distinctly above the middle: 11.
5. Length of leaves
a. up to 10 cm: 1. 2. 3. 4. 5. 6. 7. 8. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24.
b. 10–15 cm: 1. 2. 4. 5. 6. 8. 9. 10. 11. 12. 14. 16. 18. 20. 21. 22. 23. 24.
c. 15–20 cm: 1. 6. 10. 11. 12. 18. 20.
d. more than 20 cm: 1. 11.
6. Width of leaves
a. up to 5 cm: all species.
b. 5–10 cm: 1. 2. 3. 4. 5. 6. 8. 10. 11. 12. 14. 16. 18. 20. 22. 23. 24.
c. more than 10 cm: 1. 2. 11. 12.
7. Leaves
a. glabrous: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 18. 21. 22. 23. 24.
b. not fully glabrous: 6. 17. 18. 19. 20. 21.
8. Lower side of leaf
a. warty(-papillose): 3. 11. 18. 20.
b. smooth: 1. 2. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 21. 22. 23. 24.
9. Leaf base
a. angular: 1. 2. 3. 4. 5. 6. 8. 9. 10. 11. 12. 13. 14. 15. 16. 18. 19. 21. 22. 23. 24.
b. rounded: 1. 2. 3. 4. 5. 6. 7. 8. 10. 11. 12. 14. 16. 17. 18. 19. 20. 21. 22. 23. 24.
c. (sub)cordate: 2. 3. 6. 11. 18. 20. 21. 22.
10. Leaf apex
a. acuminate: 1. 2. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24.
b. not acuminate: 1. 2. 3. 5. 10. 11. 12. 16. 18. 22. 23.
11. Leaf apex or acumen
a. acute: 1. 2. 3. 4. 5. 6. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24.
b. blunt to rounded: 1. 2. 3. 5. 7. 8. 9. 10. 11. 18. 22.
c. emarginate: 3. 18.
12. Number of main nerves
a. 3: 1. 2. 3. 4. 5. 9. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24.
b. 5: 2. 3. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 16. 17. 18. 20. 21. 22. 23.
c. 7: 11. 14.
13. Petiole, length
a. up to 4 mm: 3. 5. 11. 12. 15. 16. 18. 20. 24.
b. 4–7½ mm: 1. 2. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 21. 22. 23.
c. more than 7½ mm: 1. 2. 5. 6. 9. 10. 11. 12. 16. 18. 19. 21. 22. 23.
14. Inflorescences
a. terminal (either on a main branch or on a short axillary shoot with at least one pair of leaves; sometimes with a pair of basal branches in the upper leaf axils): 1. 2. 3. 4. 5. 6. 7. 8. 9. 11. 14. 16. 17. 18. 21. 22. 23. 24.
b. axillary, sometimes ramiflorous or together pseudoterminal: 1. 4. 5. 6. 7. 8. 10. 11. 12. 13. 14. 15. 16. 18. 19. 20. 21. 24.
15. Inflorescences, length
a. up to 5 cm: 1. 2. 3. 4. 5. 7. 8. 11. 12. 13. 14. 15. 16. 18. 19. 20. 21. 22. 23. 24.
b. 5–10 cm: 1. 4. 5. 6. 8. 9. 10. 11. 12. 13. 16. 17. 21. 23.
c. more than 10 cm: 6. 11.
16. Calyx outside
a. hairy: 1. 2. 3. 4. 5. 6. 8. 9. 11. 12. 15. 16. 17. 18. 20. 21?. 22.
b. glabrous: 4. 6. 7. 10. 11. 12. 13. 14. 18. 19. 21?. 23. 24.
17. Calyx inside
a. hairy: 4. 6. 12. 13. 19. 20?. 21?. 24?.
b. glabrous: 1. 2. 3. 4. 5. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 20?. 21?. 22. 23. 24?.
18. Sepals
a. acute: 1. 2. 3. 5. 6. 10. 11. 12. 15. 17. 18. 19. 20?. 21?. 22. 24.
b. blunt, rounded, or truncate: 1. 2. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 16. 17. 18. 20?. 21?. 23. 24.
19. Corolla, total length
a. up to 5 mm: 4. 5. 6. 11. 12. 14. 15. 16. 17. 18. 19. 20. 21?. 24.
b. 5–10 mm: 1. 7. 8. 9. 10. 11. 13. 21?. 22.
c. 10 mm or more: 1. 2. 3. 21?. 22. 23.
20. Corolla tube
a. longer than limb: 1. 2. 3. 18. 20?. 21?. 23.
b. equal to limb: 11. 13. 14. 15. 16. 18.

19. 20?. 21?. 22. 24.
c. shorter than limb: 4. 5. 6. 7. 8. 9. 10. 12. 17. 20?. 21?.
21. Mature corolla outside
a. hairy: 5. 6. 9. 15. 16. 18. 20?. 21?.
b. fully glabrous: 1. 2. 3. 4. 5. 7. 8. 10. 11. 12. 13. 14. 17. 18. 19. 20?. 21?. 22. 23. 24.
22. Corolla inside
a. glabrous: 3. 16. 20?. 21?.
b. with a whorl of bristle-like hairs in the mouth or up to halfway on the lobes: 17. 18. 19. 20?. 21?. 24?.
c. woolly in the tube, sometimes extending to the lobes: 1. 2. 3. 6. 8. 9. 10. 11. 13. 20?. 21?.
d. only woolly about the mouth: 4. 5. 11. 12. 14. 16. 20?. 21?. 22. 23. 24?.
e. woolly on the lobes, sometimes from the mouth upwards: 7. 11. 12. 15. 16. 19. 20?. 21?. 24?.
23. Insertion of stamens
a. in the mouth: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 20?. 21?. 22. 23.
b. in the tube: 12. 14. 18. 19. 20?. 21?. 22. 23. 24.
24. Filament, length
a. up to $^1/_2$ mm: 1. 2. 3. 5. 6. 11. 14. 15. 16. 17. 18. 19. 20?. 21?. 23. 24.
b. $^1/_2$–$1^1/_2$ mm: 1. 3. 5. 6. 10. 11. 12. 13. 15. 18. 20?. 21?.
c. $1^1/_2$-$2^1/_2$ mm: 4. 5. 7. 9. 12. 13. 20?. 21?.
d. $2^1/_2$ mm or more: 4. 8. 12. 20?. 21?. 22.
25. Anther
a. ovate: 4. 5. 6. 11. 12. 15. 16. 17. 18. 19. 20?. 21?. 24.
b. elliptic: 2. 5. 9. 11. 12. 13. 14. 20?. 21?. 23.
c. oblong: 1. 3. 4. 7. 10. 11. 12. 13. 20?. 21?. 22. 23.
d. lanceolate: 4. 7. 8. 10. 11. 13. 20?. 21?.
26. Anther, length
a. up to 1 mm: 4. 5. 6. 7. 11. 12. 14. 15. 16. 17. 18. 19. 20?. 21?. 23. 24.
b. more than 1 mm: 1. 2. 3. 5. 8. 9. 10. 11. 13. 20?. 21?. 22. 23.
27. Anther
a. hairy: 4. 5. 6. 8. 10. 11. 13. 15. 16. 17. 18. 19. 20?. 21?. 24.
b. glabrous: 1. 2. 3. 4. 7. 8. 9. 11. 12. 13. 14. 16. 20?. 21?. 22. 23.
28. Pistil, length
a. up to 4 mm: 4. 5. 6. 11. 12. 14. 15. 16. 17. 18. 19. 20?. 21?. 24.
b. more than 4 mm: 1. 2. 3. 7. 8. 9. 10. 11. 13. 20?. 21?. 22. 23.
29. Ovary
a. hairy: 4. 5. 6. 7. 8. 9. 10. 11. 13. 15. 17. 20?. 21?. 24.
b. glabrous: 1. 2. 3. 4. 5. 6. 12. 14. 16. 18. 19. 20?. 21?. 22. 23.
30. Style
a. hairy: 1. 2. 4. 5. 6. 7. 8. 9. 10. 11. 13. 14. 15. 16. 17. 20?. 21?. 23. 24?.
b. glabrous: 1. 3. 4. 5. 6. 11. 12. 16. 18. 19. 20?. 21?. 22. 24?.
31. Pedicels in fruit
a. much thickened: 1. 2. 7?. 9?. 10?. 13. 14?. 15. 17?. 19?. 20. 23. 24?.
b. only slightly thickened: 3. 4. 5. 6. 7?. 8. 9?. 10?. 11. 12. 14?. 16. 17?. 18. 19?. 21. 22. 24?.
32. Fruits
a. globular: 1. 2. 3. 4. 5. 6. 7?. 8. 9?. 10?. 11. 12. 13. 14?. 15?. 16. 17?. 18. 19?. 20. 22. 23. 24.
b. ellipsoid or ovoid: 1. 5. 6. 7?. 9?. 10?. 14?. 15?. 17?. 18. 19?. 21.
33. Fruits, diameter or length
a. up to $2^1/_2$ cm: 3. 4. 5. 6. 7?. 9?. 10?. 11. 12. 13. 14?. 15?. 16. 17?. 18. 19?. 21. 22. 24.
b. more than $2^1/_2$ cm: 1. 2. 7?. 8. 9?. 10?. 11. 14?. 15?. 17?. 19?. 20. 21. 22. 23.
34. Fruits
a. thick-walled: 1. 7?. 9?. 10?. 14?. 15?. 17?. 19?. 23. 24?.
b. thin-walled: 2. 3. 4. 5. 6. 7?. 8. 9?. 10?. 11. 12. 13. 14?. 15?. 16. 17?. 18. 19?. 20. 21. 22. 24?.
35. Number of seeds
a. 1 or 2: 3. 4. 5. 6. 7?. 9?. 10?. 11. 12. 13?. 14?. 16. 17?. 18. 19?. 21. 22. 24?.
b. more than 2: 1. 2. 3. 6. 7?. 8. 9?. 10?. 11. 13?. 14?. 15. 17?. 19?. 20. 22. 23. 24?.

6: 347*a* **1. Strychnos ignatii** Berg.
Add to literature: Back. & Bakh. *f.* Fl. Java 2 (1965) 210; Tirel-Roudet, Logan. Cambodge, Laos & Vietnam (1970) 59, t. 4 f. 6–8.
Change *S. philippinensis* Blco into *S. philippensis* Blco.

6: 349*b* **2. Strychnos nux-vomica** L.
Add to literature: Troup, Silvic. Ind. Trees 2 (1921) 673; Pételot, Pl. Médic. Cambodge, Laos & Viet-Nam 2 (1953) 169; Back. & Bakh. *f.* Fl. Java 2 (1965) 210; Tirel-Roudet, Logan. Cambodge, Laos & Vietnam (1970) 71.
Add to Distr.: Burma.

6: 350*a* **3. Strychnos lucida** R.Br.
Add to literature: Back. & Bakh. *f.* Fl. Java 2 (1965) 210.

6: 350*b* **4. Strychnos maingayi** Clarke.

6: 351*a* **5. Strychnos ovata** Hill.
Add to literature: Tirel-Roudet, Logan. Cambodge, Laos & Vietnam (1970) 55, t. 3 f. 1–5.
Add to synonymy: *Strychnos sp.* Merr. Pl. Elm. Born. (1929) 252.
Add to description: Young twigs sometimes sparsely minutely hairy. Leaves up to 11 cm long.

6: 315*b* Insert after the paragraph on Ecology:

Uses. In Sarawak, Ukit nomads prepare one of the elements of their dart poison from this species.

6: 351*b* **6. Strychnos villosa** HILL.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 209.

6: 353*a* **7. Strychnos curtisii** K. & G.

8. Strychnos polytrichantha GILG.

6: 353*b* **9. Strychnos oleifolia** HILL.

6: 355*a* **10. Strychnos lanata** HILL.
The correct name for species 11 is:
11. Strychnos minor DENNST. Schluess. Hort. Malab. (1818) 33; BISSET & PHILCOX, Taxon 20 (1971) 537-543. — *S. colubrina Auct. non* L.: HILL, Kew Bull. (1917) 157 *et seq.*; LEENH. Fl. Mal. I, 6 (1962) 355; BACK. & BAKH. *f.* Fl. Java 2 (1965) 209; TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 50, t. 12 f. 5.
Add to description: Leaves sometimes not acuminate at apex; lower side mostly smooth to rarely minutely papillose.

6: 356*a* Add to Distr.: Lesser Sunda Is. (Flores).

6: 356*b* Replace species 12 as follows:
12. Strychnos vanprukii CRAIB, Kew Bull. (1911) 421; HILL, Kew Bull. (1917) 139; in Craib, Fl. Siam. En. 3 (1951) 62; TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 48, t. 2 f. 1–7. — *S. aenea* HILL, Kew Bull. (1917) 138, *cum fig.*, incl. also *var. acuminata.* — *S. quadrangularis* HILL, Kew Bull. (1917) 205; LEENH. Fl. Mal. I, 6 (1962) 356. — *S. maingayi* CLARKE *ssp. borneensis* LEENH. Blumea 14 (1966) 230.

Climbing shrub or liana, provided with double tendrils. *Twigs* slender, mostly sharply quandrangular, glabrous; branches rounded quadrangular. *Leaves* $7^1/_2$–20 by $2^1/_2$–11 cm, ratio *c.* 2–3, widest about or sometimes below the middle, thin-chartaceous to papyraceous, beneath copper-red to yellowish brown or sometimes green when dried, smooth and glabrous; base cuneate to rounded; apex short- to caudate-acuminate, acute; strongly 3–5-plinerved; petiole 4–5 mm. *Inflorescences* axillary, $1^1/_2$–6 cm long, lax, few- to many-flowered, puberulous or glabrous. *Flowers* 5-merous. *Sepals c.* 1 mm, acute or blunt, outside glabrous, inside glabrous or nearly so. *Corolla* 3–4 mm long, the tube $^1/_4$–$1^1/_4$ mm, outside glabrous, inside woolly about the mouth up to halfway the lobes and papillose hairy at the tips. *Stamens* inserted at or slightly below the mouth, filament 1–3 mm long, anther ovate, elliptic, or oblong, $^1/_2$–$^3/_4$ mm long, glabrous. *Pistil* $^3/_4$–$2^3/_4$ mm long, glabrous. Pedicels in fruit hardly thickened. *Fruits* globular, *c.* 2 cm ∅, thin-walled, said to be white. *Seeds* 1, semiglobular, *c.* 1 cm ∅ and 8 mm thick, glabrous.

Distr. S. and NE. India, Thailand, Laos, Vietnam, and *Malesia*: Malay Peninsula (Perak, Selangor), Borneo (Sarawak, Central E. Borneo).

Ecol. Dense jungle, from the lowland to above 1000 m. *Fl.* Aug., Nov. *fr.* Sept.

Uses. The bark of the roots is used for arrow-poison. See BURKILL, Dict. (1935) 2099.

Vern. *Akar ipoh*, Mal. Pen.

13. Strychnos borneensis LEENH.

6: 357*a* **14. Strychnos ledermannii** GILG & BENED.
Add to description: Leaves sometimes with 3 main nerves.

6: 357*b* **15. Strychnos lanceolaris** MIQ.

16. Strychnos flavescens K. & G.
Add to description: Leaves in a specimen from Borneo (Sarawak For. Dept. 13460) 5-plinerved, the outer nerves diverging at, the inner distinctly above the base. Corolla of the same specimen woolly inside all over the inner surface of the lobes; stamens with short filaments.

6: 358*a* Add to Distr.: Borneo (Sarawak, Sabah).
Add to Ecol.: Altitude up to 1350 m. *Fl.* from March onwards, *fr.* Febr., Sept.

17. Strychnos luzonensis ELM.

18. Strychnos axillaris COLEBR.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 209; TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 37, t. 12 f. 1–3.

6: 359*a* Add to Distr.: Lesser Sunda Is. (Flores: KOSTERMANS 22156).

6: 360*b* **19. Strychnos ridleyi** K. & G.

6: 361*a* **20. Strychnos rufa** CLARKE.

21. Strychnos thorelii PIERRE *ex* DOP.
Add to literature: TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 82, t. 12 f. 5.

6: 361*b* **22. Strychnos angustiflora** BTH. J. Proc. Linn. Soc. Bot. 1 (1856) 102; Fl. Hongkong (1861) 232; HILL, Kew Bull. (1917) 182 *cum fig.*; MERR. Lingn. Sc. J. 5 (1927) 148; HERKLOTS, Hongkong Natur. 4 (1934) 108, f. 3; TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 62, t. 5 f. 1–5. — *S. nux-vomica Auct. non* L.: LEENH. Fl. Mal. I, 6 (1962) 349 *pro specim. Philipp.*

Liana, provided with simple tendrils and spines. *Twigs* puberulous, early glabrescent. *Leaves* 3–12 by $1^1/_2$–7 cm, ratio 1–2, widest below, sometimes about the middle, chartaceous to thin-coriaceous, smooth and glabrous; base rounded to cordate, exceptionally obtuse; apex not or tapering short-acuminate, acute to blunt, mucronate; 3–5-plinerved; petiole 4–10 mm. *Inflorescences* terminal on short axillary shoots, rather lax and fairly many-flowered, 2–4 cm long. *Flowers* 5-merous. *Calyx* outside puberulous, inside glabrous, sepals acute, 1–$1^1/_2$ mm long. *Corolla c.* 1 cm long, the tube

about as long as the lobes, outside papillose but not hairy, inside woolly in the mouth and on the lower part of the lobes. *Stamens* inserted about the mouth, filament 3–4 mm long, anther oblong, $1^3/_4$–2 mm long, glabrous, blunt. *Pistil c.* 1 cm long, glabrous. Pedicels in fruit only slightly thickened. *Fruits* globular, 2–4 cm ∅, thin-walled. *Seeds* 1 or 2 (rarely more), disk-shaped, *c.* $1^1/_2$–$1^3/_4$ cm ∅, sericeous.

Distr. China (Kwantung), Hainan, Hong-Kong, Thailand, S. Vietnam, and *Malesia*: Philippines (Mindoro, Oriental Prov., Puerto Galera Bay, once collected).

Ecol. Collected on the shore above tide level. *Fr.* April.

Note. *S. angustiflora* is rather closely allied to *S. nux-vomica* and, whereas the differences in the flowers are clear, vegetatively and in fruit they look much alike. As a whole the leaves are broader, more ovate, and at base deeper cordate than in *S. nux-vomica*, but less so than in the also closely allied *S. nux-blanda*. It was Dr. N. G. Bisset, London, who, on account of the alkaloids found in the seeds, first expressed his doubt as to the identification of the Philippine specimen.

23. Strychnos kerrii Hill, Kew Bull. (1925) 426; in Craib, Fl. Siam. En. 3 (1951) 58; Tirel-Roudet, Logan. Cambodge, Laos & Vietnam (1970) 78, t. 5 f. 6–9.

Liana, provided with double tendrils. *Twigs* glabrous, sparsely lenticellate. *Leaves* $7^1/_2$–14 by 4–5 cm, ratio *c.* 2–3, widest about or sometimes below the middle, papyraceous to chartaceous, smooth and glabrous; base cuneate to rounded; apex acute to abruptly acute-acuminate; 3 (rarely 5) main nerves; petiole 5–10 mm. *Inflorescences* terminal, dense and many-flowered, 4–6 cm long. *Flowers* 5-merous. *Calyx* glabrous on both sides, sepals rounded, 1 mm long. *Corolla* 10–15 mm long, the tube 4–5 times as long as the limb, outside glabrous, inside densely woolly in the mouth. *Stamens* inserted in or slightly below the mouth, filament very short, anther elliptic or oblong, 1–$1^1/_2$ mm long, glabrous. *Pistil c.* 12–13 mm long, ovary glabrous, style hairy in the lower half. Pedicels in fruit strongly thickened. *Fruits* globular, 3–5 cm ∅, the wall *c.* $^1/_2$ cm thick. *Seeds* unknown.

Distr. Assam, Burma, Thailand, Indo-China, and *Malesia*: probably in the Malay Peninsula.

Ecol. Lowland rain-forest.

Note. Dr. N. G. Bisset, London, informed me that he had seen sterile material of this species collected in the Malay Peninsula.

24. Strychnos melanocarpa Gilg & Bened.

6: 363*a* *Gardneria ovata* Wall.
Add to literature: Back. & Bakh. *f.* Fl. Java 2 (1965) 210.

6: 365 *Neuburgia* Bl.
Add to Notes: Some species of *Psychotria* (*Rubiaceae-Coffeoideae*) show a great resemblance to *Neuburgia*. They differ mainly by the connate stipules not adnate to the petioles, by the cupular 5-toothed calyx, the glabrous anthers, and the triangular style with a truncate stigma; the ovary is for the main part superior but the fruits are inferior.

6: 365*b* *Neuburgia corynocarpa* (A. Gray) Leenh.
Add to Uses: In NE. New Guinea, Finisterre Mts, the wood was formerly used for making bowls and plates.

6: 366*a* Add to Notes: For an opinion as to specific delimitation in the Pacific contrary to the one expressed here see A. C. Smith, Pac. Sci. 23 (1969) 387.
Neuburgia sarcantha (Gilg & Bened.) Leenh.
Add to description: Leaves from 7 by $5^1/_2$ cm, nerves 5–8 pairs.

6: 366*b* *Neuburgia kochii* (Val.) Leenh.
Add to description, 1st sentence: apparently sometimes a creeper (NGF 14779). Add to leaves, entry on the base: rarely rounded to cordate.

6: 367*a* *Neuburgia rumphiana* Leenh.
Add to Distr.: Terr. of New Guinea (Sepik Distr.).
Neuburgia celebica (Koord.) Leenh.
Add to Distr.: New Britain, Solomon Is.

6: 371*a* *Geniostoma rupestre* Forst.
Add to literature: Back. & Bakh. *f.* Fl. Java 2 (1965) 207.

6: 372*a* Add to Notes, at the end of the 1st paragraph: An example of such a local subdivision has been given by Backer & Bakhuizen *f.*, *l.c.*, who distinguish among the material from Java between 3 'microspecies'.

6: 373*a* *Geniostoma arfakense* Kan. & Hat.
Add to description, under fruits: purple when ripe.

6: 375 *Cynoctonum* Gmel.
The correct name and citation for the genus is **Mitreola** Linné, Opera Varia (1758) 214, validated by indirect reference to Gen. Pl. ed. 1 (1737) 377.

6: 375*a* *Cynoctonum mitreola* (L.) Britt.
The correct name is: **Mitreola petiolata** (Gmel.) Torr. & Gray, Fl. N. Am. 2 (1841) 45.
Add to literature: Back. & Bakh. *f.* Fl. Java 2 (1965) 208; Tirel-Roudet, Logan. Cambodge, Laos & Vietnam (1970) 132, t. 9.

6: 377*a* Add to Distr.: W. Africa (possibly introduced, *cf.* Heine, Kew Bull. 17, 1963,

171).

6: 377*b* *Cynoctonum sphaerocarpum* LEENH.
The name should be corrected as follows: **Mitreola sphaerocarpa** (LEENH.) LEENH., *nov. comb.*
Add to Note, distribution of *C. pedicellatum*: Assam (Khasi Hills). A third species of the same Asian relationship is *Mitreola reticulata* TIREL, Adansonia II, 9 (1969) 119; Logan. Cambodge, Laos & Vietnam (1970) 136, t. 10, only known from N. Vietnam.

6: 378*a* *Spigelia anthelmia* L.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 207.

6: 378*b* Add to Distr.: Introduced in Java 1845, *cf.* BACK. Trop. Natuur Jubileumuitg. (1936) 54.

6: 380*b* *Mitrasacme elata* R.BR.
Add to Distr.: Flores.

6: 381*b* *var. brevicalyx* LEENH.
Add to Distr.: Flores, SE. New Guinea.
Add to Ecol.: from *c.* 30 m onwards.

6: 382*a* *Mitrasacme pygmaea* R.BR.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 208; TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 148, t. 11 f. 10–16.
(*sub M. nudicaulis* BTH.): DE VOOGD, Trop. Natuur 30 (1941) 103, f. 4.

6: 383*a* *var. pygmaea.*
Add to Distr.: Sumbawa. Drop: Mt Merapi, Bali, Lombok, Timor.

6: 384*a* Insert after 2. *Mitrasacme pygmaea* R.BR.:
2a. Mitrasacme erophila LEENH. Bull. Jard. Bot. Brux. 32 (1962) 446, f. 72; TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 143, t. 11 f. 1–5. — *M. pygmaea* R.BR. *var. pygmaea* LEENH. Fl. Mal. I, 6 (1962) 383 *p.p.*, incl. f. 43.
Erect, annual herb, up to 15 cm high, simple or branched at base. *Leaves* rosulate, (oblong-)lanceolate, 3–6 by $^3/_4$–2 mm, herbaceous, puberulous above, glabrous beneath, base cuneate, apex acute, 1-nerved. *Inflorescences* laxly umbellate, few-flowered; peduncle 4–11 cm long, terete, puberulous at base, with some scattered pairs of scale-like, 1–$1^1/_2$ mm long empty bracts; pedicels $^1/_2$–$2^1/_2$ cm long. *Calyx* campanulate, 2 mm long, glabrous or puberulous, the lobes triangular, acute. *Corolla* widely infundibuliform, $3^1/_2$–4 mm long, white, hairy in the throat, the lobes *c.* $1^1/_2$ mm long, oblong or obovate, rounded. *Stamens* inserted in the tube at *c.* 2/3 of the height; filament $^1/_2$ mm long; anther orbicular, $^1/_2$ mm ∅, cleft at base, dehiscing all around, ciliate along the margin. *Pistil* $2^1/_4$ mm high, styles nearly completely connate, stigma deeply bilobed. *Capsule* globular, $1^1/_2$–2 mm ∅, styles short, free. *Seed* angular-ovoid, brown, reticulate.
Distr. Assam and *Malesia*: Central Java (Merbabu-Merapi), Lesser Sunda Is. (Bali, Lombok, Alor, Timor).
Ecol. Grassland, *Eucalyptus*-forest *etc.*, locally often common, from 650–2000 m, on Bali, Mt Agung, near solfatara, even at 3150 mm. *Fl. fr.* March-June.
Note. Originally, when revising the genus *Mitrasacme* for the Flora Malesiana, I did not recognize this material as different from *M. pygmaea var. pygmaea*, even though later on I described the present species as new from Assam. For differences with *M. pygmaea* see there.
Mitrasacme indica WIGHT.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 208; TIREL-ROUDET, Logan. Cambodge, Laos & Vietnam (1970) 145.
Add to synonymy: *Non* RIDSDALE, Trans. Papua N. G. Sci. Soc. 9 (1968) 18 (=*Lindernia subulata* R.BR.).

6: 385*a* *Mitrasacme saxatilis* BACK.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 208.

6: 386*a* *Mitrasacme neglecta* LEENH.
Add to literature and synonymy: BACK. & BAKH. *f.* Fl. Java 2 (1965) 209. — *Evolvulus sp.* RIDSDALE, Trans. Papua N. G. Sci. Soc. 9 (1968) 17.

6: 386*b* Add to Distr.: SE. New Guinea.
Mitrasacme bogoriensis LEENH.
Add to literature: BACK. & BAKH. *f.* Fl. Java 2 (1965) 209.

6: 387 Add to Excluded:
Logania dentata (ELM.) HAYATA, J. Coll. Sc. Imp. Un. Tokyo 25, art. 19 (1908) 162, t. 28. — *Nertera dentata* ELM. Leafl. Philip. Bot. 1 (1906) 15 = *Hemiphragma heterophylla* WALL. (*Scrophulariaceae*). *Cf.* MERR. in Hayata, *l.c.*; HALL. *f.* Beih. Bot. Centralbl. 39, 2 (1923) 161.

Malpighiaceae (JACOBS)

5: 127*b* *Aspidopterys elliptica* (BL.) JUSS.
Add to Distr.: Lesser Sunda Is. (Bali, KOSTERMANS 272, distributed as *Tristellateia*; Flores, *cf.* STEEN. Blumea 15, 1967, 153).

Moringaceae

4: 45*a* *Moringa oleifera* LAMK.
Add to synonymy: *M. domestica* HAM. *ex* HENSCHEL, Clavis Rumph. (1833) 44.

Pittosporaceae

5: 345 In the revision of *Pittosporum* only 3 endemic species were known from New Guinea which stands in contrast with the large number of endemic species in New Caledonia and also the much higher number in Australia.
It has appeared, however, that further

exploration has yielded more novelties in the last decade, partly described by Dr. BAKKER, partly by Dr. SCHODDE. But I hesitate to share the view of the latter that East New Guinea would represent a 'centre of diversity' for the genus. It may later appear that some novelties are possibly marginal extremes of other species and I feel that hybridization is also not excluded. I cannot recognize two of SCHODDE's taxa at specific level.

5: 348 In the Key to the species (flowering material), replace the first entry of fork 5 by:

5. Flowers always axillary, solitary.
5a. Leaves mostly small, obovate, *c.* 2–4(–8½) by 1–3(–4) cm, abruptly shortly acute-acuminate, coriaceous. Reticulation conspicuous, prominent on *both* sides. Twigs glabrous. Flowers 12 mm. Ovary glabrous. Fruit 12 by 8 mm. **5. P. berberidoides**
5a. Leaves small, obovate to spathulate, 3–25 by 2–10 mm, glabrous, herbaceous; apex broadly cuneate, with a blunt tip; nerves not prominent, few. Twigs covered by a persistent indument of short, thickish ferrugineous hairs. Flowers 8 mm long. Ovary with a few long hairs at the base . . . . . **P. inopinatum**

5: 348 In the Key to the species (dry fruiting material), replace forks 5 and 6 by:

5. Nerves and larger veins distinctly prominent on both leaf surfaces. Leaves obovate, ± pointed, *c.* 2–4 by 1–3 cm.
5a. Main nerves *c.* 10–15 pairs, close. Leaf apex suddenly acute-acuminately contracted. Young twigs glabrous . . . **5. P. berberidoides**
5a. Main nerves 4–6 pairs. Leaves with rather bluntish apex, in pseudo-verticils. Young twigs densely ferrugineous-hairy . **5b. P. pumilum**
5. Nerves and larger veins not prominent above.
6. Fruits longer than broad (not including the stipe and apical mucro).
6a. Twigs densely persistently set with dark-brown thickish hairs. Leaves small, 3–25 by 2–10 mm, spathulate, herbaceous, spirally arranged, with blunt tip; nerves 3–4 pairs, rather indistinct above (neither impressed nor prominent). Fruit valves thickish. **5a. P. inopinatum**
6a. Otherwise.
7. Remains unaltered.
7. Remains unaltered.
6. Fruits as long as broad or slightly broader than long.
7a. Fruits globular, 11–13 mm ∅, with thick valves. Leaves not in pseudo-verticils, very thick, small, ± bullate, 6–14 by 3–7 mm, with 3–4 pairs of nerves which are impressed above. **6a. P. pullifolium** *var.* **globosa**
7a. Leaves much larger with many more pairs of nerves which are not impressed above.

5: 349*a* *Pittosporum sinuatum* BL.
Add to description: A specimen from East New Guinea (BRASS 30801) has *entirely* glabrous, slender ovaries in predominantly ♂ flowers; all other material has pubescent ovaries.

5: 349*b* Add after 1. *Pittosporum sinuatum* the following variety:

1a. *var.* **efuniculare** STEEN. *var. nov.* — *P. tenuivalve* SCHODDE, Blumea 15 (1967) 407, f. 2.
Funiculus brevipes. Typus ROBBINS 888.
Falls within the variable *P. sinuatum*, differs obviously only by the short funicles.
Distr. *Malesia*: East New Guinea (Madang Distr., Kubor Range: ROBBINS 888, 1121), not seen.
Ecol. Montane forest, 2100–2300 m.
Note. I agree with Dr. SCHODDE's tentative suggestion that this represents perhaps only a mountain form of *P. sinuatum*.

5: 350*b* *Pittosporum ramiflorum* (ZOLL. & MOR.) ZOLL. *ex* MIQ.
Add to Distr.: Lesser Sunda Is. (Sumbawa). *Cf.* BAKKER, Blumea 11 (1962) 426.

5: 351*b* Line 6 from top, add after *P. ramiflorum f. macrocarpum*: Another specimen, again from NW. New Guinea, Vogelkop Peninsula, was collected (BW 6880). It can easily be distinguished from the equally large-fruited Philippine *P. resiniferum* by the absence of the large resiniferous cavities in the fruit valves. *Cf.* BAKKER, Blumea 11 (1962) 426.

5: 352*a* *Pittosporum resiniferum* HEMSL.
Omit in key and description that *fruit* is compressed; this is only so in immature ones and caused by pressure. It is really very broad-ellipsoid, tending to globular: occasionally it is 3-valved.
Add to Distr.: Solomon Is. (Bougainville: SCHODDE 3767), climbing tree, in fr., 800 m. Hitherto only known from N. Borneo and Philippines.

5: 353*a* *Pittosporum berberidoides* BURKILL.
Add to description: Tree up to 14 m, stem to 20 cm ∅. Leaves up to 12 by 4½ cm; petiole to 2 cm. *Cf.* also BAKKER, Nova Guinea n.s. 9 (1958) 339; Blumea 11 (1962) 426.
Add to Distr.: Now found in many other places (Mt Wilhelm; Chimbu; Sepik-Wangi Divide; Goroka, *etc.*) and as low

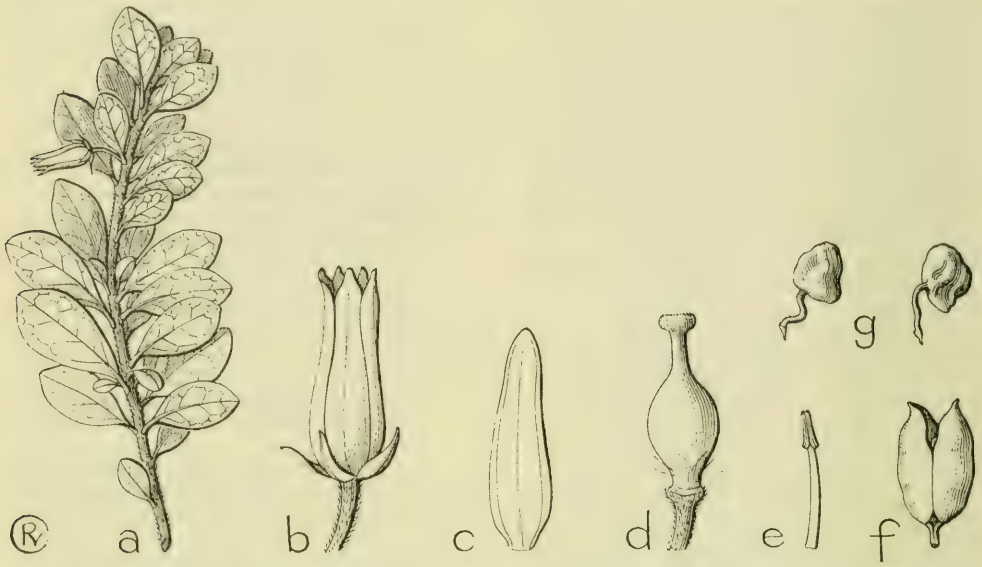

Fig. 11. *Pittosporum inopinatum* BAKKER. *a.* Habit, nat. size, *b.* flower, ×3, *c.* petal, ×5, *d.* style, ×7, *f.* fruit, nat. size, *g.* seeds, ×2 (*a–g* ROBBINS 829).

down as 2400 m.

5: 353*a* Add after 5. *Pittosporum berberidoides* BURKILL:

5a. Pittosporum inopinatum BAKKER, Nova Guinea n.s. 9 (1958) 339, f. 1. — **Fig. 11.**

Much-branched shrub or dwarf tree, $1^1/_2$–$2^1/_2$ m. Twigs covered with a persistent indument of short, thickish ferrugineous hairs; internodes up to *c.* $1^1/_2$ cm. *Leaves* spirally arranged, herbaceous, obovate to spathulate, entire, 3–25 by 2–10 mm, glabrous, apex broadly cuneate with a blunt tip, base decurrent, cuneate; nerves 3–4 pairs, indistinct above, not prominent on either surface; petiole *c.* 1–2 mm below the decurrent leaf base. *Flowers* solitary, axillary, pendent, *c.* 8 mm. Pedicels ferrugineous-hairy, *c.* 4 mm. Bracts triangular, very narrow, acute, *c.* 2 mm. *Sepals* free, narrow-oblong, acute, *c.* 2 by $^3/_4$–1 mm, yellowish green with a purple top. *Petals* free though cohering, ligulate, narrowing towards the rounded tip, *c.* 7–8 by 2 mm, pink or purplish especially at the top. *Stamens* sagittiform, filaments narrowing towards the anthers, *c.* $2^1/_2$ mm; anthers *c.* 1 by $^1/_2$ mm. *Ovary* depressed-ellipsoid, glabrous, *c.* 3 by 2 mm; style glabrous, *c.* 1 mm; stigma capitate. *Fruit* 2-valved, ellipsoid, *c.* $1^1/_2$ by 1 cm; valves coriaceous, orange-yellow to brown, rather thin; placentas slightly raised; funicles *c.* 10–12 on each placenta, inserted up to *c.* 2/3 of the length of the valves, in ripe seeds up to *c.* 3 mm long, very dark violet. *Seeds* *c.* 4–6 on each placenta, irregular-globose, dark violet, *c.* 4 mm ∅.

Distr. *Malesia*: East New Guinea (Mt Otto, 3 collections; Mt Piora, NGF 16535).

Ecol. Mountain forests of *Podocarpus-Libocedrus*, 2550–2860 m, said to be common. *Fl. fr.* Sept.

5b. Pittosporum pumilum SCHODDE, Blumea 15 (1967) 406, f. 1.

Slender shrub, 1 m. Twigs densely ferrugineous-hairy; internodes with a few tiny cataphylls. *Leaves* mostly in pseudo-verticils, spathulate, with rather rounded apex, glabrous, thinly coriaceous, $1^1/_2$–$4^1/_2$ by $^1/_2$–2 cm; nerves 4–6 pairs, *on both surfaces* prominent; base attenuate, a petiole hardly discernible. *Fruit* solitary, pseudo-terminal, later subterminal, on a rather stout glabrescent peduncle 5–8 mm long, ellipsoid, when young shortly stipitate and rostellate, $2^1/_2$–3 by $1^1/_2$ cm, glabrescent, red (drying orange-yellow); valves outside rugose, inside without transverse ribs and set with funicles all along their length. *Seeds* *c.* 8, semi-reniform, 5 mm, on rather long funicles, reddish brown, drying black.

Distr. *Malesia*: East New Guinea (Morobe Distr.: Mt Shungol), one collection.

Ecol. Lower mossy forest, 2100 m. *Fr.* Dec.

Note. According to SCHODDE most related to *P. sinuatum*, but to my opinion most allied to *P. berberidoides* through the remarkably prominent veins.

5: 353*b* *Pittosporum pullifolium* BURKILL.
Add to description: A specimen with young *fruit* had the infructescences axillary on the twigs instead of terminal. *Cf.* BAKKER, Blumea 11 (1962) 426.

5: 354*a* Add after 6. *Pittosporum pullifolium* the following variety:

6a. *var.* **globosum** STEEN. *var. nov.* — *P. nubicola* SCHODDE, Blumea 15 (1967) 411, f. 3–4.

Differt ab species: Capsula globosa, 11–13 mm ∅.

Shrub 1–2 m. *Leaves* thick, bullate by recurved margins, *c.* 10 by 5–6 mm; midrib and *c.* 3 pairs of nerves impressed above. Infructescence of *c.* 5 fruits apical; capsules globose, 11–13 mm ∅.

Distr. *Malesia*: East New Guinea (Kubor Range: Mt Kinkain), one collection.

Ecol. Border of alpine shrubbery adjacent to peaty grassland, at 3600 m. *Fr.* July.

Note. As SCHODDE already remarked close to *P. pullifolium*, of which the alpine dwarfed forms have similarly small leaves, and in fact grew to near 100 m from this form which differs by the globose fruit.

5: 355*a* *Pittosporum pentandrum* (BLANCO) MERR.
Add to Distr.: N. Borneo. *Cf.* BAKKER, Blumea 11 (1962) 426.

5: 356*b* *Pittosporum moluccanum* (LAMK) MIQ.
Add to synonymy: *Vareca moluccana* ROXB. Fl. Ind. ed. Carey 1 (1832) 647.
In Fl. Mal. I, 5 (1954) 33, this was excluded from *Hydnocarpus* and tentatively assigned to *Rinorea*. ROXBURGH's type (BM) was kindly identified by Mr. H. K. AIRY SHAW (*in litt.* to Dr. JACOBS, *cf.* Blumea 15, 1967, 138). No change of epithet is necessary.

5: 360*b* Add to Excluded:
Pittosporum serrulatum JACK *ex* ROXB. Fl. Ind. 2 (1824) 401; *ex* GRIFF. Calc. J. Nat. Hist. 4 (1843) 195; *cf.* MERR. J. Arn. Arb. 33 (1952) 240 = *Rinorea lanceolata* (ROXB.) O.K. (*Violaceae*).

Podostemaceae

4: 65 Add to Distr.: The knowledge of the distribution of the family in Indo-Australia is still expanding. A new species, of *Indotristicha*, has been found in Malaya. TUYAMA & HARA (J. Jap. Bot. 39, 1964, 185–188) mapped Asian localities, which comprise amongst others localities in the East Himalaya, the Chinese mainland in Fukien, Kwantung, Kanton (TUYAMA & HARA, *l.c.* 185; CHAO, Contr. Inst. Bot. Nat. Peiping 6, 1948) and Hainan (CHUN, Fl. Hainanica, 1964, 373), Thailand (VAN ROYEN, Blumea 10, 1960, 141; Dansk Bot. Ark. 23, 1965, 185) and the Ryu Kyu Is. Probably the range of the family extends by several genera all over SE. and E. Asia (tropical to warm-temperate), but the small plants are evasive to collectors. Recently, an undoubted member has also been found by Mr. BYRNES in the Kimberley District, NW. Australia; this is distinctly different from *Torrenticola* from Queensland. It bears resemblance to *Indotristicha malayana*, but has only 2 stamens. Miss ASHTON, Melbourne, has tentatively referred it to *Tristicha trifaria* (BORY *ex* WILLD.) SPRENG., a species known from the tropics of America and Africa. Replace the Key to the genera into the following:

1. Leafy (flowering) stems very short, hardly 10 mm long, with scattered, imbricate, 3–7-segmented leaves. Spathella oval, nippled, usually dehiscing irregularly. Tepals 2, narrow. Stamen 1. Stigma 2 . . . . **1. Cladopus**
1. Leafy (flowering) stems 25–100 mm, often branched. Leaves distichous, laterally compressed, the lower entire, the upper 3(-4)-dentate. Spathella oval, tipped, irregularly circumscissile-dehiscent. Tepals 2, narrow. Stamen 1. Stigmas 2. . . . . **2. Torrenticola**
1. Leafy shoots up to 20 mm, rarely branched, with imbricate triangular leaves in 3 ranks, those of 2 ranks $1\frac{1}{2}$ by $\frac{1}{2}$ mm, those of the 3rd rank 1 by $\frac{3}{4}$ mm. No spathella. Tepals 3, halfway connate. Stamens 3. Ovary 9-veined. Stigmas 3. **3. Indotristicha**

4: 66 *Cladopus* H. MÖLL.
Add to Distr.: SE. Asia (Siam, Hainan, Kwantung, Kanton, Fukien) and Ryu Kyu Is. Possibly monotypic.

4: 66*b* *Cladopus nymani* H. MÖLL.
Add to Distr.: Possibly all the names and localities in SE. & E. Asia of *Cladopus* refer only to one species; see VAN ROYEN, Dansk Bot. Ark. 23 (1965) 185.

4: 68 Add after 2. *Torrenticola etc.*:

3. INDOTRISTICHA

VAN ROYEN, Acta Bot. Neerl. 8 (1959) 474; BAKH. *f.* Taxon 18 (1969) 598. — *Dalzellia* (*non* WIGHT) ENGL. Nat. Pfl. Fam. Nachtr. 3 (1908) 135–136; *ibid.* ed. 2, 18a (1930) 33, f. 24.

See for the main characters in the key.

Distr. Species 2, one in India (W. Ghats and S. Canara to Travancore), one in Malaya.

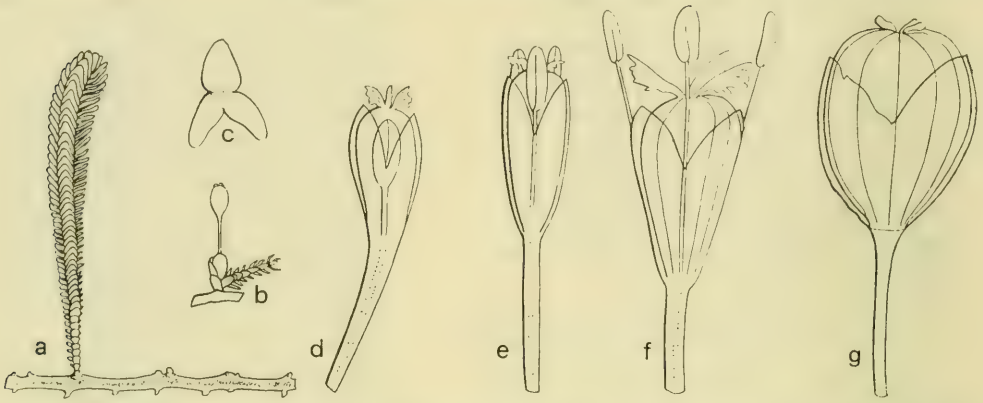

Fig. 12. *Indotristicha malayana* DRANSF. & WHITMORE. *a.* Habit, sterile, ×3, *b. ditto*, fertile, ×3, *c.* tepals, ×7, *d–g*, four stages in the development from flower to fruit, ×14.

1. Indotristicha malayana DRANSF. & WHITMORE, Blumea 18 (1970) 154, pl. 1, f. 1. — **Fig. 12.**

Rhizome creeping, flattened, thalloid, closely adpressed to the substratum, 1/2 mm wide, occasionally to 1 mm, of indefinite length, branching irregularly. *Leafy shoots* rarely flowering, borne irregularly, usually closely, to 2 cm long, rarely branching, usually curved, pale green and attenuate in shade, tinged red and shorter in full sun, irridescent. Stem triangular in section. *Leaves* sessile in very close whorls of 3 unequal ranks, the bases touching, increasing in size to about two thirds of the length from the rhizome, and thence decreasing slightly; two ranks long triangular to 1 1/2 by 1/2 mm, outline slightly asymmetric recurved, convex towards the third rank which is broadly triangular to 1 by 0.7 mm. Also with flower bearing leafy shoots, often clustered, with smaller rather distant leaves. *Flowers* protogynous, lateral, solitary; peduncle slender, stiff, erect, to 5 mm long at anthesis, subtended by two unequal, concave, sometimes mucronate, chartaceous imbricate bracts to 1 by 1/2 mm. *Tepals* 3, valvate, obovate, 1 by 0.8 mm, slightly concave, chartaceous, translucent. *Stamens* 3, at first hidden by tepals, later at anthesis longly exserted to 1 mm on stiff, erect, pink filaments, later shrivelling and becoming thread-like and twisted; anthers ovate-oblong, 0.4 mm long, cream. *Ovary* pale straw-coloured, obovoid, becoming narrowly obovoid by anthesis to 1.6 by 1 mm with 9 rib-like veins; styles short, pink, 3, flattened in a vertical plane, with a deeply divided outer margin; placentation free central, ovules numerous, tiny, cylindrical. *Capsule* narrowly obovoid, 2 by 1.3 mm, light brown, crowned by remains of styles.

Distr. *Malesia*: Malay Peninsula (Pahang, Trengganu), at least 3 localities.

Pontederiaceae

4: 258*b* *Monochoria hastata* (L.) SOLMS.
Add to Distr.: Now also recorded from Australia: Northern Territory, Litchfield Homestead. *Cf.* Muelleria 2 (1971) 134.

Primulaceae

6: 180*a* *Lysimachia capillipes* HEMSL.
Add to Distr.: East New Guinea (Morobe Distr.: Bulolo, NGF 30727, Wau, TGH 11596, NGF 35800; Eastern Highl. Distr.: NGF 27158), 100–1700 m. *Fl. fr.* Jan.-July.
Note. The Papuan material is homogeneous and is tentatively best classified with the Chinese-Luzon distributed *L. capillipes*. It must be remarked that the anthers have no permanent apical pore; they seem to dehisce with an apical slit-like pore which later extends downwards to a completely lengthwise splitting of the anther-cells. The calyx is narrow in all specimens (in contrast with that of *L. laxa* BAUDO) but its length seems to vary in proportion to the length of the capsule. It seems to be not always exceeding the capsule, but this could not well be checked as most capsules were dehisced and the more or less flattened valves are of course much longer than the undehisced capsule. The Papuan specimens are more-stemmed but rather erect. More and better preserved material is desirable for a definite conclusion. — L. RÖST, Oct. 1971.

6: 185*b* *Lysimachia decurrens* FORST. *f.*
Add to Distr. and map (fig. 10): SW. Central Celebes (Latimodjong Ra., KJELLBERG 1425). *Cf.* BENTVELZEN, Blumea 13 (1965) 140.

6: 192 Add to the excluded names:
Hottonia sessiliflora VAHL, Symb. 2 (1791) 36, the type of which was described from 'India orientalis' (C), from BURMAN's herbarium; it belongs according to VAN DER MEIJDEN (Blumea 17, 1969, 311) to a species of *Limnophila* (*Scrophulariaceae*). The epithet is already occupied in that genus.

Proteaceae (SLEUMER)

5: 171*b* *Helicia rufescens* PRAIN.
Add to Distr.: Borneo (Brunei).

5: 192*a* *Heliciopsis rufidula* SLEUM.
Add to Distr.: Borneo (Sarawak).

Rhizophoraceae

5: 431 Range maps of many species were given by DING HOU in STEEN. Pacific Plant Areas 1 (1963) maps 2–10, 20, 23.

5: 444 *Distribution past and present.* The second paragraph refers to the peculiar distribution of mangrove species, *Rhizophoraceae* and otherwise, of which no species is in common to those in the Atlantic and Indian Oceans. As a matter of fact this holds also for marine Phanerogams. On the other hand it has appeared that at least of the genus *Rhizophora* the three species of the Caribbean occur also on the west coast of Africa and that at least two of these also occur on the Pacific coast of tropical America. *Cf.* DING HOU, Blumea 10 (1960) 625–634. This means that there must have been in the past an open seaway between the Americas and this is corroborated by the geology. Africa seems to have been a distinct barrier between the Indian and Atlantic Oceans.

I have discussed these major phytogeographical features in 1962 in a paper (Proc. Kon. Akad. Wet. A'dam ser. C, 65: 164–169) in which it was also shown that the marine *Rhizophoraceae* seem to have originated in the Indo-Malesian tropics where all 4 genera are centred, the Americas having only 3 out of 7 species of the one genus *Rhizophora*.

As to the African barrier, it seemed to me that whereas even today species of the shore plants of the *pes-caprae* and *Barringtonia formations* cannot round the Cape of Good Hope because of temperature conditions and oceanic circulation system, the temperature must have been the chief factor that the dispersal of more megatherm mangrove species — of which dispersal is far more restricted by the viviparous drifting embryos which can only disperse in non-turbulent water and near-shore shallow muddy coasts — could not be effective even under the more ameliorated Tertiary climatic conditions.

Mr. MULLER (Review Palaeobot. Palyn. 6, 1968, 281–282) correctly stated that there was a northern open seaway, the Tethys, between the Indian and Atlantic Oceans and that this must have had an impact on diffusion of seaborne dispersed marine Phanerogams. He derives that the replacement of Atlantic and Indian Ocean species — if we presume that the Tethys was an effective dispersal route indeed (including suitable ecological shore conditions!) — must be ascribed to the assumption that these Phanerogams had not yet evolved (or were at least not yet occurring in the Indian Ocean — v.St.) in the Early Tertiary and that when they came there the Tethys had by that time lost its capacity for their dispersal. That the Tethys must have had this function seems to be proved by the recent find of fossil *Nypa* pollen in West Africa (Upper Cretaceous to Upper Eocene), a genus which obviously got extinct there and in the Caribbean simultaneously for unknown reasons.

Unfortunately we have no clear view of the course of the sea current regime at the time of the Tethys Sea.

In addition we should mention that Rhizophoraceous pollen is only found as early as the Upper Eocene, but not (yet) in Paleocene or Upper Cretaceous sediments *Cf.* MULLER, Biol. Rev. 45 (1970) 434, f. 5.

One important conclusion can, I believe, not be doubted, except by superstitious diffusionists, namely that dispersal of both mangroves and marine seagrasses can only take place at short distances and their occurrence is testimony of near-landmasses in the past, in contrast to most beach and Barringtonia formation species which are indeed frequently equipped to perform long-distance waterborne dispersal.

5: 445 Add to Taxonomy: According to Mr. MULLER (*in litt.*) the pollen of *Carallia* is similar to that of marine genera (*Rhizophora*, *Bruguiera*) and does not warrant a separation into a distinct family.

5: 448 *Rhizophora* L.
Add to Distr.: DING HOU has revised the entire genus *Rhizophora* after the account in Fl. Mal. was written. Though this has brought no changes in taxonomy or distribution, some ranges in the West Pacific appear to be more extensive: *R. mucronata* LAMK extends to Tonga,

R. apiculata BL. to the Solomons and New Hebrides, *R. stylosa* GRIFF. is also in Micronesia (Guam & Marshalls). *Cf.* DING HOU, Blumea 10 (1960) 625–634, map.

5: 453*b* The proper references of *Rhizophora mucronata* seem to be: POIR. in LAMK, Tabl. Encycl. Méth. Bot. (text) 2 (1794) 517; LAMK, Tabl. 1 (1797) t. 396 f. 2; POIR. in LAMK, Encycl. 6 (1804) 189; DC. *etc.*

5: 457 *Bruguiera* LAMK.
The date of publication of the genus is: 1797.

5: 461*a* *Bruguiera gymnorrhiza* (L.) LAMK.
In references line 2 the year of publication is: 1798. SAVIGNY seems to be responsible for the treatment of the genus in LAMARCK's work.

5: 464*a* *Bruguiera exaristata* DING HOU.
Add to synonymy: *B. eriopetala var. exsetata* VALETON, Bull. Dép. Agr. Ind. Néerl. 10 (1907) 38 (type: KOCH *s.n.*, L).

5: 468*b* *Bruguiera hainesii* C. G. ROGERS.
Add to Distr.: Also found in the Sundribans. *Cf.* S. K. MUKERJEE, Bull. Bot. Surv. India 8 (1966) 357.

5: 474 *Anisophyllea* R.BR. *ex* SABINE.
Add to description of embryo: This is solid and indeed consists of an almost undifferentiated hypocotyl which contains the reserve food, similar as in several other tropical tree genera *e.g. Barringtonia* and *Bertholletia*. From this 'pre-adapted' structure one can imagine the origin of the further differentiated embryogeny of the marine species.

5: 477*a* *Anisophyllea beccariana* BAILLON.
Add to Distr.: Central East Sumatra (Tenajan R., SOEPADMO 37).

5: 477*a* *Anisophyllea ferruginea* DING HOU.
Add to description: Mature leaves glabrous. Inflorescences up to 4 cm. Fruits 1(-2)-seeded, 8 by 4 cm, glabrous; pericarp 8–10 mm ∅, exocarp soft. Seeds very hard, solid and large, $5^1/_2$ by 2 cm.
The two additional specimens (ASHTON BRUN 580, S 7867) have mature inflorescences and fruit. In mature state the rusty tomentum disappears.

5: 480 *Combretocarpus* HOOK. *f.* and *C. rotundatus* (MIQ.) DANSER.
Add to Distr.: Malay Peninsula (Johore), in peat swamp forest of Ayer Hitam South For. Res., occupying *c.* 30% of the big trees in the Reserve. *Cf.* F.S.P. NG, Mal. For. 29 (1966) 32–33, 1 fig.

5: 483 *Carallia* ROXB.
Replace in the Key forks 5 & 6 into the following:

5. Petals persistent. Calyx lobes hairy inside or at least at base or margin. Seed obovoid or ellipsoid. Embryo curved.
6. Leaf margin distinctly fimbriate. Disk slightly crenulate. Fruit more than twice as long as wide, *c.* 15 by 6 mm . . . **6. C. suffruticosa**
6. Leaf margin entire or almost so, at most very short-dentate or crenulate. Disk distinctly lobed halfway. Fruit less than twice as long as wide.
6a. Cymes only in the axils of the upper pair of leaves of each shoot. Stipules up to 16 mm long. Calyx lobes 3–4 mm. Petals 3–4 mm. Seeds *c.* 9 by 6 mm. **5. C. borneensis**
6a. Cymes in the axils of successive leaf pairs of each shoot. Stipules *c.* 5 mm long. Calyx lobes *c.* $1^1/_2$ mm long. Petals *c.* $2^1/_4$ by 1 mm. Seeds *c.* 8 by 3 mm. **5a. C. longipes**
5. Petals caducous. Calyx lobes glabrous. Seed reniform or curved. Embryo curved.

5: 484*a* *Carallia eugenioidea* KING.
Add to Distr.: Indo-China (Vietnam). *Cf.* VU VON CUONG, Fl. Camb. Laos & Vietn. 4 (1965) 172.

5: 485*a* Add the following species:

5a. Carallia longipes DING HOU, Nova Guinea, Bot. *n.* 4 (1960) 21–23, f. 4. — **Fig. 13.**

Shrub, 3–5 m. *Leaves* chartaceous to thin-coriaceous, elliptic-oblong or elliptic, sometimes ovate, $3^1/_2$–$6^1/_2$ by $1^1/_2$–$3^1/_2$ cm, base cuneate rarely rounded, apex acute, margin obscurely serrulate in upper half; nerves 5–7 pairs, ± elevated on both surfaces, veins reticulate, ± elevated above, visible or obscure beneath; petiole 5–10 mm; 2–4 small, with conical to subulate appendages at the base on each side, persistent but breaking off easily. Stipules *c.* 5 mm. *Inflorescences* up to 7 cm long, axillary, solitary, on several nodes along the young branches, usually few-flowered cincinnal cymes; internodes distinct, up to $1^1/_2$ cm, very rarely with a few short internodes between the long ones; peduncles $1^1/_2$–4 cm. *Flowers* sessile, not resinous, slightly obovoid-oblong, *c.* 6 by 3 mm. *Calyx* lobes 5, ovate, *c.* 1.6 by 1 mm, acuminate, sparsely puberulous on the margins and towards the base inside. *Petals* persistent, obovate-spathulate, *c.* $2^1/_4$ by 1 mm, unguiculate, lamina short-fimbriate. *Filaments* $3^1/_2$–$4^1/_2$ mm, the lower 2/5 united into a tube, free parts fleshy; anthers small, *c.* 0.4 by $^1/_4$ mm, obtuse. Disk fleshy, distinctly 10-lobed. *Ovary* 1-celled, 10-ovuled; style cylindric, *c.* $3^1/_2$ mm, slightly and gradually thickened towards the base; stigma obscurely capitate. *Fruits* dark-red, broadly ellipsoid or subglobose, 13–15 by 10–13 mm. *Seed* 1, oblong-obovoid, slightly ribbed, *c.* 8 by 3 mm, reddish to dark brown. Embryo straight.

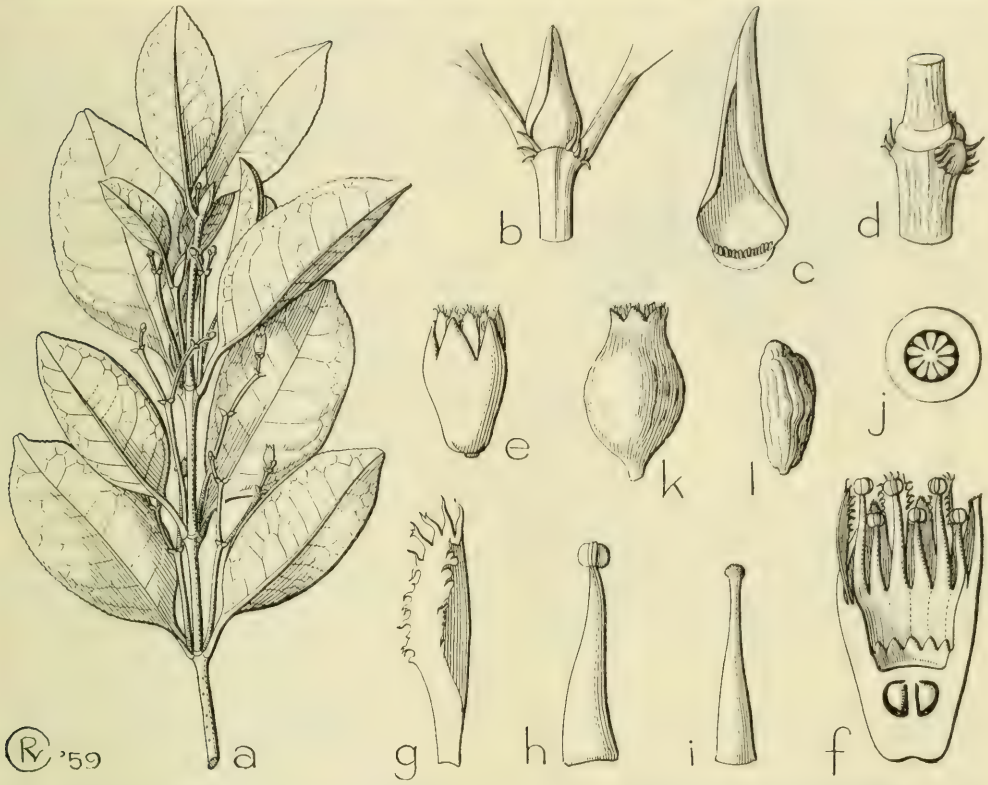

Fig. 13. *Carallia longipes* DING HOU. *a.* Habit, ×2/3, *b.* apex of branchlet showing appendages outside the base of the petioles and stipule, ×2, *c.* inside view of stipule showing colleters, ×7, *d.* node of branchlet, ×3, *e.* flower, ×3, *f.* longitudinal section of flower (style removed), ×7, *g.* petal, ×13, *h.* stamen, ×13, *i.* style and stigma, ×7, *j.* cross-section of ovary, ×7, *k.* young fruit, ×2, *l.* seed, ×2 (*a* & *e–k* BW 4980, *b–d* & *l* BW 7371).

Distr. *Malesia*: West New Guinea (Vogelkop Peninsula).

Ecol. Lowland forest, on limestone, 275 m.

Note. Closely related to *C. papuana* DING HOU.

5: 488*b* *Gynotroches axillaris* BL.
Omit under Distr. 'Australia'; *cf.* DING HOU & STEEN. Pac. Pl. Areas 1 (1963) 284, map 20.

Though the distribution was correctly mentioned under the genus, Australia was by error mentioned in the distribution of the species, which induced Miss BURBIDGE to enter this generic record in the Dict. Austr. Pl. Gen. (1963) 141. It is of course not excluded that this may be found in future in the N. Queensland rain-forest, as it is abundant in New Guinea and the Solomons, but at present there is no proof for this.

5: 491*b* *Pellacalyx saccardianus* SCORT.
Add to Distr.: Also in Peninsular Thailand (near Trang, RFD 35161).

Sarcospermataceae

4: 34*b* *Sarcosperma uittienii* H. J. LAM.
Add to Distr.: In addition to the 2 specimens mentioned by H. J. LAM & VAROSSIEAU, Blumea 3 (1938) 194: Sumatra (Eastcoast, Wampa Valley, 550 m, GALOENGI 432; Karo country, Biang Valley, 800 m, LÖRZING 14457) and Malay Peninsula (Selangor, Ulu Gombak, 600 m, SF 34191 MOH. NUR, FRI 1950 FRANCIS NG).

Scyphostegiaceae

5: 297 *Scyphostegia* STAPF and *S. borneensis* STAPF, — **Fig. 14.**
At my suggestion Dr. W. A. VAN HEEL made a detailed anatomical-morphological investigation because Dr. J. HUTCHINSON in the 2nd edition of his 'The Families of Flowering Plants' 1 (1959) 326–329, f. 187 a–b, did still accept a disharmony between the ♂ and ♀ flowers,

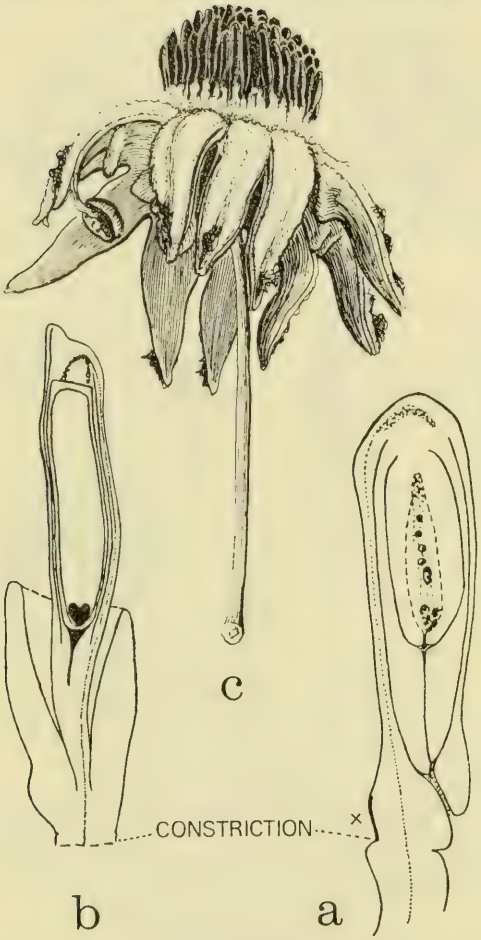

Fig. 14. *Scyphostegia borneensis* STAPF. *a.* L.s. of the ovule at the stage of the first formation of nuclear endosperm, the funicle shows a constriction just below the meristem (indicated by a cross) of the later formed arilloid, ×20, *b.* l.s. of young seed, with the arilloid developed above the constriction, embryo still small, ×3, *c.* fully mature, dehisced fruit, the fleshy pericarp valves each with a part of the stigma on top, the bunch of dark, erect seeds attached to the base of the fruit, at base each surrounded by the (pale) arilloid, ×4/3 (after VAN HEEL).

the latter being accepted as a fleshy receptacle containing numerous achenes, thus remaining at variance with SWAMY (Proc. Nat. Inst. India 19, 2, 1953, 127–142) and myself (Fl. Mal. I, 5, 1957, 297–299), who interpreted the fruits ('achenes') of HUTCHINSON as ovules. Furthermore, HUTCHINSON placed the family in *Celastrales*, near *Siphonodon*, probably because of the similarity of the thickened stigma.

VAN HEEL has found (Blumea 15, 1967, 107–125, 13 fig.) that the reproductive units are doubtless seeds, that HUTCHINSON's 'receptacle' is a pericarp, and that his assumed 'tepals' in the ♀ flower are really an aril(loid). Besides, the ovule shows some remarkable characters, namely a pedestal funicle with a constriction, a protuberance on the chalazal side, and a 5-lobed exostome.

In my description of the fruit I had already observed that in later stages it was breaking up at the mouth. Dr. W. MEIJER, to whom we are extremely obliged for the very complete pickled material, succeeded in finding in Sabah the final fruiting stage in which the pericarp is split to the base into 9–12 valves; it is really a fleshy capsule, but is probably swallowed by animals in immature state as happens with so many fleshy fruits in Malesia. Fig. 14.

Our suggestion of affinity with *Flacourtiaceae* seems to be not unreasonable to VAN HEEL, from the morphological viewpoint the only discrepancy being that the placentation in the latter family is as far as known lateral-parietal and never basal as in *Scyphostegia*. But the placentation in *Tamaricaceae*, also listed in *Parietales*, seems intermediate, according to VAN HEEL, who will pursue further studies in *Flacourtiaceae* for checking this.

It is curious to find that HUTCHINSON even in his latest work 'Evolution and Phylogeny of Flowering Plants' (1969: 360, f. 310 A, B) maintains his view that the ovary of *Scyphostegia* represents a disk concealing free carpels, completely neglecting the detailed morphological work by VAN HEEL which I had personally brought to his attention in 1967. A remarkable case of prejudice leading to quixotic stubbornness which as far as I know finds no parallel in botanical science.

Simaroubaceae (NOOTEBOOM)

6: 193 Line 5 from top, replace '*Samadera*' by: *Quassia.*
Line 6 from top, after '*Irvingia*' add: *Allantospermum.*
Line 2 from bottom, replace 'AUBL' by: L.

6: 194 Line 6 from bottom, after '*Klainedoxa* (erron. *Klaineodoxa*)' add: *Allantospermum.*

6: 195 Add to the phytochemistry:
H. P. NOOTEBOOM (Blumea 14, 1966, 309–315) made an additional study on phenolic compounds in the family of 13 Malesian species of 9 genera. This con-

firms the suggestions that *Simaroubaceae* are fairly closely related to *Rutaceae*.

The genus *Irvingia* seems to fit well with *Simaroubaceae*.

But *Suriana* deviates distinctly from all others which would sustain the findings of GUTZWILLER (Bot. Jahrb. 81, 1961, 1–49) and others who regard this as a separate family.

6: 196 Change in the Key to the genera:

1. Leaves simple.
   2. Leaf-buds enclosed by caducous intra-petiolar stipules. Carpels connate. Stamens 10, without an adaxial scale. Plant not bitter.
      2a. Stipules leaving conspicuous annular scars. Ovary 2-celled. Fruit drupaceous . . . . **9. Irvingia**
      2a. Stipular scars obscure. Ovary 5-celled. Fruit a capsule. **10. Allantospermum**
   2. Stipules absent. Carpels free or connate. Stamens 5, or 10 and then with an adaxial scale.
   3. *Etc. etc.*

6: 196 In Key fork 4 second lead line 2, replace 'without' by: with.

6: 198 *Quassia* L.
Add to references: NOOTEBOOM, Blumea 11 (15 Dec. 1962) 509–528, gave a new subdivision of *Quassia*.

6: 201*b* In caption fig. 4 replace '*Q. harmandiana*' by: *Eurycoma harmandiana*.

6: 206*b* *Eurycoma harmandiana* PIERRE.
Add: Distr. Fig. 4.

6: 218*a* Lines 10 & 11 from top, replace '(K. & V.) KOORD.' by: (*non* K. & V.) KOORD.

6: 220*a* *Ailanthus fordii* NOOTEBOOM, Fl. Mal. I, 6 (1962) 220. — **Fig. 15.**

In my world revision of the genus *Ailanthus* in Fl. Mal. (*l.c.* 215–220, f. 17–18) I described a new species, known only from one old collection from Hong Kong made by FORD, *a.* 1884–1886, and named this *A. fordii*, represented in the Kew Herbarium and that of the British Museum (Nat. Hist.), London. FORD collected this in SE. Hong Kong I. 'near Cape d'Aguilar, as a small but conspicuous emergent tree from the shrubberies, the bare trunk being surmounted with foliage like a palm, the leaves being *c.* 40 cm long.'

Thanks to the kind intermediary of Mr. D. R. W. ALEXANDER, Director of Urban Services, where the Hong Kong Herbarium is housed, the Forester of the Urban Services Department, Mr. LAU YUNG-SUM, who acts as a collector of plants and seeds, has found that in the original locality which is still fully intact, *viz* on the Cape d'Aguilar headland, 10 trees could be located. In Nov. 1968 only one tree was in flower and that proved to be male. But its identification is fully certain, as the species differs from all others in both flowers and in fruit structure and could be easily checked on a duplicate forwarded to me and deposited in the Rijksherbarium.

Fig. 15. *Ailanthus fordii* NOOTEBOOM. *a.* Fruit, *b–d.* germlings, the pericarp sometimes remaining at the base of the hypocotyl, sometimes elevated with the cotyledons, plumule central and germination distinctly epigeal, seed germinated immediately after receipt, *b–d* after 2 weeks, *e.* germling with first leaves, 2 months later; all in greenhouse at Leyden. All $\times 3/7$.

Mr. ALEXANDER added that 'the flowering tree is *c.* 30 feet tall, growing between granite rocks in a steep ravine where it faces the westerly afternoon sun but is sheltered from the strong north-east wind. All ten trees have the same characteristics of a grey trunk, with surprisingly large bole at the base, tapering sharply upwards. Most of the trees are forked about two feet from the ground and continue upwards with two main stems. The wood appears brittle; the lower trunk carries numerous scars and callouses where the wood has grown over the sites of the broken-off branches. It appears likely that the tree is slow-growing. It is possible that more trees may be found on this headland which is about 2 km long and 1 km broad, rising at its highest point to 325 m. There are numerous ravines with big granite boulders. The undergrowth in parts is very thick and it is by no means easy to traverse the headland looking for *Ailanthus*.'

In examining the Hong Kong Herbarium I found 4 *Ailanthus* sheets of *A. fordii*, all wrongly assigned to *A. malabarica*.

It is interesting to enumerate the specimens now known, and their localities, herbarium specimens as well as living trees:

Hong Kong: Cape d'Aguilar, 1884–1886 CH. FORD *s.n.* (K, BM); *ditto*, Y.S. LAU (Mr. LAU YUNG-SUM) 1438, Nov. 1968, tree 30 ft, in rocky ravine. Mt Gough, a spur of the Peak area, south, leg. W.J.T. (UTCHER), 24 Oct. 1905, Gard. Dept. Hong Kong Herb. No. 666, in flower; *ditto*, No. 667 leg. Mr. LO (QUAI), 16 Jan. in fruit; beside the Peak Tram track near its upper terminus, *c.* 400 m, a well-grown tree *c.* 10 m high (ALEXANDER, *in litt.*).

New Territories: Sha Tin, leg.? 24 Jan. 1905, Bot. & For. Dept. No. 4715, in fruit; in Jan.–March 1969 16 living trees located on hillsides (ALEXANDER, *in litt.*).

Cultivated: In N.B.G. (New Botanic Gardens) 93, leg. H. C. TANG, Gard. Dept. No. 12830, in flower, tall deciduous tree, bark grey, smooth, 16 March 1949. Mr. ALEXANDER reported that this cultivated tree is still alive. It is 12 m high, with a single trunk bare of branches for its first 5 m. It shows no thickened stem-base. It flowered Nov. 1968 and is male.

Notes. It is of course a pleasure to observe that this unique endemic of Hong Kong is still present in native vegetation and at least in its *locus classicus* in such rough terrain that it will probably remain there for a long time to come. A Nature Reserve is, however, badly needed for it and we hope that the Hong Kong Government will be sympathetic towards this. Because the other places are partially residential areas, no tree could be found any more on Mt Gough and only one at another place on the Peak. Also at Sha Tin there is considerable development and though still 17 trees could be discovered this coastal area, adjacent to the big inlet in the east central part of the N. T., is a threatened area for native trees.

Early March 1969 Mr. ALEXANDER sent a parcel of fruits to the Rijksherbarium and these were distributed to various botanical gardens. Germination was at Leyden perfect and provided the material for the figure here reproduced. Fruiting is obviously in Jan.-Febr.

The fruits collected from the single tree in the Hong Kong Botanic Garden, which can therefore not be male, as the herbarium suggested. Hitherto the genus was said to be dioecious. A local study of the flower morphology and biology seems desirable to solve this discrepancy.

6: 220*b* Add at base:

Doubtful

Ailanthus esquirolii LÉVEILLÉ, Fl. Kouy-Tcheou (1914–15) 404, *nomen*; Le Monde des Plantes 17 (1915) 23, *descr.* — The diagnosis is too short for identification; the specimen could not be located and probably does not belong to *Ailanthus* according to REHDER (J. Arn. Arb. 14, 1933, 227).

6: 226 Add above Excluded:

10. ALLANTOSPERMUM

FORMAN, Kew Bull. 19 (1965) 517, t. 1; WEBERLING & LEENHOUTS, Abh. Akad. Wiss. Lit. Mainz, M.-N. Kl. *n.* 10 (1965) 544; NOOTEBOOM, Adansonia 7 (1967) 161–168. — *Cleistanthopsis* CAPURON, Adansonia 5 (1965) 213, t. 1. — **Fig. 16.**

Trees, glabrous. *Leaves* simple, penninerved, entire; beneath the upper epidermis a hypodermal layer which contains mucilage. Stipules intra-petiolar, soon caducous. Inflorescence a panicle. *Flowers* bisexual. *Sepals* 5, imbricate, connate towards the base. *Petals* 5, free, imbricate. *Stamens* 10, free, sigmoid-folded in bud. Disk intrastaminal, 10-lobed. *Ovary* 5-celled with 1 pendent anatropous-epitropous ovule centrally attached near the apex of each cell; style terminal, sigmoid-folded in bud. *Fruit* a septicidal and incompletely loculicidal capsule, the valve-halves becoming slightly twisted after dehiscence, detaching, leaving a central columella; the (often aborted) seeds are attached to an enlarged placenta towards the apex of the columella. In *A. multicaule* the young fruit is ± drupaceous. *Seeds* shining and waxy, cotyledons planoconvex, radicle pointing upwards; plumule very small.

Distr. 2 *spp.*, 1 in *Malesia* (Malaya and Borneo) and 1 in Madagascar (*A. multicaule* (CAPURON) NOOT., *l.c.* 163).

Notes. This genus has a remarkable distribution and an equally interesting taxonomy. It was only recently independently described by CAPURON who arranged it in *Irvingioideae* and by FORMAN who removed *Irvingioideae* from *Simaroubaceae* and *Ixonanthoideae* from *Linaceae*, joining them as distinct subfamilies into a new family *Ixonanthaceae*. *Allantospermum* he arranged in subfamily *Ixonanthoideae*.

Independently I came to the same conclusion as CAPURON, *viz* that *Allantospermum* belongs to *Simaroubaceae-Irvingioideae*. The morphological characters are in favour of this and this disposition is also sustained on chemotaxonomical grounds; see NOOTEBOOM, Adansonia 7 (1967) 161–168.

Fig. 16. *Allantospermum borneense* FORMAN. *a.* Habit, ×2/3, *b.* flower, ×4, *c. ditto*, floral parts removed except ovary, ×8, *d. ditto*, lengthwise section, *e.* fruit, ×2/3, *f–g*, fruit valves, ×2/3, *h.* seed, ×2/3, *i.* columella, (*1.* placental outgrowth, *2.* sterile ovule), ± ×2. — *ssp. rostratum* NOOTEBOOM, *j.* Columella, ×2, *k.* young fruit, ×2/3 (*a–d* S 3364, *e–h* S 15166, *i* S 15162, *j* SAN 36068, *k* SAN 36015).

The controversy about the systematical affinity of *Allantospermum* has also been tried to solve by means of anatomical and palynological comparison.

Wood Anatomy. ROJO (Adansonia 8, 1968, 73–83) examined its wood anatomy and found this distinctly different from that in *Irvingioideae* and possibly more approaching, but still different from *Ixonanthes* and *Ochthocosmus* (*Ixonanthaceae sens. str.*). Wood anatomically *Irvingioideae* constitute a distinct group within *Simaroubaceae*. For its wood anatomy *Allantospermum* could be another group of the same rank as the other distinct wood anatomical types *Irvingioideae*, *Kirkioideae*, *Picramnioideae* and *Alvaradoideae* (*cf.* WEBBER, Am. J. Bot. 23, 1936, 577–587).

Leaf Anatomy. METCALFE, LESCOT &

LOBREAU (Adansonia 8, 1968, 337–351) reported the differences between *Allantospermum* and *Irvingioideae*, mainly being the absence of mucilage cavities in the former and their presence in the latter and other *Simaroubaceae*. Remarkable, however, is the common presence of cristarque cells in both *Allantospermum*, *Klainedoxa* and *Irvingia*. The absence of mucilage canals is a negative character shared with *Ixonanthaceae sens. str.*

Palynology. In her comparison with *Irvingia*, LOBREAU, *l.c.*, stresses differences more than the undoubted similarities and is apparently unaware that the general *Simaroubaceae* pollen type is close to that of *Allantospermum*.

In comparing with *Ixonanthaceae* she does the opposite and stresses similarities more than the differences and strangely enough does not comment on the striking difference in exine structure between *Allantospermum* and *Ixonanthes*. Her conclusions rest therefore only on a comparison with *Ochthocosmus*. Here she states that in both genera the polar triangle is small, but omits to mention that this is only true for *A. multicaule*. In *A. borneense* the polar triangle is large. The endexinous thickenings which form the other support for her thesis are in all types concerned weakly developed and should not carry weight.

LOBREAU's idea that *Allantospermum* pollen is more similar to *Ixonanthaceae* pollen than to *Irvingiaceae* would therefore appear to be weakly founded. The striking similarity of *Allantospermum* pollen to other Simaroubaceous pollen and the undoubted resemblance to *Irvingia* pollen support, in my opinion, NOOTEBOOM's idea to include *Allantospermum* in *Simaroubaceae subfam. Irvingioideae*. — J. MULLER.

Concluding, the evidence is first that the genus stands apart in various aspects. Second that the morphological, chemotaxonomical and palynological characters all point to inclusion with *Irvingioideae* in *Simaroubaceae*, that the balance in leaf anatomy is 50 : 50, and that the wood anatomy would be in favour of inclusion in *Ixonanthaceae sens. str.*

1. Allantospermum borneense FORMAN, Kew Bull. 19 (1965) 517, t. 1; NOOTEBOOM, Adansonia 7 (1967) 162, pl. 1 f. a–b. — **Fig. 16 a-i.**

Tree, up to 30 m by 50 cm ⌀; buttresses short to steep, up to 75 cm high, sometimes with warts. Stipules only present in leaf-buds, narrowly elliptic-oblong, pointed, *c.* 1 cm (FORMAN, *l.c.*). *Leaves* glossy above, dull beneath, elliptic with cuneate to broadly rounded base and acuminate, blunt apex, 7–16 by 3–8 cm; nerves 5–10 pairs, arching upwards and meeting in a not very conspicuous intramarginal vein; veins ± transverse, netted; midrib and nerves prominent, veins slightly prominent on both surfaces; petiole dark-coloured, grooved above, *c.* 1 cm. *Panicles* lax, up to 7 cm. Bracts early caducous, leaving an obvious scar. Pedicels 7–9 mm. *Sepals* boat-shaped, reflexed at anthesis, 3–4 by 2–3 mm, caducous when the fruit matures. *Petals* elliptic to obovate, 4–5 by $2^1/_2$–3 mm, membranous, veined, reflexed at anthesis, caducous. *Stamens* up to 6 mm long, with versatile, *c.* 1 mm long latrorse-introrse anthers. Disk *c.* $1^1/_2$ mm ⌀ and $^1/_2$ mm thick. *Ovary* 5-lobed, *c.* $1^1/_2$ by 2 mm; style filiform, *c.* 3(–4) mm; stigma capitellate. *Capsule* broadly ellipsoidal, 5-lobed, $2^1/_2$–5 cm long, abruptly (up to 3 mm) acuminate at apex. *Seeds* cylindrical, often slightly curved, 2–$2^1/_2$ by 4–6 mm.

Distr. *Malesia*: Malaya (Penang, Perak, Trengganu), Borneo (Sarawak, Brunei).

Ecol. Obviously not rare in primary lowland rain-forest.

Notes. In my paper (*l.c.* 164) I wrote: 'I never saw a lobed structure as depicted in Forman's paper'. In fact, the placental outgrowths are somewhat lobed, and the lowermost part sometimes tears from the columella (probably due to desiccation in the herbarium). In some cases the seeds leave some material when tearing off from the placenta.

A. multicaule from Madagascar differs from *A. borneense* in the following characters: Tree with many trunks. Stipules narrowly lanceolate, acute, 2–$2^1/_2$ mm long. Leaves (narrowly) ovate, with rounded base and long-acuminate, acute apex, $3^1/_2$–10 by $1^1/_2$–$3^1/_2$ cm; nerves 3–5 pairs. Fruit *c.* 2 by 1.7–2 cm. Seeds 10–14 mm long, possessing a horseshoe-shaped arillodium directly above the hilum.

ssp. **rostratum** NOOTEBOOM, *ssp. nov.* — **Fig. 16 j-k.**

Inflorescentia praesertim basi racemosae plusminus condensae. Capsula apice longiter acuminato. — Typus: SAN 36068 (L).

Distr. *Malesia*: Sabah (Sandakan, Lahad Datu and P. Sakar, SAN A 4162, 17478, 26030, 36015, 36068, 37479, 37931, 38777).

Note. Different from the type subspecies in having a shorter, more condensed inflorescence predominantly branched towards the base and up to 2 cm long; acumen on the fruit 6–8 mm long.

Sonneratiaceae

4: 281 *Sonneratia* L. *f.*

It has appeared that *S. caseolaris* (L.) ENGL. can grow in fully fresh water without any connection with brackish water. It has been found along the shore of the Sentani Lake, at 75 m altitude, on sandy clay or peaty soil, and also along the Obehfareh R., near Hollandia, in the North of West New Guinea. Other plants occurring along the lake-shore are *Crinum asiaticum* L. and *Pongamia pinnata* (L.) MERR. which are otherwise largely confined to the sea-shore. This lake contains also several marine animals. It is accepted that it was, even in historical time, a lagoon in open connection with the sea which has become an inland lake by the rapid upheaval to which the northcoast of New Guinea is subjected. It is most curious that the species has been able to maintain itself. It produces the normal aerophores.

Shortly afterwards we received material of the same species from East New Guinea, again from the northcoast, where Mr. J. S. WOMERSLEY collected it at 150 m altitude, in Morobe Distr., 10 miles from Lae, as a 9 m tall tree along the inner margin of a sago swamp, near Oomsis on Wau road (NGF 15307), Aug. 15, 1962.

Though it can be cultivated in fresh water, *e.g.* at Bogor Botanic Gardens, at 250 m alt., this is the first time it was found in fresh water under purely natural conditions. Obviously, if conditions are favourable and upheaval rapid, marine plants may maintain themselves for some time. The trees in question are not thick enough to have survived since the beginning of the upheaval which started some 4–5 centuries ago and must date from later generations. Also at Bogor regeneration takes place under freshwater conditions. *Cf.* STEEN. Nova Guinea, Bot. *n.* 12 (1963) 189.

A distribution map of the genus is published in Pac. Pl. Areas 2 (1966) 248–249.

The species of *Sonneratia* can mostly be distinguished also in the sterile state, except for *S. alba* and *S. caseolaris*. Mr. J. MULLER has found a most easy differentiating character in the leaf tip which bears a thickened pitted gland (? hydathode) peculiar to *S. caseolaris*; in *S. alba* instead the leaf margin at and near the ending of the midrib is thinner and finely recurved without such thickened tip. This character is possibly not absolute, but in any case most helpful. Fig. 17.

4: 282 Add the following new paragraphs:

Anatomy. It is to be regretted that Dr. C. A. STACE in his work on epidermal characters on mangroves (New Phytologist 66, 1966, 304–318) omitted to examine *Sonneratia*. Dr. DING HOU found that the stomata of *Sonneratia*

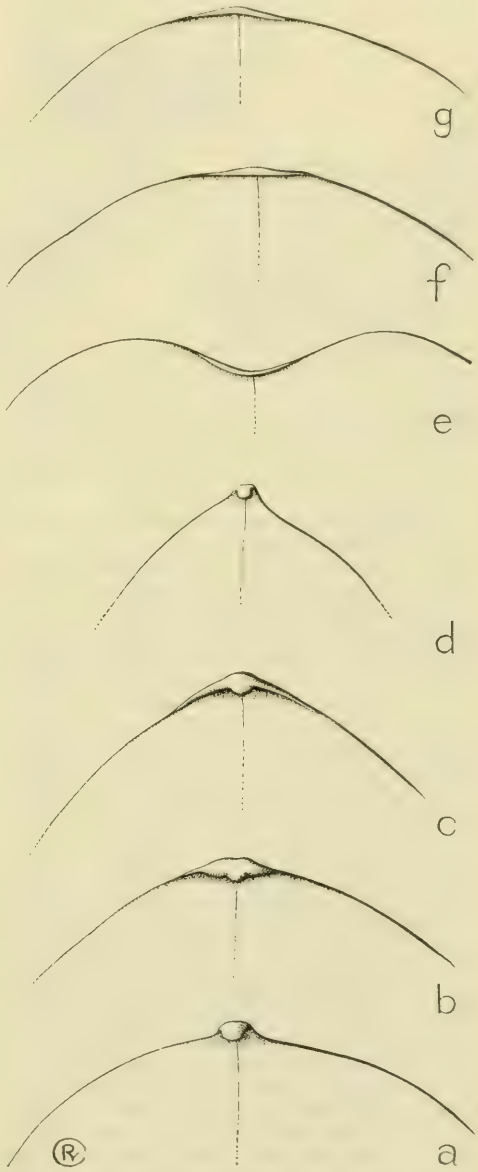

Fig. 17. Leaf tips of *Sonneratia*. — *a–d. S. caseolaris* (L.) ENGL., ×3. — *e–g. S. alba* J.SM., ×3. The difference is not completely exclusive and some intermediates occur (*a* KOORDERS 4442, *b* NGF 5026, *c* BW 3198, *d* KOORDERS 14219, *e* KARSTEN *s.n.*, *f* COERT 1456, *g* BORSSUM WAALKES 272).

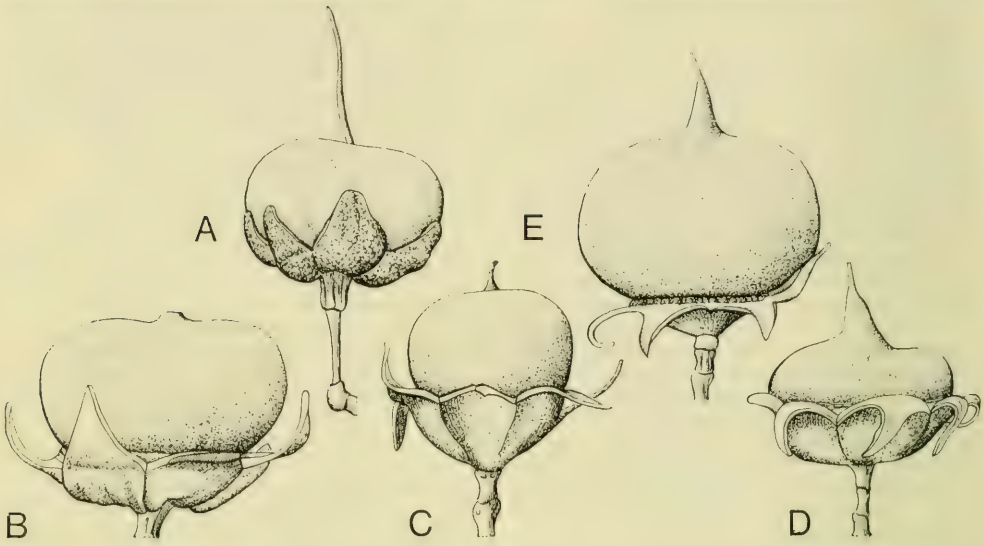

Fig. 18. A. *Sonneratia ovata*, B. *S. alba* × *ovata*, C. *S. alba*, D. *S. alba* × *caseolaris*, E. *S. caseolaris*, all ×1/2 (*A* MULLER 5, Labuan, *B* MULLER 8, Brunei, *C* MULLER *s.n.*, 28–12–63, Labuan, *D* MULLER 11, Brunei, *E* MULLER *s.n.*, 30–5–64, Brunei).

agree in structure very well with those of *Rhizophoraceae*.

He found, however, that they differ in the species, those of *S. alba* and *S. ovata* being much larger than those in *S. caseolaris*. Moreover, the two former species have a peculiar type of glands (?) in the leaves, of the size of stomata and equalling the latter in number. They are surrounded by a fairly large number of radially arranged cells. In section there appears to be a large sac-like hollow (cell or intercellular space ?) below them. These glands or whatever they may be are not found in *S. caseolaris*.

Hybridisation & Chromosomes. J. MULLER & Mrs. S. Y. HOU-LIU (Blumea 14, 1966, 337–343) have together worked on the identity, the pollen and the chromosomes of pickled material of *Sonneratia* collected by MULLER and by Mr. J. P. VAN NIEL, in Seria, Brunei. This was initiated through Mr. MULLER who in his pollen studies had found discrepancies in the pollen when in Brunei.

It has been shown that in material collected by MULLER *S. alba* may form hybrids with *S. caseolaris* and with *S. ovata*, the characters of which have been tabulated by MULLER (*l.c.* tab. 1) as to morphological characters, amongst them the fruits (fig. 18). This is the first time that the occurrence of hybrids in mangrove trees was reported (it was recently suggested by BRETELER in Acta Bot. Neerl. 18, 1969, 434–444, that *Rhizophora harrisonii* is also a hybrid).

Mr. MULLER says that the hybridisation is due to the rather unusual situation that the the three parent species grow side by side in the Brunei River estuary; usually they are ecologically separated, *S. alba* being the more marine, *S. ovata* the least marine, while *S. caseolaris* is ecologically intermediate. The very narrow mangrove belt along the rather steep banks of the Brunei R. has telescoped the various ecological zones and increased chances of contact. Another factor possibly promoting hybridisation may have been the scarcity of *S. ovata* which thus stands a large chance of being cross-fertilized with *S. alba* pollen. This is also suggested by the obvious concentration of *alba* × *ovata* hybrids around the single observed locality of *S. ovata*.

The reduced fertility of the hybrids indicates that the three are good species, but the sterility barrier between *S. ovata* and *S. alba* appears lower as compared with that between *S. alba* and *S. caseolaris*.

Mrs. HOU-LIU recorded her experience with the chromosomes which appeared very difficult to count; all species have n=11.

MULLER & VAN STEENIS (North Queensl. Natur. 35, 1968, *n.* 147, 6–8, 1 map) revised the genus *Sonneratia* for Australia and mapped its localities in Northern Australia and Queensland where only *S. alba* and *S. caseolaris*

occur, but also indubitable hybrids between them, as proved by fruit anomalies and pollen sterility.

Palynology. J. MULLER (Pollen et Spores 11, 1969, 223–298, 15 fig., 15 pl.) has made an extensive examination of pollen of *Sonneratia* and compared it with that of *Duabanga*, and various *Lythraceae*. In *S. alba* and *S. caseolaris* he found a distinct intraspecific variability which is geographical and which is assumed to be genotypic. These were charted. A key was given to the 5 species on pollen characters.

Fossil pollen. J. MULLER (in Cranwell, ed., Ancient Pacific Floras, Univ. Hawaii Press, 1964, 33–42, 2 fig., 1 pl.) studied fossil pollen of Borneo. In NW. Borneo pollen of the *S. caseolaris* type is oldest and found onwards the transition between Oligocene and Miocene; the *S. alba* type is younger, from the start of the Pliocene. This is not reflected in the present range, *S. alba* is the wider distributed species. *S. ovata* was not charted; this is said to be closest related to *S. alba*.

MULLER refers also to papers of Indian palaeobotanists who have recorded Pliocene fossil wood of *Sonneratia*-like structure and a flower and fruit from the Eocene.

A tentative picture of the evolution of *Sonneratia* pollen was presented by GERMERAAD, HOPPING & MULLER (Rev. Palaeobot. Polynol. 6, 1968, 189–348) in which is discussed a Lythraceous Tertiary pollen type, *Florschuetzia trilobata*, which is presumed to be ancestral to *Sonneratia*, and pointed to the remarkable resemblance of the latter to the pollen of the Lythraceous genus *Lagerstroemia*.

Affinity. Pollen types closely comparable to those of *Sonneratia* are found in *Duabanga* and furthermore in various *Lythraceae* (MULLER, *l.c.* 1969, 291–292), notably the New World subtribe *Diplusodontinae* (*Diplusodon, Lafoënsia*) and the Old World subtribe *Lagerstroemiineae*). Palynologically there would be no objection to merge *Sonneratiaceae* with *Lythraceae*.

4: 283*a* *Sonneratia acida* L. *f. var. mucronata* MIQ. was reduced here to *S. caseolaris* (L.) ENGL. MIQUEL's variety was based on two sheets, one of HORSFIELD and one of REINWARDT. The first is in U and appears to belong to *S. alba* J. SMITH. I could not find at U or L the REINWARDT sheet ticketed by MIQUEL.

4: 288 *Duabanga* BUCH.-HAM. — **Fig. 19.**
Add under the genus the following paragraphs:
Blastogeny. Seedlings have been described and depicted by TROUP (Silv. Ind. Trees 2, 1921, f. 228) and JAYAWEERA & HOWARD (Baileya 10, 1962, 8–13, 2 fig.).

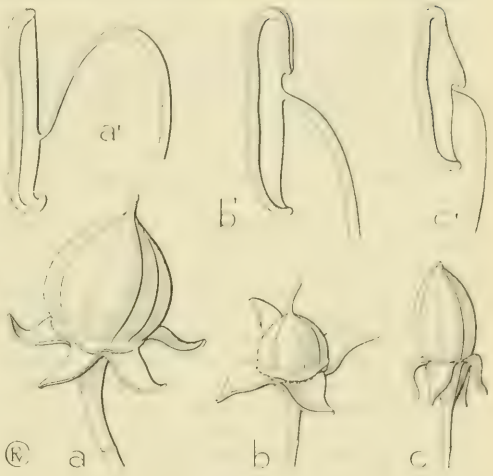

Fig. 19. Fruit and stamen details of *Duabanga*. *a–a'*. *D. grandiflora* (ROXB. *ex* DC.) WALP., *b–b'*. *D. taylorii* JAYAWEERA, *c–c'*. *D. moluccana* BL. Fruits $\times 1/2$, stamens $\times 2^1/_2$ (after GEESINK).

Hybridisation & Chromosomes. JAYAWEERA (J. Arn. Arb. 48, 1967, 89–100, 8 fig., 1 tab.) has found that four large trees growing in the Botanic Garden at Peradeniya and raised from seed received from the Botanic Gardens, Bogor about 1853, are distinctly different from the two known species. He described this as a new species, *D. taylorii* JAYAWEERA. Fig. 19 b–b'.

It struck us that in a number of characters the new species is intermediate between the continental SE. Asian species *D. grandiflora* and the Malesian *D. moluccana*, which have replacing ranges. At our suggestion Mr. GEESINK has studied the new species and satisfactorily shown that it must be a primary hybrid between the two known species. See his study in Blumea 18 (1970) 453–456, 1 fig.

Naturally this hybrid could not have been found in the wild, because of the replacing ranges of the parents. However, in the Botanic Gardens at Bogor, where cultivated species are grown in systematic arrangement, the two species grow side by side in the same compartment parcel VII. D, so that hybridisation can easily occur. See TEYSMANN & BINNENDIJK, Cat. Hort. Bog. (1866) 241 and DAKKUS, Cat. Bot. Gard. (1927) 119.

A further communication from Dr. JAYAWEERA is most interesting, *viz* that the seed of *D.* × *taylorii* is for 95% fertile, from which it should consequently be deduced that *D. grandiflora* and *D. moluccana* are rather subspecies (replac-

ing races) of one species only than species in their own right.

A further study of chromosomes seems desirable; this has only been observed for *D. grandiflora* by J. L. THOMAS (Baileya 10, 1962, 13), n=24.

Sphenocleaceae, see **Campanulaceae**

Stylidiaceae

4: 530*b* *Stylidium inconspicuum* SLOOT.
Add to literature: ERICKSON in Specht, Rec. Am.-Austr. Exp. Arnhem Land 3 (1958) 312; Triggerplants (1958) 197–198.
Add to Distr.: North Australia, Arnhem Land (Groote Eylandt: Hemple Bay).
Note. Mrs. ERICKSON refers this with some doubt to the species which was first described from Java. In our experience Malesian representatives of genera which are characteristic of Australia, especially herbaceous ones, are almost never endemic in Malesia but almost always also present in Australia (as for example in *Goodeniaceae*, *Amaranthaceae*, *etc.*); the existence in Australia of this hitherto endemic species of Java would be no great surprise.

4: 531*a* *Stylidium javanicum* SLOOT.
Add to literature: ERICKSON, Triggerplants (1958) 196.
Note. At some time it was assumed that also this Malesian endemic (Indramaju; Sumba) occurred in NW. Australia, but on closer examination Mrs. ERICKSON and Mr. WILLIS found the Australian specimens allied but specifically different and have described them as *S. fluminense* ERICKSON & WILLIS, Vict. Natur. 83 (1966) 108, pl. 2, f. 1–6.

4: 532*a*, 5: 564*a* *Stylidium pedunculatum* R.BR.
Add to literature: ERICKSON, Triggerplants (1958) 190, pl. 55, f. 5–9.
Note. I have reduced to this *S. ericksonae* WILLIS, Vict. Natur. 73 (1956) 43; ERICKSON, Triggerplants (1958) 189, pl. 55, f. 10–17. — *syn. S. androsaceum* O. SCHWARZ in Fedde, Rep. 24 (1927) 105, *non* LINDL., *nec* DC.
Both Mrs. ERICKSON and Mr. WILLIS believe these two species to be different and distinguish them as follows:

1. Leaves shortly ciliate on the margins only, terminating into a long hair-like point. Peduncles 2–6 cm. Small petals notched, corolla throat quite naked. **S. pedunculatum**
1. Leaves bristly-hairy all over, blunt to acuminate but not hair-pointed. Peduncles 6–11 cm. Smaller petals entire, corolla throat with 4 obscure appendages . . . . **S. ericksonae**

I must remark that the Aru specimens are almost glabrous and that I am not particularly impressed by the amount of hairs on the leaves. A very hairy specimen of the North. Terr., *viz* S. T. BLAKE 16371, was by him identified as *S. pedunculatum*, but must then belong to *S. ericksonae*, but the smaller petals are not notched as far as I can observe. And also I am not impressed by the notching of the smaller petals if I see the plate; it may be that two taxa are involved but the scant material at present available does seem to indicate the desirability of future research on delimitation and status.

Styracaceae

4: 49 *Bruinsmia* BOERL. & KOORD.
Change in the description: Leaves almost entire to coarsely crenate. Calyx truncate or 5-lobed. Corolla dull greenish or white. Ovary 3–5(–6)-locular. Fruit oblong to globular. Pericarps pulpy or drupaceous. Seeds 1-∞ per cell. *Cf.* STEEN. Bot. Jahrb. 86 (1967) 390.
Change last line on Distr. as follows: Distr. Two species, one in *Malesia*, the other one in Burma, Assam, and Thailand.

4: 50*a* *Bruinsmia styracoides* BOERL. & KOORD.
Add to Distr.: Philippines, Mindanao (PNH 36146). *Cf.* STEEN. Philip. J. Sc. 88 (1959) 121.
By this discovery also this genus can be removed from the few which cross Makassar Straits without intermediary stations either in the Philippines or Lesser Sunda Islands. Also *Bromheadia* and *Pericopsis* are now removed from this list, published by me in Bull. Jard. Bot. Btzg III, 12 (1932) 259.

Thymelaeaceae

Gonystyloideae (AIRY SHAW)

4: 352, 353 *Gonystylus* TEYSM. & BINN.
Replace the Key to the species by the following:

REVISED KEY TO THE SPECIES

1. Leaves very long, 40–50 cm, venation bullately impressed above, very prominent below. Inflorescence robust, with a very thick rachis, up to 5 mm ⌀. Flowers large, with *c.* 40 disk-lobes and 80 stamens. Style robust, with large stigma, and 4–7 small clavate 'parastyles' around

the base. . . . . **2. G. areolatus**

1. Leaves shorter, 3–40(–43) cm, venation rarely bullately impressed (*cf.* 26. *G. nervosus*). Inflorescence much less robust. Flowers smaller, disk-lobes and stamens 10–40. Style slender; stigma small; 'parastyles' absent (rarely present: *cf.* 6. *G. xylocarpus* and 18. *G. micranthus*), but sometimes represented by 3–4 small rounded humps.
2. Inflorescence-branches elongating almost indefinitely, forming long crowded cicatricose racemes with a few flowers at the apex at the time of flowering. Leaves 10–29 by 5–14 cm. Disk-lobes (where known) 15-16, densely retrorse-setulose. Capsule ± lanceolate, 3- or 6-ribbed (*Sect. Auxanthus* AIRY SHAW).
3. Leaves up to 29 cm long, with a dull, 'shagreened' surface, the lower surface always bearing minute adpressed hairs, lying parallel to the nerves, often difficult to see (W. Indonesian Borneo; SW. Sarawak) . . . . . **1. G. augescens**
3. Leaves up to 20 cm long, with a very smooth and somewhat shining surface, the lower side entirely devoid of minute hairs (NE. Sarawak; Brunei) . . . . . **25. G. lucidulus**
2. Inflorescence-branches not elongating, bearing fascicles or short irregular racemes of flowers on short nodulose side-branches. Disk-lobes glabrous or occasionally setulose. Capsule ± globose, not or sometimes weakly ribbed.
4. Leaves gradually narrowed at the apex into a relatively long slender acumen, cuneate at the base, up to 20 by $5^1/_2$ cm, almost glabrous, drying chestnut-brown. Inflorescence ferrugineous-tomentellous, branches shortly racemiform. Flowers truncate at the base. **11. G. acuminatus**
4. Leaves not gradually narrowed into a long acumen, usually rather suddenly narrowed into a relatively short acumen or cusp, sometimes rounded or even retuse.
5. Pedicels 2–3 cm. Leaves usually large (up to 40 by 15 cm).
6. Midrib distinctly raised above; leaves up to 43 by 12 cm, drying olivaceous-brown, almost glabrous; petiole $1^1/_2$–2 cm. Inflorescence rather robust, to 17 cm; disk-lobes 30–35, glabrous . . . . . **22. G. costalis**
6. Midrib impressed above.
7. Petioles usually or sometimes exceeding 2 cm.
8. Leaves, especially midrib and nerves, ochraceous-tomentellous beneath; petioles and inflorescence-rachis strongly angled, tawny-tomentellous; disk-lobes 40–45. **28. G. spectabilis**
8. Leaves glabrous beneath; petioles and inflorescence-axis terete or less strongly angled, cinereous-pubescent; disk-lobes 20–40.
9. Petiole up to $2^1/_2$ cm; leaves drying some shade of ochraceous brown. Inflorescence elongate, to 22 cm . . . . . **5. G. macrophyllus**
9. Petiole 3–4 cm, 4–5 mm ⌀; leaves drying pale greenish above, with a narrow purple margin. Inflorescence to 11 cm . . . . . **27. G. nobilis**
7. Petioles not exceeding 2 cm.
10. Leaves glabrous or almost so.
11. Leaves drying a dark purplish-leaden colour; base of calyx narrowing gradually into pedicel; disk-lobes 20–30 . . . . . **3. G. calophyllus**
11. Leaves drying a light brownish colour; base of calyx broadly truncate, passing abruptly into the pedicel; disk-lobes *c.* 50 . . . . . **20. G. calophylloides**
10. Leaves thinly pilose or pubescent beneath, at least on the midrib.
12. Leaves drying a light green with a narrow dark brown margin; disk-lobes *c.* 40. **4. G. reticulatus**
12. Leaves greyish-green above, ochraceous-brown beneath; disk-lobes *c.* 30. **21. G. consanguineus**
5. Pedicels $^1/_2$–2 cm. Leaves small or medium.
13. Calyx-segments strongly reflexed or revolute at anthesis; disk-lobes 7–12. Inflorescence usually considerably branched. Flowers small. Leaves small, up to 13 by 5 cm, distinctly shagreened.
14. Disk-lobes tomentellous throughout and setulose within. Leaves elliptic or almost rhomboid, glabrous or almost so, usually ochraceous when dry; nerves rather steeply ascending . . . . . **14. G. forbesii**
14. Disk-lobes glabrous. Leaves elliptic to oblong but never subrhomboid, drying brownish or greenish; nerves rather widely spreading.
15. Young parts and inflorescence densely fulvo-velutinous. Leaves usually ± pubescent below, glossy above (even when dry), rather variable in shape, often cuneate at base. **15. G. velutinus**
15. Young parts and inflorescence tomentellous. Leaves glabrous or almost so below, dull above when dry, regularly elliptic-oblong, mostly rounded at base. **16. G. maingayi**
13. Calyx-segments not or scarcely reflexed at anthesis.

16. Disk-lobes 10–12, very slender, pustulate toward apex. Flowers very small (4–6 mm). 3 filiform, clavate parastyles present. Leaves drying a dull purplish-leaden colour, up to 15 by 6 cm . . . . . **18. G. micranthus**
16. Disk-lobes 13–40. Flowers larger.
17. Leaves drying a purplish-leaden colour; midrib flat or slightly raised above. **12. G. confusus**
17. Leaves not drying purplish-leaden.
18. Disk-lobes retrorse-setulose within.
19. Leaves drying greyish-green above with a narrow brown border, pinkish-brown below, chartaceous; nervation lax, the primary nerves being distinctly differentiated from the secondaries; disk-lobes 20–22 . . . . . **9. G. keithii**
19. Leaves drying brownish or ochraceous, or greenish without a brown border, ± coriaceous; venation dense, without distinctly differentiated primary nerves.
20. Leaves drying chestnut-brown throughout; disk-lobes 25–30. **10. G. brunnescens**
20. Leaves drying ochraceous or greenish; disk-lobes 35–40 . . **23. G. decipiens**
18. Disk-lobes glabrous.
21. Midrib distinctly prominent above. Sepals narrowly triangular-lanceolate. Leaves yellow-ochraceous when dry . . . . . **7. G. stenosepalus**
21. Midrib flat or channelled above. Sepals ovate-deltoid.
22. Leaves small, 4–15 by 2–7 cm, coriaceous, often ± conduplicate, drying dull purplish-red below and chestnut above; nervation relatively inconspicuous. **19. G. bancanus**
22. Leaves various, but not conduplicate, nor drying as above; nervation more conspicuous.
23. Indumentum of inflorescence tomentose or tomentellous, *i.e.* with short spreading hairs, usually ± fulvous.
24. Leaf-surface not dull and 'shagreened' (though not shining); pedicels $1^1/_2$-$2^1/_2$ cm; calyx 5–8 mm long; disk-lobes *c.* 30 . . . . . **21. S. consanguineus**
24. Leaf-surface dull and 'shagreened', slightly glaucescent below; pedicels 0.8–2 cm; calyx 5–6 mm long; disk-lobes 20–30.
25. Leaves long and narrow, up to 27 by 7 cm, at least 4 times as long as broad, glabrous; inflorescence up to 28 cm long . . . . . **24. G. glaucescens**
25. Leaves less elongate, up to 17 by $8^1/_2$ cm, only 2–3 times as long as broad, often tomentellous below; inflorescence up to 12 cm long. **13. G. affinis**
23. Indumentum of inflorescence thinly adpressedly grey-pubescent.
26. Leaves large, glabrous, up to 34 by 12 cm.
27. Leaves coriaceous, drying pale green above with a narrow brown edge (as in 9. *G. keithii* and 4. *G. reticulatus*); nerves not bullately impressed; petiole robust, terete, up to 4 cm long . . . . . **27. G. nobilis**
27. Leaves chartaceous, not drying pale green with a brown edge; primary nerves ± bullately impressed; petiole much less robust, up to 2 cm long. **26. G. nervosus**
26. Leaves small or medium, 9–24 by 3–$7^1/_2$ cm, glabrous or shortly adpressed-pubescent below.
28. Leaves rigidly coriaceous, broadly elliptic, up to 17 by 9 cm; inflorescence robust, up to 18 cm; disk-lobes 35–40; parastyles 2–3; fruit massive, pericarp up to 2 cm thick, almost stony . . . . . **6. G. xylocarpus**
28. Leaves thinly to firmly chartaceous; inflorescence rather slender; disk-lobes 25–30; parastyles absent; fruit with moderately thick and woody pericarp.
29. Leaves 12–24 by $4^1/_2$–$7^1/_2$ cm; inflorescence 10-20 cm. **8. G. borneënsis**
29. Leaves 9–11 by 3–4 cm; inflorescence 2–3 cm, few-flowered. **17. G. pendulus**

4: 355*a* *Gonystylus xylocarpus* AIRY SHAW.
Add to literature: Fl. Mal. I, 4 (1953) 355; Kew Bull. 17 (1964) 450.
Add to description: Tree up to 36 m. *Inflorescence* robust, up to 18 cm long. Pedicels up to 1.8 cm, grey-sericeous. *Calyx* 7 mm long, 7–8 mm ∅, thickened and truncate at the base, very shortly adpressed-sericeous; segments ± deltoid, somewhat obtuse and very shortly recurved at the apex. *Disk-lobes* 35–40, narrowly subulate, 3–4 mm long, glabrous, epustulate. Style pilose below; parastyles 2–3, flattened-clavate, $1^1/_2$ mm. *Fruit* dehiscing by 4 valves.
Add to Ecol.: Dominant tree in kerangas on flat ridge, 30–150 m altitude. *Fl.* March, *fr.* March, June, July.
Add to Vern.: *Ramin batu, garu mĕlitan*, Sarawak.
Replace the Note by: Noteworthy as one of the very few species of the genus in which 'parastyles' are developed.

4: 359*a* *Gonystylus maingayi* HOOK. *f.*
Add to literature: AIRY SHAW, Fl. Mal. I, 4 (1953) 359; Kew Bull. 17 (1964) 456.

4: 359*b* Add to Distr.: Borneo (Sarawak, Brunei, Sabah).
Add to Ecol.: Common dominant tree in primary peat-swamps, up to 15 m. *Fl.* Febr., Oct.-Nov., *fr.* Febr., April.
Add: Uses. Wood used for planks and boards for domestic buildings (Sabah).
Add to Vern.: *Ramin batu*, Sarawak, *bidaru*, Sabah (from Brunei informant).
Add to Notes: This species apparently occupies a similar peat-swamp habitat to 19. *G. bancanus*, but is evidently far more local. The fruit develops into a curiously asymmetrical, bean-like form, with one of the three valves almost abortive.

4: 361*a* *Gonystylus micranthus* AIRY SHAW.
Add to literature: Fl. Mal. I, 4 (1953) 361; Kew Bull. 17 (1964) 457.
Add to description: Tree to 15–20 m. *Leaves* with drip-tip up to $2^1/_2$ cm. *Calyx* ovoid, up to 6 mm. *Disk-lobes* 10–12, very slender, pustulate towards apex, glabrous. Style surrounded at the base by 3 conspicuous, filiform, clavate-capitate parastyles, $1^1/_2$ mm long.
Add to Distr.: S. Indonesian Borneo.
Add to Ecol.: Primary lowland forest or marshy forest, on sandy loam soil, 20–90 m. *Fl.* Febr., March, July, Aug.
Add to Notes: The fruit of this very distinct species is still a desideratum.

4: 361*b* After 19. *Gonystylus bancanus* (MIQ.) KURZ add the following species:

20. Gonystylus calophylloides AIRY SHAW, Kew Bull. 17 (1964) 448.

Small tree to 6 m. *Leaves* oblong or slightly oblanceolate-oblong, 30–37 by 11–12 cm, slightly cordate at base, rounded and abruptly shortly caudate at apex (cauda 1.2–1.8 cm by 2–4 mm), chartaceo-coriaceous, glabrous, pale ochraceous-brownish (greenish tinged above) when dry; midrib moderately robust, very prominent and subcylindric beneath, flat or scarcely prominulous above; nerves very slender, *c.* 35 pairs, distinctly prominulous on both surfaces; petiole $1–1^1/_2$ by 4 mm, very rugose. *Inflorescence* very abbreviated, $2^1/_2$ cm, few-flowered, sericeous. Pedicels 1.2–2.5 cm, densely ochraceous-sericeous. *Calyx* broadly ovoid, truncate at base, 7–8 cm ⌀; sepals broadly deltoid, 7–8 by 4–6 mm, slightly recurved and sometimes with a slight thickening at the apex, dorsally ochraceous-sericeous. *Disk-lobes* *c.* 50, robust, laterally flattened, 6 mm long, glabrous, epustulate. Style elongate, long-hairy, surrounded at the base by 4–5 small obtuse 'parastyles'. *Fruit* subglobose, $3^1/_2$ cm ⌀, apparently 5-valved, rugulose. obscurely puberulous, subtended by the 10 mm long sepals and borne on a striate pedicel $2^1/_2$ cm by 3–4 mm. *Seed* apparently solitary, large.

Distr. *Malesia*: Borneo (NE. Sarawak).

Ecol. Banks of rocky stream at 210 m. *Fl. fr.* July.

Vern. *Ramin*, Sarawak.

Note. Closely related to 3. *G. calophyllus* of SW. Sarawak, differing in the pale ochraceous-brown colour on drying, and in the broadly ovoid shape of the calyx, the truncate base of which passes abruptly into the pedicel.

21. Gonystylus consanguineus AIRY SHAW, Kew Bull. 17 (1964) 454.

Tree, 16–40 m. *Leaves* elliptic to oblong, 10–25 by 5–9 cm, broadly cuneate or rarely rounded at base, rather abruptly caudate-acuminate at apex (cauda $^1/_2–2^1/_2$ cm), chartaceous to coriaceous, mostly grey-green above when dry, ochraceous-brown beneath, upper surface dull but scarcely 'shagreened' and glabrous or very sparsely pilose towards the base, lower surface also dull, very shortly tomentellous or spreading-puberulous, at least along the midrib; midrib moderate, cylindric-prominent beneath, not deeply impressed above; primary nerves 15–25 pairs, together with the numerous minor nerves conspicuously prominulous, especially beneath; petiole 7–12 by 1–2 mm, shortly fulvo-tomentellous or rarely glabrescent. *Inflorescence* 10–13 cm, sparingly and very shortly branched, sparsely fulvo-tomentellous. Pedicels $1^1/_2–2^1/_2$ cm, densely fulvo-tomentellous. *Sepals* 5–8 by 3–4 mm, externally densely fulvo-tomentellous. *Disk-lobes* *c.* 30, glabrous, epustulate, irregularly connate. Style glabrous.

Distr. *Malesia*: Borneo (W. & E. Indonesian Borneo, Sarawak, Sabah).

Ecol. Very varied: primary forest or disturbed forest on black or brown soil, once over sandstone, up to 60 m (Sabah); primary lowland Dipterocarp forest (Sarawak); loam soil and coral limestone, or sand and limestone, at 50–400 m (E. Borneo); old secondary forest, in bog on clay submerged during Westmonsoon, at 40 m (W. Borneo; identity not quite certain). *Fl.* June, Nov., *fr.* July, Sept., Dec.

Vern. *Bidaru*, Sabah, *ramin bukit*, Sarawak, *ngalin*, *njoelir (nyulir)*, *tempëèng*, E. Borneo, *mëlingkat pëpah*, W. Borneo (?).

Note. This species resembles 8. *G. borneënsis* in its conspicuous raised parallel nervation and large flowers, and 13. *G. affinis* RADLK. in its more stiffly coriaceous leaves and subtomentellous indumentum, but the inflorescence and

flowers are larger than in either. It seems to be remarkably indifferent in its ecology.

22. Gonystylus costalis AIRY SHAW, Kew Bull. 23 (1969) 269.

Small tree, 4 1/2 m. *Leaves* large, oblong-elliptic, 25–42 1/2 by 8–12 cm, base shortly cuneate or subrotundate, apex subrotundate and shortly (1 1/2 cm) apiculate-caudate, margin conspicuously revolute, coriaceous, glabrous or with a few lax hairs beneath near the base of the midrib, brownish when dry, or greenish above, dull, under a lens densely minutely puncticulate above, very minutely granulose below; midrib moderately robust, prominent and 2–2 1/2 mm thick beneath, broadly (2 mm) but shallowly elevate above and bordered on each side by a groove which is often indistinct or obsolete on account of the oblique nerve-bases traversing it; principal nerves *c.* 30 pairs, scarcely distinguishable from the minor ones, prominulous on both surfaces, occasionally subbullately impressed, conspicuously anastomosing near the margin and conspicuously abruptly decurving below into the midrib; petiole 1 1/2–2 cm by 4–6 mm, rugulose. *Inflorescence* robust up to 17 cm, with an occasional subbasal branch to 7 cm, rachis compressed, very shortly fulvous-tomentellous. Pedicels up to 2.3 cm, tomentellous. *Calyx* 7–9 mm long, externally sericeous. *Disk-lobes* 30–35, subulate, glabrous, epustulate. Style 7–8 mm, glabrous.

Distr. *Malesia*: Borneo (Central Sarawak).

Ecol. Presumably evergreen rain-forest, on ridge on sandy clay soil at 210 m. *Fl.* Oct.

Note. Readily distinguished from all other species except 7. *G. stenosepalus* by the raised midrib on the upper surface of the leaves. From that species it differs in the much greater size of the leaves, the broader elevation of the midrib, the denser arrangement and occasionally bullate impression of the nerves, which are more or less decurrent on to the midrib, and by the much less conspicuous glandular puncticulation.

23. Gonystylus decipiens AIRY SHAW, Kew Bull. 17 (1964) 454.

Tree, 25–30 m. *Leaves* elliptic or almost oblong or oblanceolate, 15–20 by 6–7 1/2 cm, cuneate or somewhat rounded at base, shortly caudate-acuminate at apex, cauda obtuse, chartaceo-coriaceous, entirely glabrous except for the midrib, not or scarcely shining, greenish or fuscous above when dry, subochraceous below; midrib moderate, prominent and rather long-adpressed-pilose below, narrowly impressed and glabrous above; nerves densely parallel and prominulous, the primaries hardly distinct from the remainder; petiole 11–14 cm by 2–2 1/2 mm, striate, sparsely long-pilose or glabrescent. *Inflorescence* 10–15 cm, rather many-flowered, with numerous abbreviated branches, very shortly grey-subsericeous. Pedicels 8–12 mm, sericeous. *Calyx* 5–7 mm long and wide, sepals subobtuse. *Disk-lobes* 35–40, subulate, 3–4 mm, sparsely retrorse-setulose, epustulate. Style glabrous, surrounded at the base by 4–5 very small subglobose parastyles.

Distr. *Malesia*: Borneo (Central Sarawak).

Ecol. Primary rain-forest on sandstone, below 500 m. *Fl.* Sept.

Notes. Among the rather few species with setulose disk-lobes, this is perhaps nearest to 9. *G. keithii*, from which it is at once distinguished by the dense prominent venation with scarcely differentiated primary nerves, and by the quite different colour assumed by the leaves on drying, especially lacking the narrow brown margin of *G. keithii*. From the somewhat similar 8. *G. borneënsis* and 21. *G. consanguineus* it differs in the setulose disk-lobes and adpressedly long-pilose, rather than shortly tomentellous, midrib beneath.

24. Gonystylus glaucescens AIRY SHAW, Kew Bull. 17 (1964) 451.

Tree, 10 m; branchlets conspicuously elevate-lenticellate. *Leaves* oblong-oblanceolate, 21–27 by 5–7 cm, ± rounded-cuneate at base, narrowed and shortly (5–10 mm) acuminate-caudate at apex (acumen obtuse), margin distinctly thickened, rigidly coriaceous, quite glabrous, greenish and dull-shagreened above when dry, or scarcely shining, greyish-ochraceous beneath and very dull, as though glaucescent; midrib moderately robust, prominent and subcylindric beneath, slightly impressed or flat above; nerves numerous, widely spreading, the smaller veins clearly reticulate above but lax and rather indistinct below; petiole 1–1 1/2 cm by 3–4 mm, rugose, glabrous. *Inflorescence* terminal, elongate, robust, 28 cm long, rachis 3–5 mm thick, conspicuously fuscous-lenticellate, in the fruiting stage finely fulvous-puberulous, branches abbreviated, nodose, densely fulvous-pubescent. *Flowers* unknown, but (from the fruits) sepals 5–6 by 2–4 mm, subobtuse, ochraceous-sericeous; disk-lobes 25–30, glabrous, epustulate. *Fruit* (immature) obtusely tetragonous-globose, 3 1/2–4 cm ∅, clearly 4-valved, pedicel 1 1/2–2 cm by 3–4 mm, fulvous-puberulous.

Distr. *Malesia*: E. Indonesian Borneo.

Ecol. Sandstone ridge at 400 m alt. *Fr.* Sept.

Note. The long, narrow, stiffly coriaceous leaves, more than 4 times as long as broad, with their dull, slightly shagreened, almost glaucescent surface, and the robust, elongate inflorescence, are highly distinctive.

25. Gonystylus (§ *Auxanthus*) **lucidulus** Airy Shaw, Kew Bull. 17 (1964) 447.

Tree to 36 m. *Leaves* oblong, elliptic-oblong or slightly lanceolate-oblong, 10–20 by 5–7 3/4 cm, base rounded (rarely slightly cuneate or very slightly cordate), apex narrowed or rounded, shortly abruptly caudate (cauda 5–15 mm), subacute or obtuse, moderately coriaceous, greenish above when dry, grey-brown to purplish beneath, very smooth on both surfaces (except for the nerves) and manifestly somewhat shining, quite glabrous, under a lens ± clearly dark-puncticulate; midrib moderately robust, almost cylindric beneath, deeply impressed above; nerves slender, spreading, sharply prominulous on both surfaces; petiole 1.2–1.8 cm by 2–3 mm, grooved above, sparsely fulvous-puberulous. *Inflorescence* very similar to that of *G. augescens*, but the rachis often thicker and more nodose, and the bracts much broader, suborbicular, 7–8 mm broad, dorsally carinate. Immature *fruit* asymmetrically lanceolate-ovoid, 3.5 by 1.7 by 1.5 cm, obliquely acuminate or subrostrate, 3-ridged, the ridges often marked with a slender groove, and alternating with 3 humps between the ridges towards the apex, very finely ± stellate-ochraceous-puberulous, subtended by the persistent 5–6 mm long densely sericeous sepals and borne on a 5 mm long densely grey-sericeous pedicel.

Distr. *Malesia*: Borneo (NE. Sarawak; Brunei).

Ecol. Primary lowland Dipterocarp forest, 30–270 m, on yellow sandy clay. *Fl.* April-June, young *fr.* June.

Vern. *Ramin*, Sarawak.

Note. Closely related to 1. *G. augescens*, of SW. Sarawak, and adjacent W. Indonesian Borneo, but differing in the smaller and narrower, smooth and shining leaves, and in the total lack of the minute adpressed hairs, lying parallel to the nerves on the undersurface, which are always found (by careful searching!) in that species.

26. Gonystylus nervosus Airy Shaw, Kew Bull. 17 (1964) 452.

Small tree, 4–5 m, *Leaves* elongate-oblanceolate, rarely oblong, 17–34 by 5–9 cm, cuneate at base, narrowed to subrotundate at apex and abruptly narrowly caudate, cauda 1–4 cm, acute, chartaceous, glabrous, not shining, obscurely grey-brown above when dry, similar or subcastaneous below; midrib relatively slender, prominent below, impressed above; primary nerves 25–30 pairs, strictly parallel, sharply raised beneath, subbullately impressed above, conspicuously arcuate-anastomosing toward the margin; petiole 1–1 1/2 cm by 2–4 mm, fulvous-pubescent at first, finally glabrescent. *Inflorescence* 2–4 cm, few-flowered, grey-sericeous. *Flowers* only known in bud stage: *disk-lobes* about 30, glabrous, epustulate; style glabrous. *Fruit* ellipsoid, 3 1/2 cm, 3-valved, subtended by 5–6 mm long sepals and borne on a 2 cm long peduncle. *Seeds* 2, flattened hemi-ellipsoid, 2.2 by 1.6 cm, shining, light chestnut.

Distr. *Malesia*: Borneo (SW. & NE. Sarawak).

Ecol. In primary rain-forest, apparently always on or near limestone hills, 60–270 m. *Fl.* June, July, *fr.* June, August.

Note. The elongate leaves, with their somewhat bullately impressed main nerves, recall those of 2. *G. areolatus*, but *G. nervosus* is probably most closely related to 8. *G. borneënsis*. The latter species, however, seems almost always to occur on more or less acid soils (basalt, kerangas, *etc.*); I have only seen one collection from limestone.

27. Gonystylus nobilis Airy Shaw, Kew Bull. 23 (1969) 271.

Tree to 24 m; branches robust, almost 1 cm ∅. *Leaves* large, elliptic to subo-blong, 23–34 by 9–12 cm, base broadly cuneate to rounded, apex narrowed to somewhat rounded, very shortly, broadly and not abruptly acuminate (acumen acute, 1 cm), firmly coriaceous, quite glabrous, dull and grey-green above when dry, with a very narrow purplish margin, smooth beneath, not shining, distinctly pale when dry; midrib robust, subcylindrically prominent beneath, deeply and narrowly impressed above, primary nerves *c.* 20 pairs, lax, conspicuously anastomosing near the margin, obscurely prominulous above, sharply prominent beneath; petiole very robust, 3–4 cm by 4–5 mm, terete, sparsely adpressed-pubescent. *Inflorescence* 11 cm, simple, rachis terete, 3–4 mm ∅, adpressed-pubescent, flower-nodules very short. *Fruit* transversely subellipsoid, 6 1/2 by 5 1/2 cm, conspicuously obtusely 4-ridged, strongly rugulose.

Distr. *Malesia*: Borneo (W. Central Sarawak).

Ecol. Primary lowland Dipterocarp

forest, altitude and soil unknown.

Vern. *Ramin*. Sarawak.

Note. Notable for its large glabrous leaves and especially for the remarkably long, robust, terete petiole. The nervation and the colouring of the leaves on drying somewhat recalls 9. *G. keithii* on a larger scale.

28. Gonystylus spectabilis AIRY SHAW, Kew Bull. 23 (1969) 269.

Tree, 24 m; branches robust, ridged, tomentellous. *Leaves* broadly elliptic-oblong, up to 32 by 14½ cm, slightly but distinctly cordate (rarely rounded) at base, rounded and shortly (to 2 cm) abruptly cuspidate-caudate, chartaceous to thinly coriaceous, glabrous above, finely velutinous beneath with short white hairs, bright green (especially below) when dry, slightly shining above; midrib strong, very prominent below, 3–4 mm thick, densely fulvo-tomentellous, narrowly impressed above; main nerves (scarcely distinguishable from the minor ones) 15–20 pairs, slender, sharply prominulous below, scarcely so above; minor nerves very numerous; petiole robust, 1½–2½ cm by 4–5 mm, longitudinally rugose, often almost tetragonous, densely tomentellous. *Inflorescence* robust, terminal, to 22 cm, little branched; rachis compressed, up to 6 mm thick, strongly grooved, fulvo-tomentellous, branches to 7 cm, widely spreading. Pedicels to 2½ cm by 2½ mm, tomentellous. *Calyx* 1–1.2 cm, truncate at base, externally tomentellous. *Disk-lobes* 40–45, narrowly subulate, glabrous, epustulate. Style 8–9 mm, glabrous.

Distr. *Malesia*: Borneo (Central Sarawak).

Ecol. Presumably rain-forest, on ridge at 195 m. *Fl.* Oct.

Note. Related to 4. *G. reticulatus*, 3. *G. calophyllus* and 20. *G. calophylloides*, but differing in its dense fulvous-tomentellous indumentum and in its petioles sometimes reaching 2½ cm; further from *G. reticulatus* in the absence of a narrow brown border to the leaves when dry, and from *G. calophyllus* in the 40–45 rather than 20–30 disk-lobes.

Aquilarioideae & Thymelaeoideae (DING HOU)

6: 9*a* *Aquilaria malaccensis* LAMK.
Add to synonymy: *A. agallocha* ROXB.: *cf.* DING HOU, Blumea 12 (1964) 286.

6: 23 *Enkleia* GRIFF.
Add to references: NEVLING, J. Arn. Arb. 42 (1961) 373–396, 9 fig., map.

He gave an extensive, detailed treatment of the morphology and anatomy, including a systematical revision. He added one new species from SE. Asia. See the remark below on the generic difference with *Linostoma*.

E. malaccensis seems to be restricted to Malesia.

6: 26 *Linostoma* WALL. *ex* ENDL.
Add to references: NEVLING, J. Arn. Arb. 42 (1961) 295–320.
NEVLING does not distinguish sections within the genus to which I agree.

Furthermore he remarked correctly that the generic difference between *Linostoma* and *Enkleia* tends to disappear as the main differential character: stamens in one or two series respectively is rather breaking down in one species which is almost intermediate in this respect.

6: 27*b* *Linostoma pauciflorum* GRIFF.
Add to Distr.: NEVLING, who first hesitated to accept *Psilaea dalbergioides* MIQ. from Sumatra as a synonym (*l.c.*), later traced its type in CAL and found (J. Arn. Arb. 43, 1962, 221) it correctly reduced by DING HOU. Thus there are 2 collections from Sumatra: mainland, pr. Sibolga and Simalur I.
Linostoma longiflorum HALL. *f.* is by NEVLING (J. Arn. Arb. 42, 1961, 313) reduced to *L. pauciflorum*; he showed that the size and shape of the bracts is variable, but he found no such graded variability in the flower length.

6: 35*a* Line 14 from top, replace '375' by: 357.

Trapaceae

4: 43 The family name *Hydrocaryaceae* must give way to the now conserved name *Trapaceae*.

Typhaceae

4: 243 *Typha* L.
Miss B. G. BRIGGS and Dr. L. A. S. JOHNSON (Contr. N.S.W. Nat. Herb. 4, 1968, 57–69, 2 fig., 1 tab.) have published a detail account of *Typha* in Australia in which they also examined Malesian material. They maintain that what has been called in Malesia and Australia *T. angustifolia* L. *sens. lat.* is not that species which to them is confined to the northern hemisphere; however, they provide for this no further arguments. The Malesian and Australian material they bring to two species, *T. domingensis* PERS. 1807 and *T. orientalis* PR. 1852 (type from the Philippines). On the basis of the Australian material it was established that two taxa are concerned, which differ in chromosome number, *T. domingensis* 2n=30 and *T. orientalis* 2n=60. They differ also in minute other characters. The authors state that they are often found in mixed stands but do not hybrid-

ize; this is not so astonishing, as hybrids between *T. angustifolia* and *T. latifolia* (2n also 30) are in Europe also very rare.

The two taxa, which both occur in Malesia, can be distinguished by some minute morphological details. To my view they are merely cyto-subspecies. For those who want to do further work on this in Malesia I have copied the key given:

1. Bracts in the ♀ inflorescence numerous, broadly spathulate (usually 4–8 cells across the lamina). Stigmas linear. Mature ♀ spikes $^1/_2$–2 cm ∅, length 6–20(–30) times ∅, cinnamon-brown (due to the numerous pale ends of the bracts interspersed among the darker stigmas and the carpodia). ♂ and ♀ spikes separated by ($^1/_2$–)2–5 cm. Sheaths of the upper leaves not auriculate or only the uppermost 1–2 leaves distinctly auriculate. **T. domingensis**

1. Bracts in the ♀ inflorescence few, or sometimes apparently absent, narrowly spathulate (usually 3–4 cells across the lamina). Stigmas narrow-obovate. Mature ♀ spikes 1–3 cm ∅, length 5–10(–18) times ∅, chestnut-brown (due to the great predominance of the brown stigmas at the surface). ♂ and ♀ spikes contiguous or separated by up to 2(–6) cm. Sheaths of the 2–4 uppermost leaves usually distinctly auriculate . . . . **T. orientalis**

4: 243*a* *Typha angustifolia* L.
Add to synonymy: *T. angustata* BORY & CHAUBARD, Exp. Sc. Morée 2, 1 (1832) 3385; HENDERSON, Mal. Wild Flow., Monoc. (1954) 211 f. 126.

4: 244*b* Add to Distr.: Malay Peninsula: Kuala Selangor; Kedah: Kuala Muda; Langkawi: Tasek Bayang Bunting.
Add to Vern.: *Bulrush*, E, *banat*, M.
Note. By a curious oversight this was omitted from RIDLEY's Materials and his Flora. Near Kuala Selangor it is found in ditches along the roadside in association with *Acrostichum aureum* and *Pluchea*, both typical for brackish water.

Umbelliferae

4: 117 *Trachymene* RUDGE.

Fig. 20. *Trachymene tripartita* HOOGL. *a*. Habit, ×1, *b*. leaf-blade, ×10, *c*. leaf-sheath, ×10, *d*. involucral bract, ×10, *e*. & *f*. flower with only one petal still present, ×15, *g*. fruit, ×15 (*a–g* HOOGLAND & PULLEN 5965).

Many new collections of the genus have come in from the Papuan highlands and a revised account has become most desirable. A newly described species is to be added:

4: 118 **Trachymene tripartita** HOOGL. Blumea Suppl. 4 (1958) 231. — **Fig. 20.**

Glabrous perennial. Stem little branched, bearing rosettes. *Leaves*: sheath 4–8 by 2 mm, attenuate into petiole; petiole 7–30 mm, exceeding the blade; blade 3-partite, 5–8 by 5–8 mm, broad-cuneate at the base, lobes almost equal, obtuse, mucronate. *Umbel* 1 from a rosette, peduncle ± as long as the leaves or ± shorter, in fruit twice as long, striate or subsulcate; involucral bracts 5–7, linear-lanceolate, 3–4 mm by 3/4 mm, obtuse, subappressed. *Flowers* 5–10, in 1(–2) rows. Pedicels in fl. 1–2 mm, in fr. to 7 mm, incurved. Calyx lobes minute. Petals rounded, *c.* 1 by 0.8 mm. Filaments linear, widened to base, 0.4 mm; anthercells 0.3 by 0.15 mm. Ovary 0.7 by 1 mm; style *c.* 0.4 mm. *Mericarps* 2 by 1.7 mm, equal; carpophore undivided, 4-apiculate, sulcate.

Distr. *Malesia*: East New Guinea (Mt Wilhelm), open rocky slopes and tussock grasslands, 3600–3750 m.

Note. Closest related to *T. novoguineensis* (DOMIN) BUW., clearly characterized by the 3-partite leaves with undivided lobes.

5: 556*b* *Daucus glochidiatus* (LABILL.) FISCHER. Add to Distr.: East New Guinea: Foramburo, 2500 m, 28 Oct. 1960, E. BORGMANN 340.

INDEX TO SCIENTIFIC PLANT NAMES

compiled by

M. J. VAN STEENIS-KRUSEMAN

Families and higher taxa have been entered under their name.

Names of families which have been revised in volumes 4, 5, and 6 have been entered and are printed in **bold type**, so that as far as this is concerned this index is complete for all preceding volumes as well.

Suprageneric epithets have been entered under the family name to which they belong preceded by the indication of their rank (subfamilies, tribes, *etc.*).

Infrageneric epithets have been entered immediately under the generic name to which they belong preceded by the indication of their rank (subgenera, sections, series, *etc.*).

Infraspecific epithets have been entered under the specific name to which they belong preceded by the indication of their rank (subspecies, variety, forma, *etc.*).

New names and *new combinations* have been printed in **bold type**, *synonyms* in *italics*.

'*Map*' printed behind a page number denotes that a map of the concerned taxon is present on that page.

An *asterisk* behind a page number denotes the presence of a figure of the concerned taxon.

Page numbers in bold type denote main treatment.

Some minor printing errors in plant names have been corrected.

Of synonyms with a double authority, the latter has not always been cited in full. See for example under *Dortmann(i)a* Adans. which was accepted by O. Kuntze to replace *Lobelia*. The full authority can easily be derived from the text.

Acer *garrettii* Craib 915
laurinum Hassk. 915
Aceraceae 4: **3–4, 592**; 6: 915
Actinidiaceae s. str. 4: **37–39**
Adenanthera *triphysa* Dennst. 219
Adenoplea Radlk. 295, 296, 337, 953
madagascariensis Eastw. 340
Adenoplusia Radlk. 295, 296, 337, 953
Adnaria *lanceolata* (Bl.) O.K. 761
Aegiphila *viburnifolia* Juss. 248
Aegle marmelos (L.) Correa 69
Aeschrion Velloso 212
excelsa (Sw.) O.K. 193
Aëtoxylon 3, 5, 6
Agallochum Rumph. ex Lamk 6
coinamense Rumph. 9
malaccense O.K. 9
malaicense Rumph. 9
secundarium Rumph. 9
Agapetes D.Don 469, 471, 473, 474, 746, **878**, 879 map
sect. *Pseudagapetes* Airy Shaw 878
subg. *Dimorphanthera* (F.v.M.) Drude 885
acuminatissima (Miq.) Niedenzu 761
alberti-eduardi Sleum. 879, 882*, **883**
amblyornidis Becc. 892
beccariana Koord. 904
brassii Sleum. 879, **881**, 882*
brevicuspis Sleum. 884
carrii Sleum. 879, **881**, 882*
coriacea (Bl.) G.Don 828
costata C.H.Wright 879,882*, **883**
cuneifolia (Bl.) G.Don 874
elliptica (Bl.) G.Don 873
filicicola Sleum. 883
floribunda (Bl.) G.Don 828, 872
forbesii F.v.M. 904
griffithii (non Clarke in Hook.) K. & G. 753
helenae (F.v.M.) F.v.M. ex Sleum. 878, **879**, 882*
lanceolata (Bl.) Niedenzu 761
laurifolia (Bl.) G.Don 872
leptantha (Miq.) Niedenzu 764
lucida (Bl.) G.Don 814
meliphagidum Becc. 906
micrantha Ridl. 753
microphylla Jungh. 814
moorhousiana Lane-Poole 892
moorhousiana F.v.M. 893
myrtoidea = *myrtoides* 812
myrtoides (Bl.) G.Don 812
myzomelae Becc. 913
obtusata Sleum. 884
parviflora Ridl. 753
perakensis Ridl. 753
polyantha ('Miq.') Niedenzu 872
prainiana Koord. 911
pubescens Ridl. 753
rubrocalyx Sleum. 879, **881**
var. pilicalyx Sleum. **881**
var. rubrocalyx **881**
sclerophylla 879, **880**, 882*
scortechinii (K. & G.) Sleum. 878, **879**, 880*, 882*
stenantha (Schltr) Sleum. 879, **884***
varingiaefolia (Bl.) G.Don 815
viridiflora (Schltr) Sleum. 879, **883**
vitis-idaea Sleum. 879, **881**, 882*
vonroemeri Koord. 911
vulgaris Jungh. 815
wrayi Ridl. 753
wrightiana Koord. 914
Agapetes (non D.Don) Koord. 885
Agelaea borneensis (Hook. f.) Merr. 933
insignis (Schellenb.) Leenh. 933
macrophylla (Zoll.) Leenh. 933
trinervis (Llanos) Merr. 933
Aglaia sapindina (F.v.M.) Harms 237
Aglaiopsis glaucescens Miq. 237
miquelii Merr. 237
Aidia cochinchinensis Lour. 309
Ailanthopsis poilanei Gagnep. 226
Ailanthus Desf. 193, 194, 195, 196, **215**, 216, 969
altissima (Mill.) Swingle 193, 215, 216, 217*, **220**
blancoi Merr. 218
cacodendron L'Herit. 220
calycina Pierre 218
erythrocarpa Carr. 220
esquirolii Léveillé 970
excelsa Roxb. 216, 217*, **219**
fauveliana Pierre 219

fordii Nooteboom 216, 217*, **220**, **969***
giraldii Dode 220
glandulosa Desf. 220
gracilis Salisb. 211
grandis Prain 218
imberbiflora F.v.M. 219
integrifolia Lamk 193, 206*, 216, 217*, **218** map, 220
ssp. **calycina** (Pierre) Nooteboom **218** map
ssp. integrifolia **218** map
var. *β* Lamk 219
kurzii Prain 219
macrophylla Hort. 220
mairei Gagnep. 220
malabarica DC. 218, 219, 969
var. *mollis* K. & V. 219 pro parte
malabarica (non DC.) F.-Vill. 218
var. *mollis* K. & V. 218 pro parte
mascula Hort. 220
moluccana DC. 218
var. *mollis* (non K. & V.) Koord. 218
peekelii Melch. 218
var. *glabrata* C.T.White 218
peregrina F.A.Barkl. 220
philippinensis Merr. 219
pongelion Gmel. 218, 220
procera Salisb. 220
punctata F.v.M. 220
rhodoptera F.v.M. 220
rubra Hort. 220
scripta Gagnep. 220
sutchuensis Dode 220
triphysa (Dennst.) Alston 193, 217*, **219** map, 220
vilmoriniana Dode 220
Ailantus = Ailanthus 215
Aizoaceae 4: **267–275**; 6: 384, 450, 915
Albonia Buchoz 215
peregrina Buchoz 220
Alfaroa 143, 146, 148
Alismataceae 5: **317–334**; 6: 158, 915
Allanthospermum Forman 968, 969, **970**, 971*, 972
borneense Forman 971*, **972**
ssp. *rostratum* Nooteboom 971*, **972**
multicaule (Capuron) Nooteboom 970, 972*
Allospondias lakonensis (Pierre) Stapf 226
Alnus japonica (Thunb.) Steud. 917
maritima (Marsh.) Nuttall 917
Aloe 31
Alphonsea arborea (Blco) Merr. 421
Alsodeia *chrysodasys* Miq. 944
glabra Burgersd. 235
Alternanthera Forsk. 915
bettzichiana = bettzickiana 916
bettzickiana (Regel) Nichols. 916*
ficoidea (L.) R.Br. ex R. & S. 915
ssp. bettzickiana (Nichols.) Backer 917
var. *versicolor* (Regel) Backer 916
ficoides P.Beauv. 915
paronychioides St.Hill 915, 916
var. paronychioides **916***
Alytostylis Hook. f. 95
Alyxia spanogheana Miq. 336
tetragona R.Br. 336
Amaracarpus 387
Amaranthaceae 4: **69–98**, **593**; 5: **554**; 6: 450, **915–917**
Amaranthus dubius Mart. 915
hybridus L.
ssp. incurvatus (Gren. & Godr.) Brenan
var. paniculatus (L.) Mansf. 915
Amaroria A.Gray 221
soulameoides A.Gray 221
Amentiferae 143
Amoora *aphanamixis* Auct. non R. & S. 921
Amphicalyx heterophyllus (Bl.) Hassk. 738
latifolius Bl. ex Hassk. 738
pilosa Bl. 729
Amyxa cf. Airy Shaw 3, 5, 6, **47**
pluricornis (Radlk.) Domke **47***
Anacardiaceae 194, 195, 220, 226, 291, 928
Anacolosa frutescens Bl. 420
Anacyclodon Jungh. 424, 425
pungens Jungh. 431
Anagallis L. 173, 174, 175, **176**
subg. Anagallis 176
subg. Centunculus (L.) P.Taylor 176
subg. Jirasekia (Schmidt) P. Taylor 176
arvensis L. 176
nana Schinz 176
pumila Sw. **176***
var. pumila **176**
Anasser Juss. 369
laniti Blco 373
moluccana Lamk 373
Anassera rumphii Span. 373
Ancistrocladaceae 4: **8–10**; 5: 553
Andrachne *cavalerieri* Léveillé 179
Andresia Sleum. **669**, 943
malayana (Scort. in Hook. f.) Sleum. **669***
Andreya 295, 296
Andromeda 472
ovalifolia Wall. 675
Androsace Tourn. 173, 175, 186
rotundifolia Hardw. 192
saxifragifolia Bunge 191, 192
tonkinensis Bonati 382, 383
umbellata Merr. 191, 192
Anhella tristis 873
Anisophyllea R.Br. ex Sabine 966
beccariana Baill 966
ferruginea Ding Hou 966
grandis (Bth.) Burk. 361
Annamocarya Chev. 143
Annonaceae 421
Amulodiscus Tardieu Blot 932
nigricans Tardieu Blot 932
Anthocleista 293, 295
Anthodendron Rchb. 661
Antirrhoea hexasperma (Roxb.) Merr. 38
Antonia Pohl 295, 296
griffithii Wight 341
Antoniaceae Hutch. 296
Apocynaceae 93, 294, 297, 315, 318, 363, 368, 369
tribe Tabernaemontanineae 297
Apodostigma 227, 390
Aponogetonaceae 4: **11–12**; 5: 553
Aquilaria Lamk 2, 3, 4, 5, **6**, 31
sect. *Agallochum* Hall. f. 6
sect. *Amphinoman* Hall. f. 6
sect. *Brachythalamus* Hall. f. 39
sect. *Gyrinops* Hall. f. 39
sect. *Gyrinopsis* Hall. f. 6
sect. *Lachnolepsis* Hall. f. 39
acuminata Quis. 11
agallocha Roxb. 982
apiculata Merr. 2, 8, **11**
bancana Miq. 15
beccariana v. Tiegh. 7*, 8, **13**, 41
borneensis Gilg 9
brachyantha (Merr.) Hall. f. 7*, 8, **10**, 12
citrinaecarpa (Elm.) Hall. f. 8, **10**
cumingiana (Decne) Ridl. 1, 4, 6, 7*, 8, 13, **15**
var. *parviflora* Airy Shaw 13
filaria (Oken) Merr. 8, **11** map, 12
grandifolia Domke 13
hirta Ridl. 7*, 8, **12**
macrophylla Miq. 15
malaccensis Lamk 7*, 8, **9**, 982
microcarpa Baill. 7*, 8, **9**
moluccana Hall. f. 39
moszkowskii Gilg 12

ovata Cav. 9
parvifolia (Quis.) Quis. 8, **12**
pentandra Blco 15
podocarpus Hall. f. 42
rostrata Ridl. 8, **13**
secundaria DC. 9
tomentosa Gilg 11
urdanetensis (Elm.) Hall. f. 6, 8, **10**
versteegii Hall. f. 42
Aquilariella v.Tiegh. 6
borneensis v.Tiegh. 9
malaccensis v.Tiegh. 9
microcarpa v.Tiegh. 9
Araliaceae 194
Araucaria 356
Arbor coeli sive Caju langit Rumph. 218
Arbutus 472
coriacea Bl. 828
Arctostaphylos 472
Ardisia *ochracea* Elm. 260
Argyreia *capitata* (Vahl) Choisy 941
capitiformis (Poir.) Ooststr. 941
congesta Ooststr. 941
Arthrosolen 4
Aruba Aubl. 202
Arytera litoralis Bl. 226
Asperula 294
Aspidopterys elliptica (Bl.) Juss. 960
Astrephia *chinensis* Dufr. 455
Astroloma R.Br. 424
Azalea (non L. sensu Salisb.) Desv. 661
subg. *Pentanthera* (G.Don) K.Koch 661
subg. *Tsutsutsi* (G.Don) K.Koch 661
brookeana (Low ex Lindl.) O.K. 655
citrina Hassk. 579
indica L. 663
indica (non L.) Sims 665
var. *angustifolia* Bl. 663
var. *floribunda* Bl. 663
var. *spathulata* Bl. 663
var. *variegata* Bl. 663
jasminiflora (Hook.) O.K. 565
javanica (Bl.) O.K. 624
lamponga (Miq.) O.K. 544
ledifolia Hook. 662
malayana (Jack) O.K. 532
mollis Bl. 661
moulmainensis (Hook.) O.K. 666
mucronata Bl. 662
multicolor (Miq.) O.K. 621
retusa (Bl.) O.K. 482
rosmarinifolia Burm. f. 662
sinensis Lodd. 661
subsessilis (Rendle) Copel. f. 664
teysmannii (Miq.) O.K. 626
tubiflora Bl. ex DC. 532

Banksia Forst. 44
musculiformis Gaertn. 367, 368
Basellaceae 5: **300–304**; 6: 450
Batidaceae 5: **414–415**; 6: 917
Batis argillicola v.Royen 917
Béla-Mòdagam Rheede 951
Bennettia papuana Gilg 944
Bernadina Baudo 177, 184
laurina Baudo
var. *stenia* Baudo 184
mauritiensis Baudo 184
parviflora Baudo 185
Bertuchia Dennst. 299, 301
Betula-Alnus maritima Marsh. 917
Betulaceae 5: **207–208**; 6: 143, 472, 917
Bhesa Ham. ex Arn. 227, 228, 230, 231, 232, **280**, 283 map, 390, 391, 930
archboldiana (Merr. & Perry) Ding Hou 281*, 282, **284**
indica (Bedd.) Ding Hou 281*, 282, **283**
moja Ham. ex Arn. 283
paniculata Arn. 229, 231, 280, 281*, **282**, 283
robusta (Roxb.) Ding Hou 280, 281*, 282, **283**
Biporeia Petit-Thouars 199
Bischofia javanica Bl. 53
Bixaceae s. str. 4: **239–241**
Blumeodendron papuanum P. & H. 944
Blyxa novoguineensis Hartog 952
Boerhaavia = Boerhavia 452
Boerhavea = Boerhavia 454
Boerhavia L. 450, 451, **452**
sect. *Adenophorae* Heimerl 452
acutifolia S.Moore 454
chinensis (L.) Aschers. & Schweinf. 450, 452, 453*, 454, **455** map
diandra L. 454
diffusa L. 453*, **454**
f. ß *paniculata* (Rich.) O.K. 454
f. γ *repens* (L.) O.K. 454
var. *acutifolia* DC. 454
var. *obtusifolia* DC. 454
var. *pubescens* DC. 454
erecta (non L.) Burm. f. 454
erecta L. 452, 453*, **454**
glabrata Bl. 454
glutinosa Vahl 454
helenae R. & S. 455
hirsuta L. 454
mutabilis R.Br. 454
var. *pubescens* (R.Br.) Choisy 454
procumbens Banks ex Roxb. 454
pubescens R.Br. 454
repanda Willd. 455
repens L. 454
var. *diffusa* (L.) Boiss. 454
var. *procumbens* (Roxb.) Hook. 454
scandens L.
var. *chinensis* (L.) O.K. 455
tetrandra Forst. 454
Bonamia Thou. 936
Bonyunia Schomb. 295, 296, 954
Boscia 61
Bougainvillea Comm. ex Juss. 450, 451, **455**
sect. Tricycla 456
× buttiana Holtt. & Standl. **456**
glabra Choisy 451, **457**
peruviana Humb. & Bonpl. **456**, 457
spectabilis Willd. 456, **457**
var. *glabra* (Choisy) Hook. 457
Brachythalamus Gilg 39
caudatus Gilg 42
podocarpus Gilg 42
versteegii Gilg 42
Brassiantha A.C.Smith 227, 230, 389, 390, 391, **392**, 393, 394, 930
pentamera A.C.Smith 393*, **394**
Bromheadia Lindl. 976
Brossaea *bandongensis* (Zoll. ex Miq.) O.K. 695
fragrantissima (non Wall.) O.K. 688
leucocarpa Bl. 692
nummularioides (D.Don) O.K. 684
α *normalis* O.K. 684
ß *glauca* O.K. 684
Brownlowia tersa (L.) Kosterm. 203
Brucea J.F.Mill. 193, 194, 196, **209**
acuminata Li 212
amarissima Desv. ex Gomes 211
dubia Steud. 214
glabrata Decne 211
gracilis DC. 211
javanica (L.) Merr. 195, 209, 210*, **211** map, 212
luzonensis Vidal 212
macrobotrys Merr. 212
membranacea Merr. 212
mollis Wall. ex Kurz 193, 210*, 211, **212** map
quercifolia Seem. 212
stenophylla Merr. 212
sumatrana Roxb. 211

sumatrensis Spreng. 211
Bruguiera Lamk 965, 966
eriopetala W. & A. ex Arn. var. *exsetata* Val. 966
exaristata Ding Hou 966
gymnorrhiza (L.) Lamk 966
hainesii C.G.Rogers 966
Bruinsmia Boerl. & Koord. 976
styracoides Boerl. & Koord. 976
Buddleia, see Buddleja 336
Buddleja Houst. ex L. 293, 294, 295, 296, 297, **336**, 953, 954
subg. Buddleja 336, **337**
sect. Alternifolia Marquand 339
subg. **Nicodemia** Leenh. 336, 337, **340**
acuminatissima Bl. 337
amentacea Kränzl. 339
arfakensis Kaneh. & Hatus. 339
asiatica Lour. 293, 336, **337**, 338*, 339*, 954
var. *brevispica* Val. 337
var. *densiflora* (Bl.) K. & V. 337
var. *salicina* (Bl.) K. & V. 337
var. *sundaica* (Bl.) K. & V. 337
brasiliensis Jacq. f. 340
crispa Bth. 337
curviflora H. & A. 337
davidii Franchet 336, **340**, 954
densiflora Bl. 339
diversifolia Vahl 340
gynandra Marquand 336
indica Lamk **340**
japonica Linden 337
lindleyana Fortune 337
madagascariensis Lamk 337, **340**
neemda Buch.Ham. ex Roxb. 337
var. *philippinensis* Cham. & Schlechtend. 337
officinalis Maxim. 336
otophylla Hassk. 340
paniculata Wall. 337
salicina Lamk 337
sundaica Bl. 339
venenifera Makino 337
virgata L. f. 339
Buddlejaceae 295, 954
Buginvillaea = Bougainvillea 455
Buginvillia racemosa Blco 460
Bulbophyllum 109, 113
Burmanniaceae 4: **13–26**, **592**; 5: **553**
Burseraceae 5: **209–296**, 567; 6: 194, 195, **917–928**
Busbeckea Endl. 69
Butomaceae 5: **118–120**, 566
Cactaceae 450
Cadaba Forsk. 61, 62, **93**, 97 map
sect. Cadaba **93**
sect. *Eu-Cadaba* Endl. 93
capparoides DC. 62, **93**, 94*, 95*, 97 map
Cadellia 194
Callitrichaceae 4: **251–252**
Calogyne pilosa R.Br. 951
Calpidia Thouars 457, 459
brubobiana (Endl.) Heimerl 461
cauliflora (Scheff.) Heimerl 462
corniculata Heimerl 464
cuspidata Heimerl 462
excelsa Heimerl 461
grandifolia Heimerl 463
lauterbachii Warb. ex Heimerl 463
longirostris Heimerl 463
mülleriana (Warb.) Heimerl 462
pancheriana 459
rostrata Heimerl 463
spathiphylla Heimerl 463
Camotain Blco 355
Campanopsis (R.Br.) O.K. 111
marginata O.K. 116
var. *rigida* O.K. 116
Campanula 107, 108, 109, 112
sect. *Campanopsis* R.Br. 111
agrestis Wall. 115
carnosa Wall. 111
ceylanica Seba 129
circaeoides Fr.Schmidt ex Miq. 111
dehiscens Roxb. ex Wall. 115
gracilis Forst. 115
gracilis (non Forst.) Sims 118
indica Dietr. 115
lancifolia Roxb. 120
lavandulaefolia Reinw. ex Bl. 115
littoralis Labill. 115
marginata Thunb. 115
medium L. 141
quadrifida R.Br. 115
rapunculoides L. 141
rotundifolia 110
sieberi Dietr. 115
vincaeflora Vent. 118
Campanulaceae **107–141**, **928**
subfam. Campanuloideae 108
tribe Campanuleae Bth. 109
tribe Pentaphragmeae Schönl. 109
tribe Sphenocleae Schönl. 109
subfam. Lobelioideae 108, 122
tribe Lobelieae Bth. 109, 140
Campanulopsis Zoll. & Mor. 111
cyanea Zoll. & Morr. 115
Campanumoea Bl. 109, 118, 119
axillaris Oliv. 120
celebica Bl. 120, 121
cordata Miq. 120
japonica Maxim. 120
javanica Bl. 119
var. *japonica* (Maxim.) Makino 120
lancifolia Merr. 119, 121
maximowiczii Honda 120
truncata Diels 120
Campylostemon Welw. 389, 390
Canarina *moluccana* Roxb. 928
Canarium Stickm. 917, 921
subg. **Africanarium** Leenh. 922
sect. *Africanarium* Leenh. 922
subg. Canariellum 922
subg. Canarium 921
sect. Canarium 922, 924, 927
sect. Pimela 922, 924, 927, 928
acutifolium (DC.) Merr. 926
var. acutifolium 926
album (Lour.) Raeusch. 922, **926**, 928
apertum H.J.Lam 924
asperum Bth. 922, 926, 927
ssp. asperum
var. asperum 926
australianum F.v.M. 925
bacciferum Leenh. 926
balsamiferum Willd. 924
caudatum King 923, 927
f. auriculiferum Leenh. 923
f. caudatum 922
cestracion Leenh. 922, 925
chinare Grutterink & H.J. Lam 922, 925
decumanum Gaertn. 924
denticulatum Bl. 924
ssp. kostermansii Leenh. 924
dichotomum (Bl.) Miq. 925
divergens Engl. 922, 923
euryphyllum Perk. 924
fusco-calycinum Ridl. 925
gracile Engl. 925
grandifolium (Ridl.) H.J.Lam 924
hirsutum Willd. 925
var. hirsutum 925
indicum L. 924
intermedium H.J.Lam 923, 925
kaniense Laut. 924
karoense H.J.Lam 924
kinabaluense Leenh. 923
kipella (Bl.) Miq. 923, 925, 927
kostermansii Leenh. 924
lamii Leenh. 922, 923
latistipulatum Ridl. 923

littorale Bl. 922, 923
f. pruinosum (Engl.) Leenh. 923
luzonicum (Bl.) A.Gray 922, 924, 926
macadamii Leenh. 922, 925*
maluense Laut. 923
ssp. maluense 923
megacarpum Leenh. 923
megalanthum Merr. 924
merrillii H.J.Lam 925
odontophyllum Miq. 924
oleosum (Lamk) Engl. 924, 927
ovatum Engl. 922, 924
parvum Leenh. 928
patentinervium Miq. 922, 923, 927
perlisanum Leenh. 923
piloso-sylvestre Leenh. 923
pilosum Benn. 924, 927, 928
ssp. borneensis Leenh. 924
ssp. pilosum 922
pimela Koen. 927
pimela Leenh. 923, **927**
polyphyllum K.Sch. 925
pseudodecumanum Hochr. 924
pseudopatentinervium H.J.Lam 924
pseudosumatranum Leenh. 925
reniforme Kochummen & Whitmore 922, **927**
rigidum (Bl.) Miq. 925
salomonense B.L.Burtt 923
samoense Engl. 926
schlechteri Laut. 926
sinense Cana Rumph. 926
sinense Tsjacana Rumph. 927
smithii Leenh. 926
sumatranum Boerl. & Koord. 925
sylvestre Gaertn. 923
trigonum H.J.Lam 924
vitiense A.Gray 922, 926
vrieseanum Engl. 922, 926
vulgare Leenh. 922, 924
Cankrienia de Vriese 186
chrysantha de Vriese 190
farinosa Zoll. 190
Cannabinaceae 4: **222–223**
Capparidaceae 61–105
subfam. Capparidoideae 62
subfam. Cleomoideae 62
Capparidales 63
Capparis Tourn. ex L. 61, 62, 63, **69**, 73 map, 89, 91
sect. Busbeckea (Endl.) B. & H. 69, 70, 92
sect. Capparis 70
subsect. Corymbosae DC. 70
subsect. Pedicellares DC. 70
subsect. Seriales DC. 70
sect. *Eucapparis* Plum. ex DC. 70
sect. *Monostichocalyx* Radlk. 70, 86
acuminata Willd. 84
acuta (sphalm.) Koord. 92
affinis Merr. 79
andamanica King 78
aurantioides Presl 87
baducca (non L.) Blco 90
billardierii DC. 86
borneensis Merr. 83
brachybotrya Hall. f. 71, **73**
f. *angustifolia* (Hall. f.) Jacobs **75***
f. brachybotrya **75**
var. *angustifolia* Hall. f. 75
brachyscias Turcz. 83
brevispina DC. 87
breynia Jacq. 70
buwaldae Jacobs 71, **85**
callophylla Bl. 71, **81**, 82 map
callophylla (non Bl.) Miq. 77
callosa Bl. 86
canescens Banks ex DC. 92
cantoniensis Lour. 70, 71, **76** map, 77, 81, 93
carandas Burm. f. 93
carolinensis Kaneh. 82
celebica Miq. 76
cerasifolia A.Gray 83, 84
copelandii Elm. 77, 78
cordifolia Lamk 89
corymbosa Lamk 81
crassifolia (sphalm.) A.Gray 84
crassifolia (sphalm.) C.Muell. 83, 84
cucurbitina King 71, **85**
cumingii Merr. & Rolfe 81
dahlii Gilg & K.Sch. 82
dasypetala Turcz. 84
dealbata (non DC.) Back. 83
dealbata DC. 87
diffusa Ridl. 71, **81**
discolor (non Donn.Smith) Standl. 93
elliptica Span. 77
emarginata Presl 79
erycibe Hall. f. 70, 71, 74*, **75**
erythrodasys Miq. 87
finlaysoniana Wall. ex Hook. f. & Th. 86
flexuosa Bl. 86
floribunda Wight 70, 71, **78** map
f. floribunda **78** map
f. **induta** Jacobs 70, **78** map
foetida Bl. 84
forsteniana Miq. 86
galeata Fresen. 90
grandiflora Wall. ex Hook. f. & Th. 84
hasseltiana Miq. 76
horrida L. f. 87
var. ß *erythrodasys* Miq. 87
horrida (non L. f.) Miq. 84
var. α Miq. 84
ilocana Merr. 79
korthalsiana Miq. 86
kunstleri King 73
lanceolaris DC. 70, 71, 76, **77** map, 78, 79, 82
larutensis King 70, **89**
lasiopoda Turcz. 83
linearis (non Jacq.) Blco 87
littoralis Merr. 79
lobbiana Turcz. 70, 71, **79**, 80*
loheri Merr. 79
longestipitata Heine 70, 71, **77**
longipes Merr. 73, **93**
longipes (non Merr.) Standl. 93
lucida (Banks ex DC.) Bth. 62, 70, **92** map
luzonensis Turcz. 78, 79
var. *ampla* Merr. 78, 79
mariana Jacq. 89
micracantha (non DC.) Blco 87
micracantha DC. 62, 70, 71, 75, **85**, 86, 89
ssp. *korthalsiana* (Miq.) Jacobs 85, **86** map
ssp. micracantha **85**, 86 map
var. *callosa* (Bl.) Hall. f. 86
micrantha (sphalm.) (non A. Rich.) Spreng. 85
mitchellii Lindl. 92
mucronata Elmer 81
myrioneura Hall. f. 83, 86
var. *latifolia* Hall. f. 86, 87
nemorosa (non Jacq.) Blco 87
nigricans Span. 83
nobilis (non Bth.) F.v.M. 92
nummularia DC. 91
oblongata Merr. 77, 78
octandra Jacq. 78
odorata Blco 86
oligostema Hayata 78
ovalifolia Zipp. ex Miq. 86, 87
oxyphylla Miq. 84
palawanensis Merr. 79
paniculata Ridl. 75, 76
perakensis (Scort. ex King) Ridl. 83
platyacantha Turcz. 77
pubiflora DC. 62, 70, 71, **82**, 83*, 84 map, 85, 93
var. *moluccana* Miq. 83
var. *perakensis* Scort. 83
var. *sumatrana* Miq. 83
pumila Champ. 76
pyrifolia Lamk 70, 71, **84** map, 89
quiniflora DC. 70, 71, 73 map, 81, 88*, **89**
renominata Jacobs 93
retusella Thw. 79

richii A.Gray 89
robusta Heine 81
roxburghii (non DC.) Span. 77
roydsiaefolia Kurz 86
rufescens Turcz. 87
salaccensis Bl. 76, 93
var. *celebica* Miq. 76, 77
sandwichiana DC. 90
scortechinii King 62, 70, **71**
sepiaria L. 71, 76, **79**, 81 map, 92
var. *acuta* Vidal 79
var. ß *glabrata* DC. 79
var. *grandifolia* Kurz & Prain 79
var. *retusella* Thw. 79
var. *trichopetala* Val. 79
var. *vulgaris* Hook. f. & Th. 79
spinosa L. 62, 70, 89, 91, 92
var. mariana (Jacq.) K.Sch. & Laut. 70, **89**, 90*, 91*
var. nummularia (DC.) F. M.Bailey 91
subacuta Miq. 79, 92
subcordata Span. 89
subspinosa Roxb. 77
tomentosa Lamk 81
torricellensis Laut. 77
trapeziflora Span. 89
trichopetala Val. 79
trinervia Hook. f. & Th. 70, 71, **73** map
turczaninowii Elmer 81
tylophylla Spreng. 81
umbellata R.Br. ex DC. 79, 81
venosa Merr. 86
versicolor Griff. 93
viminea (non Hook. f. & Th.) Fern.-Vill. 87
viridis Elmer 77, 78
zeylanica (non L.) DC. 84
zeylanica L. 70, 71, 72*, 86, **87** map
zeylanica (non L.) Roxb. 87
zippeliana Miq. 71, 78, **82**, 86 map
var. *novobritannica* Laut. 82
var. *novohibernica* Laut. 82
Caprifoliaceae 4: **175–194**, 598; 6: **928–930**
Capura L. 28
Capusia Lecomte 394
Carallia Roxb. 965, 966
borneensis Oliv. 966
eugenioidea King 966
longipes Ding Hou **966**, 967*
papuana Ding Hou 967
suffruticosa Ridl. 966
Cardiocarpus Reinw. 221
amarus Reinw. 221
Cardiophora Bth. 221
hindsii Bth. 221
Carices 953
Carissa carandas L. 93
grandis Bert. ex Guillemin 335
Carya 143
illinoensis (Wang) K.Koch 143
Caryo juglans Kirchh. 143
Caryophyllaceae 450
Caryospermum Bl. 230, 288
alpestre O.K. 290
arborescens F.v.M. 291
moluccanum Bl. 291
philippinense Vidal 291
serrulatum Miq. 290
Casearia grewiaefolia Vent. 944
var. *deglabrata* K. & V. 944
var. **gelonioides** (Bl.) Sleum. 944
pallida Craib 944
velutina Bl. 38
Cassine L. 231, 232, **284**, 391, 392, 930
subg. *Elaeodendron* Loes. 285
sect. *Cassine* Loes. 285
sect. *Elaeodendron* Loes. 285
australe (Vent.) O.K. 287
discolor Wall. in Roxb. 275
elliptica O.K. 286
fortunei O.K. 252
glauca (Rottb.) O.K. 228, 284, **286**
var. cochinchinensis Pierre 285*, **286** map
viburnifolia (Juss.) Ding Hou 228, 284, 285*, **286** map
Cassiope 472
Casuarina 152, 221
junghuhniana Miq. 153, 187
Casuarinaceae 143
Catanthera F.v.M. 914
Catha Forsk. 229
edulis Forsk. 230
fasciculata Tul. 51
montana G.Don 241
vitiensis A.Gray 242
Caulinia Willd. 153, 164
indica Willd. 164, 166
ovalis R.Br. 953
Cedrota guianensis Blco 461
Celastraceae 49, **227–291**, **389–421**, **930–932**
tribe *Hippocrateaceae* Hook. f. 389
Celastrales 53, 390, 968
Celastrineae R.Br. 389
Celastrus L. 228, 229, 230, 231, 232, **233**, 238, 240, 391, 392, 930
sect. *Eucelastrus* W. & A. 233
sect. *Gymnosporia* W. & A. 238
subg. Celastrus **234**
ser. Axillares Rehd. & Wils. 234
ser. Paniculati Rehd. & Wils. 234
alpestris Bl. 290
apoensis Elmer 236
australis Harv. & F.v.M. 235
axillaris Ridl. 236
bivalvis Jack 276, 277
championii (non Bth.) King 236
dispermus 230
diversifolius Hemsl. 242
emarginatus Willd. 241, 242
franchetiana Loes. 236
glaucus Vahl 286
hindsii Bth. 234, 235, **236**
jackianus Steud. 237
lucida Wall. 237
lucidus L. 237
malayensis Ridl. 236
marianensis Koidz. 236
micrantha Roxb., nomen 237
monospermoides Loes. 234, 235, **236**, 237, 243
monospermus Roxb. 234
montana = *montanus* 241
montanus Roth 241, 242
montanus Roxb. 242
multiflorus Roxb., nomen 235
novoguineensis Merr. & Perry 233*, 234, **235**
nutans Roxb., nomen 235
obtusifolia Roth 237
oppositus Wall. in Roxb. 288
orbiculatus 228
paniculatus Willd. 229, 231, 234, **235**
ssp. *multiflorus* Ding Hou 235
ssp. *paniculatus* Ding Hou 235
ssp. *serratus* Ding Hou 235
var. *balansae* Loes. 235
var. *poilanei* Tardieu 235
var. *venulosoides* Kanj. & Das 235
papuana Warb. 235
pauciflora Wall. 237
polybotrys Turcz. 235
racemosa Turcz. 235, 290
racemulosa Franch. 236
racemulosus Hassk. 236
repandus Bl. 237
robustus Roxb. 283
scandens L. 228, 230
semiarillata Turcz. 241
senegalensis Lam. 242
stylosus Wall. 234, 235*, **237**, (sphalm. Willd.) 420
ssp. **glaber** Ding Hou **237**
ssp. **stylosus** Ding Hou **237**
subspicatus Hook. 235
tonkinensis Pitard 236
trigyna Roxb. 237, 238
wallichii G.Don 237
Centrolepidaceae 5: **421–427**
Centropogon lucyanus Schönl. 108

Centrospermae v.Wettst. 174, 450, 451
Centunculus L. 174, 175, 176
indicus Royle 176
pentandrus R.Br. 176
pumilus O.K. 176
tenellus Duby 176
Ceodes J. & G.Forst. 457, 459
brunoniana Skottsb. 461
corniculata Merr. & Perry 464
corniculata (non Barg.-Petr.) Merr. & Perry 462
excelsa Skottsb. 461
longirostris Merr. & Perry 463
umbellata = *umbellifera* 460
umbellifera J. & G.Forst. 460, (sphalm. Skottsb.) 461
urocarpa Merr. & Perry 463
Cephaelis 336
Cephalostigma DC. 109, 111, 112, 113
erectum (Roth) Vatke 113
hirsuta Edgew. 113
hookeri Clarke 114
paniculatum DC. 114
paniculatum (non DC.) Hosseus 114
schimperi Hochst. ex Rich. 113
Ceratophyllaceae 4: **41–42**
Ceratopteris thalictroides Brongn. 171
Cerbera 368
musculiformis Lamk 367, 368
Cerium Lour. 177
spicatum Lour. 185
Cervicina Delile 111
gracilis Britt. 116
Chailletia sumatrana Miq. 942
Chamaedaphne 472
Cheiloclinium 227, 389
Cheilotheca Hook. f. 670
Cheilotheca (non Hook. f.) Prain 669
malayana Scort. 669
Chenopodiaceae 4: **99–106**, **594**; 6: 450, 932
Chenopodium carinatum R.Br. 932
pumilio R.Br. 932
Chilianthus 296
Cladopus H.Möll. 963
nymani H.Möll. 963
Cleidion spiciflorum (Burm. f.) Merr. 203
Cleisocratera Korth. 387
Cleistanthopsis Capuron 970
Cleome L. 61, 62, 63, **99**, 100
sect. Cleomes (DC.) Schult. 100
subsect. Pedicellaria (DC.) Schult. 100
subsect. Siliquaria (Forsk.) Schult. 100
sect. Corynandra(e) (Schrad.) Schult. 100
sect. Gymnogonia R.Br. 100
sect. Gynandropses (DC.) Schult. 100
sect. Polanisiae (DC.) Schult. 100
sect. Ranmanissa (Endl.) Griseb. 100
sect. Rutidosperma Iltis 100
sect. Tarenaya (Raf.) Iltis 100
aculeata L. 100, **104**, 105*
acutifolia Elmer 103
affinis (non DC.) Spreng. 101
alliacea Blco 101
alliodora Blco 101
aspera Koen. ex DC. 100, **105***
blumeana D.Dietr. 101
blumeana Schult. 101
chelidonii (non L. f.) Burk. 103
chelidonii L. f. 62, 100, **102**, 103*, 104
ciliata Schum. & Thonn. 104
gigantea (non L.) Blco 101
gynandra L. 62, 100, **101**
houtteana Schlechtend. 102
hulletii King 104
icosandra L. 103
natalensis 62
pentaphylla L. 101
rutidosperma DC. 98*, 100, **104**, 105*
sandwicensis A.Gray 102
speciosa Raf. 62, 100, **101**
f. alba 101
speciosissima Deppe ex Lindl. 101
spinosa Jacq. 62, 100, **102**
triphylla L. 101
viscosa L. 62, 100, **103***, 104
f. **deglabrata** (Back.) Jacobs **104**
f. viscosa **103**
Cnestis palala (Lour.) Merr. 933
ssp. diffusa (Blco) Andreas 933
stenopetala Griff. 933
steriopetala = *stenopetala* 933
Cocculus hirsutus (L.) Diels 939
villosus DC. 939
Cochlospermaceae 4: **61–63**
Codonopsis Wall. 107, 109, 110, **118**, 119*
albiflora Griff. 120
celebica (Bl.) Miq. 119, 120, 121
cordata Hassk. 120
cordifolia Komarov 120
javanica (Bl.) Hook. f. 108, 110, **119**, 120*
lancifolia (Roxb.) Moeliono 110, **120**, 928
ssp. **celebica** (Bl.) Moeliono **121**
ssp **lancifolia** **121**, 928
leucocarpa Miq. 120, 121
parviflora 119*
purpurea Wall. in Roxb. 119
truncata Wall. ex DC. 120
viridis 119
Coinochlamys 296
Combretaceae 4: **533–589**; 5: **564**; 6: **932–933**
Combretocarpus Hook. f. 966
rotundatus (Miq.) Danser 966
Commicarpus Standl. 452
chinensis Heimerl 455
plumbaginea 453
Comocladia *serrata* Blco 419, 420
Compositae 108, 109
subfam. Cichorieae 108
Connaraceae 5: **495–541**; 6: **933–936**
Connaropsis rubescens Ridl. 934
Connarus cochinchinensis (Baill.) Pierre 935
conchocarpus F.v.M. 936
ssp. conchocarpus 936
ssp. **schumannianus** (Gilg) Leenh. **936**
culionensis Merr. 935
var. culionensis 935
var. stellatus (Merr.) Leenh. 935
euphlebius Merr. 935
ssp. euphlebius
var. bullatus Leenh. 935
ssp. moluccanus Leenh. 935
lamii Leenh. 935
lucens Schellenb. 935
monocarpus L. 935
odoratus Hook. f. 935
paniculatus Roxb. 935
var. hainensis (Merr.) Vidal 935
var. paniculatus 935
peekelii Schellenb. 936
pickeringii A.Gray 936
salomoniensis Schellenb. 936
schumannianus Gilg 936
semidecandrus Jack 935
villosus Jack 935
winkleri Schellenb.
ssp. philippinensis Leenh. 936
Conopharyngia 294
Contortae 294, 297
Convolvulaceae 4: **388–512**, **599**; 5: **558**; 6: 390, **936–941**
Convolvulus *acuminatus* Vahl 941
capitatus Vahl 941
capitiformis Poir. 941
gangeticus L. 939
hastatus Desr., non Forsk. 939
maximus L. f. 941
ochraceus Lindl. 941
purpureus L. 941
Cordia *clitoria* Blco 464

Coris 174
Cortex filarius Rumph. 11, 12
foetidus Rumph. 12
Cortusa 174
matthioli L. 174
Corynocarpaceae 4: **262–264**; 5: **557**; 6: 941
Corynocarpus cribbianus (F.M. Bailey) L.S.Smith 941
Costera J.J.S. 469, 470, 471, 473, 474, **740**, 742 map, 746
borneensis J.J.S. 741, **744**
cyclophylla (Airy Shaw) J.J.S. & Airy Shaw 741, **742**, 743*
elegans J.J.S. ex Dunselman 745
endertii J.J.S. 741, **745**
lanaensis (Merr.) Airy Shaw 741, **745**
loheri (Merr.) Airy Shaw **741**, 744*
lucida (Merr.) Airy Shaw 741, **742**
ovalifolia J.J.S. 741, **745**
sumatrana J.J.S. 741, **744**
tetramera Sleum. 741, **742**, 744*
Couthovia A.Gray 296, 363, 365
alata A.C.Smith 366
astyla Gilg & Bened. 365, 366
brachyura Gilg & Bened. 365
brassii S.Moore 365
calophylla Gilg & Bened. 367
celebica Koord. 366, 367
collina A.C.Smith 365, 366
corynocarpa A.Gray 365
densiflora K.Sch. 365
kochii Val. 366
leucocarpa Merr. & Perry 365
macrocarpa A.C.Smith 366
macroloba A.C.Smith 366
macrophylla Merr. & Perry 367
neo-ebudica Guill. 366
novo-britannica Kaneh. & Hatus. 365
novo-caledonica Gilg & Bened. 366
nymanii Gilg & Bened. 365
pachyantha A.C.Smith 366
pachypoda Gilg & Bened. 365
rhynchocarpa Gilg & Bened. 365, 366
sarcantha (non Gilg & Bened.) Cammerl. 367
sarcantha Gilg & Bened. 366
seemanni A.Gray 365
terminalioides Gilg & Bened. 365
toua Kaneh. 367
undulatifolia Kaneh. & Hatus. 366
urophylla Gilg & Bened. 366
yunzaingensis Merr. & Perry 365
Covilhamia Korth. 95
ovata Korth. 97
Coxia Endl. 177
Crassulaceae 4: **197–202**; 6: 173, 195
Crataeva L. 63
Nürvala Ham. 68
octandra Blco 78
religiosa Forst. f. 65
Crateriphytum Scheff. ex Koord. 296, 363, 365
moluccanum Scheff. ex Boerl. 367, 368
Crateva L. 61, **63**, 69
A Corner 68
adansonii DC. 68
axillaris Presl 66
B Corner 65
hansemannii K.Sch. 65
hygrophila Kurz 65, **69**
lophosperma Kurz 68, 69
macrocarpa Kurz 65, 66
magna (Lour.) DC. 68
marmelos (L.) Correa 69
membranifolia Miq. 65
nurvala Ham. 62, **68**
var. nurvala 64*, 65*, **68***
odora Ham. 66
f. **axillaris** (Presl) Jacobs 65*, **66**, 67*
religiosa (non Forst. f.) Blco 68
religiosa (non Forst. f.) Bl. 68
var. *nurvala* (Ham.) Hook. f. & Th. 68
religiosa Forst. f. **65***, 66, 67, 69
speciosa Volkens 65
tapia (non L.) Bl. 66
tumulorum Miq. 66
unilocularis Ham. 69
Cressa L. **936**
australis R.Br. 937
cretica L. **937***
Crinum asiaticum L. 973
Cruciferae 62, 63
Cuervea 390
Cunoniaceae 49, 933
Cupania *spinosa* Blco 241, 242
Cuscuta L.
subg. Cuscuta 936
subg. *Grammica* (Lour.) Yuncker 936
Cyathodes Lab. 424, 433
colensoi (Hook. f.) Hook. f. 428, 431
laurina R.Br. ex Drude 437
Cyclamen 173, 175
persicum L. 175
Cyclocodon Griff. 118, 119
adnatus Griff. 120
distans Griff. 119
lancifolium Kurz 120
truncatum Hook. f. & Th. 120
Cymothoe Airy Shaw 740
cyclophylla Airy Shaw 742
Cynoctonum J.F.Gmel. 293, 295, 296, 297, **375**, **959**
mitreola (L.) Britt. 293, 374*, **375**, **959**
var. *intermedia* Hochr. 377
var. *lilacina* (Back.) Bakh. f. 375
var. *orthocarpa* Hochr. 375
paniculatum (Wall.) B.L.Rob. 375
pedicellatum (Bth.) B.L.Rob. 377, 960
petiolatum Gmel. 375
sphaerocarpum Leenh. 374*, 375, **377**, 960
Cyrtophyllum Reinw. ex Bl. 299, 303
caudatum (Ridl.) Ridl. 307
fragrans (Roxb.) A.DC. 307
giganteum (Ridl.) Ridl. 307
lanceolatum DC. 307, 309
peregrinum Reinw. ex Bl. 307
speciosum Bl. 303
var. *montanum* Ridl. 303
wallichii (Bth.) Ridl. 307

Dacryodes Vahl 917
breviracemosa Kalkman 919
costata (Benn.) H.J.Lam 918, 919
crassipes Kalkman 919
elmeri H.J.Lam 918
expansa (Ridl.) H.J.Lam 919
incurvata (Engl.) H.J.Lam 918, 919
kingii (Engl.) Kalkman 917, 919
laxa (Benn.) H.J.Lam 918, 919
longifolia (King) H.J.Lam 919
var. longifolia 919
macrocarpa (King) H.J.Lam 919
var. kostermansii (Kalkman) Kalkman 919
var. macrocarpa 919
nervosa (H.J.Lam) Leenh. 918, **919**
papuana Husson 919, 921
puberula (Benn.) H.J.Lam 918
rostrata (Bl.) H.J.Lam 918, 919
f. pubescens 918
rubiginosa H.J. Lam 918
rugosa (Bl.) H.J.Lam 918, 919
Dais (non L.) auct. 15
coccinia Gaudich. 18, 21
dubiosa Bl. 20
dubiosa (non Bl.) Decne 17
laurifolia (non Jacq.) Blco 18
octandra L. 17, 18
Dalrympelea Roxb. 51
pomifera Roxb. 58
Dalrympelia = *Dalrympelea* 51,

58
Dalzellia (non Wight) Engl. 963
Daphne L. 2, 3, 4, 5, 6, 34, **35**
sect. Daphnanthoides Gilg 37
sect. Eriosolena (Bl.) Meisn. 36, 37
aquilaria Blco 31, 35
arisanensis Hayata 38
cannabina (non Lour.) Schauer 33
cannabina (non Lour.) Wall. 37
composita (L. f.) Gilg 2, 36*, **37**, 38
var. *montana* Hochr. 37
f. *macrophylla* Hochr. 37
decandra Bl. 38
foetida (non L.) Blco 32
indica (non L.) Blco 32
indica L. 35
javanica Thunb. 38
kiusiana Miq. 38
luzonica C.B.Rob. 2, 36*, 37, **38**
montana Meisn. 38
odora Thunb. 38
papyracea Wall. ex Steud. 37
pendula Sm. 38
var. γ *concolor* Meisn. 38
var. ß *montana* Meisn. 38
phaetida 32
sp. Steen 35
Daphnobryon Meisn. 43
ericoides Meisn. 44
Datiscaceae 4: **382–387**
Datura 253
Daucus glochidiatus (Labill.) Fischer 984
Decaisnella O.K. 6
cumingiana O.K. 15
Decaspora laurina O.K. 437
Decatoca F.v.M. 423, 424, **434**, 436 map
spenceri F.v.M. **435***
Deltaria 3
Denhamia Meisn. 240, 243
parvifolia L.S.Smith 240
pittosporoides F.v.M. 230, 240
Dentella 253
erecta Roth ex R. & S. 113
perotifolia Willd. ex R. & S. 113
Desfontainea Kunth 295, 297, 954
Dichapetalaceae 5: **305–316**, 567; 6: **941–943**
Dichapetalum Thou. 238, 941
gelonioides (Roxb.) Engl. 941, 942
ssp. pilosum Leenh. 942
ssp. tuberculatum Leenh. 942
glabrum (Vahl) Prance 942
grandifolium Ridl. 941, **942**
griffithii (Hook. f.) Engl. 942
hainanense Engl. 942
helferianum (Kurz) Pierre 941, 942
laurocerasus (Hook. f.) Engl. 942
longipetalum (Turcz.) Engl. 942
papuanum (Becc.) Boerl. 941, 942
ssp. *borneense* Leenh. 942
ssp. *papuanum* 942
peekelii Krause 941, 942
scorpioideum Leenh. 941, **943**
sessiliflorum Leenh. 942
setosum Leenh. 942
steenisii Leenh. 942
ssp. steenisii 942
tenerum Leenh. 943
timoriense (DC.) Boerl. 941, 942
tricapsulare (Blco) Merr. 942
Diervilla *fallax* (Miq.) Boerl. 929
Dillenia 49
Dilleniaceae 4: **141–174**; 5: 557; 6: 933
Dimorphanthera F.v.M. 469, 470, 471, 473, 474, 746, **885**, 886 map
sect. *Brachychone* Schltr 890
sect. *Cyclosiphon* Wernh. 890
sect. Dimorphanthera Sleum. 886, **890**
subsect. *Brachychone* (Schltr) Sleum. 890
sect. Pteridosiphon Wernh. 886, **889**
sect. Trochilanthe Schltr 887, **896**
subsect. *Trochilanthe* (Schltr) Sleum. 896
alba J.J.S. 904
albiflora Schltr 887, **892**
alpina J.J.S. 888, **905**
var. alpina **905**
var. pubigera Sleum. **905**
alpivaga Sleum. 886, 889, **912**
amblyornidis (Becc.) F.v.M. **892**
var. amblyornidis 887, **892**, 893*, 896
var. moorhousiana (F.v.M.) Sleum. 887, **893**, 894*
amoena Sleum. 886, 887, **896**
anchorifera J.J.S. 887, 888, **902**
apoana (Merr.) Schltr 887, **895**
arfakensis J.J.S. 892
beccariana (Koord.) J.J.S. 888, **904**
brachyantha Sleum. 887, **899**
brassii Sleum. 887, 888, **897**, 898*
breviflos Sleum. 886, **891**
brevipes Schltr 887, 888, **900**
calodon Sleum. 887, 889, **910**
chlorocarpa Sleum. 895
clemensiae Sleum. 888, **902**, 903*
collinsii Sleum. **908**
var. collinsii 888, **908**
var. montis-wilhelmi Sleum. 888, **908**, 909*
cornuta J.J.S. 887, **899**
var. cornuta **899**
var. tenuiflora Sleum. **899**
crassifolia Sleum. 888, **901**
d'armandvillei J.J.S. 914
declinata Sleum. 886, **890**
dekockii J.J.S. 887, **893**
var. chlorocarpa (Sleum.) Sleum. 894, **895**
var. dekockii 893, **894**
var. pubiflora Sleum. 887, 894, **895**
denticulifera Sleum. **905**
var. denticulifera 888, 889, **905**
var. pubens Sleum. 888, **905**
dielsiana J.J.S. 891
doctorsii J.J.S. 887, 888, **906**
dryophila Sleum. 889, **914**
var. dryophila **914**
var. trichoclada Sleum. **914**
elegantissima K.Sch. 888, **908**
eymae Sleum. 887, **898**
forbesii (F.v.M.) F.v.M. 888, **904**
forbesii [non (F.v.M.) F.v.M.] Warb. 908
gracilis Sleum. 887, **900**
hirsutiflora Sleum. 887, **897**
intermedia (non J.J.S.) Diels 891
intermedia J.J.S. 886, **892**
kalkmanii Sleum. 888, **908**
kaniensis Schltr 908
kempteriana Schltr 886, **891**
lancifolia Sleum. 889, **910**
latifolia Schltr 887, **897**
leucostoma Sleum. 888, 889, **905**
longifolia Kaneh. & Hatus. 888, **907**
macleaniaefolia = macleaniifolia 889
macleaniifolia Wernh. 886, **889**
magnifica Sleum. 886, **891**
megacalyx Sleum. 889, **910**
meliphagidium = meliphagidum 906
meliphagidum (Becc.) F.v.M. 888, **906**
microphylla Sleum. 889, **913**
militaris J.J.S. 889, **910**
mindanaensis Merr. 887, **892**
moluccana J.J.S. 896

moorhousiana F.v.M. 893
moorhousiana (non F.v.M. s. str.) Schltr 892
myzomelae (Becc.) J.J.S. 889, **913**
nigropunctata Sleum. 888, **901**
obovata J.J.S. 736, 911, 912
obtusifolia Sleum. 889, **913**
ovatifolia Sleum. 888, **907**
parviflora J.J.S. 889, **912**
parvifolia J.J.S. 889, **912**
peekelii Sleum. 888, **907**
prainiana (Koord.) J.J.S. 889, **911***
profusa J.J.S. 891
pulchra J.J.S. 887, **896**
racemosa Schltr 887, **898**
robbinsii Sleum. 888, **902**
splendens Sleum. 888, **904**
steinii Sleum. 887, **895**
thibaudifolia Sleum. 888, **901**
torricellensis Schltr 887, **899**
tridens J.J.S. 886, **890**
umbellata Wernh. 886, **890**
vaccinioides Sleum. 889, **912**
velutina Schltr 887, **896**
vestita Sleum. 887, **900**
vonroemeri (Koord.) J.J.S. 889, **911**
wollastonii Wernh. 887, **898**
womersleyi Sleum. 888, **906**
wrightiana (Koord.) J.J.S. 889, **914**

Dioscoreaceae 4: **293–335**; 5: 557

Diosma *serrata* Blco 235

Diospyros *hierniana* (K. & G.) Bakh. 932

Diotocranus 297

Diplomorpha Meisn. 28

Diplusodon Pohl 975

Diplycosia Bl. 469, 471, 473, 474, 677, **696** map, 912
abscondita Sleum. 697, **703**
acuminata Becc. 700, **722**, 732*
amboinensis Becc. 699, **716**, 732*
aperta J.J.S. 697, **706**
apiculifera J.J.S. 701, **731**
apoensis Elm. 699, **716**
atjehensis Sleum. 697, 701, **707**
aurea Sleum. 697, **704**
baclay(a)ensis Elm. 740
barbigera Sleum. 697, **703**
bartlettii Merr. 738
brachyantha Sleum. 698, 699, 701, **713**
var. brachyantha **713**
var. parvula Sleum. **713**
breviflora Ridl. 676
calelanensis Elm. 720
capitata Sleum. 699, 702, **721**
carrii Sleum. 697, **702**
caryophylloides J.J.S. 699, **721**
var. caryophylloides **721**
var. longipes Sleum. **721**
caudatifolia Sleum. 700, **729**
celebensis J.J.S. 700, **730**
chrysothrix Stapf 697, **702**
ciliolata Hook. f. 698, **708**, 732*
cinnabarina Sleum. 700, **724**, 732*
cinnamomifolia Stapf 702, 735*, **736**
clementium Sleum. 697, **704**, 705*
commutata Sleum. 701, **734**
consobrina Becc. 700, **724**
cordifolia Ridl. 723
coriifolia Sleum. 734
crassiramea Sleum. 699, 701, **719**
crenulata Sleum. 700, **723**
edulis Schltr 699, 701, **735**
elliptica Ridl. 700, **723**, 732*, 778
endertii J.J.S. 740
ensifolia Merr. 702, 735*, **737**
erythrina (Hook.) K. & G. 815
fasciculiflora Merr. 720
filipes Sleum. 698, **708**, 732*
fimbriata Sleum. 699, **722**
glabra Merr. 720
glauciflora Sleum. 698. **712**
gracilipes J.J.S. 700, **730**
haemantha Sleum. 700, **730**
heterophylla Bl. 702, **738**
var. heterophylla **738**
var. latifolia (Bl.) Sleum. 701, **738**, 739*, 740*
var. *obovata* J.J.S. 738
heterophylla (non Bl. s. str.) K. & G. 740
hirsuta Sleum. 698, **709**
kalmiifolia Sleum. 699, **717**
kemulensis J.J.S. 701, **731**
kerintjensis J.J.S. 740
var. *elliptica* J.J.S. 740
kinabaluensis Stapf 699, 701, **717***, 735*
kingii Merr. 723
kjellbergii J.J.S. 698, **709**
kosteri Sleum. 698, **710**
kostermansii Sleum. 700, **724**
lamii J.J.S. 699, **719**
lancifolia Ridl. 700, **728**
var. calvescens Sleum. **729**
var. lancifolia 728
latifolia Bl. 738
latifolia (non B.) Hall. f. 738
lavandulifolia Sleum. 700, **727**
ledermannii Schltr 698, 700, **713**
lilianae J.J.S. 697, **706**
loheri Merr. 697, **706**
lorentzii Koord. 701, **736**
lucida Merr. 742
luzonica (A.Gray) Merr. 699, 701, **720**
var. calelanensis (Elm.) Sleum. **720**
var. luzonica **720**
var. merrittii (Merr.) Sleum. 720, **721**
var. pubens Sleum.**720**
lysolepis Sleum. 701, **734**
macrophylla Becc. 740
memecyloides (non Stapf) Merr. 717
memecyloides Stapf 700, **729**
merrittii Merr. 721
microphylla Becc. 700, **723**, 732*
microphylla (non Becc.) Clarke 723
minutiflora Sleum. 701, **731**
morobeensis Sleum. 698, **713**
var. morobeensis Sleum. 698, **713**
var. ovatifolia Sleum. **714**
mundula (F.v.M.) Schltr 684
muscicola Sleum. 699, **716**
myrtillus Stapf 700, **728**
opaca C.B.Robins. 721
orophila Sleum. 699, 702, **720**
parvifolia Merr. 698, **711**
pendens Sleum. 698, 699, **714**
penduliflora Stapf 697, 701, **707**, 735*
piceifolia Sleum. 700, **726**
pilosa Bl. 700, **729**
pinifolia Stapf 700, 725*, **726***, 727*
pittosporifolia J.J.S. **732**
var. pittosporifolia 701, **732**
var. punctiloba Sleum. 699, **733**
pokapindjangensis J.J.S. 706
pseudorufescens Sleum. 700, **711**
var. elliptifolia Sleum. 698, 700, **711**
var. pseudorufescens 698, **711**
pubivertex Sleum. 697, **707**
punctulata Stapf 701, **736**
retusa Sleum. 701, **733**
rosea Sleum. 698, **709**, 710*
rosmarinifolia Sleum. 701, 731, 732*
rubella Sleum. 700, **728**
rubidiflora J.J.S. 701, **733**
rufa (non Stapf) Merr. 704
rufa Stapf 697, **702**
rufescens Schltr 698, **708**
rupicola Sleum. 698, **714**, 732*
sagittanthera J.J.S. 700, **722**
salicifolia Sleum. 702, **737**
sanguinolenta Sleum. 701, **733**
saurauioides J.J.S. 697, **704**
scabrida Becc. 699, **721**

scandens Merr. 720
schramii Sleum. 697, **703**
schultzei Schltr 699, **714**
setiloba Sleum. 700, **724**
setosa J.J.S. 698, **710**
soror Becc. 698, 699, **712**
var. nuda Sleum. 701, **712**
var. soror **712**
sphenophylla Sleum. 701, 732*, **733**
stellaris Sleum. 699, **715**
stenophylla Sleum. 700, **727**, 732*
subglobularis Sleum. 699, **715**
sumatrensis Merr. 699, **718***
tetramera Sleum. 697, 698, **711**
triangulanthera J.J.S. 698, **708**
trinervia Elm. 699, **719**
var. trinervia **719**
var. urdanetensis (Elm.) Sleum. **719**
undata (non J.J.S.) H.J.Lam 706
undata J.J.S. 699, **715**
urceolata (non Stapf) Ridl. var. 740
urceolata (non Stapf) Sleum. 734
urceolata Stapf 701, **734**, 735*
urdanetensis Elm. 719
varians Sleum. 699, **715**
viridiflora Sleum. 702, **737**
var. megalantha Sleum. **738**
var. viridiflora **737**
Dipsacaceae 4: **290–292**; 5: 557
Dipterocarpaceae 154
Disiphon Schltr 785
papuanum Schltr 786
Distyliopsis Endress 952
Distylium Sieb. & Zucc. 952
Dodecatheon 174
Dodonaea 152
Dolianthus C.H.Wright 387
Dortmanna Adans. 121
Dortmannia (sphalm.) O.K. = *Dortmanna* Adans. 121
alsinoides O.K. 127
campanuloides O.K. 131
chinensis O.K. 131
colorata O.K. 124
erecta O.K. 124
griffithii O.K. 127
haenkeana O.K. 136
inconspicua O.K. 129
leschenaultiana O.K. 123
nicotianaefolia O.K. 124
pyramidalis O.K. 124
radicans O.K. 131
reinwardtiana O.K. 129
rosea O.K. 124
subcuneata O.K. 128
succulenta O.K. 128
trialata O.K. 129
trigona O.K. 127
var. *affinis* O.K. 128
var. *microcarpa* O.K. 127
var. *terminalis* O.K. 127
zeylanica O.K. 128, 129
Dovyalis *macrodendron* Gilg 944
Drapetes Banks ex Lamk 2, 4, 5, 6, **43**
sect. *Daphnobryon* Boerl. 43
dieffenbachii Hook. 43
ericoides Hook. f. 2, 43, **44*** map
muscosus Lamk 43
tasmanicus Hook. f. 43
Drimyspermum Reinw. 15, 16
ambiguum Meisn. 17
blumei Decne 20
blumei (non Decne) Hassk. 17
burmanni Decne 17, 18
cauliflorum Thw. 20
coccineum Becc. 18, 21
cumingii Meisn. 21
laurifolium Decne 17
laurifolium (non Decne) Hassk. 20
longifolium Miq. 17
macrocarpum Scheff. 22, 23
perrottetianum Decne 18
phaleria Meisn. 20
revolutum T. & B. 21
urens Reinw. 20
urens (non Reinw.) Scheff. 18
Drosera petiolaris R.Br. 943
spathulata Labill. 943
umbellata Lour. 191, 192
Droseraceae 4: **377–381**; 5: **557**; 6: **943**
Drymispermum = *Drimyspermum* 15, 16
Duabanga Buch.-Ham. 975*
grandiflora (Roxb. ex DC.) Walp. 975*, 976
moluccana Bl. 975*
×taylorii Jayaweera 975*
Durio 70
Dysoxylum *dasyphyllum* Miq. 218
quercifolium (Seem.) A.C. Smith 212

Ebelingia Rchb. 207
brownii Steud. 207
paucijuga O.K. 208
Edgeworthia 3
Elaeocarpaceae 420, 914
Elaeocarpus oxypyren K. & V. 420
Elaeodendron Jacq. f. ex Jacq. 228, 284, 285
australe Vent. 287
ellipticum Decne 286, 287
var. *glauca* Pierre 287
var. *montana* (Thw.) Pierre 287
var. *roxburghii* (W. & A.) Pierre 287
fortunei Turcz. 252, 253
glaucum (Rottb.) Pers. 286
var. *macrocarpa* K. & V. 286
horizontale Turcz. 241
javanicum Turcz. 252, 253
microcarpum White & Francis 288
mindanaense Merr. 288
pauciflorum Tulasne 287
roxburghii W. & A. 286, 287
subrotundum King 228, 286
viburnifolium Merr. 286
Elaeodendrum = *Elaeodendron* 284
Elatinaceae 4: **203–206**
Eleocharis 165
Ellipanthus beccarii Pierre 935
tomentosus Kurz 935
ssp. tomentosus 935
var. tomentosus 935
Emorya Torr. 295, 296, 953
Enchysia Presl 140
Engelhardia Lechen. ex Bl. 143, **145**, 146 map, 147, 148
sect. Engelhardia 145, 147, **148**
sect. Oreomunnea (Oerst.) C.DC. **148**
sect. Psilocarpeae Nagel emend. Leroy 145, **148**
sect. *Pterilema* (Reinw.) C.DC. 148
sect. *Trichotocarpeae* Nagel 148
aceriflora Bl. 152
acerifolia (sphalm.) Hook. f. 152
apoensis Elm. ex Nagel 148, **151**
chrysolepis Hance 154
colebrookeana Lindl. ex Wall. 153
esquirolii Lév. 153
fenzelii Merr. 154
formosana Hayata 143, 154
lepidota Schltr 148
mollis Hu 148
nucifera (Ludwig) Mädler 147
nudiflora Hook. f. 150
var. *crenata* Hook. f. ex Gamble 150
palembanica Miq. 150
parvifolia C.DC. 146, 150
permicrophylla Elm. 150
philippinensis C.DC. 152
polystachya Radlk. 143, 154
pterococca O.K. 154
var. α *roxburghiana* O.K. 154
rigida Bl. 144*, 145, **148**, 149*
roxburghiana Lindl. ex Wall. 152
roxburghiana Wall. 148, 149*, **154**

selanica Bl. 154
serrata Bl. 144*, 146, 148, 149, **150***
sp. Corner 151
spicata Lechen. ex Bl. 143, 144*, 145, 146, 147*, 148, **151***, 152*, 153, 154, 953
var. α *genuina* K. & V. 151
var. ß *aceriflora* K. & V. 151, 152
var. γ *colebrookiana* K. & V. 151, 154
var. *colebrookeana* (Lindl. ex Wall.) O.K. 151, 153, 953
var. *formosana* Hayata 154
var. **integra** (Kurz) Manning **953**
var. spicata 153
subsimplicifolia Merr. 148
villosa Kurz 153
var. *integra* Kurz 153, 953
wallichiana (Lindl. ex Wall.) C.DC. 154
ß *chrysolepis* C.DC. 154
zambalensis Elm. 148, 149
Engelhardtia = Engelhardia 145
Englerodaphne Gilg 79
Enhalus acoroides (L. f.) Royle 952
Enkleia Griff. 2, 4, 5, 6, **23**, 982
coriacea Hall. f. 25
malaccensis Griff. 24*, **25**, 982
malayana Griff. 25
paniculata (Merr.) Hall. f. 24*, **25**
riouwensis Hall. f. 25
zippeliana Hall. f. 25, 26
Epacridaceae 50, **422** map-**444**, 943
subfam. *Epacrideae* 423
tribe Epacrideae 423
subfam. *Styphelieae* 423
tribe Styphelieae 423
Epacris 423
Epigynium coriaceum (Bl.) Kl. 828
ellipticum (Bl.) Kl. 873
floribundum (Bl.) Kl. 872
laurifolium (Bl.) Kl. 872
lucidum (Bl.) Kl. 814
varingiaefolium (Bl.) Kl. 815
Ericaceae 49, 423, 424, **469–914**, 943
subfam. Arbutoideae 473, 474
tribe Andromedeae 474
tribe Gaultherieae 474
tribe Pyroleae 474
subfam. Ericoideae 473
subfam. Monotropoideae 469, 473
subfam. Rhododendroideae 473
tribe Rhododendreae 474
subfam. Vaccinoideae 472, 474
Ericales 473, 669
Eriosolena Bl. 35
affinis Zoll. 38
composita v.Tiegh. 38
montana Bl. 38
var. α *macrophylla* Hassk. 38
var. ß *minor* Hassk. 38
pendula Bl. ex Lecomte 38
viridiflora Zoll. & Mor. 33
Erodium L'Hérit. 445, **448**
cicutarium (L.) L'Hérit. ex Ait. 445, **448**
Ervatamia sphaerocarpa (Bl.) Burk. 347
Erycibe 390
Erythroxylaceae 5: **543–552**
Eucommiaceae 229
Euonymus Tournef. ex L. 227, 228, 229, 230, 231, 232, 243, **245**, 253, 254, 256, 264, 274, 391, 392, 930
subg. Euonymus **247**
subg. Kalonymus Beck 247
acuminifolius Blakelock 247, **251**
var. *borneensis* Blakelock 251
alatus [non (Thunb.) Sieb.] Elm. 249
alatus Sieb. 230
atropurpureus Jacq. 229, 230
bancanus Miq. 249
benguetensis Merr. 248, **253**
castaneifolius Ridl. 246*, 247, **251**
cochinchinensis Pierre 247, **248**, 286, 930
congolensis Wilczek 245
coriaceus Ridl. 249
decora W.W.Sm. 245
elmeri Merr. 249
europaeus L. 229, 230
f. *genuinus* Back. 248
fengii Chun & How 256
fimbriatus Baill. ex Laness. 267
fortunei (Turcz.) Hand.-Mazz. 252, 253
var. *radicans* (Miq.) Rehd. 252
fungosus Ohwi 252, 253
glaber Roxb. 247, **250**
glandulosus (Merr.) Ding Hou 248, **251**
grandiflorus Wall. 264
horsfieldii Turcz. 249
impressus Blakelock 247, **250**
japonicus (Thunb.) L. f. 252, 253
japonicus Thunb. 246*, 248, **252** map
var. *radicans* Miq. 252
javanicus Bl. 231, 245, 247, **248**, 250
f. genuinus 248
var. conocarpus Hassk. 249
var. *coriaceus* 248
var. *elmeri* 248
var. *genuina* K. & V. 248
var. *genuinus* K. & V. 248
var. *horsfieldii* Turcz. 248
var. *sphaerocarpus* Hassk. 248, 249
var. *talungensis* Pierre 248
var. *timorensis* 248
latifolia (L.) Mill. 245, 246
lichiangensis W.W.Sm. 245
linearifolia Franch. 245
marivelensis Elm. 258
micropetalus Ridl. 249
moluccensis Blakelock 248, **254**
moultoni Ridl. 251
nana M.B. 243
oliganthus Merr. 248
omeiensis Fang 245
pahangensis Ridl. 248
philippinensis Merr. 248
platyclinis Ohwi 243
radicans (Miq.) Sieb. ex Miq. 252
recurvans Miq. 247, **250**
rufulus Ridl. 250
sumatranus Miq. 248
timorensis (non Zipp. ex Span.) Turcz. 248
timorensis Zipp. ex Span. 248, 249
tonkinensis Loes. 247
viburnifolius Merr. 248, 286
wrayi King 247, **250**, 258
yunnanensis Franch. 245
Eupatorium inulifolium 145
Euphorbiaceae 4, 203, 420, 944
Eurycoma Jack 193, 196, **203**
apiculata Benn. 205, **206**
dubia Elmer 206
eglandulosa Merr. 206
harmandiana Pierre 205, **206**, 969
latifolia (sphalm.) Ridl. 205
longifolia Jack 204*, **205**, 206* map
ssp. **eglandulosa** (Merr.) Nooteboom **206** map
ssp. longifolia **206** map
var. *cochinchinensis* Pierre 205
var. *merguensis* Pierre 205
merguensis Planch. 205
tavoayana Wall. 205
Euscaphis Sieb. & Zucc. 49, 51
Evodia 226
meliaefolia (Hance) Bth. 206
parviflora Craib 56
triphylla DC. 214
Evolvulus L. 936

gangeticus (L.) L. 939
sp. Ridsdale 960
Evonymus Auct. 245
Exobasidium 172, 471, 659, 747

Fagaceae 143, 145, 472
Fagaceae-Castaneae 143
Fagara 207, 209
piperita (non L.) Naves 208
Fagraea Thunb. 293, 294, 295, 297, 298*, **299**, 301*, 303 map, 312, 318
sect. *Corymbosae* Bth. 315
sect. Cyrtophyllum (Reinw.) Bl. 300, **303**, 309
sect. *Eufagraea* Bl. 315
sect. Fagraea 300, **315**
sect. *Fagraeae verae* Bl. 315
sect. *Parviflorae* Bth. 303
sect. *Pseudocorymbosae* Soler. 315
sect. *Pseudoracemosae* Soler. 311
sect. Racemosae Bth. 300, **309**
subg. *Cyrtophyllum* (Bl.) Miq. 303
subg. *Eufagraea* Miq. 315
acuminatissima Merr. 302, **319**, 320, 954
affinis S.Moore 335
alteniana F.v.M., nomen 335
amabilis S.Moore 332
amboinensis Bl. 316, 318
ampla S.Moore 333
angiensis Kaneh. & Hatus. 317, 318, 319*
annulata Hiern 300, 302, 303, **318**, 333, 334, 335
anthocleistifolia Gilg & Bened. 326
appendiculata Bl. 311
archboldiana Merr. & Perry 317, 318
aurantiodora S.Moore 304
auricularia = auriculata 327
auriculata Jack 300, 301*, 302, **326**, 329*, 954
ssp. auriculata **328**, 954
ssp. **borneensis** (Scheff.) Leenh. **328**, 329, 954
ssp. **parviflora** Leenh. 303, **328**
berteriana A.Gray 301, 302, 316, 317, 319, 331, 333, **335**, 954
birmanica Gandoger 317
blumei G.Don 293, 299, 300, 301, 302, 315, 316, 317, 318, **320**, 322*, 324, 325, 954
ssp. blumei **323**, 324, 954
ssp. plumeriaeflora (DC.) Leenh. **323**, 325, 326
blumei Steud. 320
blumii = blumei 320
bodenii Wernh. 302, **333**, 335, 336
borneensis Scheff. 327, 328
bracteosa Cammerl. 328
calcarea M.R.Hend. 303, **332**
calophylloides Gilg & Bened. 335
cambagei Domin 300, 332, 333
cardinalicarpa Elm. 336
carnosa Jack 302, 316, **331**
carstensensis Wernh. 302, **326**, 327*
caudata Ridl. 307, 309
ceilanica Thunb. 301, 302, 303, **315**, 316*, 318*, 319*, 320, 323, 954
f. khasiana 303
var. *brevituba* Clarke 315
celebica Bl. 316, 318
chinensis Merr. 317
coarctata Bl. 311
var. *ligustrina* (Bl.) Miq. 311
cochinchinensis (Lour.) A.Chev. 307, 309
congesta Bl. 316
congestiflora Elm. 311
cordifolia Bl. 311
coromandelina Wight 316
crassifolia Bl. 316
crassifolia Wall., non Bl. 320
crassipes Bth. 311
crenulata Maing. ex C.B.Clarke 293, 299, 300, 301, **324***
cuernosensis Elm. 322, 323
curranii Merr. 327, 328, 329
curtisii K. & G. 303, 331, **332**
cuspidata Bl. 311
cymosa Merr. 311
dasyantha Gilg & Bened. 335
dolichopoda Gilg & Bened. 332
dubia Wall. 336
elata Merr. & Perry 300, 332
elliptica Roxb. 293, 300, 301, **303**, 304*, 309, 315, 954
epiphytica Elm. 327, 328
eucalyptifolia Cammerl. 311, 312*, 315
euneura Scheff. 327, 328
eymae Back. 301*, 303, **333**
fagraeacea Druce 332
fastigiata Bl. 301*, 323, **324**, 325, 954
fastigiata (non Bl.) Cammerl. 325, 328
fastigiata (non Bl.) Ridl. 324
flavidula Ridl. 331
forstenii Bl. 316, 318
forstenii (non Bl.) Koord. 325
fragrans Roxb. 293, 300, 301, 303, **304**, 305*, 306*, 307*, 308*, 309, 323, 954
fuscescens Bl. 316
galilai Gilg & Bened. 335
gardeniaeflora Wernh. 317, 318
gardenioides Ridl. 300, 302, **331**, 332
ssp. borneensis Leenh. **332**
ssp. gardenioides **331**
garneri Thw. 317
gigantea Ridl. 307, 309
gitingensis Elm. 302, 317, **334**, 335
gracilipes A.Gray 300, 301, 303, 309, **332**, 334, 335, 954
gracilis Cammerl. 311
grandifolia Merr. 311
grandis Panch. & Sébert 335
heterophylla Bl. 316
imperialis Miq. 327, 328, 329*
intermedia Ridl. 322, 323
involucrata Merr. 301, 328, **329***, 330*, 331, 332
var. *longipetiolata* Merr. 329, 330
jackii Elm. 327, 328
jasminodora Gilg & Bened. 333
javanensis Bakh. f. 304
javanica (Reinw. ex) Bl. 327, 328
khasiana Bth. 316
kimanga = *kimangu* 303
kimangu Bl. 303
ksid Gilg & Bened. 335
kusaiana Hosok. 335
lanceolata Bl. 316
lanceolata (non Bl.) Hend. 331
lanceolata Schnizl. 309
lanceolata Wall., non Bl. 307
latifolia Miq. 311
ledermannii Gilg & Bened. 335
leschenaultii Bl. 320, 323
ligustrina Bl. 311, 312*, 315
var. *brachystachya* Bth. 311
var. *disparifolia* Bl. 311
litoralis Bl. 316, 317, 318, 323, 954
var. *amboinensis* Bl. 316
var. *forstenii* (Bl.) Miq. 316
var. *moluccana* Miq. 316
littoralis = *litoralis* 316
loheri Merr. 317, 318
longicuspis Gandoger 319
longiflora Merr. 302, **326**
lutea Cammerl. 317, 318
lutea (non Cammerl.) Merr. 322, 323
macgregorii Merr. 326
macrodendron Gilg & Bened. 317
macroscypha Baker 302, 328, 329*, **330**, 331
macroscypha (non Baker) Heine 329
maingayi C.B.Clarke 311, 315
malabarica Bl. 316
malabarica Wight, non Bl. 316
malayana Mart. 311, 315

melanochlora Gilg & Bened. 333, 335
minor (non Bl.) Heine 311
minor Reinw. ex Bl. 316, 318
monantha Miq. 331
monticola Gilg & Bened. 333, 336
morindaefolia (Reinw.) Bl. 293, 311
var. *robusta* Bl. 311
morindifolia = *morindaefolia* 311
muelleri Bth. 300, 332, 333
negrosensis Elm. 322, 323
nonok Elm. 327, 328
novae-guineae Cammerl. 335
nov. sp. aff. longiflora 325
oblonga K. & G. 317, 318, 954
obovata Bl., non Wall. 320, 323, 324
obovata (non Wall.) King 319, 320, 323
obovata (non Wall.) Miq. 321, 323
var. *brevicalyx* Bakh. f. 322, 323
var. *latifolia* Miq. 321, 323
obovata Wall. 315, 317
var. *brevicalyx* Bakh. f. 316
var. *gardneri* Clarke 315
var. *latifolia* Miq. 315
var. *papuana* F.M.Bailey 316, 335
obovato-javana Bl. 293, 320, 323
var. *bebeak* Bl. 320, 323
var. *latifolia* Miq. 320, 323
obtusifolia Merr. & Perry 332
oxyphylla Miq. 316, 318
pachyclados K.Sch. 336
pachypoda Gilg & Bened. 335
papuana Merr. & Perry 333
pauciflora (K. & G.) Ridl. 311, 315
peekelii Gilg & Bened. 335
pendula Merr. 310*, 311, 315
peregrina (Reinw.) Bl. 307
picrophloea Bl. 303
plumeriaeflora DC. 320, 323
plumeriaeflora (non DC.) Koord. 325
plumeriaefolia = *plumeriaeflora* 320, 325
pluvialis S.Moore 335
prainii Gandoger 317
pseudoelliptica Kaneh. & Hatus. 304
pusilliflora Bakh. f. 304
pyriformis S.Moore 317, 318
racemosa Jack ex Wall. 293, 300, 302, 310*, **311**, 312*, 313*, 314*, 316, 954
var. *coarctata* (Bl.) Miq. 311
var. *grandis* Wall. ex A.DC. 311
var. *pauciflora* K. & G. 311
rahmatii Merr. 317
resinosa Leenh. 302, **331**
ridleyi Gandoger (non K. & G.) 307
ridleyi K. & G. 303, 316, **320**, 321*, 954
robusta Bl. 311
rodatzii K.Sch. & Laut. 311
rosenstromii C.T.White 335
rostrata Bl. 316
rotundifolia Ridl. 331
sair Gilg & Bened. 335
salomonensis Gilg & Bened. 335
salticola Leenh. 302, **333**, 334*, 335, 336
samoensis Gilg & Bened. 335
sasakii Hayata 317, 318
schlechteri Gilg & Bened. 335, 954
scholaris Blco 311
sororia J.J.S. 307
sp. Endert 307
sp. Kaneh. & Hatus. 332
sparei M.R.Hend. 317, 318
spatiosa S.Moore 322, 323
speciosa (Bl.) Bl. 303
speciosa (non Bl.) Ridl. 307
spicata Baker 310*, 311, 315
splendens Bl. 316
stenophylla Becc. 311, 315
suaveolens Cammerl. 333
subreticulata Bl. 311
sumatrana Miq. 304
tacapala Leenh. 301*, 323, **325**, 326
ssp. ceramensis Leenh. 325, **326**
ssp. gracilis Leenh. **325**
ssp. tacapala **325**
ternatana (non Miq.) Holth. & Lam 324
ternatana Miq. 317, 318
tetragona Span. 336
teysmannii Cammerl. 311, 312*, 315
thwaitesii F.v.M. 311
truncata Bl. 302, 316, 320, **325**
tubulosa Bl. 302, **320**
umbelliflora Gilg & Bened. 301, 303, **309**, 333
uniflora (non Merr.) Heine 329
uniflora Merr. 331
vaginata K. & G. 322, 323
valida Miq. 304
vitiensis Gilg & Bened., non Seem. 335
vitiensis Seem. 336
volubilis Wall. 311
wallichiana Bth. 307, 309
woodiana F.v.M. 301, 325, **326**
zeylanica = ceilanica 315

Fagus 49
Feroniella *pubescens* Tanaka 208
Flacourtiaceae 5: **1–106**, **565**; 6: 4, **943-944**, 968
Flagellariaceae 4: **245–250**; 5: 557
Flemingia Hunter 299, 301, 303
fragrans Hunter 307, 309
Florschuetzia trilobata 975
Flü(e)ggea *serrata* Miq. 236
Forsellesia 227
Fructus musculiformis Rumph. 367, 368
Fumariaceae 62, 63
Funis toaccae Rumph. 318

Gaertnera Lamk 387
Galium 253, 294
Gardneria Wall. 295, 296, 297, **361**
fagraeacea F.v.M. 332, 333
ovata Wall. 362*, **363**, 959
wallichii Wight ex Wall. 363
Garuga floribunda Decne 917
Gaultheria Kalm ex L. 470, 471, 472, 473, 474, **677**, 678 map, 696, 697
sect. *Amphicalyx* Endl. 696
abbreviata J.J.S. 678, 682*, **683**
acroleia Sleum. 678, **681**, 682*
arfakana Sleum. 679, **689**
atjehensis J.J.S. 678, **680***, 681
bandongensis Zoll. 694, 695
barbulata Sleum. 678, **682**
benguetensis Copel. f. 679
berberidifolia Sleum. 679, **686**, 687*
blumei F.v.M. 778
borneensis Stapf 678, **679**, 680*
calyculata Wernh. 691
celebica J.J.S. 679, **686**
var. celebica **686**
var. petiolata J.J.S. **686**
ciliolata (Hook. f.) F.v.M. 708
crenulata Kurz 691
crenulata (non Kurz) J.J.S. 694
cumingiana (non Vidal) Merr. 695
cumingiana Vidal 694
dialypetala Sleum. 678, 680*, **681**
fragrantissima (non Wall.) K. & G. 690
fragrantissima (non Wall.) Mor. 688
var. *punctata* (Bl.) J.J.S. 688
fragrantissima Wall. 688
var. *papuana* J.J.S. 691
gracilescens Sleum. 679, **687**
heterophylla (Bl.) Endl. ex Hassk. 738
hirta Ridl. 679, **691**

intermedia J.J.S. 679, **690**
itoana Hayata 679, 680
kemiriensis Sleum. 678, 682*, **683**
latifolia (Bl.) Endl. ex Hassk. 738
latifola Endl. ex Zoll. 738
laxiflora Diels 694
leiotheca Sleum. 692
leucocarpa Bl. 470, 677, 679, 690, **692**, 693*
f. *glabra* J.J.S. 692
f. *pubescens* J.J.S. 695
var. hirta Val. ex J.J.S. 679, 692, **695**
var. leucocarpa **692**, 694*
f. cumingiana (Vidal) Sleum. 692, **694**
f. leucocarpa **692**
f. melanocarpa J.J.S. ex Amsh. 692, **695**
f. scandens Hochr. 692, **694**
var. *melanocarpa* J.J.S. ex Steen. 695
var. *melanocephala* Steen. 695
var. *papuana* Becc. 689
var. psilocarpa (Copel.) Sleum. 692, **695**
var. *seminuda* J.J.S. 694
losirensis Sleum. 678, 682*, **683**
luzonica A.Gray 720
malayana Airy Shaw 679, 682*, **690**
mundula F.v.M. 470, 678, 680*, **684**, 778
var. mundula 684, **685***, 686
var. setifolia (Sleum.) Sleum. 684, **686**
var. tanythrix (Sleum.) Sleum. 684, **686**
notabilis Anthony 681
novaguineensis J.J.S. 679, 680*, **695**
var. novaguineensis **695**
var. pascua Sleum. **695**
nummularioides D.Don 677, 678, 680*, **684**
pernettyoides Sleum. 679, 680*, **695**
pilosa (Bl.) Zoll. 729
psilocarpa Copel. f. 695
pullei J.J.S. 679, **691**
var. leiotheca (Sleum.) Sleum. **692**
var. pullei **691**
punctata Bl. 677, 679, **688**, 689*, 694
repens Bl., non Raf. 684
solitaria Sleum. 678, 680*, **681**
sp. Vidal 782
tanythrix Sleum. 686
var. *setifolia* Sleum. 686
trichophylla (non Royle in DC.) Hassk. 684
viridiflora Sleum. 679, **691**
yunnanensis (Franch.) Rehd. 694
(Gay) Lussacia Gaylussacia 761
Gaylussacia *elliptica* Zoll. & Mor. 873
lanceolata Bl. 761
Gelonium Roxb. ex Willd. 944
Gelsemium Juss. 293, 294, 295, 296, 297, **343**, 954
elegans (Gardn. & Champ.) Bth. **343**, 344*
rankinii 954
sempervirens 343
sumatrana (Bl.) Boerl. 343
Geniostoma J.R. & G.Forst. 293, 295, 296, 297, **369**
acuminatissima Merr., non Gilg & Bened. 373
acuminatissimum Gilg & Bened. 371
acuminatum Wall. 373
acutifolium Hiern 372
antherotrichum Gilg & Bened. 371
arboreum O.K. 371
var. *laevigatum* (Bl.) O.K. 371
archboldianum Merr. & Perry 373
arfakense Kaneh. & Hatus. 371, **373**, 959
australianum F.v.M. 371
avene Val. 371, 372
batanense Merr. 371
brevipes Merr. 371
caulocarpum K.Sch. 371
celebicum Val. 371
crassifolium Bth. 373
cumingianum Bth. 371, 372
dallmannense Kaneh. & Hatus. 371
dasyneurum Gilg & Bened. 371
fasciculata Quis. & Merr. 371
gilgii Merr. & Perry 373
haemospermum Steud. 293, 371, 372
var. *angustifolia* Bl. 371
var. *elongata* Bl. 371
var. *erosa* Bl. 371
var. *laevigata* Bl. 371
var. *rugulosa* Bl. 371
lanceolatum (non Bojer) Z. & M. ex Miq. 371, 372
lancilimbum Merr. 371
lasiostemon Bl. 371
var. *moluccanum* Bl. 371
laxa Elm. 371
longipes Merr. 371
micranthum DC. 371
mindanaense Elm. 371
miquelianum K. & V. ex Val. 293, 371
moluccanum Val. 371
montanum Zoll. & Mor. 371, 372
nigrescens (Blco) Merr. 371, 373
oblongifolium K. & V. ex Val. 293, 371
obtusum Merr. & Perry 372
oleifolium S.Moore 373
pachyphyllum Merr. 371
philippinense Merr. 371, 373
psychotrioides Gilg & Bened. 371
pulgarense Elm. 371, 372, 373
pullei Cammerl. 371, 373
ramosii Merr. 371
randianum Merr. & Perry 369*, 371, **372**
reticulata Bl. 371
rupestre Forst. 293, 369*, 370, **371**, 373, 959
schlechteri Gilg & Bened. 371
stenophyllum Gilg & Bened., non Merr. 373
stenophyllum Merr. 371
weinlandii K.Sch. 371, **372**
Gentiana quadrifaria 953
Gentianaceae 294
Gentianales 297
Geraniaceae 195, **445–449**
Geraniales 195
Geranium L. **445**
sect. Australiensia 445
sect. Chilensia 445
sect. Columbinum 445
sect. Striata 445
affine (non W. & A.) Britten 447
ardjunense Zoll. & Mor. 447
australe (non Nees) Allan 448
carolinianum 445
clemensiae Knuth 446
dissectum (non L.) Hemsl. 446
var. *glabratum* Hook. f. 448
glabratum (Hook. f.) Small ex Hanks & Small 448
homeanum Turcz. 446, **448**
macrorrhizum L. 445
microphyllum Hook. f. 446
monticola Ridl. **446**
nepalense (non Sweet) Backer 448
nepalense (non Sweet) Doct.v. Leeuwen 447
nepalense Sweet 448
papuanum Ridl. 446
var. *alpestris* Ridl. 446
parviflorum Willd. 448
philonothum DC. 446
pilosum [non (Sol.) Forst.] F.v.M. 446
potentilloides L'Hérit. ex DC. **446**, 447*

var. **ardjunense** (Zoll. & Mor.) Carolin **447**
var. potentilloides **447**
sarawaketense Knuth 446
Girocarpus (sphalm.) = Gyrocarpus 152
Glaphyria nitida Jack 814
Glaux 173
Glinus lotoides L. 915
Glochidion 420
Glosocomia D.Don 118
Glyptopetalum Thw. 228, 232, 252, **254**, 264, 391, 392, **421**, 930
acuminatissimum Merr. 256, **257**
calocarpum 256
calyptratum 256
euonymoides Merr. **256**
euphlebium (Merr.) Merr. 256, 257, **258**
fengii (Chun & How) Ding Hou **256**
glandulosum Merr. 251
loheri Merr. 256, **257**
marivelense (Elm.) Merr. 255*, 256, **258**, 421
var. *euphlebium* Merr. 258
palawanense Merr. 256, **257**
quadrangulare Prain ex King 254, 255*, 256, **257**, 258
remotinervium Merr. 258
reticulatum Merr. 258
scortechinii King 248
zeylanicum Thw. 256, **257**
var. **brevipedicellatum** Ding Hou 255*, 256, **257**
var. zeylanicum **258**
Gnetaceae 4: **336–347**; 6: **944–949**
Gnetum L.
sect. Cylindrostachys Mgf 945, 946
sect. *Gnemomorphi* Mgf 947
sect. Gnetum 944, 946, 947
subsect. Eugnemones Mgf 944, 946
acutatum Mgf 947
acutum Mgf 945, **947**
arboreum Foxw. 945, 946
costatum K.Sch. 944, 946
cuspidatum Bl. 945, 947, 948*, 949
diminutum Mgf 945, 947, 949
globosum Mgf 945, 947, **949**
gnemon L. 944, 946
var. brunonianum (Griff.) Mgf 944, 946
var. gnemon 944, 946
var. gracile Mgf 944, 946
var. griffithii (Parl.) Mgf 944, 946
var. ovalifolium (Poir.) Bl. 945, 946
var. tenerum Mgf 944, 946
gnemonoides Brongn. 945, 946, 947, 949
klossii Merr. 945, 947, 949
latifolium Bl. 945, 946
var. funiculare (Bl.) Mgf 945, 946
var. latifolium 945, 946
var. laxifrutescens (Elm.) Mgf 945, 946
var. minus (Foxw.) Mgf 945, 946
leptostachyum Bl. 945, 946, 949
var. abbreviatum Mgf 945, 946, **949**
var. leptostachyum 945, 946
var. robustum Mgf 945, 946, 949
loerzingii Mgf 945, 947, 949
macrostachyum Hook. f. 945, 947
microcarpum Bl. 945, 947
neglectum Bl. 945, 946, 947
oxycarpum Ridl. 946, 947
raya Mgf 945, **947**
ridleyi Gamble ex Mgf 945, 946, 947, 949
tenuifolium Ridl. 945, 946
Gnidia 3, 4, 30
oppositifolia (non L.) Blco 48
philippinica Meisn. 48
Gomphostigma Turcz. 295, 296, 953
Gomphrena celosioides Mart. 917
Gonus Lour. 209
amarissimus Lour. 211
Gonystylaceae, see Thymelaeaceae
Gonystylus Teysm. & Binn. 1, 3, 5, 6, **976–982**
sect. Auxanthus Airy Shaw 977, 981
acuminatus Airy Shaw 977
affinis Radlk. 978, 979
areolatus Domke ex Airy Shaw 977, 981
augescens Ridl. 977, 981
bancanus (Miq.) Kurz 2, 5, 15, 978, 979
borneënsis (v.Tiegh.) Gilg 978, 979, 980, 981
brunnescens Airy Shaw 978
calophylloides Airy Shaw 977, **979**, 982
calophyllus Gilg 977, 979, 982
confusus Airy Shaw 978
consanguineus Airy Shaw 977, 978, **979**, 980
costalis Airy Shaw 977, **980**
decipiens Airy Shaw 978, **980**
forbesii Gilg 977
glaucescens Airy Shaw 978, **980**
keithii Airy Shaw 987, 980, 982
lucidulus Airy Shaw 977, **981**
macrophyllus (Miq.) Airy Shaw 15, 977
maingayi Hook. f. 977, 978
micranthus Airy Shaw 977, 978, 979
nervosus Airy Shaw 977, 978, **981**
nobilis Airy Shaw 977, 978, **981**
pendulus Airy Shaw 978
reticulatus (Elm.) Merr. 977, 978, 982
spectabilis Airy Shaw 977, **982**
stenosepalus Airy Shaw 978, 980
velutinus Airy Shaw 977
xylocarpus Airy Shaw 977, 978
Goodenia J.E.Smith 950
koningsbergeri (Back.) Back. ex Bold. 950
pumilio R.Br. **950***
purpurascens R.Br. **950**
Goodeniaceae 5: **335–344**; 6: 108, 109, **949–952**
Guioa koelreuteria (Blco) Merr. 226
Guttiferae 294, 336
Gymnosporia Hook. f. 229, 238, 240, 241
ambigua Vidal 241, 242
curtisii King 240
diversifolia Maxim. 241, 242
emarginata Thw. 241
inermis Merr. & Perry 241
montana Bth. 241
var. *littoralis* Back. 241
var. *parvifolia* Pitard 242
neglecta Wall. ex Laws. 237, 420
nitida Merr. 242
senegalensis (Lamk) Loes. 241
spinosa (Blco) Merr. & Rolfe 241
var. *parva* Merr. & Rolfe 241
trigyna 238
Gynandropsis DC. 99, 100
affinis Bl. 101
gynandra Briq. 101
pentaphylla (nor. DC.) Blco 101
pentaphylla DC. 101
speciosa DC. 101
Gynotroches axillaris Bl. 967
Gyrinops Gaertn. 2, 3, 4, 5, **39**, 41 map
caudata (Gilg) Domke 39, 40*, **42**
decipiens Ding Hou 4, 39, 40*, **41**
ledermannii Domke 39, **41**
ledermannii (non Domke) Merr. & Perry 42

moluccana (Miq.) Baill. 4, **39**, 40*, 41
podocarpus (Gilg) Domke 39, 40*, **42**
salicifolia Ridl. 39, 40*, **41**
sp. Hall. f. 42
versteegii (Gilg) Domke 2, 39, 40*, **42**
walla Gaertn. 39
walla (non Gaertn.) Koord. 42
Gyrinopsis Decne 6, 12
acuminata Merr. 11
brachyantha Merr. 10, 11, 12
brachyantha (non Merr. 1912) Merr. 11
citrinaecarpa Elm. 10
cumingiana Decne 15
var. *pubescens* Elm. 15
decemcostata Hall. f. 15
grandifolia Quis. 13
parvifolia Quis. 12
pubifolia Quis. 15
salicifolia Quis. 41
urdanetense Elm. 10
Gyrocarpus *pendulus* Blco 152

Haematosperma arborescens Hassk. 371
Haemodoraceae 5: **111–113**
Haemospermum Reinw. 369
arboreum Reinw. 371, 372
Halophila 171
beccarii Aschers. 953
decipiens Ostenf.
var. *pubescens* Hartog 953
minor (Zoll.) Hartog 953
ovata Gaud. 953
Hamamelidaceae 5: **363–379**; 6: 145, 195, 472, 952
Hannoa Planch. 198, 202
Harrisonia R.Br. 193, 195, 196, **207**
bennettii Benn. 208
var. *multijuga* F.-Vill. 208
var. *paucijuga* F.-Vill. 208
brownii A.Juss. **207**, 208* map
citrinaecarpa Elm. 208
paucijuga Oliv. 208
perforata (Blco) Merr. 207, **208***, 209 map
Hasskarlia Meisn. 51
Hebonga Radlk. 215
mollis Radlk. 219
obliqua Radlk. 219
siamensis Radlk. ex Craib 219
Hedraianthera F.v.M. 390, 393, 394, 930
porphyropetala F.v.M. 393
Hedyotis 379
Heimerlia Skottsb. 457, 459
brunoniana Skottsb. 461
Heimerliodendron Skottsb. 457, 459
brunonianum Skottsb. 461
Helicia rufescens Prain 965
Heliciopsis rufidula Sleum. 965
Helobieae 157
Hemiphragma heterophylla Wall. 960
Hemiscolopia trimera (Boerl.) Sloot. 944
Herbaceae Hutch. 62, 451
Hermicium (sphalm.) = Hermidium
Hermidium alipes S.Wats. 450
Hexaspora C.T.White 240
pubescens C.T.White 229
Heynea Roxb. 226
Hibbertia 49
Hippobroma G.Don 139, 140
longiflora G.Don 140
Hippocratea 231, 389, 397
arborea Roxb. 420
beccarii Tuyn 402
bojeri Tul. 420
brachystachys Ridl. 400
cassinoides DC. 402
cumingii Laws. 399, 400
ellipticarpa Merr. 402
ferruginea King 402
glaga Korth. 402
grahamii Wight 402
hasseltiana Miq. 398
indica (non Willd.) Span. 402
indica Willd. 401, 402
f. *timorensis* Miq. 401
var. *evonymoides* Bl. 401
lawsonii Elm. 400, 417
macrantha auct. non Korth. 400
macrantha (non Korth.) King 400
macrantha Korth. 398
macrantha (non Korth.) Rolfe 399
maingayi Laws. 262
maingayi (non Laws.) Vidal 269
megalocarpa Merr. 402
nigricaulis Ridl. 400
obtusa Ridl. 406
obtusifolia (non Roxb.) Koord.-Schum. 400
obtusifolia (non Roxb.) Merr. 406
pauciflora DC. 400
f. *minor* Miq. 400
f. *novoguineensis* Miq. 400
rigida Span. 400
salacioides Korth. 402, 404
sogerensis Baker f. 398
sp. Burk. & Haniff 406, 407
timorensis Span. 421
trichopetala Merr. 399
trilobulata Ridl. 398
volubilis (non L.) Blco 401, 402
zippeliana Miq. 402
Hippocrateaceae 228, 229, 230, 231, 389, 390, 932
Hippocraticeae Juss. 389
Hiptage *lawsonii* Elm. 417
Holosteum *hirsutum* L. 915
Homalanthus giganteus 152
Homalium Jacq.
subg. Blackwellia (Lamk) Warb. 944
sect. Blackwellia Bth. 944
subg. *Pythagorea* (Lour.) Sleum. 944
sect. *Pythagorea* (Lour.) O.K. 944
Hornera Jungh. 48
glomerata Jungh. 48
umbellata Jungh. 48
Hottonia *sessiliflora* Vahl 965
Huertea 49
Hydnocarpus 963
Hydrilla verticillata 164
Hydrocaryaceae 4: **43–44**; 6: 982; see Trapaceae
Hydrocharitaceae 5: **381–413**, 569; 6: 158, 171, 952
Hydrophyllaceae 4: **207–209**
Hymenanthes Bl. 656
Hypericineae 49
Hypsagine Jack ex Burk. 421
Hyptiandra Hook. f. 202

Iaera Copel. f. 740
lanaensis (Merr.) Copel. f. 745
loheri (Merr.) Copel. f. 741
lucida (Merr.) Copel. f. 742
Ignatia amara L. f. 347, 349
Ignatiana philippinica Lour. 347, 349
Ilex *racemosa* Oliv. 290
Indotristicha v.Royen **963**
malayana Dransf. & Whitmore 963, **964***
Inocarpus 201, 226
Ipomoea sect. Ipomoea 940
sect. *Pharbitis* (Choisy) Griseb. 940
acuminata Ruiz & Pav. 941
acuminata (Vahl) R. & Sch. 939, 940, 941
angulata Ortega 941
congesta R.Br. 939, 940, 941
dasysperma Jacq. 941
digitata L. 940, 941
gracilis R.Br. 940, 941
littoralis Bl. 940, 941
mauritiana Jacq. 940, 941
maxima (L. f.) Don ex Sweet 940, 941
×multifida (Raf.) Shinners 940, 941
ochracea (Lindl.) G.Don 939, 941
ochroleuca (sphalm.) Span. 939, 941
pes-caprae (L.) R.Br. 941
plebeia R.Br. 940

ssp. africana Meeuse 940
ssp. indica Verdc. 940
ssp. plebeia 940
purpurea Roth 941
riparia G.Don 940, 941
rubens Choisy 940, 941
sepiaria Koen. ex Roxb. 940, 941
sloteri 939
tuba (Schlechtend.) G.Don 941
tuberculata Ker-Gawl 941
Irvingella v.Tiegh. 223
harmandiana v.Tiegh. 225
malayana v.Tiegh. 225
oliveri v.Tiegh. 225
Irvingia Hook. f. 193, 194, 195, 196, 201, **223**, 969, 972
harmandiana Pierre ex Lecomte 225
longipedicellata Gagnep. 225
malayana Oliv. ex Benn. 223, 224*, **225***, 226 map
oliveri Pierre 225
Irvingiaceae 195, 972
Iso Kuroggi Kaempf. 253
Isolobus DC. 121
caespitosus Hassk. 130
campanuloides DC. 130
kerii DC. 130
radicans DC. 130
roxburghianus DC. 130
Isotoma Lindl. 108, 139, 140, 141
longiflora Presl 140
runcinata Hassk. 140
Itea 280
Ixonanthaceae 970, 972
Ixonanthes Jack 971, 972

Jacquemontia Choisy 939
browniana Ooststr. 939
Jasione 108
Jaundea Gilg 934
Johnia Roxb. 404
sumatrana Jack 421
Juglandaceae 143–154, 953
Juglandicarya Reid & Chandler 143
Juglans 143
plerococca = *pterococca* 154
pterococca Roxb. 152, 154
regia 145
rupestris Engelm. 143
sieboldiana 143
Juncaceae 4: **210–215**; 5: 557; 6: 953
Juncaginaceae 4: **56–57**; 5: 554
Juncodes silvaticum (Huds.) O.K. 953
Juncus effusus L. 953
prismatocarpus R.Br. 953

Kaernbachia Schltr 49, 51
brachypetala Schltr 59
pentandra Schltr 59
Kalmia 472
Karin-Njoti Rheede 199
Kelleria Endl. 43
papuana Domke 44
Kentia Steud. 299, 301, 309
morindaefolia Steud. 311, 315
Kippistia Miers 389
Klainedoxa 194, 195, 972
Kokoona Thw. 228, 231, 232, **258**, 260 map, 264, 389, 391, 392, 930, 932
coriacea King 260, **261**
lanceolata Ridl. 261
littoralis Laws. 231, 260, **261**
luzoniensis Merr. 262, 402
ochracea (Elm.) Merr. 259*, **260**
ovatolanceolata Ridl. 228, 259*, 260, **261**
reflexa (Laws.) Ding Hou 231, 259*, 260, **262**
scortechinii King 261
scortechinii (non King) Steen. 261
sessilis Ding Hou 260, **261**
zeylanica 260
Kokoonia = Kokoona 260, 402
Kuhlia H.B.K. 301
Kuhlia Reinw. ex Bl., non H.B.K. 299, 301, 309
morindaefolia Reinw. ex Bl. 311, 315
Kurrimia Wall. ex Arn. 230, 280
archboldiana Merr. & Perry 284
bipartita Laws. 283
calophylla Wall. 283
gracilis Vidal 284
indica Gamble 283
luzonica Vidal 282
maingayi Laws. 283
minor Ridl. 282
paniculata Wall. ex Arn. 282
pulcherrima (non Wall.) Baker f. 420
pulcherrima Wall. ex Laws. 283
robusta Kurz 282, 283
var. *roxburghii* Pierre 283
var. *thorelii* Pierre 283
Kurrimia Wall. ex Meisn. 280
Kurrimiaceae 230

Labordia Gaud. 295, 296, 370
Lachnolepis Miq. 39
moluccana Miq. 39
Lachnopylis 296
Lafoënsia Vand. 975
Lagansa alba Rumph. 103
rubra Rumph. 101
Lagerstroemia L. 975
Lasianthus furcatus (Miq.) Bremek. 373
Lasiolepis Benn. 207
bennettii Planch. 208
var. α *paucijuga* (Benn.) Planch. 208
var. ß *multijuga* (Benn.) Planch. 208
paucijuga Benn. 208
Lasiosiphon 4
scandens Endl. 25
Launaea pinnatifida 223
Lauraceae 194
Laurentia Mich. ex Adans. 109, 110, **139**, 141
sect. Isotoma (R.Br.) Endl. 107, **140**
subg. *Isotoma* Peterm. 140
gasparrinii (Tineo) Strobl. 140
longiflora (L.) Peterm. 108, 138*, **140**
var. *runcinata* (Hassk.) Wimmer 140
Lechenaultia filiformis R.Br. 951
Ledum 472
Leea 52
Legousia Durand 928
speculum-veneris (L.) Fisch. 141, 928
Leguminosae 216, 226, 933
Lemnopsis Zoll. 171
Leptopteris Bl. 343
sumatrana Bl. 343
Leucopogon R.Br. 424, 425
sect. *Anacyclodon* (Jungh.) Miq. 425
sect. *Stypheliopsis* Miq. 425
abnormis Sond. 433
acuminatus R.Br. 432
acuminatus (non R.Br.) Duperrey 433
colensoi Hook. f. 428
hookeri Sond. 428
javanicus de Vriese 431
lancifolius Hook. f. 433
malayanus Jack 426
var. α Kurz 426
var. *moluccanus* (non Scheff.) Kurz 426, 433
moluccanus Scheff. 433
obovatus Fawc. 429, 432
obtusatus Hook. f. 428
ophirensis Griff. 943
papuanus C.H.Wright 443
philippinensis (Merr.) Hosokawa 429
suaveolens Hook. f. 428
Leucosmia Bth. 15
Leucothoë 472
Libocedrus 333
Lightfootia L'Hérit., non Sw. 109, 111, 112, 113
gracilis Miq. 115
var. *lavandulaefolia* Miq. 115
Lightfootia Sw. 113
Ligia Fasano 28
Lignosae 62

Lignum colubrinum timorense Rumph. 350
Limnophila *sp.* 965
Limonia *pubescens* Wall. ex Hook. f. 208
Linaceae 970
subfam. Ixonanthoideae 970
tribe *Erythroxyleae* 195
Linaria 294
Lindernia subulata R.Br. 960
Linociera *sp.* 280
vitiensis A.C.Smith 336
Linostoma Wall. ex Endl. 2, 4, 5, **26**, 982
sect. *Eulinostoma* Meisn. 27
sect. Psilaea (Miq.) Hall. f. 27
subg. *Linostoma* Kurz 23
subg. *Nectandra* [(non Berg.) Roxb.] Kurz 27
leucodipterum Hall. f. 27
longiflorum Hall. f. 2, 26*, **27**, 982
pauciflorum Griff. 2, 26*, **27**, 982
scandens Kurz 25
Lissanthe R.Br. 424
montana R.Br. 429
Lobelia L. 107, 108, 109, 110, 119, **121**, 122, 129, 135, 137, 140, 928
sect. *Isotoma* R.Br. 140
affinis Wall. ex G.Don 128, 129
var. *lobbiana* Clarke 128
alata Labill. 136
aligera Haines 129
alsinoides Lamk 107, 122, 123, **126**, 127 map, 128, 130, 132*
anceps L. f. 129
anceps Thunb., non L. f. 136
angulata Forst. 108, 110, 123, **133**, 134*, 135*
archboldiana (Merr. & Perry) Moeliono 123, **131***, 928
arenarioides DC. 129
arfakensis Gibbs 134
aromatica Moon ex Wight, nomen 123
barbata Warb. 128
beddomeana Wimmer 124
begonifolia Wall. 133
bialata Merr. 129, 130
borneensis (Hemsl.) Moeliono 122, **133** map, 928
brachyantha Merr. & Perry 123, **131**, 132*
caespitosa Bl. 130
campanuloides Thunb. 130
camptodon Wimmer 124
chevalieri Danguy 127
chinensis (non Lour.) Hance 127
chinensis Lour. 108, 123, **130***
cliffortiana L. **136**
colorata Wall. 123, 126
conferta Merr. & Perry 123, **135***
cordigera Cav. **136**
decurrens Roth 129
dichotoma Miq. 129
var. *aligera* Wimmer 129
var. *pilosella* Wimmer 129
donanensis v.Royen **928**
doniana Skottsb. 124
dopatrioides Kurz 127, 128
dubia de Vriese 115
epilobioides Wimmer 124
var. *sarasinorum* Wimmer 124
erecta Hook. f. & Th. 123
erinoides (non L.) Thunb. 130
erinus L. **136**
erinus (non L.) Thunb. 130
eryliae Fischer 124
eurostos Voigt 123
excelsa Lesch. ex Roxb. 123
filiformis (non Lamk) Cav. 126
var. *luzoniensis* Pers. 126
fossarum Wimmer 124
graminea Lamk 136
griffithii Hook. f. & Th. 127
var. *dopatrioides* 127
var. *genuina* 127
haenkeana DC. 136
hainanensis Wimmer 127
hederacea Cham. 134
heyneana = heyniana 126, 127, 129
heyniana R. & S. 123, **129**, 130 map, 132*, 176
horsfieldiana Miq. 134
hosseusii Wimmer 127
var. *villosa* 127
inconspicua Rich. 129
inflata L. 108
javanica Thunb. 133
laurentia L. 140
laxiflora H.B.K. **136**
var. nelsonii McVaugh 136
leucanthera Kerr 124
linnaeoides (Hook. f.). Petrie 134, 135
var. *brevipilis* 134
littoralis R.Cunn. ex A.Cunn. 134
lobbiana Hook. f. & Th. 128
longiflora L. 140
longifolia DC. 136
luzoniensis (Pers.) Merr. 127, 128
micrantha Hook. 129
microcarpa Clarke 127
montana Reinw. ex Bl. 107, 108, 122, **132***, 133 map
nelsonii Fernald 136
nicotianaefolia Roth ex R. & S. 107, 110, 122, **123**, 124*, 125* map, 126
var. *bibarbata* Wimmer 123
var. *macrostemon* Skottsb. 123
var. *mollis* Elm. 123
var. *nicotianaefolia* Wimmer 123
var. *trichandra* Clarke 123
nummularia Lamk 133
obliqua Ham. ex D.Don 133
palustris Kerr 124
paradoxa Wimmer 134, 135
philippensis Skottsb. 124
plumierii L. 951
pratiana Gaudich. 133
pumila Burm. f. 136
purpurescens Wall., nomen 123
pyramidalis Wall. 123
var. ß 123
radicans (non Thunb.) Hosseus 127
radicans Thunb. 130
reinwardtiana DC. 129
reniformis Cham. 134
robusta Wall. ex Voigt 123
rosea Wall. 123
rotundifolia Banks & Sol. ex Hook. f. 134
rugulosa Graham 134
sebae DC. 129
seguinii Léveillé & Van 124
sinaloae 140
sp. Griff. 127
sp. Steen. 126
stimulans Ham. ex D.Don 123
stipularis Roth 127, 128
subcuneata Miq. 128
subincisa Wall. ex DC. 129
subracemosa Miq. 129
var. *rigidior* 129
succulenta Bl. 128, 129
f. *glabra* 128
var. *lobbiana* 128
sumatrana Merr. 122, **126***
syphilitica L. **136**
taccada Gaertn. 951
terminalis Clarke 127, 128
tetragona Bl. 136
thorelii Wimmer 127
trialata Ham. ex D.Don 126, 127, 129
var. *lamiifolia* 129
triangulata Roxb., nomen 127
trichandra Wight 123
trigona (non Roxb.) Hook. f. & Th. 129
trigona Roxb., nomen 126
wallichiana Hook. f. & Th. 123
wallichii Steud. 123
zeylanica L. 122, 123, **128**, 129
var. *affinis* 128
zeylanica (non L.) Moon 129
var. *aligera* Haines 129
var. *parviflora* Danguy 129

var. *walkeri* Clarke 129
Lobeliaceae 108, 109
Locandi Adans. 199
Locandia O.K. 201
glandulifera Pierre 201
indica O.K. 201
madagascariensis O.K. 201
mekongensis Pierre 201
merguensis Pierre 201
pendula Pierre 201
Loeseneriella A.C.Smith 262, 390, 391, **397**
cumingii (Laws.) Ding Hou 397, **399**
macrantha (Korth.) A.C. Smith 397, **398** map
pauciflora (DC.) A.C.Smith 399*, **400**, 417
sogerensis (Baker f.) A.C. Smith 397, **398**
zippeliana A.C.Smith 402
Logania 295, 296
dentata (Elm.) Hayata 960
Loganiaceae 298–387, 953–960
subfam. Buddlejoideae 294
subfam. Loganioideae 294
tribe Antonieae 294, 295, 296, 297
tribe Buddlejeae 294, **295**, 296, 297, 953
tribe Desfontainea Leeuwenb. 954
tribe *Euloganieae* 295
subtribe *Buddlejeae* 295
tribe Gelsemieae 294, 295, 296, 297
tribe Loganieae 295, 296
tribe Plocospermeae 954
tribe Potalieae 294, **295**, 296, 297
tribe Retzieae Leeuwenb. 954
tribe Spigelieae 295, 296, 297
tribe Strychneae 294, 295, 296
Loganiales 294, 297
Lonicera malayana Hend. 929
Lophopetalum Wight ex Arn. 227, 228, 229, 230, 231, 232, 260, **262**, 266 map, 391, 392, 930, 932
subg. *Solenospermum* (Zoll.) Val. 262
beccarianum Pierre 263*, 264, **266**
celastroides Laws. 269
celebicus Koord. 270
coriacea Ridl. 261
curtisii King 268, 269
dubium Laws. 261
fimbriatum (non Wight) F.-Vill. 269
fimbriatum Wight 267, 268
floribundum Wight 229, 265, **266**, 930
fuscescens Kurz 269
glabrum Ding Hou 265, **266**
grandiflorum Arn. 264
havilandii Ridl. 266
intermedium Ridl. 270
javanicum (Zoll.) Turcz. 228, 265, **269**
javanum = javanicum 269
ledermannii (Loes.) Ding Hou 265, **271**
littoralis Ridl. 261
macranthum (Loes.) Ding Hou 263*, 265, **268**, 930
maingayi Ridl. 261
micranthum Loes. 265, **268**
multinervium Ridl. 227, 228, 231, 265, **270**, 271*
oblongifolium King 270
oblongum King 269
pachyphyllum King 265, **267**
pallidum Laws. 231, 263*, 264, 265, **268**
var. *curtisii* (King) Ridl. 268
paucinervium Merr. 270
penduculatum Ridl. 250
reflexum (non Laws.) King 266
reflexum Laws. 262
rigidum Ridl. 228, 263*, 265, **267**
scortechinii King 266
sessilifolium Ridl. 228, 262, 264, **265**
sp. Thorenaar 269*, 270
subobovatum King 265, **272**
subsessile Ridl. 267
torricellense Loes. 265, **271**
toxicum Loher 230, 270
wallichii Kurz 269
wightianum Arn. 231, 264, 265, **267**
var. *macrocarpum* Pierre 267
winkleri Loes. 267
Lubinia Vent. 177, 184
linearifoba Pax 184
lubinoides Pax 184
mauritiana Spreng. 184
spathulata Vent. 184
Lunasia 221
Luronium natans (L.) Raf. 953
Lussa Rumph. 209
radja Rumph. 211
(Gay) Lussacia = Gaylussacia 761
Luzula silvatica (Huds.) Gaudin 953
Lyonia Nutt. 469, 472, 474, **674**
ovalifolia (Wall.) Drude 673*, 674*, **675** map
Lysimachia Tourn. ex L. 173, 174, 175, **177**
subg. Lysimachia (*Eu-lysimachia*) 177
sect. Alternifoliae Knuth 180
sect. Apodanthera 177
subsect. Ramosae 177
ser. Evalves 177
ser. Valvatae 177
sect. Nummularia 177, 183
ser. Debiles 177, 183
ser. Japonicae 177, 183
subg. Palladia (Moench) H.-M. 177, 184
acroadenia Maxim. 185, 186
ardisioides Masam. 178, 179
capillipes Hemsl. 177, 178, **179**, 180 map, 181, 182, 964
chapaensis Merr. 181
consobrina Hance 185
cuspidata Bl. 180, 181
var. *glabra* Mor. 181
var. *glabrescens* Knuth 181
var. *hispida* Knuth 181
cuspidata (non Bl.) Hand.-Mazz. 179
debilis Wall. 182
var. *minor* Baudo 182
var. *vulgaris* Baudo 182
decurrens Forst. f. 177, 178, 184, **185** map, 965
var. *acroadenia* Makino 185
var. *recurvata* Mats. 185
deltoides Wight 183
floribunda Zoll. & Mor. 180, 182
fragrans Hayata 178, 179
garrettii Fletch. 178
glaucophylla Hook. & Arn. 184, 185
japonica Thunb. 178, 181, **182**
var. japonica 177, **182**, 183 map
var. *minutissima* Masam. 183
var. papuana S.Moore 177, **183** map
var. *subsessilis* Hara 182
var. *thunbergiana* Hara 182
javanica Bl. 185
keiskeana Miq. 185, 186
klattiana Hance 181
laxa Baudo 177, 178, 179*, **180** map, 182, 964
linearifoba Hook. & Arn. 184
lobelioides Wall. 186
lubinoides Sieb. & Zucc. 184
maculata R.Br. 182
mauritiana Lamk 177, 178, **183**, 184 map
montana (Reinw.) Bakh. f. 177, 178, 180, **181** map
var. **montana 181**
var. **platyphylla** (Merr.) Bentvelzen **181**
microphylla Merr. 182, 183
minutissima (Masam.) Masam. 182, 183
multiflora Wall. ex Duby 185
nebeliana Gilg 184
obovata Ham. ex Hook. f. 186

peduncularis Wall. ex Kurz 177, 178, **182** map
pierrei Petitmengin 182
platyphylla Merr. 181
procumbens Baudo 183
ramosa Wall. ex Duby 180, 181, 182
var. *grandiflora* Franch. 180
var. *typica* Knuth 178, 180
var. *zeylanica* Hook. f. 180
rapensis F.B.H.Brown 185
recurvata (Mats.) Masam. 185, 186
rubida Koidz. 184
siamensis Bonato 182, 183
sikokiana Miq. 177, **178**, 179* map, 180
simulans Hemsl. 178
sinica Merr. 185
solanoides H.-M. 174
spathulata Schouw 184
spatulata = *spathulata* 184
suborbicularis Went 182, 183
trichopoda Franch. 181
uliginosa Bl. 181, 182
uliginosa (non Bl.) Klatt 181
vulgaris L. 174
Lythraceae 198, 975
subtribe Diplusodontinae 975
subtribe Lagerstroemiineae 975

Maba hierniana K. & G. 932
Macanea arborea Blco 421
Macgregorianthus Merr. 23
paniculatus Merr. 25
Maerua 61
Maesa membranifolia Mez 237
perakensis Ridl. 290
ramentacea (Roxb.) A.DC. 237
Magnolia 228
Magnoliaceae 228
Malpighiaceae 5: **125–145**, 566; 6: 960
Malpighiales 195
Mangifera L. 231
glauca Rottb. 286
Mannia Hook. f. 202
Manotes asiatica Gagnep. 205
Manungala Blco 199
pendula Blco 201
Mastixiodendron pachyclados (K.Sch.) Melch. 336
Mauduita Comm. ex DC. 199
penduliflora Comm. ex DC. 200
Maurocenia sect. *Triceros* O.K. 51
pomifera O.K. 58
zollingeri O.K. 56
Maytenus Molina 227, 228, 229, 230, 231, 232, **238**, 240, 243, 391, 392, 930
acuminatus 228
bilocularis (F.v.M.) Loes. 243
boaria Molina 240
crassa Ding Hou 240, **242**
cupularis Ding Hou 239*, 240 **243**
curtisii (King) Ding Hou 239*, **240**
dispermus 230
diversifolia (Maxim.) Ding Hou 231, 232, 240, 241, **242**, 391, 930
emarginata (Willd.) Ding Hou 229, 239*, 240, **241**, 930
ilicifolia Mart. 229
magnifolia 228
nitida Mart. 242
rapakir Loes. 242
senegalensis (Lamk) Exell 240, 241
spinosa (Gris.) Lourt. & O'-Donell 229
vitiensis (A.Gray) Ding Hou **242**
Mazus pumilus (Burm. f.) Steen. 136
Medicia Gardn. & Champ. 343
elegans Gardn. & Champ. 343
Melastomataceae 914
Meliaceae 194, 212, 220
Melichrus R.Br. 424
Menyanthes trifoliata 294
Merremia Dennstedt 939
sect. *Eu-Merremia* 939
sect. Merremia 939
aniseiifolia Ooststr. **939**, 940*
borneensis Merr. 939
crispatula Prain 939
emarginata (Burm. f.) Hall. f. 939
gangetica (L.) Cufod. 939
peltata (L.) Merr. 939
quinata (R.Br.) Ooststr. 939
tridentata (L.) Hall. 939
ssp. hastata Ooststr. 939
Messerschmidia argentea 197
Micropyxis Duby 176
pumila Duby 176
tenella Wight 176
Microsemma 3
Microtropia Rchb. 272
Microtropis Wall. ex Meisn. 227, 228, 229, 230, 232, **272**, 275 map, 391, 392, 930
basilanensis Merr. & Freem. 279
bicolor Merr. & Freem. 276
bivalvis (non Wall.) Koord. 277
bivalvis (Jack) Wall. 272, 274, **276**
borneensis Merr. & Freem. 279
chartacea Merr. & Freem. 279
coriacea Wall. ex Ettingsh. 280, 412
curranii Merr. 273, 274, **278**
var. *obovata* Merr. & Freem. 278
var. *zambalesensis* Merr. & Freem. 278
discolor (Wall.) Wall. 272, 274, **275**
elliptica King 273*, 274, **277**
fasciculata Quis. & Merr. 279
filiformis King 232, 276, 277, 391
javanica Merr. & Freem. 277
kinabaluensis Merr. & Freem. 274, **277**
var. *acuminata* 277, 278
lanceolata Boerl. & Koord. 280
longifolia Wall. 274
longirostris Merr. & Freem. 277
ophirensis Ridl. 277
ovata Merr. & Freem. 274, 275, **279**
pachyphylla Merr. & Freem. 274
pauciflora Boerl. ex Merr. & Freem. 276
peduncularis Ridl. 276, 277
philippinensis Merr. 279
platyphylla Merr. 274, 275, **279**
var. *ellipticifolia* Merr. & Freem. 279
ramiflora (non Wight) Thw. 279
rigida Ridl. 275, **278**
rostrata Merr. 279
rubra Elm. ex Merr. & Freem. 279
sterrophylla Merr. & Freem. 277, 278
suborbiculata Merr. & Freem. 279
sumatrana Merr. 275, **278**
tenuis Symington 272, 274, **275**, 276
tetrameris Ding Hou 272, 273*, 274, **275**
valida Ridl. 274, **276**
vinculans Boerl. & Koord. 277
wallichiana Wight ex Thw. 275, **279**
zeylanica Merr. & Freem. 279
Mirabilis L. 450, **451**
jalapa L. 450, **451**
Mirabilis Rumph. 451
longiflora (non L.) Blco 451
Mischopleura Wernh. 914
Mitrasacme Labill. 293, 295, 296, 297, 375, **378**
albomarginata Leenh. 379, **385***
alsinoides R.Br. 379, 384
alsinoides (non R.Br.) Clarke 384

var. *indica* (Wight) Hara 384
alsinoides (non R.Br.) Merr. 382
bogoriensis Leenh. 379, **386***, 960
capillaris Wall. 382, 383, 384
chinensis Griseb. 382
connata R.Br. 381
crystallina Griff. 384
elata R.Br. 293, 379, **380**, 381* map, 960
var. brevicalyx Leenh. 380*, **381**, 960
var. elata 380*, **381**
erophila Leenh. 380, 384, **960**
exserta F.v.M. 382
indica Wight 379, **384** map, 386, 960
longiflora F.v.M. ex Bth. 380, 381
malaccensis Wight 382, 383
micrantha Domin 382, 383, 384
neglecta Leenh. 379, **386**, 960
nudicaulis (non Bl.) Bth. 382, 383, 960
nudicaulis Reinw. ex Bl. 380, 381, 382
paludosa R.Br. 385
polymorpha R.Br. 379, 384
polymorpha (non R.Br.) Clarke 382, 383, 384
var. *grandiflora* Hemsl. 382
var. *parishii* Clarke 382
pusilla Dalz. 384, 385
pygmaea R.Br. 379, **382**, 960
var. grandiflora (Hemsl.) Leenh. 383
var. malaccensis (Wight) Hara 380, 382*, **383**, 384
var. parishii (Clarke) Leenh. 383
var. pygmaea 380, 382*, **383***, 384, 960
saxatilis Back. 379, **385**, 960
setosa Hance 382
setosa (non Hance) Masam. 382
tenuiflora Bth. 379
trinervis Span. 380, 381, 382, 383
Mitrasacmopsis Jovet 297
Mitreola Boehm. 375
Mitreola L. 296, 375, 959
inconspicua Zoll. & Mor. 375
oldenlandioides (Wall.) G.Don 375, 377
paniculata Wall. ex G.Don 375
var. *lilacina* Back. 375, 377
perrieri Jovet 377
petiolata (Gmel.) Torr. & Gray 375, 959
reticulata Tirel 960
sphaerocarpa (Leenh.) Leenh. 960
turgida Jovet 377
Mitreola Schaeff. 375
Modagam Rheede 315
Molinadendron Endress 952
Mollugo nudicaulis Lamk 384
Monocelastrus Wang & Tang 231, 233, 234
monosperma (Roxb.) Wang. & Tang 234
virens Wang & Tang 234
Monochoria hastata (L.) Solms 964
Monopsis simplex (L.) Wimmer 129
Monotropa L. 472
humilis D.Don 670
uniflora L. 670
Monotropaceae 473
Monotropanthum Andres 670
Monotropastrum Andres 469, 470, 474, **670**
humile (D.Don) Hara **670**, 671*
Moringa *domestica* Ham. ex Henschel 960
oleifera Lamk 960
Moringaceae 4: **45–46**; 5: 554; 6: 62, 960
Mostuea 294, 295, 296
Moya Griseb. 238
spinosa Griseb. 229
Muenteria Walp. 212
Myoporaceae 4: **265–266**
Myricaceae 4: **276–279**; 6: 143, 146
Myristica *laurina* (non Bl.) Hochr. 933
Myristicaceae 194
Myrsinaceae 173, 174, 237
Mystroxylon 229, 284

Najadaceae 157–171
Najadales 157
Najadeae 171
Najas L. **157**, 158
subg. *Caulinia* Aschers. ex Rendle 161, 164
sect. Caulinia A. Braun 161, **164**
subg. *Eunajas* Aschers. ex Rendle 162
sect. *Eunajas* A.Braun 162
sect. Najas 161, **162**
bengalensis Horn af Rantzien 169
brevistyla Rendle **167**
browniana Rendle 158, 160*, 161, 163 map, **165**
celebica Koord. 167, 168
falciculata A.Braun 165, 166
falciculata (non A.Braun) Coert 168
foveolata A.Braun ex Rendle 166
gracillima (A.Braun) Magnus 165, 166
graminea Del. 158, 161, **169**, 170 map
var. *angustifolia* Rendle 169
var. *delilei* Magnus 169
var. graminea 158, 160*, **170**
var. *minor* Rendle 169
var. robusta de Wilde **170**
var. (ß) *tenuifolia* (R.Br.) A.Braun 167, 168, 169
graminea (non Del.) Miq. 168
graminea (non Del.) Ridl. 169
hagerupi Horn af Rantzien 165
horrida 170
indica (Willd.) Cham. 158, 160*, 161, 164, **166**, 167 map, 170
var. *gracillima* A.Braun ex Engelm. 165
var. *macrodictya* A.Braun 166
var. *rigida* A.Braun 166
intermedia Gorski 162
kingii Rendle 166
kurziana Rendle 160*, 161, 163 map, **165**
lacerata Rendle 166
lobata Blco 166
major All. 162
ß *angustifolia* A.Braun 162
ε *intermedia* A.Braun 162
malesiana de Wilde 158, 160*, 161, **169** map
marina L. 158, 159, 160, 161, **162**, 170
var. ß 162
var. γ 162
var. *angustifolia* Rendle 162
var. *intermedia* Rendle 162
var. marina 160*, **162**, 163 map
var. sumatrana de Wilde 160*, 162, **163** map
var. zollingeri Rendle 158, 160*, 162, **163***
minor All. 161, **164**
var. *indica* A.Braun 166
minor (non All.) Hook. f. 166
obvoluta Blco 171
oguraensis Miki 164
palustris Blco 166
pseudograminea W.Koch 167, 168
seminuda Griff. ex Voigt 169
tenuifolia (non R.Br.) auct. 168
tenuifolia R.Br. 158, 161, **167**, 168
ssp. **pseudograminea** (W. Koch) de Wilde 167, **168**
var. **celebica** (Koord.) de

Wilde 158, 160*, **168**
var. pseudograminea 159*, 160*, **168** map
ssp. tenuifolia 167, **168**
tenuifolia (non R.Br.) Miq. 166
Naumburgia Moench 174, 175, 177
Nectandra (non Berg.) Roxb. 26
Neerija dichotoma Roxb. 286, 287
Neojunghuhnia Koord. 785
insignis Koord. 787
Neotrewia *arborea* Elm. 944
cumingii (M.A.) P. & H. 944
Nephelium 283
Nertera *dentata* Elm. 960
Neuburgia Bl. 293, 295, 296, 297, **363**, 959
celebica (Koord.) Leenh. 364*, 365, **367**, 368, 959
corynocarpa (A.Gray) Leenh. 364*, **365**, 366, 959
kochii (Val.) Leenh. 365, **366**, 959
moluccana (Boerl.) Leenh. 364*, 365, **367**, 368*, 369
musculiformis (Lamk) Miq. 367, 368
rumphiana Leenh. 364*, 365, **367**, 959
sarcantha (Gilg & Bened.) Leenh. 363, 365, **366**, 959
sumatrana (Miq.) Boerl. 369
tuberculata Bl. 365, 367, 368
tubiflora Bl. 365, 367, **368**
Neuropeltis Wall. 936, 937
Neuropeltopsis Ooststr. 936, **937**
alba Ooststr. **937**, 938*
Nicodemia Tenore 296, 336, 340
diversifolia Tenore 340
madagascariensis R.N. Parker 340
philippinensis Elm. 341
Nima Ham. ex Juss. 212
Niota Lamk 199
commersonii Pers. 200
globosa Blco 203
lamarckiana Bl. 200
lucida Wall. 200
pentapetala Poir. 199
polyandra Buch.Ham. ex W. & A. 203
tetrapetala Poir. 200
Norrisia Gardn. 293, 295, 296, 297, **341**
maior Soler. **341**, 342*
malaccensis Gardn. **341**, 342*, 373
var. *major* (Soler.) Ridl. 342
var. *malaccense* Ridl. 341
var. *pubescens* K. & G. 341
malaccensis (non Gardn.) Merr. 341
philippinensis Elm. 341
Nothocnestis Miq. 280
sumatrana Miq. 283
Nothofagus 49
Nothoprotium Miq. 928
Nürvala Rheede 68
Nuxia 294, 295, 296
Nyctaginaceae 450–468
Nypa 965
Nyssaceae 4: **29–31**

Ochranthe Lindl. 49, 51
Ochthocosmus Bth. 971, 972
Odyendyea (Pierre) Engl. 198, 202
Olacaceae 420
Oldenlandia brachyphylla Merr. 384
Oleaceae 280, 296, 297, 336
Olus album Rumph. 464
album insulare Rumph. 464
Operculina riedeliana (Oliv.) Ooststr. 939
Ophiorhiza L. 375
mitreola L. 375
mungos L. 375
Ophispermum Lour. 6
Orchipeda sumatrana Miq. 369
Oreamunoa = *Oreomunnea* 148
Oreomunnea Oerst. 145, 148
Orescia Reinw. 177
montana Reinw. 181
Orobanchaceae 294
Orobanche 294
Oxybaphus 451

Pachistima 228
Paliurus dubius Blco 208
perforatus Blco 208
Palmerella 140
Papaveraceae 5: **114–117**; 6: 62, 63
Paphia Seem. 878
helenae (F.v.M.) Schltr 879
stenantha Schltr 884
viridiflora Schltr 883
Paracelastrus Miq. 272, 277
bivalvis Miq. 276
wallichianus F.N.Williams 279
Parietales 968
Parophiorrhiza Clarke 375
Paropsia vareciformis (Griff.) Mast. 944
Passerina javanica Thunb. 48
Pedaliaceae 4: **216–221**; 5: 557
Pedicellaria Schrank 99
pentaphylla Schrank 101
Pelargonium L'Hérit. 445, 448, 449
×asperum Ehrh. ex Willd. 449
crispum 449
graveolens Thunb. 449
radens H.E.Moore 449
Pellacalyx saccardianus Scort. 967
Pelletiera 173
Peltanthera Bth. 294, 295, 296, 953
Pemphis acidula Forst. 198
Pentaceras australis Hook. f. 220
Pentachondra javanica Zoll. 431
Pentaphragma 107, 108, 109, 110
Pentaphragmataceae 4: **517–528**
Pentaphylacaceae 5: **121–124**, 566
Pentapterygium Klotzsch 878
scortechinii K. & G. 879
Pentaspadon Hook. f. 928
Peracarpa Hook. f. & Th. 107, 109, **110**
carnosa (Wall. in Roxb.) Hook. f. &. Th. **110**
var. *circaeoides* 111
circaeoides Feer 111
luzonica Rolfe 111
Pericopsis Thw. 976
Pernettya 472
repens (Bl.) Zoll. 684
Pernettyopsis K. & G. 469, 474, **675**
breviflora (Ridl.) Ridl. 676
malayana K. & G. **676***
subglabra K. & G. 676
Perriera 194
Perrottetia H.B.K., non DC. 228, 229, 230, 231, 232, 240, **288**, 390, 391, 392, 930
alpestris [non (Bl.) Loes.] Koord. 291
alpestris (Bl.) Loes. 229, **290**, 291 map
ssp. alpestris 289*, **290**
ssp. **moluccana** (Bl.) Ding Hou 289*, 290, **291**
ssp. **philippinensis** (Vidal) Ding Hou 289*, 290, **291**
var. *philippinensis* Stapf 291
arborescens (F.v.M.) Loes. 291
arisanensis Hayata 290
caudata Ridl. 291
grandifolia Ridl. 291
lauterbachiana Loes. 291
f. ß *macrophylla* Loes. 291
moluccana (Bl.) Loes. 291
nervosa Ridl. 291
philippinensis Loes. 291
racemosa (Oliv.) Loes. 290
schlechteri Loes. 291
traumatophylla Merr. & Perry 291
Phaleria Jack 2, 3, 5, **15**, 19*
ambigua Hook. f. 17
amboinensis Merr. 21
axillaris Elm. 23
blumei (non Bth.) Hemsl. 18
calantha Gilg 22, 23
capitata Jack 2, 14*, 16, **20***,

21 map
cauliflora Bedd. 20
coccinea (Gaudich.) F.v.M. 16, **21**
cumingii F.-Vill. 20
dubiosa Zoll. 20
elegans Perry 14*, 16, **17**
laurifolia Hook. f. 2, 17, 18
var. *javanica* Val. 17
longifolia Boerl. 17
macrocarpa (Scheff.) Boerl. 2, 14*, 16, **22***
neumanni F.v.M. 2
nisidai Kaneh. 16, **19**
octandra (L.) Baill. 2, 14*, 16, **17**, 18 map
var. *laurifolia* Warb. ex von Malm 17
octandra [non (L.) Baill.] K.Sch. & Hollr. 22
papuana Warb. ex K.Sch. & Laut. 22
parvifolia Back. 17
pentecostalis Léandri 4, 16
perrottetiana (Decne) F.-Vill. 5, 16, **18** map, 19
platyphylla Merr. 21
revoluta Boerl. 21
sogerensis S.Moore 16, 21
sp. Gilg 22
splendida Val. 18
subcaudata Merr. & Perry 21
urens Koord. 20
vriesii Baill. 21
wichmannii Val. 22, 23
zippelii Baill. 21
Phanrangia Tardieu 231
Philagonia Bl. 226
Phyllidraceae 4: **5–7**
Phyllocharis Diels 107, 109, 110, **137**, 928
lamiifolia Wimmer 139
oblongifolia Diels **137**, 139*
saxicola v.Royen 137, **139***, *schlechteri* Diels **137**, 139*, *subcordata* Merr. & Perry 137, **139***,
Phyteuma 108
Phytolaccaceae 4: **228–232**; 5: 557, 6: 109, 451
Picraena Lindl. 212
Picramnia 194
Picrasma Bl. 193, 195, 196, **212**
andamanica Kurz ex Benn. 214
denhamii Seem. 214
javanica Bl. 213*, **214** map
nepalensis Benn. 214
philippinensis Elm. 214
quassioides (D.Don) Benn. 193, 194, 214
Picroderma laotica Thorel ex Gagnep. 226
Picrolemma pseudocoffea Ducke 194
Picrophloeus Bl. 299, 303
javanensis Bl. 303, 304
Picroxylon Warb. 203
siamense Warb. 205
Piddingtonia DC. 121
cyanocarpa Hassk. 132
montana Miq. 132
nummularia DC. 134
palliardii Lehm. 134
patens Miq. 132
Pieris (non D.Don 1834) Clarke 472, 674
ovalifolia (Wall.) D.Don 675
Pierreodendron Engl. 198, 202
Pimela alba Lour. 926
nigra Lour. 927
Pimelea Banks & Soland. ex Gaertn. 2, 3, 4, 5, 6, 43, **44**
subg. Thecanthes (Wikstr.) Gilg 46
brevituba Fawc. 46
concreta F.v.M. 45*, **46*** map
cornucopiae Vahl 45*, **46** map
philippinensis C.B.Rob. 46
sp. Dammerm. 46
Piper 468
Pirola = Pyrola
Pisonia Plum. ex L. 450, 451, **457**, 462 map
aculeata L. 450, 457, 459, 460, 463*, **467** map
alba Span. 464, 466*
anisophylla Hassk. 467
artensis (Montr.) Barg.-Petr. 459, 460
aruensis Barg.-Petr. 461
beccariana Barg.-Petr. 463
brunoniana Endl. 460
cauliflora Scheff. 460, **462** map
corniculata Barg.-Petr. 460, **464**
diandra Pulle 458*, 459, 460, **463**
excelsa Bl. 460
excelsa (non Bl.) Corner 459, 464, 465
fragrans 459
gammillii Merr. 461
grandifolia Warb. 463
grandis R.Br. 197, 223, 459, 460, **464**, 465* map, 466*
var. *sylvestris* (T. & B.) Heimerl 464
inermis (non Jacq.) Forst. ex Seem. 464, 466, 467
inermis Jacq. 466, 468
limonella Bl. 467
lineatipilum C.DC. 468
longirostris Teysm. & Binn. 459, 460, **463***, 464 map
macrophylla (Bojer) Choisy 464
major Baill. 462
membranacea K.Sch. & Hollr. 468
micrantha Val. 463
mitis L. 467
mooriana F.v.M. 461
morindifolia R.Br. ex Wight 464
mülleriana Warb. 459, 460, **462** map, 464
nishimura Koidz. 461
procera Bertero ex Guill. 464, 467
rostrata Warb. 463
spathiphylla K.Sch. & Laut. 463
sylvestris Teysm. & Binn. 464, 467
triandra Barg.-Petr. 463
umbelliflora (Forst.) Seem. **460**, 461* map
villosa Poir. 467
Pittosporaceae 5: **345–362**; 6: 373, **960–963**
Pittosporales 63
Pittosporum Banks ex Gaertn. 152, 960
berberidoides Burkill 961, 963
ferrugineum 12
var. *filarium* DC. 11
filarium Oken 11, 12
inopinatum Bakker 961, **962***
moluccanum (Lamk) Miq. 373, 963
nubicola Schodde 963
pentandrum (Blco) Merr. 15, 963
pullifolium Burkill 963
var. **globosum** Steen. 961, **963**
pumilum Schodde 961, **962**
ramiflorum (Z. & M.) Zoll. ex Miq. 961
f. macrocarpum Bakker 961
resiniferum Hemsl. 961
serrulatum Jack ex Roxb. 963
sinuatum Bl. 961, 963
var. **efuniculare** Steen. **961**
tenuivalve Schodde 961
Pityopus Small 670
Platycarya 143
strobilacea 143
Platycodon grandiflorum (Jacq.) DC. 108, 141
Pleurostylia W. & A. 227, 228, 232, **287**, 391, 392, 930
heynei W. & A. 288
opposita (Wall.) Alston 287*, **288**
wightii W. & A. 288
var. *neocaledonica* Loes. 288
Pleurostylis = Pleurostylia 288
Plocosperma Bth. 954
Plumbaginaceae 4: **107–112**; 6: 173, 174, 451
Plumbaginales 451
Plumbago 451
Podandrogyne 100

Podocarpus 333
Podostemaceae 4: **65–68**; 6: **963–964**
Polanisia (non Raf.) DC. 62, 99, 100
angulata DC. 102
chelidonii DC. 102, 103
dodecandra (L.) DC. 100
icosandra W. & A. 103
f. *deglabrata* Back. 104
f. *typica* Back. 103
viscosa DC. 103, 104
f. *typica* Back. 103
var. α Back. 103
var. *deglabrata* Back. 104
Polanisia Raf. 62, 99, 100
graveolens Raf. 99, 100
Polemoniaceae 4: **195–196**
Polycardia Juss. 932
Polygalales 63
Polypremum 293, 295, 296
Pongamia pinnata (L.) Merr. 973
Pongelion Adans. 215, 216
sect. *Ailanthus* Pierre 215
sect. *Euailanthus* Engl. 215
sect. *Eupongelion* Rumph. ex Pierre 215
cacodendron Farwell 220
calycinum Pierre 218
excelsum Pierre 219
fauvelianum Pierre 219
grandis v.Tiegh. 218
imberbiflora Pierre 219
malabaricum Pierre 219
wightii v.Tiegh. 219, 220
Pongelion Rheede 219
Pongelium glandulosum Pierre 220
vilmorinianum v.Tiegh. 220
Pontederiaceae 4: **255–261**; 5: 557; 6: 964
Posoqueria longiflora Aubl. 349
Potalia 295
Potaliaceae Hutch. 297
Potamogetonaceae 157, 171
Pragmatropa Pierre 245
Pragmotessara Pierre 245
japonica Pierre 252
Pratia Gaudich. 107, 109, 119, 121, 122, 135
angulata (Forst.) Hook. f. 122, 134, 135
var. *arenaria* 134
archboldiana Merr. & Perry 131
arenaria Hook. f. 134
arenosa = *arenaria* 134
begoniaefolia = *begonifolia* 134
begonifolia (non Lindl.) Hosseus 128
begonifolia Lindl. 134
begoniifolia = *begonifolia* 134
borneensis Hemsl. 133
var. *grandiflora* Stapf 133
conferta Wimmer 135
hederacea G.Don 134
var. *elliptica* 134
linnaeoides Hook. f. 134
montana Hassk. 132
f. *variegata* Hochr. 132
var. *cyanocarpa* Wimmer 132
nummularia A.Br. & Aschers. 134, 135
ovata Elm. 128
papuana S.Moore 134, 135
podenzanae S.Moore 134
radicans G.Don 131
reniformis Kanitz 134
repens Gaudich. 134
serpyllacea Presl. 134
thunbergii G.Don 131
torricellensis K.Sch. & Laut. 128
wollastonii S.Moore 134, 135
zeylanica Hassk. 134
Primula Tourn. ex L. 173, 174, 175, **186**, 188
sect. Callianthae Pax 191
sect. *Candelabra* Balf. f. 186, 191
sect. *Cankrienia* (de Vriese) Pax 186
sect. Proliferae Pax 186, 188, 191
auricula L. 175
cortusioides L. 174
elatior (L.) Hill 173
farinosa L. 186, 189
helodoxa Balf. f. 190, 191
hirsuta All. 188
hortensis 188
imperialis Jungh. 189, 190, 191
var. *gracilis* Pax 189
kewensis W.Wats. 175
khasiana Balf. f. 190, 191
kuhlii Bl. 190
malacoides Franch. 192
minutiflora Forrest 191
mollis Hook. 174
obconica Hance 174, 192
praenitens Ker-Gawl 175, 188, 192
prolifera Wall. 173, 186, 187*, **189***, 190* map
saxifragifolia O.K. 191
sieboldii Morren 174
sinensis Lindl., non Lour. 175, 188, 192
smithiana Craib 190, 191
sumatrana Merr. 190, 191
umbellata (Lour.) Bentv. 186, 189, **191***, 192 map
veris L. 173, 174
var. elatior L. 192
Primulaceae 173–192, 964
subfam. Androsaceae 174
subfam. Corideae 174
subfam. Cyclamineae 174
subfam. Lysimachieae 174
subfam. Samoleae 174
Pristimera *grahamii* A.C.Smith 402
indica A.C.Smith 401
Proteaceae 5: **147–206**, 566; 6: 368, 965
Protium javanicum Burm. f. 917
macgregorii (F.M.Bailey) Leenh. 917
Pseudais Decne 15
coccinea Decne 21
Pseudogardneria Racib. 296
Pseudospigelia 296
Psilaea Miq. 27
dalbergioides Miq. 27, 982
Psychotria L. 387, 959
Pteridophyta 171
Pterilema Reinw. 145
aceriflorum Reinw. 152
Pteris wallichiana Agardh 187*
Pterocarya 143
Punicaceae 4: **226–227**
Pyrola Tourn. ex L. 469, 472, 474, **671**
japonica Klenze ex Alefeld 673
ssp. coreana Andres 673
japonica (non Klenze ex Alefeld) Steen. 671
sumatrana Andres **671**, 672*
Pyrolaceae 472, 473
Pyroleae 472
Pyrospermum Miq. 280
calophyllum Miq. 282
Pyrus granulosa Bertol. 878

Quassia L. 968, 969
harmandiana (Pierre) Noot. 969

Randia cochinchinensis (Lour.) Merr. 309
Rapuntium Miller 121
affine Presl 128
alsinoides Presl 127
angulatum Presl 134
arenarioides Presl 129
caespitosum Presl 130
campanuloides Presl 130
chinense Presl 130
coloratum Presl 123
haenkeanum Presl 136
leschenaultianum Presl 123
longiflorum Miller 140
longifolium Presl 136
nicotianaefolium Presl 123
nummularium Presl 134
pyramidale Presl 123
radicans Presl 130
reinwardtianum Presl 129
reniforme Presl 134
roseum Presl 123
succulentum Presl 128

trialatum Presl 129
wallichianum Presl 123
zeylanicum Presl 128
Reissantia Hallé 390, 391, **400**
cassinoides (DC.) Ding Hou **402**
ferruginea (King) Ding Hou **402**
grahamii (Wight) Ding Hou **402**, 403*
indica (Willd.) Hallé **401**
Resedaceae 62, 63
Restionaceae 5: **416–420**, 569
Retzia Thunb. 295, 297, 954
Rex amaroris Rumph. 221
Rhamnaceae 49, 280, 284
Rhamphocarya Kuang 143
Rhesa = Bhesa 282, 283
Rhizophora L. 965
apiculata Bl. 966
harrisonii Leechm. 974
mucronata Lamk 965, 966
stylosa Griff. 966
Rhizophoraceae 5: **429–493**; 6: 361, **965–967**, 974
Rhododendron L. 469, 470, 471, 472, 473, **474**, 475 map
subg. Anthodendron (Rchb.) Endl. ex Wils. & Rehd. **661**, 943
sect. Anthodendron (Rchb.) Endl. **661**, 943
subg. *Anthodendron* (non Wils. & Rehd.) Sleum. 661, 662
sect. *Anthodendron* Sleum. 662
subg. Azaleastrum Planch. 480, **665**
sect. Choniastrum Franch. 480, **665**, 666 map
subg. *Eurhododendron* (Endl.) Koehne 656
sect. *Eurhododendron* Endl. 657
subg. Hymenanthes (Bl.) Koch 480, **656**
sect. Hymenanthes 480, **657**
subsect. Irrorata Sleum. 480, **657** map
subg. *Hymenanthus* = Hymenanthes 656
subg. *Lepidorrhodion* Koehne 480
subg. *Pentanthera* (G.Don) Pojarkova 480, **661**, 943
sect. *Pentanthera* 480, **661**, 943
subg. *Pseudovireya* Clarke 480
subg. Rhododendron 479, **480**, 943
sect. *Discovireya* Sleum. 480
sect. *Eurhododendron* Endl. 480
sect. *Hadranthe* Schltr 497, 501, 547
sect. *Hapalanthe* Schltr 606
sect. *Linnaeopsis* Schltr 568
sect. *Schistanthe* Schltr 501, 606
sect. Vireya (Bl.) Copel. f. 475, 477*, 478*, 479, **480**, 943
subsect. Albovireya Sleum. 479, **537**, 538 map
subsect. *Astrovireya* Sleum. 580
subsect. Euvireya Copel. f. 476, 479, 527, 537, **567** map, 606
ser. Buxifolia Sleum. 538, 568, **580**
ser. Citrina Sleum. 568, **579**
ser. Javanica Sleum. 536, 568, **606**
ser. Linnaeoidea Sleum. 567, **568**
ser. Saxifragoidea Sleum. 567, **574**
ser. Stenophylla Sleum. 568, **576**
ser. Taxifolia Sleum. 568, **575**
subsect. *Leiovireya* Copel. f. 606
subsect. *Linearanthera* Copel. f. 580
subsect. *Linnaeopsis* (Schltr) Sleum. 568
subsect. Malayovireya Sleum. 477*, 478*, 479, **527** map
subsect. *Malesia* Copel. f. 580
subsect. Phaeovireya Sleum. 478*, 479, **501**, 511, 527 map
subsect. Pseudovireya (Clarke) Sleum. 476, 478*, 479, **480** map, 527, 536
subsect. *Schizovireya* Sleum. 606
subsect. Siphonovireya Sleum. 476, 479, **497**, 527 map
subsect. Solenovireya Copel. f. 476, 479, 527, **547** map
sect. *Zygomorphanthe* Schltr 480, 501, 537, 576, 580, 606
ser. *Malayanum* Copel. f. 527
subg. Tsutsutsi (G.Don) Pojarkova 480, **661**
sect. *Tsutsia* = Tsutsutsi 662
sect. *Tsutsugi* = Tsutsutsi 662
sect. *Tsutsusi* = Tsutsutsi 662
sect. Tsutsutsi 480, 657 map, **662**
subg. *Vireya* (Bl.) Clarke 480
abietifolium Sleum. 581, **590**, 591
acrocline Sleum. 652
acrophilum Merr. & Quis. 581, **595**
acuminatum Hook. f. 528, **534***
adinophyllum Merr. 481, **490***
aequabile J.J.S. 538, **539**
agathodaemonis J.J.S. 497, **499**, 505
agathodaemonis (non J.J.S. 1913) J.J.S. 1936 500
album Bl. 538, **539**, 626
album (non Bl.) Ridl. 539
album (non Bl.) Zoll. 540
alternans Sleum. 581, **592**
alticolum Sleum. 582, **597**
amabile Sleum. 548, **559**
anagalliflorum Wernh. **568**
andersonii Ridl. 536
angiense J.J.S. 652
angulatum J.J.S. 607, **616**
apoanum Stein 528, **531**
araiophyllum Balf. f. & W.W. Sm. 661
archboldianum Sleum. 548, **555**
arenicolum Sleum. 539, **546**
arfakianum Becc. 581, 609, 610, **648**
armitii F.M.Bailey 548, **557**
asparagoides Wernh. 643
asperrimum Sleum. **509**
asperum J.J.S. 476, 478, 517, **521***
astrapiae Foerster 515
atjehense Sleum. 472, **657**, 658*, 659*
atropurpureum Sleum. 570, 582, 602*, **603**
aurigeranum Sleum. 609, **642**
baenitzianum Laut. 608, **627**
bagobonum Copel. f. 580, **586**
banghamiorum (J.J.S.) Sleum. 581, **596**
basirotundatum J.J.S. 626
beccarii Sleum. 607, **622**, 626
beyerinckianum Koord. 477*, 478, **511**
var. *longipetiolatum* J.J.S. 511
bloembergenii Sleum. 608, **633**
bodenii Wernh. 497
brachygynum Copel. f. 609, 610, **650**
brachypodarium Sleum. 549,

561, 562*
brassii Sleum. 470, 582, **600**
brevipes Sleum. 609, **642**
brevitubum J.J.S. 607, **622**
breynii Planch. 663
brookeanum Low ex Lindl. 475, 537, 610, **655**
var. brookeanum **655**, 656
var. cladotrichum Sleum. 655, **656**
var. extraneum Sleum. 655, **656**
var. gracile (Low ex Lindl.) Sleum. 655, **656**
brookeanum (non Low ex Lindl.) Stapf 653
bryophilum Sleum. 477*, **509**
bullifolium Sleum. **522**
burmanni G.Don 662
buruense J.J.S. 608, **632**
buxifolium Low ex Hook. f. 582, **603**
var. buxifolium **603**, 604
var. robustum Sleum. 591, **604**, 612
caespitosum Sleum. 568, 569*, **571***
calceolarioides Wernh. 634
callichilioides Wernh. 628
var. *minor* Wernh. 628
calodon Ridl. 591
calosanthes Sleum. 582, **605**
candidapiculatum Wernh. 572
carrii Sleum. 548, **557**
carringtoniae (non F.v.M.) Lane-Poole 500
carringtoniae F.v.M. 548, **552**, 558
var. *maius* J.J.S. 554
carstensense Wernh. 548, **553**
caryophyllum Hayata 664
celebicum (Bl.) DC. 606, **615**
cernuum Sleum. 538, **545**
cerochitum Balf. f. & Forr. 661
chamaepitys Sleum. 548, **552**
chevalieri Dop 475
christi Foerster 606, **612**, 614
var. *loniceroides* Schltr 612
christianae Sleum. 471, 608, **637**
chrysopeplon Sleum. 512
ciliilobum Sleum. 482, **494**
cinchoniflorum Sleum. 497, **498***
cinerascens Sleum. 540, **561**
citrinum (Hassk.) Hassk. **579**
var. *albiflorum* Miq. 579
var. citrinum **579**
var. discoloratum Sleum. **580**
citrinum (non Hassk.) Miq. 580
clementis Merr. 625
coelorum Wernh. 568, **573**
coenenii J.J.S. 652
commonae Foerster 581, **587**, 588*, 589*
commutatum Sleum. 608, **629**
comparabile Sleum. 608, **636**
comptum C.H.Wright **543**
var. comptum 538, **543**, 544*
var. trichodes 538, **544**
coniferum Wernh. 543
convexum Sleum. 651
copelandii Merr. 567
coriifolium Sleum. 612
cornu-bovis Sleum. 580, **585**
correoides J.J.S. 538, **543**
corruscum Ridl. 659
crassifolium Stapf 607, **626**
crassinervium Ridl. 626
cruttwellii Sleum. 548, **554**, 555*
culminicolum F.v.M. 580, 581, 608, 610, **651**
var. angiense (J.J.S.) Sleum. 476, 524, 651, **652**
var. culminicolum 597, **651**, 652
var. nubicola (Wernh.) Sleum. 580, 581, 651, **652**
cuneifolium (non Stapf) Rendle 495
cuneifolium (non Stapf) Ridl. 496
cuneifolium Stapf 496
var. *subspathulatum* (non Ridl.) Merr. 496
var. *subspathulatum* Ridl. 586
curranii Merr. 583
curviflorum J.J.S. 606, **613**
cuspidellum Sleum. 608, 610, **629**
cyatheicolum Sleum. **520**
cyrtophyllum Wernh. 481, **491**
dasylepis Schltr 512
delicatulum Sleum. 501, **507**
var. delicatulum **507**
var. lanceolatoides Sleum. **509**
devrieseanum Koord. 515
ssp. *astrapiae* Foerster 515
devrieseanum vel aff. Stonor 505
devriesianum = *devrieseanum* 515
dianthosmum Sleum. 477*, **526**
dielsianum Schltr **510**, 511
var. dielsianum **510**
var. stylotrichum Sleum. **510**
discolor Warb. 615
disterigmoides Sleum. 568, 569*, **573**
doctersii J.J.S. 643
dubium K. & G. 659
durionifolium Becc. 528, **529**, 531
durionifolium (non Becc.) Stapf 531
edanoi Merr. & Quis. 549, **564**
elegans Ridl. 591
elongatum Bl. 565
englerianum Koord. 608, 609, **628**
ericoides (non Low ex Hook. f.) Burtt 496
ericoides Low ex Hook. f. 481, **491**
var. ericoides **491***
var. silvicolum Sleum. **492**
erosipetalum J.J.S. 481, **485**
extrorsum J.J.S. 501, **504**
eymae Sleum. 501, **503**
fallacinum Sleum. 528, 530*, **531**
filamentosum Wernh. 560
flavoviride J.J.S. 608, **637**
fortunans J.J.S. 528, **535**
franssenianum J.J.S. 614
frey-wysslingii J.J.S. 580, **582**
fuchsii Sleum. 609, **648**
fuchsioides Schltr 486
fuchsioides aff. Stonor 575
fuscum Bl. 532
galioides J.J.S. 586
gardenia Schltr **514**
gaultheriifolium J.J.S. 477*, 481, **484**
var. expositum Sleum. **485**
var. gaultheriifolium **484**
gibbsiae J.J.S. 652
gilliardii Sleum. **522**
giulianettii Laut. 538, **546**
glabrifilum J.J.S. 635
glabriflorum J.J.S. 606, **614**
goodenoughii Sleum. 549, **561**
gorumense Schltr 634
gracile (non Low ex Lindl.) Becc. 629
gracile Low ex Lindl. 656
gracilentum F.v.M. 568, **570***
gregarium Sleum. 651
habbemae Koord. **497**
habbemai = habbemae 497
haematophthalmum Sleum. 522, **524**
hameliiflorum Wernh. 481, **486**
hansemannii Warb. 633
hatamense Becc. 580, **584**, 606, 608
hatamense (non Becc.) Sleum. 652
helwigii (non Warb.) Koord. 499
hellwigii Warb. 501, **504**
helodes Sleum. 581, **594**
herzogii Warb. 470, 497, **500***
himantodes Sleum. **528**
var. himantodes **528**

var. lavandulifolium Sleum. **529**
hirtolepidotum J.J.S. 607, **618**
hooglandii Sleum. 501, **507**, 576*
hybridogenum Sleum. 528, **537**
impositum J.J.S. 609, **649**
impressopunctatum J.J.S. 607, **617**
incommodum Sleum. 497, **500**
inconspicuum J.J.S. 470, 477*, 538, 582, **598**
inconspicuum aff. Stonor 569
indicum (L.) Sweet 662, **663**
f. variegatum (Bl.) DC. **663**
intranervatum Sleum. 610, **654**
inundatum Sleum. 497, **499**
invasorium Sleum. 481, **488**
jasminiflorum (non Hook.) F.-Vill. 531
jasminiflorum Hook. 476, 478, 537, 548, 549, **565**
var. copelandii (Merr.) Sleum. 566, **567**
var. heusseri (J.J.S.) Sleum. 565, **566**
var. jasminiflorum **566**
var. *maculatum* Ridl. 566
var. oblongifolium Sleum. 566, **567**
var. punctatum Ridl. 528, 537, **566**
jasminiflorum (non Hook.) Koord. 579
jasminiflorum (non Hook.) Merr. 567
jasminiflorum (non Hook.) Ridl. 563, 566
jasminiflorum (non Hook.) Sarasin 560
javanicum (Bl.) Benn. 471, 478*, 537, 607, 610, **624***
var. *citrinum* Hassk. 624
var. *gymnocarpum* Hochr. 624
var. javanicum **625**, 626
var. schadenbergii (Warb.) Sleum. **625**
var. teysmannii (Miq.) K. & G. 528, 537, **625**
var. *tubiflorum* Hook. 640
javanicum (non Benn.) Clarke 620
javanicum (non Benn.) F.-Vill. 641
javanicum (non Benn.) Koord. 615
javanicum (non Benn.) Malm 650
javanicum (non Benn.) Steen. 621
keditii Sleum. 606, **612**
kemulense J.J.S. 607, **623**
keysseri Foerster 651
kjellbergii J.J.S. 630
klossii Ridl. 666 map, **667**
kochii Stein 609, **641**
konori Becc. 477*, 478*, **515**, 516*, 518*, 519, 652
korthalsii Miq. 657, **660**
lacteum Stapf 551
laetum J.J.S. 476, 478, 517, 521, 608, 609, **638***
laetum (non J.J.S. 1914) J.J.S. 1936 643
lagunculicarpum J.J.S. 538, **542**
lamii J.J.S. 582, **599**
lampongum Miq. 538, **544**
lanceolatum Ridl. 609, 610, **647**
langbianense Chev. ex Dop 659
laoticum Dop 667
lauterbachianum Foerster 633
ledifolium (Hook.) G.Don 662
leptanthum F.v.M. 478, **512**, 513*
leptobrachion Sleum. 608, **631**
leptomorphum Sleum. 581, **593**
leptopeplum Balf. f. & Forr. 661
leucobotrys Ridl. 666
leucogigas Sleum. 477*, 478, 608, **632**
leytense Merr. 609, **649**
var. leytense **649**
var. loheri (Copel. f.) Sleum. **649**
lindaueanum Koord. 481, **486**
var. bantaengense J.J.S. **486**
var. *cyclopicum* Sleum. 486
var. *latifolium* J.J.S. 486
var. lindaueanum **486**
var. *psilacrum* Sleum. 486
lineare Merr. 528, **535**
linearifolium S. & Z., non Poir. 943
var. *macrosepalum* (Maxim.) Makino 662, **663**
linnaeoides Schltr 568
lobbii Veitch 640
loboense Copel. f. 607, **619**
lochae F.v.M. 475, 636
loerzingii J.J.S. 607, **616**
loheri Copel. f. 649
lompohense J.J.S. 608, **632**
var. *grandifolium* J.J.S. 633
longiflorum Lindl. 475, 478, 537, 566, 608, 609, **640**
var. bancanum Sleum. **641**
var. *heusseri* J.J.S. 566
var. longiflorum **640**
loranthiflorum Sleum. 549, **564**
lowei = lowii 654
lowii Hook. f. 610, **654**
lowii (non Hook. f.) F.v.M. 628
lukiangense Franch. 661
luraluense Sleum. 580, 608, **636**
lussoniense Rendle 583
luteosquamatum Sleum. 582, **598**, 599
maboroense Schltr 627
macgregoriae F.v.M. 478, 522, 608, 609, 610, **633**, 634*, 652
var. glabrifilum (J.J.S.) Sleum. 634, **635**
var. macgregoriae **634**, 635
var. mayrii (J.J.S.) Sleum. 634, **635**
macrosepalum Maxim. 662, **663**, 943
macrosiphon Sleum. 548, **552**
magnificum Sleum. 515
maius (J.J.S.) Sleum. 548, **554**
malayanum Jack 477*, 478*, 528, **532**, 536, 537, 597, 617
var. axillare J.J.S. **533**
f. axillare 532, **533**
f. latifolium Sleum. 532, **533**
f. ovatum Sleum. 532, **533**
var. infrapilosum Sleum. 532, **533**
var. malayanum 528, **532**
var. pilosifilum Sleum. 528, 532, **533**
var. pubens Sleum. 528, 532, **533**
malayanum (non Jack) Koord. 540
malindangense Merr. 496
maxwellii Gibbs 609, **644**
mayrii J.J.S. 635
megalostigma F.v.M. 628
melantherum Schltr **520**
meliphagidum J.J.S. 482, **493**
microphyllum J.J.S. 568, **571**
mindanaense Merr. 610, **650**
minimifolium Wernh. 483, 571
mjöbergii Merr. 529
molle (Bl.) G.Don **661**
mollianum Koord. 610, **652**
moszkowskii Schltr 643
moulmainense Hook. **666** map, 667*, 668
moultonii Ridl. 607, **623**
mucronatum (Bl.) G.Don **662**
multicolor Miq. 607, **621**
var. *curtisii* Henslow 621
multicolor (non Miq.) S.Moore 580
multinervium Sleum. 547, **549**, 550*
murudense Merr. 626
murudense (non Merr.) J.J.S.

618
muscicola J.J.S. 568, **572**
myrsinites Sleum. 576, **578**
nanophyton Sleum. **492**
var. nanophyton 481, **492**
var. petrophilum Sleum. 482, **493**
natalicium Sleum. 547, **549**
neriifolium Schltr 501, **506**
nervulosum Sleum. **646**
var. exuberans Sleum. 610, **646**
var. nervulosum 609, **646***
nieuwenhuisii J.J.S. 580, **586**
ningyuenense Hand.-Mazz. 659
nitens Sleum. 593
nodosum C.H.Wright 651
nortoniae Merr. 528, **533**
nubicola Wernh. 652
nummatum J.J.S. 481, **484**
obscurinervium Merr. 656
obscurum Sleum. 528, **535**
oliganthum Sleum. 548, **556**
ombrochares Balf. f. & Ward 661
opulentum Sleum. **519**
oranum J.J.S. 643
orbiculatum Ridl. 549, **563**, 608, 609
oreadum Wernh. 548, **560**
oreites Sleum. 481, **485**
var. chlorops Sleum. **485**
var. oreites **485**
orion Ridl. 490
var. *aurantiacum* Ridl. 640
oxycoccoides Sleum. 568, 569*, **573**
oxyphyllum Franch. 666
pachycarpon Sleum. 606, **614**
pachystigma Sleum. 607, **616**
papuanum Becc. 581, **594**, 595*
papuanum (non Becc.) C.H. Wright 546
partitum J.J.S. 647
parvulum Sleum. 568, 569*, **573**
pauciflorum K. & G. 581, **591**
var. calodon (Ridl.) Sleum. **591**
var. pauciflorum **591**
pennivenium Balf. f. & Forr. 660
perakense K. & G. 481, **488**, 536
perplexum Sleum. 607, **626**
phaeochitum F.v.M. **511**
phaeochitum (non F.v.M.) Wright 526
phaeochristum Sleum. 476, 478, **523**
phaeopeplum Sleum. 476, 478, **517**, 519, 644
phaeops Sleum. **525**
planecostatum Sleum. 580, **586**
pleianthum Sleum. 548, **556**
pneumonanthum Sleum. 549, **563**
podocarpoides Schltr 579
polyanthemum Sleum. 609, **641**
poremense J.J.S. 610, **652**
porphyranthes Sleum. 582, **599**
prainianum Koord. 501, **505**
proliferum Sleum. 538, **540**
protandrum Sleum. 497, **498**
psammogenes Sleum. 581, **591**
pseudobuxifolium Sleum. 581, **587**
pseudomurudense Sleum. 607, **618**
pseudonitens Sleum. 581, **593**
pseudotrichanthum Sleum. 548, **559**
psilanthum Sleum. **511**
pubigermen J.J.S. 580, **583**, 597
var. *banghamiorum* J.J.S. 596
pubitubum Sleum. 548, **558**
pudorinum Sleum. 538, **545**
pulleanum J.J.S. **483**
var. maiusculum Sleum. 481, **484**
var. pulleanum 481, **483**
purpureiflorum J.J.S. 576, **578**
pusillum J.J.S. 568, **572**
pyrrhophorum Sleum. 527, 582, **597**
quadrasianum Vidal 482, **494**
f. *banahaoense* Copel. f. 495
f. *davaoense* Copel. f. 495
f. *halconense* Copel. f. 495
f. *lutea* H.J.Lam 496
f. *marivelesense* Copel. f. 496
f. *monodii* H.J.Lam 496
f. *negrosense* Copel. f. 495
f. *pulogense* Copel. f. 495
f. *pulogense* (non Copel. f.) H.J.Lam 496
f. *rubra* H.J.Lam 496
var. angustissimum Sleum. 494, **496**
var. borneense J.J.S. 494, **497**
var. cuneifolium (Stapf) Copel. f. 494, **496**, 478*
var. davaoense (Copel. f.) Sleum. 494, **495**
var. *intermedium* Merr. p.p. 495
var. intermedium Merr. s. str. 494, **496**
var. malindangense (Merr.) Copel. f. 494, **496**
var. marivelesense (Copel. f.) Sleum. 494, **496**
var. quadrasianum 494, **495**
var. rosmarinifolium (Vidal) Copel. f. 494, **495**
var. selebicum J.J.S. 494, **496**
var. villosum J.J.S. 494, **496**
radians J.J.S. 548, **560**
var. minahasae Sleum. **560**
var. radians **560**
rappardii Sleum. 519, **525**
rarelepidotum J.J.S. **620**
var. ootrichum Sleum. 609, **621**
var. rarelepidotum 607, **620**
rarum Schltr 501, **507**, 508*
renschianum Sleum. 610, **650**
retivenium Sleum. 607, 610, **653**
retrorsipilum Sleum. 549, **565**
retusum (Bl.) Benn. 470, 471, 477*, 481, 820*
f. *angustifolia* Miq. 482
var. epilosum Sleum. **483**
var. *macranthum* Hochr. 482
var. retusum **482**
var. trichostylum Sleum. **483**
retusum (non Benn.) F.-Vill. 494
retusum (non Benn.) Steen. 566
retusum (non Benn.) Wernh. 486
revolutum Sleum. 501, **503**
rhodochroum Sleum. **521**
rhodoleucum Sleum. 548, **558**
rhodopus Sleum. 608, **627**
rhodosalpinx Sleum. 548, **551**
rhodostomum Sleum. 581, **592**
ripense Makino 663
ripleyi Merr. 581, **596**
var. basitrichum Sleum. 581, 596, **597**
var. cryptogonium Sleum. 527, 596, **597**
var. ripleyi **596**
robinsonii Ridl. 607, **620**, 621
rosendahlii Sleum. 608, **635**
rosmarinifolium Vidal 495
rubellum Sleum. **526**
rubrobracteatum Sleum. 582, **605**
rubropilosum Hayata 664, 665
rugosum Low ex Hook. f. 590, 606, **611**, 612
var. coriifolium (Sleum.) Sleum. 581, 590, **612**
var. rugosum **611**
ruttenii J.J.S. 547, **550**
saavedranum Diels 512

salicifolium Becc., non Bl. 609, **646**
salicifolium Bl. 621
sarasinorum Warb. 625
saruwagedicum Foerster 481, **487***
var. *alpinum* Sleum. 487
saxifragoides J.J.S. 574*, **575**, 589*
sayeri Sleum. 606, **615**
scabridibracteum Sleum. 608, 609, **639***
scrabrum G.Don **662**
scarlatinum Sleum. 582, **601**
schadenbergii (non Warb.) Merr. 619, 641
schadenbergii Warb. 625
schizostigma Sleum. 482, **493**
schlechteri Laut. 608, **631**, 632
schoddei Sleum. **523**
schultzei Schltr 512
scortechinii K. & G. 481, **490**, 536
seimundii J.J.S. 481, **490**
seranense = seranicum 619
seranicum J.J.S. 607, 617, **619**
sessilifolium J.J.S. 607, **622**
sheilae Sleum. 581, **590**
siamense Diels 666
simsii Planch. 662, 663, **665**
simulans Sleum. 582, **600**
sinense (Lodd.) Sweet 661
solitarium Sleum. **523**
spathulatum Ridl. 481, **487**, 536
spectabile Merr. 625
spondylophyllum F.v.M. **520**
stapfianum Hemsl. ex Prain 548, **551**
stelligerum Sleum. 501, **506**
stenaulum Balf. f. & Forr. 666
stenophyllum Hook. f. 576*, **577***
var. *angustifolium* J.J.S. 577
stolleanum Schltr **510**
stonori Sleum. 587
stresemannii J.J.S. 610, **653**
suaveolens Sleum. 563
subcordatum Becc. 608, **630**
subcrenulatum Sleum. 582, **605**
subpacificum Sleum. 549, **565**
subsessile Rendle 662, **663**, 664*, 665*
var. *baucoense* Copel. f. 664, 665
subuliferum Sleum. 582, **601**
subulosum Sleum. 576, **578**
sumatranum Merr. 609, **647**
superbum Hort. ex Lavallée 505
superbum Sleum. 501, **505**
syringoideum Sleum. 548, 549, **553**
taxifolium Merr. **575**
taxoides J.J.S. 481, **483**
teysmannii (non Miq.) Hend. 620
teysmannii Miq. 626
thaumasianthum Sleum. **515**
torricellense Schltr 635
toverenae F.v.M. 515
toxopei J.J.S. 610, **655**
trichanthum Sleum. 559
triumphans Yersin & Cheval. 475
truncicolum Sleum. **525**
tuba Sleum. 548, **557**
tuberculiferum J.J.S. **509**
tubiflorum Low ex Lindl. 640
tubiflorum (non Bl.) Mor. 540
tubiflorum Reinw. in Bl. 532
tubulosum Reinw. 615
uliginosum J.J.S. 638
ultimum Wernh. 582, **600**
undulaticalyx J.J.S. 648
vanderbiltianum Merr. 481, **488***
vandeursenii Sleum. 580, 581, **585**
vanvuurenii J.J.S. 471, 608, **630**
variolosum Becc. **536**
var. andersonii (Ridl.) Sleum. 528, **536**
var. variolosum 528, **536**
velutinum Becc. 611
versteegii J.J.S. 539, **546**
verticillatum (non Low ex Lindl.) Becc. 567
verticillatum (non Low) Koord. 560
verticillatum (non Low ex Lindl.) Low ex Hook. f. 604
verticillatum Low ex Lindl. 606, **610**
f. velutinum (Becc.) Sleum. 606, 607, **611**
f. verticillatum 609, **610**
verticillatum (non Low ex Lindl.) Vidal 583
vidalii Rolfe 580, **583**, 584*
villosulum J.J.S. 606, **613**
vinicolor Sleum. 528, **529**
vinkii Sleum. 482, **493**
vitis-idaea Sleum. 581, **592**
vonroemeri Koord. 633
warianum Schltr **514**
wentianum Koord. 608, 610, **628**
wentianum all. Stonor 612
westlandii Hemsl. 666
whiteheadii Rendle 583
wilhelminae Hochr. 528, **536**
williamsii Merr. ex Copel. f. 607, **619**
wollastonii Wernh. 628
womersleyi Sleum. 603, 568, **569***
wrayi K. & G. 657, **659**, 660*
var. *elliptica* Ridl. 659
var. *minor* Ridl. 659
wrightianum Koord. 478, 582, **604**
var. cyclopense J.J.S. **604**
var. insulare Sleum. **604**
var. *ovalifolium* J.J.S. 600, 604
var. *piliferum* J.J.S. 594
var. wrightianum **604**
xanthopetalum Merr. 607, **617**
yelliotii Warb. 538, **542**, 599
yelliottii = yelliotii 542
zippelii Bl. 579
zoelleri Warb. 476, 478, 519, 609, 635, 639, **643**, 644*, 645*, 652
zollingeri J.J.S. 538, **540**, 541*
var. *latifolium* J.J.S. 540
zollingerianum = zollingeri 540
Rhoeadales 62
Rhoipteleaceae 143
Rhus *cacodendron* Ehrh. 220
javanica L. 211
cf. linguata W.Slis 291
vernicifera DC. 220
Rigiolepis Hook. f. 754
bigibba (J.J.S.) J.J.S. 761
borneensis Hook. f. 756
caudatifolia (Merr.) J.J.S. 765
endertii J.J.S. 758
filiformis J.J.S. 758
korthalsii J.J.S. 763
lanceifolia Ridl. 755
lanceolata (Bl.) J.J.S. 761, 762
f. *elliptica* J.J.S. 762
f. *marapiensis* J.J.S. 762
f. *sumatrana* (Miq.) J.J.S. 762
lancifolia = *lanceifolia* 755
leptantha (Miq.) J.J.S. 764
f. *elliptica* J.J.S. 764
lobbii Ridl. 755
macrophylla J.J.S. 757
moultonii (Merr.) J.J.S. 763
salicifolia J.J.S. 757
sulcata (Ridl.) J.J.S. 758
uniflora (J.J.S.) J.J.S. 757
Rinorea 963
glabra O.K. 235
lanceolata (Roxb.) O.K. 237, 963
Rockia Heimerl 457, 459
Rosaceae 472, 878
Rosales 49
Rourea Aubl. 934
subg. Palliatus Leenh.
sect. Palliatus 934
acropetala Pierre 934
mimosoides (Vahl) Planch. 934
f. mimosoides 934
minor (Gaertn.) Leenh. 934, 935

ssp. microphylla (Hook. & Arn.) Vidal 934
ssp. minor 934
ssp. monadelpha (Roxb.) Vidal 934
oligophlebia Merr. 934
ovale (Schellenb.) Leenh. 934
pinnata (Merr.) Veldkamp **934**
prainiana Talbot 934
Roureopsis Planch. 933
sect. Taeniochlaena Leenh. 934
acutipetala (Miq.) Leenh. 934
ssp. borneensis (Schellenb.) Leenh. 934
asplenifolia Schellenb. 933, 934
emarginata (Jack) Merr. 934
incurva Pierre 933
stenopetala (Griff.) Schellenb. **933**
Roydsia Roxb. 95, 97
floribunda Planch. ex Hook. f. 97
parviflora (non Griff.) King 99
philippinensis Turcz. 97
scortechinii King 99
Rubiaceae 107, 195, 294, 297, 309, 336, 349, 373, 379, 387, 401
subfam. Coffeoideae 959
tribe Hedyotideae 297
tribe Psychotrieae 387
Rubiales 294, 297
Ruppia 171
Ruppiaceae 171
Rutaceae 69, 194, 195, 206, 214, 220, 221, 226, 969
Ruthiella Steen. **928**
oblongifolia (Diels) Steen. **928**
saxicola (v.Royen) Steen. **928**
schlechteri (Diels) Steen. **928**
subcordata (Merr. & Perry) Steen. **928**

Sagittaria sagittifolia L.
ssp. *leucopetala* (Miq.) Hartog 915
trifolia L.915
Salacia L. 231, 390, 391, 392, **404** map, 421, 930, 932
alternifolia Scort. 421
amentacea Ridl. 408
amplifolia Merr. ex Chen & How 412, 413
bartletti Ridl. 420
beccarii Ridl. 417
blepharophora Ding Hou 405, **408**
buddinghii Scheff. 412
campanuloidea King 408
castaneifolia Ridl. 406, **413**
celebica Bl. 412
cerasiformis Teysm. & Binn. 421
chinensis L. 392, 406, **419** map, 421, 932
coromandeliana Teysm. & Binn. 421
cymosa Elm. 405, **407**, 408, 416*
diandra Miq. 410
f. *lanceolata* Miq. 411
disepala (C.T.White) Ding Hou 420
erythrocarpa K.Sch. 404, 405, **411**
cuphlebia Merr. 406, **418**
evonymiflora Zipp. ex Miq. 419
exsculpta Korth. 406, 417
flavescens Kurz 412
var. *dumosa* King 412
forsteniana Miq. 404, 405, **410**, 932
grandiflora Kurz 406, **413**, 932
var. *longifolia* (Hook. f.) King 413
griffithi Laws. 400
integrifolia Merr. 415
intermedia Ding Hou 405, **411***
javanensis Bl. 400
kalahiensis Korth. 406, **420**
kamputensis Pierre 412
klossii Ridl. 408
korthalsiana Miq. 405, **406**, 407 map, 420
kraemeri Ding Hou 410
lanceolata Teysm. & Binn. 408
latifolia Wall. ex Laws. 419
laurifolia Stapf 405, 406, **417**
lawsoni King 412
ledermannii (Loes. ex Harms) Ding Hou 405, **410**
leucoclada Ridl. 405, 406, **415**
litseifolia Ridl. 415
littoralis Back. 419
lobbii Laws. 417
longifolia Hook. f. ex Laws. 413
longipedicellata Ding Hou 406, **413**
macrocarpa Korth. 412
macrophylla Bl. 405, **412** map, 416*
var. *angustifolia* Miq. 412
maingayi Laws. 406, 416*, **417**
marginata Ding Hou 405, 406, **413**
megasperma Ridl. 417
melitocarpa Bl. 408
minutiflora Ridl. 420
naumanni Engl. 419
nitidissima Merr. 406, **418**
oblonga (non Wall.) Rendle 412
oblonga Wall. 420
oblongifolia Bl. 405, **408**
f. *latior* Miq. 408
ovalis (non Korth.) Koord.-Schum. 419
ovalis Korth. 406, **415**, 416*
ovalis Laws., non Korth. 412
papuana (Loes.) Ding Hou 405, **408**, 409*
patens Decne 419, 420
perakensis King 400
philippinensis Merr. 406
polyantha Korth. 414
prinoides (Willd.) DC. 419, 420, 421
var. *macrophylla* (Bl.) King 412, 419
var. *timorensis* Span. 419
radula (non G.Don) Dietr. ex Hassk. 406, 407
radula G.Don 407
roxburghii (non Wall.) Vidal 415
roxburghii Wall. ex Laws. 420
rubra Laws. 417, 418
scortechinii King 413, 414
sinensis (non L.) Blco 406
sinensis Gmelin 418, 420
socia Craib 419
sororia Miq. 405, **409***, 420, 932
sp. 280
subalternifolia Merr. & Perry 405, **407**, 416*
subscandens Elm. 420
triplinervis Llanos 421
venosa Ding Hou 406, **417**
verrucosa Wight 406, **414***, 932
vimeria Wall. 392, 406, **418**, 421
viridis Craib 408
wenzelii Merr. 405, **411**, 416*
wrayi King 418
Salacicratea Loes. 404
australis Loes. 420
brassii A.C.Smith 409
diandra (Miq.) A.C.Smith 410
glandulosa A.C.Smith 405, 409
kraemeri (non Loes.) Kaneh. 419, 420
kraemeri Loes. 410
ledermannii Loes. 410
papuana Loes. 408
sarasinorum Harms 410
sororia A.C.Smith 409
Salacighia Loes. 930
Salicaceae 5: **107–110**
Salvadoraceae 4: **224–225**
Samadera Gaertn. 193, 194, 198, 199, 226, 968
brevipetala Scheff. 201
glandulifera Presl 201
indica Gaertn. 199

var. *brevipetala* (Scheff.) Back. 199
var. *papuana* Laut. 199
madagascariensis Juss. 200
mekongensis Engl. 201
pentapetala G.Don 201
tetrapetala Wall. 200
Samandura L. ex Baill. 199
indica Baill. 201
madagascariensis Perr. de la Bâthie 201
mekongensis Pierre 201
Sambucus 51
Samolus 173, 174
valerandi L. 173, 192
Sanango G.S.Bunting & J.A. Duke 295, 296
Santaloides ovale Schellenb. 934
Santiria Bl. 917, 920
apiculata Benn. 920, 921
var. apiculata 921
var. rubra (Ridl.) Kalkman 921
conferta Benn. 920, 921
grandiflora Kalkman 920, 921
griffithii (Hook. f.) Engl. 920, 921
laevigata Bl. 920, 921
megaphylla Kalkman 920, 921
mollis Engl. 920
nervosa H.J.Lam 919, 921
oblongifolia Bl. 920, 921
ridleyi H.J.Lam 920
rubiginosa Bl. 920, 921
var. rubiginosa 921
tomentosa Bl. 920
Sapindaceae 49, 194, 226
Sapindales 49, 53, 933
Sapindus saponaria L. 226
Sapotaceae 229
Saprosma 387
Sarawakodendron Ding Hou **930**
filamentosa Ding Hou 931*, **932**
Sarcocaulon 445
rigidum Schinz 445
Sarcosperma uittienii H.J.Lam 967
Sarcospermataceae 4: **32–34**; 6: 967
Sarcotheca *pinnata* Merr. 934
Sauruaceae 4: **47–48**
Saxifragaceae 173, 174, 280, 472
Scaevola L. 949, 951
lobelia Murr. 951
micrantha Presl 951, 952
oppositifolia R.Br. 951, 952
pauciflora Leenh. 951, 952
plumierii 223
sericea Vahl 951
taccada (Gaertn.) Roxb. 949, 951
verticillata Leenh. **951**, 952*
Scaphocalyx spathacea Ridl. 944
Schmidelia conferta Blco 282
Schmidellia = *Schmidelia* 282
Scolopia Schreb. 943
kermodei C.E.C.Fischer 943
Scopolia (non Jacq.) L. f. 35, 37
composita L. f. 38
Scrophulariaceae 136, 294, 295, 296, 297, 960, 965
Scrophulariales 297
Scutinanthe Thw. 921
brevisepala Leenh. 919, 921
brunnea Thw. 921
Scyphostegia Stapf 967, **968***
borneensis Stapf 967, **968***
Scyphostegiaceae 5: **297–299**; 6: **967**
Scyphostrychnos 296
Selenocera Zipp. ex Span. 375
secundiflora Zipp. ex Span. 375
Sericolea Schltr 914
Shorea selanica Bl. 154
Simaba Aubl. 198, 202
Simarouba 194, 198
cedron Planch. 194
glauca 194
Simaroubaceae **193–226**, **968–972**
subfam. Alvaradoideae 195, 971
subfam. Irvingioideae 193, 194, 195, 970, 971, 972
subfam. Kirkioideae 195, 971
subfam. Picramnioideae 195, 971
subfam. Simarouboideae 195
subfam. Surianioideae 193, 194
tribe Simaroubeae 198
subtribe Eurycominae 205
subtribe Simaroubinae 195, 205
Simarubopsis Engl. 202
Simirestis 390
Siphonodon Griff. 227, 228, 229, 230, 231, 390, 391, 392, 394, 968
australe Bth. 230
celastrineus Griff. 229, 231, **394**, 395*, 396* map
var. *acuminatissima* Merr. 395
var. *integrifolia* Tardieu 412
var. *subglobosa* Merr. 395
peltatus Ding Hou 395*, **397**, 932
pyriformis Merr. 395, 396
var. *parvifolius* Merr. 395
Sirioides Rumph. 355
alter Rumph. 355
Solanaceae 297
Solenopsis 140
Solenospermum Zoll. 231, 262, 264
apiculatum Ridl. 272
aquatile Ridl. 270, 271
javanicum Zoll. 269
ledermannii Loes. 271
littorale Loes. 261
macranthum Loes. 264, 268
micranthum Loes. 268
oblongifolium Loes. 270
pallidum Loes. 268
paucinervium Loes. 270
torricellense Loes. 271
var. *opacum* Loes. 271
toxicum Loes. 270
Solmsia 3
Sonneratia L.f. 973
acida L. f.
var. *mucronata* Miq. 975
alba J.Smith 973*, 974*, 975
alba × ovata 974*
caseolaris (L.) Engl. 973*, 974*, 975
ovata Backer 974*, 975
Sonneratiaceae 4: **280–289**; 5: 557; 6: 973
Soulamea Lamk 193, 196, **221**
amara Lamk 193, 197, **221**, 222*, 223 map
soulameoides (A.Gray) Nooteboom **221**
terminalioides Baker 221
Sparganiaceae 4: **233–234**
Specularia Heist. ex Fabr. 928
speculum-veneris (L.) Caruel 928
Speirema Hook. f. & Th. 121
montanum Hook. f. & Th. 132
Sphaerodiscus Nakai 245
cochinchinensis Nakai 248
Sphenoclea 107, 108, **109**, **110**
zeylanica Gaertn. 928
Sphenocleaceae 4: **27–28**. See Campanulaceae
Spigelia L. 295, 296, 297, **377**
anthelmia L. 376*, **378**, 960
Spilanthes urens 223
Spinifex 221
Spiraeaceae 195
Stackhousiaceae 4: **35–36**
Staphylea 49, 52
Staphyleaceae **49–59**, 214, 230
Steironema Raf. 177
Stellera L. 28
chamaejasme L. 28
passerina L. 28
Stenanthera R.Br. 424
Stenocarpus moorei F.v.M. 428
Stixis Lour. 61, 63, **95**, 97 map
fasciculata var. *borneensis* Heine 97
floribunda (Planch. ex Hook. f.) Pierre 97
obtusifolia (Hook. f. & Th.) Pierre 97
ovata (Korth.) Hall. f. **97**
ssp. fasciculata (King) Jacobs 97 map

ssp. ovata (Korth.) Hall. f. 96*, **97** map
philippinensis (Turcz.) Merr. 95, **97** map
scortechinii (King) Jacobs 97 map, **99**
suaveolens (Roxb.) Pierre 95, 97
Struthiola 4
Strychnos L. 205, 293, 294, 295, 296, 297, **343**, 361, 954
sect. Booneae Duvign. 346
sect. Breviflorae Progel 345
sect. Brevitubae A.W.Hill 345, 346, 955
sect. Floribundae Duvign. 346
sect. Intermediae Progel 345
sect. Lanigerae A.W.Hill 345, 346, 955
sect. Ligustroides Duvign. 346
sect. Longiflorae Progel 345
sect. Penicillatae A.W.Hill 345, 346, 352*, 357, 955
sect. Sambae Duvign. 346
sect. Strychnos 955
sect. Tubiflorae A.W.Hill 345, 346
acuminata Wall. ex DC. 355
aenea A.W.Hill 958
var. *acuminata* A.W.Hill 958
andamanensis A.W.Hill 351
angustiflora Bth. 345, 955, **958**, 959
arborea A.W.Hill 358, 360
armata A.W.Hill 358, 359
axillaris Colebr. 346, 347, 351, 352*, **358**, 360, 361, 955, 958
balansae A.W.Hill 347, 349
bancroftiana F.M.Bailey 355, 356
barbata A.W.Hill 355
beccarii Gilg 347, 349
borneensis Leenh. 346, 347, 355, **356**, 357*, 955, 958
celebica Koord. 355
cenabrei Merr. 358
chloropetala A.W.Hill 358, 359
cinnamophylla Gilg & Bened. 355
colubrina Auct. non L. 346, 347, 350, 353, 354*, **355**, 356, 358, 361, 955, 958
confertiflora Merr. & Chun 351
curtisii King & Gamble 345, 346, 351, **353**, 355, 955, 958
cuspidata A.W.Hill 347, 349
dubia A.W.Hill 355
flavescens K. & G. 346, 347, **357**, 955, 958
forbesii A.W.Hill 354*, 355, 356
grandis Wall. 361
hirsutiflora A.W.Hill 351
horsfieldiana (non Miq.) Koord.-Schum. 351
horsfieldiana Miq. 358, 359
hypogyna C.B.Clarke 355
ignatii Bergius 297, 345, 346, **347**, 348*, 351, 361, 955, 957
ignatii (non Berg.) Vidal 355
impressinervis A.W.Hill 351, 358, 359
kawbet A.W.Hill 358, 359
kerrii Hill 955, **959**
kerstingii Gilg & K.Sch. 355
krabiensis A.W.Hill 347, 349
lanata A.W.Hill 345, 346, **355**, 955, 958
lanceolaris Miq. 346, 347, **357**, 955, 958
laurina DC. 350
laurina (non DC.) Heine 356
laurina (non DC.) K. & V. 351
laurina Wall. ex DC. 355
var. *thorelii* A.W.Hill 355
ledermannii Gilg & Bened. 346, 347, **357**, 955, 958
leuconeura Gilg & Bened. 355
ligustrina Bl. 350
lucida R.Br. 293, 346, 349, **350** map, 355, 955, 957
luzonensis Elm. 346, 347, 355, **358**, 955, 958
maingayi C.B.Clarke 346, **350**, 351, 955, 957, 958
ssp. *borneensis* Leenh. 958
var. *fructuosa* Clarke 347, 350
malaccensis Bth. 358, 360
melanocarpa Gilg & Bened. 361, 955, 959
merrillii A.W.Hill 355, 356
minahassae Koord. ex Boerl. 355
minor Dennst. 955, 958
monosperma Miq. 358
mucronata A.W.Hill 358
multiflora Bth. 355, 356
muricata Kosteletzky 350
myriantha Gilg & Bened. 355
nux-blanda A.W.Hill 349, 959
nux-vomica Auct. non L. 958
nux-vomica L. 297, 345, 346, 348*, 349, 955, 957
f. *depauperata* Miq. 349
oleifolia A.W.Hill 346, 347, **353**, 355, 955, 958
oophylla Gilg & Bened. 358, 360
ovalifolia Wall. 347, 349, 351
ovata A.W.Hill 346, **351**, 352*, 358, 955, 957
ovata (non Hill) Merr. 358
palembanica Miq. 358, 359
panayensis A.W.Hill 351
penicillata A.W.Hill 358, 360, 361
philippensis Blco 957
philippinensis Blco 347, 349, 957
pilgeriana Gilg 358
plumosa A.W.Hill 358, 359
polytoma Gilg & Bened. 358, 360
polytoma (non Gilg & Bened.) Kaneh. & Hatus. 355
polytrichantha Gilg 345, 346, **353**, 357, 955, 958
potatorum (non L. f.) F.-Vill. 355
var. *multiflora* Vidal 355
pseudotieuté A.W.Hill 347
psilosperma F.v.M. 358, 360
pubescens C.B.Clarke 358, 360
var. *scortechinii* K. & G. 358
pycnoneura Gilg & Bened. 355
quadrangularis A.W.Hill 346, 347, **356**, 955, 958
quintuplinervis A.W.Hill 358, 359
ridleyi K. & G. 346, 347, **360**, 955, 958
robinsonii A.W.Hill 358, 360
roborans A.W.Hill 350
rufa C.B.Clarke 358, **361**, 955, 958
schmidtii Gilg 358, 359
scortechinii A.W.Hill 358, 359
septemnervis C.B.Clarke 355
var. *imberbis* A.W.Hill 355
silvicola A.W.Hill 355
similis A.W.Hill 355
sp. Hill 358
sp. Merr. 957
sp. 1 Hill 351
sp. α & ß Koord.-Schum. 351
spireana Dop 349
tesseroidea A.W.Hill 358, 359
thorelii Pierre ex Dop **361**, 955, 958
tieute Leschen. 347, 349
vanprukii Craib 357, 955, **958**
villosa A.W.Hill 346, **351**, 355, 955, 958
viridiflora A.W.Hill 358
wenzelii Merr. 358, 360
Stylidiaceae 4: **529–532**; 5: 564; 6: 108, 109, 976
Stylidium *androsaceum* O. Schwarz 976
ericksonae Willis 976
fluminense Erickson & Willis 976
inconspicuum Sloot. 976
javanicum Sloot. 976
pedunculatum R.Br. 976
Styphelia J.E.Smith 423, **424**
subg. Cyathodes (Lab.) Drude 425, 426 map, **433**

subg. Leucopogon (R.Br.) Drude 423, **425**, 426 map
sect. Styphelia 423
abnormis (Sond.) J.J.S. 425, **433**
abscondita J.J.S. **425**
acuminata (R.Br.) Spr. 423, 425, **432**
arfakensis Kaneh. & Hatus. 443
brassii Sleum. 425, **433**, 434*
brevistyla Moore 434
carstensensis Wernh. 441
celebica J.J.S. 439
cornifolia Rudge 437
culminis Wernh. 440
cuspidata (R.Br.) Spr. 432
cymbulae (Lab.) Spr. 427
dekockii J.J.S. 440
forbesii Sleum. 425, **432**
gjellerupii J.J.S. 438
hookeri (Sond.) J.J.S. 429
javanica (de Vriese) J.J.S. 423, 425, 430*, **431***, 432
juniperina (Forst.) Pers. 434
lamii J.J.S. 443
lancifolia J.J.S. 433
learmonthiana Gibbs 439
leptospermoides (R.Br.) Spr. 433
malaica Jack 426
malayana (Jack) Spr. 423, 425, **426**, 943
var. malayana 425, **426**, 427*
var. novoguineensis 425, **427**, 428*, 429*
moluccana J.J.S. 433
montana F.v.M. 429
var. *hookeri* 429
nesophila (DC.) Sleum. 432
nubicola Wernh. 442
nutans J.J.S. 441
var. *arfakensis* J.J.S. 441
obovata J.J.S. 432
obovata Malm 429
obtusifolia J.J.S. 429
var. *hypoleuca* J.J.S. 429
oxycedrus Lab. 434
papuana (C.H.Wright) Koord. 443
philippinensis Merr. 429
pungens Koord. 431
rapae Sleum. 434
spicata J.J.S. 429
suaveolens (Hook. f.) Warb. 423, 425, **428**, 429*
trilocularis J.J.S. 429
var. *quinquelocularis* J.J.S. 429
trochocarpoides F.v.M. 437
vandewateri Wernh. 429
vannouhuysii J.J.S. 440
wetarensis J.J.S. 432
Styracaceae 4: **49–56**; 6: 976
Sulamea = Soulamea 221
Suregada Rottl. 944
Suriana L. 193, 194, 195, **196**, 969
maritima L. 193, **196**, 197 map, 223
Surianaceae 195, 196
Sycopsis Oliver 952
dunnii Hemsl. 952

Tabernaemontana corymbosa Roxb. 315
Taeniochlaena Hook. f. 933
Talauma 228
Tamaricaceae 968
Tamaricales 63
Tapiscia 49
Tayotum nigrescens Blco 373
Telanthera bettzickiana Regel 916
manillensis Walp. 915
Terminalia L. 932
catappa 325
crassifolia Exell 932
darlingii Merr. 933
macrantha Rojo **932**
polyantha Pr. 48
zollingeri Exell 933
Ternstroemia *megacarpa* Elm. 336
penangiana Choisy 336
Tetramyxis Gagnep. 226
Theaceae 472
Thecanthes Wikstr. 44
cornucopiae Wikstr. 46
Thibaudia coriacea (Bl.) Bl. 828
cuneifolia Bl. 847
elliptica Bl. 873
floribunda Bl. 872
laurifolia Bl. 871
lucida Bl. 814
myrtoides Bl. 812
rosea Jungh. 872
singalensis Korth. ex Boerl. 762
varingiaefolia Bl. 815
Thylachium lucidum Banks ex DC. 92
Thymelaea 28
Thymelaeaceae 4: **349–365** (Gonystyloideae); 6: **1–48**, **976**
subfam. Aquilarioideae 1, 3, 982
tribe Microsemmatidae 3
subfam. Gilgiodaphnoideae 3
subfam. Gonystyloideae 1, 2, 3, **976–982**
subfam. Thymelaeoideae 3, 982
Thymelaeales 451
Tiliaceae 4, 203
Timeroyea Montrouz. 457
Tonsella chinensis (L.) Spreng. 419
prinoides Willd. 418
Toona sinensis (Juss.) Roem. 220
Torrenticola Domin 963
Tovariaceae 62
Toxicodendron altissimum Mill. 220
Toxina Noroña 954
Trachymene Rudge 983
novoguineensis (Domin) Buw. 984
tripartita Hoogl. 983*, **984**
Trapaceae 982
Trianthema triquetra Rottl. ex Willd. 915
Tricalysia tinagaoensis Elm. 23
Triceros Lour. 51
cochinchinensis (non Lour.) Mor. 56
Trichadenia 39
philippinensis Merr. 944
Trichilia 194
connaroides (W. & A.) Bentvelzen
f. connaroides 226
f. glabra Bentvelzen 226
Trientalis 174
Trigoniaceae 4: **58–60**
Tripterygium Hook. f. 229, 230, **231**
wilfordii Hook. f. 229, 230
Triscaphis Gagnep. 49, 212, 214
kerrii Gagnep. 214
Tristellateia Thouars 960
Tristicha trifaria (Bory ex Willd.) Spreng. 963
Triumfetta 223
Trochisandra Bedd. 280
indica Bedd. 283
Trochocarpa R.Br. 423, 424, 434, **436** map
subg. Pseudocyathodes Sleum. 437, **443**
subg. **Trochocarpa** 436, **437**
arfakensis (Kaneh. & Hatus.) Sleum. **443**, 444*
bellendenkerensis Domin 437
celebica (J.J.S.) Steen. **439**
dekockii (J.J.S.) H.J.Lam 435*, **440***
dispersa Sleum. **442**
gjellerupii (J.J.S.) H.J.Lam **438**, 439*
lamii H.J.Lam 443
laurina (R.Br. ex Drude) R. Br. 423, **437**, 438*
learmonthiana (Gibbs) H.J. Lam 439
nubicola (Wernh.) Sleum. **442**, 443
nutans (J.J.S.) H.J.Lam 435*, **441***, 442*, 443
papuana (Wright) Sleum. **443**
vannouhuysii H.J.Lam 441
Tubiflorae 294, 297
Turneraceae 4: **235–238**

Turpinia Vent. 49, **51**, 56 map
arguta 55
borneensis (Merr. & Perry) v. d.Linden 50*, 53, 54, 55, **56**
brachypetala (Schltr) v.d. Linden 52, 54, **59**
cochinchinensis (Lour.) Merr. 58
formosana Nakai 55
glaberrima Merr. 56
gracilis Nakai 56
grandis v.d.Linden 52, 53, 54, **55**, 58
indochinensis Merr. 55
laxiflora Ridl. 53, 54, 55, **57**
lucida Nakai 58
malabarica Gamble 59
montana (Bl.) Kurz 50*, 52, 53, 54, **55**, 56
α *genuina* Kurz 55
f. *arborescens* Hochr. 56
f. *scandens* Hochr. 56
var. *borneensis* Merr. & Perry 56
nepalensis 52, 55, 56, 57, 58, 59
nitida Merr. & Perry 52, 54, **58**
ovalifolia Elm. 50*, 53, 54, **58**
pachyphylla Merr. 58
papuana Harms 59
papuana Merr. & Perry 59
parva K. & V. 56
parviflora Craib 53, 56
pentandra (Schltr) v.d.Linden 52, 54, 55, **59**
pomifera (Roxb.) DC. 50*, 52, 54, **58**
var. *sphaerocarpa* (non Hassk.) King 57, 58
robusta Craib 58
simplicifolia Merr. 52, 53, 54, **55**
sp. Merr. 58
sphaerocarpa Hassk. 50*, 52, 53, 54, **57**, 58, 59
var. **pubescens** v.d.Linden **57**
stipulacea v.d.Linden 50*, 51, 52, 53, 54, **55**
trifoliata Ridl. 58
unifoliata Merr. & Chun 53, 55
versteeghii Merr. 59
Typha L. **982**
angustata Bory & Chaubard 983
angustifolia L. s.l. 982, 983
domingensis Pers. 982, 983
latifolia L. 983
orientalis Pr. 982, 983
Typhaceae 4: **242–244**; 6: **982**

Umbelliferae 4: **113–140**, **595**; 5: **555**; 6: 194, **983–984**
Urophyllum streptopodium Wall. 373
Usteria 295, 296, 954
Utania G.Don 299, 301, 309
morindaefolia G.Don 311

Vacciniaceae 473
Vaccinium L. 469, 470, 471, 472, 473, 474, 741, **746**, 878
sect. Bracteata Nakai 747, **791**, 792 map
sect. *Euepigynium* Schltr 791
sect. Galeopetalum (J.J.S.) Sleum. 747, 748 map, **753**
sect. Neojunghuhniana (Koord.) Sleum. 747, 753 map, **785**
sect. *Nesococcus* Copel. f. 791
sect. Oarianthe Schltr 747, **765** map
sect. Pachyanthum Sleum. **747**, 748 map
sect. Rigiolepis (Hook. f.) J.J.S. 747, 753 map, **754**
subg. *Galeopetalum* J.J.S. 753
absconditum J.J.S. 767, **775**
acrobracteatum K.Sch. 470, 793, 796, 800, **868***
acuminatissimum (non Miq.) Merr. 756
acuminatissimum Miq. 755, **761**
f. acuminatissimum **761**
f. ellipticum (J.J.S.) Sleum. 761, **762**
f. *javanicum* Miq. 762
f. *leptantha* = *leptanthum*
f. *leptanthum* (Miq.) Vuyck 764
f. marapiense (J.J.S.) Sleum. 761, **762**
f. *sumatranum* Miq. 762
var. *singalense* J.J.S. 762
acuminatissimum (non Miq. s. str.) Ridl. 762
acutissimum F.v.M. **831**
var. acutissimum 795, **831**
var. pilosistylum Sleum. 796, **831**
acutissimum (non F.v.M.) Warb. 830
adenanthum Sleum. 868
adenopodum Sleum. 755, **765**
adenotrichum Sleum. 796, **846**
adenurum C.E.C.Fischer 840
agusanense Elm. 793, **807**
aitapense Sleum. 795, 800, **833**
albicans Sleum. 795, **832**
var. albicans 797, **832**
var. pseudopsammogenes Sleum. 832, **833**
var. pubens Sleum. 832, **833**
alvarezii Merr. 798, 800, **857**
var. alvarezii **857**
var. moisense Copel. f. **858**
ambivalens Sleum. 796, 799, 801, **847**
amblyandrum F.v.M. 768, **783**
var. amblyandrum 766, **783**, 784
var. maiusculum Sleum. **783**
var. pungens Sleum. 783, **784***
ambyandrum = *amblyandrum* 783
amphoterum Sleum. 793, 797, 798, **848**
amplexicaule J.J.S. 794, 799, **861**
amplifolium F.v.M. 748, **751**
var. amplifolium **751**, 752, 753
var. giganteum Sleum. 751, **752**
var. oblongum Sleum. 751, **752**
var. stabilipes Sleum. 751, **752**
ampullaceum Sleum. 792, **804**
andersonii Sleum. 755, **763**
angiense Kaneh. & Hatus. 798, 800, **856**
angulatum J.J.S. 798, 799, **856**
angustilimbum Merr. 870
apiculatum Sleum. 800, **869**
apoanum Merr. 895
apophysatum Sleum. 797, **850**
appendiculatum Schltr 794, **826**, 861
ardisiflora = *ardisiiflorum* 843
ardisiiflorum Ridl. 843
ardisioides Ridl. 843
ardisioides Wernh., non Ridl. 863
arenarium Sleum. 784
artum J.J.S. 798, **854**
atrescens Sleum. 753
aucupis Sleum. 794, **822**
auriculifolium Sleum. 792, **805**
bancanum (non Miq. s.str.) Clarke 842
bancanum (non Miq. s.str.) K. & G. 842
bancanum (non Miq.) Koord. 847
bancanum Miq. 796, 803, **840**, 841*
var. bancanum **841**, 842*, 843
var. kemulense J.J.S. ex Sleum. 841, **843**
var. kunstleri (K. & G.) Sleum. 841, **842**
var. tenuinervium J.J.S. 841, **842**, 843
bancanum (non Miq.) Ridl. 854
banksii Merr. 797, **849**

banksii (non Merr. 1906) Merr. 850
barandanum Vidal 793, **806**
var. barandanum **807**
var. cagayanense Copel. f. **807**
var. hutchinsonii (Merr.) Copel. f. **807**
barbatum J.J.S. 768, **781**
bartlettii Merr. 800, **867**
benguetense Vidal 797, 801, **875**
besagiense J.J.S. 796, **838**
bigibbum J.J.S. 754, **761**
blepharocalyx (non Schltr) Lane-Poole 876
blepharocalyx Schltr 801, **876**
blumeanum Niedenzu 872
bodenii Wernh. 766, 767, **774**
borneense (non W.W.Sm.) Anderson 763
borneense W.W.Sm. 754, **756**
var. borneense **756**
var. poianum (J.J.S.) Sleum. **756**
brachycladum Sleum. 766, **770**
brachygyne J.J.S. 794, **824**
brachytrichum Sleum.796, **847**
bracteatum Thunb. 747, 791, 793, **801**
brassii Sleum. 799, **864**
var. brassii **864**, 866
var. madarum Sleum. **866**
breviflos Ridl. 842
brevipedunculatum J.J.S. 799, **863**
buxifolium Hook. f. 839
buxoides J.J.S. 777
calelanum Elm. 895
camiguinense Merr. 795, **836**
capillatum Sleum. 794, 799, **866**
capillipes Sleum. 754, **757**
cardiophorum Sleum. 786, **789**
carneolum Sleum. **831**
var. carneolum 795, **831**
var. nesophilum Sleum. 795, **832**
caudatifolium Merr. 765
caudatum Warb. 797, 801, **875**
cavendishioides Sleum. 798, 800, 801, **858**
centrocelebicum Sleum. 792, **803**
var. centrocelebicum **803**
var. maius Sleum. **803**
ceramense Sleum. 767, **775**
cercidifolium J.J.S. 794, **827**
chionostomum Sleum. 776
ciliatipetalum J.J.S. 777
claoxylon J.J.S. 798, **859**
clementis Merr. 795, 796, **836***
coelorum Wernh. 768, **784**
collivagum Sleum. 772
contractum Sleum. 794, **821**
convallariiflorum J.J.S. 794, **826**, 861
convexifolium J.J.S. 766, 772
cordifolium Stapf 794, 827
coriaceum Hook. f. 792, 795, 796, **838**
coriaceum (Bl.) Miq. 828
cornigerum Sleum. 796, **837**
corymbiferum Miq. 878
costerifolium Sleum. 796, 801, **845**
costeroides Merr. 742
crassiflorum J.J.S. 767, **777**
crassiflorum (non J.J.S. 1912 & 1914) J.J.S. 774
crassifolium Andr. 746
crassistylum Sleum. 799, **863**
crenatifolium Sleum. 797, **849**
cruentum Sleum. 798, 831, **857**, 877
cryptodon Sleum. 776
culminicolum Wernh. 766, 767, **774**
cumingianum Vidal 797, 798, **850**
var. cumingianum **850**, 851
var. igorotorum Copel. f. **851**
var. marivelesense Copel. f. **851**
var. pyriforme (Merr.) Copel. f. **851**
var. *tayabasense* Copel. f. 850
cuneifolium (Bl.) Miq. 796, **847**
var. *acutum* Miq. 847
cyclopense J.J.S. **773**
f. cyclopense 767, **773**
f. glabrum Sleum. 768, **773**
var. *arfakense* J.J.S. 773
cyrtodon Miq. 872, 873
daphniphyllum Schltr 794, **826**, 861
debilescens Sleum. 797, **852**
decorum Ridl. 852
decumbens J.J.S. 767, **776**
dempoense Fawc. 810
dempoense (non Sp.Moore) de Voogd 811
densifolium J.J.S. 766, **769**
dialypetalum J.J.S. 752*, **753**
dictyoneuron Sleum. 798, 800, **858**
var. dictyoneuron 798, **858**
var. koëbrense Sleum. **859**
var. oreophilum Sleum. **859**
dipladenium Sleum. 755, **763**
disterigmoides Sleum. 777
dominans Sleum. 471, 793, **809**
dubiosum J.J.S. 747, 793, **808**
eburneum Ridl. 843
elegans Elm. 795, **829**
ellipticum (Bl.) Miq. 815, 873
var. *macrocalyx* J.J.S. 873
elliptifolium Merr. 795, **835**
endertii (J.J.S.) Masam. 758
endertii J.J.S. 795, **835**
epiphythicum Merr. 793, **806**
erythrinum Hook. 815
euanthum Bl. 872
eugenoides Sp.Moore 811
evanidinervium Sleum. 768, **784**
eymae Sleum. 786, **790**, 791*
fastigiatum Sp.Moore 872
filiforme (J.J.S.) Sleum. 754, **758**
filipes Schltr 796, **844**
finisterrae Schltr 766, **769**
fissiflorum Sleum. 747, **748**
flagellatifolium Copel. f. 755, **765**
floribundum (Bl.) Miq. 872
forbesii Fawc. 810
foxworthii Copel. f. 837, 847
fraternum Sleum. 793, 798, **859**
gitingense Elm. 792, **803**
gjellerupii J.J.S. 798, 801, **871**
glabrescens K. & G. 792, **804**
glandellatum Sleum. 794, **813**
globosum J.J.S. 768, **778**, 781
var. *latifolium* J.J.S. 779
goodenoughii Sleum. 795, **829**
gracile J.J.S. 797, 799, **851**
gracilipes Sleum. 801, **874**
gracillimum J.J.S. 801, **877**
grandibracteatum Schltr 793, **809**
habbemae Koord. 798, **855**
var. habbemae **855**
var. parvifolium J.J.S. **855**
var. pluriglandulosum J.J.S. 798, **855**
haemanthum Sleum. 769
haematochroum Sleum. 766, 767, **770**
halconense Merr. 798, 799, **860**
hasseltii Miq. 854
var. *sabuletorum* Ridl. 854
hatamense Becc. 766, **770**
hatamense (non Becc.) Koord. 782
helenae F.v.M. 879
hellwigianum Sleum. 795, **830**
henrici Sleum. 754, **759**
hispidulissimum Wernh. 786, **789**
hooglandii Sleum. 793, 799, **862**
horizontale Sleum. 796, **839**, 840*
hosei Merr. 873
hutchinsonii Merr. 807
igneum J.J.S. 767, **775**

igorotorum Copel. f. ex Elm. 851
ilocanum Merr. 810
imbricans J.J.S. 786, **789**
inconspicuum J.J.S. 768, **781**
indutum Vidal 792, 793, **804**
ingens Sleum. 747, **748**, 749*
insigne (Koord.) J.J.S. 786, **787**
irigaense Merr. 798, 801, **859**
jagori Warb. 800, **870**
javanicum Hook. 873
kemulense Sleum. 754, **758**
keysseri Schltr ex Diels 748, **750***
var. acutatum Sleum. **751**
var. keysseri **750**
kjellbergii J.J.S. 791, 793, **802**
korinchense Ridl. 794, **811**
var. korinchense 792, **811***
var. losirense Sleum. **812**
korthalsii (J.J.S.) Masam. 763
korthalsii Miq. 795, **828**
kostermansii Sleum. **786**
kunstleri K. & G. 842
kunstleri (non K. & G.) Ridl. 843
lageniforme (non J.J.S.) Kaneh. & Hatus. 868
lageniforme J.J.S. 799, 800, **862**
lanaense Merr. 745
lanceifolium (Ridl.) Sleum. 754, **755**
lanceolatum (Bl.) J.J.S. 761
f. *ellipticum* Sleum. 762
f. *marapiense* (J.J.S.) Sleum. 762
f. *sumatrana* (Miq.) Sleum. 762
lancifolium = lanceifolium 755
latissimum J.J.S. 794, 796, **821**
laurifolium (Bl.) Miq. 471, 746, 801, **871***, 878
var. *arborescens* O.K. 873
var. ellipticum (Bl.) Sleum. 872, **873**
var. glanduligerum Sleum. 798, 872, **874**
var. laurifolium **872**, 873, 874
var. pensile (Sp.Moore) Sleum. 872, **873**
var. robustum (Ridl.) Sleum. 872, **873**
var. sarawakense (Merr.) Sleum. 872, **873**
var. trichodes Sleum. 872, **873**
ledermannii Schltr 773
leptanthum Miq. 755, **764**
f. ellipticum (J.J.S.) Sleum. **764**
f. leptanthum **764**
f. malayanum Sleum. **764**
var. *ellipticum* (J.J.S.) Masam. 764
leptocladum Sleum. 799, **861**
leptomorphum Sleum. 799, **866**
leptospermoides J.J.S. **779**, 780
f. glabrum J.J.S. 767, 768, **780**
f. leptospermoides 767, 768, **779***, 780*
ligustrifolium J.J.S. 800, **870**
littoreum Miq. 747, 797, **854**
lobbii (Ridl.) Sleum. 754, **755**
loheri Merr. 741
longepedicellatum Sleum. 799, **863**
longibracteatum Ridl. 804
longilingua Sleum. 753
longipes Sleum. 753
longiporum (non Schltr) Diels 876
longiporum Schltr 795, **831**
longisepalum J.J.S. 786, **788**
loranthifolium Ridl. 797, **853**
lorentzii Koord. **782**
f. lorentzii 768, **782**
f. puberulum J.J.S. 768, **782**
lucidum (Bl.) Miq. 746, 794, 814*
f. *epiphyticum* O.K. 814
f. *terrestre* O.K. 814
var. lucidum 799, 800, **814**
var. *micranthum* Hochr. 814
var. *orientale* Hochr. 820
var. pumilum J.J.S. 867
var. roseitinctum Sleum. **815**
var. *typicum* Hochr. 814
luridum Sleum. 777
luzoniense Vidal 796, **843**
macbainii F.v.M. 747, **748**
macgillivrayi Seem. 791
macgregorii Merr. 804
macrophyllum (J.J.S.) Sleum. 757
malacca = *malaccense* 801
malaccense Wight 801
var. *bancanum* Miq. 801
var. *celebense* J.J.S. 802
malacothrix Sleum. 786, **787**
marginellum Sleum. 778
mearnsii Elm. 870
medinilloides Elm. 745
megalophyes Sleum. 747, 794, **825**
megaphyllum Sleum. 754, **757**
var. adenophorum Sleum. **757**
var. megaphyllum **757**
micrantherum Stapf 843
micranthum = *micrantherum* 843
microphyllum Reinw. ex Bl. 742, 766, 768, **778**
microphyllum (non Reinw. ex Bl.) F.-Vill. 812, 850
microphyllum (non Bl.) K. & G. 723
microphyllum (non Bl.) J.J.S. 775
mindorense Rendle 778
minimiflorum Sleum. 754, **759**
minusculum Sleum. 797, **852**
minuticalcaratum J.J.S. 794, 797, **822**
f. *capillatum* Sleum. 866
f. glabrum J.J.S. **822**, 823*
f. *latifolium* J.J.S. 822
f. minuticalcaratum **822**, 823
miquelii Boerl. 470, 794, **810***
var. atjehense Sleum. **811**
var. miquelii 793, **810**
mjoebergii J.J.S. 795, **834**
molle J.J.S. 796, **844**
var. molle **844**, 845
var. mollissimum (Sleum.) Sleum. 792, **845**
mollissimum Sleum. 845
monanthum Ridl. 754, **756**
montis-ericae Sleum. 793, **809**
moultonii Merr. 755, **763**
muriculatum J.J.S. 795, **829**
var. *albidum* J.J.S. 829
myrianthum Sleum. 765
myrsinoides Schltr 766, **772**
myrtoides (Bl.) Miq. 746, 747, 793, 794, **812**, 813*, 821
var. ß 810
var. *celebicum* J.J.S. 812
nitens Sleum. 800, **869**
nitidum Andr. 814
nyctericoides = *nycteroides* 823
nycteroides Wernh. 823
oblongum Wright 752
obovalifolium Sleum. 824
obversum Miq. 815
oranjense J.J.S. 777, 778
var. marginellum (Sleum.) Sleum. 767, **778**
var. oranjense 767, **777**, 778
oreites Sleum. 786, **788**
oreomyrtus Sleum. 767, **777**
otophyllum Sleum. 794, **827**, 861
pachydermum Stapf 795, **834***
palawanense Merr. 795, **837**
var. foxworthii (Copel. f.) Sleum. **837**
var. palawanense **837**
paludicolum Sleum. 794, **814**
papuanum J.J.S. 868
paradisearum Becc. 794, **824***
parvibaccatum J.J.S. 811
parvulifolium (non F.v.M.) Diels 769
parvulifolium F.v.M. 766, **771**

pauciflorum Fletch. 753
pensile Sp. Moore 873
perakense Ridl. 852
perrigidum Elm. 798, **855**
philippinense Warb. 793, **808**
phillyreoides Sleum. 799, **861**
piceifolium Wernh. 767, **774**
pilosiflorum J.J.S. 768
pilosilobum J.J.S. 474, 799, **867**
piperifolium Sleum. 755, **762**
piroliflorum J.J.S. 826
platyphyllum Merr. 793, **810**
polyanthum O.K. 872
var. *bicolor* O.K. 872
var. *viridiflorum* O.K. 872
profusum J.J.S. 824
prostratum Sleum. 767, 768, **785**
psammogenes Sleum. 795, **830**
pseudocaudatum Sleum. 797, 801, **874**
psittacobium Sleum. 824
pubicarpum Ridl. 801
pugionifolium Sleum. 767, **774**
pullei J.J.S. 766, 768, **782**
pyriforme Merr. 851
quinquefidum J.J.S. 794, **823**
var. oranjense J.J.S. **824**
var. quinquefidum **823**, 824
rariflorum Schltr 773
retevenium = retivenium 856
reticulato-venosum Sleum. 799, **866**
retivenium Sleum. 798, **856**
retusifolium J.J.S. 799, **864**
ridleyi Sleum. 753
rigidifolium Sleum. 796, 799, **846**
rizalense Merr. 810
robustum Ridl. 873
rollinsoni Hook. 814
roseiflorum J.J.S. 798, 799, **860**
rubroviolaceum Sleum. 801, **877**
sabuletorum Ridl. 854
sabuletrum = *sabuletorum* 854
salicifolium (J.J.S.) Masam. 757
sanquineum Schltr 768, **781**
sarawakense Merr. 873
scandens Schltr 797, **853**
schimperi Koord. 815, 820
schlechterianum Sleum. 785, **786**, 787
schoddei Sleum. 799, **862**
schultzei Schltr 767, **773**
sclerophyllum Sleum. 799, **867**
scortechinii K. & G. 793, **807**
scyphocalyx Sleum. 766, **771**
sessiliflorum Schltr 769
simulans Sleum. 795, **833**
var. leptopodum Sleum. **834**
var. simulans **833**
sororium J.J.S. 767, **776**
sorsogonense Elm. 804
sp. Koord. 774, 815
sp. Merr. 844
sp. Rappard 874
sp. Stapf 859, 861
sp. Vidal 812, 850, 875
spaniotrichum Sleum. 786, **790**
sparsicapillum Sleum. 766, **769**
sparsum Sleum. 801, **876**
stabilipes Sleum. 752
stapfianum Sleum. 793, 796, 838, **839**
var. minus Sleum. **839**
var. stapfianum **839**
steinii Sleum. 801, **876**
stellae-montis Sleum. 799, 800, **862**
stenanthum Sleum. 796, **843**
stenolobum Schltr 794, **825**
striicaule Sleum. 471, **876**
var. adenodes Sleum. 798, **877**
var. pubiflorum Sleum. 796, **877**
var. striicaule 801, **876**, 877
subobovatum Fletcher 852
subulisepalum J.J.S. 786, **790**
sulcatum Ridl. 754, **758**
suluense Copel. f. 840
summifaucis Sleum. 796, **845**
sumatranum Jack **877**
sylvaticum Elm. 800, **870**
taxifolium Sleum. 766, **772**
tenerellum Sleum. 754, **760**
tentaculatum J.J.S. 795, **828**
tenuipes Merr. 796, **844**
teysmannii [non (Bl.) Miq.] Koord. 873
teysmannii Miq. 872
teysmannii (non Miq.) Ridl. 852
thibaudifolium Wernh. 793, **806**
tiariforme J.J.S. 868
timonioides Wernh. 786, **788**
timorense Fawc. 792, 793, 796, 797, **802**
var. *denticulatum* Fawc. 802
tomicipes J.J.S. 796, 800, **869**
torricellense Schltr 868
trichocarpum Sleum. 792, **805**
tubiflorum J.J.S. 797, **851**
turbinatum Merr. 857
turfosum Sleum. 799, 801, **874**
uniflorum J.J.S. 754, **757**
urnigerum Sleum. 779
uroglossum Sleum. 754, **759**, 760*
urophyllum Merr. 753
varingiaefolium (Bl.) Miq. 470, 471, 746, 794, 802, **815**, 816*, 817*, 818, 819*, 820*
f. *parvifolia* Miq. 815
f. *sublanceolata* Miq. 815
var. *angustifolium* O.K. 815
var. calcaratum Sleum. 793, 815, **820**
var. *erythrinum* (Hook.) O.K. 815
var. orientale (Hochr.) Sleum. 815, **820**
var. *pilosiusculum* Hochr. 815
var. *racemosum* Hochr. 815
var. *typicum* Hochr. 815
var. varingiaefolium 815, **816**, 821
varingiaefolium [non (Bl.) Miq.] Miq. 845
varingiaefolium [non (Bl.) Miq.] Vidal 812
varingifolium = varingiaefolium 815
versteegii Koord. 766, **771**
vidalii (non Merr. & Rolfe) H.J.Lam & Holth. 850
vidalii Merr. & Rolfe 797, **848**
villarii Vidal 812
villosiflorum J.J.S. 766, **768**
viridiflorum J.J.S. 795, **833**
viscifolium K. & G. 800, **852**, 853
var. bicalcaratum Sleum. **853**
var. *minus* K. & G. 852
var. viscifolium 797, **853**
vonroemeri Koord. 768, **780**
warburgii Sleum. 794, **821**
whiteanum Sleum. 767, **775**, 778
whitfordii Merr. 768, **782**
wisselianum Sleum. 792, **805**
wollastonii Wernh. 768, **785**
wondiwoiense J.J.S. 767, **772**
woodianum Copel. f. 797, **850**
wrayi Ridl. 843
xerampelinum Sleum. 799, **864**, 865*
zollingeri Miq. 872
Valeriana *chinensis* L. 455
Valerianaceae 4: **253–254**
Valli-Modagam Rheede 326, 328
Vareca moluccana Roxb. 963
Velleia J.E.Smith 950
spathulata R.Br. 950
Ventilago 280
dichotoma (Blco) Merr. 284
Vernonia arborea 152
Vertifolia rubra Rumph. 291
Viburnum amplificatum Kern **929**, 930*
clemensae Kern 929
glaberrimum Merr. 929
hispidulum Kern 929
junghuhnii Miq. 929

lutescens Bl. 929
platyphyllum Merr. 929
vernicosum Gibbs 929
Vieillardia Brongn. & Gris 457
Viereya = *Vireya* 480
Violaceae 237, 963
Violales 63
Vireya Bl. 480
alba Bl. 539
celebica Bl. 615
javanica Bl. 624
retusa Bl. 482
tubiflora Bl. 532
Vitmannia Vahl 199
elliptica Vahl 199
lucida Steud. 201
polyandra Steud. 203
Voacanga *sp.* 369

Wahlenbergia Schrad. ex Roth 107, 109, 110, **111**, 112, 113, 128
agrestis DC. 115
bivalvis Merr. 117, 118
candollei Tuyn 114
confusa Merr. & Perry 107, 113, **114**, 115*
consimilis Lothian 118
dehiscens (Roxb.) DC. 115
erecta (Roth ex R. & S.) Tuyn **113**, 114*
eurycarpa Domin 115
gloriosa Lothian 118
gracilenta Lothian 116, 118
gracilis (Schrad.) DC. 115, 116, 118
var. *hirsuta* Jungh. 115
var. *vincaeflora* DC. 118
gracilis E.Mey., nomen 117
hirsuta Steud., nomen 113
hirsuta (Edgew.) Tuyn 113
hookeri (Clarke) Tuyn 107, 113, **114***
indica DC. 115
lavandulaefolia DC. 115
marginata (Thunb.) DC. 107, 110, 113, **115**, 116*, 117* map
var. **grandiflora** Tuyn 113, **118**
subvar. **trichogyna** (Stearn) Tuyn **118**
multicaulis Bth. 115
paniculata (Thunb.) DC. 114
perotifolia W. & A. 113
quadrifida (R.Br.) DC. 115, 118
sieberi DC. 115
simplicicaulis de Vriese 115
trichogyna Stearn 118
vincaeflora (Vent.) Decne 118
Weigelia coraeensis Thunb. 929
fallax Miq. 929
Wendlandia 152
Wickstroemia = Wikstroemia 28
Wikstroemia Endl. 2, 3, 4, 5, **28**
subg. *Chamaejasme* (Amman) Domke 28
subg. (*Eu*)wikstroemia 28
sect. *Euwikstroemia* Meisn. 28
acuminata Merr. 31
amplifolia (Schltr) Domke 35
androsaemifolia Decne 2, 29*, 30, 32, **33**
androsaemifolia Hand.-Mazz. 34
angustissima Merr. 30
aurantiaca 4
australis Endl. 28
brachyantha Merr. 2, 29*, 30, **31**
calva Back. 32, 33
candolleana Meisn. 33
candolleana (non Meisn.) Ridl. 32
candollei = *candolleana* 32
chamaejasme (L.) Domke 28
clementis Merr. 31
crassifolia Merr. ex Domke 31
fenicis Merr. 33
indica (L.) C.A.Mey. 2, 3, 4, 30, **34**
var. *viridiflora* Hook. f. 35
junghuhniana = *junghuhnii* 32
junghuhnii (non Miq.) K. & V. 32
junghuhnii Miq. 32, 33, 34
lanceolata Merr. **30**
linearifolia Elm. 35
longifolia Lecomte 33
meyeniana Warb. 30, **33**
nutans Champ. 33
ovata C.A.Mey. ex Meisn. 30, **31**, 32 map
ovata (non C.A.Mey.) Vidal 35
pachyphylla Merr. 35
polyantha Merr. 30, **32**
pulgarensis Elm. 35
ridleyi Gamble 30, **34**
ridleyi (non Gamble) Gibbs 32
spanoghii Decne 33, 34
subcoriacea Merr. 35
tenuiramis Miq. 29*, 30, **31**
venosa Merr. & Perry 30, **33**
viridiflora Meisn. 35
Willughbeia *auriculata* Spreng. 327, 328
elliptica Spreng. 303
fragrans Spreng. 307
racemosa Spreng. 311
volubilis Spreng. 311
Wimmeria Schlechtend. 228, 229, **231**
Wirtgenia Andres 469, 470, 474, 669, 943
malayana (Scort. in Hook. f.) Andres 669
Wrightia laniti (Blco) Merr. 373

Xanthophyllum *subglobosum* Elm. 395
var. *longifolium* Elm. 395
Xanthostemon brassii Merr. & Perry 428
Xanthoxylum = Zanthoxylum 56
Xolisma Raf. 674
ovalifolia (Wall.) Rehd. 675
Xylonymus Kalkman 231, 232, **243**, 391, 392, 930
versteeghii Kalkman 244*, **245**
Xylosma luzonense (Presl) Clos 944
palawanense Mendoza **944**
Xyridaceae 4: **366–376**, **598**; 5: 557

Zannichellia 157
Zannichelliaceae 157
Zanthoxylum 207, 209
montanum Bl. 56
serrulatum Bl. 56
Zygophyllaceae 4: **64**

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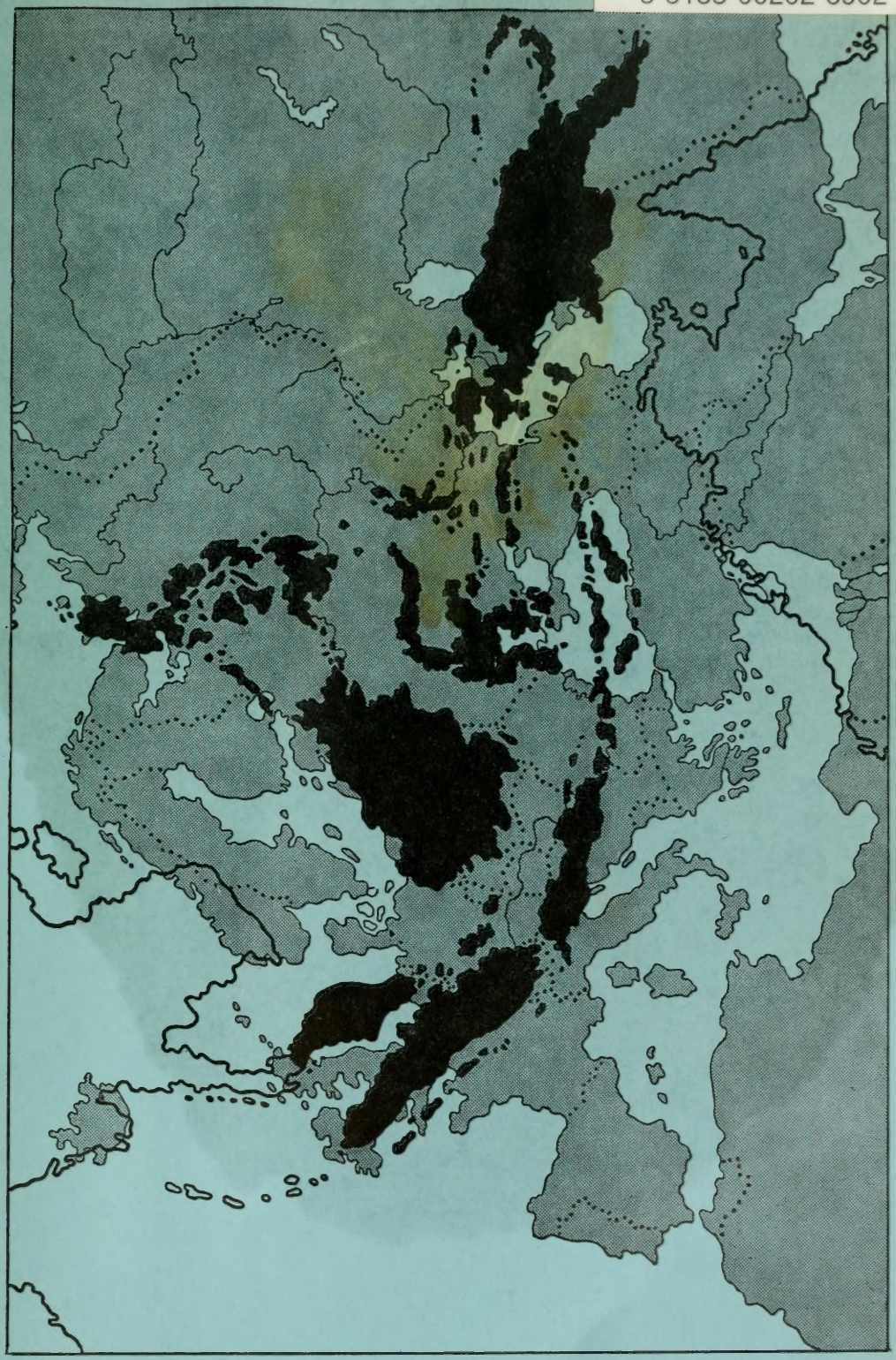

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