REINWARDTIA
Published by Herbarium Bogoriense, Kfcbun Raya Indonesia
Volume 5, Part 4, p.p. 419-456 (196t)

PRELIMINARY REVISIONS OF SOME GENERA OF MALAYSIAN PAPILIONACEAE I

M. S. VAN MEEUWEN, H. P. NOOTEBOOM,
& C. G. G. J. VAN STEENIS *

SUMMARY

The revisions have been performed by Miss M. S. van Meeuwen *(Pycnospora, Smithia, Uraria),* H. P. Nooteboom *(Galactia, Moghania, Rhynehosia, Stylosanthes, Zornia),* and C. G. G. J. van Steenis (*Cyclocarpa, Neocollettia).*

Cyclocarpa has been recorded for Borneo and Java.

Galactia is represented in Malaysia by only one species; its variability in the Old and New World is discussed.

Of *Moghania (Flerningia)* 4 species are distinguished. *F. cumingiana, F. philippinensis,* and *F. latifolia* have been merged with *M. macrophylla.*

On *Neocollettia* particulars are given on its occurrence in Java and its ecology.

Pycnospova has only one species in Malaysia; its distribution is given.

Rhynehosia has been revised and several specific names have been reduced, specially under *R. acuminatissima* which ranges from Sumatra to Queensland.

In *Stylosanthes* three species are distinguished and a key is given for their identification.

Smithia possesses only three species in Malaysia; *S. geminiflora* and *S. hispidissima* have been reduced to S. *conferta.*

Uraria is obviously in Malaysia only represented by 5 species which have been keyed out; their synonymy has been corrected. *Desmodium horsfieldii* Miq. has been reduced to *U. rufescens.*

In *Zornia* only one species is accepted; it is very variable and shows regional and local racial variation.

No new species or new combinations have been proposed.

In the introduction a discussion is given on the distribution pattern in Malaysia of plants bound to a seasonal climate the pathway of which runs from continental Asia to Australia via the Philippines, Celebes, and Moluccas to Java, the Lesser Sunda Islands and South New Guinea. It is assumed that this pathway consisted of more and larger stepping stones during the Pleistocene Glacial Epoch.

* Foundation Flora Malesiana, Leyden.

INTRODUCTION

Although there are as yet no definite prospects to revise the subfamily *Papilionaceae* for the Flora Malesiana, it seems to me that something is gained if we can gradually accumulate precursory data for its study. It is remarkable that, although Backer and Merrill accomplished most useful work on it for Java and the Philippines respectively, this large group has been much neglected and that taxonomical work performed on it is inversely proportional to its size and importance in various aspects.

One of its interesting aspects is ecological. Many genera show a distinct centre of development inside Malaysia and there are even endemic or subendemic Malaysian genera; they are mostly constituents of the rain-forest. Another group, however, consists of genera which are worldwide distributed in the tropics; even many of their species show very large ranges. In general the latter do not belong to the rain-forest (with exceptions), but to the areas subject to a dry season. These are the most interesting ones, as their distribution involves the problem how seasonal plants could cross the everwet tropics between continental Asia to Australia.

SOUTHEASTERN CONTINENTAL ASIA, including Burma, Siam, Indo-China, S. China, and Hainan, is an area of which the major surface is subject to annual drought, certain everwet foci excepted; southwards this climatic regime is found to the south of Peninsular Siam about the isthmus of Kra.

THE WESTERN PART OF MALAYSIA, including Malaya, Sumatra, Borneo, and West Java, forms a colossal continuous area with an everwet climate; as far as we can conclude from the fossil record this has been so at least onwards of the Pliocene, and probably even the Miocene. In it are only a negligeable number of very local dry spots caused by rain-shadows cast by mountains (Pleihari in SE. Borneo, Sumatra West Coast, Tapanuli, Atchin).

THE CENTRAL PART OF MALAYSIA, including the Philippines, Celebes, the Moluccas, Central and East Java, and the Lesser Sunda Islands, is an area characterized by a climatic mosaic of everwet and seasonal. The amount of seasonal area differs from island to island. In the Philippines the western faces of almost all western islands are subject to a dry season. In Celebes the largest areas with a dry season are found in the southern extremities of the two southern peninsulas, but in Central and North Celebes there are only very local areas which, through topographic causes,

have a dry season. The Moluccas show a mosaic which is predominantly everwet, but with isolated spots or local areas which are seasonal; they are found in Halmahera, Buru, Ceram, the Aru Is., etc. Central and East Java, however, possess more seasonal area than everwet, and in East Java the everwet spots are simply caused by local topography, the S. sides of the volcanoes having an everwet climate due to the rain given off by the monsoon winds ascending the slopes. The Lesser Sunda Islands have a similar mosaic as East Java.

NEW GUINEA is almost entirely everwet, the southern coastal part from Frederik Hendrik I. to Moresby excepted; besides, there are along the coasts some local dry pockets caused by rain-shadow.

NEW BRITAIN is also everwet in general, but shows in various places dry pockets.

NORTH AUSTRALIA AND NORTH QUEENSLAND are also largely subject to a seasonal climate.

In mapping the distributional areas of the species of the seasonal flora it appears that they follow the seasonal areas and spots, that is, *they occur with a large number of localities in continental Southeast Asia, they occupy the isolated dry spots in Central Malaysia, where they are consequently commonest in Java and the Lesser Sunda Islands, and then they reappear again in South New Guinea, the Bismarcks, and Australia.*

If we consider for a moment this pattern of seasonal climatic conditions (map 1), it appears that the distributional pathway of drought plants through Malaysia is very much broken up in smaller or larger 'stepping stones', because apart from the insular character of Central Malaysia, it is only small parts of these islands which offer a suitable ecological seasonal climate.

Several of the *Leguminosae* treated in this contribution exactly fit in with this climatic distribution pattern. I may add that in hundreds of other maps I have made, specially of *Leguminosae* and grasses, the same pattern reappears again and again. These areas are obviously ecologically defined.

This raises of course not the problem how the plants have 'found' this corridor. It is clear that they have avoided the huge West Malaysian everwet rain-forest area as they cannot compete with rain-forest vegetation, although they can be grown under everwet conditions; see under *Neocollettia.*

The problem is, however, how they could disperse themselves over these (now) remote stepping stones which are separated by wide distances, in fact too wide to imagine that the intervening spaces could be bridged

by natural means of dispersal. Even sporadic chance dispersal is unlikely in most cases. It might be held that some of these distributions are due to anthropogenous dispersal, but in many cases these plants have such huge areas, and occupied them already one or two centuries ago, that this explanation is unlikely in most cases.

I have been aware of this problem and its implications several decades ago, when I made my first attempt to define the plant geographical regularities in the Malaysian flora [1], specially those of the remarkably disjunct so-called monsoon plants between Asia and Java. I was confronted with it again in connection with the alleged introduction of teak in Java by the Hindus and with the origin of sandalwood.

For a solution of the problem I have indicated [2] that the same drought-pathway has not only been occupied by species which came from Asia, but also by those which came from Australia, and by those which are native to Malaysia. For the latter two categories anthropogenous dispersal from Australia or inside Malaysia is excluded. For that reason the problem of the present absence of sufficient, and sufficiently close, stepping stones for dispersal of drought plants through Malaysia remains valid. Its solution must be found in either a drier climate or more stepping stones in the past which enabled their active dispersal which is impossible by the present configuration of land, sea, and climatic conditions in the archipelago.

I believe I have found a solution which satisfies all these conditions, *viz* the influence of the Pleistocene Ice Age. As is well-known this was accompanied by a worldwide lowering of the level of the sea, which resulted in the merging of the landmasses of West Malaysia on the Sunda shelf into one very large peninsula and the merging of the North Australian with the Aru Islands and New Guinea in the Papuasian Sahul shelf area. According to Dr. H. P. Berlage, then meteorologist at Djakarta, the increase of the landmasses changed the wind regime and air humidity in Malaysia. The overall result would be that there must have been distinctly more and larger areas of periodical drought between the two large rainforest areas in West and East Malaysia respectively. These two everwet cores remained stable, but locally, and along their margins, more local dry spots were found than there are at present, for example in Sumatra in Palembang, Sumatra Westcoast Res., Tapanuli, Gajo Lands, and Atchin, furthermore in SE. Borneo. All these spots are also now only faintly set with some indicator plants tolerant of a feeble dry season.

[1] *In* Bull. Jard. bot. Btzg III, 13: 31—33, *fig. 9.* 1933.
[2] *In* Hand. 8e Ned. Ind. natuurwet. Congr. 1938: 408—409. 1939.

With the post-glacial rising of the sealevel the situation as it is at present gradually returned. Many stepping stones disappeared and were overwhelmed by the rain-forest, but some remained intact, notably the rain-shadow slopes and valleys. Naturally the percentage of area subject to annual drought in the corridor decreased and stepping stones became more spaced than they were before. The spacing of these stepping stones was caused partly by the postglacial increase of humidity but also by the submersion of large areas, notably in the South China Sea, by the rising sealevel, which caused the origin of a big gap between the drought areas of Indo-China and the Philippines. How the extension of the dry period may have affected Malaysia during the Ice Age has been tried to reconstruct from observations in exceptionally dry years. See the instructive map by C. Braak '.

A (geologically) rather recent exchange of drought plants between Asia and Australia fits nicely with the fact that practically all of these species are exactly the same as are found on the continents, which pleads for recent dispersal. A similar observation was made by Warburg -' on the savannah plants in the dry areas of South New Guinea which are specifically not distinct from those of Australia and must be of 'recent' arrival.

The reaction of plants on a seasonal climate is of course widely differing: some are indifferent to climate, as for example *Smithia sensitiva* (map 2). Others are obviously bound to the annual occurrence of a severe dry season, as for example *Rhynchosia rothii* (map 6). Between these extremes there are intermediates, some which need a short dry season, others which prefer a distinct dry season, etc. Miss A. Lammertse has tried to find out for the flora of Java how many 'drought classes' it would be convenient to distinguish in order to fit plant distributions. For that purpose she has used a transparent climatic base map with 6 climatical drought classes in colours which she projected over maps of the same scale on which the localities of a number of common Javanese plant species were dotted. Her results, which are as yet not published, have shown that indeed species can be sorted out into drought classes and that certain species can be used as distinct indicators for these classes.

From her work it also appeared that some species belonging to the lower drought classes (needing only a feeble dry period) are found (very locally) in some isolated dry pockets in the rain-forest area, but that those of the higher classes (needing a strong or long dry period) are rarest and show the most disjunct localities.

[1] Braak, *in* Verh. Kon. Magn. meteor. Obs. Batavia 1: map facing p. 218. 1923.
[2] Warburg *in* Bot. Jahrb. 13: 238—242. 1891.

Though not all distribution maps of the species treated in this paper could be reproduced, a few have been chosen to show this response of plants to a seasonal climate (maps 2—6).

The taxonomical revisions have been primarily based on the material represented in the collections of the Rijksherbarium, Leyden. For loan of the sheets of *Rhynchosia cunninghamii* Bth. we are indebted to the Government Botanist, Brisbane, Mr S. L. Everist, and for loan of the type material of *Rhynchosia sumatrana* Merr. to the Curator of the Herbarium of Michigan, Ann Arbor, Dr. R. McVaugh, to both of whom we tender our sincere thanks.

THE PATHWAY FOR DROUGHT PLANTS FROM ASIA TO AUSTRALIA THROUGH MALAYSIA VICE VERSA WITH PLANT MAPS IN SEQUENCE OF INCREASING DROUCHT REQUIREMENT

Although the number of papilionaceous species revised in this paper is only small, their distributions show various patterns of drought requirement, 'drought' taken in the sense of the occurrence of a dry season. They can serve as rough illustrations of the drought classes of plants mentioned in the introduction.

Although some of these plants are weeds and others are distinctly native species, their reaction to climatic conditions is essentially similar.

In map 1 the two cores of rain-forest area have been drawn black, in the west the Sunda shelf area, in the east the Papuasian or Sahul shelf. In both of the adjoining continental areas of Asia and Australia a seasonal climate is predominant, and the intervening areas of Central Malaysia, almost coinciding with that which Dickerson and Merrill termed „Wallacea", including the major part of Java, are also either seasonal or consist of a mosaic of everwet and seasonal climate. This intervening area is the pathway of the drought plants, vice versa.

The areas of the drought plants have been arranged in maps 2—6 in the sequence of increasing drought, *viz* starting with a species requiring a *feeble* dry season (map 2), followed by one with a *pronounced* dry season (map 3), a *rather strong* dry season (map 4), a *strong* dry season (map 5), and a *severe* dry season (map 6).

From the fact that distributions naturally show less localities, in proportion to the decrease in surface of areas subject to a stronger and severe dry season, it must be concluded that they are e q u i f o r m, *i.e.* in Hultén's sense, that they are comparable, or in other words that their genesis rests on the same base or cause.

In this sequence the species show an increasing 'aversion' for the two everwet rain-forest cores and 'retreat' steadily more from the neighbourhood of these rain-forest areas.

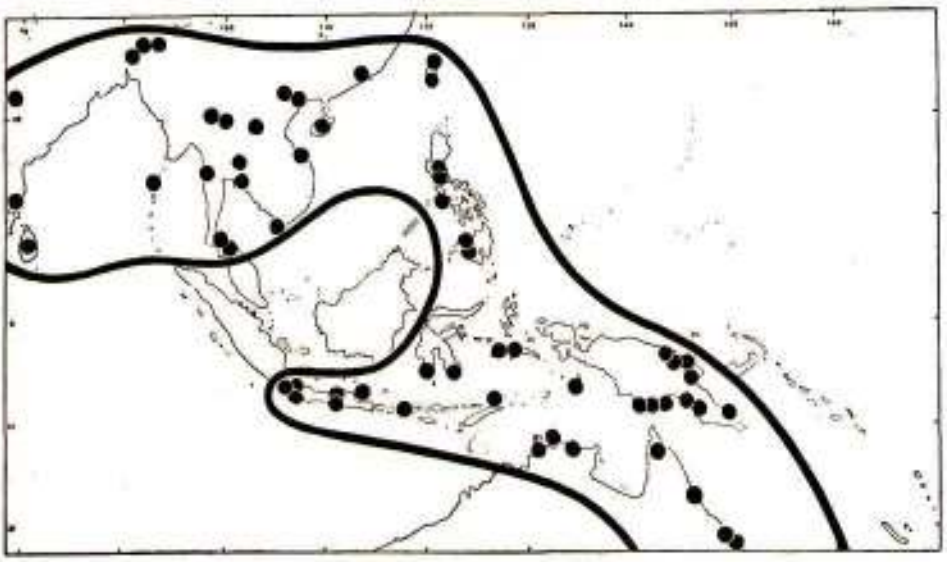
As the surfaces of the areas suitable for representatives of the higher drought classes are very restricted, the distributions of these species become disrupted; in map 4 the example shows a semi-disjunction between S. Celebes and Luzon; in maps 5 and 6 a complete disjunction is found.

The arrangement of drought classes distinguished here as proportional to the size of the disjunction between the areas in Asia and Malaysia is of course open to dispute. I admit that chance factors may have played a role and that much more must be known about the autecology of the individual species before we can definitely assign a species to a drought class. For the present it seems convenient, however, to identify the geographical distribution patterns with the drought classes.

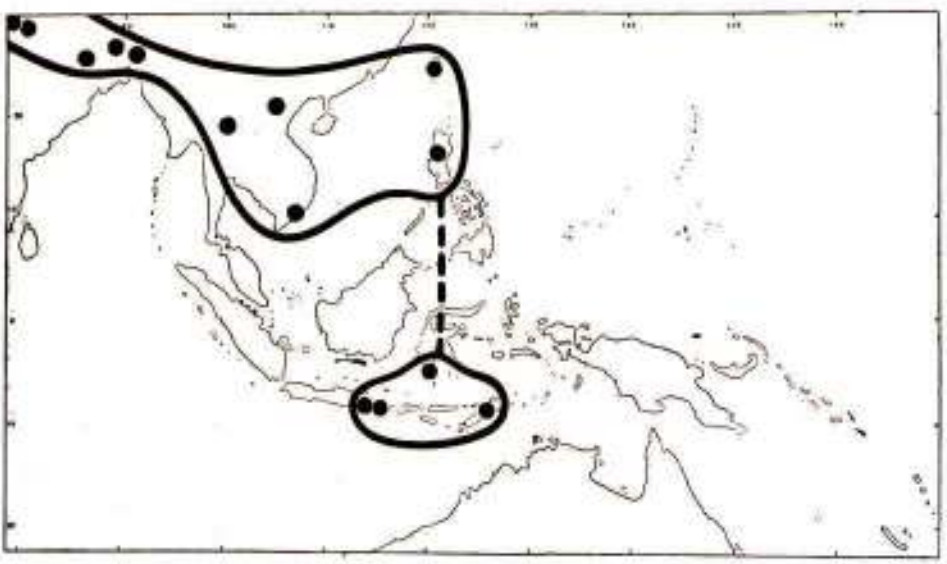
Arranging the species treated in this paper [1] according to drought class types they can be tabulated as follows:

1. Indifferent to climate: —	*Moghania macrophylla*
	———*strobilifera*
	Rhynchosia acuminatissima
	———*viscosa*
	Uraria crinita
	———*lagopodioidec*
2. Feeble dry season: — (map 2)	*Cyclocarpa stellaris*
	Smithia sensitiva
	Zornia diphylla
3. Pronounced dry season: — (map 3)	*Galactia tenuiflora*
	Moghania lineata
	———*involucrata*
	Pycnospora lutescens
	Uraria picta
	———*nifescens*
4. Rather strong dry season: — (map 4)	*Smithia ciliata*
	———*conferta*
5. Strong dry season: — (map 5)	*Rhynchosia minima*
6. Severe dry season : — (map 6)	*Neocollettia gracilis*
	Rhynchosia rothii
	———*rufescens*
	Stylosanthes fruticosa
	———*sundaica*
	Uraria Candida

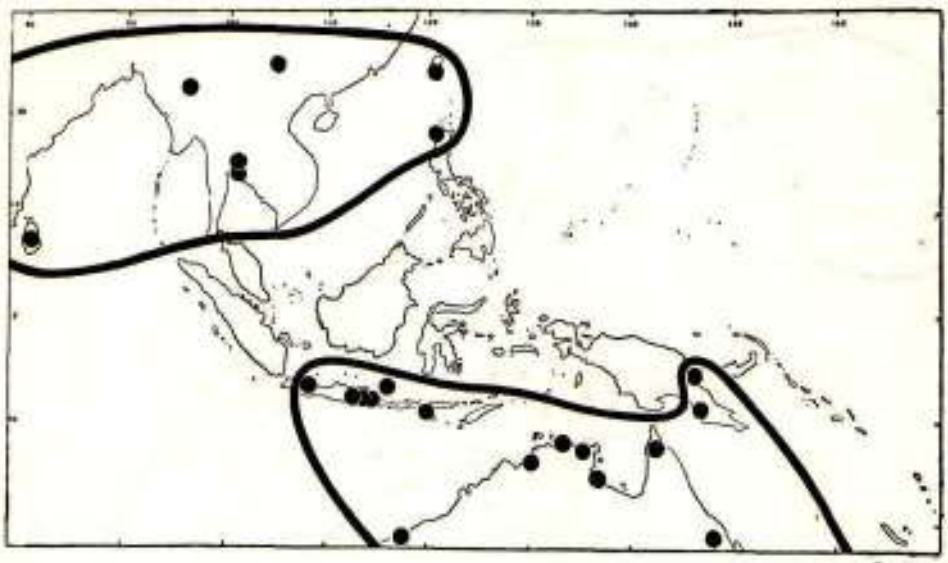
[1] *Stylosanthes rufescens*, which is only found as a recent adventive, is excluded; the adventive locality of S. *sundaica* at Singapore has also been disregarded.



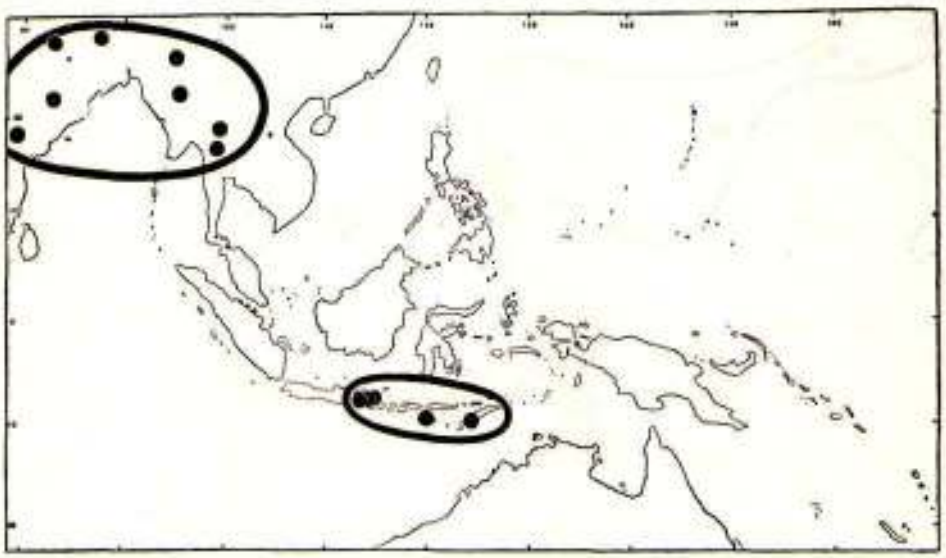
MAP 3. *Pyenospom lutescens* as an illustration of a species requiring a pronounced dry season, viz absent from the Sunda shelf and in Papua only in strictly seasonal spots.



MAP 4. *Smithia ciliata* as an illustration of a montane species requiring a rather strong dry period; between the Philippines and Java there is still a locality in Celebes. The area is semi-disjunct.



MAP 5. *Rhynehosia minima* as an example of a species requiring a strong dry season, with an obvious disjunction.



MAP 6. *Rhynehosia rothii* illustrating a distribution of a species bound to a severse dry season, in Malaysia restricted to the driest area. The disjunction is still wider than that shown in map 5.

It will be observed that I have in the foregoing applied the term „equiformal areas" in a wider sense than that of Hultén's original concept of the „equiformal progressive areas", that is, areas of taxonomically unrelated species which radiate from a common centre to form a common pattern, although to various degree[1]. Hultén had especially in view the explanation for such extending areas during the retreat of the ice in the northern polar regions. The extending and retreat of these areas followed of course also a given pattern of ecological conditions to which the species and their distribution responded.

It seems to me that the concept „equiformal" can be used in essentially the same way for all areas which show in their entirety, or in part of their delineation, a comparable geographical pattern which can be correlated with former or present ecological patterns.

In the case of the Malaysian *Leguminosae* we cannot speak about progressive, but rather of *regressive* areas of distribution which are equiformal. I feel there is no objection in a wider application of this useful concept in distributional plant geography.

C. G. G. J. VAN STEENIS.

[1] E. Hultén, Outline of the history of Arctic and Boreal biota during the Quaternary Period. Stockholm, 1937: 9—11.

CYCLOCARPA Afz. *ex* Baker

Through the publication of Specht's elaborate volume on the Flora of Arnhem's Land, in which *Cyclocarpa stellaris* was mentioned with the note that ,,it seems hardly credible that it will not be discovered in some of the intervening areas", between Africa and North Australia, Mr Airy Shaw became interested in it and found a specimen collected by Motley in SE. Borneo. In passing, it has appeared that Dr Leonard knew these localities already. At his suggestion I scanned indeterminate *Leguminosae* in the Rijksherbarium and succeeded in locating one specimen, collected by myself in Indramaju, West Java, between Djakarta and Cheribon, where I have collected so many novelties and new records, 1935—1937. Its main biotope, which I have described formerly[1], is not particularly aberrant or unique and similar areas must be common in India, Burma, Siam, and Indo-China. By its heat and mud it is not particularly inviting but exploration proved most profitable. It is a landscape on rather coastal low-lying, marine clays and loams, receiving large quantities of water in the rainy season. Drainage is impeded and the entire area is full of the hummocks of low termite hills. In the dry period these soils are baked hard and crack, and are liable to great desiccation by hard, dry SE. winds. The original vegetation has been a mixed monsoon forest, with teak in it, but man fires these areas frequently, and the region is now occupied by a poor, stunted savannah-like teak-forest, mixed with teak co-dominants, alternating with plenty of high grass fields, in which the most prominent one as to volume is siil, *Sorghum nitidum* (L.) Pers., over a man's height. But with it are very numerous other grasses and specially *Cyperaceae,* many of which are very rare and only known in Java or Malaysia from this spot. Under the siil there is in the months of March to May still wettish clay and this is the habitat of a number of most interesting small herbs, many of which are again very rare in Malaysia. The best time to collect is from April to early June, after which the vegetation gets parched and shrivels up. I am very sure that still new records can be found.

The plant in question is one of these small herbs and superficially it resembles a *Smithia* or *Zornia* in habit. The pod is most peculiar; it is

[x] *In* Trop. Natuur 25, Jub. no: 111—123, 21 fig. 1936.

twisted but flat and disk-like, and both Taubert and Specht gave a very good picture of it.

The record is as follows:

CYCLOCARPA STELLARIS Afz. *ex* Baker

Cyclocarpa stellaris Afz. *ex* Baker, FI. Trop. Afr. 2: 151. 1871; Urban *in* Jahrb. bot. Gart. Berl. 3: 248. 1884; Taubert *in* E. & P., Pfl. Fam. 3, 3: 320, 246, *fig. 112 M.* 1894; Gagnep., Fl. Gén. I.-C. 2: 554, *fig. 53 (9—10).* 1920; Hutch. & Dalz., Fl. West trop. Afr. 1: 416. 1928; White & Francis *in* Proc. R. Soc. Queensl. 41: 140. 1929; Léonard, Fl. Cong. Belg. 5: 241. 1954; Specht, Rec. Amer.-Austr. Exp. Arnhem Land 3: 242, *pi. 3 fig. B.* 1958.

DISTRIBUTION. — Tropical Africa, Indo-China (Laos, Gagnepain, *I.e.),* Java (Indramaju, Terisi, near Plosokerep, 25 m alt., *Van Steenis 8188,* May 3, 1936, BO, L), SE. Borneo (Bandjermasin, *Motley,* K), North Australia, and Queensland (Specht, *I.e.).*

GALACTIA P. Browne

GALACTIA TENUIFLORA (Klein ex Willd.) W. & A.

Galactia tenuiflora (Klein *ex* Willd.) W. & A., Prod.: 206. 1834; Miq., Fl. Ind. Bat. 2: 220. 185.7; Bth. *in* Mart., Fl. Bras. 15, 1: 143. 1859, *p.p.1;* Baker *in* Hook, f., Fl. Br. Ind. 2: 192. 1876; F. v. M., Descr. Not. Pap. PI. 3: 42. 1876; F. M. Bailey, Queensl. Fl. 2: 430. 1900; K. Sch. & Laut., Fl. deut. Schutzgeb. Südsee: 369. 1901; Back., Schoolfl. Java: 366. 1911; Merr., En. Philip. Fl. PI. 2: 310. 1923; Back., Fl. Java (em. ed.) 5: fam. 120, p. 131. 1941; Robijns, Fl. Cong. Belg. 6: 140. 1954. — *Glyeine tenuiflora* Klein *ex* Willd., Sp. PI. 3: 1059. 1800; DC, Prod. 2: 241. 1825. — *G. dubia* DC, Prod. 2: 238. 1825. — *Teramnus tenuiflorus* Spreng., Systt. 3: 235. 1826. — *G. villosa* W. & A., Prod.: 207. 1834; Bth. *in* Miq., PI. Jungh.: 233. 1852; Miq., Fl. Ind. Bat. 2: 220. 1857.

DISTRIBUTION. — Tropical Africa and Asia through Malaysia (Luzon, SW. Celebes, Java, Madura, Kangean, Bali, Lombok, and E. New Guinea) to tropical Australia.

This species has a worldwide distribution in the tropical regions. In the Malaysian region it is a twiner in grasslands and savannahs and is obviously more or less bound to seasonal climatic conditions, from sealevel to c. 2000 m; often subject to grass-fires, then the root and stembase thickening.

It shows a rather wide variability in degree of hairiness and shape and size of the leaflets; the latter vary from ovate to lanceolate, 17—60 by 7—25 mm, with a subcordate to rounded base, the mucronate tip being blunt or emarginate; petiole 8—25 mm; petiolules ½— 2 mm; peduncle 2½—20 cm; pedicels ½—3 mm. The flower colour is mostly noted as red, purplish, lilac, pink, white, and in one case even yellow.

Bentham gave, in 1859, *I.e.,* an account of the complicated synonymy; he distinguished three varieties on the indument of the leaves and the pods; these are extremes of a larger series of variability into which one of the New Guinean specimens cannot be arranged.

From the fact that the variability does not show any special geographical (racial) segregation and is found all over the range, I conclude that it is largely an individual response to habitat factors, and that no taxonomical importance should be attributed to it.

In identifying the Malaysian material with the key in the revision of the Caribbean *Galactias* by Urban (Symb. Antill. 2: 307—336. 1900) I arrived mostly at *G. dubia* DC. and with two specimens (Brass 6363, Carr 11195) at G. *longifolia* (Jacq.) Bth. In comparing this Papuan material with that of the Caribbean and with Urban's description the only difference between the Asiatic and American material seems to be the very short petiole and the appressed hairs on the stem in the latter. This seems a slight difference indeed. The Malaysian materials identified as *G. dubia* with Urban's key can, however, not be distinguished from those of the Caribbean where they show a similar range of variability; for that reason the epithet *dubia* turns up in three places in Urban's key; *G. tenuiflora* has also been reduced to *G. dubia* in Index Kewensis, although the former name has priority.

The definite conclusion reached is that the species at hand occurs in both the New and Old World.

The correct name of the species is probably *Galactia longifolia* (Jacq.) Bth. [syn. *G. filiformis* (Jacq.) Bth.], which have simultaneously been described (under *Galega)* by Jacquin as early as 1789 in Coll. Bot. vol. 2 (and in the same year in Ic. PI. Rar. 3) from tropical America, but the final disposition would require a larger study of American material which falls outside the scope of the present note.

MOGHANIA St. Hil.

In revising the Malaysian material of *Flemingia* I have come to the conclusion that only four species can be recognized. Two endemic species described from the Philippines, *F. cumingiana* and *F. philippinensis,* fall within the range of variation of *F. maerophylla;* besides I can not uphold *F. latifolia* against *F. macrophylla,* the distinction of which was already doubted by Backer; Backer distinguished them as varieties of one species.

The Malaysian species fall apart into two distinct ecological groups. *F. lineata* and *F. involucrata* show a distributional pattern coinciding with a seasonal rainfall regime and no specimen has ever been collected

in the everwet West Malaysian Sunda area (Malay Peninsula, Sumatra, Borneo). *F. strobilifera* and *F. macrophylla* on the other hand are indifferent to rainfall conditions.

It is unfortunate that the well-known name *Flemingia* Roxb. ex Ait. (1812) is a later homonym of *Flemingia* Roxb. ex Rottl. (1803) which is a taxonomic synonym of *Thunbergia* Retz. *(Acanthaceae).* The name to accept seems to be *Moghania* St. Hil. 1813, but also this can only be used if it is conserved against *Lourea* St. Hil. 1812, an earlier homonym of *Lourea* Desv., which, now Necker's names have been declared invalid, must also be conserved. See Hui-lin Li *in* Am. J. Bot. 31: 224—225. 1944, and Abeywickrama *hi* Taxon 8: 29. 1959.

KEY TO THE SPECIES

1. Flowers in small cymes, each enveloped by a large, folded, reniform, persistent bract, the cymes arranged in copious simple or slightly branched racemes. Leaflet 1. . . . . *1. M. strobilifera*
1. Bracts never reniform and folded, usually early caducous. Leaflets 3.
   2. Flowers in loose panicles. . . . . *2. M. lineata*
   2. Flowers in dense, spike-like, often fascicled racemes. Bracts imbricate in bud, linear or lanceolate, usually early caducous, sometimes very large. . . . . *3. M. macrophylla*
   2.. Flowers in copious heads, surrounded by a dozen bracts. . . *4. M. involucrata*

1. MOGHANIA STROBILIFERA (L.) St. Hil. *ex* Jacks.

Moghania strobilifera (L.) St. Hil. *ex* Jacks, *in* Ind. Kew. 2: 252. 1894; Hui-lin Li *in* Am. J. Bot. 31: 227. 1944. — *Hedysanim strobiliferum* Linne, Sp. PI.: 764. 1753; Roxb., Fl. Ind. (ed. Carey) 3: 350. 1832. — *Zornia strobilifera* Pers., Syn. 2: 319. 1807. — *Flemingia strobilifera* R. Br. *in* Ait., Hort. Kew. ed. 2, 4: 350. 1812; DC, Prod. 2: 351. 1825; Wall., Cat.: 5753. 1832; W. & A., Prod.: 243. 1834; Miq., Fl. Ind. Bat. 1, 1: 161. 1855; Baker, Fl. Br. Ind. 2: 227. 1876; Kurz *in 3.* As. Soc. Beng. 45, ii: 260. 1876; Prain, *ibid.* 66, ii: 437. 1897; Backer, Schoolfl. Java: 383. 1911; Gagnep., Fl. Gen. I.-C. 2: 296. 1916; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 144. 1941. — *Hedysanim bracteatum* Roxb., Fl. Ind. (ed. Carey) 3: 351. 1832. — *Flemingia bracteata* (Roxb.) Wight, Ic: t. 268. 1840; Miq., Fl. Ind. Bat. 1, 1: 162. 1855; Kurz *in* J. As. Soc. Beng. 45, ii: 260. 1876; Prain, *ibid.* 66, ii: 437. 1897; Gamble, Fl. Madras 2: 378. 1918. — *Flemingia, fruticulosa* Wall. [Cat.: 5754. 1832, *nomen]* ex Bth. *in* Miq., PI. Jungh.: 245. 1852; Prain *in* J. As. Soc. Beng. 66, ii: 438. 1897. — *Flemingia fluminalis* Clarke *ex* Prain *in* J. As. Soc. Beng. 66, ii: 438. 1897. — *M. bracteata* Hui-lin Li *in* Am. J. Bot. 31: 227. 1944. — *M. fluminalis* Hui-lin Li, *I.e.*

DISTRIBUTION. — India to southern China, throughout Malaysia introduced in Mauritius (ex litt.) and in the West Indies (e.g. Jamaica and Trinidad).

Flemingia bracteata (Roxb.) Wight has been regarded by Baker, *I.c.*, as a variety of *F. strobilifera;* Kurz, *I.c.*, Prain, *I.c.*, and Gamble, *I.c.*, accepted it as a distinct species. After having seen much material of both India and Malaysia I agree with Wight & Arnott, *I.c.*, that *F. bracteata* can not be kept apart. According to some of these authors it would differ from *F. strobilifera* by the pubescent bracts, in combination with emarginate bracts and long stipules. But I have seen pubescent bracts which were not emarginate and the other way round. Besides, the size of the stipules varies considerably.

Flemingia chap-par Ham. *ex* Wall, is an allied Indian species, superficially very similar but clearly distinct by deeply emarginate bracts, relatively short calyx lobes, and orbicular-cordate leaflets.

2. MOGHANIA LINEATA (L.) 0. Kuntze

Moghania lineata (L.) 0. Kuntze, Rev. Gen. PI. 1: 199. 1891; Hui-lin Li *in* Am. J. Bot. 31: 227. 1944. — *Hedysarum lineatum* L., Sp. PI.: 1054. 1753. — *Lespedeza lineata* Pers., Syn. 2: 318. 1807. — *Flemingia lineata* Roxb. [Hort. Beng-.: 56. 1814, *nomen],* Fl. Ind. (ed. Carey) 3: 341. 1832; Wall., Cat.: 5752. 1832; DC, Prod. 2: 351. 1825; W. & *A.*, Prod.: 242. 1834; Wight, Ic: *t. 327.* 1840; Bth. *in* Miq., PI. Jungh.: 245. 1852; Fl. Austr. 2: 268. 1864; Baker, Fl. Br. Ind. 2: 228. 1876; Kurz *in* J. As. Soc. Beng-. 45, ii: 260. 1876; Prain, *ibid.* 66, ii: 438. 1897; Gagnep., Fl. Gen. I.-C. 2: 298. 1916; Backer, Schoolfl. Java: 384. 1911; Gamble, Fl. Madias 2: 378. 1918; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 145. 1941. — *Flemingia hlancoana* Llanos, Fragm.: 80. 1851.

DISTRIBUTION. — India, Burma, Siam, through Malaysia, W. Australia ; in Malaysia only found in the Philippines (Luzon), SW. Celebes, Java, the Lesser Sunda Islands (Bali, Timor), and South New Guinea.

3. MOGHANIA MACROPHYLLA (Willd.) O. Kuntze

Moghania \imcrophylla (Willd.) O. Kuntze, Rev. Gen. PI. 1: 199. 1891; Hui-lin Li *in* Am. J. Bot. 31- 227. 1944. — *Cvotalaria macrophylla* Willd., Sp. PI. 3: 982. 1800. — *Flemingia trinervia* Desf., Tabl. ed. 2: 269. 1815, *ex* Ind. Kew. — *Rhynchosia crotalarioides* DC, Prod. 2: 387. 1825. — *Flemingia angustifolia* Roxb. [Hort. Beng.: 98. 1814, *nomen],* Fl. Ind. (ed. Carey) 3: 341. 1832. — *Flemingia congesta* Roxb. [Hort. Beng.: 56. 1814, *nomen],* Fl. Ind. (ed. Carey) 3: 340. 1832; DC, Prod. 2: 351. 1825; W. & A., Prod.: 241. 1834; Wight, Ic: *t. 390.* 1840; Dalz. & Gibs., Bomb. FL: 75. 1861; Bth, *in* Miq., PI. Jungh.: 246. 1852; Baker, Fl. Br. Ind. 2: 228. 1876; Kurz *in* J. As. Soc. Beng. 45, ii: 260. 1876; Prain, *ibid.* 66, ii: 440. 1897; Backer, Schoolfl. Java: 384. 1911; Gagnep., Fl. Gen. I.-C. 2: 302. 1916; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 145. 1941. — *Flemingia prostrata* Roxb. [Hort. Beng.: 56. 1814, *nomen],* Fl. Ind. (ed. Carey) 3: 338. 1832; Bth. *in* Miq., PL Jungh.: 245. 1852; Kurz *in* J. As. Soc. Beng. 45, ii: 260. 1876; Prain, *ibid.* 66, ii: 440. 1897. — *Flemingia procumbens* Roxb. [Hort. Beng.: 56. 1814, *nomen],* Fl. Ind. (ed. Carey) 3: 338. 1832;

Wight, Ic: *t. 408.* 1840; Gagnep., Fl. Gen. I.-C. 2: 301. 1916. — *Flemingia semialata* Roxb. [Hort. Beng.: 56. 1814, *nomen'],* Fl. Ind. (ed. Carey) 3: 340. 1832; Don, Prod. Fl. Nepal. 2: 242. 1825; W. & A., Prod.: 241. 1834; Wight, Ic: *t. 326.* 1840; Kurz *in* J. As. Soc. Beng. 45, ii: 261. 1876; Prain, *ibid.* 66, ii: 441. 1897. — *Flemingia stricta* Roxb. [Hort. Beng.: 56. 1814, *nomen],* Cor. PI. 3: *t. 248.* 1815; Fl. Ind. (ed. Carey) 3: 342. 1832; DC, Prod. 2: 351. 1825; W. & A., Prod.: 241. 1834; Wight, Ic: *t. 329.* 1840; Miq., Fl. Ind. Bat. 1, 1: 164. 1855; Baker, Fl. Br. Ind. 2: 228. 1876; Kunz *in* J. As. Soc. Beng. 45, ii: 261. 1876. — *Flemingia wightiana* R. Grah. *[in* Wall., Cat.: 5751. 1832, *nomen']* ex W. & A., Prod.: 242. 1834; Prain *in* J. As. Soc. Beng. 66, ii: 441. 1897. — *Flemingia capitata* Buch. Ham. *in* Wall., Cat.: 5746. 1832, *nomen.* — *Flemingia bhottea* Buch. Ham., *I.e.* 5749, *nomen.* — *Flemingia wallichii* W. & A., Prod.: 242. 1834; Miq., Fl. Ind. Bat. 1, 1: 165. 1855; Baker, Fl. Br. Ind. 2: 229. 1876; Prain *in* J. As. Soc. Beng. 66, ii: 442. 1897. — *Flemingia graha-?niana* W. & A., Prod.: 242. 1834; Baker, Fl. Br. Ind. 2: 228. 1876; Prain *in* J. As. Soc. Beng. 66, ii: 439. 1897. — *Flemingia ferruginea* R. Grah. *[in* Wiall., Cat.: 5750. 1832, *nomen] ex* Bth. *in* Miq., PI. Jungh.: 245. 1852; Kurz *in* J. As. Soc. Beng. 45, ii: 260. 1876; Prain, *ibid.* 66, ii: 440. 1897. — *Flemingia latifolia* Bth. *in* Miq., PL Jungh.: 246. 1852; Miq., Fl. Ind. Bat. 1, 1: 163. 1855; Kurz *in* J. As. Soc. Beng. 45, ii: 261. 1876; Prain, *ibid.* 66, ii: 441. 1897; Backer, Schoolfl. Java: 385. 1911; Gagnep., Fl. Gen. I.-C. 2: 299. 1916; Backer. Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 146. 1941. — *Flemingia cumingiana* Bth. *in* Miq., PI. Jungh.: 245. 1852; Miq., Fl. Ind. Bat. 1, 1: 165. 1855; Merr. in Philip. J. Sc. 5: Bot. 103, 354. 1910; En. Philip. 2: 317. 1923. — *Flemingia teysmanniana* Miq., Fl. Ind. Bat. 1, 1: 1083. 1858. — *Flemingia rhodocarpa* Baker, Fl. Trop. Afr. 2: 231. 1871. — *Flemingia sericans* Kurz *in* J. As. Soc. Beng. 43, ii: 186. 1874; Prain, *ibid.* 66, ii: 442. 1897. — *Flemingia lamontii* Hance *in* Journ. Bot. 16: 10. 1878, *ex descr.* — *M. cumingiana* (Bth.) O. Kuntze, Rev. Gen. PI. 1: 199. 1891. — *M. grahamiana* (W. & A.) 0. Kuntze, *I.e.* — *M. strieta* (Roxb.) O. Kuntze, *I.e.* — *M. wallichii* (W. & A.) O. Kuntze, *I.e.* — *Flemingia macrophylla* (Willd.) 0. Kuntze *ex* Prain *in* J. As. Soc Beng. 66, ii: 440. 1897; Bold., Zakfl. Landb.: 121. 1916; Merr. *in* Philip. J. Sc. 5: Bot. 130. 1910; En. Philip. 2: 317. 1923; *in* Brittonia 5: 25, 28. 1943. — *Flemingia philippinensis* Merr. & Rolfe *in* Philip. J. Sc 3: Bot. 103. 1908; Merr., *ibid.* 5: Bot. 130. 1910. — *M. philippinensis* (Merr. & Rolfe) Hui-lin Li *in* Am. J. Bot. 31: 227. 1944. — *M. ferruginea* (Wall, *ex* Bth.) Hui-lin Li, *l.c.* — *M. teysmanniana* (Miq.) Hui-lin Li, *I.e.* 228.

DISTRIBUTION. — Africa, Mozambique Distr.; Asia, Central Himalayas to Ceylon and China, throughout Malaysia, probably also in Australia.

This species is very variable as to the shape and size of the leaflets, the indument of the leaflets and the branches, the indument of the calyx and the size and shape of the calyx lobes, of which the inferior one is always the longest. After having seen many plants from Malaysia and the Asiatic continent I can say that range of the variability covers all the descriptions which belong to the synonyms, ———

Moghania macrophylla seems tolerant to rainfall and occurs under both everwet and seasonal rainfall regimes. It seems probable that the wide variation in indument and size can partly be ascribed to the large range of habitats.

As to *Flemingia philippinensis* Merr. & Rolfe, I have seen an isotype of Merrill 4460 (L), which fully agrees with *M. macrophylla* (Willd.) 0. Kuntze; it is remarkable, however, that the type description by Merrill does not agree in detail with this isotype.

Probably *Flemingia parviflora* Bth., Fl. Austr. 2: 269. 1864, also belongs to *M. macrophylla;* it has been recorded for New Guinea by Specht, Rec. Arnhem Land Exp. 3: 246. 1958.

I prefer to postpone a final decision until I have studied Australian material; I have seen several Malaysian specimens which agree with Bentham's description and which doubtless belong to *M. macrophylla.*

4. MOGHANIA INVOLUCRATA (Wall, *ex* Bth.) 0. Kuntze

Moghania involucrata (Wall, *ex* Bth.) 0. Kuntze, Rev. Gen. PI. 1: 199. 1891; Hui-lin Li *in* Am. J. Bot. 31: 227. 1944. — *Lepidocoma trifoliatum* Jungh., Reisen: 338. 1845, *nomen.* — *Flemingia involucrata* Bth. *in* Miq., PI. Jungh.: 246. 1852; Fl. Austr. 2: 269. 1864; Baker, Fl. Br. Ind. 2: 229. 1876; Backer, Schoolfl. Java: 384. 1911; Merr., En. Philip. 2: 316. 1923; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 145. 1941. — *Flemingia capitata* Zoll. [Nat. Geneesk. Arch. 3: 64. 1846, *nomen]* ex Miq., Fl. Ind. Bat. 1, 1: 166. 1855.

DISTRIBUTION. — Eastern Himalayas, Assam, and Sikkim, to Burma, Siam, and Indo-China, through Malaysia to Queensland; in Malaysia in the Philippines (Culion I.), SW. Celebes, Java (East Java, and a few localities in Indramaju in West Java), Lesser Sunda Islands (Bali, Sumba), and SE. New Guinea.

NEOCOLLETTIA Hemsl.

This is a remarkable monotypic genus, both by its disjunct distribution and in the ecology of its fruit.

Originally it was described from flowering material, the pods being unknown. These have later appeared to be geocarpous. In Java it was found in teak forests, but the prostrate, rooting, herbaceous plant, producing roots from all nodes and attaining a length of 50—100 cm, is inconspicuous and easily escapes attention of field botanists.

Though it distinctly belongs to regions with a semi-arid climate, and is for that reason absent in the area between Burma and Central Java, it is cultivated in the Bogor Botanic Gardens under everwet conditions.

After anthesis the pedicel recurves and penetrates with the undeveloped ovary into the soil. Between the calyx and the ovary two strong, opposite roots develop on the short gynophore which in all probability feed the growing ovary and may be instrumental in pulling the pod deeper into the earth. As far as I know it is only known from Burma and Java.

The synonymy and Javanese records are as follows:

NEOCOLLETTIA WALLICHII (Kurz) Schindl.

Neocollettia wallichii (Kurz) Schindl. *in* Pedde, Rep. 21: 16. 1925; Backer, Bekn. PI. Java (em. ed.) 5: fam. 120, p. 9*6. 1941. — *Teramnus wallichii* Kurz *in* J. As. Soc. Beng. 45, ii: 255. 1876. — *Stylosanthes sp.* Wall., Cat.: 5974, cited under *Desmodium rottleri* by Baker, PI. Br. Ind. 2: 174. 1876. — *Neocollettia gracilis* Hemsl. *in* J. Linn. Soc. Bot. 28: 43—44, 189—191, *t. 6.* 1890; Taub. *in* E. & P., Pfl. Fam. 3, 3: 384. 1894. — *Neocollettia sp.* Beumée, Flor.-Anal. Onderz.: 30. 1922.

DISTRIBUTION. — Central Java (Res. Cheribon: Kadipaten, Tjikamuning Estate, *J.E.A. den Doop,* April 1928; Res. Surabaja: Forestry Distr. Mantup, *Bremekamp,* Aug. 1919; ditto, Forest Complex Pandjeran, *Weeda,* April 1918).

PYCNOSPORA W. & A.

PYCNOSPORA LUTESCENS (Poir.) Schindl.

Pycnospora lutescens (Poir.) Schindl. *in* J. Bot. 64: 145. 1926; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 89. 1941; Léonard, PL Cong. Belg. 5: 239, *fig. 16.* 1954. — *Hedysarum lutescens* Poir. *in* Lamk, Enc. Bot. 6: 417. 1806. — *Zornia lutescens* Steud., Nom. ed. 1: 900. 1821. — *Desmodium lutescens* DC., Prod. 2: 326. 1825. —? *Flemingia monosperma* Moon, Cat. Ceyl.: 54. 1824, sec. W. & A. — *Phyllodium lutescens* Desv. *in* Mem. Soc. Linn. Paris 4: 324. 1825, *pro nom.* — *Crotalaria nervosa* Grah. *in* Wall., Cat.: n. 5428. 1832, *nomen;* Mor., Syst. Verz.: 7. 1846. — *Pycnospora nervosa* W. & A., Prod.: 197. 1834; Merr. in Philip. J. Sc. 5: Bot. 91. 1910; En. Philip. 2: 292. 1923. — *Pycnospora hedysaroides* R. Br. *ex.* W. & A., *I.e., nomen;* Baker *in* Hook., Fl. Br. Ind. 2: 153. 1876; F. v. M., Descr., Not. Pap. PI. 1: 42. 1876; Bailey, Queensl. Fl. 2: 416. 1900; Laut. & K. Sch., Nachtr. Fl. deut. Schutzgeb. Siidsee: 277. 1905; Pulle *in* Nova Guinea 8: 377. 1910; Backer, Schoolfl. Java: 347. 1911. — *Desmodium viride* Vog. *in* Nov. Act. Ac. Nat. Cur. 19, Suppl. 1: 29. 1843. — *lndvgofera desmodioides* Bth. *in* Hohen., PI. Ind. Or. n. 303, *nomen;* ex Baker *in* Hook, f., Fl. Br. Ind. 2: 153. 18:76, *in synon.* — *Crotalaria tappenbeckiana* K. Sch. & Laut., Fl. deut. Schutzgeb. Siidsee: 351. 1901.

DISTRIBUTION. — From tropical Africa and Asia (India through Burma, Siam, Indo-China to S. China and Formosa) through Malaysia (Philippines, S. Celebes, Java, Lesser Sunda Islands, Moluccas, Aru Islands, and SE. New Guinea) to tropical E. Australia. — Map 3.

This species clearly avoids the everwet Sunda shelf area and most of New Guinea except in its seasonal parts. . . . . .

RHYNCHOSIA Lour.

During the revision it has appeared that there are obviously only 5 species in the Malaysian region. The current name of a rather well-known species, *R. sericea*, cannot be used because of homonymy; it is remarkable that, though Bentham provided a new name for it already 90 years ago, nobody has cared to take it up. A widely distributed, well-characterized species, described by Miquel from Java, *R. acuminatissima*, appears to have also been described under two other names from New Guinea, under a fourth one from Sumatra, a fifth from Mindanao, and a sixth from Queensland.

Distributionally, some species seem to be tolerant of climate, but *R. rufescens* and *R. minima* are strictly bound to seasonal climate conditions and show the usual pattern avoiding to occur in Malaya, Sumatra, and Borneo.

KEY TO THE SPECIES

1. Corolla included in the calyx. Calyx deeply cleft with hardly any tube left at the base, the lobes oblong with ± parallel margins, and a very blunt apex (sometimes provided with a mucro). Seed 1, black, shining, strophiolate. Pod as long as the calyx or slightly exceeding it, 10—12 by 6—7 mm . . . . *1. R. rufescens*
1. Corolla longer than the calyx. Calyx cleft to ¼—2/3, but with a distinct tube at the base, the lobes triangular, acute or almost so. Seeds 2 (occasionally 3), estrophiolate.
   2. Lamina of the standard 3—6 mm. Free tops of the upper lip of the calyx 1—2 mm. Pod c. 14 by 4½ mm. Leaflets small. . . . . *2. R. minima*
   2. Lamina of the standard 7—14 mm. Free tops of the upper lip of the calyx ½—1¼ mm. Pod 20—25 mm by 6—10 mm.
      3. Pedicels during anthesis 2—5 mm, then lengthening to 4—8 mm. Stipules deltoid-lanceolate, acute, very early caducous. Lamina of the standard usually without distinct callosities. Vexillar stamen egeniculate. Pods tomentose or velutinous, gold-green or grey-brown, often with a mixed tomentum. Plant always without glandular hairs. Seeds blue or blue-black. . . . . *3. R. acuminatissima*
      3. Pedicels in anthesis 1—2 mm, not lengthening. Stipules ovate short-acuminate to lanceolate, not early caducous. Lamina of the standard above the claw whether or not with two distinct calluses. Vexillar stamen geniculate above the base. Stem and outer side of the calyx sometimes with glandular **hairs.**
         4. Stipules c. 5 mm. Standard without two distinct calluses. Ovary with a mixed tomentum of short pubescent hairs and rather stiff, long, silky bulbous-based hairs. Pods with long yellow or white bulbous-based bristly hairs. Plant with many glandular hairs, also on the calyx. . . . . *4. R. viscosa*

4. Stipules c. 7 mm. Standard at the inner side with two distinct calluses above the claw. Ovary with a dense and soft, long, silky tomentum, hairs not bulbous-based. Pod with a long, soft tomentum. Stem sometimes with, calyx without glandular hairs . . . . . *5. R. rothii*

1. RHYNCHOSIA RUPESCENS (Willd.) DC.

Rhynchosia rufescens (Willd.) DC, Prod. 2: 387. 1825; W. &A., Prod. 1: 239. 1834; Baker *in* Hook, f., Fl. Br. Ind. 2: 220. 1876; Hook., Ic. PI. XX, 2: 189. 1837; Backer, Schoolfl. Java: 381. 1911; Bekn. Fl. Java (em. ed.) 5: fam. 120, **p.** 142. **1941.** —*Glycine rufescens* Willd., Neue Schrifte 4: 222. 1803. — *Hallia trifoliata* Roth, Nov. Sp. PL: 352. 1821. — *Flemingia rothiana* DC, Prod. 2: 351. 1825. — *Glycine pondicheriensis* Sprang., Syst. 3: 196. 1826. — *Lespedeza indica* Spreng., *l.c.* 202. — *Cylista suaveolens* Grah. *in* Wall., Cat.: 5587. 1831—32, *nomen.* — *Cyanospermum javanicum* Miq., Fl. Ind. Bat. 1, 1: 167. 1855.

DISTRIBUTION. — Widely distributed in Ceylon and continental SE. Asia (Deccan Peninsula, Assam, Khasia, Siam, and Cambodia); in Malaysia only known from a few scattered localities, *viz* West Java (Dago), extreme East Java (Asem Bagus), and the Lesser Sunda Islands (Sumba and Alor I.), up to c. 1000 m, obviously restricted to regions with a dry monsoon, showing the usual disjunction of the monsoon plant flora between continental SE. Asia and Java.

The Malaysian material agrees very well with that of Asia. In Leyden I have seen an isotype of *HaUia trifoliata* Roth, which is the basis of *Flemingia rothiana.*

2. RHYNCHOSIA MINIMA (L.) DC.

Rhynchosia minima (L.) DC, Prod. 2: 385. 1825; Baker *in* Hook, f., Fl. Br. Ind. 2: 223. 1876; Backer, Scoolfl. Java: 381. 1911; Merr., En. Philip. 2: 316. 1923; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 142. 1941; Hauman, Fl. Cong. Belg. 6: 166. 1954. — *Dolichos minimus* L., Sp. PL: 1020. 1753. — *Dolichos medicagineus* Lamk, Enc. Meth. 2: 297. 1786. — *Glycine rhombifolia* Willd., Sp. PL 3: 1065. 1800. — *R. medicaginea* DC, Prod. 2: 386. 1825; W. & A., Prod.: 238. 1834. — *R. rhombifolia* DC, Prod. 2: 386. 1825, incl. *var. fi. timoriensis* DC. — *R. nuda* DC, *l.c.* — *R. ervoidea* DC, *l.c.* — *R. candollei* Decne *in* Nouv. Ann. Mus. Hist. Nat. 3: 473. 1834 (Herb. Timor. 145). — *R. fridericiana (non* Weinm.) Zoll. & Mor. *in* Nat. & Geneesk. Arch. Neêrl. Ind. 3: 631. 1846. — *R. adenantha* Miq., Fl. **Ind. Bat.** 1, 1: 170. 1855; Backer, Schoolfl. Java: 381. 1911.

DISTRIBUTION. — Pantropical, recorded from America, the Cape and tropical Africa; rather common in SE. — E. Asia (northward to Yunnan) and Australia; in Malaysia only found in the extreme NW. corner of Luzon, further in W. Java (only once, of course in Indramaju), East Java, Kangean, Sumba, and Papua. All localities are situated under conditions of a typically seasonal lowland climate, with a pronounced dry season. — Map 5.

The Malaysian material is not entirely homogeneous in all details. The specimens from Java and Papua are very similar, but differ slightly from those of Asia and Luzon in having a shorter tomentum on the ovary through which the glandular dots are distinctly visible and not obscured by the tomentum. In the specimens from the Lesser Sunda Islands, which have been described as a separate species, *R. candollei,* the ovary is still less hairy and shorter hairy, the specimens are almost glabrous (leaves, pods), and the standard is entirely glabrous on the dorsal surface.

3. RHYNCHOSIA ACUMINATISSIMA Miq.

Rhynchosia acuminatissima Miq., Fl. Ind. Bat. 1, 1: 171. 1855; Backer, Schoolfl. Java: 382. 1911; Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 143. 1941. — *Dunbaria acuminatissima* Miq., Fl. Ind. Bat. 1, 1: 180. 1855. — *R. cunninghamii* Bth., Fl. Austr. 2: 266. 1864; F. v. M. *in* Ann. Rep. Br. New Guinea 1892—94, App. ii: 127. 1895; Bailey, Queensl. Fl. 2: 440. 1900; C. T. White *in* Froc. R. Soc. Queensl. 34: 37. 1922. — *R. calosperma* Warb. *in* Bot. Jahrb. 13: 324. 1891; K. Sch. & Laut., Fl. deut. Schutzgeb. Siidsee: 370. 1900; Pulle *in* Nova Guinea 8: 383. 1910; Merr. *in* Philip. J. Sc. 5: Bot. 128. 1910; En. Philip. 2: 316. 1923; Hosokawa *in* Trans. Nat. Hist. Soe. Form. 25: 244. 1935; Hatusima *in* Bot. Mag. Tokyo 56: 370. 1942. — *R. versteegii* Pulle *in* Nova Guinea 8: 383. 1910. — *R. myriocarpa* Quis. & Merr. *in* Philip. J. Sc. 37: 153. 1928, ex descr.; Merr. & Chun *in* Sunyatsenia 2: 249. 1935; Tanaka & Oda-shima in J. Trop. Agric. 10: 369. 1938. — *R. sumatrana* Merr. *in* Pap. Mich. Ac. Sc. 24: 74. 1938.

DISTRIBUTION. — Hainan, Philippines (Luzon, Mindanao, Guimaras), N. Sumatra, Java, Lesser Sunda Islands (Sumba, Sumbawa), Moluccas (Klein Key), New Guinea, Bismarck Arch., Micronesia (Tinian), and Queensland. In thickets and along forest edges and river banks, from the lowland up to c. 1000 m alt., nowhere common.

Some specimens possess small, black dots on the undersurface of the leaflets; Pulle used these as a botanical character; under the microscope no fungal hyphae or spores are be found; there is black-coloured substance in the intercellular spaces which does not make the impression of being 'normal', specially as the dots are of unequal size and seem to enlarge and produce 'pseudopodia' so that the dots are no longer circular in shape. Pulle further mentioned that *R. versteegii* would differ from *R. calosperma* by more glabrous leaves and acute upper calyx lobes. Additional material, however, shows that these differences grade and cannot be upheld.

Of *R. sumatrana* Merr. I could borrow the type specimens from Herb. Michigan; Merrill declared it allied to *R. calosperma,* but I cannot observe any difference with it and it has accordingly been reduced to *R. acuminutissima.* It extends the distribution to Sumatra.

Of *R. myriocarpa* Quis. & Merr. I have seen no material but as there are no points in its description which disagree with the other material, it is consequently reduced.

The blue or blue-black seeds which remain attached on a short f unicle in open pods produce a marked colour contrast with the pale-brown or golden yellow pod valves.

4. RHYNCHOSIA VISCOSA (Roth) DC.

Rhynchosia viscosa (Roth) DC, Prod. 2: 387. 1825; Hassk. *in* Flora Beibl. 2: 67. 1842, incl. *var. mollis* Hassk.; Cat. Hort. Bog.: 282. 1844; Bth. *in* Miq., PL Jungh.: 244. 1852; Miq., Fl. Ind. Bat. 1, 1: 168. 1855; Baker *in* Hook, f., Fl. Br. Ind. 2: 225. 1876; Backer, Schoolfl. Java: 382. 1911; Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 143. 1941. — *Glydne viscosa* Roth, Nov. Sp. PL: 349. 1821. — *Dolichos glwbinosus* Roxb., Fl. Ind. (ed. Carey) 3: 312. 1832, ex descr.; Wall., Cat.: 5560. 1831—32; W.&A., Prod.: 248. 1834. — *R. stipulosa* A. Rich., Tent. Fl. Abyss. 1: 229. 1847, sec. lit. — *R. sericophylla* Kuwze *in* Linnaea 20: 63. 1874, ex descr.

DISTRIBUTION. — Widely distributed in Africa, Madagascar, Mauritius, and continental SE. Asia; in Malaysia in West Java, in a very restricted area from Bogor northward to Djakarta and its harbour Tandjongpriok. The species was at least in 1844 cultivated in the Botanic Gardens at Bogor and possibly even earlier. It is almost certain that it has escaped from these Gardens and has naturalized; we do not believe it is native in Malaysia. Along the coast near Priok it is found up to the sandy beach and may be very common in thickets behind it.

In have seen an isotype of *Glydne viscosa* Roth at Leyden with which the Javanese plants fully agree. Hasskarl's *var. mollis* seems not worthy of distinction. *R. sericophylla* was raised from seeds in the Botanic Garden at Leipzig received in 1844 (from Hasskarl?); according to the description this material agrees with *var. mollis.*

5. RHYNCHOSIA ROTHII Bth. *ex* Aitch.

Rhynchosia rothii Bth. ex Aitch., Cat. PI. Punjaub & Sindh: 50. 1869, a new comb, based on *Dolichos tomentosus* Roth 1821; *non R. tomentosa* Hook. & Arn. 1835. — *Dolichos tomentosws* Roth, Nov. Sp. PL: 345. 1821; DC, Prod. 2: 401. 1825; W. & A., Prod.: 248. 1934. — *R. sericea* Span, *in* Linnaea 15: 195. 1841, *non* Gill, *ex* Hook. & Arn., Bot. Misc. 3: 199. 1833; Baker *in* Hook, f., Fl. Br. Ind. 2: 225. 1876; Gamble, Fl. Madras: 3175. 1918. — *R. mollissima* Zoll. & Mor. *in* Nat. & Geneesk. Arch. Neerl. Ind. 3: 63, 78. 1846, *non* G. Don, Gen. Syst. 2: 347. 1832; Backer, Schoolfl. Java: 382. 1911. — *R. tomentosa* Kurz *ex* Ind. Kew 2: 718. 1895, *non* Hook. & Arn. 1835; Ostenfeld *in* Bull. Herb. Bpiss. II, 5: 713. 1907; Williams, *I.e.* 961; Hosseus *in* Beih. Bot. Centr. Bl. 27, ii: 494. 1910, in syn. *sub bracteata;* Craib, Fl. Siam. En. 1: 466. 1928, ditto.

DISTRIBUTION. — Tropical SE. Asia (India, Burma); in Malaysia only in the driest parts of East Java (Djatiroto to Mt Baluran), and the Lesser Sunda Islands (Sumba, Timor), in Asia ascending into the montane zone, in Malaysia in lowland country only, in teak savannahs, grass-thickets, and on the sandy beach. — Map 6.

The complicated synonymy is caused by the fact that all three epithets of the early names were homonyms or would become later homonyms if transferred to *Rhynchosia;* for that reason Bentham has proposed a new name, *R. rothii,* for *R. sericea* Spreng. (sic) which is based in turn on *Dolichos tomentosus* Roth. At Leyden we have several sheets named so by Bentham in his own hand.

Sometimes it is referred to as *R. tomentosa* Kurz, with the reference J. As. Soc. Ueng. 43, ii: 186. 1874; this is an error taken up by Index Kewensis; Kurz did not make the transfer, although he suggested that *Dolichos tomentosus* should be referred to *Rhynchosia.*

Kurz made here an error, in reducing *Dolichos bracteatus* (Wall., Cat.: 5554) Bth. *[ex* Baker *in* Hook, f., Fl. Br. Ind. 2: 225. 1876] to *Dolichos tomentosus* Roth, although they were properly distinguished by Baker in the Flora of British India. I could study isotypes of both *Dolichos bracteatus* Wall., Cat.: 5554 and of *Dolichos tomentosus* Roth and they are perfectly distinct species. Kurz's erroneous reduction was perpetuated by Hosseus *(I.e.)* and by Craib *(I.e.).* Gamble rightly recognized them as distinct species (Fl. Madras: 375, 376. 1918).

In the herbarium I found several sheets of *R. rothii* misidentified as *R. viscosa;* both species possess glandular hairs but they can easily be identified by the characters given in the key.

EXCLUDED SPECIES

Rhynchosia, biflora DC, Prod. 2: 387. 1825; Mor., Syst. Verz.: 3. 1846 = *Cantharospermum scarabaeoides* Baill.

Rhynchosia reticulata (Vahl) DC, Prod. 2: 385. 1825; Bth. *in* Mart., Fl. Bras. 15, 1: 203. 1859; Urban, Symb. Antill. 4: 307. 1905. — *Glycine reticulata* Vahl, Symb. 3: 88. 1794. — *Glycine fridericiana* Weinm. *in* Flora 4, 1: 29. 1821. — *R. fridericiana* DC, Prod. 2: 387. 1825; *non* Zoll. & Mor. *in* Nat. & Geneesk. Arch. Need. Ind. 3: 63. 1846, quae est *R. minima* sec. Backer det. (Zoll. 2800).

DISTRIBUTION. — This species is a native of the warmer parts of the New World, extending from Mexico to Peru and the West Indies.

The reason that it is treated here is the fact that *R. fridericiana* was described by Weinmann from plants raised in the Imperial Botanic Gardens of Pawlowsk (E of Moscow) from seed said to have come from Manila. Merrill has not recorded the species from the Philip-Tines and it has been reduced in Index Kewensis. In the Herbarium of Hasskarl at Leyden is a specimen named *R. fridericiana* by Hasskarl, which he might have received from Weinmann; it agrees exactly with the description and with the West Indian specimens. Obviously the provenance of the seed was not Manila, unless it has been a post-Columbian import which has failed to naturalize.

Rhynchosia volubilis Lour., Fl. Coch.: 460. 1790; Miq., Fl. Ind. Bat. 1. 1: 169. 1855; Gagnep., Fl. Gen. I.-C. 2: 353. 1916; Merr., Comm. Lour.: 212. 1935.

This SE. — E. Asiatic species has never been found native in Malaysia; it was cultivated in the Botanic Gardens at Bogor in Blume's time, but has obviously disappeared and not been naturalized.

SMITHIA Ait.

It appears that there are only three species of this genus in Malaysia which are well-distinguished and can easily be recognized.

The species of *Smithia,* like so many other grasses and Leguminosae, behave ecologically as typical ruderals and if they were originally native — which seems slightly dubious for *S. sensitiva* and *S. conferta* — they must have been very rare in the forested islands of Malaysia which offered very few suitable places to these typical heliophilous plants, except in a few ecological niches (along streams and swamps, and in rocky places). Man must have considerably increased their potential area by his opening of land, his fields, and roads which could be easily invaded. *S. dliata* is an exception, this being almost certainly a native mountain plant.

S. sensitiva Ait. is very tolerant ecologically, the two others, *S. dliata* and *S. conferta,* are both confined to areas subject to a dry season. Distributionally they follow the usual pattern of drought-loving plants, *viz* by going round the large everwet part of West Malaysia (Sumatra, Malaya, Borneo, West Java) from continental SE. Asia to the Philippines (west side of the islands), South Celebes, and the Lesser Sunda Islands. *S. ciliata* is not found further to the east, but *S. conferta* is spread also over the drier parts of New Guinea onto Australia.

The three species were rightly distinguished in Java already more than a century ago, by Zollinger, although under different specific names.

There appear to occur no other species on the islands outside Java. They can be distinguished as follows:

KEY TO THE SPECIES

1. Flowers yellow. Calyx and bracteoles glabrous or provided with some bristle-like bulbous-based hairs but not ciliate on the margin. Calyx densely parallel-striped-veined.
1. Flowers pale blue or pale violet, in racemes. Calyx and bracteoles dorsally with some scattered bulbous-based bristle-hairs, their margin ciliate. Calyx not densely parallel-veined, the veins reticulate towards the apex . . . . . *1. S. ciliata*
2. Flowers in peduncled racemes. Calyx and bracteoles glabrous or with a few scattered bristle-hairs . . . . . *2. S. sensitiva*
2. Flowers in axillary fascicles of 1—4, the subtending leaves close together, the flowers therefore in a more or less head-like 'inflorescence'. Upper lip of the calyx glabrous or with a few bristle-hairs, lower lip long-hairy. Bracteoles with some long hairs . . . . . *3. S. conferta*

1. SMITHIA CILIATA Royle

Smithia ciliata Royle, 111. Bot. Himal.: 201, *t. 35 fig. 2.* 1934; Baker *in* Hook, f., Fl. Br. Ind. 2: 150. 1876; C.B. Rob. *in* Philip. J. Sc. 3: Bot. 184. 1908; Merr., *ibid.* 5: Bot. 77. 1910; En. Philip. 2: 283. 1923; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 71. 1941; *in* Blumea 5: 512. 1945. — *S. coerulescens* Zoll. & Mor. *in* Nat. & Geneesk. Arch. Neerl. Ind. 3: 76, 56. 1846; *in* Flora 30: 696. 1847; Bth. *in* Miq.:, PI. Jungh.: 213. 1852; Miq., Fl. Ind. Bat. 1, 1: 273. 1855; Backer, Schoolfl. Java: 334. 1911.

DISTRIBUTION. — Continental Asia (Himalaya, N. Siam, Tonkin), Formosa, Philippines (N. Luzon), South Celebes, East Java (Mt Idjen), Lesser Sunda Islands (Bali, Timor), c. 1000—2200 m alt. — Map 4.

2. SMITHIA SENSITIVA Ait.

Smithia sensitiva Ait., Hort. Kew. ed. 1, 3: 496. 1789; Mor., Syst. Verz.: 6. 1846; Zoll. & Mor. *in* Flora 30: 696. 1847; Miq., Fl. Ind. Bat. 1, 1: 272. 1855; Pulle *in* Nova Guinea 8: 650. 1911; Merr., En. Philip. 2: 283. 1923; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 71. 1941. — S. *javanica* Bth. m Miq., PI. Jungh.: 211. 1852; Miq., Fl. Ind. Bat. 1, 1: 271. 1855; Backer, Schoolfl. Java: 334. 1911. — *S. laxiflora* Bth. *in* Miq., PI. Jungh.: 211. 1852, pro specim. Zoll. 897.

DISTRIBUTION. — Tropical Africa and Asia to Formosa, throughout Malaysia (not yet recorded for Borneo) and Australia, from the lowland up to c. 2000 m. — Map 2.

There are slight variations in habit; in some specimens the stems become slightly woody, while in others the roots and root-crown can become thickish and woody. The dorsal face of the calyx is mostly glabrous

but some specimens have a few scattered hairs here; a New Guinean collection (Hoogland & Pullen 5258) has unusually many. Usually the peduncle is rather longish and well-visible, but in a few New Guinean collections (v. Romer 320, 170, Brass 11651) the peduncle is relatively very short.

We have at Leyden a duplicate specimen of Zollinger 897 from Java which was cited by Bentham as one of the constituents of his *S. laxiflora,* though without flowers; it does not seem to differ from *S. sensitiva.* It is distinctly not *S. purpurea* Hook, to which *S. laxiflora* is reduced by Baker in the Flora of British India vol. 2, p. 149; also Hook., Bot. Mag. *t. 4283.*

3. SMITHIA CONFERTA J. E. Smith

Smithia conferta J.E. Smith *in* Rees, Cycl. 33, no 2. 1816, *non vidi;* Bth. *in* Miq., PI. Jungh.: 213. 1852; Miq., Fl. Ind. Bat. 1, 1: 272. 1855; Bth., Fl. Austr. 2: 228. 1864; Backer, Schoolfl. Java: 334. 1911; Gibbs *in* J. Linn. Soc. Bot. 42: 68. 1914, Gagnep., Fl. Gen. I.-C. 2: 531. 1920; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 129, p. 72. 1941. — S. *geminiflora* Roth, Nov. PI. Sp.: 352. 1821; Baker *in* Honk, f., Fl. Br. Ind. 2: 149. 1876, incl. *var. conferta.* — S. *hispidissima* Zoll. & Mor. *in* Nat. & Geneesk. Arch. Neerl. Ind. 3: 76, 56. 1846; *in* Flora 30: 696. 1847.

DISTRIBUTION. — Continental Asia (India, Indo-China) through Malaysia: Philippines (Mindoro), N. Borneo, S. Celebes, Java, and Lesser Sunda Islands (Lombok) to Queensland. From the lowland up to c. 1000 (rarely 1400) m alt. It is newly recorded here for the Philippines (West Mindoro: *PNH 22478 Sulit).*

It has been suggested that the oldest name for this species is *S. capitata* Desv. *in* J. Bot. 1: 121. 1813. This is, however, a nomen nudum. Desvaux gives a schematic figure in his work (t. IV, fig. xii), but this is merely intended to elucidate the characters of the genus. Its detail (no corolla is given) does not tally with S. *conferta* and there is no indication that the figure in fact represents an illustration of his new species. Therefore the Indian species *S. capitata* Dalz. is not a later homonym and can stand. The figure does not validate the nomen nudum in the text.

In the Flora of Madras Gamble (p. 329. 1918) distinguished two species, *S. geminiflora* and *S. conferta,* which had been considered as varieties of one species by Baker in the Flora of British India. The differential characters cited in his key: smooth pod-joints and a lower calyx-lip bristly on the back in *S. conferta* and papillose joints combined with a lower calyx-lip with a tuft of bristles near the apex in *S. geminiflora* do not hold in the Indian and Malaysian material I have studied. The

fragment of an isotype of *S. geminiflora* possesses sparse bristle hairs in the upper half of the lower calyx lip. The density and degree of these bristles show an appreciable degree of variation which is also found on the upper lip; they may even be found near the base. The degree of papillosity of the pod joints varies also; I have not seen any which are really smooth. I cannot find reason to distinguish these two species.

EXCLUDED SPECIES

Smithia bigeminata Blanco, Fl. Filip. ed. 2: 395. 1845 = *Zornia diphylla* (L.) Pers.

STYLOSANTHES Swartz

Stylosanthes Swartz, Prod. Veg. Ind. Occ: 108. 1788; Vogel *in* Linnaea 12: 63. 1838; Taubert *in* Verh. Bot. Ver. Brandenburg 32, 1: 1—34. 1890; Mohlenbrock *in* Ann. Mo. Bot. Gard. 44, 4: 299—355. 1957. — *Styposa-nthes* Herter *in* Rev. Sudani. Bot. 7: 209. 1943.

Both Taubert and Mohlenbrock had for their revision only scanty material from Malaysia at their disposal and it seemed worthwhile to make a new revision. This is especially urgent because there appear to exist rather serious differences of opinion about the identity of the Malaysian species.

Before giving my results in a new key some general remarks should be made.

Stylosa/nthes is a genus comprising some two dozens of species which were mainly described from tropical America and from another centre in Africa. In the Asiatic and Malaysian tropics it is poorly represented and partly introduced. In Queensland one species is introduced according to Mohlenbrock, *I.e.* 347.

The species are much resembling one another in habit; the main specific differences are found in the structure of the partial inflorescences of the head-like spikes and the pods. The flowers are very uniform; the calyx possesses a long narrow tube with a 5-lobed ciliate limb and the petals and stamens are inserted in the throat of the calyx, the whole withering and caducous during the ripening of the pod. The pod has two joints of which often only the superior is fertile. The style hardens during the ripening and is frequently provided with a hooked or coiled apex.

Each partial inflorescence consists of one flowers, subtended by a large, stipule-like, greenish, 3-nerved bract, sometimes bearing 1—3 re-

duced leaflets. Within this stipular bract a short rachis is found which bears one 2-tipped hyaline-membranous, 2-nerved, narrow-lanceolate bract. Opposite this bract there is in certain species a filiform, terete, sterile, hairy appendage, inserted at the same height, which can vary in length. Bract and appendage are situated in the transversal plane. Between them the flower is found on a very short pedicel provided with 1—2 linear, hyaline, 1-tipped, but often cleft, membranous bracteoles, of which the adaxial one is higher inserted than the abaxial one. They resemble the 2-tipped bract but are narrower, almost linear.

Both Taubert and Mohlenbrock have given great attention to this structure, specially to the presence or absence of the sterile appendage, on which Vogel based his sections *Styposanthes* and *Eustylosanthes* respectively, raised by Herter (1943) to generic rank under the names *Stylosarir thes* and *Astyposanthes*, considered to represent sections *Stylosanthes* and *Astyposanthes* by Mohlenbrock.

I do not understand that Mohlenbrock made sections without regard to those of Vogel which have clear priority and further that he typified *Stylosanthes* by *S. hamata* (L.) Taub., as the type of the genus should be one of the two original species of Swartz, viz *S. viscosa* Sw. and *S. procumbens* Sw. As Vogel distinguished *sect. Eu-Stylosanthes* to which *S. viscosa* Sw. belongs, it is clear that this must be the type species of the genus and of the *sect. Eu-Stylosanthes* Vogel = *sect. Astyposanthes* (Herter) Mohlenbrock, nom. illeg. = *sect. Stylosanthes* in the modern nomenclatural sense.

Sect. Styposanthes Vogel (syn. *sect. Stylosanthes* sensu Mohlenbrock) is not typified by *S. hamata* (L.) Taub., but by one of the species Vogel enumerated. It seems appropriate to choose for the other species of Swartz, *viz S. procumbens* Sw.

The taxonomical importance of the presence or absence of the sterile appendage, which has been unanimously morphologically accepted as the abortive apex of a 1-flowered raceme, has given raise to a controversy, as some authors believed this was a variable character, and maintained that it was frequently absent in the upper flowers of a head. In dissecting more than one hundred heads and examining about four hundreds of flowers in Malaysian material of *S. sundaica* my observations led to the following conclusions: (1) in setting fruit the appendage becomes caducous in the lower flowers, (2) during anthesis the appendage is smallest in the youngest flowers and obviously lengthens towards anthesis, (3) the relative position of the two bracteoles in the diagram is somewhat variable, and occasionally only 1 bracteole is present. In material of all other spe-

cies of *sect. Styposanthes* Vogel I found always the appendage, the 2-tipped bract, and the two bracteoles. In species of *sect. Stylosanthes (Astyposanthes* (Hert.) Mohl.) I never found any appendage and always the 2-tipped bract, but only 1 bracteole.

In determining the Malaysian material with Mohlenbrock's key it appears impossible to identify the Malaysian material of *S. sundaica,* which Mohlenbrock reduced to *S. humilis;* for the latter he stated *I.e.* p. 308: „beak nearly 2—4 times longer than the upper articulation of the pod", but in his description *I.e.* p. 346 one reads: „beak equaling to greatly surpassing the upper articulation". Besides this, *S. sundaica* belongs, by virtue of the presence of an appendage, to the other section.

In trying to identify *S. macrocarpa* Blake, from Mexico, of which I had an isotype of Pringle 6721, with Mohlenbrock's key, one comes into great difficulty. After having arrived at the entry GG, *S. subsericea* is split on account of a strongly coiled beak of the pod; but the figure he gives *I.e.* p. 301, f. 11, does not mark this as a particularly strong character as a nearly equal strongly uncinate beak tip occurs in Pringle 6721. As an additional character it is recorded in the key that *subsericea* should often have a sericeous indument on stem and bracteal sheath, but not other species *{macrocarpa, nervosa,* and *fruticosa),* which would have a stem with tuberculate bristles but not sericeous. Through this it impossible to identify *S. macrocarpa* with this key, as the stem in the isotype of *S. macrocarpa* is distinctly densely sericeous-pubescent with sparse tubercle-based bristles, which Mohlenbrock also mentions in his description *I.e.* p. 322 (sic). In passing it may be remarked that *S. subsericea* is known from only few collections, inter alia from Oaxaca, which is the type locality of *S. macrocarpa.* Besides it appears difficult to judge the degree in which the tip of the beak is recurved, uncinate, or coiled.

The next entry in the key, *S. macrocarpa* is distinguished by having an upper articulation + beak combined of 8 mm (plant to 20 cm tall) against 5—7½ mm in *S. fruticosa* and *S. nervosa* (plant to 1 m).

The type of *S. macrocarpa* has beak + articulation 6¼ mm long; in Mohlenbrack's description *I.e.* p. 323 he records the length in *S. macrocarpa* as 6—*8½* mm (sic). Besides, the difference between 7½ and 8 seems ridiculous and the height of the plant must be influenced strongly by the environment.

In identifying the type of *S. macrocarpa* further we come to *S. nervosa,* as there is only one articulation fertile, and the bracteal sheath is short-hispid (and finally sericeous-ciliate along the margin).

KEY TO THE SPECIES

1. Flowers *not* subtended by a filiform, hairy appendage (axis-rudiment) *(Sect. Stylosanthes).* Beak of the pod distinctly uncinate, mostly much longer than the upper articulation. Usually only the upper articulation fertile, pilose-pubescent with a pubescent beak. Bracteole 1. . . . . *1. S. humilis*
1. Mature flowers always subtended by an appendage (below young buds insignificant). Upper articulation and beak short-pubescent.
   2. Beak of the pod curved but not distinctly uncinate, usually shorter than the upper articulation, sometimes of the same length. Usually both articulations fertile. Appendage not caducous. Always 2 bracteoles present. *2. S. fruticosa*
   2. Beak of the pod distinctly uncinate, nearly always much exceeding the upper articulation. Usually only the upper articulation fertile, but not rarely the lowermost too. Appendage caducous,½—3 mm long. Mostly 2 bracteoles, sometimes only 1. . . . . *3. S. sundaica*

1. STYLOSANTHES HUMILIS H.B.K.

Stylosanthes humilis H.B.K., Nov. Gen. Sp. 6: 506, t. 594. 1823; Vogel *in* Linnaea 12: 66. 1838; Taub. *in* Verh. Bot. Ver. Brand. 32: 30. 1890; Mohlenbrock *in* Ann. Mo. Bot. Gard. 44: 345. 1957, excl. syn. *S. sundaica.* — *Astyposanthes humilis* Herter *in* Rev. Sudam. Bot. 7: 209. 1943.

DISTRIBUTION. — Native in Central Mexico through Guatemala and Panama to Columbia, Venezuela, and Brasil, recently introduced in the Philippines (Luzon: Zambales Prov., Zambales Breeding Station at San Marcelino, *PNH 37087 E. C. Farinas)* and in Queensland (Townsville, *C. T. White 8818,* cf. Mohlenbrock, *I.e.* p. 347).

Besides by the absence of an appendage differing from S. *sundaica* and *S. fruticosa* by the indument of the pod which is denser and longer than in the two other species. The size and the shape of beak and the loment are similar to those of *S. sundaica.*

2. STYLOSANTHES FRUTICOSA (Retz.) Alston

Stylosanthes fruticosa (Retz.) Alston *in* Trimen, Handb. Fl. Ceyl. 6 Suppl.: 77. 1931; Mohlenbrock *in* Ann. Mo. Bot. Gard. 44: 318. 1957. — *Hedysurum hamatum (non* L.) Burm., Fl. Ind.: 167. 1768. — *Arachis fruticosa* Retz., Obs. 5: 26. 1791. — *S. mucronata* Willd., Spec. PI. 3: 1166. 1800; DC, Prod. 2: 318. 1825; W. & A., Prod. 1: 218. 1834; Decne *in* Nouv. Ann. Mus. Hist. Nat. 3: 471. 1834; Vogel in Linnaea 12: 68. 1838; Zoll. *in* Nat. & Geneesk. Arch. Neerl. Ind. 3: 55. 1846; Miq., Fl. Ind. Bat. 1, 1: 277. 1855; Baker, Fl. Trop. Afr. 2: 157. 1871; *in* Hook, f., Fl. Br. Ind. 2: 149. 1876; Taub. *in* Verh. Bot. Ver. Brand. 32: 19. 1890. — *S. bojeri* Vogel *in Linnaea* 12: 68. 1838, ex descr. — *S. sletosa* Harv., Fl. Cap. 2: 227. 1862, ex descr. — S. *flavicans* Baker, Fl. Trop. Afr. 2: 156. 1871, ex descr.

DISTRIBUTION. — South Africa, Madagascar, East Africa: Abessynia, Zanzibar, Mozambique, India, Ceylon; in Malaysia once found: Lesser

Sunda Islands, Wetar I., *Elbert 4651* (L), in dry lowland, Eucalypt savannah on the south coast near Ilmedo.

Mohlenbrock, *I.e.* p. 318, reduced *Stylosanthes aprica* Span. nom. nud., collected in Timor, to this species, adding curiously behind the name, as the type, a South African collection, Burke & Zeyher 404, which belongs to *S. setosa,* a line lower. The type of *S,. aprica* Span, at Leyden belongs undoubtedly to *S. sundaica.*

3. STYLOSANTHES SUNDAICA Taub.

Stylosanthes sundaica Taub. *in* Verh. Brand. 32: 21. 1890; Backer, Schoolfl. Java: 335. 1911; Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 72. 1941; Mohlenbrock *in* Ann. Mo. Bot. Gard. 44: 345. 1957, in syn. sub. S. *hum/Ms.* — S. *aprica* Span, *in* Linnaea 15; 192. 1841, nom. nud. — *S. mucronata (non* Willd.) Miq., Fl. Ind. Bat. 1, 1: 277. 1855. — S. *fruticosa [non* (Retz.) Alston] Sinclair in Gard. Bull. Sing. 14: 32. 1953.

DISTRIBUTION. — Malaysia: Malay Peninsula (adventive in Singapore: Sinclair, *I.e.),* Central and East Java, Lesser Sunda Islands (Bali, Lombok, Sawu, Timor, Kisar), and ?Moluccas (unspecified).

S. *sundaica* is considered by most recent authors as conspecific with *S. fruticosa,* but in my opinion it differs distinctly in size and form of the beak on the pod which is longer and more uncinate and in the caducous appendage. This beak is similar to that of *S. humilis* H.B.K. For this reason, and because he could not find an axis-rudiment, Mohlenbrock reduced it to *S. humilis.* However, I have found in many specimens an evident axis-rudiment, though sometimes early caducous. Besides there are nearly always 2 bracteoles. Sometimes I could find only 1 bracteole, the way it always occurs in *S. humilis,* but this only in a few flowers.

Considering these facts it seems that *S. sundaica,* although a distinct species, stands between S. *fruticosa* and *S. humilis.*

URARIA Desv.

As far as I have ascertained there are only five species of *Uraria* in Malaysia, all of them also occuring in Java. They are all plants of ruderal places, grassland, and open forest. *U. Candida* and *U. rufescens* seem bound to a distinctly seasonal climate; *U. picta* prefers a less strong seasonal climate.

There are some discrepancies in the citation of references to the names. Index Kewensis attributed several combinations to Desvaux, Journ. de Botanique 1: 123. 1813, but Desvaux, though indicating that several *Hedysarums* belong to his genus, did not effectively publish them

under *Tirana.* As far as I can trace De Candolle (1825) made the effective combinations. Index Kewensis also erroneously referred Desvaux's figure (t. 5, fig. 19) to *U. picta;* it belongs, however, to *U. cercifolia* Desv., which is accepted as a taxonomic synonym of *U. picta.*

I have examined the type specimens of *Desmodium horsfieldii* Miq. and found it conspecific with *U. rufescens.*

KEY TO THE SPECIES

1. Flowers in panicles. Pedicels 4—5 mm, with short (± ½ mm), patent, brown, ± straight hairs without hook. Racemes rather loose. Leaves 3-foliolate, leaflets ovate, elliptical or oblong, obtuse, rounded or emarginate, 3—7 by 1½—5½ cm. All bracts caducous. Lower calyx-lobes 1½—2 times as long as the upper ones. Ripe pod with 3—7 articulations, grey, with short hooked hairs and long erect hairs. . . . . *5. U. rufescens*
1. Flowers in simple, spike-like racemes. Pedicels either with long (more than 1 mm), thin, soft, whitish hairs or with short (± ½ mm) stiffish hooked hairs, or with both these types. Racemes dense.
   2. Pedicels either only with long, soft, white hairs or also with some hooked hairs or also with some hooked hairs at the apex.
      3. All bracts prominent. Pedicels 4—8 mm long, only with long, soft, white hairs. Lower calyx-lobes more than 3 times as long as the upper ones. Leaflets 1—3, obovate, circular, ovate or elliptic, obtuse or acute. Terminal leaflets 2—8 by 1½—6 cm. Ripe pod with 2 articulations, pod joints brown, grey or black, glabrous or short-hairy, without hooked hairs. . . . . *1. U. lagopodioides*
      3. Bracts caducous during anthesis, except the lower ones. Pedicels 6—12 mm long, with white, soft, long hairs and at the top some short, hooked hairs. Lower calyx-lobes 2—2½ times as long as the upper ones. Upper leaves 5—7 (—9)-foliolate, leaflets elliptical acute, lanceolate, 8—16 by 1½—5½ cm. Ripe pod with 3—6 articulations, glossy black, short-hairy, without hooks. . . . . *4- U. crinita*
   2. Pedicels predominantly with the short hooked hairs and some long, soft, white hairs at the base.
      4. Pedicels 6—7 mm. Ripe pod with 3—5 articulations, black, short-hairy, without hooks. Upper leaves 3—5-foliolate, leaflets ovate to ovate-oblong, 1¼—15 by ½—10 cm. Lower calyx-lobes 1½—2 times as long as the upper ones. Upper calyx-lobes united for half their length. . . . . *2. U. Candida*
      4. Pedicels 4—6 mm. Ripe pod with 3—6 articulations, light grey, glabrous. Leaves 3—7 (—9)-foliolate. Leaflets of the upper leaves ± linear, long-attenuate, from a rounded base, 4—20 cm by 3½—20 mm. Lower calyx-lobes twice as long as the upper ones, the last ones not united. . *3. U. picta*

1. URARIA LAGOPODIOIDES (L.) Desv. *ex* DC.

Uraria lagopodioides (L.) Desv. *ex* DC., Prod. 2: 324. 1825 *(„lagopoides"); in* Mem. Soc. Linn. Paris 4: 309. 1826; Kurz *in* J. As. Soc. Beng. 45, ii: 235—237. 1876 *(„lagopoides");* Bth., Fl. Austr, 2: 237, 1864 *(„lagopoides");* Gagnep., PI. Gen. I.-C.

2: 541. 1920 *(Jagopoides");* Ridl., Fl. Mai. Pen. 1: 603. 1922 *(Jagopoides")*; Merr., En. Philip. 2: 293. 1923; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 92. 1941. — *Hedysarum lagopodioides* L., Sp. PI.: 1198. 1753; Burm., Fl. Ind. 3: 168, *t. 53 f. 2.* 1768 *(„lagopoides"). — Lespedeza lagopodioides* Pers., Syn. 2: 318. 1807 *(„lagopodoides"). — U. cercifolia* Desv. *in* Journ. Bot. 1: 123, *t. 5 f. IS.* 1813. — *Doodia lagopodioides* Roxb., Fl. Ind. 3: 366. 1832. — *U. cylindracea* Bth., Fl. Austr.: 237. 1864; Specht, Rec. Am.-Austr. Exp. Arnhem Land 3: 244. 1958.

DISTRIBUTION. — N. India, SW. China, Hainan, Malaysia, N. Australia, Polynesia, e.g. Bismarck I., Solomons, New Hebrides, New Caledonia, Fiji, Samoa (in Tonga introduced).

2. URARIA CANDIDA Backer

Uraria Candida Backer *in* Blumea 5: 512. 1945.

DISTRIBUTION. — Malaysia: Kangean Archipelago and Wetar.

3. URARIA PICTA (Jacq.) Desv. *ex* DC.

Uraria picta (Jacq.) Desv. *ex* DC., Prod. 2: 324. 1825; Miq., Fl. Ind. Bat. 1, 1: 267. 1855; Bth., Fl. Austr. 2: 237. 1864; Kurz *in* J. As. Soc. Beng. 45, ii: 235—237. 1876; Hook, f., Fl. Ind. 2: 155. 1879; Gagnep., Fl. Gen. I.-C. 2: 547. 1920; Ridl., Fl. Mai. Pen. 1: 603. 1922; Merr., En. Philip. 2: 293. 1923; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 92. 1941; Leonard, Fl. Cong. Belg. 5: 232, *fig. U.* 1954; *non* Wight, Ic: *t. ill.* 1840 (= *U. crinita). — Hedysarum pictum* Jacq., Coll. Bot. 2: 262. 1788; Ic. PI. Rar. 3: 13, *t. 567.* 1793. — *Doodia picta* Roxb., Fl. Ind. 3: 368. 1832. — *U. linearis* Hassk. *in* Flora 25 Beibl. 2: 48, 61. 1842.

DISTRIBUTION. — India to southern China, throughout Malaysia, Australia (Queensland), Tropical Africa, introduced into the West Indies.

4. URARIA CRINITA (L.) Desv. *ex* DC.

Uraria crinita (L.) Desv. *ex* DC, Prod. 2: 324. 1825; Kurz *in* J. As. Soc. Beng. 45, ii: 235—237. 1876; Hook, f., Fl. Ind. 2: 155. 1879; Gagnep., Fl. Gen. I.-C. 2: 546. 1920; Ridl., Fl. Mai. Pen. 1: 602. 1922; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 92. 1941. — *Hedysarum oriniUim* L., Mant. 1: 102. 1767; Burm., Fl. Ind. 3: 169, *t. 56.* 1768. — *Doodia crinita* Roxb., Fl. Ind.: 369. 1832. — *U. picta (non* Desv.) Wight, Ic: t 411.1840. 1840.

DISTRIBUTION. — India to southern China, Hainan, Malaysia with the exception of the Philippines and New Guinea.

U. crinita var. macrostachya Wall, *in* Fedde, Rep. Beih. 49: 364 a.o. 1928; PI. As. Rar. 2: 8, *1.110.* 1831, has been regarded by Schindler as a distinct species *U. macrostachya,* but I could not see any difference, except a more robust habit and larger leaves.

5. URARIA RUPESCENS (DC.) Schindl.

Uraria rufescens (DC.) Schindl. *in* Fedde, Rep. 21: 14. 1925. — *Desmodium rufescens* DC. *in* Ann. Sc. Nat. 4: 101. 1825, non vidi. — *Doodia hamosa* Roxb., Fl. Ind. 3: 367. 1832. — *Doodia, simplicifolia* Roxb., *I.e.* 366. — *U. hamosa* [Sweet, Hort. Brit, ed. 2: 149. 1830, nom. nud.; Wall., Cat.: n. 5681 B. 1831—32, nom. nud.] Wall, *ex* W. & A., Prod.: 222. 1834; Gagnep., Fl. Gen. I.-C. 2: 544. 1920; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 92. 1941. — *U. paniculata* Hassk., Cat. Hort. Bog.: 273. 1844; Schindl. *in* Fedde, Rep. Beih. 49: 367. 1928. — *Desmodium horsfieldii* Miq., Fl. Ind. Bat. 1, 1: 251. 1855 (type in U).

DISTRIBUTION. — India to southern China, in Malaysia known only from the northern part of the Malay Peninsula, W. Java, and SW. Celebes.

Uraria paniculata Hassk. is distinguished by Schindler from *U. rufescens* (DC.) Schindl. A type specimen was not available. Javanese specimens of Blume of *U. paniculata* agree with the description of Hasskarl, except the indument of the pod. The difference between *U. rufescens* and *U. paniculata* according to the original descriptions is the hairiness of the leaflets and the pods. After seeing some material of Java I observed that these differences do not hold good. So I conclude that *U. paniculata* Hassk. is a synonym of *U. rufescens.*

Doodia simplidfolia Roxb. seems to be only the simple-leaved form of this species.

EXCLUDED SPECIES

Uraria cordifolia Wall., PI. As. Rar. 1: 33 p.p. 1830 = *U. latifolia* Prain in J. As. Soc. Beng. 66, ii: 383. 1897 = *Urariopsis cordifolia* (Wall.) Schindl. *in* Bot. Jahrb. 54: 51. 1916; Backer, Bekn. Fl. Java (em. ed.) 5: fam. 120, p. 93. 1941.

Uraria obcordata Miq. Sum. 305. 1861 = *Lourea vespertilionis* [(non. L.f.) Desv.J Zoll. & Mor. *in* Nat. Geneesk. Arch. 3: 56. 1846 = *Desmodium obcordatum* (Miq.) Kurz *in* J. As. Soc. Beng. 229. 1873; *ibid.* 45, ii: 230. 1876.

ZORNIA Gmel.

Zornia Gmel., Syst.: 1076, 1096. 1791; DC, Prod. 2: 316—317. 1825; G. Don, Gen. Syst. 2: 280. 1882.

ZORNIA DIPHYLLA (L.) Pers.

Zornia diphylla (L.) Persoon, Syn. PI. 2: 318. 1807; Bth., Fl. Bras. 15: 80, *t. 21—22.* 1859; Fl. Austr. 2: 228. 1864; Baker, Fl. Br. Ind. 2: 147. 1876; Bailey, Queensl. Fl. 2: 409. 1900; Merr. *in* Philip. J. Sc. 5: Bot. 77. 1910; Backer, Schoolfl. Java: 336. 1911; Gagnep., Fl. Gen. I.-C. 2: 611. 1920; Merr., En. Philip. 2: 283. 1923; Domin

in Bibl. Bot. 89: 209. 1926; Craib, Fl. Siam. En. 1: 402. 1928. — *Hedysarum diphyllum* Linné, Sp. PL: 747. 1753; ed. Willd.: 1178. 1800. — *Hedysarum conjugatum* Willd., Sp. PL: 1178. 1800. — *Z. zeylonensis* Pers., Syn. PL 2: 317. 1807; DC, Prod. 2: 316. 1825; W. & A., Prod.: 217. 1834; Dalz. & Gibs., Bomb. FL: 62. 1861. — *Z. angustifolia* Sin. *in* Rees, Cycl. 39: n. 1. 1819; DC, Prod. 2: 316. 1825; W. & A., Prod.: 217. 1834. — *Z. conjugata* (Willd.) Sm. *in* Rees, Cycl. 39: n. 3. 1819. — *Z. reticulata* Sm. *in* Rees, Cycl. 39: n. 2. 1819; DC, Prod. 2: 316. 1825. — *Z. pubescens* H.B.K., Nov. Gen. Sp. 6: 515. 1823; DC, Prod. 2: 317. 1825. — *Z. thymifolia* H.B.K., Nov. Gen. Sp. 6: 514. 1823!; DC, Prod. 2: 317. 1825. — *Z. dyctiocarpa* DC, Prod. 2: 317. 1825. — *Z. graeilis* DC, *I.e.* — *Z. latifolia* DC, *l.c.* — *Z. microphylla* Desv. *in* Mém. Soc. Linn. Paris 4: 325. 1826. — *Z. laevis* Schlecht. & Cham, *in* Linnaea 5: 582. 1830. — *Z. nuda* Vogel *in* Linnaea 10: 587. 1836. — *Z. walkeri* Am. in Nov. Act. Nat. Cur. 18: 330. 1836. — *Lupinus angustifolius* Blanco, Fl. Filip.: 566. 1837. — *Z. ovata* Vogel *in* Linnaea 12: 58. 1838. — *Z. perforata* Vogel, *I.e.* 59. — *Z. gemella* Vogel, *I.e.* 61. — *Z. trachycarpa* Vogel, *l.c.* 60. — *Z. gibbosa* Span, *in* Linnaea 15: 192. 1841. — *Z. graminea* Span., *I.e.* — *Z. surinamensis* Miq. *in* Ann. & Mag. Nat. Hist. ser. 1, 11: 14. 1843. — *Smithia bigeminata*, Blanco, Fl. Filip. ed. 2: 395. 1845; ed. 3, 2: 362. 1878. — *Z. chaetophorm* F. v. M. *in* Trans. Phil. Inst. Viet. 3: 56. 1859. — *Z. biarticulata* G. Don, Gen. Syst. 2: 280. 1882. — *Z. filifolia* Domin *in* Bibl. B.ot. Heft 89: 210. 1926. — *Z. stirlingii* Domin, *l.c.*

DISTRIBUTION. — Pantropical herb in Malaysia found in almost all islands or island groups except Borneo and distinctly rare in Sumatra, Malaya, West Java, S. Philippines, Celebes, and New Guinea, an example of a class of plants which, though not absent under everwet climatic conditions favours those areas which are subject to a dry period.

Zornia diphylla is a pantropical species which is fairly common in grasslands and savannahs up to 2000 m. In Malaysia it prefers on the whole localities subject to an annual drought. In Africa specimens of this species are even found in places with an arid climate. The large number of synonyms is caused by the great variability of this species. After having seen much material of *Zornia* I cannot but conclude that the genus is represented in Malaysia by only one species. If only some of the sometimes widely differing specimens were considered, one could easily come to the conclusion that there are several species. But I have found transitions between all the different forms.

The variable characters are mainly: (1) The shape and size of the leaflets; (2) the occurrence of pellucid glands on the stipules, inflorescential stipules, and leaflets; (3) the size of the flowers, which are sometimes entirely enveloped by the inflorescential stipules but sometimes 1½ times as large; (4) the size and the number of articulations of the pods; (5) the occurrence and size of stiff, usually retrorsely hispid bristles on the pod;_{6) the hairiness, of. the pod;. *(7)* the indument of the .whole plant;..

(8) the size and shape of the inflorescential stipules. The habit is also very variable; plants can be prostrate or erect, much branched or only sparsely branched.

The inflorescential stipules, by all authors called bracts, are situated in twos on the rachis; they enclose one or two flowers and obviously they represent the stipules of a reduced leaf with 1—2 axillary flowers. All stipules are peltately attached and of about the same shape, save that those enveloping- flowers are generally wider.

In the Malaysian material I have found that some variations do not occur at racdom but show a geographical pattern. I have found plants with linear leaflets, glandular stipules, and fairly long bristles on the pods in most of the material from India, the Philippines, and Celebes, and in about half the material from Java and the Lesser Sunda Islands. Predominantly ovate-lanceolate leaflets, eglandular stipules and rather short bristles on the pods I have found in all the material from Cochinchina and Sumatra, about half of the material from Java and in only a few specimens from the Philippines and Celebes. These two main forms had been already distinguished by Bentham a century ago, as *var. k. vulgaris punctata* and *i. vulgaris impunctata* respectively.

In some other specimens the pods are glabrous or puberulous and in both cases this can be combined with the occurrence of a few very short bristles or absence of bristles. These sheets are predominantly from the Lesser Sunda Islands. Sometimes the bristles were only found at the apex of each articulation. There is in these Lesser Sunda Islands specimens no correlation between the character of the indument and the shape of the leaflets.

In one of the Philippine specimens the leaflets are orbicular and very small, c. 5 by 5 mm. The racemes, which usually possess c. 10—20 pairs of inflorescential stipules, have in this specimen only one pair of stipules.

All but one of the specimens from New Guinea which I have seen possess puberulous pods without bristles, while the branches and the rachis of the racemes are silvery-white curly pilose, a character not encountered in any other Malaysian specimen. These Papuan plants are all small, about 1 dm, the usual length being 1—5 dm. This Papuan form seems to have been described by Domin as *var. hirsuta* from Queensland.

I have reached the same conclusion to which Bentham came already a century ago when he studied *Zornia* over a very wide range from almost all major areas of the world, namely that although some major forms can be distinguished, there is no distinct correlation of characters in strict groups resulting into various transitional forms between a multi-

tude of paramorphs and clines. Bentham and also Domin named a number of varieties but I have refrained from doing so. Milne-Redhead *(in* Bol. Soc. Brot. 28: 79. 1954) recently made an extensive study of *Zornia* in Africa and came to the conclusion that *Z. diphylla* does not occur there, but in my opinion *Z. glochidiata* Rchb. *ex* DC. is the African form of *Z. diphylla* (L.) Pers., a point of view I share with Bentham, Baker, Pirotta, and Robijns.

One of the major characters for specific distinction used by Milne-Redhead is whether the plants are annual or perennial. I fail to see how this can be applied in plants as *Zornia,* from savannahs, grassfields, and roadsides where this distinction fades away in the tropics.

Merrill mentioned that *Zornia.* „has all the appearance of an introduced species" in the Philippines and it is indeed mainly ruderal in Malaysia but it seems not possible to decide to its post-Columbian introduction.