FLORA MALESIANA

SERIES I - SPERMATOPHYTA

Flowering Plants

Vol. 6, part 6

INDEX TO REVISED FAMILIES

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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SEVERAL DIRECTORS OF BOTANIC GARDENS / KEEPERS OF HERBARIA
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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in alphabetical sequence

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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

ABBREVIATIONS AND SIGNS

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.*)
×2/5 = 2/5 of natural size
× *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-

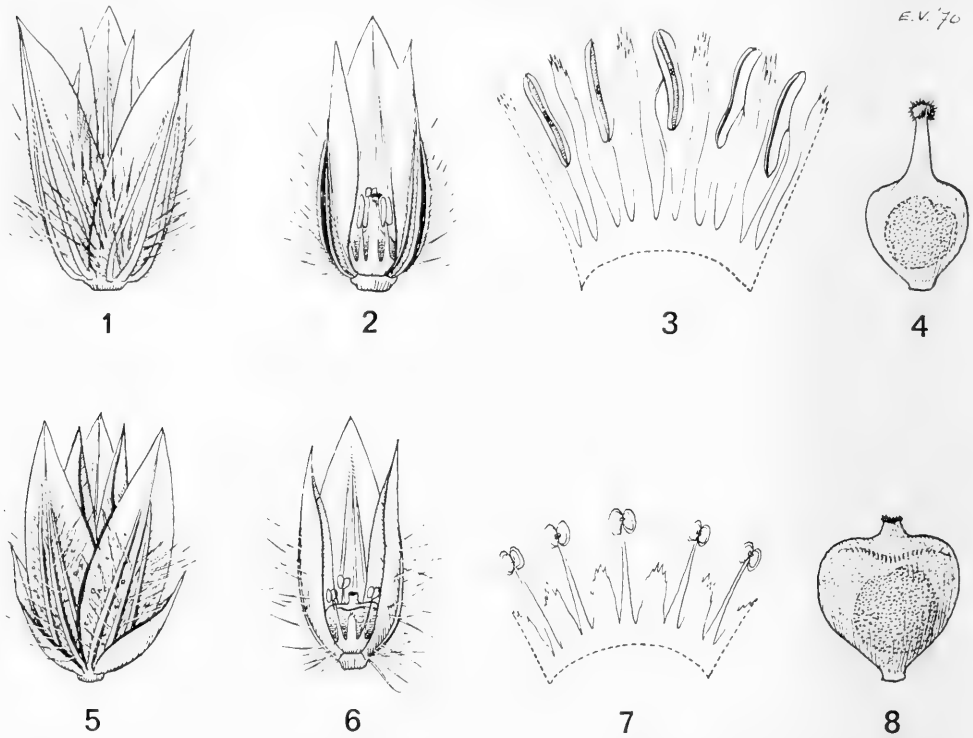

Fig. 1. *Alternanthera bettzickiana* (REGEL) NICHOLS. *1.* Flower, abaxial, without bract and bracteoles × 12, *2. ditto*, without abaxial tepals, × 12, *3.* staminal tube, × 24, *4.* young fruit, × 24. — *A. paronychioides* ST. HIL. *var. paronychioides. 5.* Flower, abaxial, without bract, × 12, *6. 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 baniéng*, 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*, *Scutinanthe brevisepala* Leenh.
567*ab* Add to literature and synonymy: Leenh. Blumea 12 (1964) 19. — *Dacryodes papuana* Husson, Blumea 7 (1952) 167, f. 1; Leenh. Fl. Mal. 1, 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*, 567*a* *Canarium lamii* Leenh.
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 stilt-roots. *Leaves* 3–4-jugate. *Stipules* sub-persistent 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

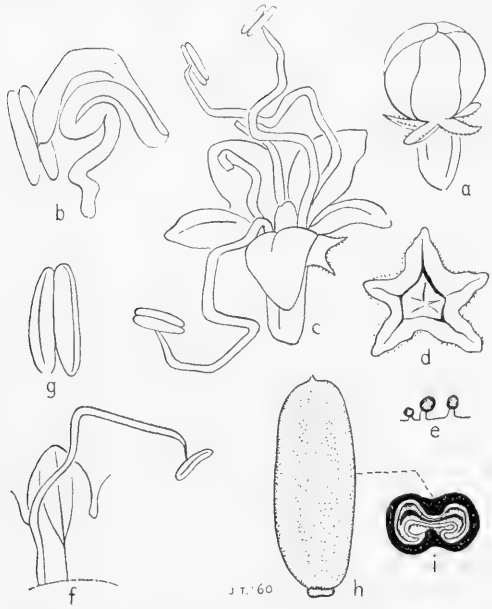

Fig. 3. *Viburnum amplificatum* KERN. *a*. Flower bud, ×5, *b*. stamen in bud, ×13, *c*. expanding flower, ×6½, *d*. calyx, *e*. glands on margin of calyx lobe, *f*. part of corolla with stamen, ×5, *g*. anther, ×13, *h*. fruit, ×2, *i*. *ditto*, in cross section (*a–i* KOSTERMANS 13864).

of the corolla, much exserted; filaments serpentine in bud, 7–8 mm; anthers oblong, 1 mm. Ovary cylindrical, glabrous, 1½ 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-

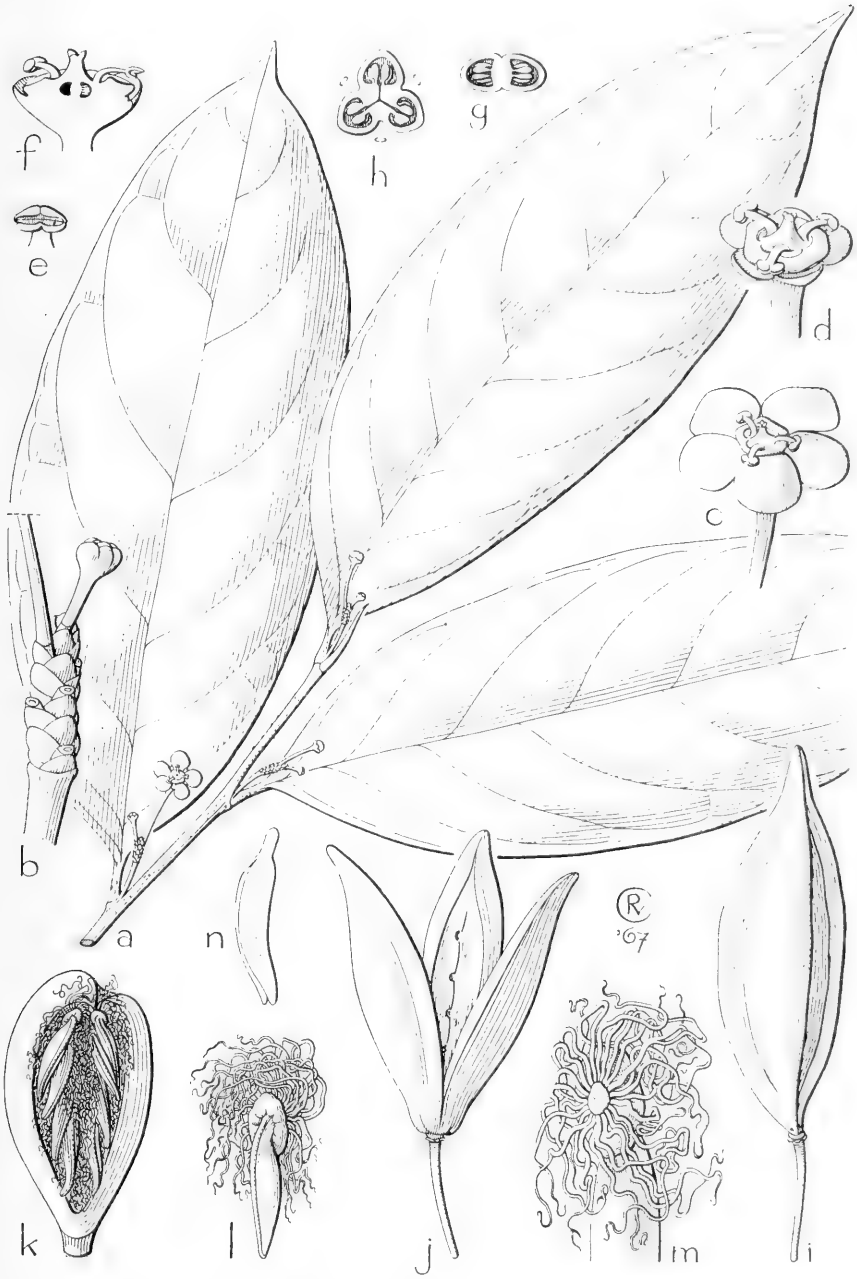

Fig. 4. *Sarawakodendron filamentosum* DING HOU. *a*. Habit, × $^2/_3$, *b*. inflorescence, ×4, *c*. flower, ×2, *d*. flower with petals removed, ×3, *e*. stamen, ×8, *f*. longitudinal section of flower shown in *d*, ×3, *g*. longitudinal section of ovary, ×8, *h*. cross section of ovary with position 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.**

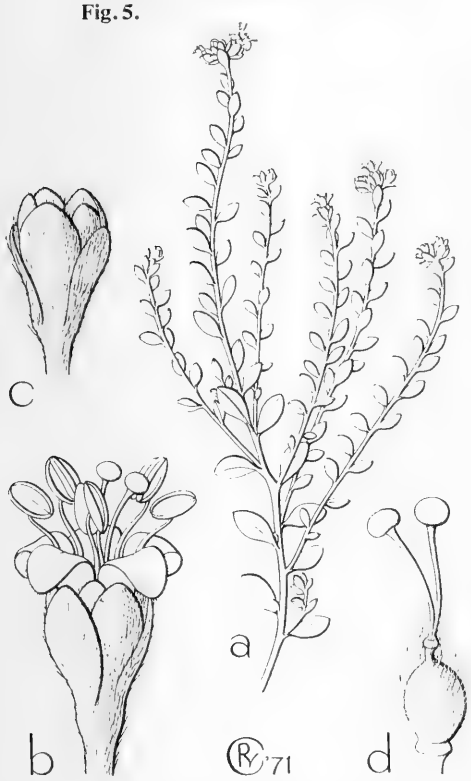

Fig. 5. *Cressa cretica* L. *a*. Habit, ×2/3, *b*. flower, ×4, *c*. calyx, supported by 2 bracteoles, ×4, *d*. pistil, ×6 (*a–d* CINATTI 339, Port. Timor).

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, 3½ mm long. *Corolla* shortly exceeding the calyx, hairy outside, 5½–6 mm long. *Anthers* oblong, *c*. 1⅓–1½ 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 2–2½ 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.

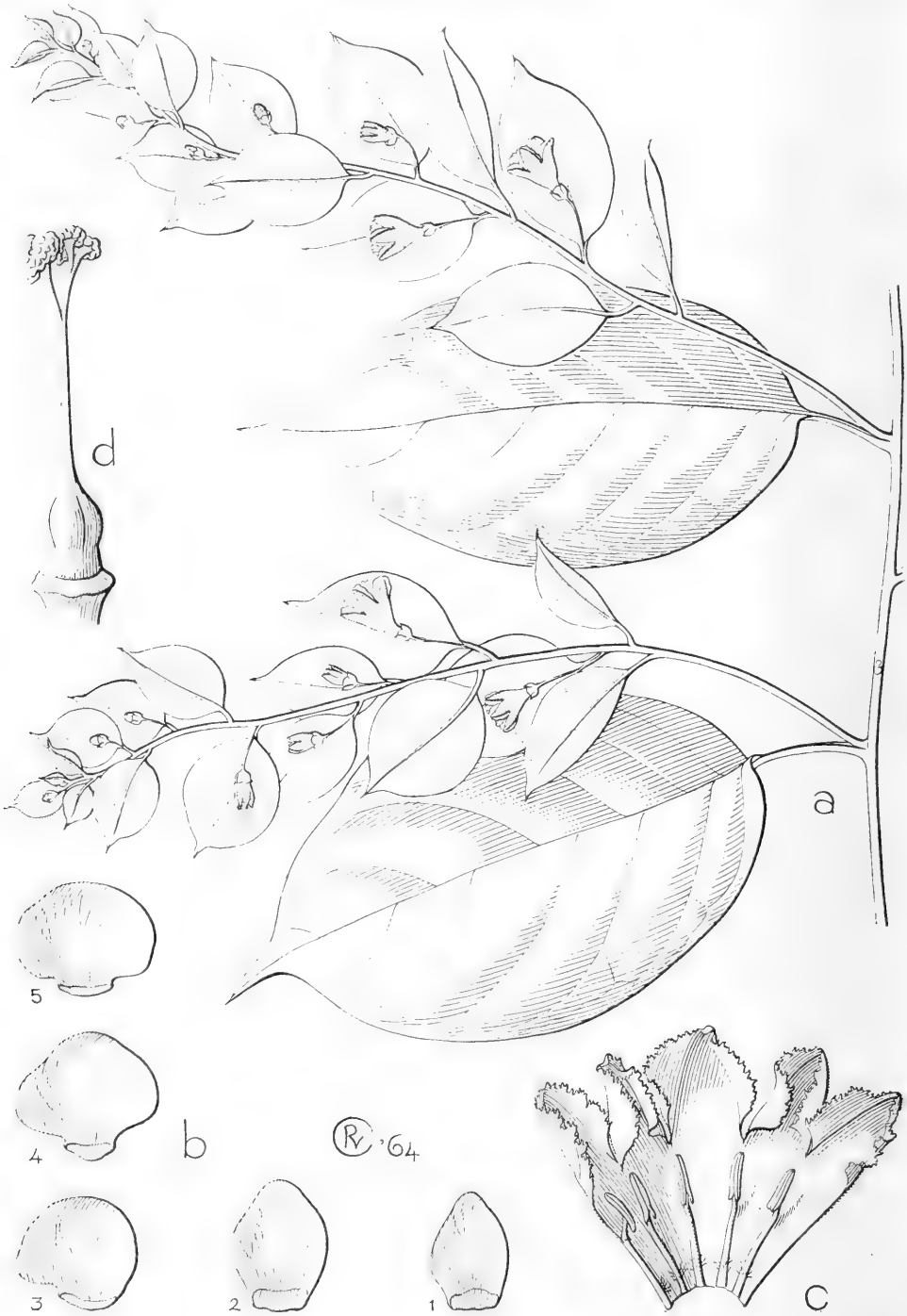

Fig. 6. *Neuropeltopsis alba* OOSTSTR. *a*. Flowering branch, $\times$ $^2/_3$, b^{1-5}. sepals 1–5, $\times$6, *c*. corolla with stamens, $\times$3, *d*. pistil, $\times$6 (*a–d* KOSTERMANS 13588).

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–o, 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:

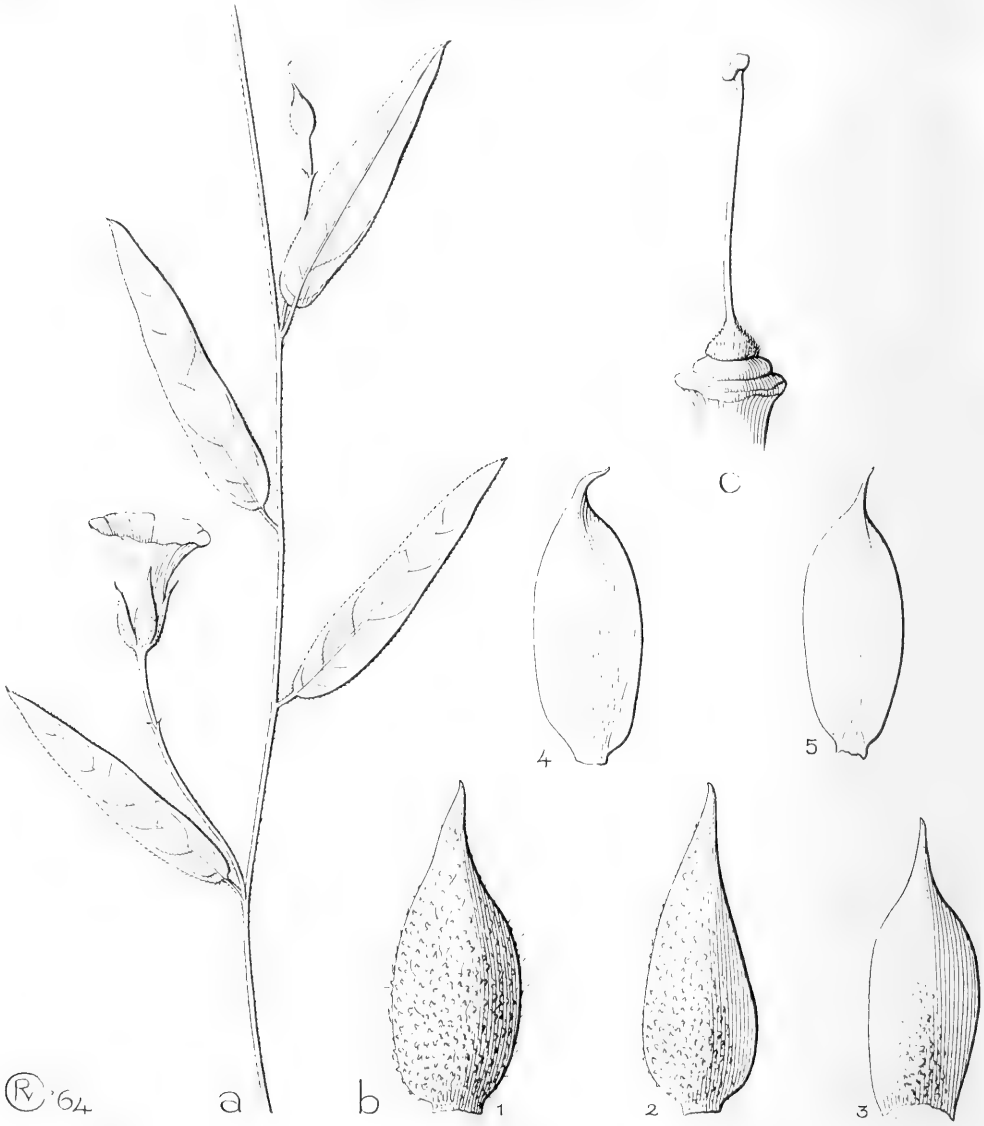

Fig. 7. *Merremia aniseiifolia* OOSTSTR. *a*. Flowering stem, $\times$ $^2/_3$, b^{1-5}. sepals 1–5, $\times$3, *c*. pistil, $\times$4 (*a–c* MOLL BW 9511).

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**

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(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.

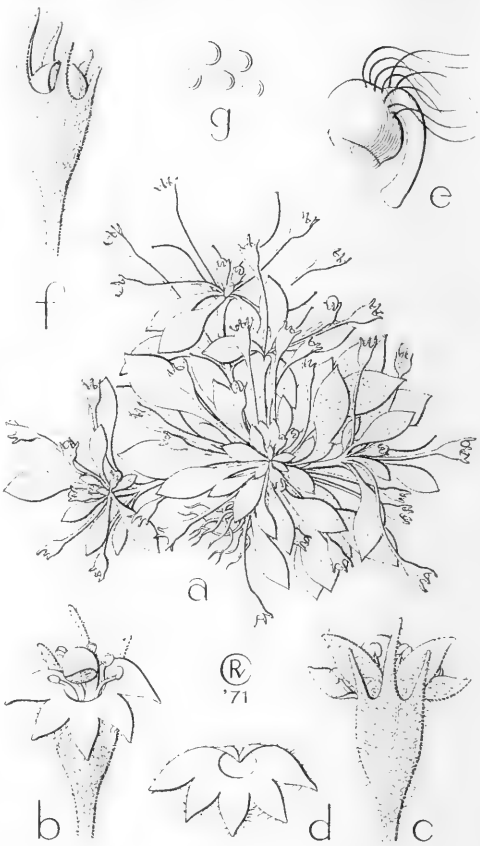

Fig. 9. *Goodenia pumilio* R.BR. *a.* Habit, ×2, *b–c.* flower, ×10, *d.* corolla, from above, ×10, *e.* style and stigma, ×20, *f.* calyx with fruit, ×10, *g.* seeds, ×8 (*a–g* PULLEN 7009).

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

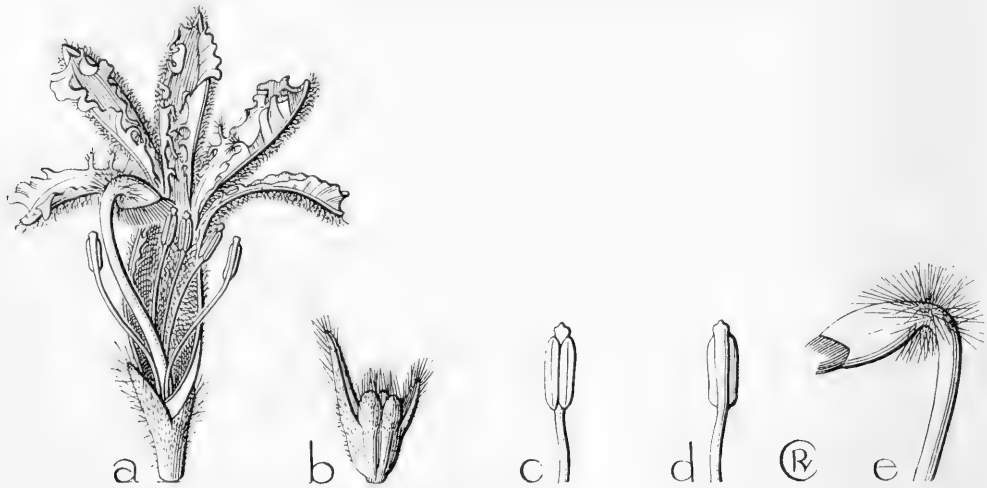

Fig. 10. *Scaevola verticillata* LEENH. *a*. Flower, ×4, *b*. calyx, ×4 (note the three different kinds of lobes!), *c*. & *d*. anther from in- and outside resp., ×8, *e*. indusium, ×8 (showing the spreading hairs at its base) (*a–e* W. MEIJER SAN 28818).

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. 1, 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 (± $1^1/_2$ 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 (± $2^1/_2$ 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–$7^1/_2$ 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 $7^1/_2$ 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(–8$^1/_2$) 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 4$^1/_2$ 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

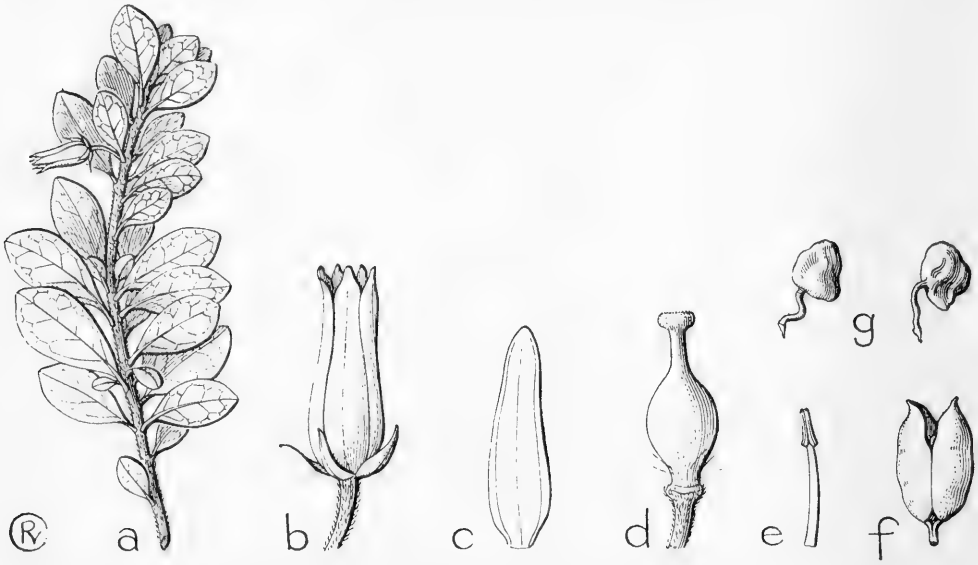

Fig. 11. *Pittosporum inopinatum* BAKKER. *a*. Habit, nat. size, *b*. flower, ×3, *c*. petal, ×5, *d*. style, ×7, *f*. fruit, nat. size, *g*. seeds, ×2 (*a–g* ROBBINS 829).

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 $1^1/_2$ by $^1/_2$ mm, those of the 3rd rank 1 by $^3/_4$ 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.

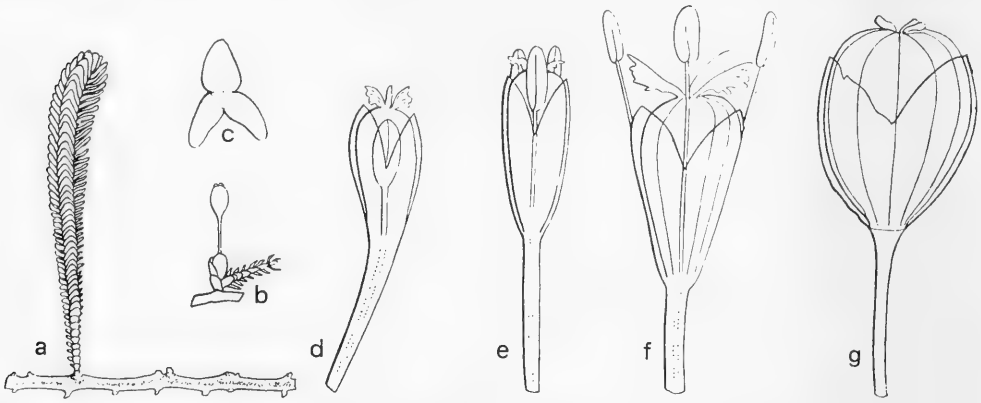

Fig. 12. *Indotristicha malayana* DRANSF. & WHITMORE. *a*. Habit, sterile, ×3, *b. ditto*, fertile, ×3, *c*. tepals, ×7, *d–g*, four stages in the development from flower to fruit, ×14.

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.

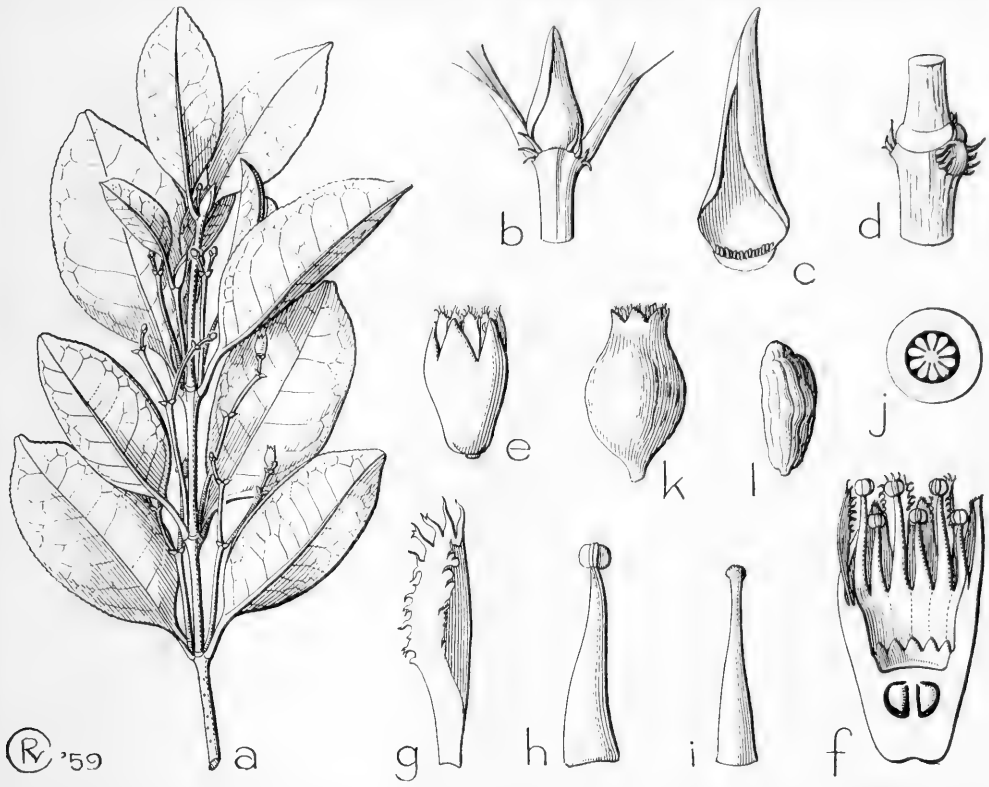

Fig. 13. *Carallia longipes* DING HOU. *a*. Habit, ×2/3, *b*. apex of branchlet showing appendages outside the base of the petioles and stipule, ×2, *c*. inside view of stipule showing colleters, ×7, *d*. node of branchlet, ×3, *e*. flower, ×3, *f*. longitudinal section of flower (style removed), ×7, *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,

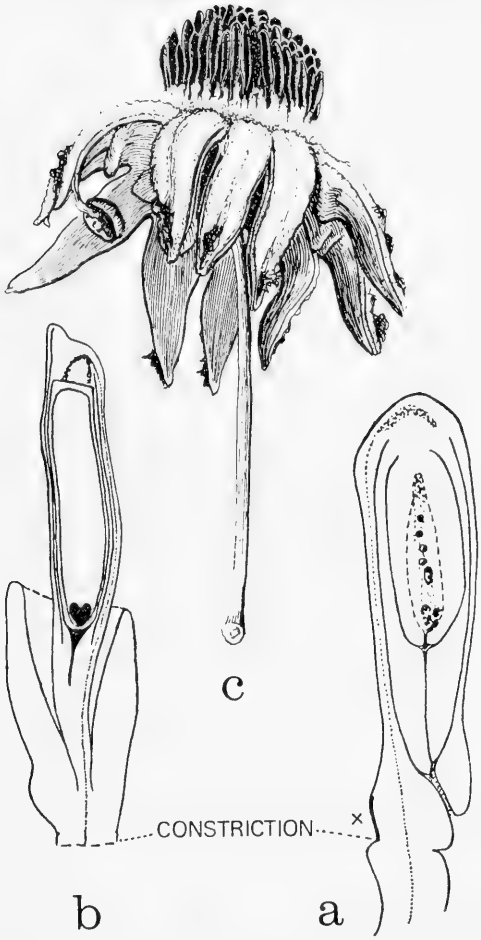

Fig. 14. *Scyphostegia borneensis* STAPF. *a.* L.s. of the ovule at the stage of the first formation of nuclear endosperm, the funicle shows a constriction just below the meristem (indicated by a cross) of the later formed arilloid, ×20, *b.* l.s. of young seed, with the arilloid developed above the 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

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.

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.

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.

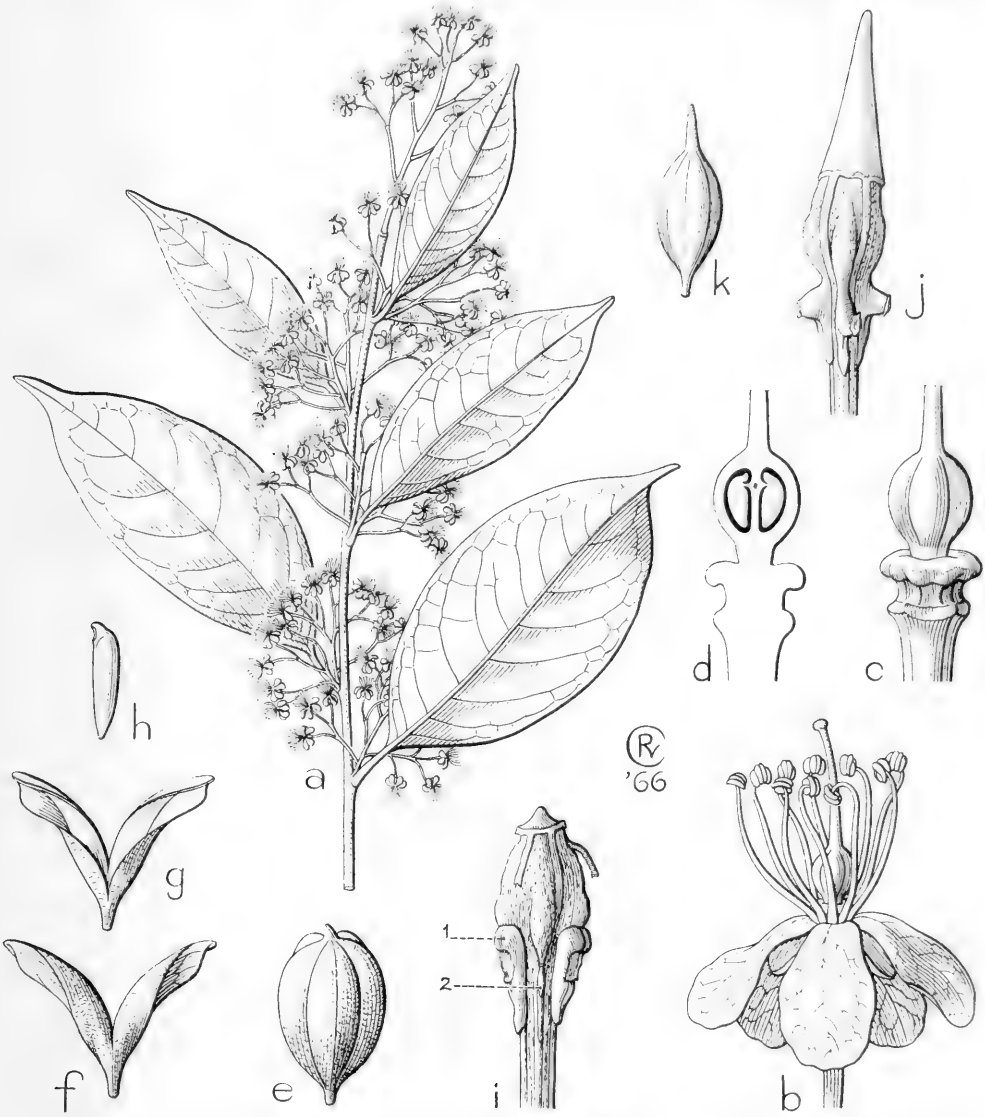

Fig. 16. *Allantospermum borneense* FORMAN. *a*. Habit, $\times 2/3$, *b*. flower, $\times 4$, *c*. *ditto*, floral parts removed except ovary, $\times 8$, *d*. *ditto*, lengthwise section, *e*. fruit, $\times 2/3$, *f–g*, fruit valves, $\times 2/3$, *h*. seed, $\times 2/3$, *i*. columella, (*1*. placental outgrowth, *2*. sterile ovule), $\pm \times 2$. — *ssp. rostratum* NOOTEBOOM, *j*. Columella, $\times 2$, *k*. young fruit, $\times 2/3$ (*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*

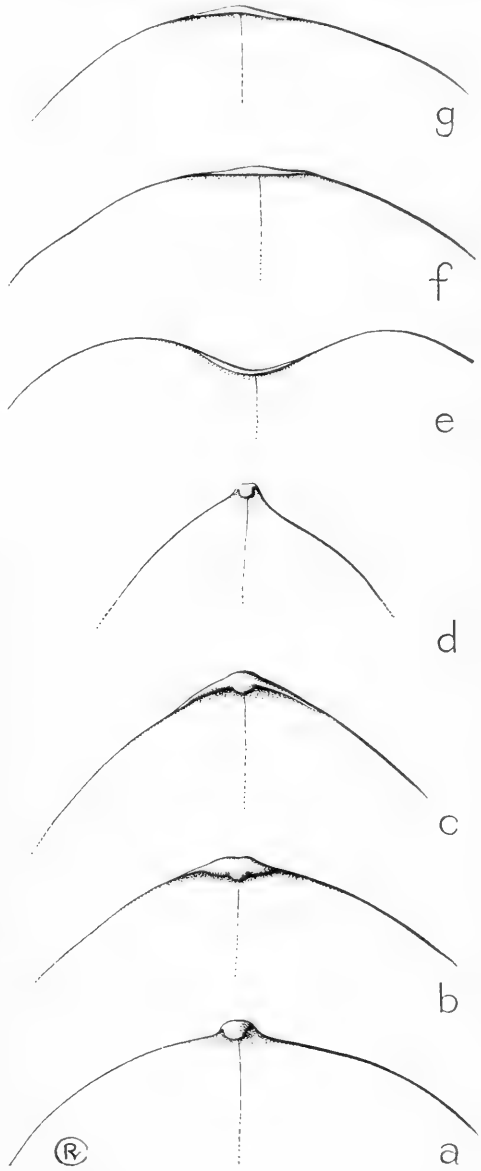

Fig. 17. Leaf tips of *Sonneratia*. — *a–d. S. caseolaris* (L.) ENGL., ×3. — *e–g. S. alba* J.SM., ×3. The difference is not completely exclusive and some intermediates occur (*a* KOORDERS 4442, *b* NGF 5026, *c* BW 3198, *d* KOORDERS 14219, *e* KARSTEN *s.n.*, *f* COERT 1456, *g* BORSSUM WAALKES 272).

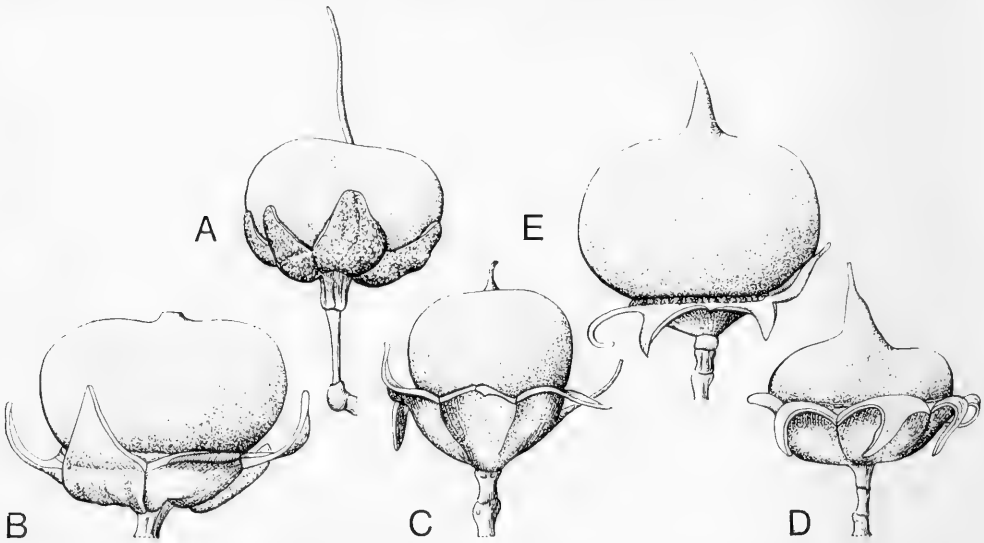

Fig. 18. A. *Sonneratia ovata*, B. *S. alba* × *ovata*, C. *S. alba*, D. *S. alba* × *caseolaris*, E. *S. caseolaris*, all × 1/2 (*A* MULLER 5, Labuan, *B* MULLER 8, Brunei, *C* MULLER *s.n.*, 28–12–63, Labuan, *D* MULLER 11, Brunei, *E* MULLER *s.n.*, 30–5–64, Brunei).

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.).

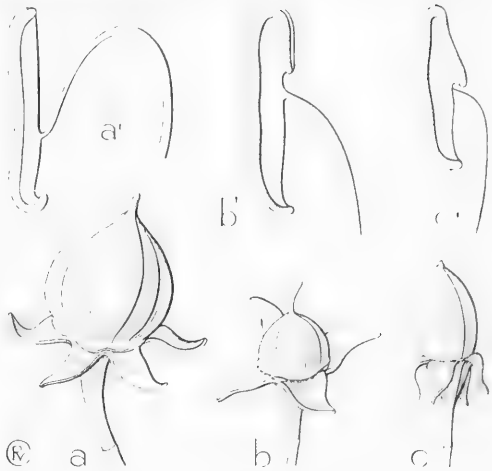

Fig. 19. Fruit and stamen details of *Duabanga*. *a–a'*. *D. grandiflora* (ROXB. *ex* DC.) WALP., *b–b'*. *D. taylorii* JAYAWEERA, *c–c'*. *D. moluccana* BL. Fruits ×1/2, stamens ×2 1/2 (after GEESINK).

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 suboblong, 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 14$^1/_2$ 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, 1$^1/_2$–2$^1/_2$ 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 2$^1/_2$ cm by 2$^1/_2$ 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 2$^1/_2$ 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.

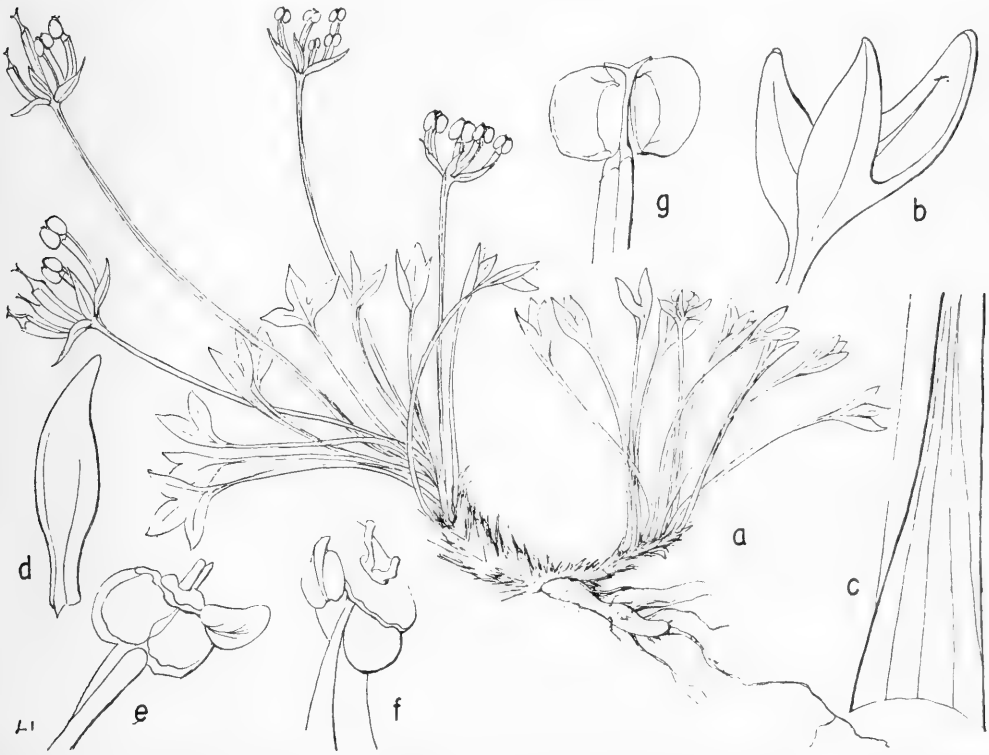

Fig. 20. *Trachymene tripartita* HOOGL. *a*. Habit, ×1, *b*. leaf-blade, ×10, *c*. leaf-sheath, ×10, *d*. involucral bract, ×10, *e*. & *f*. flower with only one petal still present, ×15, *g*. fruit, ×15 (*a–g* HOOGLAND & PULLEN 5965).

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; anther-cells 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.

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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.*).

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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*.

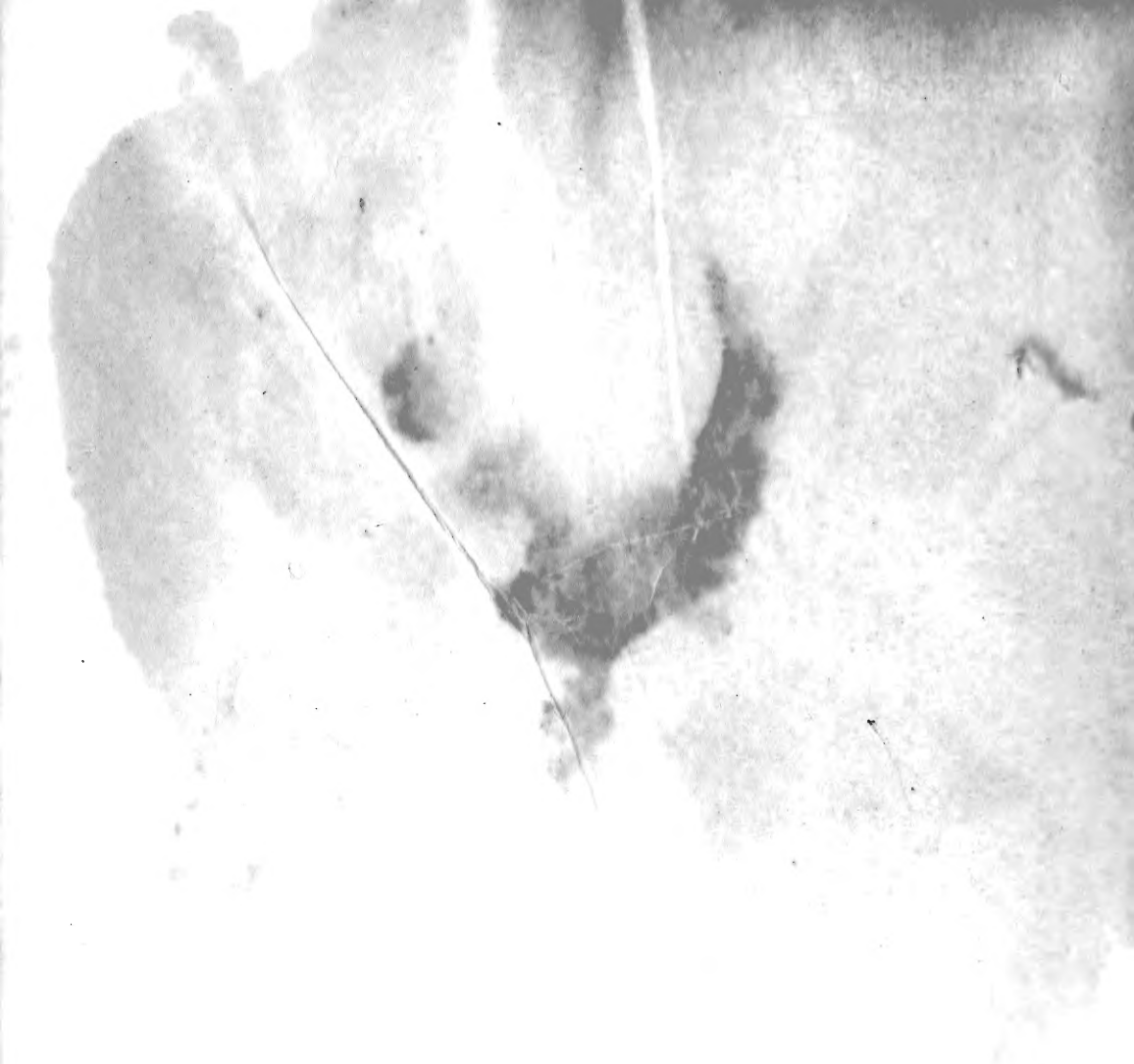
'*Map*' printed behind a page number denotes that a map of the concerned taxon is present on that page.

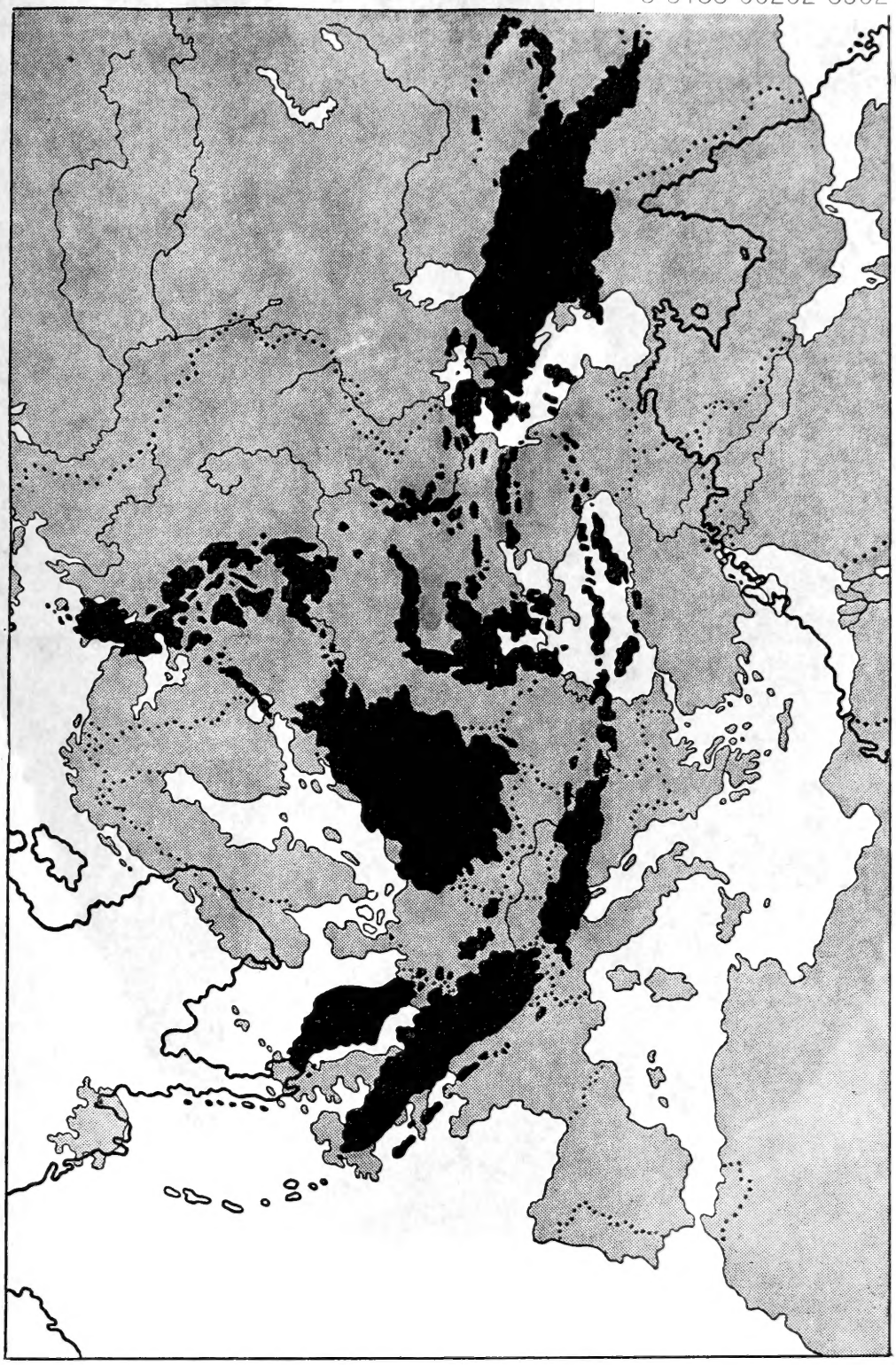
An *asterisk* behind a page number denotes the presence of a figure of the concerned taxon.

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.





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