

THE *THUNBERGIA* SPECIES OF THE
MALESIAN AREA

BY

C. E. B. BREMEKAMP

VERHANDELINGEN DER KONINKLIJKE NEDERLANDSE
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A. DELIMITATION AND SUBDIVISION OF *THUNBERGIA* ¹⁾

The family *Thunbergiaceae* as defined by me in Proc. Kon. Ned. Akad. v. Wetensch., Amsterdam, Ser. C, **56**, 540, 1953, corresponds to a group that so far, as a rule, had been included in the *Acanthaceae*. LINDAU in his monograph of the latter in ENGLER & PRANTL, Nat. Pflanzenfam. IV, 3 b, 1895 regarded it as a subfamily, for which he introduced the name *Thunbergioideae*. It is therefore more narrowly circumscribed than VAN TIEGHEM's family *Thunbergiaceae* (in Ann. d. Sc. Nat., Sér. 9, Bot. 7, 18. 1908), which comprised also LINDAU's *Mendoncioideae* and *Nelsonioideae*. In the paper quoted above LINDAU's *Mendoncioideae* were raised to family rank, whereas his *Nelsonioideae* were referred to the *Scrophulariaceae*, where they found a place in the vicinity of the *Rhinantheae*.

LINDAU recognized in his subfamily *Thunbergioideae* three genera, viz. *Thunbergia* Retz., *Pseudocalyx* Radlk. and *Meyenia* Nees. VAN TIEGHEM (in Ann. d. Sc. Nat., Sér. 9, Bot. 7, 111, 1908) wanted to recognize also *Hexacentris* Nees, a genus that ANDERSON (in THWAITES, Enum. Pl. Zeyl. 224, 1864) had sunk in *Thunbergia*, where it had since been left. VAN TIEGHEM's main argument for the restoration of this genus was an anatomical one; in the species which he referred to *Hexacentris* the vascular strands of the petiole are arranged in the form of a hollow cylinder, which means that they appear in cross section as a ring, whereas in the species which he left in *Thunbergia* they form an open channel and in cross section therefore an arc. However, as in *Hexacentris* the petioles are much longer and the leaf blades larger and heavier than they are in his *Thunbergia* species, the difference in the stelar structure of the petiole might perhaps be correlated with the difference in weight of the leaves and with the length of the lever arm on which the latter acts, and in that case the difference in structure would not necessarily possess morphological importance. As I will return further on to the question of the rank that is to be assigned to this unit, I will for the moment abstain from further comments.

More recently a position in LINDAU's *Thunbergioideae* was claimed by BENOIST (in Bull. Soc. Bot. France **85**, 679, 1938) for his new genus *Pounguia*. The latter is said to resemble the other genera in the large size of the bracteoles and in the presence of two collateral ovules in each of the ovary cells, but it differs from them in the structure of the calyx, which is not, as in the other genera, reduced to a shallow cup eventually crowned by 5—23 usually rather short and if longer then always filiform

¹⁾ The studies on which this paper is based, were made possible by a grant from the "Nederlandse Organisatie voor Zuiver Wetenschappelijk Onderzoek (Z.W.O.)".

teeth, but produced into five lanceolate lobes that are nearly as long as the bracteoles. This is an unexpected feature, and as it has appeared since then (cf. BENOIST in Not. Syst. 11, 144, 1944) that the pollen grains are discoid with a smooth marginal zone and finely granulate sides, there is good reason to question the correctness of the author's conclusion with regard to its taxonomic position. It seems more plausible to assume that it belongs to the *Whitfieldieae*, a tribe of the *Acanthaceae* created by me (in Verh. Akad. v. Wetensch., Afd. Natuurk., 2nd Sect., XLI, No 1, 12, 1944) for the reception of *Withfieldia* Hook. and the nearly allied or perhaps identical *Stylarthropus* Baill., and to which LINDAU'S genus *Chlamydacanthus* should also be referred. These plants are all provided with comparatively large bracteoles, four stamens, discoid pollen grains and ovules which, although not exactly collateral, are inserted at nearly the same height. However, so long as the fruit of *Pouguia* is unknown, and so long as it is uncertain whether cystoliths are present or absent, it seems advisable to suspend our judgment.

The genus *Thunbergia* as defined by LINDAU l.c. comprises besides one or two Australian species a large number of Asiatic and African ones, resembling each other in the structure of the fruit, the mode of dehiscence of the anthers and the type of pollen. The fruit is a loculicidal capsule drawn out into a flattened beak which is distinctly narrower than the seminiferous part; the thecae open by slits; and the pollen grains are globose and lack pores or colpae but are, as a rule, provided with more or less conspicuous circular or, more often, meandering but always closed lines of dehiscence; more rarely they burst irregularly (*Th. chrysops* Hook.), in the latter case the surface is covered with a mosaic of hexagonal and pentagonal disks, each provided with a small spinule, and the dehiscence takes place along the lines separating these disks. The lines of dehiscence are therefore not directly comparable with colpae, which show at least towards the middle a considerable width, and which, as a rule, end blindly in the exine.

Among the large number of species that have been referred to this genus several groups can be distinguished, and the differences between these groups are often so striking that it is not at once clear why the latter should all be regarded as lower in rank than *Pseudocalyx* and *Meyenia*. In order to arrive at an unbiassed conclusion we will have to consider the differences between these genera and *Thunbergia* sensu Lindau in some detail.

The differences between *Thunbergia* sensu Lindau and *Pseudocalyx* are found in the aspect of the bracteoles, the mode of dehiscence of the thecae, and the structure of the stigma. The bracteoles of *Pseudocalyx* are leathery, without prominent nerves and, like those found in some of the *Mendoncia* species, covered with a short but dense orange-brown felt, which is never met with in *Thunbergia*, where the bracteoles, moreover, are always rather thin and distinctly nerved. The thecae of *Pseudocalyx*

open by apical slightly slanting but well-defined pores, those of *Thunbergia* by slits extending, as a rule, from top to base, though sometimes, e.g. in *Th. guerkeana* Lindau and *Th. vogeliana* Bth., ending slightly above or below the middle. The stigma of *Pseudocalyx* is a very small and shallow cup, whereas that of *Thunbergia* is much larger and always more or less distinctly two-lobed.

The main difference between *Meyenia* and the two other genera is sought by modern authors in the structure of the pollen grains, those of *Thunbergia* and *Pseudocalyx* being globose and provided, as a rule, with one or more meandering or, less often, circular but always closed lines of dehiscence or, rarely (*Th. chrysops* Hook. v. supra), bursting more or less irregularly, whereas those of *Meyenia* are melon-shaped with flattened ribs, each of the latter being provided with a line of dehiscence running along their middle but not meeting at the poles and of negligible width. Other points of difference are found in the structure of the anthers and in that of the stigma (v. infra).

At the time the genus *Meyenia* was separated by NEES from *Thunbergia* no attention was paid to the structure of the pollen grains, and the distinction therefore was based on characters of another kind. However, a critical examination of the key to the genera *Thunbergia*, *Meyenia* and *Hexacentris* given by this author in WALL., Pl. As. Rar. 3, 74, 1832, and repeated in a slightly simplified form in DC, Prodr. 11, 49, 1847, leads to the conclusion that the differences to which he himself attached special importance, are in reality illusory. The corolla is said to be regular in *Thunbergia* and *Hexacentris* and subregular in *Meyenia*, but in some of the *Hexacentris* species that since then have been discovered, it is doubtless far more distinctly irregular than in *Meyenia*. Further the basal part of the anthers is said to be muticous in *Meyenia*, provided with a single awn in *Thunbergia* and in the lower stamens of *Hexacentris* and with two awns in the upper stamens of the latter, but this too is incorrect, for in the species which NEES referred to *Thunbergia* the awns may be present or absent, and if present, their number may vary, in *Hexacentris* too the number of awns is not fully constant, and in the only species of *Meyenia* the anthers of the longer stamens prove to be provided at the base with a single, admittedly much shorter and somewhat unusually shaped awn. Lastly, the thecae of the longer stamens of *Meyenia* are described as divergent, and so they are shown in the figure given by WIGHT in his "Icones", but in the specimens examined by me this feature was hardly noticeable. Therefore, if we had to base our opinion entirely on the points mentioned in the key, we should have to conclude that there is no appreciable difference between these genera. The descriptions given by NEES, however, lead to a different conclusion. For a better understanding I will quote that of *Meyenia* in full. It reads as follows (in WALL., Pl. As. Rar. 3, 78, 1832, reprinted with a few irrelevant changes in the choice of terms in DC, Prodr. 11, 49, 1847):

“Calyx parvus quinquelobus, bracteolis duabus magnis inclusis. Corolla infundibuliformis, fauce sensim ampliata, tubo brevissimo, intus annulo piloso clauso, limbo subaequali. Stamina quattuor, didynamia, antherae apice barbatae, biloculares, superiorum loculis inaequalibus, altero magis supero divergente latere tomentoso; inferiorum parallelis subaequalibus basi muticis. Stigma membranaceo-dilatatum, bilabiatum, labiis bilobis. Capsula e basi tumidulo conico-attenuata, ad basin bilocularis tetrasperma, dissepimento persistente valvis adnato, ad axin lignoso dissolubili. Semina (immatura) strophilo cupulaeformi solubili spongiosa suffulta. — Planta Indica. Caulis scandens. Folia opposita, integerrima. Flores axillares, pedunculati.”

Most of the features mentioned in this description are general characters of the *Thunbergiaceae* s.m., but the description of the anthers and that of the stigma reveal the presence of peculiarities that are not met with in the other genera. The anthers are described as comose, and that is a character that does not return elsewhere, and attention is drawn to the fact that one of the thecae of the upper stamens is at one side tomentose. This too is not found in the other genera, where the thecae are either all glabrous or, more often, all provided with a row of longer or shorter hairs along the line of dehiscence. The stigma is described as two-lipped with the lips two-lobed; this too is not found in the other genera, where the stigma lobes are as a rule distinctly unequal, not so long and narrow and not incised at the top. The description of the thecae of the upper stamens is incomplete, as no mention is made of the short awn at the base of one of them.

Our analysis of the description given by NEES has revealed therefore the presence of differences that seem to be of sufficient importance to maintain the genus.

The aberrant character of the pollen grains of *Meyenia hawtayneana* Nees was discovered by RADLKOEFER. They were figured by LINDAU in ENGLER & PRANTL, *Natürl. Pflanzenfam.* IV, 3 b, 282, fig. 111 H, and recently an excellent microphotograph was published by ERDTMAN in his “Pollen Morphology and Plant Taxonomy, Stockholm 1952”, *Frontispiece* fig. 1. So far they have been described and figured as provided with 7 to 9 ribs, and this indeed seems to be the usual condition, but in one of the two slides studied by me the anthers proved to contain besides grains with 7 or 8 ribs also some with 12 ribs (cf. fig. 1). This is the more remarkable as this mixture of grains was obtained from a single anther (Lawson s.n. K). The difference in the number of ribs is correlated with a difference in size, the contents of the grains with 12 ribs being about twice as large as that of the grains with 7 and 8 ribs. This suggests that part of the grains in this particular anther may have been diploid, and if this is right it is not impossible that part of the plants will prove to be tri- or tetraploid.

Let us now turn our attention to the species that have been left in *Thunbergia*, and try to find out whether the differences between the various groups, those that have been distinguished by earlier authors as well

as those that are proposed here, must be regarded as of less importance than the differences we have indicated between this genus as a whole and the genera *Pseudocalyx* and *Meyenia*. We will begin with an examination of the subdivisions proposed by earlier taxonomists.

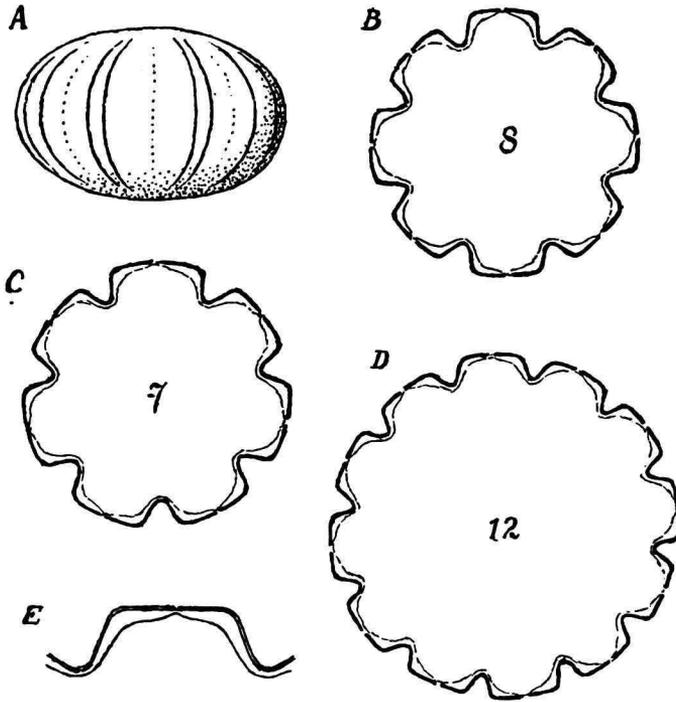


Fig. 1. Pollen grains of *Meyenia hawtayneana* Nees; A side view of one of the smaller grains; B, C and D equatorial sections through grains of different size; A, B, C and D same magnification; E section through one of the ridges, showing line of dehiscence, slightly more magnified.

In BENTHAM and HOOKER'S "Genera Plantarum" (2, 1072, 1876) the genus is in accordance with the views of ANDERSON divided into three groups for which the names *Euthunbergia*, *Meyenia* and *Hexacentris* are used. *Euthunbergia* as well as *Meyenia* comprise in their delimitation Asiatic as well as African species, and the difference between these two groups is sought in the structure of the calyx; that of *Euthunbergia* would be provided with several teeth, whereas that of *Meyenia* would be either truncate or sinuate. With regard to the species referred by them to the latter this is not correct; in fact, it applies to the type species only, not to the African species. *Hexacentris* is said to agree in this respect with *Meyenia*, but to differ from the latter as well as from *Euthunbergia* in the seeds, which are described as orbicular or ovate and dorsally compressed with a nearly flat ventral side, whereas those of *Euthunbergia* and *Meyenia* would be globose or subovoid and excavated on the ventral side, but this can hardly be considered correct, for the cavity on the central side is

everywhere present, and in the shape too there is no general difference. This classification, therefore, is of no help to us.

LINDAU (in Bot. Jahrb. 17, Beibl. 41, 31—43, 1893) accepted *Meyenia* in its original delimitation as a distinct genus, and distinguished among the other species four groups, viz. *Thunbergiopsis*, *Pseudohexacentris*, *Euthunbergia* and *Hexacentris*. In the first two groups the stigma is said to be crateriform, and in the latter two 2-lobed, and the first and third group are said to differ from the second and the fourth in the position of the flowers; in *Thunbergiopsis* and *Euthunbergia* the latter would be axillary, in *Pseudohexacentris* and *Hexacentris* arranged in axillary or terminal racemes. The structure of the stigma is in dried material not always easily recognizable, and LINDAU did not always succeed in his attempts; in fact, in 5 of the 19 species referred by him to *Thunbergiopsis* the stigma is quite distinctly 2-lobed, and these species should accordingly have been referred to other groups. Moreover, there are in reality everywhere two stigma lobes, though they differ in relative size. In the 14 other species referred to *Thunbergiopsis* the stigma lobes are at the base united in a rather wide funnel, and the free part of the lower lobe, although nearly as wide as the free part of the upper one, is much shorter than the latter, and as it is in the normal position folded inwards and completely surrounded by the upper lobe, it is easily overlooked. At the place where the two lobes fuse, a bundle of rather stiff hairs is inserted, and these two bundles are an easily recognizable and very characteristic feature of this group, though it seems to have escaped LINDAU's attention. In the only species of *Pseudohexacentris*, *Th. vogeliana* Bth., the two stigma lobes are easily recognizable, and of the same type as those found in several of the species which LINDAU referred to *Euthunbergia*. The flowers, moreover, are not arranged in axillary racemes, but stand for the greater part in the axils of gradually reduced leaves on axillary short-shoots and occasionally in the axils of ordinary leaves on the main shoots. Since then a number of species with true axillary racemes have been described, viz. *Th. adjumaensis* de Wild., *Th. Batiscombei* Turrill, *Th. cuanzensis* S. Moore and *Th. togoensis* Lindau, but these species are no near allies of *Th. vogeliana*, but belong to the group of species provided with whiskered stigma to which reference has already been made. *Th. vogeliana* itself is a near ally of *Th. erecta* (Bth.) Bth. and *Th. affinis* S. Moore, which LINDAU referred to *Euthunbergia*. There is therefore no reason to retain LINDAU's group *Pseudohexacentris*; in fact, it was already suppressed by BURKILL in his revision of the tropical African species in the "Flora of Tropical Africa" (5, 10, 1899). As stated above, the two subdivisions with two-lobed stigma, *Euthunbergia* and *Hexacentris*, were separated from each other in a similar way; species with axillary flowers were referred to *Euthunbergia*, those with the flowers in terminal racemes to *Hexacentris*. This principle, which was apparently derived from NEES, led to a rather paradoxical situation. LINDAU and NEES had apparently never seen correctly identified

specimens of *Th. grandiflora* (Roxb. ex Rottl.) Roxb., and so it could happen that they mistook shoots of *Th. cordifolia* Nees, which apart from the axillary flowers is a very similar plant, for this species, and that they accordingly excluded the latter from *Hexacentris*. A specimen of the true *Th. grandiflora* collected in Réunion (Bourbon) was not recognized by LINDAU but referred to a new species which he described under the name *Th. borbonica*; because of the terminal racemes this new species was correctly referred to *Hexacentris*. The very close affinity between *Th. cordifolia* and such species as *Th. grandiflora* and *Th. laurifolia* Lindl. was entirely overlooked by NEES and LINDAU. The resemblance nevertheless is so striking that *Th. cordifolia* as well as *Th. laurifolia* have been regarded by some authors (CLARKE, BENOIST) as mere varieties of *Th. grandiflora* (the var. *axillaris* C. B. Clarke of *Th. grandiflora* is identical with *Th. cordifolia*).

The remarks made in the preceding paragraph lead to the conclusion that of the four groups distinguished by LINDAU *Thunbergiopsis* is a mixture of but distantly related species, that *Pseudohexacentris* is based on faulty observation and has therefore no right of existence whatever, and that *Euthunbergia* as well as *Hexacentris* are wrongly defined. LINDAU'S subdivision too is, therefore, unsatisfactory. This means that we will have to see whether a more suitable one can be devised.

Th. capensis Retz. was by all authors included in *Eu-thunbergia*, and from a nomenclatural point of view this is, of course, correct, as it is the species on which the genus was founded. The specific epithet *capensis* has often been attributed to the younger LINNÉ, who used it in his "Supplementum Plantarum" (292, 1781). In his description the younger LINNÉ did not refer to RETZIUS' paper, which had appeared a year before in Phys. Saellsk. Handlingar (1, 163, 1780) and which contains a latin description accompanied by a good plate. THUNBERG, however, who in his "Nova Genera" (1, 22, 1781) also published a description of the plant, duly mentioned RETZIUS' original contribution. RETZIUS therefore was doubtless the first to describe the plant and it was he who proposed for the genus the name *Thunbergia*, because, as he remarks, it had appeared that the name *Thunbergia florida* proposed in 1773 by MONTIN for a plant belonging to the *Rubiaceae*¹⁾ could not be maintained. According to our present notions of nomenclature the use of the name *Thunbergia* for RETZIUS' new genus is illegitimate, but the necessity of rejecting it has been eluded by placing it on the list of "nomina generica conservanda".

Th. capensis is a perennial herb with several rather short decumbent stems springing from a thick, woody caudex. The leaves are subsessile and

¹⁾ This is an error; in MONTIN'S description of the genus *Thunbergia* no specific name is mentioned. The younger LINNÉ used in the synonymy of *Gardenia Thunbergia* the name *Thunbergia capensis* Mont., but with what right is unknown. It is rather unfortunate that MONTIN'S species was referred to *Gardenia*, for it has since been found that it is generically distinct.

palmately nerved, and the flowers are axillary. The corolla throat is campanulate, the stamens are didynamous, and the stigma lobes (Fig. 3A) are both well developed and clearly visible. The capsule shows the usual structure, and the seeds are hemispherical with a large hilum and a scaly dorsal side. All these characters return in a large number of African species, but *Th. capensis* possesses also some peculiarities that are but rarely met with. A study of the anthers (Fig. 2F) reveals that the connective is drawn out into a fairly long point, and that the thecae are entirely glabrous and provided at the base with a rather short and therefore easily overlooked mucro but without a distinct spur or a crested appendage. Such entirely glabrous anthers without basal spurs or crested appendages are in the African species very rare, but return in a group of Asiatic species, viz. in *Th. fragrans* Roxb. and its allies; the latter, however, differ conspicuously from the African species in the structure of the pollen grains, those of the Asiatic species being covered by large, bluntly conical protuberances, whereas those of the African ones are smooth. African species resembling *Th. capensis* in the structure of the anthers are *Th. schimbensis* S. Moore, *Th. sessilis* Lindau, *Th. cynium* S. Moore and *Th. oubanguiensis* R. Ben. All these species are rather similar in habit. They are several-stemmed perennial herbs with subsessile, palmately nerved leaves and well-developed, easily visible stigma lobes, the upper one folded and erect, the lower one flat and spreading. The rather weak, decumbent stems of *Th. capensis*, however, are in the other species replaced by more robust, erect or suberect ones. For this group of African species which I regard as a subgenus, I reserve the name *Eu-thunbergia* (subgen. *Thunbergia* for those who wish to follow the rule laid down in the present "International Code of Botanical Nomenclature").

The distinctly didynamous stamens and the easily recognizable stigma lobes of our subgenus *Eu-thunbergia* return, as stated above, in a large number of species, but except in the Asiatic *Th. fragrans* and its allies (Fig. 2 G) always in combination with a different kind of anthers. First of all there is a large group of African species in which at least one of the thecae is provided at the base with a strong, slightly curved awn (Fig. 2 C). Their best-known representative is *Th. alata* Boj. ex Sims, an often cultivated climber that in various parts of the world has settled. They are all perennial herbs with usually distinctly petiolate, palmately nerved leaves and seeds that show a more or less distinct reticulation on the dorsal side. Their habit varies; part of them are climbing or prostrate plants and others are erect or suberect ones. This subgenus, for which I propose the name *Parahezacentris* is confined to Africa and the islands in the western part of the Indian Ocean.

Awned thecae, easily discernable stigma lobes (Fig. 3 C) and palmately nerved leaves are also present in a number of species occurring in India, Indo-China and the Malay Peninsula, but in these plants the stamens are not as in *Parahezacentris* didynamous but homodynamous (Fig. 2 D), and

the plants themselves are of a different habit; it are large, woody climbers with large leaves and large, often blue or red flowers, usually arranged in drooping racemes. In some species, however, the first-formed flowers are subtended by leaves of normal size, and in some other ones (*Th. cordifolia*

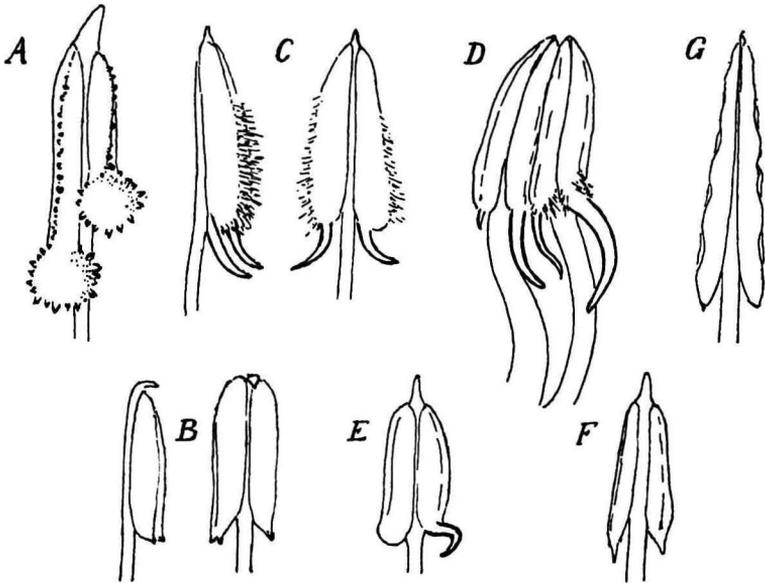


Fig. 2. Anthers of various *Thunbergia* species; *A* *Thunbergia vogeliana* Bth. (subgen. *Coniostephanus*), *B* *Th. Kirkii* Hook.f. (Subg. *Thamnidium*), *C* *Th. alata* Boj. ex Sims (subgen. *Parahexacentris*), *D* *Th. coccinea* Wall. (subgen. *Hexacentris*), *E* *Th. natalensis* Hook. (subgen. *Hypenophora*), *F* *Th. capensis* Retz. (subgen. *Eu-thunbergia*), *G* *Th. stenochlamys* Brem. (subgen. *Adelphia*).

Nees, *Th. Lacei* Gamble, *Th. papilionacea* W. W. Smith) this applies to all flowers. The calyx is, as a rule, very short and truncate, but in *Th. Hossei* C. B. Clarke it is drawn out in two rather long lobes, which CLARKE mistook for a second pair of bracteoles; that the presence of a second pair of bracteoles would be a noteworthy anomaly, apparently escaped his attention. That the vascular strands in the petiole are arranged in the form of a hollow cylinder, a character to which VAN TIEGHEM drew the attention, seems to me of little importance (v. supra). In my opinion the characters of this group of species show such a strong resemblance to those observed in my subgenus *Parahexacentris* that it would not be justified to give it generic rank. I regard it as a subgenus, and as I base the latter on *Th. coccinea* Wall., the type of NEES's genus *Hexacentris*, I will retain for it the name *Hexacentris*.

Awned thecae and palmately nerved leaves are also found in a third group, viz. *Th. natalensis* Hook. and its allies. The awns are here much shorter than in *Hexacentris* and *Parahexacentris*, usually confined to a single anther pair, and always distinctly recurved instead of pointing

downwards (Fig. 2 E). The species of this group differ from those belonging to *Parahexacentris* in the homodynamous anthers, and from the latter as well as from the species belonging to *Hexacentris* in the shape of the connective, which is drawn out in fairly a long point. Their most striking feature, however, is the shape of the stigma, the lobes being united into a rather wide funnel, and the free part of the upper lobe being much longer than that of the lower one, which in the bud, moreover, is entirely enveloped by the latter (Fig. 3 D₁); another very characteristic feature is the presence

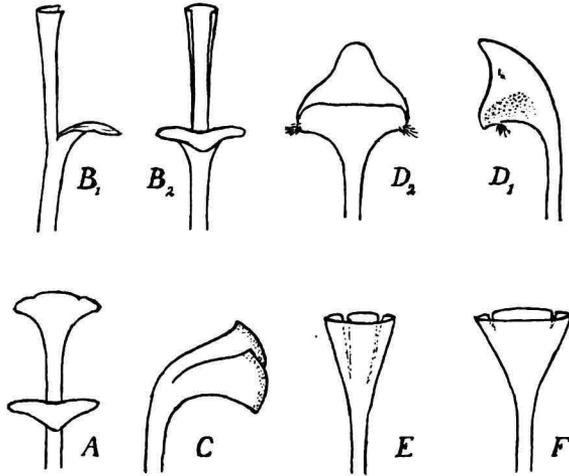


Fig. 3. Stigma forms in *Thunbergia*; A *Thunbergia capensis* Retz. (subgen. *Euthunbergia*), B *Th. alata* Boj. ex Sims (subgen. *Parahexacentris*), C *Th. grandiflora*, (Roxb. ex Rottl.) Roxb. (subgen. *Hexacentris*), D *Th. natalensis* Hook. (subgen. *Hypenophora*), E *Th. laevis* Nees (subgen. *Adelphia*), F *Th. javanica* Gaertn. (subgen. *Adelphia*). B₁, C and D₁ in side view; the other ones in front view.

of two bundles of spreading hairs, one on each side, springing from a point just below the place where the two lobes part; they prove to be confined to this group. The species of the latter that were known to LINDAU were referred by him to his subdivision *Thunbergiopsis*, but as this subdivision also contained species of totally different parentage, it must be considered a happy coincidence that this name has to be dropped; art. 31 of the present "Code of Botanical Nomenclature" forbids the use of the suffix *-opsis* for a subdivision of a genus in combination with the root of the latter's name; in the present instance it would mean "a *Thunbergia* resembling a *Thunbergia*". Because of the "whiskered" stigma I propose for this new subgenus the name *Hypenophora*. It is confined to Africa, but here it is represented by a large number of species and widely distributed. Some of them are herbaceous climbers, others erect herbs. Among the climbers a small number are noteworthy for the arrangement of the flowers in axillary racemes (*Th. adjumaensis* de Wild., *Th. Battiscombei* Turrill, *Th. cuanzensis* S. Moore, *Th. togoensis* Lindau); in all other species the flowers are axillary. Among the erect herbs some are provided with

large and thin, usually distinctly petiolate leaves (*Th. cordata* Lindau, *Th. bogoroensis* de Wild., *Th. natalensis* Hook., *Th. Swynnertonii* S. Moore), whereas the majority is provided with much smaller and narrower, leathery and always sessile or subsessile leaves.

The most aberrant group of species, it seems to me, is formed by *Th. vogeliana* Bth., *Th. erecta* (Bth.) T. And., *Th. affinis* S. Moore and their allies. It are either shrubs or woody climbers, but according to RADLKOFER (in *Abhandl. d. naturwiss. Vereins zu Bremen* 8, 369, 1883) and ROULET (in *Bull. Herb. Boiss.* 2, 315, 1894) their secondary wood lacks the embedded phloem strips that are such a characteristic feature of the secondary wood of the species belonging to the other groups. Their leaves, moreover, are not palmately, but pinnately nerved, and most important of all, the thecae (Fig. 2 A) possess at their base a curious rounded appendage with a ring of conical bristles along the margin ¹). The latter are unicellular structures and therefore entirely different from the multicellular awns that are found in the subgenera *Parahexacentris*, *Hexacentris* and *Hypenophora*. The pollen grains are in this group often rather thin-walled, so that the characteristic lines of dehiscence are not always easily discernible. This subgenus, for which I propose the name *Coniostephanus*, is best represented in tropical Africa, but it has also some representatives in Northern India, Burma and Southern China (*Th. lutea* T. And., *Th. maculata* Lace, *Th. salwenensis* W. W. Smith).

In the vicinity of *Coniostephanus* a place should be found for *Th. guerkeana* Lindau, *Th. gigantea* Lindau and *Th. longisepala* Rendle, three very similar plants from East Africa that are regarded by BURKILL (in *Fl. Trop. Afr.* 5) as specifically identical. It are herbaceous climbers, whose stems spring from a woody caudex and are provided with cordate, somewhat indistinctly palmately-nerved leaves. The corolla possesses a very long tube and a short throat, and the style is long-exserted with two rather small but easily distinguishable stigma lobes. As the anthers are provided with similar bristles as those found in the subgenus *Coniostephanus* it can not be doubted that these plants are nearly related to this group, but on account of the difference in habit and especially because of the aberrant structure of the corolla, it seems to me that they should be referred to a subgenus of their own, for which I propose the name *Macrosiphon*.

Th. Kirkii Hook. f. (syn. *Th. hookeriana* Lindau) and the either identical or very nearly related *Th. amanensis* Lindau occupy a rather isolated position. It are small shrubs with subsessile, palmately nerved leaves and flowers that are at least partly arranged in axillary triads or in somewhat more amply developed cymes. The anthers are not, like those of *Parahexacentris*, *Hexacentris* and *Hypenophora*, provided with multicellular awns,

¹) It is noteworthy that groups of similar bristles are found at the base of the anthers of the *Mendonciaceae*. This might perhaps be regarded as indicating a closer affinity with the *Thunbergiaceae* than the differences in the structure of the pollen grains and of the fruit would seem to allow.

and they are not equipped either with the rounded appendage beset with conical bristles that is found at the base of the thecae in all the anthers of *Coniostephanus* or in half of them in *Macrosiphon* nor do they possess the bands of conical bristles that border the fissures of the thecae in these two subgenera. The bristles, however, are not entirely absent, but they are very few in number, viz. 1–3, and confined to the base of the thecae (Fig. 2 B). The pollen grains show the usual meandering lines of dehiscence, but between these lines they are covered with very small spinules. For these species too I propose a new subgenus that I will call *Thamnidium*.

In Asia the genus is not only represented by the woody climbers belonging to the subgenera *Coniostephanus* and *Hexacentris* but also by a comparatively large number of herbaceous ones that up to now have been included almost without exception in *Th. fragrans* Roxb. The white, ivory-coloured or, rarely, light violet flowers are provided with a narrow, in the middle slightly widened throat, didynamous stamens with glabrous anthers without spurs or other appendages (Fig. 2 G), pollen grains with large conical protuberances, and suberect stigma lobes of equal length, of which the lower and wider one has incurved margins and the upper and narrower one fills the gap between the latter; together they form a funnel-like structure (Fig. 3 E and F). Protuberances on the surfaces of the pollen grains are also met with in some of the African species, e.g. in *Th. Kirkkii* Hook. f. and in *Th. chrysops* Hook. (*Th. geraniifolia* Bth.), but in these species they are much smaller and far more numerous. In *Th. chrysops* the dehiscence, moreover, does not take place along the usual meandering lines, but more or less irregularly between the hexagonal and pentagonal disks on which the spinules are inserted. Because of the very close affinity between the species that are brought together in the *fragrans* group I will designate the latter as the subgenus *Adelphia*.

A comparison of the differences between these subgenera and those existing between *Thunbergia* sensu Lindau and the genera *Meyenia* and *Pseudocalyx* leads in my opinion to the conclusion that the genus *Thunbergia* should be maintained in the delimitation it received from LINDAU. The most aberrant groups seem to be *Coniostephanus* and *Macrosiphon*, but even these groups deviate less far from the other subgenera than they do from *Meyenia* and *Pseudocalyx*. *Hexacentris*, the only group for which in the past generic rank has been claimed, is certainly not the most markedly deviating one; in fact, it seems a rather near ally of *Parahexacentris*.

In order to give the above remarks a more precise form, it seems indicated to define the various subgenera by means of Latin diagnoses and to give a survey of the species that are to be referred to them. This survey is not complete; in fact, I have confined myself to those species of which I have seen specimens and to those of which the description proved to be sufficiently detailed to allow a determination of their position. It does not express an opinion on the value of the species either; it is quite possible that the lists contain names that should be reduced to synonyms.

Subgenus 1. **Coniostephanus** Brem. Frutices erecti vel volubiles, ligno normali instructi. Folia penninervia. Flores in axillis foliorum solitarii. Calyx dentibus 10—12 inaequalibus vel subaequalibus instructus. Corolla fauce campanulato. Stamina didynamia, thecis basi appendiculo rotundato instructis, appendiculo et fissura setulis conicis marginatis (Fig. 2 A). Granula pollinis laevia, plerumque pariete tenui instructa. Stigmatis lobi inaequales vel subaequales, conduplicati, superior erectus, inferior patens. Semina facie dorsali laevia.

Habitat Africam et partem septentrionalem Asiae Tropicalis.

Species typica: *Th. erecta* (Bth.) T. And.

Conspectus specierum: a. Frutices erecti africani: *adenocalyx* Radlk., *affinis* S. Moore, *crispa* Burkill, *erecta* (Bth.) T. And., *ikbadiana* de Wild., *malangana* Lindau, *recasa* S. Moore; b. Frutices volubiles africani: *Homblesi* de Wild., *liebrechtsiana* de Wild. et Th. Dur., *Pynaertii* de Wild. *rufescens* Lindau, *Thonneri* de Wild., *vogeliana* Bth.; c. Frutices volubiles asiatici: *lutea* T. And., *maculata* Lace, *salweenensis* W. W. Smith.

Subgenus 2. **Macrosiphon** Brem. Herbae perennes, caulibus volubilibus e caudice lignoso orientibus. Folia petiolata, subpalmatinervia. Flores in axillis foliorum solitarii. Calyx in dentes plures longissimos productus. Corolla alba, tubo longissimo et fauce brevi, vix ampliato instructa. Stamina subdidynamia, thecis staminum interiorum basi in appendiculum setulis conicis marginatum productis et ad fissuram eodem modo ciliolatis. Granula pollinis irregulariter carunculata. Stylus longius exsertus; stigmatis lobi inaequales. Semina nondum nota.

Habitat Africam Tropicalem Orientalem.

Species typica: *Th. guerkeana* Lindau.

Conspectus specierum: *gigantea* Lindau, *guerkeana* Lindau, *longisepala* Rendle.

Subgenus 3. **Thamnidium** Brem. Frutices erecti parvi. Folia breviter petiolata, palmatinervia. Flores in axillis foliorum inserti, pro parte solitarii, pro parte in cymas breviter pedunculatas dispositi. Calyx in dentes plures productus. Corolla fauce campanulato. Stamina didynamia, thecis staminum interiorum basi setulis conicis 1—3 instructis (Fig. 2 B). Granula pollinis carunculis multis, maxime 2μ altis sparsa. Stigmatis lobi inaequales distincti. Semina nondum nota.

Habitat Africam Tropicalem Orientalem.

Species typica: *Th. Kirkii* Hook. f. (syn. *Th. hookeriana* Lindau). *Th. amanensis* Lindau clare est species cum typo identica vel ei valde affinis.

Subgenus 4. **Parahexacentris** Brem. Herbae perennes, caulibus volubilibus, prostratis, suberectis vel erectis e caudice lignoso orientibus. Folia petiolata vel sessilia, semper palmatinervia. Flores axillares. Calyx in dentes plures productus, rarius truncatus. Corolla fauce campanulato. Stamina didynamia, thecis omnibus vel minime aliquibus basi in calcar

leviter curvatum productis, ad fissuram minime basin versus longe ciliatis (Fig. 2 C). Granula pollinis plerumque laevia, rarius spinulis parvis sparsa, casu quo irregulariter dehiscentia. Stigmati lobis inaequales, superior erectus, inferior patens (Fig. 3 B). Semina facie dorsali laevia vel reticulata.

Habitat Africam Tropicalem et Subtropicalem et insulas ad Occasum.

Species typica: *Th. alata* Boj. ex Sims.

Conspectus specierum: a. Herbae volubiles vel prostratae: *alata* Boj. ex Sims, *amoena* C. B. Clarke, *armipotens* S. Moore, *aurea* N. E. Br., *aureosetosa* Mildbr., *bikimaensis* de Wild., *brewerioides* Schwfth. ex Lindau, *chrysops* Hook., *cynanchifolia* Bth., *Delamani* S. Moore, *dregeana* Nees, *Elliottii* S. Moore, *Erythrae* Schwfth, *fasciculata* Lindau, *furcata* T. And. ex Lindau, *geraniiifolia* Bth., *Gibsoni* S. Moore, *Gossweileri* S. Moore, *gracilis* R. Ben., *Gregorii* S. Moore, *hamata* Lindau, *Hanningtonii* Burkill, *leucorrhiza* R. Br., *manganjensis* T. And. ex Lindau, *Mauginii* Fiori, *Monroi* S. Moore, *oculata* S. Moore, *paulitschiana* Beck, *pondoensis* Lindau, *prostrata* Turrill, *purpurata* Harv. ex C. B. Clarke, *Roberti* Mildbr., *subalata* Lindau, *vincoides* R. Ben., *Woodii* Gandoger; b. Herbae erectae vel suberectae: *abyssinica* Turrill, *alba* S. Moore, *annua* Hochst. ex Nees; *aspera* Nees, *atriplicifolia* E. Mey., *Bachmanni* Lindau, *cardiobracteolata* C. B. Clarke, *Fischeri* Engl., *flavo-hirta* Lindau, *Galpini* Lindau, *hirsuta* T. And., *hirta* Sond., *hirtistyla* C. B. Clarke, *huillensis* S. Moore, *kirkiana* T. And., *neglecta* Sond., *petersiana* Lindau, *primulina* Hemsl., *proxima* de Wild., *Randii* S. Moore, *sericea* Burkill, *stenophylla* C. B. Clarke, *subfulva* S. Moore, *venosa* C. B. Clarke, *xanthotricha* Lindau. Ad subgenus hoc probabiliter referendae sunt species madagascarienses *angulata* Boj., *convolvulifolia* Boj., *cyanea* Boj.

Subgenus 5. **Hexacentris** Bth. et Hook. f. emend. Brem. Frutices volubiles. Folia petiolata, palmatinervia. Flores nunc axillares et casu quo plerumque duo vel plures superpositi nunc in racemos terminales dispositi. Calyx truncatus vel sinuatus, rarius in dentes paucos productus. Corolla fauce late campanulato. Stamina homodynamia, thecis plerumque sex, rarius omnibus in calcar longum, leviter curvatum productis (Fig. 2 D). Granula pollinis laevia. Stigmati lobis subaequales, superior ab inferiore partim amplectus (Fig. 3 C). Semina facie dorsali carunculata.

Habitat Indiam et Ceylaniam, Indo-Chinam, Peninsulam Malayanam.

Species typica: *Th. coccinea* Wall.

Conspectus specierum: *adenophora* W. W. Smith, *bicolor* (Wight) Lindau (syn. *wightiana* T. And.), *chinensis* Merrill, *coccinea* Wall. (syn. *Hexacentris acuminata* Nees, *H. dentata* Nees,) *cordifolia* Nees (syn. *grandiflora* var. *axillaris* C. B. Clarke, *Talbotiae* S. Moore), *Eberhardti* R. Ben., *Geoffrayi* R. Ben., *grandiflora* (Roxb. ex Rottl.) Roxb. (syn. *borbonica* Lindau), *Hossei* C. B. Clarke, *Lacei* Gamble, *laurifolia* Lindl. (syn. *Harrisii* Hook., *grandiflora* var. *laurifolia* R. Ben.), *mysorensis* (Wight) T. And., *papilionacea* W. W. Smith, *pendula* Hassk., *smilacifolia* Kurz.

Subgenus 6. **Hypenophora** Brem. (*Thunbergiopsis* Lindau p.p.). Herbae perennes, caulibus volubilibus vel suberectis e caudice lignoso orientibus. Folia petiolata vel sessilia, semper palmatinervia. Flores axillares vel rarius in racemos axillares dispositi. Calyx in dentes plures productus. Corolla fauce campanulato. Stamina homodynamia, antheris apiculatis, thecis aliquibus in calcar brevius, fortiter incurvatum productis, ad fissuram glabris vel ciliatis (Fig. 2 E). Granula pollinis laevia. Stigmatis lobi inaequales; inferior brevis et in alabastro a superiore totus amplexus; basi in infundibulum amplum connati et ubi discurrunt utroque latere fasciculo pilorum patentium barbellati (Fig. 3 D). Semina facie dorsali squamata.

Habitat Africam Tropicalem et Subtropicalem.

Species typica: *Th. natalensis* Hook.

Conspectus specierum: a. Herbae volubiles flores in racemos axillares prodentes: *adjumaensis* de Wild., *Batiscombei* Turrill, *cuanzensis* S. Moore, *togoensis* Lindau; b. Herbae volubiles flores axillares prodentes: *beniensis* de Wild., *beniensoides* de Wild., *masisiensis* de Wild., *Mechowii* Lindau, *microchlamys* S. Moore, *usambarica* Lindau; c. Herbae erectae foliis membranaceis latioribus instructae: *bogoroensis* de Wild., *Claessensi* de Wild., *cordata* Lindau, *mellinocaulis* Burkill, *mollis* Lindau, *natalensis* Hook., *Stuhlmannii* Lindau, *Swynnertonii* S. Moore, *Torrei* R. Ben.; d. Herbae erectae foliis sessilibus, coriaceis, plerumque angustioribus instructae: *angolensis* S. Moore, *Bonnefouxii* Lindau, *cerinthoides* Radlk., *collina* S. Moore, *Dekindtii* de Wild., *Elskensi* de Wild., *gentianoides* Radlk., *glaucina* S. Moore, *graminifolia* de Wild., *Hockei* de Wild., *hyalina* S. Moore, *Kassneri* S. Moore, *katentaniensis* de Wild., *laborans* Burkill, *lamellata* Hiern, *lancifolia* T. And., *lathyroides* Burkill, *longifolia* Lindau, *oblongifolia* Oliv., *parvifolia* Lindau, *retefolia* S. Moore, *Rogersii* Turrill, *Schweinfurthii* S. Moore, *squamuligera* Lindau, *stellarioides* Burkill, *trinervis* S. Moore, *valida* S. Moore, *vossiana* de Wild.

Subgenus 7. **Eu-thunbergia** Bth. et Hook. f. emend. Brem. (subgenus *Thunbergia* sensu praeceptorum internationalium ad nomenclaturam botanicam ordinandum institutorum et hoc tempore vigentium). Herbae perennes, caulibus decumbentibus vel suberectis e caudice lignoso orientibus. Folia sessilia vel subsessilia, palmatinervia. Flores in axillis foliorum solitarii. Calyx in dentes 12 productus. Corolla fauce campanulato. Stamina didynamia, antheris mucronatis, thecis glabris, basi mucronulatis (Fig. 2 F). Granula pollinis laevia. Stigmatis lobi inaequales, superior erectus, inferior patens (Fig. 3 A). Semina facie dorsali squamulosa.

Habitat Africam Australem et Tropicalem.

Species typica: *Th. capensis* Retz.

Conspectus specierum: *capensis* Retz., *cycnium* S. Moore, *schimbensis* S. Moore, *sessilis* Lindau, *oubanguiensis* R. Ben.

Subgenus 8. **Adelphia** Brem. Herbae perennes, caulibus volubilibus e caudice lignoso orientibus. Folia petiolata, palmatinervia. Flores in axillis foliorum solitarii vel rarius duo superpositi. Calyx in dentes 5—23 productus. Corolla fauce angustiore ad medium paulo dilatato. Stamina didynamia thecis glabris et inappendiculatis (Fig. 2 G). Granula pollinis protuberantiis haud numerosis, minime 4 μ altis sparsa. Stigmatis lobi aequilongi, superior inferiore angustior, alter cum altero infundibulum formans (Fig. 3 E et F). Semina facie dorsali squamulifera.

Habitat Asiam et Australiam tropicales.

Species typica: *Th. fragrans* Roxb.

Conspectus specierum: *fragrans* Roxb., *laevis* Nees, *nivea* Craib, *similis* Craib, *tomentosa* Wall., *wallichiana* Gandoger, species plurimae in Peninsula Malayana, Archipelago Malesiano, Nova Guinea endemicae et in libello hoc delineatae.

In order to facilitate the identification of the various subgenera I have constructed the following key, in which use has been made of their most conspicuous peculiarities.

Key to the Subgenera of *Thunbergia* Retz. sensu Lindau

1. Anther cells either of all four stamens or at least of the two inner ones provided at the base with an appendage bordered by conical bristles
 2. Erect or climbing shrubs with pinnately nerved leaves. Corolla with short tube and long campanulate throat. Style included. — African and Asiatic species 1. *Coniostephanus*
 - 2: Climbing herbs with cordate, subpalmately nerved leaves. Corolla with a long tube and a short, hardly widened throat. Style distinctly exserted. — East African species 2. *Macrosiphon*
- 1: Anther cells never provided with appendages bordered by conical bristles. Leaves always pinnately nerved
 3. Small shrub with at least part of the flowers in axillary cymes — One or two East African species 3. *Thamnidium*
 - 3: Herbs or large climbing shrubs. Flowers never in axillary cymes
 4. Anthers of all the stamens or of two of them provided with one or two basal awns
 5. Awns long and but slightly curved, pointing downward. Stigma lobes free to the base and easily recognizable; no hair bundles at the point where the lobes separate
 6. Climbing, prostrate, suberect or erect herbs. Stamens didynamous. Convex side of the seed smooth or reticulate. — African species 4. *Parahexacentris*
 - 6: Woody climbers. Stamens homodynamous. Convex side of the seed carunculate. — Asiatic species 5. *Hexacentris*
 - 5: Awns short and strongly curved, patent. Stigma lobes united into a wide funnel, the free parts of very unequal length and

the shorter lower one in the bud almost entirely surrounded by the upper one and hidden from view; a bundle of spreading hairs on each side just below the point where the lobes separate.—African species 6. *Hypenophora*

4: Anthers without basal awns

7. Erect or decumbent herbs with sessile or subsessile leaves. Corolla throat campanulate. Pollen grains smooth. Stigma lobes distinctly unequal.—Tropical and South African species 7. *Eu-thunbergia*

7: Climbing or very rarely prostrate herbs with petiolate leaves. Corolla throat narrow, in the middle but slightly widened. Pollen grains with large, bluntly conical protuberances. Stigma lobes different in width but of the same length.—Asiatic and one or two Australian species 8. *Adelphia*.

Now that we have obtained some knowledge of the delimitation and the subdivision of the genus *Thunbergia*, it is time to turn our attention to the representatives of the genus occurring in the Malesian area. Originally only two of the subgenera were represented here, viz. *Hexacentris*, of which a single species is found wild in the Malay Peninsula, and *Adelphia*, which is represented by a considerable number of species that usually have been included in *Th. fragrans* Roxb.; my reasons for adopting another attitude will be expounded in the next chapter. Apart from these endemic species there are a number of species that have been introduced as garden plants; and some of the latter have run wild and are now more or less firmly established. They belong partly to subgenera that were originally not represented in this area, and partly to *Hexacentris* and *Adelphia*.

The subgenus *Hexacentris* is represented in cultivation by *Th. grandiflora* (Roxb. ex Rottl.) Roxb., which in abandoned gardens may maintain itself for a very long time, but which on account of its self-sterility does not spread, and also by *Th. coccinea* Wall. Whether *Th. pendula* Hassk. is conspecific with the latter, is difficult to make out, as it is known only from the Botanical Gardens, Bogor (Buitenzorg), where its inflorescences never develop flowers, the bracts remaining completely empty. The problem might be solved by transferring specimens to a higher station or else by a very careful comparison of the anatomical characters of its stem and leaves with those of other species with similar bracts, but as the plant is known in a single specimen only, it did not seem worth while to waste time on this problem.

The subgenus *Adelphia* is represented in cultivation by two species, viz. *Th. laevis* Nees and *Th. fragrans* Roxb. *Th. laevis* is in botanical gardens more often met with than *Th. fragrans*, and has more often escaped from cultivation, but neither of them seems to have moved far from the place where it was originally grown.

The entirely African subgenus *Parahexacentris* is represented by two species, *Th. alata* Boj. ex Sims and *Th. Gregorii* S. Moore. *Th. alata* is a very popular garden plant, of which several colour varieties are grown; it escapes easily from cultivation, and has become firmly established in many parts of the area. The large-flowered *Th. Gregorii*, whose young parts are covered with a ferrugineous indumentum, is less often grown, and has as yet not escaped from cultivation. It is usually called *Th. Gibsoni* S. Moore, but as there is, so far as I can see, no difference between the latter and *Th. Gregorii*, I have united them, and as the epithet *Gregorii* has priority of place, it had to be accepted.

Two other popular garden plants of African origin are *Th. erecta* (Bth.) T. And. and *Th. affinis* S. Moore, both belonging to the subgenus *Coniostephanus*. So far as I know, they have nowhere in our area escaped from cultivation. The related *Th. vogeliana* Bth. is known only from the Singapore Botanical Garden. Here too the type species of the subgenus *Thamnidium*, *Th. Kirkii* Hook. f., is grown, whereas the subgenus *Hypenophora* is represented in the Botanical Garden at Bogor and in the Mountain Garden of Tjibodas, Java, by *Th. natalensis* Hook.

B. THE MALESIAN SPECIES OF THE SUBGENUS *ADELPHIA*

In the special part of this work a large number of species pertaining to the subgenus *Adelphia* are described, whereas up to now botanists have as a rule been satisfied by recognizing but a single one, viz. *Th. fragrans* Roxb. Here, as in the case of *Pavetta indica* L, with which I have dealt in my monograph of the genus *Pavetta* (Fedde's Repert. 37, 80—125, 1934), the reason why such an extremely polymorphous mixture was for a long time accepted as a single species, is that but few botanists had seen the type, and that all along material of very different origin had been identified with it by comparison with the not sufficiently detailed description. The circumstance that this wrongly identified material was distributed to herbaria all over the world, helped, of course, to perpetuate the confusion. It is true that some authors recognized the very variable character of the material, and realized that the present way of dealing with the latter was unsatisfactory, but as it proved impossible to arrive within a short time to an adequate splitting, they dropped the matter. A serious monographer, however, can not acquiesce in such a situation, and will have to sacrifice enough of his time to arrive at a satisfactory classification. A detailed study revealed that the variability is in *Thunbergia*, just as in *Pavetta*, discontinuous, and that the various forms are not indiscriminately mixed but that at least most of them are confined to comparatively small areas, in which, however, they may occur in great abundance. Moreover, between the *Thunbergia* species of the subgenus *Adelphia* nowhere intermediate forms could be detected. In this respect too there proved to be parallelism with what I had found in *Pavetta*, section *Pavettaster* (*P. indica* and its

allies). This, of course, could not have been predicted. It would even have been more plausible to expect a certain amount of crossing wherever two or more of these nearly related species would have come together, and it is at the moment impossible to say why this did not happen. It may be that the differences between them are after all of a more fundamental nature than the not very striking structural diversity would suggest, but this is not necessary, for incompatibility is not always bound to important differences in genetic constitution; it may be due to structural peculiarities hindering pollination or fertilisation (floral di- or polymorphism) or to differences in physiological behaviour tending in the same direction (differences in flowering time, a different growth rate of the pollen tubes), or as in many cases of self-sterility, to some unknown cause. However, this is a problem that can not be solved by a study of herbarium material.

Some authors have objected against my recognition of a considerable number of species among the plants that my predecessors referred to *Pavetta indica* L, and generally against the description of a large number of new species in that genus and in the genus *Ixora*, and I have little doubt that they will protest also against my splitting of *Thunbergia fragrans*, but it seems to me that the cause of this opposition is mainly to be sought in a sentimental aversion of what to these critics are revolutionary changes. They close their eyes for the fact that the old specific concepts very often fail to answer our present needs, and they simply find it disagreeable that they are burdened with a large supply of dates for which they did not ask. Some of them even do not find it necessary to produce any arguments, so e.g. E. P. PHILLIPS, who in his "The Genera of South African Flowering Plants, 2nd ed., Pretoria 1951" simply states (l.c. 735) "There appears little doubt that Professor C. E. B. Bremekamp has described too many species from South Africa." Comments of this kind, not supported by a single argument, are to nobody of any value. It is to be regretted that such an equivocal remark should have found a place in a work that on the whole maintains a high standard.

More explicit than Dr PHILLIPS was E. J. H. CORNER in an article on *Ixora* published in *Gardener's Bulletin* 11, 1941. In order to give the reader an opportunity to form himself an opinion on the value of this criticism, it will be necessary to enter into some detail. I will begin by quoting part of it in full. At the base of page 178 he says "I have not attempted to dissect Bremekamp's latest paper on the Malaysian species (*Bull. Jard. Buit. ser. 3, vol. 14, 1937*). I doubt if anyone will be prepared to struggle through so much detail before the name of a species can be found. The classificatory value of the details I consider so dubious and trivial that I would regard most of Bremekamp's species as forms of subspecies and his series as species, did our study of these forest plants usefully extend to such fractionising. If so many "species" can be recognized in the herbarium, what is to become of the genus when we shall have reckoned also with all the characters that disappear from the living plant on drying? If the

length of the rudimentary sepals is so important or the excursion of a few epidermal cells on the style into macroscopic vision, then so are the sliminess of the root-cap, the rate of mitosis, the latent period of tropism, the glitter or convexity of the epidermal cells and the exact tint of the young leaf. I disagree so profoundly with unargued "splitting" that I leave it to others to consult this new language."

The first sentence shows that Dr CORNER has wilfully neglected one of the foremost duties of the serious student, viz. to take the work of his predecessors in careful consideration; a monograph should certainly not be discarded in such an off-hand fashion. Already at an earlier occasion (Fedde's Repert. 47, 9 footnote, 1939) I had to rebuke him for an offence of this kind; it was apparently in vain. When he proceeds "I doubt if anyone will be prepared to struggle through so much detail before the name of a species can be found" I may draw his attention to a paper by MERRILL and PERRY in Journ. Arn. Arbor. 26, 1945, in which the authors state (p. 256) that by the aid of my work they "have placed their unnamed collections with considerable ease". That he considers the classificatory value of the characters used by me "dubious and trivial" is apparently due to the fact that my work, as he himself somewhat inadvertently admitted, was not sufficiently studied by him, and the conditional clause at the end of this sentence "did our study of these forest plants usefully extend to such fractioning" is rather perplexing, for this is evidently no condition at all for judging the rank of a systematic group. The idea expressed in the clause, moreover, is foolish, for it can certainly not be doubted that it would on the contrary be very useful to know the constituents of the forest, as indeed of every other community, as accurately as possible. Dr CORNER likes to pose as a "field botanist", with which term he apparently means a phytocoenologist, but he does not seem to know that the species of the Linnean period are of very little avail in this branch of botany, as the various constituents of that kind of "species" may have very different ecological requirements. "If so many 'species' can be recognized in the herbarium, what is to become of the genus when we shall have reckoned also with all the characters that disappear from the living plants on drying?" This rhetorical question brings the problem down from the scientific to the sentimental plane. If there really are a large number of species, they simply have to be named and described whether one finds this agreeable or not. Moreover, the author's presumably not fully sincere alarm is unfounded. Species should never be based on a single character, and if the critic had taken the trouble to study my work, he would have seen that I have never done such a thing. If this precept is followed, the circumstance that a character becomes indistinguishable, will but seldom obscure a specific difference. That this could escape the critic's attention, reveals a regrettable lack of taxonomic experience. His statement "If the length of the rudimentary sepals (thsee 'rudimentary' sepals may reach a length of 1.8 cm!) is so important or the excursion of

a few epidermal cells on the style into macroscopic view (with this jargon he apparently wants to suggest that the style is always hairy, but that the hairs are not always visible to the naked eye, which is entirely misleading for where I described the style as smooth, hairs are really absent), then so are the sliminess of the root-cap, the rate of mitosis, the latent period of tropism (the author apparently knows very little of tropisms, for otherwise he would never have spoken of 'the' latent period, and he would not have used the term 'tropism' in the singular), the glitter or convexity of the epidermal cells and the exact tint of the young leaf" shows that he does not know in what way the taxonomic value of a character is determined; like some mis-guided botanists of the past he seems to think that these characters can be chosen on a-priori grounds, and he is apparently unaware of the fact that taxonomically important characters are not necessarily easily observable. To the serious student of my work on *Ixora* there can not be the slightest doubt that the length of the calyx lobes and the presence or absence of hairs on the style are important characters. With regard to the hairs on the style I might add that they develop in a space that is entirely shut off from the outside world, i.e. under almost constant conditions, which means that there is very little reason to assume that they will show an appreciable degree of fluctuating variability, which indeed they do not. With regard to the features whose taxonomic value for some unspecified and wholly incomprehensible reason is put by Dr CORNER on one line with those that were used by me, I can only say that neither Dr CORNER nor I have tested their value, and that it is by no means excluded that some of them might prove to be of taxonomic importance. When the author winds up by saying that he disagrees with "unargued" splitting, I can only express my adhesion, under the proviso, however, that I also disagree with "unargued" lumping, and when he leaves it to others to consult this new language" he probably took a wise decision, for so far he has not impressed his readers with the clearness of his perception.

In the paragraph which precedes the one discussed above Dr CORNER remarks i.a. that "the more one studies the wild plants the more one will encounter intermediates between the microspecies of the splitters," but no dates are given in support of this opinion, which is flatly contradicted by my own experience and by that of many other botanists. In the sentence which immediately follows, I can find nothing of this kind. It reads "For example, a good case might be put forward for uniting *I. chinensis*, *I. javanica*, *I. congesta* (*I. Griffithii* is meant), *I. Lobbii* and *I. Robinsonii* because there are a few plants which cannot be classified as one or the other, but can be referred equally well to two of the species". When there are plants that indeed can not be classified as one or the other, this obviously means that they belong either to a hybrid or to a different species; that it should be possible to refer such plants to two of the species is clearly nonsensical. At any rate, to the student of my papers on the Asiatic *Ixora*

species it will be clear that the species to which Dr CORNER refers ¹⁾ are quite distinct, and that *I. chinensis* is even but distantly related to the other ones. A re-examination of the material from the Malay Peninsula is urgently needed, for Dr CORNER's paper contains grave errors, e.g. in the delimitation of *I. javanica* and of *I. grandifolia*. Serious mistakes are also present in his plea for the restoration of *I. congesta* and in his remarks on *I. fulgens*. However, a discussion of these points falls outside the scope of this paper.

When Dr CORNER states that "to the field botanist in Malaya, *Ixora* is clearly in a 'state of evolution' comparable with that of *Rubus*, *Rosa*, or *Oenothera*" he probably means that *Ixora* shows a wide range of forms, and that it resembles in this respect the genera *Rubus*, *Rosa* and *Oenothera*. That this would indicate a "state of evolution" is obviously an unfounded assumption, for no one can say whether this state of things is of comparatively recent origin or whether it has existed for a geologically long time. It is certainly not the task of the "field botanist" to study the whole range of variability exhibited by such a group; he will have to confine his attention to the forms found in an area of comparatively limited extent, and here he will either have to accept the classification offered to him by the taxonomist or he will have to study them himself, but in that case he will have to apply the methods of the taxonomist, which eventually may include the study of large-scale cultures. Whether the variability in the genus *Ixora* is of the same kind as that found either in *Rubus*, in *Rosa* or in *Oenothera* is at the moment impossible to say, but in view of the fact that so far no spontaneous hybrids have been observed, this does not seem likely ²⁾. To answer this question hybridisation experiments and large-scale cultures would certainly be required.

The remarks made above on Dr CORNER's paper will suffice to show that his "criticism" is a mixture of unjustified assumptions and mere flippancy, and that it does not contain a single serious argument.

A subdivision of the subgenus *Adelphia*, and accordingly the construction of a key to the species, proved to offer considerable difficulties. In view of the comparatively uniform structure of flower and fruit on the one hand and of the considerable fluctuating variability of the vegetative parts on the other, this was to be expected. However, in the end I succeeded in finding a character by the aid of which two main groups could be distinguished, and as soon as this result had been arrived at, it appeared

¹⁾ *I. Robinsonii* was not mentioned by me, as it does not occur in the area dealt with in my revision.

²⁾ The differences between the *Ixora* species are on the whole far more conspicuous than those between the species of *Rubus* or of *Rosa*, but this is of no great moment, as the taxonomic value of a difference does not depend on the way it affects our senses. Of more importance is the fact that in contrast to what we find in *Rubus* the number of *Ixora* species that occur in the same area is but small, and that the areas occupied by nearly related species but rarely overlap.

that the further subdivision was a comparatively easy matter. Several of the smaller groups obtained in this way impress us as being quite natural units.

The character that has been used for the main subdivision is found in the relief of the seedcoat. The convex dorsal side is in this subgenus everywhere covered with scales, but the flat ventral one with the usually rather wide hilum proves to be of two kinds: in the species found in the western part of the area (Ceylon, India, Indo-China and South China, the Malay Peninsula, Sumatra, Banca, Borneo and Palawan) it is smooth or nearly so, in the species occurring in the rest of the area (Java, Celebes, the Philippines, the Moluccas, the Lesser Sunda Islands, New Guinea and Tropical Australia) it is more or less distinctly ribbed or carunculate. There is in so far a slight overlapping that one of the Javan species occurs also in the southern part of Sumatra, and there are among the species found in the western part two exceptions, viz. *Th. brachypoda* Brem. n. spec., a plant collected in Palawan, i.e. exactly on the borderline between the eastern and the western part, and *Th. cycloneura* Brem. n. spec., a plant found in the south-eastern part of Borneo, which in its other characters is not unlike some of the species belonging to the western group. *Th. brachypoda* is an easily recognizable species, but as no corolla was available, its exact position in the subgenus could not be determined. In one of the Philippine species, *Th. benquetensis* Brem. n. spec., the ventral side of the seed is, on the contrary, but indistinctly carunculate. As so far not other common characters of the species referred to the two main groups could be detected, the possibility that these groups may be artificial can not be excluded; for this reason I have refrained from giving them a name ¹).

In the group of western species a single one, viz. *Th. palawanensis* Brem. n. spec., proved to possess a calyx with, as a rule, five or six teeth, whereas in all the other species of this group 9—13 teeth are found. *Th. palawanensis* differs from the other species also in some other, rather important points, viz. in the great length of the bracteoles and in the rather considerable difference in length between the inner and the outer filaments. Species with a small number of calyx teeth, viz. 6—8, occur also in the Philippines, but in their other characters they show no definite approach to *Th. palawanensis*.

For the subdivision of the remaining western species use has been made

¹) In order to facilitate a comparison of the species occurring in a definite part of the area, e.g. in Celebes or in the Philippines, I have arranged the species in the special part as much as possible according to their geographic distribution. As, moreover, each species is compared with all those which it resembles in important points, it will be comparatively easy to construct keys to the species occurring in these parts. Keys to a limited number of species are, of course, much handier than a large one like that given in the special part by the aid of which all species can be identified.

of the length of the filaments. In the two Indian species that have been introduced into the Malesian area, *Th. fragrans* Roxb. and *Th. laevis* Nees, the shorter filaments measure 5–6 mm, the longer ones 11–12 mm. In the species found in Indo-China, the Malay Peninsula, Sumatra, Banca and North Borneo, and also in a large part of the species belonging to the eastern main group, the shorter filaments are 3–6 mm, the longer ones 6–8 mm long. In part of the western species the shorter filaments do not exceed a length of 3.5 mm, whereas in the remaining ones they measure 5–6 mm; in the length of the longer filaments there is but little difference. The group in which the shorter filaments vary in length between 3 and 3.5 mm contains five species occurring in the area under survey, and these species are easily distinguishable by the shape of the leaves and bracteoles and by differences in the nature of the indumentum, and this applies also to the three species of the group in which the shorter filaments measure 5–6 mm.

Among the species belonging to the eastern main group the only representative known so far from Borneo, viz. *Th. cycloneura* Brem. n. spec., occupies a somewhat isolated position, because the relative difference in length between the shorter and the longer filaments is rather small; they measure respectively 6 and 8 mm. In this respect this species resembles the last-mentioned group of western species, and this might indicate a real affinity. This possibility deserves the more attention as the relief on the ventral side of the seed is in this species less strongly marked than in the other eastern species. A noteworthy difference with the corresponding group of western species is found in the larger number of calyx teeth (13–15 instead of 12). The problem will perhaps be solved when more Bornean species become known.

In part of the remaining eastern species, viz. in those occurring in Java, Madoera and Kangean, the shorter filaments measure 2.5–3.5 mm and the longer ones 6–7.5 mm. These species therefore show an approach to the group of western species mentioned above in which filaments of the same length are found. In this case too it is not impossible that this similarity between a group of eastern and a group of western species indicates a real affinity. This would mean that the presence or absence of a relief on the ventral side of the seed would be of less importance than some other characters, and would have to be shifted to a more subordinate place. An argument in favour of this supposition might be found in the circumstance that one of the Javan species occurs also in the southern part of Sumatra, i.e. within the confines of the area occupied by the other group.

If *Th. cycloneura* and the species occurring in South Sumatra, Java, Madoera and Kangean (*Th. javanica* Gaertn., *Th. trichocarpa* Brem. n. spec. and *Th. kangeanensis* Brem. n. spec.) are excluded, the remaining eastern species prove to be provided with filaments that differ more conspicuously in length than those of *Th. cycloneura* and that are longer

than those of *Th. javanica* and its nearest allies, the shorter ones being at least 3.5 mm and the longer ones at least 7 mm. There are two exceptions to this rule, viz. the Celeban *Th. parviflora* Brem. and the Philippine *Th. mindanaensis* Brem. n. spec., where they are respectively 2.5 mm and 5 mm long, but in these species the flowers themselves are only half as large as in the other ones. In the other Celeban species the length of the filaments is very uniform, the shorter ones being everywhere 5–6 mm, the longer ones 9–10 mm. Some of these species exhibit also another peculiarity, viz. that the anthers are at the top bidentulate.

Bidentulate anthers are also found in two of the Philippine species, viz. *Th. mindanaensis* Brem. n. spec. and *Th. brachythylla* Brem. n. spec. The latter deserves our attention also because of the small size of the warts by which the pollen grains are covered. In this respect it resembles *Th. hastata* Decn. and *Th. thespesiifolia* Brem. n. spec., two plants found in the Lesser Soenda Islands, which in their other characters differ rather widely from the Philippine species. A third noteworthy character of *Th. brachythylla* is the small number of calyx teeth, viz. 6 or 7, but in this respect it differs only gradually from two other Philippine species, viz. *Th. benguetensis* Brem. n. spec. and *Th. ilocana* Brem. n. spec. with 8 and from the Moluccan *Th. batjanensis* Brem. n. spec. with 10 calyx teeth. On the whole the Philippine species are difficult to classify, because of several of them the corolla is still unknown or insufficiently known, so that we are unable to use the length of the filaments as a distinguishing character. Where the filaments could be studied, the length of the shorter ones proved to vary between 3.5 and 7 mm, and that of the longer ones between 7 and 10 mm. This means that, so far as we can tell, the filaments of the Philippine species are shorter than those of the species occurring in the Lesser Soenda Islands, New Guinea and Tropical Australia, where the shorter ones vary between 7 and 8.5 mm, and the longer ones between 10.5 and 16 mm. Because of the shortness of the filaments (respectively 3.5 and 7 mm) I have placed *Th. batjanensis*, a native of the northern Moluccas, in the vicinity of the above-named Philippine species, whereas *Th. quadricostata* Brem. n. spec., a native of the southern Moluccas, whose filaments are respectively 7 and 12 mm long, was placed near the species from the Lesser Soenda Islands and New Guinea. For the classification of the Philippine species, however, use had to be made of other characters, and as such I have chosen i. a. the number of calyx teeth.

In the species occurring in the Lesser Soenda Islands and New Guinea the number of calyx teeth varies between 12 in *Th. hastata* Decne and 14–23 in *Th. pleistodonta* Brem. n. spec. In the two species known from the Moluccas, *Th. batjanensis* and *Th. quadricostata*, it is 10. *Th. pleistodonta* so far surpasses all other species in the number of calyx teeth. With regard to *Th. hastata* it is perhaps worth mentioning that its stigma is not, as LINDAU supposed, of the kind found in my subgenus *Hypenophora*, but

exactly as in the other species of the subgenus *Adelphia* two-lobed with lobes of equal length. The only character in which *Th. hastata* differs somewhat from the other representatives of this subgenus, is found in the slightly longer style, which is distinctly exerted.

C. SPECIAL PART

In this part all *Thunbergia* species that so far have been collected in the area covered by the "Flora Malesiana" will be dealt with, no matter whether they are wild or cultivated ones. Of the latter *Th. alata* Boj. ex Sims is the only one that has become naturalized and that here, as in many other parts of the tropics, is now wide-spread. This was known already to LINDAU (in Bot. Jahrb. 17, Beibl. 41, 31, 1893), but when the latter said of *Th. fragrans* Roxb. "Noch weiter geht die ostindische *T. fragrans* Roxb., die sich als Tropenunkraut fast in allen heißen Districten der alten und neuen Welt als Tropenunkraut bemerkbar macht", he certainly was mistaken. As already pointed out in the preceding chapter the true *Th. fragrans* has but rarely escaped from cultivation and has apparently nowhere spread on a large scale, and this applies also to *Th. laevis* Nees, which has often been regarded as a mere variety of *Th. fragrans*. The plants that LINDAU, following the example of CLARKE and other predecessors, referred to *Th. fragrans* belong in reality to a comparatively large number of distinct species, of which the majority are confined to areas of comparatively small extent. In how far one is allowed to regard them as weeds, depends of course on the meaning one wishes to attach to this term. It are certainly not plants that follow man on his peregrinations all over the world, nor do they infest his cultures. Their most common habitat seem to be road sides, but they occur also in light secondary forest. The *Hexacentris* species and the woody climbers belonging to the subgenus *Coniostephanus* are on the other hand true forest plants, but the climbing species belonging to *Parahexacentris* and *Hypenophora* grow in similar habitats as the *Adelphia* species, and the erect shrubs and herbs are inhabitants of the African parklands and steppes.

To facilitate the identification of the species dealt with in this chapter I will give a key to the subgenera that are represented among them and keys to the species belonging to these subgenera. For the construction of these keys use has been made of the characters that are found in the species occurring in our area. A general key to the subgenera has been given in the first chapter.

Key to the Subgenera represented in Malesia

1. Basal part of anther cells sterile and bordered with conical bristles.
Leaves pinnately nerved.—Cultivated erect or climbing shrubs . . .
. subgen. 1. *Coniostephanus*

- 1: Basal part of anther cells not bordered with conical bristles. Leaves palmately nerved
- 2. Small shrub with at least part of the flowers in subsessile axillary triads. Pedicels of the lateral and of the solitary flowers circ. 1 cm long.—Cultivated subgen. 2. *Thamnidium*
- 2: Herbaceous or woody climbers or erect herbs. Flowers never in axillary triads. Pedicels always more than 1 cm long
- 3. At least some of the anther cells in each flower provided with a basal awn. Pollen grains without warts
- 4. Herbaceous or woody climbers. Stigma lobes not united into a funnel and without hair bundles at their base
- 5. Herbaceous climbers. Flowers always axillary. Calyx dentate. Stamens didynamous. Convex side of the seed smooth or reticulate.—Cultivated and naturalized subgen. 3. *Parahexacentris*
- 5: Woody climbers. Flowers usually in terminal racemes. Calyx truncate. Stamens homodynamous. Convex side of the seed carunculate.—Cultivated and wild . . subgen. 4. *Hexacentris*
- 4: Erect herb. Stigma lobes united into a wide funnel which on each side is provided with a bundle of spreading hairs.—Cultivated subgen. 5. *Hypenophora*
- 3: Anther cells always unarmed. Pollen grains covered with bluntly conical warts.—Cultivated and wild . . . subgen. 6. *Adelphia*.

Key to the *Coniostephanus* species

- 1. Scrambling, 2—4 m high shrub. Leaves 5—19 cm long and 2.2—7 cm wide, and with 4—10 nerves on each side of the midrib. Flowers nearly all on axillary short-shoots.—Introduced from West Tropical Africa 1. *Th. vogeliana* Bth.
- 1: Erect, 1—2.5 m high shrubs. Leaves 2—6 cm long and 0.9—2.5 cm wide, and with 2—5 nerves on each side of the midrib. Flowers not confined to axillary shoots and the latter not developed as short-shoots
- 2. Leaves without mucro, usually with acute or subacute base, and with 2 or 3 nerves on each side of the midrib. Bracteoles subobtuse. Calyx lobes at anthesis not exceeding 2 mm in length.—Introduced from West Tropical Africa 2. *Th. erecta* (Bth.) T. And.
- 2: Leaves mucronate, with obtuse or subobtuse base, and with 4 or 5 nerves on each side of the midrib. Bracteoles acute. The longer calyx lobes at anthesis 4—6.5 mm long.—Introduced from East Tropical Africa 3. *Th. affinis* S. Moore.

Thamnidium

Only one species.—Introduced from East Tropical Africa
 4. *Th. Kirkii* Hook. f.

Key to the *Parahexacentris* species

1. Stem, petioles, pedicels and bracteoles ferrugineously hirsute. Bracteoles 2—3 cm long. Anther cells with hairs at the base of the fissures only.—Introduced from East Tropical Africa 5. *Th. Gregorii* S. Moore
- 1: Stem, petioles, pedicels and bracteoles softly greyish pubescent or strigose; the stem ultimately glabrescent. Bracteoles 1.4—2.0 cm long. Anther cells with hairs along the whole length of the fissure.—Introduced from East Tropical Africa, cultivated and naturalized 6. *Th. alata* Boj. ex Sims
 - α. Stem at first softly pubescent. Leaves on both sides softly pubescent. Bracteoles densely pubescent subsp. *alata*
 - α. Stem at first strigose. Leaves on the upper side at first strigose, afterwards scabrid, on the lower side at first densely, then sparsely pubescent. Bracteoles sparsely pubescent subsp. *reticulata* Brem.

Key to the *Hexacentris* species

1. Corolla red or orange-red; the suborbicular lobes 0.7 cm long. Stamens exerted; filaments 19—20 mm long; anther cells towards the base of the fissure with a few hairs.—Introduced from the northern part of India 7. *Th. coccinea* Wall.
- 1: Corolla violet-blue or white; the orbicular lobes 1.8—3.2 cm long. Stamens included; filaments 8—11 mm long; anther cells along the whole length of the fissure fringed with hairs
 2. Only one of the anther cells of the outer stamens awned; the awns always smooth. Leaves palmately lobed, 5- or 7-nerved, on the upper side scabrid or scabridulous and on the lower side especially on midrib and nerves pubescent or totally glabrous. Pedicels usually 4—5 and sometimes up to 13 cm long. Bracteoles free.—Introduced from the northern part of India 8. *Th. grandiflora* Roxb.
 - α. Leaves on the upper side scabrid, on the lower, especially on midrib and nerves pubescent. Corolla violet-blue var. *grandiflora*
 - α. Leaves on the upper side scabridulous, on the lower glabrous. Corolla violet-blue or white var. *spaniotricha* Brem.
 - 2: Both anther cells of the outer stamens awned; the longer awns at the base and the shorter ones over their whole length covered with spinules. Leaves ovate-lanceolate or oblong, 3- or rarely 5-nerved; midrib and nerves on both sides pustulate. Pedicels at the most 2 cm long. Bracteoles on the adaxial side cohering.—Indo China and northern part of the Malay Peninsula; elsewhere cultivated. 9. *Th. laurifolia* Lindl.

Hypenophora

- One species cultivated.—Introduced from South Africa
 10. *Th. natalensis* Hook.

Key to the *Adelphia* species

1. Ventral side of the seed smooth or nearly so.—Species occurring in Ceylon and India, Indo-China, the Malay Peninsula, Sumatra, Banca, Borneo and Palawan
2. Calyx with 9—13 teeth. Bracteoles at the most 2 cm long, usually much shorter
 3. The shorter filaments 5—6 mm, the longer ones 11—12 mm long.—Species introduced from India
 4. Ovary and capsule glabrous. Basal half of the leaf blade on each side with two patent lobes.—Cultivated in botanical gardens and at one place in Luzon escaped from cultivation 11. *Th. fragrans* Roxb.
 - 4: Ovary and capsule puberulous. The basal half of the leaf blade usually on each side with a single patent lobe, never with two lobes.—Cultivated in botanical gardens and in the vicinity of Singapore naturalized 12. *Th. laevis* Nees
 - 3: The shorter filaments 3—6 mm, the longer ones 6—8 mm long.—Species endemic in Indo China, the Malay Peninsula, Sumatra, Banca and Borneo
 5. The shorter filaments 3—3.5 mm, the longer ones 6—7.5 mm long, i. e. circa twice as long
 6. Base of the larger leaves always cordate
 7. Stem at first sparsely strigose. The larger leaves usually hastately lobed and with slightly curled margin. Pedicels glabrous. Bracteoles on the nerves and along the margin fringed with long hairs.—Northern part of the Malay Peninsula 13. *Th. trachychlamys* Brem.
 - 7: Stem at first densely pubescent. Leaves never hastately lobed; margin flat. Pedicels pubescent. Bracteoles densely pubescent.—Southern part of the Malay Peninsula 14. *Th. dasychlamys* Brem.
 - 6: Base of the larger leaves sometimes emarginate but never distinctly cordate
 8. Bracteoles ovate, circa twice as long as wide. Stem at first densely strigose
 9. Leaves at the most 7 cm long and 2.6 cm wide, on the upper side sparsely scabridulo-pubescent, on the lower side densely pubescent. Calyx tomentellous. Capsule pubescent.—Northern part of the Malay Peninsula 15. *Th. crispula* Brem.
 - 9: Leaves usually circa 8 cm long and 2.5 cm wide, on both sides scabridulous; the midrib on both sides and the nerves on the lower side hirtello-pubescent. Calyx teeth along the margin papillose. Capsule glabrous.—Anambas Islands 16. *Th. siantanensis* Brem.

- 8: Bracteoles narrowly ovate-triangular, more than three times as long as wide. Stem at first sparsely pubescent.—Sumatra and Borneo 17. *Th. stenochlamys* Brem.
- 5: The shorter filaments 5–6 mm, the longer ones 7–8 mm long, i.e. the longer ones less than one and a half times as long as the shorter ones
10. Stem dull. Leaves ovate, ovate-oblong or oblong. Bracteoles ovate or widely ovate. Capsule puberulous
11. Leaves subacute, i.e. near the mucro over a short distance depressed; base truncate. Bracteoles with the corolla deciduous. Calyx teeth up to 2 mm long. Corolla lobes circa 15 mm long. Anthers mucronate. Capsule beak 15 mm long.—Northern part of the Malay Peninsula. 18. *Th. hebecocca* Brem.
- 11: Leaves obtuse or more or less rounded at the top and obtuse to subacute at the base. Bracteoles persistent round the fruit. Calyx teeth at the most 0.6 mm long. Corolla lobes circa 10 mm long. Anthers subobtuse. Capsule beak 10 mm long.—Thailand, including the northern part of the Malay Peninsula 19. *Th. Ridleyi* Brem.
- 10: Stem nitidulous. Leaves narrowly lanceolate or linear. Bracteoles narrowly ovate-lanceolate. Capsule glabrous.—Bangka. 20. *Th. bancana* Brem.
- 2: Calyx with 5 or 6 teeth. Bracteoles ovate-lanceolate, 2–2.5 cm long. Filaments respectively 4 and 10 mm long.—Palawan 21. *Th. palawanensis* Brem.
- 1: Ventral side of the seed ribbed or wrinkled.—Species occurring in Palawan, the south-eastern part of Borneo, the southern part of Sumatra, Java, Celebes, the Philippines, the Moluccas, the Lesser Soenda Islands, New Guinea and tropical Australia
12. Petioles 1.5 to 4 mm long
13. Leaves ovate to ovate-lanceolate; the wider ones up to 5 cm long and 3 cm wide, the narrower ones up to 7 cm long and 1.8 cm wide.—Palawan 22. *Th. brachypoda* Brem ¹⁾.
- 13: Leaves linear, up to 7 cm long and 0.9 cm wide.—Mindanao 35. *Th. linearifolia* Brem. ¹⁾
- 12: Petioles more than 4 mm long
14. The longer filaments less than one and a half times as long as the shorter ones (the latter 6 mm, the former 8 mm). Flowers almost all in pairs superposed.—South-eastern part of Borneo 23. *Th. cycloneura* Brem.

¹⁾ The stamens of *Th. brachypoda* and *Th. linearifolia* are as yet unknown, so that for their identification no use could be made of the length of the filaments. The stamens of *Th. Loheri* too are unknown, but this species comes so near to *Th. subsagittata* that I have assumed that it will resemble the latter in the structure of the androeceum.

- 14: The longer filaments more than one and a half times as long as the shorter ones or else the shorter ones at least 7 mm and the longer ones at least 10 mm long. Flowers (except in *Th. brachythylla*) all solitary
15. The shorter filaments 2.5–3.5 mm, the longer ones 5–7.5 mm long
16. Calyx with 10–13 teeth; the longer ones at least 1.5 mm long
17. Pedicels usually less than 5 cm long
18. Corolla throat at least 13 mm long. The longer filaments 7–7.5 mm long
19. Lower leaves with obtuse or subobtuse top. Warts on the pollen grains circa 6 μ high.—South Sumatra and Java 24. *Th. javanica* Gaertn.
- α . Stem from the first subglabrous. Leaves scabrid or scabridulous above, at first densely, afterwards sparsely puberulo-pubescent beneath. Bracteoles only on the nerves pubescent var. *javanica*
- α . Stem at first densely pubescent. Leaves at first on both sides tomentellous. Bracteoles persistently tomentellous var. *tomentella* Brem.
- 19: All the leaves at the top acute or contracted. Warts on the pollen grains 7–12 μ high
20. Bracteoles tomentose or tomentellous. Calyx with 10 teeth. Filaments respectively 2.5 and 7 mm. Capsule puberulous.—East Java and Madoera 25. *Th. trichocarpa* Brem.
- 20: Bracteoles either hirsute, puberulo-pubescent or glabrous. Calyx with 10–15 teeth. Filaments respectively 3–3.5 and 7–7.5 mm. Capsule glabrous
21. Bracteoles ovate-lanceolate, circa 17 mm long and 6 mm wide. Warts on the pollen grains 10–12 μ high.—Kangean Archipelago 26. *Th. kangeanensis* Brem.
- α . Leaves ovate, ovate-oblong or ovate-lanceolate var. *kangeanensis*
- α : Leaves linear-lanceolate var. *angustifolia* Brem.
- 21: Bracteoles ovate, 9–15 mm long and 5–7 mm wide. Warts on the pollen grains 7–10 μ high
22. Petioles not exceeding 1.5 cm; blade 3.0–6.5 long and 1.0–2.4 cm wide. Calyx with 10–12 cm teeth. Beak of the capsule 12 mm long and at the base 4 mm wide.—Luzon and Samar 36. *Th. subsagittata* Blanco
- α . Stem and petioles at first densely, afterwards sparsely pubescent
- β . Leaves scabridulous above and puberulo-pubescent beneath. Bracteoles on the nerves pubescent, between the nerves puberulous var. *subsagittata*

- β : Leaves hirsute above and pubescent beneath.
 Bracteoles rather densely hirsute
 var. *hirsutifolia* Brem.
- α : Stem and petioles from the first glabrous or sub-
 glabrous. Leaves on the underside glabrous. Brac-
 teoles with hairs on the nerves only
 var. *glabra* Brem.
- 22: Petioles 1.5—3.0 cm long; blade 4—11 cm long
 and 1.4—3.5, rarely up to 6 cm wide. Calyx
 with 13—15 teeth. Beak of the capsule 14 mm
 long and at the base 6 mm wide. —Luzon. . .
 37. *Th. Loheri* Brem.¹⁾
- 18: Corolla throat 10—11 mm long. The longer filaments
 5 mm
23. Calyx teeth not exceeding 2 mm. Stigma but partly
 exerted.—South-west Celebes
 27. *Th. parviflora* Brem.
- 23: The longer calyx teeth 3—4 mm. Stigma 3 mm
 exerted—Mindanao . 34. *Th. mindanaensis* Brem.
- 17: Pedicels 5—7 cm long. Beak of the capsule 17 mm long
 and at the base 4 mm wide.—Northern Moluccas: Batjan
 40. *Th. batjanensis* Brem.
- 16: Calyx with 8 teeth; none of the teeth exceeding 1 mm.—Luzon
 38. *Th. benquetensis* Brem.
- 16: The shorter filaments at least 4.5 mm, the longer ones at
 least 7.5 mm long
24. The shorter filaments 4.5—7 mm, the longer ones 7.5—10
 mm long
25. Calyx with 6 or 7 teeth. Filaments respectively 4.5 and
 7.5 mm long. Warts on the pollen grains 4 μ high.—Min-
 danao 33. *Th. brachythylla* Brem.
- 25: Calyx with 8 or more teeth. Filaments respectively 5—6
 and 9—10 mm long. Warts on the pollen grains 7—10 μ
 high.—Celeban species
26. Calyx with 8 or 9 teeth. Corolla throat circa 14 mm
 long.—South-west Celebes 28. *Th. macalensis* Brem.
- 26: Calyx with 11—13 teeth. Corolla throat 19—23 mm long
27. Leaves at first on both sides villous, afterwards,
 except on midrib and nerves beneath, glabrescent.
 Bracteoles densely villous. Anthers mucronate.—
 Central and South-eastern Celebes
 29. *Th. Eymae* Brem.

¹⁾ The flowers of *Th. Loheri* are as yet unknown, but it has been inserted here
 because it comes in its other characters so near to *Th. subsagittata* that I expect that
 it will agree with the latter also in the length of the filaments.

- 27: Leaves either from the first glabrous or soon entirely glabrescent. Bracteoles either sparsely strigose or sparsely pubescent. Anthers with bidenticulate top
28. Stem at least in the beginning pubescent. The higher leaves always with hastate or subhastate base, at first on both sides pubescent. Bracteoles ovate-lanceolate, 13–16 mm long and 7–8 mm wide
29. Bracteoles sparsely strigose. Stigma shortly exerted. Capsule always glabrous.—P. Moena, South-eastern Celebes 30. *Th. hederifolia* Brem.
- 29: Bracteoles sparsely pubescent or subglabrous but with ciliate margin. Stigma totally included. Capsule either glabrous or puberulous.—South-west Celebes and Saleyer. 31. *Th. Bünnemeyeri* Brem.
- α. Capsule puberulous var. *Bünnemeyeri*
 α: Capsule glabrous var. *glabra* Brem.
- 28: Stem glabrous. Leaves with a rounded base, on both sides glabrous. Bracteoles lanceolate, 13–17 mm long and 5–6 mm wide.—Eastern Celebes 32. *Th. celebica* Brem.
- 24: The shorter filaments 7–8.5 mm, the longer ones 10–16 mm long
30. Leaves small, 2–3 cm long and 1.8–2.2 cm wide. Calyx with 8 teeth.—Luzon 39. *Th. ilocana* Brem.
- 30: The majority of the leaves much larger. Calyx with 10 or more teeth
31. Calyx with 10–12 teeth
32. Calyx with 10 teeth. Anthers ending in a long mucro. Filaments respectively 7 and 12 mm. Style included.—Southern Moluccas: Mangole and Ceram 41. *Th. quadricostata* Brem.
- 32: Calyx with 12 teeth. Anthers bidenticulate at the top. Filaments respectively 7.5–8.5 and 14–16 mm. Style 4 mm exerted.—Timor and Wetar 42. *Th. hastata* Decne
- α. Stem, petioles and leafblades soon glabrescent
- β. Pedicels towards the top strigose. Bracteoles at first strigulose but soon glabrescent. var. *hastata*
- β: Pedicels towards the top hirsute. Bracteoles at first hirsute, afterwards sparsely pubescent var. *pilosiuscula* Zipp. ex Brem.
- α: Stem at first tomentose, afterwards sparsely pubescent; petioles tomentose; leafblades on both sides pubescent. Pedicels and bracteoles tomentose var. *tomentosa* Brem.

- 31: Calyx with 14—23 teeth
33. Corolla throat 14 mm long. Anthers bidenticulate at the top. Warts on the pollen grains circa 4 μ high.—Soemba . . . 43. *Th. thespesiifolia* Brem.
- 33: Corolla throat 18—20 mm long. Anthers obtuse or ending in a long mucro. Warts on the pollen grains 8—9 μ high
34. Stem at first densely, afterwards sparsely pubescent. Leaves at first on both sides pubescent, afterwards on the upper side scabrid and on midrib and nerves beneath pubescent. Bracteoles densely pubescent; hairs aeresopic. Anthers subobtuse. Capsule puberulous; beak 17 mm long.—Flores, Soembawa and Lombok.
. 44. *Th. pleistodonta* Brem.
- 34: Stem at first strigulose, afterwards glabrescent. Leaves at first on both sides strigulose, afterwards scabridulous. Bracteoles strigulose. Anthers produced into a long mucro. Capsule glabrous; beak 13 mm long.—New Guinea: Papua . . .
. 45. *Th. papuana* Brem.

Subgenus *Coniostephanus* Brem.

1. *Thunbergia vogeliana* Bth. in Hooker, Niger Flora 476, 1849; Burkill in Fl. Trop. Afr. 5, 10, 1899; *Meyenia vogeliana* (Bth.) Bth. in Bot. Mag. t. 5389, 1863.

Frutex subscandens, 2—4 m altus. Rami novelli quadricostati, ad nodos primum densius pubescentes, deinde plus minusve glabrescentes; veteriores cortice brunneo opaco vestiti. Folia petiolo glabro 3—15 mm longo instructa; lamina elliptico-oblonga, oblonga vel lanceolata, 5—19 cm longa et 2.2—7 cm lata, apice longius acuminata et mucronata, basi acuta, margine plerumque plana, subcoriacea, discolor, sicc. plerumque supra olivaceo-brunnea, subtus griseo-viridis, utrimque glabra, nervis utroque latere costae 4—10, superioribus tamen difficiliter distinguendis. Flores fere omnes in ramulis axillaribus inserti. Pedicellus 1.1—2.0 cm longus, glaber. Bracteolae vivo primum albae, deinde paulo purpurescentes, ovato-oblongae, 11—16 mm longae et 7—10 mm latae, obtusae, glabrae. Calyx in dentes 10—12 subaequilongos, ad anthesin circ. 4 mm longos, post anthesin usque ad 8 mm elongatos, vix notabile papillosos productus. Corolla tubo et fauce alba, limbo violacea, intus ad orem pilis capitatis sparsa, tubo 7 mm, fauce 35 mm, lobis 15 mm longis. Filamenta dimidio superiore pilis capitatis minimis hirtella, breviora 8 mm, longiora 12 mm longa; antherae mucronatae, 4 mm longae. Granula pollinis 62—65 μ diam. Ovarium glabrum; stylus apicem versus pilis ecapitatis vix notabile hirtellus; stigma ad medium faucem inclusum, lobis subaequalibus.

Capsulae glabrae pars seminifera 10 mm diam. et 7 mm alta; rostrum 12 mm longum et ad basin 7 mm latum.

Habitat Africam Tropicalem Occidentalem. In horto botanico Singapo-
rensi culta.

This species is in the area under survey known only from specimens obtained from the Botanical Gardens, Singapore. It is easily recognizable as a representative of the subgenus *Coniostephanus* by the penninerved leaves and by the structure of the anthers, the thecae ending at the base in a rounded appendage bordered with conical bristles. From the two following species it is easily distinguishable by its subscaudent habit, the large size of its leaves and by the arrangement of the flowers, which are for the greater part produced on short lateral shoots.

2. *Thunbergia erecta* (Bth.) T. And. in Journ. Linn. Soc. 7, 18, 1861; Burkill in Fl. Trop. Afr. 5, 12, 1899; *Meyenia erecta* Bth. in Hook., Niger Flora 476, 1849; Bot. Mag. t. 5013, 1857.

Frutex ramosior, 1.0—2.5 m altus. Rami novelli quadricostati, ad nodos primum densius pubescentes, deinde plus minusve glabrescentes vel ab initio toti glabri; veteriores cortice griseo opaco vestiti. Folia petiolo glabro 2—5 mm longo instructa; lamina ovato-lanceolata vel rhomboidea, nunc circ. 5 cm longa et 2.5 cm lata, nunc multo minor et circ. 2 cm longa et 0.7 cm lata, apicem versus sensim contracta, non mucronata, basi plerumque acuta vel subacuta, margine interdum sinuoso-dentata, subcoriacea, discolor, sicc. plerumque supra olivacea et subtus griseo-viridis, supra ad costam et ad marginem pilis minimis scabridula, subtus praesertim costa nervisque puberula sed ultimo plus minusve glabrescens, nervis utroque latere costae 2 vel 3; gemmae axillares pilis ferrugineis vestitae sed minores et inde vix conspicuae. Pedicellus 1.5—2 cm longus, glaber. Bracteolae vivo albae, oblongae, 15 mm longae et 7—8 mm latae, subobtusae, glabrae. Calyx in dentes 12 inaequales, majoribus ad anthesin 2 mm longis, post anthesin usque ad 3 mm elongatis, subglabris vel papillois, productus. Corolla tubo et fauce luteola, limbo violacea vel alba; intus ad orem pilis capitatis sparsa, tubo 10 mm, fauce 35 mm, lobis 18 mm longis. Filamenta glabra, breviora 7 mm, longiora 10 mm longa; antherae mucronatae, 4.2 mm longae. Granula pollinis 62 μ diam. Ovarium glabrum; stylus apicem versus pilis capitatis vix notabile hirtellus; stigma ad medium faucem inclusum, lobis valde inaequalibus, superiore erecto et angustiore. Capsulae glabrae pars seminifera 12 mm diam. et 9 mm alta; rostrum 17 mm longum et ad basin 9 mm latum.

Habitat Africam Tropicalem Occidentalem; in regionibus aliis tropi-
calibus in hortis culta e.g.

Malay Peninsula: Perak; Kuala Lumpur; Singapore

Sumatra: Asahan; Fort de Kock; Padang

Java: Djakarta; Bogor (microphyllous form); Priangan (Tjisalak, micro-
phyllous form); Salatiga; Madioen (Ngebel); Pasoeroean; Idjen Plateau
(Belawan)

Celebes: Tondano

Philippines: Luzon, Camarines, Laguna (Mt Makiling), Manila

Ternate: Tafoeri

Moluccas: Ceram (Kg Wahai).

Apart from the ordinary form with violet corolla limb, one with a white limb is sometimes grown. There is also a form with very small leaves, which deserves further study; it might represent a distinct, although doubtless nearly related species.

Th. erecta is easily distinguishable from *Th vogeliana* (v. supra), but it differs only slightly from the following species. The most useful points of difference are found in the absence of the small tubercles or spinules into which the ribs along the stem in *Th. affinis* go out at the insertion of the leaves, in the usually acute or subacute instead of subobtuse or obtuse leaf base, in the absence of a mucro at the top of the leaves, in the presence of 2 or 3 instead of 4 or 5 nerves on each side of the midrib, in the subobtuse instead of acute bracteoles, in the shorter calyx teeth and in the shorter style, the stigmata being included in the middle of the throat instead of in its mouth.

3. *Thunbergia affinis* S. Moore in Journ. of Bot. 1880, 6; Burkill in Fl. Trop. Afr. 5, 12, 1899; Bot. Mag. t. 6975, 1888;—*Th. Holstii* Lindau in Bot. Jahrb. 17, 95, 1893.

Frutex ramosior, 1.5—2.5 m altus. Rami novelli quadricostati, costis ad insertionem foliorum in tubercula vel spinulos productis, ad nodos primum interdum densius pubescentes, deinde plus minusve glabrescentes vel ab initio glabri; veteriores cortice griseo opaco vestiti. Folia petiolo glabro 2—3.5 mm longo instructa; lamina lanceolata, 3—6 cm longa et 1.0—2.2 cm lata, apice acuta vel subacuminata et mucronata, basi obtusa vel rotundata, margine crispula, subcoriacea, discolor, sicc. plerumque supra olivacea et subtus griseo-viridis, utrimque glabra, nervis utroque latere costae 4 vel 5; gemmae axillares dense ferrugineo-tomentosae. Pedicellus circ. 1.5 cm longus. Bracteolae late oblongae, 20 mm longae et 12 mm latae, acutae, glabrae. Calyx in dentes 12 inaequales, e basi anguste deltoidea filiformes, papillosos productus, dentibus majoribus ad anthesin 6.5 mm longis, post anthesin usque ad 12 mm elongatis. Corolla tubo et fauce luteola, limbo violacea, intus ad orem pilis capitatis sparsa, tubo 10 mm, fauce 35 mm, lobis 20 mm longis. Filamenta dimidio superiore pilis capitatis hirtella, breviora 11 mm, longiora 13.5 mm longa; antherae mucronatae, 4.5 mm longae. Granula pollinis 62 μ diam. Ovarium glabrum; stylus apicem versus pilis capitatis vix notabile hirtellus; stigma ad orem inclusum, lobis valde inaequalibus, superiore erecto et angustiore. Capsulae glabrae pars seminifera 10 mm diam. et 9 mm alta; rostrum 16 mm longum et basi 6 mm latum.

Habitat Africam Tropicalem Orientalem; in regionibus aliis tropicalibus in hortis culta e.g.

Malay Peninsula: Selangor; Singapore

Java: Bogor; Pasoeroean

Philippines: Manila.

For the differences between this species and *Th. erecta* see under *Th. erecta*, and for the differences between these two species and *Th. vogeliana* see under the latter.

Th. affinis is apparently not so often cultivated as *Th. erecta*, although the merits of these two species as garden plants do not seem to differ much.

Subgenus *Thamnidium* Brem.

4. **Thunbergia Kirkii** Hook.f. in Bot. Mag. t. 6667, 1883; *Th. hookeriana* Lindau in Bot. Jahrb. 17, Beibl. 41, 38, 1896 nom. nov. superfl.; Burkill in Fl. Trop. Afr. 5, 13, 1899.

Frutex 0.5—0.9 m altus, totus glaber. Rami quadricostulati, opaci. Folia petiolo 1—2 mm longo instructa; lamina ovata vel lanceolata, 3.5—5 cm longa et lobis lateralibus exclusis 0.8—1.6 cm lata, apicem versus attenuata, apice ipso obtusa et mucronata, basi obtusa, ad medium plerumque utroque latere lobo mucronato circ. 0.5 cm longo munita, rarius utroque latere lobis duobus munita vel integra, subcoriacea, subconcolor, sicc. griseo-brunnea, supra nitidula, 3-nervia. Flores aliqui solitarii, aliqui in triades axillares dispositi, casu quo triades plerumque breviter pedunculatae et pedicelli florum lateralium bracteis minimis suffulti. Pedicelli florum solitariorum et florum triades constituentium circ. 1 cm longi. Bracteolae ovato-oblongae, 7 mm longae et 4 mm latae, breviter acuminateae, 5-nerviae. Calyx dentibus 7 vel 8 usque ad 0.7 mm longis instructus. Corolla tubo et fauce alba, limbo dilute violacea, intus fauce pilis capitatis minimis vix notabile punctata, tubo 4 mm, fauce 16 mm, lobis retusis 7 mm longis. Filamenta glabra, breviora 4 mm, longiora 6 mm longa; antherae 3.5 mm longae, apice incurvato mucronatae; thecae basi spinulis 1—3 armatae, rarius muticae. Granula pollinis 45 μ diam., carunculis numerosis maxime 2 μ altis sparsa. Ovarium et stylus glabri; stigma breviter exsertum, crateriforme, breviter 2-lobatum. Capsula glabra, parte seminifera 6.5 mm diam. et 6.5 mm alta; rostrum conicum, 9 mm longum et basi 5 mm latum.

Habitat Africam Tropicalem Orientalem; in horto botanico singaporensi culta.

This species is easily recognizable by its habit. It is a small and rather stiff, entirely glabrous shrub with narrow leaves, of which the majority are provided on each side and about halfway between top and base with a large deltoid lobe. The spinules at the base of the thecae are of the same kind as the far more numerous spinules bordering the basal lobe of the thecae in the subgenus *Coniostephanus*.

Subgenus *Parahexacentris* Brem.

5. *Thunbergia Gregorii* S. Moore in Journ. of Bot. 1894, 130; Burkill in Fl. Trop. Afr. 5, 17, 1899;—anne *Th. Gibsoni* S. Moore in Journ. of Bot. 1894, 131 incertum sed probabile; certe *Th. Gibsoni* S. Moore apud Turrill in Bot. Mag. t. 8604, 1915,—*Th. Roberti* Mildbr. in Notizbl. Bot. Gard. u. Mus. Berl.-Dahl. 9, 491, 1926,—anne *Th. aureosetosa* Mildbr. in op. cit. 11, 408, 1932 incertum sed haud improbabile.

Herba volubilis. Caulis bisulcatus, pilis longis hirsutus. Folia petiolo anguste alato, sulco pilis retrorsis densius strigoso, ceterum hirsuto 1.5—3 cm longo instructa; lamina late ovata, plerumque 4—5 cm longa et 4—5 cm lata, apice acuta vel subacuta et mucronulata, basi sagittato-cordata, margine utroque latere dentibus 3—6 munita, sicc. olivaceo-brunnea, utrimque densius hirtella, 5-nervia, nervis e costa orientibus utroque latere 1 vel 2, inter nervos laxae et vix conspicue reticulata. Flores in axillis foliorum solitarii. Pedicellus 5—11 cm longus, ad apicem dense, ceterum sparse hirsutus. Bracteolae ovato-lanceolatae, 2—3 cm longae et 1.2—1.8 cm latae, 9-nerviae, extus hirsutissimae, intus primum pilis capitatis tenuibus sparsae, deinde glabrescentes. Calyx extus pilis capitatis hirsutus, in dentes valde inaequales circ. 15 productus, dentibus longioribus circ. 3 mm longis. Corolla tubo 4 mm, fauce 26 mm longis, limbo aurantiaco 50 mm diam., lobis obcordatis, fauce rugula instructo, marginibus rugulae hirtellis. Filamenta pilis capitatis minimis sparsa, breviora 7 mm, longiora 11 mm longa; antherae apice vix conspicue mucronulatae, 4 et 5 mm longae, thecis ad basin solum barbatis. Granula pollinis 58 μ diam. Ovarium puberulum; stylus 17 mm longus, apicem versus pilis capitatis vix notabile hirtellus; stigma ad medium faucem inclusum, lobis paulum inaequalibus circ. 3 mm longis, superiore 3 mm, inferiore 4 mm lato. Capsulae pars seminifera 12 mm diam. et 9 mm alta; rostrum 15 mm longum et basi 4.5 mm latum. Semina facie dorsali laevia.

Habitat Africam Tropicalem Orientalem, in insula Java culta. Java: Res. Pasoeroean, Nongkodjadjar (Buysman legit).

This species and the next are winding herbs, and in this respect they resemble the species of the subgenus *Adelphia*, from which they are easily distinguishable by the structure of the anthers, the thecae, or at least some of them, being armed with basal spurs. Other points of difference are found in the greater width of the corolla throat and in the smooth or reticulate seeds. The more or less distinctly winged petioles may also be used as a distinctive character, but this is no general feature of the subgenus *Parahexacentris*.

Th. Gregorii differs from the next species in the nature of the indumentum, stem, petioles, pedicels and bracteoles being ferruginously hirsute, in the larger size of the bracts, and in the presence of hairs at the base of the anthers only instead of along the whole length of the fissures.

6. *Thunbergia alata* Boj. ex Sims, Bot. Mag. t. 2591; 1825, Lodd., Bot. Cab. t. 1045, 1825; Hooker, Exot. Fl. t. 177, 1827; Nees in Wall., Pl. As. Rar. 3, 78, 1833; id. in DC, Prodr. 11, 58, 1847; Burkill in Fl. Trop. Afr. 5, 16, 1899; Koorders, Exkursionsfl. v. Java 3, 213, 1912; id. Syst. Verz. I, § 1, 6, 40, 1912; Backer, Onkruidfl. Suikerrietgr. 631, 1934; — *Th. alba* Paxt., Mag. Bot. 3, 28, 1837; — *Th. aurantiaca* Paxt., Mag. Bot. 6, 269, 1839; — *Th. alata* var. *albiflora* Hooker in Bot. Mag. t. 3512, 1836; *Th. albiflora* Gord. in Gard. Chron. 1845, 169; — *Th. alata* var. *Dodssi* Hort., Fl. d. Serres 4, 415, 1848; *Th. aurantiaca* var. *Dodssi* Paxt., Mag. Bot. 15, 221, 1849; — *Th. alata* var. *velutina* Brem. in Verh. Kon. Ned. Akad. v. Wetensch., Afd. Natuurk., 2^e Sect. 45, No. 2, 8, 1948.

Herba volubilis. Caulis bisulcatus, primum in subsp. *alata* pilis patentibus satis longis dense pubescens et in subsp. *reticulata* pilis retrorsis strigoso-pubescens, ultimo sulcis exceptis plus minusve glabrescens. Folia petiolo alato, pilis subpatentibus densius pubescente, 2–3 cm longo instructa; lamina ovato-sagittata vel ovato-subhastata, 2.5–5 cm longa et 2–4 cm lata, apice acuta et mucronata, basi sagittata vel subhastata, lobis obtusis vel subacutis, plus minusve distincte mucronulatis, margine ceterum plerumque integra, rarius utroque latere dentibus uno vel duobus brevibus et latis munita, sicc. supra saturate, subtus dilute olivaceo-brunnea, in subsp. *alata* utrimque molliter pubescens, in subsp. *reticulata* primum supra pilis brevibus cum pilis aliquibus longioribus mixtis densius strigosa, deinde pilis dejectis scabrida, subtus primum dense, deinde sparsius pubescens, 5-nervia, nervis e costa orientibus utroque latere 1 vel 2, inter nervos dense reticulata. Pedicellus in subsp. *alata* pilis patentibus densius pubescens, in subsp. *reticulata* sparse pubescens, 2.5–6 cm longus. Bracteolae ovatae vel ovato-lanceolatae, 1.4–2.0 cm longae et 0.7–1.3 cm latae, 7-nerviae, extus intusque in subsp. *alata* densius pubescentes, in subsp. *reticulata* plerumque sparse pubescentes. Calyx extus puberulo-pubescens, in dentes inaequales circ. 10 productus, dentibus longioribus 1.5 mm longis. Corolla tubo 3.5 mm, fauce 15 mm longis, limbo circ. 40 mm diam., lobis late obovatis, fauce rugula instructo, limbo plerumque aurantiaco et ad orem saturate vinaceo, interdum luteo (var. *Fryeri* Vilm.) vel albo (var. *albiflora* Hook.) et ad orem lilacino vel toto luteo (var. *lutea* Hook.) vel albo. Filamenta glabra, omnia circ. 4 mm longa; antherae mucronatae 3.5 et 4 mm longae, thecis ad basin et ad fissuram barbatis. Granula pollinis 45 μ diam. Ovarium glabrum; stylus 8 mm longus, glaber; stigma ad medium faucem inclusum, lobis 1.5 et 2.5 mm longis et 2.0 et 1.2 mm latis, ambobus conduplicatis, superiore erecto, inferiore patente. Capsulae pars seminifera 8–10 mm diam. et 6–7 mm alta; rostrum 10–12 mm longum et basi 3.5 mm latum. Semina facie dorsali reticulata.

Habitat Africam Tropicalem Orientalem. In regionibus tropicalibus, subtropicalibus et temperatis totius orbis culta et in regionibus tropicalibus haud raro ex hortis evasa et graecisans.

subsp. *alata*, caule pilis patentibus satis longis primum dense pubescente foliis utrimque molliter pubescentibus, pedicello pubescentia cum caule quadrante, bracteolis extus intusque densius pubescentibus noscenda.

Malay Peninsula: Selangor, Batang Berjuntai Forest Reserve, Hume 7435 SING; Singapore, Beccari 7169 FI

Riau Archipelago: P. Bintan, Bünнемeyer 6400 BO, SING, L

Sumatra: East Coast, Medan, Lörzing 3500 et 3665 BO; Lake Toba, alt.

700 m, id. 8833 BO; West Coast, Merapi, alt. 850 m, Bünнемeyer 4816 BO, L; Fort de Kock, alt. 920 m, id. 1316 BO, Jacobson 4 BO ("escaped from my garden").

Bangka: P. Pinang, Bünнемeyer 2122 BO, L; Muntok, id. 1535 BO, L; Aer Mesar, van der Vecht 3 BO

Borneo: North Borneo, Sandakan, Wood 800 SING, L, id. 865 SING, Creagh 17.4.95 K; s.l. Agama 470 L; Western Division, Mengkatji, de Mol 145 BO

Java: Bantam, Djampang Koelon, alt. 100 m, Backer 17331 BO; Djakarta, Djasinga, id. 10208 BO, SING; Bogor, Hallier 24^b NY, Schiffner 2575 L; Priangan, Soekaboemi, alt. 800 m, Backer 14758 BO; Tjibadak, alt. 380 m, id. 568 BO; Garoet, alt. 1250 m, id. 5464 BO, L; Pandeglang, alt. 250 m, id. 14232 BO; Banjoemas, Rawah Lakbok, alt. 40 m, id. 4333 BO; Soembing, Katjepit, alt. 1300 m, Lörzing 263 BO; Semarang, Lingga Djatti, alt. 500 m, Backer 5013 BO; Tjimahi, alt. 750 m, v. Slooten 324 BO; Salatiga, alt. 570 m, Backer 30134 BO; Pekalongan, Soebah, Koorders 36837 BO; Pasoeroean, Bodo, alt. 900 m, Wisse 306 BO; Gendro, alt. 1000 m, Mousset 116 L, FI; Besoeki, Poeger, alt. 0 m, Koorders 20402 BO, SING, L; Djember, Ultée 14 BO; Bondo, Ottolander 389 BO

Celebes: Menado, Amoerang, Koorders 15834 BO, L; Kota Menado, id. 15835 BO

Philippines: Luzon, Benguet, Baguio, Ramos and Edaña B. Sc. 45076 SING, G, BM

Ternate: Ternate, alt. 0 m, Beguin 808 BO

Moluccas: Ambon, Wai Batoe Gadja, alt. 50 m, Kornassi 1126 BO; Benteng, Rant 514 BO; s.l. Binnendijk s.n. BO, Warburg 17476 NY

New Guinea: South-western part, Babo, Mc Cluergulf, Aet 695 L; Papua, Kanosia, Carr 11124 NY, L

New Caledonia: Paita, Schlechter 14855 BO.

subsp. *reticulata* (Hochst. ex Nees) Brem. n. comb.; *Th. reticulata* Hochst. ex Nees in DC, Prodr. 11, 58, 1847; A. Rich., Tent. Fl. Abyss. 2, 139, 1851 p.p; *Th. alata* Boj. ex Sims var. *reticulata* Burkill in Fl. Trop. Afr. 5, 17, 1899.

Caule primum pilis retrorsis strigoso-pubescente, foliis primum supra pilis brevibus cum pilis paucis longioribus mixtis densius strigosis, deinde scabridis, subtus primum dense, deinde sparse pubescentibus, pedicello bracteolisque sparse pubescentibus a subsp. *alata* distinguenda.

Malay Peninsula: Kuala Lumpur, Symington 18181 SING; Negri Sembilan, Serumban, Malvins 1986 SING; Singapore, Bot. Gard. cult., Md Nur s.n. SING, Holttum s.n. SING; Furtado s.n. SING; Singapore Island, Hullett 258 SING.

Sumatra: East Coast, Karo Plateau, Kabandjahe, alt. 1225 m, Rahmat 676 SING, Lörzing 6213 BO, L; Lake Toba, id. 9848 et 10105 BO, Burkill 134 SING; Asahan, Boenoet, alt. 100 m, Yates 1257 UC, L; Palembang, Lahat, Verboom 28 L; Kota Palembang, alt. 3 m, de Raadt 30 et 31 L; Border Palembang — Benkoelen, Dempo, alt. 700 m, Huitema 87 BO (i)

Java: Bantam, Pandeglang, alt. 250 m, Backer 7516 L; Djakarta, Djakarta, id. 34826 et 34827 BO, Vorderman s.n. BO; Bogor, cult. in hort. bog., Hallier 51 BO, cult. X F 93 BO, L, cult. X F 95 BO, L, cult. X F 96^a BO, L, cult. X F 98^a BO, L, cult. X F 99 BO, Boerlage s.n. L, Hallier 246 et 246^a BO, Schiffner 2584 L, SING; Batoe Toelis, Raap 2 L; Bolang, Backer 4133 BO; G. Salak, alt. 900 m, Raap 156 L, Kota Batoe, de Monchy s.n. BO; Tjibodas, alt. 1200 m, Koorders 31614, BO; Sindanglaia, Holstvoogd 47 L, Telaga Warna, Sapiin s.n. BO; Priangan, Tjandjoer, alt. 450 m, Backer 3123 Bo; Tjidadap, Tjibeber, alt. 1000 m, cult., Bakhuizen v. d. Brink 1807 BO; Togogapoe, alt. 600 m, Lörzing 1108 BO; Tasikmalaja, alt. 720 m, Koorders 47980 BO; Garoet, alt. 800 m, Koents 404 BO; Lembang, Backer. 34828 et 34829 BO, Popta 43 BO, Karsten 83 L; Bandjar, Backer 34825 BO; Semarang, Selokaton, Loogen 6 BO; Salatiga, cult., Docters v. Leeuwen-Reynvaan s.n. BO; Kediri, G. Kawi, Gadengan, alt. 200 m, Koorders 23882 BO, L

Philippines: Luzon, Manila, Merrill 14 BO, SING, K, NY, US, id. 288 Fl; Prov. Bataan, Foxworthy B. Sc. 1612 US, Fl, Curran For. Bur. 19143 BO, L, NY, US

Moluccas: Ambon, s.l., Robinson 1788 BO, L, K, US.

Of both subspecies a number of colour varieties occur; the corolla limb may be orange, yellow, ivory or white, and a dark centre may be present or absent. Of the subsp. *alata* moreover a variety with white-bordered leaves (var. *Dodsii*) is known. Sometimes specimens are met with that are more or less intermediate between the two subspecies; they have been marked with an i between brackets; they may be of hybrid origin.

The differences between *Th. alata* and *Th. Gregorii* and those between these two species and the winding herbs belonging to the subgenus *Adelphia* have been discussed under *Th. Gregorii*.

Subgenus *Hexacentris* Bth. et Hook.f. emend. Brem.

7. *Thunbergia coccinea* Wall., Tent. Fl. Nep. 1, 49 et 58, t. 37, 1824; Don, Prodr. Fl. Nep. 129, 1825; Lodd., Bot. Cab. t. 1195, 1826; Hook. in Bot. Mag. t. 5124, 1859; T. And. in Journ. Linn. Soc. 9, 448, 1868; Planchon in Fl. d. Serres, Sér. 2, 13 t. 2447/8, 1880; Clarke in Hook.f., Fl. Brit. Ind. 4, 393, 1884, Lindau in Bot. Jahrb. 17, Beibl. 41, 42, 1893; Koorders,

Exkursionsfl. v. Java 3, 213, 1912; Benoist in Fl. Gén. Indo-Chine 4, 618, 1935; *Hexacentris coccinea* (Wall.) Nees in Wall., Pl. As. Rar. 3, 78, 1832; id. in DC, Prodr. 11, 61, 1847; Miq., Fl. Ind. Bat. 2, 769, 1858;—*H. dentata* Nees in Wall., Pl. As. Rar. 3, 78, 1832 et in DC, Prodr. 11, 61, 1847;—*H. acuminata* Nees in Wall., As. Rar. 3, 78, 1832 et in DC, Prodr. 11, 61, 1847 quoad specimen a Gomez in Silhet lectum;—anne *Thunbergia pendula* Hassk., Cat. Hort. Bog. alter 147, 1844 et *Hexacentris pendula* (Hassk.) Hassk., Pl. Jav. Rar. 499, 1948 incertum sed probabile.

Frutex scandens, usque ad 25 m altus, gemmis et alabastris exceptis glaber. Caulis vix notabile quadricostulatus. Folia majora petiolo bicos-
tulato, usque ad 8 cm longo instructa, minora subsessilia; lamina ovato-
lanceolata, usque ad 20 cm longa et 10 cm lata, foliorum superiorum quae
gradatim in bracteas vergent sensim minor, foliorum omnium apice
acuminata, basi cordata vel rotundata, margine sinuosa vel remote et grosse
dentata, utrimque opaca, 3-, 5- vel rarius 7-nervia, nervis medianis in
apicem excurrentibus, nervis e costa orientibus utroque latere 4 vel 5.
Racemi penduli; rachis ex internodiis gradatim longitudine decrescentibus
constituta, internodiis basalibus ab internodiis precedentibus vix distinctis.
Bracteae inferiores foliaceae, usque ad 3 cm longae et 1.5 cm latae, foliis
precedentibus paulo minores; bracteae aliae gradatim magnitudine decres-
centes et plerumque mox deciduae. Flores haud raro plures superpositi.
Pedicelli 1—2.5 cm longi. Bracteolae oblongae, 1.5 cm longae et 0.7 cm latae,
acutae, margine undulatae, 7-nerviae. Corolla rubra vel rubro-aurantiaca,
inter tubum et faucem contracta, tubo 5 mm longo, fauce 20—30 mm
longo et 7 mm diam., facie dorsali rugula et facie ventrali palato indistincto
instructa, lobis suborbicularibus 7 mm longis. Filamenta 19 et 20 mm
longa; antherae breviter exsertae mucronatae, thecis 5 et 6—7 mm longis,
minime longioribus basi in calcaria usque ad 4.5 mm longa exeuntibus,
basin versus ad fissuram barbatis. Granula pollinis 54 μ diam. Inter
stamina interiora interdum staminodium minimum observandum. Ovarium
et stylus glabri. Stigma ad orem faucis inclusum, lobis subaequalibus,
conduplicatis. Capsula glabra; pars seminifera 10 mm diam. et 10 mm alta;
rostrum 25 mm longum et basi 6.5 mm latum.

Habitat regiones montanas Indiae Septentrionalis et Indo-Chinae Sep-
tentrionalis. In Horto Botanico Tjibodensi (Java) culta et ex horto in
silvam vicinam evasa.

Java: Tjibodas, alt. 1420 m, Koorders 42131 BO, L., den Berger s.n. BO, L.

Thunbergia pendula Hassk. is known only from the Botanical Garden,
Bogor, where it has maintained itself for a long time, regularly producing
racemes consisting of a rachis beset with empty bracts. In the absence of
flowers it is, of course, extremely difficult to identify this plant, but it so
closely resembles *Th. coccinea* that there can hardly be any doubt that it
belongs to that species. It has been suggested that it might belong to
Th. mysorensis (Wight) T.And., whose vegetative parts are very similar to
those of *Th. coccinea*, but it seems hardly probable that *Th. mysorensis*

would have been introduced into the Buitenzorg Botanical Garden at such an early date. If the plant is still alive, the problem could probably be solved by transplanting part of it into the mountain garden at Tjibodas. The hot climate of Bogor apparently does not suit it.

8. *Thunbergia grandiflora* (Roxb. ex Rottl.) Roxb. in Lodd., Bot. Cab. t. 324, 1819; Roxb. in Bot. Reg. t. 495, 1820, Sims in Bot. Mag. t. 2366, 1822; Roxb., Fl. Ind. 3, 34, 1832; Nees in Wall., Pl. As. Rar. 3, 77, 1832; Wight, Ic. 3 t. 872, 1843/1845; Nees in DC, Prodr. 11, 54, 1847 p.p.; Miq., Fl. Ind. Bat. 2, 769, 1858; T.And. in Journ. Linn. Soc. 9, 447, 1866; Kurz, For. Fl. 2, 240, 1877; Clarke in Hook. f., Fl. Brit. Ind. 4, 392, 1884 (syn. *Th. cordifolia* Nees excl.); non Lindau in Bot. Jahrb. 17, Beibl. 41, 39, 1893 quae est *Th. cordifolia* Nees; Boerl., Handl. Fl. Ned. Ind. 2, 655, 1899; Clarke in Journ. As. Soc. Beng. 72, 631, 1908; Koorders, Exkursionsfl. v. Java 3, 213, 1912; id. Syst. Verz. I, § 1, 6, 40, 1912; Ridl., Fl. Mal. Pen. 2, 357, 1923; Backer, Onkruidfl. Suikerrietgr. 644, 1934; *Flemingia grandiflora* Roxb. ex Rottl. in Nov. Act. Nat. Cur. 4, 202, 1803;—*Thunbergia borbonica* Lindau in Bot. Jahr. 17, Beibl. 41, 42, 1893.

Frutex ramosior, alte scandens, stolonibus vagans. Caulis ramique quadricostulati, in var. *grandiflora* primum densius pubescentes, deinde plus minusve glabrescentes, in var. *spaniotricha* ab initio glabri, ad nodos et praesertim infra nodos pustulati. Folia petiolo costulato, usque ad 9 cm longo, in var. *grandiflora* pilis retrorsis breviter sed densius pubescente, in var. *spaniotricha* subglabro instructa; lamina cordata et palmatiloba, 5—10 cm longa et 6—13.5 cm lata, utroque latere petioli sinu obtuso retracta, margine in lobos 5 vel 7 late deltoideos, mucronatos producta, herbacea, paulum discolor, sicc. olivaceo-brunnea, utrimque opaca, supra in var. *grandiflora* pilis basi bulbosis sparse scabrido-pubescentibus, in var. *spaniotricha* scabridula, subtus in var. *grandiflora* costa nervisque densius, inter nervos sparse pubescens, in var. *spaniotricha* glabra, plerumque 5- vel 7-nervia, nervis e costa orientibus utroque latere 1 vel 2. Flores aliqui in axillis foliorum solitarii, alii in racemos dispositi; bractee racemorum haud raro flores 2—4 superpositos suffulgentes; flores in racemos dispositi semper floribus axillaribus foliis parvis apicem versus gradatim minoribus suffultis praecessi; bractee florum aliorum parvae, ovatae, apice longe acuminatae. Pedicelli florum axillarum usque ad 13 cm longi, florum in racemos dispositorum plerumque 4—5 cm longi, in var. *grandiflora* dense puberulo-pubescentes, in var. *spaniotricha* ad apicem solum sparse puberulo-pubescentes. Bracteolae oblongae, 2.5—3 cm longae et circ. 1.5 cm latae, apice acuminatae, extus in var. *grandiflora* dense puberulo-pubescentes vel velutinae, in var. *spaniotricha* subglabrae, in varietatibus ambabus pustulatae, facie adaxiali non cohaerentes, 7- vel 9-nerviae. Corolla tubo et fauce alba, limbo in var. *grandiflora* coerulea vel violaceo-coeruleo, in var. *spaniotricha* albo vel dilute violaceo, intus ad orem pilis capitatis brevibus punctata, tubo 7 mm longo, fauce 22—25

mm longa et 18—22 mm diam., facie dorsali rugula instructa, facie ventrali palato vix conspicuo, lobis rotundatis et interdum paulum emarginatis 18—25 mm longis. Filamenta basi geniculata et incrassata 8—10 mm longa; antherae ad medium faucem inclusae, apice subacutae, thecis spinis exclusis 8 mm longis, ad fissuram barbatis; antherae alterae calcaribus duobus 1—2 mm et 3 mm longis, alterae calcare singulo 2.5—3 mm longo armatae, calcaribus longioribus apice curvatis, nullis spinulosis. Granula pollinis 68 μ diam. Ovarium subglabrum; stylus glaber 24 mm longus; stigma paulo infra orem inclusum, lobis subaequalibus, conduplicatis, inferiore superiorem amplectente. Capsula puberula; pars seminifera 13 mm diam. et 14 mm alta; rostrum 35 mm longum et basi 6.5 mm latum.

Habitat Indiae et Indo-Chinae partes septentrionales. In regionibus tropicalibus totius orbis in hortis culta.

var. **grandiflora**, caule ramisque primum densius pubescentibus, foliis subtus costa nervisque densius, inter nervos sparse pubescentibus, pedicellis totis dense puberulo-pubescentibus, bracteolis dense puberolu-pubescentibus, corollae limbo coeruleo vel violaceo-coeruleo noscenda.

Malay Peninsula: Penang, Botanical Garden; Singapore

Riau Archipelago: P. Bintan

Sumatra: Medan; Asahan

Borneo: Sandakan

Java: Bogor, Botanical Garden; Tjiomas; Tjibeber; Bandoeng; Banjoemas; Bagelen

Philippines: Luzon, Laguna

Amboina: Ambon.

var. **spaniotricha** Brem. n. var.

Caule ramisque glabris, foliis supra scabridulis, pedicellis apice solum sparse pubescentibus, bracteolis subglabris, corollae limbo albo vel dilute violaceo a var. *grandiflora* recedens.

Malay Peninsula: Perak, Batu Gajah; Selangor, Kuala Lumpur, Public Garden; Singapore, Botanic Garden, Nur s.n. SING, BO, K, NY, typus varietatis.

Java: Bogor; Soerabaja.

The var. *grandiflora* is in Java always sterile, the var. *spaniotricha* fertile. As CAMERLOHER (in Oesterr. Bot. Zeitschr. 76, 57—58, 1927) has shown, the sterility of the var. *grandiflora* rests on self-incompatibility. After the introduction of a new specimen from the Botanical Garden, Calcutta, the plants in the Botanical Garden, Bogor, at once began to produce fruits. The plants that up to that time were grown in Java were probably all obtained by vegetative propagation from a single specimen originally introduced into the Botanical Garden, Bogor.

The var. *grandiflora* is easily grown from cuttings, and once rooted it spreads by means of stolons. This explains that it is sometimes found on sites that were at one time inhabited but have for a long time been deserted.

Th. grandiflora is a very near ally of the next species, which has some-

times been regarded as a mere variety. It differs from it in the shape of the leaves, in the greater length of the pedicels and in the nature of the spurs at the base of the anthers, which in *Th. laurifolia* are at least at the base beset with small spinules. The affinity of these species with the red-flowered *Th. coccinea* is but remote. The flowers are much larger, and the filaments are relatively shorter, the anthers being included in the middle of the throat instead of partly exerted.

9. *Thunbergia laurifolia* Lindl. in Gard. Chron. 1856, 260; Hook. in Bot. Mag. t. 4985, 1857; Miq., Fl. Ind. Bat. 2, 769, 1858; T. And. in Journ. Linn. Soc. 9, 447, 1866; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4, 392, 1884; Lindau in Bot. Jahrb. 17, Beibl. 41, 43, 1893; Boerl., Handl. Fl. Ned. Ind. 2, 655, 1899; C. B. Clarke in Journ. As. Soc. Beng. 74, 631, 1907; Koorders, Exkursionsfl. v. Java 3, 213, 1912; Ridl., Fl. Mal. Pen. 2, 556, 1923; *Th. grandiflora* (Roxb. ex Rottl.) Roxb. var. *laurifolia* (Lindl.) R. Ben. in Fl. Gén. Indo-Chine 4, 618, 1935;—*Th. Harrisii* Hook. in Bot. Mag. t. 4998, 1857;—*Hexacentris acuminata* Nees in DC, Prodr. 11, 54, 1847 quoad specimen a cl. Griffith in Mergui lectum.

Frutex ramosior, alte scandens, subglaber. Caulis ramique vix notabile quadricostulati, ad nodos et praesertim infra nodos pustulati. Folia majora petiolo usque ad 6 cm longo, pustulato instructa; folia superiora minora haud raro subsessilia; lamina ovato-lanceolata vel oblonga, 5.5—18 cm longa et 1.7—8.3 cm lata, apice caudato-acuminata et longius mucronata, basi rotundata vel interdum in foliis aliquibus subcordata vel subhastata, margine integra vel remote dentata, subcoriacea, facie superiore et in nervis venulisque facies inferioris pustulata, 3- vel rarius 5-nervia, nervis e costa orientibus utroque latere 3—5. Flores aliqui in axillis foliorum solitarii, alii in racemos dispositi; bracteae racemorum haud raro flores 2 vel 3 superpositos suffulgentes; flores in racemos dispositi floribus axillaribus foliis parvis sessilibus, apicem versus gradatim minoribus suffultis praecessi; bracteae florum aliorum plerumque mox deciduae. Pedicelli usque ad 2 cm longi. Bracteolae oblongae, 2.5—3.5 cm longae et 1.5—2.5 cm latae, apice acuminatae, facie adaxiali cohaerentes, ad marginem apicem versus dense puberulae, ceterum sparse puberulae et sparse pustulatae, 9-nerviae. Corolla tubo et fauce alba, limbo coerulea, intus ad orem pilis capitatis brevibus punctata, tubo 7 mm longo, fauce 25—32 mm longo et circ. 25 mm diam., facie dorsali rugula instructo, facie ventrali palato colore aurantiaco interdum conspicuo, lobis rotundatis 20—30 mm longis. Filamenta basi geniculata et incrassata 9—11 mm longa; antherae ad medium faucem inclusae, apice acutae, thecis calcaribus exclusis 7 mm longis, ad fissuram barbatis; antherae alterae calcaribus 2.7 et 3.2 mm longis, alterae calcaribus 1.0 et 2.5 mm longis armatae, calcaribus longioribus ad basin, calcaribus brevioribus totis breviter spinulosis. Granula pollinis 54 μ diam. Ovarium et stylus glabri; stylus 26 mm longus; stigma paulo infra orem inclusum, lobis subaequalibus. Capsula glabra; pars

seminifera 14 mm diam. et 13 mm alta; rostrum 28 mm longum et basi 6.5 mm latum.

Habitat Indo-Chinam et Peninsulam Malayanam. In regionibus tropicalibus totius orbis culta.

Lower Siam: West Coast, Namchuk, Kloss 6672 K; Tazan, id. 6869 K
 Malay Peninsula: Perlis, Lankawi, Fox 12694 SING, Curtis Sept. 90 SING, Ridley 12694 BM; Kedah, Kg Maka, Holttum 6.9.33 SING; Penang, Gapis Pass, Curtis May 1892 SING; Perak, Bt Padang, Ridley s.n. SING; Kuala Kangsan, id. March 1892 SING; Haniff SF 15563 SING; Ulu Selama, Yapp 620 K; G. Booboo, King's coll. 8418 SING; Kelantan, Kuala Aring, id. 50 K; Kota Bahra, Ridley Febr. 16, 1917 K; Chaning, id. Febr. 1917 K; Pahang, Tembeling, Holttum s.n. SING; Telom valley, Kiah & Strugnell 23957 SING, NY; Tahang River, coll. ign. s.n. SING; Pulau Manis, Ridley 2172 SING, BM; Kuala Lipis, Burkill & Haniff 15763 SING; Kuala Tahan, Seimund 802 SING; Kuala Tekam, Evans 13213 SING, K; Malacca s.l. (cult.), Maingay 1755 K; Singapore (cult.), Furtado 34883 SING, Nur s.n. SING

Java (cult.): Djakarta, Matraman, Backer 34122, 34123 et 34124 BO, L; Bogor, Bot. Gard.; Sindanglaia, alt. 1075 m, Backer 13743, 22248 et 31260 BO; Semarang, Docters v. Leeuwen—Reynvaan s.n. BO

Philippines (cult.): Luzon, Bataan, Merrill 7592 L, US; Laguna, Mabesa, For. Bur. 26313 US; ibid. Mt Makiling, alt. 50 m, Canicosa PNH 9726 PNH.

Th. laurifolia is a very near ally of *Th. grandiflora*, but the points in which it differs from the latter are so numerous that it can hardly be doubted that it should be regarded as more than a mere variety of this species. In how far all the Indo-China material that has been referred to *Th. laurifolia*, really belongs to it, is at the moment difficult to say, but the material collected in the Malay Peninsula is sufficiently uniform to be regarded as conspecific. None of the plants I have seen is throughout provided with subsessile leaves, the distinctive character of *Th. Harrisii* Hook., but as this applies also to the plant preserved under this name in the Kew Herbarium, it seems that this species can safely be reduced to *laurifolia*.

The delimitation of *Th. grandiflora* is certainly not yet fully satisfactory, and further study of material collected in various parts of the area from which it has been reported as endemic, may very well lead to the distinction of quite a number of different species. The plants for which I created the var. *spaniotricha* may also deserve specific rank, but in view of its very close resemblance to the type of *grandiflora*, it seemed for the moment more prudent to regard it as a variety. With regard to the varietal name, it might perhaps be objected that I should have adopted the name *alba* which, as Dr B. K. BOOM kindly informed me, was used for the first time in Ill. Hort. 1896 p. 295 (probably by RODIGAZ) and subsequently by BEDDOME in Journ. Royal Hort. Soc. 34, 94, 1908, but as the description

is in the first instance confined to the words "fleurs blanches" and in the second case to "flowers white" and as I have been unable to find type specimens, it is impossible to say whether the plants to which this name was applied, really belonged to the systematic unit for which I introduced the varietal name *spaniotricha*, and for this reason it seemed better to drop the varietal epithet *alba*.

Subgenus *Hyphenophora* Brem.

10. *Thunbergia natalensis* Hook. in Bot. Mag. t. 5087, 1858, C. B. Clarke in Fl. Cap. 5, (1), 4, 1901.

Herba robustior, circ. 0. 60 m alta, ramosa. Caulis obtuse quadrangularis et quadrisulcatus, ad nodos dense pubescens, inter nodos pilis aliquibus sparsus, sicc. stramineus, basi lignescens. Folia petiolo 1—2 mm longo, subtus pubescente instructa; lamina ovata 4.5—9 cm longa et 2.2—5.4 cm lata, apice acuta et mucronata, basi subcordata, margine vix notabile et remote sinuoso-dentata, paulum discolor, sicc. olivacea, supra primum pilis paucis sparsa sed mox glabrescens, subtus costa nervisque basin versus pubescens, 5-nervia, nervis e costa orientibus utroque latere 2. Flores in axillis solitarii. Pedicellus pilis perpaucis sparsus vel glaber, 3—4 cm longus. Bracteolae lanceolatae, 2.5 cm longae et 0.8—1.0 cm latae, acutae, glabrae, 5-nerviae, nervis exterioribus aliis multo brevioribus. Calyx 5-dentatus, dentibus late triangularibus, obtusis, 0.7 mm longis. Corolla tubo et fauce alba, limbo violacea, extus pilis capitatis longioribus sparsa, intus pilis capitatis brevibus punctata, tubo 7.5 mm, fauce 32 mm, lobis 20 mm longis, fauce facie ventrali ad medium incurvato et subintruso. Filamenta aequilonga 10 mm longa, glabra; antherae apice longius mucronatae, 3 mm longae, thecis paulum inaequalibus, altera basi calcare recurvato 1 mm longo armata. Granula pollinis 50 μ diam. Ovarium glabrum; stylus glaber; stigma ad medium faucem inclusum, basi late infundibuliforme et utroque latere fasciculo pilorum patentium instructum, lobo superiore lobum inferiorem multo breviorum in alabastro amplectente. Capsula papillosa; pars seminifera 13 mm diam. et 7 mm alta; rostrum 19 mm longum et basi 5 mm latum.

Habitat Transvaliam Orientalem et Nataliam; in horto botanico bogoriensi et in horto botanico tjiobodensi culta.

Th. natalensis is an erect herb and therefore easily distinguishable from all its allies that are found either wild or cultivated in the area under survey, for these are either herbaceous or woody climbers or else shrubs. It is also distinguishable by those characters on account of which it is recognized as a representative of the subgenus *Hyphenophora*, viz. the whiskered infundibuliform stigma and the short, strongly recurved spur at the base of the anther.

Subgenus *Adelphia* Brem.

11. *Thunbergia fragrans* Roxb., Cor. Pl. 1, 47, t. 67, 1795; Willd., Sp. Pl. 3, 388, 1800; Roxb., Fl. Ind. 3, 33, 1832; Nees in Wall., Pl. As. Rar. 3, 77, 1832 quoad typum; id. in DC, Prodr. 11, 57, 1847 quoad typum; T. And. in Journ. Linn. Soc. 9, 448, 1866 quoad typum; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4, 390, 1884 quoad typum; Trimen, Fl. Ceyl. 3, 288, 1895 quoad typum; Cooke, Fl. Bombay 2, 342, 1905 quoad typum; Gamble, Fl. Madras Pres. 1007, 1923 quoad typum; Santapau in Univ. of Bombay Mem., no. 2, 8, 1951 p.p.

Caulis pilis retrorsis primum dense, deinde sparse strigosus, sicc. brunescens. Folia petiolo sparse sed longius pubescente 1.8–4.0 cm longo instructa; lamina ovata, 2–7 cm longa et 2.5–5.5 cm lata, apice obtusa et mucronata, ad basin plerumque utroque latere in lobos 2 patentes obtusos et vix conspicue mucronulatos producta, subconcolor, sicc. brunescens, primum utrimque pilis brevibus cum pilis aliquibus longioribus mixtis densius pubescens, deinde supra scabridula et subtus costa nervisque solum pubescens, 5-nervia, nervis utroque latere e costa orientibus plerumque 3. Flores in axillis plerumque solitarii. Pedicellus 4–5.5 cm longus, apicem versus pubescens. Bracteolae ovatae, 10–14 mm longae et 5–8 mm latae, acutae, costa nervisque pilis satis longis strigosae. Calyx in dentes circ. 10 inaequales, puberulos productus; dentes longiores 2.5 mm longi. Corolla tubo 5 mm, fauce 19 mm, lobis 15 mm longis. Filamenta breviora 6 mm, longiora 12 mm longa; antherae 3 mm longae, apice vix notabile 2-denticulatae et inter denticulos longius mucronatae; thecae basi callosae. Granula pollinis 45μ diam., protuberantiis 7μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum vel partim exsertum. Capsula glabra; pars seminifera 10 mm diam. et 7 mm alta; rostrum 15 mm longum et basi 4.5 mm latum. Semina facie ventrali laevia; hilum magnum.

Habitat Peninsulam Indicam et Ceylaniam. In hortis botanicis interdum culta sed raro ex hortis evadens.

Philippines: Luzon, Zambales, Mt Pinatabo, alt. 200 m, Fox PNH 4792 PNH.

Although the label of the specimen quoted above gives us no information with regard to the way in which this species may have reached Luzon, there can in my opinion be little doubt that it has escaped from cultivation.

Most of the authors quoted above accept in the subgenus *Adelphia* but two species, viz. *Th. fragrans* Roxb. and *Th. tomentosa* Nees, of which the first would be distributed over Ceylon and India to Burma or even to Australia, but the number of species is doubtless much larger, and the true *Th. fragrans* seems to be confined to the Indian Peninsula and Ceylon. It should be noted that ROXBURGH'S specimens in the Kew Herbarium and in the herbarium of the British Museum were collected in the Calcutta Botanical Garden and do not agree with the plant figured in ROXBURGH'S "Plants of the Coast of Coromandel" and can therefore not be regarded

as types; they apparently belong to a different though closely related species. Among these closely related species only two seem to have been described from India, viz. *Th. laevis* Nees and *Th. wallichiana* Gdyl. The difference between *Th. laevis* and *Th. fragrans* was generally recognized, though most authors regarded it as subspecific only, but this was due to the fact that they took *Th. fragrans* too wide so that most of its characters became too vague to be of diagnostic value. If *Th. fragrans* is accepted in the delimitation given to it above, the differences with *Th. laevis* prove to be numerous and well-marked, and there can be no doubt that the latter deserves specific rank. These differences are found in the nature of the indumentum, in the shape of the leaves, in the number of calyx teeth and in the extent to which these teeth vary in length, in the size of the corolla lobes, in the length of the filaments and the shape of the anther top, in the size of the pollen grains and in the width of the hilum. Both species resemble the species found in the western part of the Malesian area in the absence of distinct ribs or wrinkles on the ventral side of the seed, but they differ from them in the greater length of the filaments and in the more deeply divided stigma.

12. **Thunbergia laevis** Nees in Wall., Pl. As. Rar. 3, 77, 1832; id. in DC, Prodr. 11, 56, 1847; *Th. fragrans* Roxb. var. *laevis* (Nees) C. B. Clarke in Hook.f., Fl. Brit. Ind. 4, 391, 1884;—*Meyenia longiflora* Bth. in Flora 32, 558, 1849.

Caulis pilis retrorsis primum strigosus, mox glabrescens, sicc. brunescens. Folia petiolo primum sparse striguloso, mox glabrescente 1.5—4.5 cm longo instructa; lamina ovata vel ovato-oblonga, 3.5—5.5 cm longa et 1.8—4 cm lata, apice acuta et mucronata, basi plerumque utroque latere in lobum subpatentem apice mucronulatum producta, paulum discolor, sicc. olivacea vel olivaceo-brunnea, supra primum pilis brevissimis puberula, mox pilis rejectis scabridula, subtus primum costa sparse pubescens, mox tota glabrescens, 5-nervia, nervis utroque latere e costa orientibus 2 vel 3. Flores nunc solitarii, nunc duo superpositi. Pedicellus 4—8 cm longus, apicem versus vix notabile strigosus. Bracteolae ovatae, 10—12 mm longae et 6—7 mm latae, acutae, costa nervisque densius strigulosae. Calyx in dentes 12 subaequales, 2 mm longos, margine papillosos productus. Corolla tubo 4 mm, fauce 18 mm, lobis 21 mm longis. Filamenta breviora 5 mm, longiora 11 mm longa; antherae 3 mm longae, apice rotundatae et mucronulatae; thecae basi callosae. Granula pollinis 55 μ diam., protuberantiis 9 μ altis sparsa. Ovarium puberulum; stigma vix notabile exsertum. Capsula puberula; pars seminifera 10 mm diam. et 6 mm alta; rostrum 13 mm longum et basi 5 mm latum. Semina facie ventrali laevia; hilum mediocre.

Habitat Peninsulam Indicam et Ceylaniam. In hortis botanicis haud raro culta et interdum ex hortis evadens.

Malay Peninsula: Singapore, Tyersall Road, Sinclair s.n. L; Pulau Ubin,

Bt Macao, Furtado S. F. 18345 SING, UC; Botanical Garden, running wild.

Th. laevis is more often cultivated in botanical gardens than *Th. fragrans*, and has escaped more often into the surrounding region. In fact most of the specimens that were collected in such localities and that in the literature have been referred to *Th. fragrans* prove to belong to *Th. laevis*.

The differences between *Th. laevis* and *Th. fragrans* and the way in which these two introduced species can be distinguished from the species that are endemic in the Malesian area have been dealt with in the note attached to the description of *Th. fragrans*.

13. *Thunbergia trachychlamys* Brem. n. spec.

Caulis primum sparse pubescens, mox glabrescens, sicc. vix notabile discoloratus. Folia petiolo primum sparse pubescente sed mox glabrescente 1—4 cm longo instructa; lamina foliorum majorum ovato-lanceolata, 6—9 cm longa et 3—4.5 cm lata, apice acuta vel subacuminata, basi cordata et plerumque plus minusve hastata, foliorum minorum ovato-oblonga, 3—6 cm longa et 1.3—2.7 cm lata, apice semper acuta et basi acuta, obtusa vel rotundata, foliorum omnium margine plerumque crispula, utrimque glabra vel supra scabridula, discolor, sicc. supra dilute olivaceo-viridis, subtus griseo-viridis, 5- vel rarius 7-nervia, nervis 3 medianis quam aliis crassioribus, lobis basalibus plerumque ramo nervi exterioris precursis, nervis e costa orientibus utroque latere 1—3 cum nervis lateralibus principalibus arcuatim connectis. Flores solitarii. Pedicellus 2.5—7 cm longus, glaber. Bracteolae ovatae, 12—18 mm longae et 6—9 mm latae, acutae et mucronatae, margine crispulae, basin versus carinatae, nervis et margine pilis longis hirsuto-ciliatae, 5-nerviae, post anthesin deciduae. Calyx in dentes 13 inaequales, subobtusos, margine vix conspicue papillosos productus; dentes longiores 1.8 mm longi. Corolla tubo 5 mm, fauce 18 mm, lobis 15 mm longis. Filamenta breviora 3 mm, longiora 7.5 mm longa; antherae 3 mm longae, apice mucronatae; thecae basi acutae. Granula pollinis 39 μ diam, protuberantiis 9 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula glabra, inter bracteolas inclusa, matura nondum visa.

Habitat partem septentrionalem Peninsulae Malayanae.

Malay Peninsula: Perlis, Tebing Tinggi, Ridley s.n. March 1920 SING, typus; Perak, Kuala Temango, id. s.n. July 1907 SING.

The leaves of the specimen collected at Kuala Temango are on the upper side scabridulous, whereas they are glabrous in the type, and its bracteoles are larger, viz. 18 mm long and 9 mm wide, against 12 mm long and 6 mm wide in the type.

Another specimen collected in Perak, viz. at Taiping, Maxwell's Hill (Spare 1491 SING) has ovate-triangular leaves which assumed a black colour in drying and are provided on the upper side with a few long hairs. It may represent a distinct species, but the material is too incomplete to allow a conclusion.

Th. trachyklamys agrees with *Th. dasychlamys*, *Th. crispula*, *Th. siantanensis* and *Th. stenochlamys* in the length of the filaments, and with *Th. dasychlamys* also in the shape of the leaves, the larger ones being provided with a distinctly cordate base. However, the leaves of these two species, which differ conspicuously in the nature of the indumentum and slightly in the width of the bracteoles, are not entirely alike, for those of *Th. trachyklamys* are usually more or less distinctly hastate, whereas those of *Th. dasychlamys* are never hastate. It is rather unfortunate that of these two species the seeds are as yet unknown, but in view of their doubtless very close affinity with the other species occurring in the Malay Peninsula and Sumatra, it seems safe to assume that the ventral side of the seeds will prove to be smooth.

14. *Thunbergia dasychlamys* Brem. n. spec.

Caulis primum pilis retrorsis dense strigosus, deinde sparse strigosus vel subglaber, sicc. vix conspicue decoloratus. Folia petiolo primum dense, deinde minus dense strigoso-pubescente 1.5—3 cm longo instructa; lamina ovata vel ovato-oblonga, dimidio inferiore interdum utroque latere dente instructa sed haud hastata, 4—8 cm longa et 1.5—3.8 cm lata, apice acuta et mucronata, basi in foliis majoribus cordata, in foliis minoribus obtusa vel truncata, discolor, sicc. supra olivaceo-viridis, subtus griseo-viridis, supra dense sed vix notabile scabridula, subtus costa nervisque satis dense, inter nervos sparse pubescens, 3-, 5- vel 7-nervia, nervis 3 medianis quam aliis crassioribus, dentibus lateralibus ramo nervi exterioris percursis, nervis e costa orientibus utroque latere 3 vel 4. Flores solitarii. Pedicellus 2.5—6 cm longus, pilis retrorsis pubescens. Bracteolae ovatae, circ. 13 mm longae et 5 mm latae, acutae et mucronatae, dense pubescentes, 5-nerviae, subpersistentes. Calyx in dentes 12 inaequales, subacutos, tomentellos productus; dentes longiores 2 mm longi. Corolla tubo 4 mm, fauce 16 mm, lobis 17 mm longis. Filamenta breviora 3 mm, longiora 6 mm longa; antherae 4 mm longae, apice acutae; thecae basi obtusae. Granula pollinis 40 μ diam., protuberantiis 6 μ altis sparsa. Ovarium puberulum; stigma exsertum. Capsula nondum visa.

Habitat partem australem Peninsulae Malayanae.

Malay Peninsula: Singapore, locality illegible, Ridley s.n. 1896 SING; ibidem, Reservoir, id. s.n. 1906 SING, typus.

In the cordate base of the larger leaves this species resembles, as stated above, the preceding one, but in the nature of the indumentum it is more like the two following ones, especially like *Th. crispula*.

15. *Thunbergia crispula* Brem. n. spec.; *Th. fragrans* Roxb. var. *javanica* (Gaertn.) C. B. Clarke in Journ. A. S. c. Beng. 74, 632, 1908 quoad specimina aliquae in Peninsula Malayana lecta, haud quoad typum; eodem modo Fl. Mal. Pen. 2, 557, 1923 (cf. *Th. hebecocca*).

Caulis primum pilis retrorsis dense strigosus, deinde sparse strigosus,

sicc. brunnescens. Folia petiolo dense pubescente 1—2 cm longo instructa; lamina anguste ovato-lanceolata, rarius ovato-lanceolata vel ovata, 5.5—7 cm longa et 1.8—2.6 cm lata, apice subacuta et mucronata, basi truncata vel rotundata, haud raro utroque latere in lobum patentem producta, margine crispula, concolor, sicc. utrimque olivacea, supra sparse scabridulo-pubescentis, subtus dense pubescens, 5- vel 7-nervia, nervis 3 medianis quam aliis multo crassioribus, nervis e costa orientibus utroque latere 2—4 difficiliter distinguendis. Flores solitarii. Pedicellus 3.5—5 cm longus, dense pubescens. Bracteolae ovatae, 16—17 mm longae et 8 mm latae, acutae et mucronatae, dense pubescentes, 7- nerviae, persistentes. Calyx in dentes 10—11 inaequales, subacutos, tomentellos productus; dentes longiores 2.2 mm longi. Corolla tubo 5 mm, fauce 15 mm, lobis 18 mm longis. Filamenta breviora 3 mm, longiora 7 mm longa; antherae 2.5 et 3 mm longae, apice acutae et mucronatae; thecae basi in mucronem incurvum productae. Granula pollinis plurima 40 μ diam., aliquae 51 μ diam., protuberantiis 6 μ altis sparsa. Ovarium pubescens; stigma ad orem inclusum. Capsula pubescens, inter bracteolas inclusa, parte seminifera 10 mm diam. et 5 mm alta; rostrum 15 mm longum et basi 4.5 mm latum. Semina facie ventrali laevia.

Habitat partem septentrionalem Peninsulae Malayanae.

Malay Peninsula: Kelantan, Kuala Krai, Haniff & Nur 10097 SING; Perak, Kuala Kendrong, Burkill 12449 SING; Ulu Kenering, Wray 52 SING; Kuala Temango, Ridley 14431 SING; Selangor, Gua Batu, Ridley 23.6. 1889 SING, id. s.n. 1897 SING, id. Dec. 1896 SING; Klang Gates, Hume 7233 SING; Kuala Lumpur, Top of Cave, Kelzal s.n. SING; ibid. nr the Museum, Ridley 15.12.20 K; Pahang, Kuala Tahan, Seimund 899 SING; Kalang Kasai, Ridley 2173 SING, BM, typi.

The great difference in size of the pollen grains suggests the presence of tetraploids.

Th. crispula comes very near to *Th. dasychlamys*, from which it differs in the narrower, at the base never distinctly cordate, concolorous leaves, the slightly larger bracteoles and the somewhat shorter anthers.

16. *Thunbergia siantanensis* Brem. n. spec.

Caulis primum pilis retrorsis dense strigosus, deinde sparse strigosus, sicc. plerumque vix notabile discoloratus, interdum tamen brunnescens. Folia petiolo primum dense, deinde minus dense strigoso-pubescente, 1—2 cm longo instructa; lamina lineari-ovata, rarius ovata vel oblonga, 4—13 cm longa et 2—5 cm lata, plerumque tamen circ. 8 cm longa et 2.5 cm lata, apice subacuta et mucronata, basi plerumque emarginata, rarius truncata, prope basin haud raro utroque latere in dentem brevem, acutum et mucronatum producta, margine crispula, paulum discolor, sicc. brunnea vel olivacea, primum utrimque pubescens, deinde scabridula, costa tamen utrimque et nervis subtus densius hirtello-pubescentibus, 5-nervia, nervis 3 medianis quam exterioribus multo crassioribus, nervis e costa orientibus

utroque latere 2—4. Flores solitarii. Pedicellus circ. 3.5 cm longus, pilis retrorsis densius pubescens. Bracteolae ovatae, 12 mm longae et 7 mm latae, acutae, dense pubescentes, 5-nerviae, persistentes. Calyx in dentes 12 inaequales, subobtusos, praesertim ad marginem papillosos productus; dentes longiores 1.8 mm longi. Corolla tubo 5 mm, fauce 15 mm, lobis 13 mm longis. Filamenta breviora 3 mm, longiora 7 mm longa; antherae 3 mm longae, acutae et mucronatae; thecae basi acutae. Granula pollinis 42 μ diam., protuberantiis 7 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula glabra, inter bracteolas inclusa, matura nondum visa.

Habitat Archipelagum Anambasicum.

Anambas Islands: Siantan, Terempak, alt. 50 m, v. Steenis 858 BO, SING, L, typi; ibidem, Henderson 20275 SING.

Th. siantanensis differs from the other species with comparatively short filaments occurring in the western part of the area (*Th. trachyclamys*, *Th. dasyclamys*, *Th. crispula* and *Th. stenochlamys*) in its long and narrow leaves. From *Th. trachyclamys* and *Th. dasyclamys* it differs, moreover, in the emarginate but never distinctly cordate leaf base; from *Th. crispula* in the nature of the indumentum; and from *Th. stenochlamys* in the greater width of the bracteoles.

17. *Thunbergia stenochlamys* Brem. n. spec.

Caulis primum sparse pubescens, deinde fere totus glabrescens, sicc. olivaceus vel fuscus. Folia petiolo primum sparse puberulo-pubescente sed mox glabrescente 1.2—2.5 cm longo instructa; lamina plerumque lanceolata vel ovato-lanceolata, rarius ovata, oblonga vel lineari-lanceolata, plerumque 5—15 cm longa et 1.8—5.5 cm lata, apice acuta vel subacuta, mucronata, basi obtusa vel rotundata, ad petiolum interdum vix conspicue emarginata, interdum in foliis paucis basi utroque latere in lobum brevem producta, margine plerumque crispula, concolor, sicc. brunnea vel olivaceo-brunnea primum utrimque sparse puberula, deinde supra vix notabile scabridula vel tota glabra, 3-nervia, nervis e costa orientibus utroque latere 3—5, lobis lateralibus cum adsunt ramo e nervo laterali oriente percursis. Flores solitarii. Pedicellus circ. 5 cm longus, glaber. Bracteolae anguste ovato-triangulares, 17 mm longae et 4.5 mm latae, acutae, sparse strigoso-pubescentes, 5- vel 7-nerviae, nervis exterioribus tamen tenuissimis, post anthesin persistentes. Calyx in dentes 9 vel 10 subaequales, obtusos, dense papillosos, usque ad 2 mm longos productus. Corolla tubo 5 mm, fauce 16 mm, lobis 12 mm longis. Filamenta breviora 3 mm, longiora 7 mm longa; antherae 2.7 mm longae, apice acutae et mucronatae; thecae basi callosae et paulum incurvae. Granula pollinis circ. 40 μ diam., protuberantiis 6 μ altis sparsa. Ovarium glabrum; stigma paulo exsertum. Capsula glabra, inter bracteolas inclusa; pars seminifera 10 mm diam. et 7 mm alta; rostrum 18 mm longum et basi 4 mm latum. Semina facie ventrali laevia.

Habitat Sumatram et terram Borneensem.

Sumatra: Atjeh, Tabengon, alt. 1190 m, v. Steenis 5788 BO; East Coast, Karo Plateau, nr Kabandjahe, alt. 600 m, Galoengi 265 BO; Lampongs, G. Raté Berenong, alt. 400 m, Iboet 200 BO, L

Borneo: North Borneo, Sandakan, Kabili, alt. 15 m, Keith 10010 SING; Tenom, alt. 240 m, Gibbs 2617 BM; Tawan, Creagh 9.4.95 K; Pangkalan Banggi, Fraser 270 K; Kinabalu, Kadamaian, alt. 700 m, Haviland 1360 K; Batoe Bini nr Kendangan, Grabowski 7.5.82 BM; East Borneo, Kg Pawaloean, Rutten 137 U; Bontang, alt. 5 m, id. 241 U; S. Boengaloen, alt. 25 m, id. 773 U, typus; South Borneo, distr. Samarinda, Kaman, alt. 30 m, Posthumus 2246 BO; Tanahboemboe, Batoelitjin, alt. 30 m, v. Slooten 2203 BO, L, NY.

Th. stenochlamys is easily distinguishable from most of the other species belonging to the subgenus *Adelphia* by the narrowness of the bracteoles. In this respect it reminds us of *Th. bancana*, from which it is easily distinguishable by the greater length of the petioles, the somewhat greater width of the leaf blade, the longer peduncles, the but 3 mm long shorter filaments, and the longer beak on top of the capsule. From *Th. siantanensis*, to which it shows an approach in the shape of the leaves, it differs in the nature of the indumentum and in the narrowness of the bracteoles.

18. *Thunbergia hebecocca* Brem. n. spec.; *Th. fragrans* Roxb. var. *javanica* (Gaertn.) C. B. Clarke in Journ. As. Soc. Beng. 74, 632, 1908 quoad specimina aliquae citata, haud quoad typum; eodum modo Ridl., Fl. Mal. Pen. 2, 557, 1923 (cf. *Th. crispula*).

Caulis primum pilis retrorsis dense, deinde sparse pubescens, sicc. olivaceus. Folia petiolo densius hirtello 0.6—1.8 cm longo instructa; lamina ovata vel ovato-oblonga, plerumque 4—7.5 cm longa et 1.5—3.5 cm lata, apice subacuta et mucronata, ad mucronem tamen semper breviter rotundata, basi plerumque truncata et ad petiolum plus minusve distincte emarginata, si distinctius emarginata utroque latere in lobum mucronatum brevem producta, rarius basi cordata, casu quo lobis in mucronem basiscopam exeuntibus instructa, margine interdum crispula, discolor, sicc. supra saturate olivacea vel fusca, subtus dilute olivacea vel dilute fusca, supra scabridula vel sublaevis, subtus costa pubescens, extra costam puberula, 5-nervia, nervis 3 medianis crassioribus, nervis e costa orientibus utroque latere 2—4. Flores solitarii. Pedicellus 2—5 cm longus, hirsutus. Bracteolae ovatae, 11—15 mm longae et 6—7 mm latae, acutae, costa nervisque hirsutae, inter nervos puberulae, 7-nerviae, post anthesin deciduae. Calyx in dentes 12 inaequales, subacutos, puberulos productus; dentes longiores 2 mm longi. Corolla tubo 4.5 mm, fauce 15 mm, lobis 15 mm longis. Filamenta breviora 5 mm, longiora 8 mm longa; antherae 3 mm longae, apice mucronatae; thecae basi mucronatae. Granula pollinis 40 μ diam., protuberantiis 6 μ altis sparsa. Ovarium puberulum; stigma ad orem inclusum. Capsula puberula, bracteolis post anthesin rejectis

nuda; pars seminifera 10 mm diam. et 5 mm alta; rostrum 15 mm longum et basi 3 mm latum. Semina facie ventrali laevia.

Habitat partem septentrionalem Peninsulae Malayanae.

Malay Peninsula: Perlis, Langkawi, Curtis Sept. 1890 SING; ibid., Selat Panchor, Henderson 29065 SING, BO, K; ibid., Batu Agam, Corner 19.11.41 SING; Wellesley, Penang, P. Tikus, Curtis Sept. 1901 SING; Penang s.l., Kuntze 6147 NY; Kelantan, Chaning, Ridley 31.2.1917 K, typus.

Th. hebecocca shows a rather striking resemblance to *Th. crispula*, from which it differs in the first place in the greater length of the filaments. Other points of difference are found in the nature of the indumentum, in the shape of the leafblade with its more or less distinctly emarginate base and its at the insertion of the mucro rounded top, and in the somewhat smaller, deciduous bracteoles. In the length of the filaments it resembles the two following species.

19. **Thunbergia Ridleyi** Brem. n. spec.; *Th. similis* Craib var. *hirta* Ridl., Fl. Mal. Pen. 2, 557, 1923.

Caulis pilis retrorsis primum dense, deinde sparse pubescens, sicc. olivaceus. Folia petiolo primum dense, deinde minus dense hirtello 0.4—0.8 cm longo instructa; lamina ovato-oblonga vel oblonga, 3—5 cm longa et 1.5—1.9 cm lata, apice obtusa vel rotundata, mucronulata, basi obtusa vel subacuta, margine crispula, concolor, sicc. brunnescens, supra pilis basi bulbosis brevibus, mox deciduis dense scabrida, subtus praesertim costa nervisque sparse pubescens, 5-nervia, nervis 3 medianis crassioribus, nervis e costa orientibus difficiliter distinguendis, plerumque utroque latere 2. Flores solitarii. Pedicellus 1.5—4.5 cm longus, densius hirtellus. Bracteolae late ovatae, 11 mm longae et 6—7 mm latae, acutae, carinatae, 7-nerviae, dense puberulo-pubescentes, post anthesin persistentes. Calyx in dentes 12 inaequales, papillosos productus; dentes longiores 0.6 mm longi. Corolla tubo 5 mm, fauce 12 mm, lobis 10 mm longis. Filamenta breviora 5 mm, longiora 8 mm longa; antherae 2.2 mm longae, apice subobtusae; thecae basi callosae. Granula pollinis 38 et 48 μ diam., minora tamen plerumque sterilia; protuberantia 6 μ alta. Ovarium puberulum; stigma ad orem inclusum. Capsula dense puberula, inter bracteolas persistentes inclusa; pars seminifera 7 mm diam. et 5 mm alta; rostrum 10 mm longum et basi 2 mm latum, marginibus parallelis. Semina nondum visa.

Habitat Siamiam parte Peninsulari inclusa.

Peninsular Siam: Setul, Ridley 14979 SING, typus, „in open country”. Siam: s.l. Kerr 13011 L (ex herb. kew.).

The affinity of *Th. Ridleyi* with *Th. similis* Craib is probably but remote. It differs from the latter not only in the nature of the indumentum but also in the obtuse leaves provided with a smaller number of nerves, the greater length of the pedicels, the smaller size of the capsule and the shape of the beak. *Th. similis* is in many respects not unlike *Th. bancana*,

but the bracteoles are wider and the nervature of the leaves is different, the principal pair of nerves being shorter. The seeds of *Th. similis* are on the ventral side smooth; of *Th. Ridleyi* no seeds were available.

Th. Ridleyi is an easily recognizable species, especially by the unusual form of the leaves, which are without exception obtuse or rounded at the top, but also by the short calyx lobes, the comparatively long filaments and the small capsule with its linear beak. The comparatively large size of the pollen grain is also noteworthy; in this respect it resembles *Th. javanica*. In the length of the filaments it resembles *Th. hebecocca* and *Th. bancana*.

20. **Thunbergia bancana** Brem. n. spec.

Caulis primum pilis longis sparse pubescens, mox nodis exceptis glabrescens, nitidulus, sicc. saturate brunneus. Folia petiolo ferrugineo-pubescente 0.5—1.0 cm longo instructa; lamina plerumque anguste lanceolata, in foliis aliquibus interdum linearis, plerumque 4—7 cm longa et 0.9—1.8 cm lata, foliorum linearium tamen 5.5—6.5 cm longa et 0.8—0.9 cm lata, foliorum omnium apice acuta et mucronata, basi plerumque ad petiolum rotundata, interdum tamen acuta vel obtusa, margine interdum crispula, concolor, sicc. saturate brunnea, primum utrimque sparse pubescens, mox tota glabrescens, laevis, plerumque 3-nervia, nervis lateralibus ad marginem approximatis et apice cum nervo mediano connectis, in foliis majoribus tamen 5-nervia, casu quo nervis exterioribus tenuissimis, nervis e costa orientibus utroque latere 3—4, vix conspicuis. Flores solitarii. Pedicellus 2—4 cm longus, apicem versus pilis aliquibus brevibus et tenuibus sparsus. Bracteolae anguste ovato-lanceolatae, 14—19 mm longae et circ. 5 mm latae, acutae et carinatae, sparsissime pubescentes, 5-7-nerviae, nervis exterioribus tamen tenuissimis. Calyx in dentes 10 vel 11 valde inaequales, vix conspicue papillosos productus; dentes longiores 2 mm longi. Corolla tubo 4 mm, fauce 13 mm, lobis 15 mm longis. Filamenta breviora 6 mm, longiora 8 mm longa; antherae 3 mm longae, apice mucronatae, thecae basi callosae et paulum recurvae. Granula pollinis 40 μ diam., protuberantiis 5 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula glabra; pars seminifera 8.5 mm diam. et 5 mm alta; rostrum 13 mm longum et basi 3 mm latum. Semina nondum visa.

Habitat insulas a Sumatra ad orientem.

Bangka: S. Selan, Kg Permis, alt. 50 m, Bünнемeyer 2012 BO, typus. P. Lepar nr Bangka, Bünнемeyer 2427 BO, L, Teysmann s.n. BO.

Whether the bracteoles persist round the capsule or not, could not be made out, as the capsules that I could study were all detached.

Th. bancana is an easily recognizable species; nitidulous stems and such narrow leaves as we find in this species are extremely rare in this subgenus. In Mindoro another species with nitidulous stem occurs which, however, on account of the incompleteness of the material could not yet be described, and in Mindanao a species is found (*Th. linearifolia*) in which all the

leaves are linear; the bracteoles of this species are shorter and relatively much wider, and its seeds show the carunculate ventral side which is characteristic for the species of the eastern group.

In the narrowness of the bracteoles *Th. bancana* shows an approach to *Th. stenochlamys*, but its filaments are much longer.

21. ***Thunbergia palawanensis* Brem. n. spec.**

Caulis primum pilis retrorsis dense ferrugineo-pubescentis, deinde sparse scabrido-pubescentis et ultimo glabrescentis, sicc. saturate brunneus. Folia petiolo primum dense, deinde sparsius pubescente vel subglabro 1.0—1.8 cm longo instructa; lamina ovato-lanceolata vel oblonga, 5—10 cm longa et 1.8—3.0 cm lata, apice acuta et mucronata, basi plerumque rotundata, interdum vix notabile emarginata, margine plana, paulum discolor, sicc. supra saturate brunnea vel olivaceo-brunnea, subtus dilute brunnea, supra primum pilis longioribus cum brevioribus mixtis pubescens, deinde scabridula, subtus primum praesertim costa nervisque pubescens, deinde sparse scabridula, 3-nervia vel indistincte 5-nervia, nervis e costa orientibus utroque latere 3 vel 4 crassioribus cum nervis principalibus arcuatim connectis et 4 vel 5 tenuioribus eos non attingentibus. Flores solitarii. Pedicellus 4—5.5 cm longus, apicem versus pilis retrorsis parce pubescens. Bracteolae anguste ovato-lanceolatae, 20—25 mm longae et 6—9 mm latae, acutae et mucronatae, pubescentes, 5-nerviae, post anthesin persistentes. Calyx in dentes 5 vel rarius 6 inaequales, papilloso-puberulos productus; dentes longiores 2 mm longi. Corolla tubo 5 mm, fauce 17 mm, lobis 15 mm longis. Filamenta breviora 4 mm, longiora 10 mm longa; antherae 3.5 mm longae, apice mucronatae; thecae basi acutae. Granula pollinis 56 μ diam., protuberantiis 8 μ altis sparsa. Ovarium glabrum; stigma nondum visum. Capsula glabra; pars seminifera 10.5 mm diam. et 5.5 mm alta; rostrum 17 mm longum et basi 5 mm latum. Semina facie ventrali laevia.

Habitat insulam Palawan dictam.

Palawan: Aborlan, Mt Apis, Eballo & Conklin 1321 PNH, typus; Puerto Princesa, Curran For. Bur. 4499 BO, Bermejós B. Sc. 193 K.

Th. palawanensis differs from all the other species of the subgenus *Adelphia* that so far are known, in the small number of calyx lobes (5 or more rarely 6). The considerable difference in length between the filaments (4 and 10 mm) is also a noteworthy feature, and so are the large pollen grains (56 μ).

22. ***Thunbergia brachypoda* Brem n. spec.**

Caulis primum pilis retrorsis sparsius pubescens, deinde sparsissime pubescens et scabridulus, sicc. vix decoloratus. Folia petiolo dense pubescente 2—4 mm longo instructa; lamina ovata, ovato-oblonga, ovato-lanceolata vel lanceolata, foliorum latiorum usque ad 5 cm longa et 3 cm lata, foliorum angustiorum usque ad 7 cm longa et 1.8 cm lata, foliorum omnium apice acuta et mucronata, basi rotundata sed ad petiolum inter-

dum emarginata, in foliis angustioribus interdum utroque latere in lobum mucronatum patentem brevissime producta, subconcolor, sicc. olivacea vel brunnea, interdum tamen vix decolorata, supra scabridula, subtus puberulo-pubescente, 5-nervia, nervis e costa orientibus utroque latere 3 vel 4 vix conspicuis, omnibus in nervos a costa proximos excurrentibus. Flores solitarii. Pedicellus circ. 3 cm longus, praesertim apicem versus densius pubescens. Bracteolae ovatae, 13—18 mm longae et 9—12 mm latae, acutae, costa nervisque pilis longis dense, inter nervos sparse pubescentes, 7-nerviae, post anthesin persistentes. Calyx in dentes 12 subaequales, carina pubescentes et ad marginem papillosos, 2 mm longos productus. Corolla nondum visa. Capsula glabra, inter bracteolas persistentes inclusa; pars seminifera 8 mm diam. et 5 mm alta; rostrum 12 mm longum et basi 4 mm latum. Semina facie ventrali carunculata.

Habitat insulam Palawan dictam.

Palawan: Puerto Princesa, Mt Pulgar, Balsahan Road, alt. 15 m, Elmer 13076 BO, G, BM, NY, typi; Balsahan River, alt. 100 m, Foxworthy B. Sc. 586 K.

So long as the corolla is unknown, the taxonomic position of this species will be difficult to ascertain. From *Th. palawanensis* it differs conspicuously in the shortness of the petioles, the much greater number of calyx teeth and in the carunculate ventral side of the seed. In the shortness of the petioles and in the carunculate ventral side of the seed it resembles *Th. linearifolia* a species occurring in Mindanao, but the leafblade is much wider and the bracteoles are larger than in that species.

23. *Thunbergia cycloneura* Brem. n. spec.

Caulis primum pilis retrorsis sparse pubescens, deinde plus minusve glabrescens, sicc. brunnescens. Folia petiolo ferrugineo-pubescente 0.5—1.0 cm longo instructa; lamina ovata vel ovato-oblonga, foliorum superiorum tamen lanceolata, foliorum latiorum 2.2—5.5 cm longa et 1.5—3 cm lata, foliorum angustiorum 2.5—3.5 cm longa et 0.8—1.1 cm lata, foliorum omnium apice subacuminata, basi rotundata, margine crispula, paulum discolor, sicc. supra saturate et subtus dilute olivaceo-brunnea, supra primum pilis longioribus cum brevioribus mixtis scabridulo-pubescentibus, deinde scabridula, subtus primum costa nervisque densius et inter nervos sparse pubescens, deinde glabrescens, 3- vel indistincte 5-nervia, nervis e costa orientibus utroque latere 3 principalibus et 4 cum eis alternantibus sed paulo tenuioribus, nervis 3 principalibus cum nervis a costa proximis connectis, nervis illis 1—2 mm a margine remotis. Flores plerumque duo superpositi, rarius solitarii. Pedicellus 1.5—3 cm longus, sparse puberulo-pubescentibus. Bracteolae ovatae, 13—15 mm longae et 10—12 mm latae, acutae et mucronatae, praesertim margine et costa pubescentes, 7-nerviae, post anthesin persistentes. Calyx in dentes 13—15 inaequales, ad marginem papillosos productus; dentes longiores 1.2 mm longi. Corolla tubo 4 mm, fauce 13 mm, lobis 13 mm longis. Filamenta breviora 6 mm, longiora 8

mm longa; antherae 2.5 et 2.8 mm longae, apice mucronatae; thecae basi callosae. Granula pollinis 42 μ diam., protuberantiis 5 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula glabra; pars seminifera 6.5 mm diam. et 4.5 mm alta; rostrum 13—17 mm longum et basi 3—4 mm latum. Semina facie ventrali paulum carunculata.

Habitat partem austro-orientalem terrae borneënsis.

S. E. Borneo: Hayoep, Hubert Winkler 2608 BO, L, K, G, typi; P. Lampei, Korthals s.n. L; another specimen collected by Korthals on G. Pamattan (L) has subsessile leaves but shows in other respects a great likeness to this species; unfortunately neither flowers nor fruits are present.

In the length of the filaments *Th. cycloneura* shows an approach to *Th. hebecocca*, *Th. Ridleyi* and *Th. bancana*, but it differs from all of them in the carunculate instead of smooth ventral side of the seed. However, as the knobs are less conspicuous than in the other species of the eastern group, a real affinity with these three species is not excluded. From *Th. bancana* it is easily distinguishable by the greater width of the leaves and of the bracteoles, and from the two other species by the subacuminate top and by the nervature of the leaf. Among the eastern species so far not a single one is known in which the relative difference in length between the filaments is so small. Superposed flowers are in the subgenus *Adelphia* comparatively rare; among the species dealt with in this work there are only two other ones in which they occur rather frequently, viz. *Th. laevis* and *Th. brachythylla*.

24. **Thunbergia javanica** Gaertn., De Fruct. et Sem. Pl. 3, 22, t. 183, 1805, Blume, Bijdr. Fl. Ned. Ind. 806, 1826; Nees in DC, Prodr. 11, 56, 1847; Miquel, Fl. Ind. Bat. 2, 768, 1858; Hochreutiner in Candollea 5, 224, 1934; Bremekamp in Verh. Kon. Ned. Akad. v. Wetensch., afd. Natuurk. 2^e Sect. 45, no 2, 6, 1948;—*Th. fragrans* Roxb. apud C. B. Clarke in Hook.f., Fl. Brit. Ind. 4, 390, 1884 quoad syn. *Th. javanica*; eodem modo Lindau in Bot. Jahrb. 17, Suppl. 38, 1893; Boerl., Handl. Fl. Ned. Ind. 2, 655, 1899; Koorders, Exkursionsfl. v. Java 3, 212, 1912; id. Syst. Verz. I, § 1, 6, 41, 1912; Backer, Onkruidfl. Suikerrietgr. 343, 1934; *Th. fragrans* Roxb. var. *javanica* (Gaertn.) C. B. Clarke in Journ. As. Soc. Beng. 74, 632, 1908 quoad typum, haud quoad specimina citata (cf. *Th. crispula* Brem. et *Th. hebecocca* Brem.), eodem modo Ridl., Fl. Mal. Pen. 2, 557, 1923;—*Th. malayana* Gdyl in Bull. Soc. Bot. de France 66, 220, 1919.

Caulis in var. *javanica* pilis parvis scabridulus, in var. *tomentella* primum pilis retrorsis dense pubescens, deinde sparse scabrido-pubescens, sicc. olivaceus vel brunneus. Folia petiolo in var. *javanica* puberulo-pubescente, in var. *tomentella* ferrugineo-tomentello, 0.5—3 cm longo instructa; lamina plerumque ovato-lanceolata, rarius oblonga, foliorum inferiorum tamen ovata et foliorum superiorum interdum anguste ovato-lanceolata, plerumque 3—8 cm longa et 1.7—3.5 cm lata, apice in foliis inferioribus obtusa vel subobtusa, in foliis aliis acuta et mucronulata, basi plerumque rotun-

data vel truncata et ad petiolum interdum vix conspicue emarginata, in foliis aliquibus interdum subhastata, casu quo lobis apice mucronulatis et a ramo e vena a costa proxima oriente percursis, margine plerumque plana, interdum tamen hic inde crispula, paulum discolor, sicc. supra olivacea vel brunnea, subtus dilute olivacea vel dilute brunnea, supra in var. *javanica* scabrida vel scabridula, ultimo haud raro plus minusve laevis, subtus primum densius, deinde sparse puberulo-pubescent, ultimo interdum glabrescens, in var. *tomentella* primum utrimque tomentella, ultimo supra scabrida et subtus sparse pubescens, 3-nervia, nervis e costa orientibus utroque latere 2—4 vix conspicuis. Flores solitarii. Pedicellus 2—3 cm longus, in var. *javanica* subglaber, in var. *tomentella* primum pilis retrorsis dense, deinde sparse pubescens. Bracteolae ovatae vel ovato-lanceolatae, 10—15 mm longae et 7—11 mm latae, acutae, in var. *javanica* praesertim nervis pubescentes, rarius subglabrae, in var. *tomentella* tomentellae, 5- vel 7-nerviae, post anthesin subpersistentes. Calyx in dentes 10 inaequales, in var. *javanica* puberulos, in var. *tomentella* puberulo-pubescentes productus; dentes longiores 1.6 mm longi. Corolla tubo 6 mm, fauce 14 mm, lobis 17 mm longis. Filamenta breviora 2.5 mm, longiora 7.5 mm longa; antherae 3 mm longae, apice mucronatae; thecae basi mucronatae. Granula pollinis 46 μ diam., protuberantiis 6 μ altis sparsa. Ovarium glabrum; stigma ad orem vel paulo infra orem inclusum vel partim exsertum. Capsula glabra; pars seminifera 6.5—10 mm diam. et 4—7 mm alta; rostrum 12—16 mm longum et basi 4—5 mm latum. Semina facie ventrali carunculata.

Habitat Sumatrae partem australem, Javam.

var. **javanica**; *Th. javanica* Gaertn. var. *scabridula* Brem. et var. *scabrida* Brem. in Verh. Kon. Ned. Akad. v. Wetensch., Afd. Natuurk., 2^e Sect. 45, no 2, 7, 1948;—*Th. malayana* Gdyl v. supra; caule scabridulo, petiolo puberulo-pubescente, lamina supra scabrida vel scabridula, pedicello subglabro, bracteolis nervis interdum exceptis subglabris, calyce puberulo noscenda.

Sumatra: Djambi, Pahoe, alt. 30 m, Posthumus 1046 BO, L; ibid. Doesoen Baroe on the Maringin, alt. 70 m, id. 1097 BO (the identification of these two specimens is not fully certain; the capsules are very large, the basal part 11 mm in diam. and 8 mm high and the beak 17 mm long and at the base 5.5 mm wide; flowers are absent); Palembang, nr Palembang, alt. 10 m, de Raadt 86 L; Benkoelen, Kroe, Bouman-Houtman 6 BO; Lampongs, Estate Wai Lima, alt. 200 m, Iboet 348 BO
Java: Bantam, Lebakkidoel, Goenoengkantjana, Koorders 40948 BO, L; between G. Kendeng and Malingping, alt. 200 m, Backer 1342 BO; between Malingping and Penjawoengan, alt. 5 m, id. 1541 BO; Djakarta, Meester Cornelis, alt. 20 m, Backer 33276 BO, L, lectotypi; Pagansaän, alt. 15 m, id. 33277 BO, SING; between Paal Merah and Kabajoran, alt. 25 m, id. 33278 BO; Weltevreden, alt. 15 m, id. 33279 BO; Depok, alt. 110 m, id. 26287 BO, Hallier 24.3.1896 BO, Burek & de Monchy s.n.

BO, Soegandiredjo 308 BO; Bogor, Tjissalak, Kuhl & van Hasselt s.n. L; Taigon, id. s.n. L, BO; Batoe Toelis, Hallier 247^a BO, id. 6.5.1893 et 6.11.1894 BO, id. 2428 BO; Tjikeumeuh, id. 29. 10.1894 BO; Kedoenghalang, alt. 200 m, v. Steenis 1587 BO; nr Tjibogea, Schiffner 2587 L; Kota Batoe, alt. 200 m, Bakhuizen v. d. Brink 2010 BO, id. 3650 BO; Tjidani, Hallier 247^a BO; Tjiliwong, id. 247^c BO; Semplak, Bakhuizen v. d. Brink Jr 984 BO; Salak, Blume s.n. L; Tjiomas, Moeara Gedeh, Boerlage 15.9.1888 L; Djasinga, alt. 100 m, Backer 10211 BO; Poerwakarta, Tjikampek, alt. 50 m, Beumée 1720 BO; ibidem, G. Parang, alt. 940 m, Bakhuizen v. d. Brink 4974 BO; Tjikoempai, alt. 110 m, Harnsen 101 BO; Priangan, Tjibadak, Tjikidang, alt. 600 m, Bakhuizen v. d. Brink 1 BO, id. 6636 BO; Tjibelong, Kuntze 4879 NY; Bantar Dawa nr Bandjar, alt. 50 m, Backer 33275 BO; Tjidadap, Kelapa Genop, Scheffer 17 BO; Telaga Bodas, Went s.n. L; Pelaboean Ratoe, alt. 10 m, v. Slooten 230 BO, Koorders 33159 BO, id. 34470 BO, K, id. 34668 BO, L; Pekalongan, G. Slammat above Batoe Rade, alt. 900 m, Backer 226 BO; Balapoelang, Beumée 145 BO; Pekalongan, id. 213 BO; Bodjonegoro, between Ngawoen and Mandjoeng, alt. 200 m, Leenart 60 et 61 BO; Semarang, Kedoeng Djati, Watoegoeling, Koorders 27212 BO; Tempoeran, alt. 70 m, Beumée 4985 BO, L, Docters v. Leeuwen—Reynvaan s.n. BO; Grobogan, Karangasem, Koorders 28204 BO, L; Bodja, Daroepono, alt. 150 m, Beumée 3870 BO; Soerakarta, G. Merapi, Andong, alt. 900 m, Junghuhn 127 L; Madioen, Koewiran, Beumée 1405 BO; Madioen, alt. 65 m, Backer 6919 BO, Wisse 17 BO; G. Wilis, Sewoe, alt. 200 m, id. 331 BO; Kediri, Soekaredjo, Manggis, Koorders 22956 BO; Rembang, Tjabak, Koorders 42545 BO; Bakoetoek, Blokhuis July 1918 BO; Djapara, Tajoe, Ngarengan, alt. 50 m, Koorders 37180 BO; Soerabaja, Modjokerto, Segoenoen, alt. 700 m, Winkel 605 BO; Ledok, Beumée 2293 BO; Pasoeroean, Kepoeh, G. Abang, alt. 100 m, Backer 8279 BO (flower lilac); Pogal, alt. 600 m, Mousset 828 BO; Probolinggo, G. Weni, alt. 100 m, Backer 24265 BO; Malang, Tangkil, alt. 250 m, Koorders 23416 BO, L; Besoeki, G. Argapoera, alt. 600 m, Backer 13231 BO; Djember, Ultée 12 BO, Backer 18369 BO; Poeger, alt. 10 m, id. 17985 BO, Koorders 20399 BO, id. 29971 BO; Kapoeran, id. 20401 BO, L; Java s.l., Blume s.n. L.

var. *tomentella* Brem., Verh. Kon. Ned. Akad. v. Wetensch., Afd. Natuurk., 2^e Sect. 45, no 2, 7, 1948; caule primum pilis retrorsis dense pubescente, deinde scabrido-pubescente, petiolo ferrugineo-tomentello, lamina primum utrimque tomentella, ultimo supra scabrida et subtus sparse pubescente, pedicello primum dense, deinde sparse pubescente, bracteolis tomentellis, calyce toto puberulo-pubescente a typo recedens.

Sumatra: Padang, Korthals s.n. L (identification because of the incomplete material uncertain); Lampongs, Estata Wai Lima, alt. 200 m, Iboet 315 BO

Java: Bantam, Djampang Koelon, Tjiratjap, alt. 60 m, Backer 17401 BO;

Tji Tespong, alt. 40 m, id. 17593 BO, L, K; Serang, alt. 25 m, v. Welsem 6.6.15 BO; Djakarta, Djakarta, Vorderman s.n. BO; Weltevreden, alt. 10 m, Backer 33280 BO; Bogor, Tjiliwoeng, Hallier 247^b BO, L, id. 19.11.94 BO; Krawang, between Haoergeulis and Tjipoenegara, alt. 25 m, Backer 16839 BO; Poerwakarta, id. 13842 BO; Santiang, Korthals s.n. L; Priangan, Tjandjoer, Kiara Pajoeng, alt. 550 m, Zwaardemaker Z 64 BO; Zandbaai, Baleh Kambang, Backer 863 BO; Patoea Menden, coll. ign. s.n. BO; Soemedang, Tomo, alt. 150 m, Koorders 42699 BO, L; Cheribon, Indramajoe, alt. 25 m, v. Steenis 6730 BO; Pekalongan, Margasari, alt. 100 m, Beumée 6683 BO; between Koeningan and Lingga Djati, alt. 500 m, Backer 5046 BO; Brebes, Bandjar Hardjo, alt. 40 m, Beumée 4775 BO; Djokjakarta, Wonosari, alt. 175 m, Backer 2612 BO; Tegal, Forestry "Oost-Tegal", alt. 75 m, Beumée 3681 et 4388 BO; Kediri, G. Pandan, between Tritik and Djomblang Djati, Thorenaar 229 BO.

As GAERTNER's figure of *Thunbergia javanica* does not show the slightest indication of hairs, it seems plausible to use the name var. *javanica* for the nearly glabrous form. As lectotype I have chosen Backer 33276, the specimen on which I based in 1948 my var. *scabridula*. My var. *scabrida* could not be kept up, as it proved impossible to draw a line between the distinctly scabrid specimens and those that are merely scabridulous, and as the pubescence on the lower side of the leaf disappears when the leaves grow older. The difference between the var. *javanica* and the var. *tomentella*, on the other hand, is well-marked, and it might even be asked whether it would not be better to regard these two forms as distinct species. However, the circumstance that at many places they are growing together, seems to point to a rather close affinity. That the var. *javanica* has been collected up to 900 m, whereas of the var. *tomentella* so far no specimens have been found above 600 m, may be accidental, the var. *javanica* being much more common than the var. *tomentella*. This comparative rarity of the var. *tomentella* may also account for its absence in the collections made in East Java, where the var. *javanica* is also far from common. The identity of the specimens collected at Padang and in Djambi is not fully established; they may represent distinct species, but as these specimens are incomplete, more material will have to be awaited before a final decision can be taken.

Th. javanica, *Th. trichocarpa* and *Th. kangeanensis* are three nearly related species well characterized by the very short outer filaments and the more than twice longer inner ones. In the other species with comparatively short filaments (*Th. trachyklamys*, *Th. dasychlamys*, *Th. crispula*, *Th. siantanensis*, *Th. stenochlamys*, *Th. subsagittata*, *Th. benguetensis*, *Th. mindanaensis*, *Th. parviflora*, *Th. batjanensis*) the shorter filaments are seldom so short as in these three species, and the longer ones are, except in *Th. batjanensis*, always comparatively shorter. *Th. batjanensis* comes in the structure of the androeceum rather near to *Th. javanica*, *Th. tri-*

chocarpa and *Th. kangeanensis*, but differs from them in the long pedicel and in the long and narrow beak of the capsule.

Th. javanica differs from *Th. trichocarpa* and *Th. kangeanensis* in the obtuse or subobtuse top of the lower leaves and in the much smaller size of the warts on the pollen grains; from *Th. trichocarpa* it differs moreover in the glabrous capsule, and from *Th. kangeanensis* in the 10 instead of 12 calyx lobes.

25. ***Thunbergia trichocarpa* Brem. n. spec.**

Caulis primum pilis retrorsis dense pubescens, deinde minus dense pubescens vel interdum sparse scabrido-pubescens, sicc. olivaceus. Folia petiolo dense pubescente 0.5—2.5 cm longo instructa; lamina plerumque ovata, 5.5—9 cm longa et 3.2—5.2 cm lata, apice semper acuta et mucronata, basi emarginata vel subcordata, haud raro utroque latere in lobum patentem producta, foliorum superiorum interdum ovato-lanceolata et basi plerumque rotundata, foliorum omnium margine plana vel subundulata, paulum discolor, sicc. olivacea, primum utrimque tomentosa, deinde supra pilis brevissimis cum pilis longioribus mixtis scabridula, subtus pubescens, foliorum latiorum 5-nervia, foliorum angustiorum 3-nervia, nervis e costa orientibus utroque latere plerumque 3. Flores solitarii. Pedicellus primum ferrugineo-tomentosus, deinde griseo-pubescens, 2.5—4.5 cm longus. Bracteolae ovatae vel ovato-lanceolatae, 15—17 mm longae et 6—7 mm latae, acutae, tomentosae vel tomentellae, 5- vel indistincte 7-nerviae, post anthesin deciduae. Calyx in dentes 10 inaequales, acutos, haud distincte carinatos, puberulos vel tomentellos productus; dentes longiores 2.5 mm longi. Corolla plerumque dilute violacea, rarius alba tubo 5.5 mm, fauce 14.5 mm, lobis 25 mm longis. Filamenta breviora 2.5 mm, longiora 7 mm longa; antherae 2.5 et 3.0 mm longae, apice subobtusae et mucronulatae; thecae basi mucronatae. Granula pollinis 48 μ diam., protuberantiis 9 μ altis sparsa. Ovarium puberulum; stigma ad orem inclusum. Capsula puberula; pars seminifera 9 mm diam. et 5.5 mm alta; rostrum 12 mm longum et basi 3.5 mm latum. Semina facie ventrali carunculata.

Habitat Javae partem orientalem et insulam Maduram.

Java: Madioen, Saradan, alt. 90 m, Wisse 143 BO; Kediri, Tempoeran, Beumée 1530 BO; G. Betet, alt. 150 m, id. 2398 BO; Toengloer, coll. ign. s.n. BO, alt. 125 m, Grutterink 3186 BO, id. 3276 BO, typus; Soerabaja, Soerabaja, Boorsma s.n. BO; between Modjokerto and Loemadjang, G. Troewé, Dorgelo 1825 L; Pasoeroean, Lawang, Backer 37689 L, PAS; Besoeki, Pradjekan, alt. 25 m, Backer 24586 BO

Madoera: Bangkalan Backer 19177 BO, id. 18983 BO, L; Sampang, alt. 25 m, id. 19648 BO, L; Tamberoe, alt. 10 m, id. 20599 BO; Soemenep, alt. 25 m, id. 20645 BO (fl. white); Manding, Vorderman 50 BO (fl. white); Petjoedan, Teysmann 1815 BO, L (fl. pink); Sapoeloe, Backer 19464 BO (fl. white).

As stated above, *Th. trichocarpa* is a very near ally of *Th. javanica*,

from which it differs in the larger size of the leaves, which are very often 5-nerved and always acute at the top, in the somewhat longer and narrower bracteoles, the longer calyx teeth, the longer corolla lobes, the larger size of the warts on the pollen grains and the puberulous capsule. *Th. kangeanensis* is perhaps even more closely allied; from this species it differs in the nature of the indumentum, in the smaller number and larger size of the calyx teeth, in the longer corolla lobes and in the puberulous capsule. The flowers of *Th. trichocarpa* are usually light violet, but in some of the specimens collected in Madoera they are said to have been white or pink.

26. ***Thunbergia kangeanensis*** Brem n. spec.

Caulis primum pilis retrorsis densius pubescens, deinde sparse strigosus, sicc. brunnescens. Folia petiolo primum dense, deinde sparse pubescente 0.6—3.0 cm longo instructa; lamina in var. *kangeanensi* ovata, ovato-oblonga vel ovato-lanceolata, foliorum latiorum plerumque 6—8.5 cm longa et 2.7—4.0 cm lata, foliorum angustiorum plerumque 4—6 cm longa et 1.3—1.4 cm lata, in var. *angustifolia* lineari-lanceolata, 5—7 cm longa et 1.0—1.5 cm lata, apice in foliis omnibus acuta vel contracta et mucronata, basi rotundata, truncata et ad petiolum interdum emarginata, casu quo plerumque utroque latere in lobum patentem breviter producta, paulum discolor, sicc. supra olivacea, subtus griseo-viridis vel dilute brunnea, supra scabridula, subtus puberulo-pubescentis, 3- vel indistincte 5-nervia, nervis e costa orientibus utroque latere 2—4. Flores solitarii. Pedicellus 3—4 cm longus, apicem versus sparse pubescens. Bracteolae ovato-lanceolatae, 17 mm longae et 6 mm latae, acutae, puberulo-pubescentes, post anthesin deciduae. Calyx in dentes 12 inaequales, subacutos, margine papillosos, vix carinatos productus; dentes longiores 1.6 mm longi. Corolla tubo 5 mm, fauce 15 mm, lobis 15 mm longis. Filamenta breviora 3.5 mm, longiora 7.5 mm longa; antherae 3.5 mm longae, apice subacutae et mucronatae; thecae basi acutae. Granula pollinis 46 μ diam., protuberantiis 11 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula glabra; pars seminifera 10 mm diam. et 5 mm alta; rostrum 15 mm longum et basi 5.5 mm latum. Semina facie ventrali carunculata.

Habitat Archipelagum Kangeanensem.

var. ***kangeanensis***, lamina foliorum latiorum ovata, ovato-oblonga vel ovato-lanceolata noscenda.

Kangean Islands: P. Mamboerit, alt. 0 m, Backer 27296 BO; P. Kangean, Ardjasa, alt. 30 m, id. 26767 BO; Tambajangan, alt. 100 m, id. 27456 BO, typus, id. 27810 BO, Beguin I 2 BO; Pandeman, alt. 90 m, Beguin H 2 BO; Sambakati, Dommers 150 BO; P. Sepandjang, alt. 3 m, Backer 28920 BO; P. Paliat, alt. 5 m, id. 29592 BO.

var. ***angustifolia*** Brem. n. var., lamina foliorum omnium lineari-lanceolata, 5—7 cm longa et 1.0—1.5 cm lata a typo recedens.

Kangean Islands: P. Kangean, Tambajangan, alt. 25 m, Backer 27727

BO, *typus* var.; Kajan Waroe, alt. 50 m, id. 28118 BO.

Th. kangeanensis and *Th. trichocarpa* resemble each other in the large size of the warts with which the surface of the pollen grains is covered, and in this respect they differ conspicuously from *Th. javanica*. It is noteworthy, however, that the size of the pollen grains themselves differs but slightly in these three species. The same size is met with in the other species of the eastern group, whereas the endemic species of the western group and also *Th. cycloneura* have smaller pollen grains, the only exceptions being *Th. palawanensis* with very large ones (56 μ) and *Th. Ridleyi*.

27. **Thunbergia parviflora** Brem. in Svensk Bot. Tidskr. 42, 375, 1948.

Caulis pilis retrorsis primum dense, deinde sparse pubescens, sicc. brunnescens. Folia petiolo primum dense, deinde sparse hirsuto 0.2—1.4 cm longo instructa; lamina ovata vel ovato-lanceolata, 2.5—6 cm longa et 1.8—3.4 cm lata, apice acuta vel subacuminata et mucronata, basi rotundata et haud raro ad petiolum emarginata, margine crispula, concolor, sicc. olivacea, primum utrimque dense pubescens, deinde supra scabrida, subtus costa nervisque densius et inter nervos sparse pubescens, 5-nervia, nervis e costa orientibus utroque latere 2. Flores solitarii. Pedicellus 2.5—4 cm longus, praesertim apicem versus pilis retrorsis vel subpatentibus dense pubescens. Bracteolae ovatae, 14 mm longae et 8 mm latae, acutae, dense villosae, 7-nerviae, nervis tribus medianis crassioribus, aliis vix distinctis, post anthesin deciduae. Calyx in dentes 12—13 inaequales, obtusos, dorso rotundatos, puberulos productus; dentes longiores 2 mm longi. Corolla tubo 2 mm, fauce 10 mm, lobis 8 mm longis. Filamenta breviora 2.5 mm, longiora 5 mm longa; antherae 3 mm longae, apice subintegrae; thecae basi acutae. Granula pollinis 55 μ diam., protuberantiis 8 μ altis sparsa. Ovarium dense puberulum; stigma vix notabile exsertum. Capsula dense puberula; pars seminifera 9 mm diam. et 5 mm alta; rostrum 15 mm longum et basi 4.5 mm latum. Semina nondum visa.

Habitat brachium austro-occidentalem insulae Celebes dictae.

Celebes: South-western arm, Enrekang, alt. 0 m, Kjellberg 4001 S, BO, *typi*.

The most striking feature of *Th. parviflora* is the small size of its flowers. The only other species of the subgenus *Adelphia* in which such small flowers are found is *Th. mindanaensis*. The latter is easily distinguishable from *Th. parviflora* by the calyx teeth, which reach the in this subgenus unusual length of 4 mm, which means that they are twice as long as those of *Th. parviflora*.

That *Th. parviflora* is a near ally of the other Celeban species can hardly be doubted, although its anthers are less distinctly bidenticulate at the top than in the majority of the latter. The filaments, however, show the same relative difference in length, and the pollen grains are of the same order of magnitude; those of *Th. parviflora* are nevertheless like those of

Th. celebica somewhat larger than those of the other Celeban species and of about the same size as those of *Th. laevis* and of *Th. palawanensis*.

28. ***Thunbergia macalensis* Brem n. spec.**

Caulis pilis retrorsis primum dense, deinde sparse pubescens, sicc. olivaceus. Folia petiolo densius hirsuto 1.0—1.5 cm longo instructa; lamina ovata vel ovato-lanceolata, foliorum latiorum usque ad 5 cm longa et 4 cm lata, foliorum angustiorum usque ad 6 cm longa et 3 cm lata, apice acuta et mucronata, basi subcordata vel truncata, ad petiolum tamen semper emarginata, margine crispula, discolor, sicc. olivacea, primum utrimque densius pubescens, deinde supra scabrida et subtus costa nervisque pilis longioribus densius pubescens, inter nervos brevius pubescens, 3- vel 5-nervia, nervis e costa orientibus utroque latere 3. Flores solitarii. Pedicellus praesertim apicem versus pilis retrorsis dense pubescens, 2.5—3 cm longus. Bracteolae ovatae, 10—12 mm longae et 5—6 mm latae, acutae, tomentosae, 7-nerviae, nervis exterioribus tamen vix distinguendis. Calyx in dentes 8 vel 9 subaequales, subacutos, puberulos, circ. 2 mm longos productus. Corolla tubo 3.5 mm, fauce 14 mm, lobis 12 mm longis. Filamenta breviora 5 mm, longiora 10 mm longa; antherae 3 mm longae, apice acutae et mucronatae; thecae basi calloso-mucronatae. Granula pollinis 48 μ diam., protuberantiis 10 μ altis sparsa. Ovarium puberulum; stigma paulo infra orem inclusum. Capsula nondum visum.

Habitat brachium austro-occidentalem insulae Celebes dictae.

Celebes: South-western arm, div. Loewoe, distr. Makale, above Boeakajoe, alt. 600 m, Gäumann s.n. BO, typus.

Th. macalensis shows in the nature of its indumentum and in the shape and size of its leaves an unmistakable likeness to *Th. parviflora*. It differs from the latter in the slightly smaller size of the bracteoles, the 8 or 9 instead of 12 or 13 calyx teeth, the larger size of the corolla, the twice longer filaments and the smaller size of the pollen grains. In the length of the filaments it agrees with the other Celeban species, but it differs from them in the nature of its indumentum, in the 8 or 9 instead of 11—13 calyx teeth and in the smaller size of its flowers. A calyx with 8 teeth is also found in two Philippine species, viz. *Th. ilocana* and *Th. benquettensis*, but from the first it is easily distinguishable by the larger size of its leaves and from *Th. benquettensis* by the greater length of the filaments.

29. ***Thunbergia Eymae* Brem. n. spec.**

Caulis pilis retrorsis primum dense, deinde sparse pubescens, sicc. olivaceus vel brunneus. Folia petiolo primum tomentoso, deinde satis dense pubescente, 1—2.5 cm longo instructa; lamina foliorum inferiorum ovata, plerumque 4—6 cm longa et 3.3—4.0 cm lata, interdum basi subhastata vel ad medium vix notabile lobata, foliorum superiorum anguste ovato-lanceolata, 5—7.5 cm longa et 2.5—3.0 cm lata, basi plerumque subhastata vel hastata, foliorum omnium apice acuta et mucronata,

margine crispula, concolor, sicc. olivacea, primum utrimque dense villosa, deinde supra scabrida et pilis aliquibus longioribus persistentibus sparsa, subtus costa nervisque dense et molliter pubescens, 5-nervia, nervis e costa orientibus utroque latere 1 vel 2. Flores solitarii. Pedicellus 3—5 cm longus, apicem versus densius, ceterum sparse pubescens. Bracteolae anguste lanceolatae. 15—16 mm longae et 6—7 mm latae, acutae, dense villosae, 5-nerviae, post anthesin deciduae. Calyx puberulo-pubescens in dentes 12 vel 13 inaequales, subobtusos, apice et margine papillosos productus; dentes longiores 1.7 mm longi. Corolla tubo 5 mm, fauce 20—23 mm, lobis 17 mm longis. Filamenta breviora 5 mm, longiora 10 mm longa; antherae 3.5 mm longae, apice mucronatae; thecae basi callosae. Granula pollinis 48 μ diam., protuberantiis 10 μ altis sparsa. Ovarium puberulum; stigma ad orem inclusum. Capsula puberula; pars seminifera 9 mm diam., et 6 mm alta; rostrum 13.5 mm longum et basi 3.5 mm latum. Semina facie ventrali marginem versus carunculata, hilo parvo instructa.

Habitat partem centralem et partem austro-orientalem insulae Celebes dictae.

Celebes, central part: Poso, between Wioe and Malino, Eyma 3427 BO, L, U, K, typi; subdiv. Sidenreng-Rapang, south of Rapang, id. 316 BO, L; Kg Sangka, Rachmat 844 BO; Pakamisang, id. 312 BO, L, K (leaves very large, up to 11 cm long and 5.5 cm wide); Papang, id. 251 BO, L

Celebes, south-eastern arm: Rumbia, Liano, alt. 100 m, Elbert 2992 L; Sangona, alt. 120 m, Kjellberg 1120 S, BO.

In the nature of its indumentum *Th. Eymae* shows an approach to the two preceding species, from which it is easily distinguishable by its for the greater part hastate or subhastate leaves and by the larger flowers. From *Th. macalensis* it differs moreover in the 12 or 13 instead of 8 or 9 calyx teeth. From the other Celeban species it differs in its at first villous leaves and permanently villous bracteoles and in the mucronate top of the anthers.

30. ***Thunbergia hederifolia*** Brem. in Svensk Bot. Tidskrift 42, 375, 1948.

Caulis pilis retrorsis primum parce pubescens, mox glabrescens, sicc. brunnescens. Folia petiolo primum sparse pubescente sed mox glabrescente, 1.0—3.5 cm longo instructa; lamina foliorum majorum ovata, plerumque 5.5—6.5 cm, rarius usque ad 10 cm longa et 4.5—5.5 cm lata, basi haud raro hastata, foliorum minorum ovata vel ovato-lanceolata, basi raro hastata, foliorum omnium apice acuta et mucronata, basi plerumque subcordata, margine interdum crispula, tenuior, discolor, sicc. olivacea, primum utrimque pubescens, mox glabrescens, 5-nervia, nervis e costa orientibus utroque latere 2 valde conspicuis. Flores solitarii. Pedicellus 4—5.5 cm longus, glaber. Bracteolae ovato-lanceolatae, 13—15 mm longae et 7 mm latae, acutae, sparse strigosae, 7-nerviae, nervis 3 medianis crassioribus, aliis vix conspicuis, post anthesin deciduae. Calyx in dentes

12—13 inaequales, carinatos, margine papillosos productus; dentes longiores 2.4 mm longi. Corolla tubo 5 mm, fauce 20 mm, lobis 19 mm longis. Filamenta breviora 5 mm, longiora 10 mm longa; antherae 3.7 mm longae, apice bidenticulatae; thecae basi acutae. Granula pollinis 50 μ diam., protuberantiis 7 μ altis sparsa. Ovarium glabrum; stigma vix notabile exsertum. Capsula glabra; pars seminifera circ. 9 mm diam. et 5—6 mm alta; rostrum 13 mm longum et basi 4.5 mm latum. Semina facie ventrali carunculata.

Habitat Munam, insulam a brachio austro-orientali insulae Celebes dictae ad austrum spectantem.

Celebes: P. Moena, alt. 0 m, Kjellberg 44 S, BO, typi.

Th. hederifolia resembles *Th. macalensis*, *Th. Eymae*, *Th. Bünnemeyeri* and *Th. celebica* in the length of the filaments and the two last-named species also in the bidentate top of the anther. From *Th. celebica* it differs in the at first sparsely pubescent stem and leaves and in the subcordate base that is found in the majority of the latter, and also in the smaller size of the pollen grains, and from *Th. Bünnemeyeri* in the somewhat longer hairs with which stem and leaves at first are covered, and in the thickness of the nerves springing from the midrib, which are but slightly thinner than the nerves arising from the top of the petiole. It can, however, hardly be doubted that these two species are very closely allied.

31. *Thunbergia Bünnemeyeri* Brem. n. spec.

Caulis primum densius puberulus sed mox glabrescens, sicc. vix conspicue decoloratus. Folia petiolo primum dense striguloso, deinde glabrescente, 1—3 cm longo instructa; lamina ovata vel foliorum superiorum ovato-lanceolata, nunc circ. 5 cm longa et 4 cm lata, nunc ad 8 cm longa et 3.5 cm lata, apice subacuta, acuta vel acuminata et semper mucronata, basi rotundata vel truncata, interdum etiam subhastata vel hastata, rarius in foliis aliquibus cordata, casu quo margine semper grosse crenatodentata, margine crispula vel plana, discolor, sicc. olivacea, primum utrimque densius puberulo-pubescent, deinde glabrescens, 5-nervia, nervis e costa orientibus utroque latere 2 vel 3. Flores solitarii. Pedicellus 3—6 cm longus, apicem versus sparse strigulosus. Bracteolae ovatae, 13—16 mm longae et 7—8 mm latae, acutae, margine ciliatae, in var. *Bünnemeyeri* sparse pubescentes, in var. *glabra* subglabrae, 5-nerviae, post anthesin deciduae. Calyx in dentes 11 vel 12 valde inaequales, margine papillosos productus; dentes longiores 2 mm longi. Corolla tubo 6 mm, fauce 19 mm, lobis 19 mm longis. Filamenta breviora 6 mm, longiora 9 mm longa; antherae 3.5 mm longae, apice vix notabile bidenticulatae; thecae basi obtusae. Granula pollinis 47 μ diam., protuberantiis 7 μ altis sparsa. Ovarium in var. *Bünnemeyeri* puberulum, in var. *glabra* glabrum; stigma paulo infra orem inclusum. Capsula in var. *Bünnemeyeri* puberula, in var. *glabra* glabra; pars seminifera 7 mm diam., et 5 mm alta; rostrum 14 mm longum et basi 4 mm latum. Semina facie ventrali carunculata.

Habitat brachium austro-occidentalem insulae Celebes dictae et insulam Salajar dictam ab eo ad austrum spectantem.

var. **Bünnemeyeri**, bracteolis sparse pubescentibus, ovario et capsula puberulis noscenda.

Celebes: south-western arm, Lombasang, alt. 90 m, Bünnemeyer 11057 BO, typus, id. 11226 BO; Bonto Parang, alt. 50 m, id. 10590 et 10603 BO; Malino, alt. 280 m, id. 10856 BO, L; ibidem, alt. 310 m, id. 10810 BO; Tanette, alt. 425 m, id. 11743 et 12540 BO.

var. **glabra** Brem. n. var., bracteolis subglabris, ovario et capsula glabris a typo recedens.

Salajar (south of the south-western arm of Celebes), alt. 600 m, Docters v. Leeuwen 1738 BO, U, typi varietatis. As no flowers are preserved, the position of this plant remains somewhat uncertain.

Th. Bünnemeyeri is, as stated above, a very near ally of *Th. hederifolia*, differing from the latter in minor points only.

32. **Thunbergia celebica** Brem. in Svensk Bot. Tidskrift 42, 373, 1948.

Caulis glaber. Folia petiolo supra sparse pubescente, 0.5—2.0 cm longo instructa; lamina ovato-lanceolata, 5—8 cm longa et 2.5—4.5 cm lata, apice acuminata et mucronata, basi rotundata, ad petiolum tamen haud raro emarginata, margine plana, utrimque glabra, 3- vel interdum 5-nervia. Flores solitarii. Pedicellus 3—3.5 cm longus, glaber. Bracteolae lanceolatae, 13—17 mm longae et 5—6 mm latae, acutae, sparse strigosae, margine ciliatae, 7-nerviae, nervis exterioribus tamen vix distinguendis. Calyx in dentes 12 valde inaequales, carinatos, margine papillosos productus; dentes longiores 2 mm longi. Corolla tubo 4.5 mm, fauce 20.5 mm, lobis 17 mm longis. Filamenta breviora 5 mm, longiora 9 mm longa; antherae 3 mm longae, apice bidentatae; thecae basi acutae. Granula pollinis 55 μ diam., protuberantiis 8 μ altis sparsa. Ovarium apice puberulum; stigma breviter exsertum. Capsula nondum visa.

Habitat brachium orientalem insulae Celebes dictae.

Celebes: eastern arm, Loewoek, 0° 56'S, 122° 45' E, Kaudern 485 S, typus.

The description of this species was adapted from that given by me in Svensk Bot. Tidskrift, 1948.

In a specimen collected at Gorontalo (Beccari 7168 FI) and in two specimens collected at Amoerang near Menado (Koorders 15823 et 15836 BO) the leaves are subacute instead of acuminate; they may nevertheless belong to this species. However, as no flowers have been preserved, it seems prudent to leave this question undecided. The hilum of the seeds belonging to the specimen collected by Beccari is remarkably wide.

In the large size of the pollen grains *Th. celebica* reminds us of *Th. parviflora*; in the fairly large size of the flowers it agrees with *Th. Eymae*, *Th. hederifolia* and *Th. Bünnemeyeri*, and with the two last-named species also in the bidentate anthers. The indumentum is even more reduced than in these two species, and the leaves are never hastate or subhasate.

33. *Thunbergia brachythylla* Brem. n. spec.

Caulis ab initio subglaber, sicc. olivaceus. Folia petiolo primum sparse pubescente, deinde subglabro, 0.5—1.0 cm longo instructa; lamina oblonga, 3—5.5 cm longa et 1.0—2.5 cm lata, apice subacuta vel acuminata et mucronata, basi rotundata, margine interdum crispula, paulum discolor, sicc. olivacea, supra primum sparse et vix notabile puberula, deinde scabridula, subtus primum sparsissime pubescens, deinde glabrescens, 5-nervia, nervis e costa orientibus utroque latere plerumque 2. Flores solitarii vel duo superpositi. Pedicellus 2.5—4 cm longus, apicem versus sparse pubescens. Bracteolae lineari-lanceolatae, 10 mm longae et 3 mm latae, acutae, praesertim apicem versus sparse pubescentes, 5-nerviae. Calyx in dentes 6 vel 7 inaequales, filiformes, subobtusos, margine papillosos productus; dentes longiores 1.5 mm longi. Corolla tubo 5 mm, fauce 18 mm, lobis 20 mm longis. Filamenta breviora 4.5 mm, longiora 7.5 mm longa; antherae 3.5 mm longae, apice bidenticulatae; thecae basi callosomucronatae. Granula pollinis 52 μ diam., protuberantiis 4 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula nondum nota.

Habitat insulam Filipinam Mindanao dictam.

Mindanao: Misamis, Dapitan, Piper 98 L, typus.

Noteworthy characters of this species are the small and narrow bracteoles, the small number of calyx teeth, the bidenticulate anthers and the small size of the warts covering the pollen grains. In the small number of calyx teeth it reminds one of *Th. palawanensis* and *Th. benquettensis*, but in *Th. palawanensis* the filaments differ far more conspicuously in length, and the pollen grains are larger and covered with much larger warts, and in *Th. benquettensis* the indumentum is very dense, the leaves are much larger and usually hastate, the filaments are shorter and the warts on the pollen grains larger, and in neither of them the anthers are bidenticulate. In the structure of the pollen grains, notably in the small size of the warts, *Th. brachythylla* resembles *Th. thespesiiifolia*, which, however, has 16 calyx teeth and far longer filaments.

Superposed flowers are not common in the subgenus *Adelphia*. They occur in *Th. fragrans* and in *Th. laevis* and among the species endemic in our area in *Th. cycloneura*. The character seems to be rather variable, and its taxonomic value should therefore not be overrated.

34. *Thunbergia mindanaensis* Brem. n. spec.

Caulis pilis retrorsis primum tomentosus, deinde sparse pubescens, sicc. olivaceus. Folia petiolo dense pubescente, 0.3—1.5 cm longo instructa; lamina ovata vel ovato-lanceolata, foliorum superiorum etiam lineari-lanceolata, foliorum majorum usque ad 9.5 cm longa et 5 cm lata, foliorum minorum interdum usque ad 4 cm longa et tantummodo 1 cm lata, foliorum omnium apice acuta vel subacuminata, basi rotundata, truncata vel subcordata, in foliis majoribus interdum utroque latere in lobum brevissimum producta, margine interdum crispula, subconcolor, sicc. olivacea vel supra

griseo-viridis, supra primum puberulo-pubescentis, deinde scabridula, subtus dense pubescens, 3- vel 5-nervia, nervis e costa orientibus plerumque utroque latere 2. Flores solitarii. Pedicellus 2.5—3 cm longus, dense pubescens. Bracteolae ovato-lanceolatae, 10—20 mm longae et 4—7 mm latae, acutae, dense et longe pubescentes, 5-nerviae, post anthesin deciduae. Calyx in dentes 10 inaequales, acutos, puberulos productus; dentes longiores 3—4 mm longi. Corolla tubo 3 mm, fauce 11 mm, lobis 7 mm longis. Filamenta breviora 2.5 mm, longiora 5 mm longa; antherae 3.2 mm longae, apice vix conspicue bidenticulatae; thecae basi callosae. Granula pollinis 48 μ diam., protuberantiis 10 μ altis sparsa. Ovarium puberulum; stigma circ. 3 mm exsertum. Capsula puberula; pars seminifera 10—12 mm diam. et 6.5—7 mm alta; rostrum 16 mm longum et basi 4.5—5.0 mm latum, supra medium attenuatum. Semina facie ventrali costulis numerosis radiatim striata.

Habitat insulam Filipinam Mindanao dictam.

Mindanao: Davao Prov., Mati, Ramos & Edaño B. Sc. 49089 BO, K, typi, Piper 454 L, co-typus; Zamboanga, Clemens B. Sc. 15754 BM.

A specimen collected at Zamboanga (Hallier 4633 L, NY) and another one collected in the subprov. Mindanao, in the vicinity of Tancubar, Bukidnon (Fenix B. Sc. 26054 US) have scabridulous stems and distinctly hastate leaves resembling those of *Th. subsagittata*, but a puberulous capsule and broadly ovate bracteoles. If the capsules, which are all detached, really belong to these specimens, they doubtless represent an undescribed species, but before describing it, it seems advisable to wait for more complete material.

Th. mindanaensis is easily distinguishable from the other species of this subgenus by its long calyx teeth. The flowers are of about the same size as those of *Th. parviflora*. In the rather far exserted stigma it resembles *Th. hastata* Decne.

35. *Thunbergia linearifolia* Brem. n. spec.

Caulis primum pilis retrorsis vix notabile strigulosus, mox totus glabrescens, sicc. olivaceus. Folia petiolo striguloso, 0.15—0.4 cm longo instructa; lamina linearis, 2.5—7 cm longa et 0.3—0.9 cm lata, apice subacuta et mucronata, basi hastata, margine plana, paulum discolor, sicc. olivacea, supra primum sparse pubescens, deinde scabridula, subtus primum puberulo-pubescentis, deinde glabrescens, 3-nervia, nervis e costa orientibus vix distinguendis. Flores solitarii. Pedicellus glaber, 2—3 cm longus. Bracteolae ovatae, 12.5 mm longae et 7.5 mm latae, acutae et mucronatae, sparse et vix conspicue puberulae, 7-nerviae, post anthesin deciduae. Calyx in dentes 10 subaequales, subacutos, carinatos, margine papillosos, circ. 2 mm longos productus. Corolla nondum visa. Capsula glabra; pars seminifera 8 mm diam. et 4 mm alta; rostrum 10 mm longum et basi 3 mm latum. Semina facie ventrali carunculata.

Habitat insulam Filipinam Mindanao dictam.

Mindanao: Cotabato Prov., Nutol, Ramos & Edaño B. Sc. 84962 AA, typus.

Although this species is known only in a single incomplete specimen, it is so strikingly different from the other species of this subgenus that it seemed worth while to draw the attention to it by publishing a description. Its most noteworthy features are the shortly petiolate linear leaves, the in contrast to the leaves rather wide bracteoles and the small capsules. Shortly petiolate leaves are also found in *Th. brachypoda*, but in that species the leaves are ovate or ovate-lanceolate. Narrow leaves are met with also in *Th. subsagittata* and in *Th. Loheri*, but they are in these species not so narrow as in this one; the leaves of *Th. subsagittata* are also rather shortly petiolate and the capsules of this species are also rather small. I suppose that these two species are its nearest allies, but so long as the flowers of *Th. linearifolia* are unknown this question can not definitely be solved.

36. *Thunbergia subsagittata* Blanco, Fl. Filip. 518, 1837; *Th. fragrans* Roxb. in errore apud Blanco, Fl. Filip. ed. 2, 360, 1847 et ed. 3, 361, 1878; eodem modo Miquel, Fl. Ind. Bat. 2, 768, 1858 quoad specimina filippina; F.-Vill., Noviss. App. 152, 1880; Vidal, Phan. Cuming. Philipp. 132, 1885; id. Rev. Pl. Vasc. Filip. 203, 1886; Merrill, Fl. Manila 440, 1912; id. Sp. Blancoanae 352, 1918; id. Enum. Philipp. Fl. Plants 3, 468, 1923 quoad specimina luzonensia et samarensia; *Th. fragrans* Roxb. var. β Nees in DC, Prodr. 11, 57, 1847 quoad specimen prope Manilam lectum, *Th. fragrans* Roxb. var. *truncata* Nees l.c.; — *Th. javanica* Gaertn. in errore apud Nees op. cit. 56 quoad syn. *Th. subsagittata* Blanco; eodem modo Miquel, Fl. Ind. Bat. 2, 768, 1858 et F.-Vill., Noviss. App. 152, 1880; — *Th. hastata* Decne in errore apud Lindau in Perk., Frag. Fl. Philipp. 38, 1904.

Caulis in var. *subsagittata* et in var. *hirsutifolia* pilis retrorsis primum densius, deinde sparsius pubescens, in var. *glabra* primum sparse pubescens, deinde glaber vel subglaber, sicc. olivaceus. Folia petiolo in var. *subsagittata* et in var. *hirsutifolia* primum dense, deinde sparsius pubescente, in var. *glabra* glabro vel subglabro, 0.8—1.4 cm longo; lamina anguste deltoidea vel rarius lanceolato-oblonga, 3.0—6.5 cm longa et 1.0—2.2 cm lata, apice acuta et mucronata, basi subhastata, margine interdum crispula, paulum discolor, sicc. olivacea, supra in var. *subsagittata* et in var. *glabra* primum pilis brevibus sparsa, deinde scabridula, in var. *hirsutifolia* insuper pilis longis persistentibus sparsa, subtus in var. *subsagittata* dense puberulo-pubescentibus, in var. *hirsutifolia* pubescens, in var. *glabra* glabra, 5- vel 7-nervia, nervis e costa orientibus utroque latere plerumque 2. Flores solitarii. Pedicellus in var. *subsagittata* et in var. *hirsutifolia* ad apicem sparse pubescens, in var. *glabra* totus glaber, plerumque 3—7 cm longus. Bracteolae ovatae, circ. 15 mm longae et 7 mm latae, acutae, in var. *subsagittata* nervis pubescentes et inter nervos sparse puberulae, in var. *hirsutifolia* densius hirsutae, in var. *glabra* nervis sparse pubescentes, 7-nerviae, post anthesin deciduae. Calyx in dentes 10—12 subaequales, subobtusos, haud carinatos, ad marginem papillosos, usque ad 2 mm longos productus. Corolla tubo

6 mm, fauce 13—15 mm, lobis 12—16 mm longis. Filamenta breviora 3.5 mm, longiora 7 mm longa; antherae 3 mm longae, apice subacutae; thecae basi paulum callosae. Granula pollinis 45—46 μ diam., protuberantiis 8—10 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula glabra; pars seminifera 9 mm diam. et 5.5 mm alta; rostrum 12 mm longum et basi 4 mm latum. Semina facie ventrali carunculata.

Habitat insulas Philippinas Luzon et Samar dictas.

var. **subsagittata**, caule petiolisque primum dense, deinde sparsius pubescentibus, foliis supra scabridulis et subtus puberulo-pubescentibus, bracteolis nervis pubescentibus et inter nervos puberulis noscenda.

Luzon: Nueva Vizcaya, Dupax, Mc Gregor B. Sc.11297 L; Bataan Prov., Manila, San Francisco del Monte, Loher 4298 et 4299 K; Lamao, Merrill Sp. Blanc. 963 BO, K, BM, NY, AA, lectotypi, Williams 71 NY; Montalban, Loher 4300 K; Rizal, s.l., Foxworthy B. Sc.115 K; Batangas, Mt Lobo, alt. 350 m, Sulit PNH 8572 PNH; Laguna, Los Baños, Elmer 8260 NY; Lepanto, Ramos B. Sc.7044 BO; Albay, Cuming 1287 K, BM, G.

var. **hirsutifolia** Brem. n. var., foliis supra hirsutis, subtus pubescentibus, bracteolis densius hirsutis a typo recedens.

Luzon: Cagayan, Warburg 11726 NY, typus varietatis.

var. **glabra** Brem. n. var., caule petiolisque glabris vel subglabris, foliis subtus glabris, bracteolis nervis solis parce pubescentibus a typo recedens.

Luzon: Cagayan, Bacani For. B.16472 L; Arayat, Warburg 13754 NY, Ilocos Norte, Burgos, Ramos 32774 K, typus varietatis; Bontoc, Vanoverbergh 3749 FI; Union, Fenix 1 K

Samar: Wright, Loquelocon, Sulti 6128 PNH, SING, L.

In the structure of the androeceum *Th. subsagittata* agrees with *Th. javanica*, *Th. trichocarpa* and *Th. kangeanensis*. The resemblance with *Th. javanica* was recognized already by NEES, who however overrated its importance by reducing BLANCO's type to the latter. *Th. subsagittata* differs from *Th. javanica* in the narrower, always acute leaves, the greater length of the pedicels and the narrower bracteoles, and from all three in the greater number of nerves in the leaves and bracteoles. From *Th. trichocarpa* it differs also in the nature of the indumentum, and from *Th. kangeanensis* in the greater width of the bracteoles. Its relation to *Th. Loheri* will be discussed under the latter.

37. *Thunbergia Loheri* Brem. n. spec.

Caulis primum pilis perpauca sparsus, mox totus glabrescens, sicc. olivaceus. Folia petiolo subglabro, 1.5—3 cm longo instructa; lamina anguste oblonga vel lanceolato-oblonga, rarius ovata, 4—11 cm longa et 1.4—3.5 cm, rarius usque ad 6 cm lata, apice acuta et mucronata, basi rotundata et ad petiolum interdum emarginata, in foliis lanceolato-oblongis aliquibus subhastata, paulum discolor, sicc. olivacea, utrimque glabra vel supra vix notabile scabridula, 5-nervia, nervis e costa orientibus utroque latere 3 vel rarius 4. Flores solitarii. Pedicellus 3—7 cm longus, glaber.

Bracteolae ovato-deltaeidae, 9—15 mm longae et 5—7 mm latae, acutae, sparsissime puberulae, 5-nerviae, post anthesin deciduae. Calyx in dentes 13—15 inaequales, subacutos, in fructu carinatos, margine papillosos productus; dentes longiores 2.2 mm longi. Corolla matura nondum visa. Antherae 2.5 mm longae. Granula pollinis 50 μ diam., protuberantiis 7—8 μ altis sparsa. Capsula glabra; pars seminifera 12 mm diam. et 7 mm alta; rostrum 14 mm longum et basi 6 mm latum. Semina facie ventrali carunculata.

Habitat insulam Philippinam Luzon dictam.

Luzon: Cagayan, Abulong River, Mc Gregor B. Sc.10784 L; Apayao Subprov., s.l., Fenix B. Sc.28022 BO, L; Rizal, Montalban, Rio Macaharing, Loher 4301 K, id. 4297 K, typus; Tayabas, Atimonan, Merrill 4004 K, NY, co-typi; ibid., Baler, Quisumbing PNH 2057 PNH; ibid., Casiguran, Ramos & Edaño B. Sc.45346 NY; Sorsogon, Irosin, Mt Bulusan, Elmer, 15365 BO, L, U, K, G, FI, NY, AA.

Notwithstanding a comparatively large number of specimens could be examined, not a single well-developed corolla was found, and the characters of the latter and those of the stamens and pistil remain therefore unknown. The anthers and the pollen grains were obtained from a bud. That *Th. Loheri* is a near ally of *Th. subsagittata* need hardly be doubted, and for this reason I have inserted it in my key immediately after the latter, assuming that it will agree with it in the structure of the androeceum. It differs from *Th. subsagittata* in the larger and relatively wider leaves, in the larger number of calyx teeth and in the larger size of the capsule.

At Pinamalayan in the island Mindoro another species was found (Ramos B. Sc.41041 US, G) with nitidulous stem and leaves, the latter rather wide, but as neither flowers nor fruits were preserved, it could not be described. At the Baco River in the same island another specimen was collected (Mc Gregor 197K) which may be conspecific, but this specimen too lacks flowers and fruits.

38. *Thunbergia benguettensis* Brem. n. spec.

Caulis primum pilis majore parte acroscopis tomentosus, deinde pilis patentibus et retrorsis sparse pubescens, sicc. brunnescens. Folia petiolo dense pubescente instructa; petiolus foliorum minorum interdum tantummodo 2 mm, foliorum majorum usque ad 4 cm longus; lamina ovata vel ovato-lanceolata, foliorum majorum usque ad 14 cm longa et 7 cm lata, foliorum superiorum minorum interdum tantummodo 2 cm longa et 0.7 mm lata, foliorum omnium apice acuminata et mucronata, basi in foliis majoribus hastata et ad petiolum emarginata, in foliis minoribus subcordata vel rotundata, margine in foliis majoribus supra lobos basales utroque latere in dentes 1—3 producta, in foliis minoribus integra, paulum discolor, sicc. supra olivacea, subtus dilute brunnea, utrimque pubescens, in foliis majoribus 7-nervia, in foliis minoribus 3- vel 5-nervia, nervis e costa orientibus utroque latere 2 vel 3. Flores solitarii. Pedicellus 3—4 cm longus,

dense pubescens. Bracteolae ovatae, 16—17 mm longae et 11 mm latae, acutae et mucronatae, longe et dense pubescentes, 5-nerviae, post anthesin persistentes. Calyx in dentes plerumque 8 inaequales, maxime 1 mm longos productus. Corolla tubo 5 mm, fauce 17 mm, lobis 28 mm longis, lobis ad basin in annulum 4 mm latum connatis. Filamenta breviora 3 mm, longiora 5 mm longa; antherae 3 mm longae, apice acutae; thecae basi acutae. Granula pollinis 52 μ diam., protuberantiis 6 μ altis sparsa. Ovarium puberulum; stigma paulo exsertum. Capsula puberula; pars seminifera 12.5 mm diam. et 7 mm alta; rostrum 14 mm longum et basi 5 mm latum. Semina facie ventrali vix conspicue carunculata.

Habitat insulam Filipinam Luzon dictam.

Luzon: Benguet, Kias, Williams 935 NY, K, typi; *ibid.*, Breed River, alt. 1300 m, Merrill 4286 K.

Noteworthy characters of this species are the eight rather short calyx teeth and the shortness of the filaments, especially of the longer ones. The only other species in which such short filaments are met with, is *Th. parviflora*, and in this species the flowers are but half as long as in *Th. benquettensis*. It is true that there are a number of species in which the shorter filaments are no longer than they are in *Th. benquettensis*, but then the longer ones are more than twice as long as the shorter ones, and in none of them the number of calyx teeth is so small as it is here.

39. *Thunbergia ilocana* Brem. n. spec.

Caulis primum pilis retrorsis paucis sparsus, mox omnino glabrescens, sicc. olivaceus. Folia petiolo sparse pubescente, 0.6—1.0 cm longo instructa; lamina ovata, 2—3 cm longa et 1.8—3.2 cm lata, apice subobtusa et mucronata, basi truncata et haud raro utroque latere in lobum brevem mucronulatum, rarius in lobos duos quorum inferior vix conspicuus producta, margine interdum crispula, discolor, sicc. supra olivacea, subtus griseo-viridis, supra scabridula, subtus primum nervis pubescens, deinde glabra, 5- vel 7-nervia, nervis e costa orientibus utroque latere 2 vel 3. Flores solitarii. Pedicellus 3.5—5 cm longus, subglaber. Bracteolae ovatae, 17 mm longae et 9—10 mm latae, subacutae et mucronulatae, margine et nervis vix conspicue strigulosae et inter nervos glabrae, 7-nerviae, post anthesin persistentes. Calyx in dentes 8 inaequales, acutos, carinatos, ad marginem papillosos productus; dentes longiores 2.5 mm longi. Corolla tubo 6 mm, fauce 21 mm, lobis 13 mm longis. Filamenta breviora 7 mm, longiora 10 mm longa; antherae 3 mm longae, in mucronem longum productae; thecae basi callosae. Granula pollinis 47 μ diam., protuberantiis 5 μ altis sparsa. Ovarium glabrum; stigma vix notabile exsertum. Capsula glabra; pars seminifera 8.5 mm diam. et 5.5 mm alta; rostrum 12 mm longum et basi 4 mm latum. Semina facie ventrali carunculata.

Habitat insulam Filipinam Luzon dictam.

Luzon: Ilocos Norte, Burgos, Ramos B. Sc.32756 BO, L, BM, typi, id. B. Sc. 33445 K.

Th. ilocana is easily recognizable by the small size and the comparatively great width of the leaves. In the small number of calyx teeth it resembles *Th. benguetensis*, from which it differs considerably in the greater length of the calyx teeth and in the much longer filaments. In the comparatively long filaments it shows an approach to the species occurring in the southern part of the Moluccas, New Guinea and the Lesser Sunda Islands. The beak of the capsule, however, is less slender than in the latter.

40. *Thunbergia batjanensis* Brem.

Caulis primum pilis retrorsis dense, deinde sparse pubescens. Folia petiolo primum dense, deinde sparse pubescente, 1—3 cm longo instructa; lamina ovata, 3.5—9 cm longa et 1.7—4 cm lata, apice acuta vel acuminata et mucronata, basi rotundata, truncata vel subcordata, haud raro subhastata vel dimidio inferiore uno vel duobus lobis mucronatis instructa, subconcolor, sicc. brunnescens, primum utrimque densius pubescens, deinde supra scabrida et subtus sparse pubescens, 5-nervia, nervis exterioribus in foliis subhastatis in lobos exeuntibus, nervis e costa orientibus utroque latere plerumque 3. Flores solitarii. Pedicellus 5—7 cm longus, praesertim apicem versus densius hirtellus. Bracteolae anguste ovato-lanceolatae, 15 mm longae et 5 mm latae, dense pubescentes, 5-nerviae. Calyx puberulo-pubescentis in dentes 10 subaequales, margine papillosos, circ. 2 mm longos productus. Corolla tubo 5 mm, fauce 17 mm, lobis 12 mm longis. Filamenta breviora 3 mm, longiora 7.5 mm longa; antherae 2.5 mm longae, apice acutae; thecae basi callosio-mucronatae. Granula pollinis 52 μ diam., protuberantiis 8 μ altis sparsa. Ovarium puberulum; stigma ad orem inclusum. Capsula puberula; pars seminifera 10 mm diam. et 8 mm alta; rostrum 17 mm longum et basi 4 mm latum. Semina facie ventrali carunculata.

Habitat insulam Moluccanam Batjan dictam.

Batjan: Amasing, alt. 3 m, Nedi 148 L (ex herb. bog.), typus.

The taxonomic position of this species is difficult to establish. The long and narrow beak of the capsule reminds us of the species occurring in the southern Moluccas, the Lesser Soenda Islands and New Guinea, from which it differs conspicuously by the much shorter filaments. In the latter point it agrees with *Th. javanica*, *Th. trichocarpa* and *Th. kangeanensis*, from which it differs in the greater length of the pedicels, and with *Th. subsagittata* and *Th. benguetensis*, from which it differs in the shape and size of the capsule.

41. *Thunbergia quadricostata* Brem. n. spec.

Caulis primum pilis retrorsis strigulosus, mox omnino glabrescens; caules robustiores quadrangulares et quadricostati. Folia petiolo primum dense, deinde sparse puberulo-pubescente, 1.0—2.5 cm longo instructa; lamina ovata vel foliorum minorum ovato-lanceolata, plerumque 5—8.5 cm longa et 1.8—3.2 cm, interdum usque ad 5 cm lata, apice acuta et mucronata, basi rotundata, in foliis majoribus raro subhastata, paulum discolor, sicc.

olivaceo-brunnea, primum utrimque puberula, deinde supra scabridula vel utrimque subglabra, 5-nervia, nervis e costa orientibus utroque latere 3—5 vix distinguendis. Flores solitarii. Pedicellus 2.5—3 cm longus, pilis retrorsis pubescens. Bracteolae anguste ovato-lanceolatae, 12 mm longae et 4 mm latae, acutae, pubescentes, 5-nerviae. Calyx in dentes 10 inaequales, margine papillosos productus; dentes longiores 2 mm longi. Corolla tubo 5 mm, fauce 19 mm, lobis 14 mm longis. Filamenta breviora 7 mm, longiora 12 mm longa; antherae 4 mm longae, apice in mucronem longum productae; thecae basi calloso-mucronatae. Granula pollinis 43—49 μ diam., protuberantiis 7 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula nondum nota.

Habitat insulas Moluccanas Mangole et Ceram dictas.

Mangole: Kg Mangole, Atje 37 BO, typus

Ceram: Boano, Kornassi 1289 BO; Manoesela, id. 587 BO.

With its 10 calyx teeth *Th. quadricostata* occupies a position midway between *Th. batjanensis*, in which the calyx is provided with 8, and *Th. hastata*, where it has 12 teeth. It resembles *Th. batjanensis* in the presence of a long mucro on top of the anther, and in the included stigma, but it differs considerably from that species in the length of the filaments. In *Th. hastata* the anthers are bidentulate at the top, and the stigma is rather far exerted; in the length of the filaments, however, this species differs but slightly from *Th. quadricostata*. Noteworthy features of *Th. quadricostata* are the four-ribbed stem and the rather long anthers.

42. *Thunbergia hastata* Decne in Nouv. Ann. du Mus. 3, 388, 1834; Nees in DC, Prodr. 11, 56, 1847; Miq., Fl. Ind. Bat. 2, 768, 1858; Lindau in Bot. Jahrb. 17, Beibl. 41, 34, 1893; Boerl., Handl. Fl. Ned. Ind. 2, 655, 1899, non Lindau in Perk., Frag. Fl. Philipp. 38, 1904 quae est *Th. sub-sagittata* Blanco, nec Hochreutiner in Candollea 5, 224, 1934 nam specimina citata ad *Th. javanicam* Gaertn. et ad *Th. trichocarpam* Brem. pertinent.

Caulis in var. *hastata* et in var. *pilosiuscula* primum pilis retrorsis strigosus, mox glabrescens, in var. *tomentosa* primum tomentosus, deinde sparsius pubescens, sicc. brunneus vel olivaceus. Folia petiolo in var. *hastata* et in var. *pilosiuscula* primum sparse pubescente, deinde margine sulci excepta glabrescente, in var. *tomentosa* tomentoso, 1—2.5 cm longo instructa; lamina foliorum majorum ovata, basi sagittata, usque ad 11 cm longa et 6 cm lata, foliorum minorum lanceolata, basi subhastata, 2.5—5 cm longa et 0.8—2.0 cm lata, apice in foliis majoribus acuminata, in foliis minoribus acuta, semper longius mucronata, lobis basalibus mucronatis vel mucronulatis, margine interdum crispula, paulum discolor, sicc. olivaceo-brunnea vel in var. *tomentosa* olivacea, in var. *hastata* et in var. *pilosiuscula* primum utrimque pubescens sed mox glabrescens, in var. *tomentosa* utrimque longius pubescens, 5-nervia, lobis lateralibus ramo nervi extremi percursis, nervis e costa orientibus utroque latere 3—5. Flores solitarii. Pedicellus 3—5 cm longus, in var. *hastata* apicem versus strigosus, in var. *pilosiuscula* apicem

versus hirsutus, in var. *tomentosa* tomentosus. Bracteolae ovato-lanceolatae, 15—20 mm longae et 7—8 mm latae, acutae vel acuminatae, in var. *hastata* primum strigulosae sed mox glabrescentes, in var. *pilosiuscula* primum hirsutae, deinde sparse pubescentes, in var. *tomentosa* tomentosae, ubique carinatae, 7-nerviae, post anthesin deciduae. Calyx in dentes 12 subaequales, subacutos, carinatos, 3-nervios, circ. 1.5 mm longos, in var. *hastata* et in var. *pilosiuscula* margine puberulos et basin versus papillis satis magnis sparsos, in var. *tomentosa* dense puberulo-pubescentes productus. Corolla tubo 5—7 mm, fauce 16—18 mm, lobis 20—25 mm longis. Filamenta breviora 7.5—8.5 mm, longiora 14—16 mm longa; antherae 3 mm longae, apice vix conspicue bidenticulatae, staminum longiorum breviter exsertae; thecae basi callosae. Granula pollinis 47—52 μ diam., protuberantiis 7—8 μ altis sparsa. Ovarium glabrum; stigma circ. 4 mm exsertum. Capsula glabra; pars seminifera 10 mm diam. et 8 mm alta; rostrum 17 mm longum et basi 3.5 mm latum. Semina facie ventrali carunculata.

Habitat Insulas Sundanas Minores Timor et Wetar dictas.

var. **hastata**, caule, petiolis folisque mox glabrescentibus, pedicello apicem versus strigoso, bracteolis primum strigulosis sed mox glabrescentibus, calycis lobis puberulis noscenda.

Timor: Koepang, Zippelius 47/2 "*Thunbergia hastata* Zp" L; s.l., coll. ign. in herb. Par. typus, n.v., dupl. L, K, G; Bunga rodia, Smith & Wiles Oct. 92 K

Wetar: Laswerang, alt. 550 m, Elbert 4462 L, *ibid.*, alt. 700 m, id. 4481 L.

var. **pilosiuscula** Zipp. ex Brem. n. var., pedicello apicem versus hirsuto, bracteolis primum hirsutis, deinde sparse pubescentibus a typo recedens. Timor: Koepang, Zippelius 47/6 L, BO (cum descriptione species et varietatis!), typi varietatis; R. Brown April 1903 BM, L; s.l., coll. ign. L

var. **tomentosa** Brem. n. var., caule primum tomentoso, deinde sparsius pubescente, petiolis tomentosis, foliis utrimque longius pubescentibus, pedicellis bracteolisque tomentosis, calyce dense puberulo-pubescente a typo et a var. *pilosiuscula* recedens.

Timor: South-central Timor, Soë, alt. 880 m, Walsh 20 BO, typus varietatis; Fatunaba, Forbes 4053 BM; s.l., id. 3783 et 3852 BM.

It is rather strange that DECAISNE should have used for this species the epithet *hastata*, which ZIPPELIUS six years earlier had written on the labels of the specimina collected by himself. I suppose that DECAISNE did see one or more of the specimina collected by the latter, and that he accepted the epithet proposed by ZIPPELIUS but forgot to mention the latter's name.

It is also rather strange that this species has been accepted by nearly all subsequent authors, whereas species like *Th. javanica* and *Th. subsagittata* with certainly as good a claim to recognition were sunk in *Th. fragrans*. Especially strange was the attitude of LINDAU who put *Th. hastata* together with a number of African species in his subdivision *Thunbergiopsis* to which he ascribed as one of its main features an infundibuliform stigma. The stigma of *Th. hastata*, however, is of a type entirely different from that of the

African species which he referred to this subdivision, and agrees exactly with that of *Th. fragrans*, which he put in *Eu-thunbergia*, and with that observed in all the other species of my subgenus *Adelphia*, which means that it consists of two lobes of equal length but unequal width, which together form a kind of funnel more or less deeply split along the lines where the narrow upper lobe and the wider lower one meet.

Th. hastata agrees with *Th. quadricostata* and with the following species in the comparatively long filaments, but differs from all of them in the rather far exserted stigma. From *Th. quadricostata* it differs moreover in the larger number of calyx teeth (12 instead of 10) and from *Th. thespesiifolia*, *Th. pleistodonta* and *Th. papuana* in the smaller number of calyx teeth (12 instead of 14—23).

Th. arnhemica F. Muell., *Fragm. Phytogr. Austr.* 9, 73, was reduced by CLARKE to *Th. hastata* or, as he called it, *Th. fragrans* var. *hastata*, but it differs from the true *Th. hastata* in the longer petioles and pedicels, the narrower calyx lobes, the slightly shorter tube and throat of the corolla and the length of the style, the stigma being but 1 mm exserted. It is doubtless a good species.

43. *Thunbergia thespesiifolia* Brem. n. spec.

Caulis pilis retrorsis primum tomentosus, deinde sensim minus dense pubescens, sicc. brunnescens. Folia petiolo densius hirtello, 1—2.5 cm longo instructa; lamina foliorum majorum late ovata, 5—6.5 cm longa et 3.2—4.8 cm lata, foliorum minorum ovato-lanceolata, 4 cm longa et 2 cm lata, foliorum omnium apice acuminata et longius mucronata, basi rotundata vel subcordata sed ad petiolum semper subito contracta, margine interdum hic inde crispula, vix notabile discolor, sicc. olivacea, supra primum densius puberulo-pubescens, deinde scabridula, subtus costa nervisque pubescens et inter nervos dense puberulo-pubescens, 5- vel in foliis majoribus 7-nervia, nervis exterioribus tamen tenuibus, nervis e costa orientibus utroque latere 3. Flores solitarii. Pedicellus pilis retrorsis praesertim apicem versus dense pubescens. Bracteolae ovato-lanceolatae, 10 mm longae et 4 mm latae, acutae, puberulo-pubescentes, 7-nerviae, post anthesin deciduae. Calyx sparse et vix conspicue puberulus in dentes plerumque 16 inaequales, margine papillosos productus; dentes longiores 2 mm longi. Corolla tubo 4 mm, fauce 14 mm, lobis 15 mm longis. Filamenta breviora 7 mm, longiora 10.5 mm longa; antherae 2.5 mm longae, apice bidenticulatae; thecae basi in mucronem curvatum productae. Granula pollinis 45 μ diam., protuberantiis 4 μ altis sparsa. Ovarium pubescens; stigma ad orem inclusum, ad antheras staminum longiorum appressum. Capsula dense pubescens, matura nondum visa.

Habitat Insulam Sundanam Minorem Soemba dictam.

Soemba: Rendi Menili, alt. 50 m, Grevenstuk 236 BO, typus.

Th. thespesiifolia resembles *Th. hastata* in the bidenticulate anthers, but differs from the latter in the shape of the leaves with their contracted base,

the smaller size of the flowers, the larger number of calyx teeth and the included stigma. In the large number of calyx teeth it shows an approach to *Th. pleistodonta* and *Th. papuana*, from which it differs in the smaller size of the flowers and the bidenticulate anthers. From all three it differs in the small size of the warts by which the pollen grains are covered. In this point it reminds us of *Th. brachythylla*, from which it differs widely in other respects, e.g. in the greater length of the filaments, the much larger number of calyx teeth and the pubescent ovary.

44. *Thunbergia pleistodonta* Brem. n. spec.

Caulis primum pilis retrorsis dense, deinde sparsius pubescens, sicc. brunnescens. Folia petiolo primum dense, deinde sparsius pubescente, 0.8—2.0 cm longo instructa; lamina ovata vel lanceolato-oblonga, plerumque 3.5—7.5 cm, interdum usque ad 8 cm longa, et 1.4—3.8 cm, interdum usque ad 6.0 cm lata, apice acuta vel subacuminata et longius mucronata, basi in foliis majoribus cordata, in foliis minoribus emarginata vel truncata, rarius vix notabile subhastata, margine interdum crispula, paulum discolor, sicc. brunnea vel olivacea, primum utrimque pubescens, deinde supra scabrida et subtus praesertim costa nervisque pubescens, 5-nervia, nervis exterioribus tamen vix conspicuis, nervis e costa orientibus utroque latere plerumque 3. Flores solitarii. Pedicellus 2.5—4 cm longus, pilis retrorsis apicem versus dense, basin versus sparse pubescens. Bracteolae ovato-lanceolatae, 16 mm longae et 7 mm latae, acutae, pilis acroscopis dense pubescentes, 7-nerviae, post anthesin deciduae. Calyx in dentes 14—23 paulum inaequales, lineares, subobtusos, papillosos et parce puberulo-pubescentes, circ. 1.5 mm longos productus. Corolla tubo 5 mm, fauce 20 mm, lobis 20 mm longis. Filamenta breviora 7.5 mm, longiora 12.5 mm longa; antherae 4 mm longae, apice subobtusae; thecae basi callosae. Granula pollinis 47 μ diam., protuberantiis 9 μ altis sparsa. Ovarium puberulum; stigma fere totum exsertum. Capsula puberula; pars seminifera 12 mm diam. et 7 mm alta; rostrum 17 mm longum et basi 4.5 mm latum. Semina facie ventrali carunculata.

Habitat Insulas Sundanas Minores Soembawa, Flores, Lombok dictas. Soembawa: Bima, Waworada Bay, alt. 200 m, Elbert 3926 L; *ibid.*, Donggo, alt. 375 m, *id.* 3507 L, alt. 225 m, *id.* 3602 L; *ibid.*, Kolo Mts, alt. 350 m, *id.* 3681 L; s.l. Colfs 268 L, *typus*

Flores: Mborong, alt. 10 m, Mrs Rensch 1445 BO

Lombok: South-eastern slopes of Mt Rindjani, Sapittal, alt. 800 m, Elbert 1842 L; Swela near Pringabaya, alt. 425 m, *id.* 2009 L (the number of calyx teeth in these two specimens is 14, whereas in the other ones it varies between 15 and 23; the wider leaves mentioned in the description too are confined to these two specimens; in other respects they seem to agree with the other specimens).

Colfs 137 L, collected at Djalata, Soembawa, has wider leaves and completely glabrous and much smaller capsules. It may represent a distinct,

although doubtless nearly related species, but as no corollas have been preserved, this question can not be decided.

Th. pleistodonta resembles *Th. thespesiifolia* and *Th. papuana* in the large number of calyx teeth. From the first it differs by the larger size of the flower and by the obtuse, not bidenticulate anthers and the larger size of the warts on the pollen grains, and from *Th. papuana* in the nature of the indumentum, the obtuse not mucronate anthers and the long beak of the capsule. From *Th. hastata* it differs in the larger number of calyx teeth and the less far exerted stigma. It resembles these species in the length of the filaments.

The number of calyx teeth varies rather considerably in this species; in some specimens up to 23 teeth are found, a number far exceeding that observed elsewhere in this genus.

45. *Thunbergia papuana* Brem. n. spec.

Caulis primum pilis retrorsis strigosus, mox omnino glabrescens, sicc. fucescens. Folia petiolo primum sparse striguloso, mox glabrescente, 1.5—2.5 cm longo instructa; lamina ovata vel lanceolata, foliorum latiorum usque ad 6 cm longa et 4 cm lata, foliorum angustiorum usque ad 8 cm longa et 3 cm lata, foliorum omnium apicem versus sensim attenuata et apice ipso rotundata et mucronata, basi sagittata, subhastata vel truncata, ad petiolum tamen semper emarginata, paulum discolor, sicc. olivacea, utrimque primum strigulosa, deinde scabridula, 5-nervia, nervis e costa orientibus utroque latere plerumque 3 vel 4. Flores solitarii. Pedicellus 4—5.5 cm longus, apicem versus pilis retrorsis strigosus. Bracteolae ovato-lanceolatae vel anguste ovato-lanceolatae, 15—19 mm longae et 7 mm latae, acutae, strigulosae, 5-nerviae, post anthesin deciduae. Calyx in dentes circ. 15 subaequales, acutos, margine papillosos, usque ad 2 mm longos productus. Corolla tubo 4 mm, fauce 18 mm, lobis 17 mm longis. Filamenta breviora 7 mm, longiora 11 mm longa; antherae 4 mm longae, apice in mucronem longum productae; thecae basi acutae. Granula pollinis 45 μ diam., protuberantiis 8 μ altis sparsa. Ovarium glabrum; stigma ad orem inclusum. Capsula glabra; pars seminifera 9.5 mm diam. et 6 mm alta; rostrum 13 mm longum et basi 3.5 mm latum. Semina facie ventrali carunculata.

Habitat Novae Guineae partem orientalem.

New Guinea: Papua, Central Division, Laloki River, Rona, alt. 450 m, Brass 3594 BO, BM, NY, typi; Laloki River, alt. 350 m, id. 539 BM; Kubuna, alt. 100 m, id. 5593 BO, NY; Kanosia, Carr 11294 L, NY; Veiya, id. 11607 L, NY.

Th. papuana agrees in the length of the filaments with *Th. ilocana*, *Th. quadricostata*, *Th. hastata*, *Th. thespesiifolia* and *Th. pleistodonta*. From the first it differs in the slender beak of the capsule and in the larger size of the leaves, and from the first, second and third in the larger number of calyx teeth. From *Th. thespesiifolia* and *Th. pleistodonta* it differs in the

presence of a long mucro on top of the anther. A similar mucro is also met with in *Th. ilocana* and in *Th. quadricostata*, and the anthers of the latter are also of the same large size (4 mm long) as in *Th. papuana*. Notwithstanding the difference in the number of calyx teeth and less important differences in the length of the pedicels and in the size of the bracteoles, it can hardly be doubted that *Th. quadricostata* is a very near ally of *Th. papuana*, with which it agrees also in the nature of the indumentum.

Index nominum in parte speciali memoratorum

Flemingia Rottl.

grandiflora Roxb. ex Rottl. = **Thunbergia grandiflora**

Hexacentris Nees

acuminata Nees = **Thunbergia coccinea** (cf. etiam *Th. laurifolia*)

coccinea Nees = **Thunbergia coccinea**

dentata Nees = **Thunbergia coccinea**

pendula (Hassk.) Hassk. = *Thunbergia pendula*

Meyenia Nees

erecta Bth. = **Thunbergia erecta**

longiflora Bth. = **Thunbergia laevis**

vogeliana (Bth.) Bth. = **Thunbergia vogeliana**

Thunbergia Retz.

3. **affinis** S. Moore

6. **alata** Boj. ex Sims

subsp. **alata**

subsp. **reticulata** Brem. n. subsp.

var. *reticulata* Burkill = subsp. **reticulata**

var. *velutina* Brem. = subsp. **alata**

alba Paxt. = **alata**

arnhemica F. Müll. cf. adnot. ad *hastata*

aurantiaca Paxt. = **alata**

aureosetosa Mildbr. cf. **Gregorii**

20. **bancana** Brem. n. spec.

40. **batjanensis** Brem. n. spec.

38. **benguettensis** Brem. n. spec.

borbonica Lindau = **grandiflora**

22. **brachypoda** Brem. n. spec.

33. **brachythylla** Brem. n. spec.

31. **Bünnemeyeri** Brem. n. spec.

var. **Bünnemeyeri**

var. **glabra** Brem. n. var.

32. **celebica** Brem.

7. **coccinea** Wall.

15. **crispula** Brem. n. spec.
 23. **cycloneura** Brem. n. spec.
 14. **dasychlamys** Brem. n. spec.
 2. **erecta** (Bth.) T. And.
 29. **Eymae** Brem. n. spec.
 11. **fragrans** Roxb.
 var. *javanica* (Gaertn.) C. B. Clarke = **javanica** (cf. etiam **crispula**
 et **hebecocca**)
 var. *laevis* (Nees) C. B. Clarke = **laevis**
 var. *truncata* Nees = **subsagittata**
 Gibsoni S. Moore = **Gregorii**
 8. **grandiflora** (Roxb. ex Rottl.) Roxb.
 var. **grandiflora**
 var. *laurifolia* (Lindl.) R. Ben. = **laurifolia**
 var. *spaniotricha* Brem. n. var.
 5. **Gregorii** S. Moore
 Harrisii Hook. = **laurifolia**
 42. **hastata** Decne (cf. etiam **javanica**, **subsagittata** et **trichocarpa**)
 var. **hastata**
 var. **pilosiuscula** Zipp. ex Brem. n. var.
 var. **tomentosa** Brem. n. var.
 18. **hebecocca** Brem. n. var.
 30. **hederifolia** Brem.
 Holstii Lindau = **affinis**
 hookeriana Lindau n. nov. illeg. = **Kirkii**
 39. **ilocana** Brem. n. spec.
 24. **javanica** Gaertn. (cf. etiam **subsagittata**)
 javanica
 var. *scabrida* Brem. = var. **javanica**
 var. *scabridula* Brem. = var. **javanica**
 var. **tomentella** Brem.
 26. **kangeanensis** Brem. n. spec.
 var. **angustifolia** Brem. n. var.
 var. **kangeanensis**
 4. **Kirkii** Hook. f.
 12. **laevis** Nees
 9. **laurifolia** Lindl.
 35. **linearifolia** Brem. n. spec.
 37. **Loheri** Brem. n. spec.
 28. **macalensis** Brem. n. spec.
 malayana Gdyl = **javanica**
 34. **mindanaensis** Brem. n. spec.
 10. **natalensis** Hook.
 21. **palawanensis** Brem. n. spec.
 45. **papuana** Brem. n. spec.

27. **parviflora** Brem.
pendula Hassk. cf. **coccinea**
44. **pleistodonta** Brem. n. spec.
41. **quadricostata** Brem. n. spec.
reticulata Hochst. ex Nees = **alata** subsp. **reticulata**
19. **Ridleyi** Brem. n. spec.
Roberti Mildbr. = **Gregorii**
16. **siantanensis** Brem. n. spec.
similis Craib var. *hirta* Ridl. = **Ridleyi**
17. **stenochlamys** Brem. n. spec.
36. **subsagittata** Blanco
 var. **glabra** Brem. n. var.
 var. **hirsutifolia** Brem. n. var.
 var. **subsagittata**
43. **thesepiifolia** Brem. n. spec.
13. **trachychlamys** Brem. n. spec.
25. **trichocarpa** Brem. n. spec.
 1. **vogeliana** Bth.

Index Speciminum

(Numeri uncis inclusi ad numeros in parte speciali usos spectant, numerus primus ad speciem, numerus secundus si exstat ad subspeciem vel varietatem. Asterisci typos indicant)

Aet: 695 (6.1)

Agama: 470 (6.1)

Atje: 37 (+41)

Bacani: For.Bur.16472 (36.3)

Backer: 226 (24.1), 568 (6.1), 863 (24.2), 1342 (24.1), 1541 (24.1), 2612 (24.2), 3123 (6.2), 4133 (6.2), 4333 (6.1), 5013 (6.1), 5046 (24.2), 5464 (6.1), 6919 (24.1), 7516 (6.2), 8279 (24.1), 10208 (6.1), 10211 (24.1), 13231 (24.1), 13743 (9), 13842 (24.2), 14232 (6.1), 14758 (6.1), 16839 (24.2), 17331 (6.1), 17401 (24.2), 17593 (24.2), 17985 (24.1), 18368 (24.2), 18983 (25), 19177 (25), 19464 (25), 19648 (25), 20599 (25), 20645 (25), 22248 (9), 24265 (24.1), 24586 (25), 26287 (24.1), 26767 (26.1), 27296 (26.1), 27456 (+26.1), 27727 (26.+2), 27810 (26.1), 28118 (26.2), 28920 (26.1), 29592 (26.1), 30134 (6.1), 31260 (9), 33275 (24.1), 33276 (+24.1), 33277 (24.1), 33278 (24.1), 33279 (24.1), 33280 (24.2), 34122 (9), 34123 (9), 34124 (9), 34825 (6.2), 34826 (6.2), 34827 (6.2), 34828 (6.2), 34829 (6.2), 37689 (25)

Bakhuizen v. d. Brink Jr: 984 (24.1)

Bakhuizen v. d. Brink Sr: 1 (24.1), 1807 (6.2), 2010 (24.1), 3650 (24.1), 4974 (24.1), 6636 (24.1)

Beccari: 7168 (32?), 7169 (6.1)

Beguïn: 808 (6.1), I 2 (26.1), H 2 (26.1)

Bermejós: B. Sc.193 (21)

- Beumée: 145 (24.1), 213 (24.1), 1405 (24.1), 1530 (25), 1720 (24.1), 2293 (24.1) 2398 (25), 3681 (24.2), 3870 (24.1), 4388 (24.2), 4775 (24.2), 4985 (24.1), 6683 (24.2)
- Boerlage: 15.9.88 (24.1)
- Bouman-Houtman: 6 (24.1)
- Brass: 539 (45), 3594 (+45), 5593 (45)
- Brown, R.: April 1803 (42.2)
- Bünnemeyer: 1316 (6.1), 1535 (6.1), 2012 (+20), 2122 (6.1), 2427 (20), 4816 (6.1), 6400 (6.1), 10590 (31.1), 10603 (31.1), 10810 (31.1), 10856 (31.1), 11057 (+31.1), 11226 (31.1), 11743 (31.1), 12540 (31.1)
- Burkill: 134 (6.2), 12449 (15)
- Burkill & Haniff: 15763 (9)
- Canicosa: PNH 9726 (9)
- Carr: 11124 (6.1), 11294 (45), 11607 (45)
- Clemens: B. Sc. 15754 (34)
- Colfs: 137 (cf. 44), 268 (+44)
- Corner: 19.11.41 (18)
- Creagh: 9. 4.95 (17), 17.4.95 (6.1)
- Cuming: 1287 (36.1)
- Curran: For. Bur. 4499 (21), For. Bur. 19143 (6.2)
- Curtis: Gapis Pass, May 90 (9), Lankawi Sept. 90 (9), *idem* (18), Penang Sept. 01 (18)
- De Mol: 145 (6.1)
- De Raadt: 30 (6.2), 31 (6.2), 86 (24.1)
- Docters v. Leeuwen: 1738 (31.+2)
- Dommers: 150 (26.1)
- Dorgelo: 1825 (25)
- Ebalo & Conklin: PNH 1321 (+21)
- Elbert: 1842 (44), 2009 (44), 2992 (29), 3507 (44), 3602 (44), 3681 (44), 3926 (44), 4462 (42.1), 4481 (42.1)
- Elmer: 8260 (36.1), 13076 (+22), 15365 (37)
- Evans: 13213 (9)
- Eyma: 316 (29), 3427 (+29)
- Fenix: 1 (36.3), B. Sc. 28022 (37)
- Forbes: 3783 (42.3), 3852 (42.3), 4053 (42.3)
- Fox, R. B.: PNH 4792 (11)
- Fox, W.: 12694 (9)
- Foxworthy: B. Sc. 115 (36.1), B. Sc. 586 (22), B. Sc. 1612 (6.2)
- Fraser: 270 (17)
- Furtado: S.F.18345 (11), S.F.34883 (9)
- Galoengi: 265 (17)
- Gäuman: Boeakajoe Nov. 21 (+28)
- Gibbs: 2617 (17)
- Grabowski: 7.5.82 (17)
- Grevenstuk: 236 (+43)

- Grutterink: 3186 (+25), 3276 (25)
 Hallier: 24^b (6.1), 51 (6.2), 246 (6.1), 246^a (6.2), 247^a (24.1), 247^b (24.2),
 247^c (24.1), 247^d (24.1), 2428 (24.1), 4633 (cf. adnot. ad 34) 6.1.93 (24.1),
 29.10.94 (24.1), 6.11.94 (24.1), 24.3.96 (24.1)
 Haniff: SF 15563 (9)
 Haniff & Nur: 10097 (15)
 Harmsen: 101 (24.1)
 Haviland: 1360 (17)
 Henderson: 20275 (16), 29065 (18)
 Holstvoogd: 47 (6.2)
 Holttum: 6.9.33 (9)
 Hort. Bog. cult. X F 93, 95, 96^a, 98^a, 99 (all 6.2)
 Huitema: 87 (6.2)
 Hume: 7233 (15), 7435 (6.1)
 Hullett: 258 (6.2)
 Iboet: 200 (17), 315 (24.2), 348 (24.1)
 Jacobson: 4 (6.1)
 Junghuhn: 127 (24.1)
 Karsten: 83 (6.2)
 Kaudern: 485 (+32)
 Keith: 10010 (17)
 Kerr: 13011 (19)
 Kiah & Strugnell: 23957 (9)
 King's coll.: 8418 (9)
 Kjellberg: 44 (+30), 1120 (29), 4001 (+27)
 Kloss: 6672 (9), 6869 (9)
 Koents: 404 (6.2)
 Koorders: 15823 (32?), 15834 (6.1), 15835 (6.1), 15836 (32?), 20399 (24.1),
 20401 (24.1), 20402 (6.1), 22956 (24.1), 23416 (24.1), 23882 (6.2), 27212
 (24.1), 28204 (24.1), 29971 (24.1), 31614 (6.2), 33159 (24.1), 34470 (24.1),
 34668 (24.1), 36837 (6.1), 37180 (24.1), 40948 (24.1), 42131 (7), 42545
 (24.1), 42699 (24.2), 47980 (6.2)
 Kornassi: 587 (41), 1126 (6.1), 1289 (41)
 Kuntze: 4879 (24.1), 6147 (18)
 Leenart: 60 (24.1), 61 (24.1)
 Loerzing: 263 (6.1), 1108 (6.2), 3500 (6.1), 3665 (6.1), 6213 (6.2), 8833
 (6.1), 9848 (6.2), 10105 (6.2)
 Loher: 4297 (+37), 4298 (36.1), 4299 (36.1), 4300 (36.1), 4301 (37)
 Loogen: 6 (6.2)
 Mabesa: 26313 (9)
 Maingay: 1755 (9)
 Malvins: 1986 (6.2)
 McGregor: 197 (cf. adnot. ad 37), B. Sc.10784 (37), B. Sc.11297 (36.1)
 Merrill: 14 (6.2), 288 (6.2), Sp. Bl. 963 (+36.1), 4004 (37), 4286 (38), 7592 (9)
 Mousset: 116 (6.1), 828 (24.1)

- Nedi: 148 (40)
Ottolander: 389 (6.1)
Piper: 98 (+33), 454 (34)
Popta: 43 (6.2)
Posthumus: 1046 (24.1?), 1097 (24.1?), 2246 (17)
Quisumbing: PNH 2057 (37)
Raap: 2 (6.2), 156 (6.2)
Rachmat: 251 (29), 312 (29), 844 (29)
Rahmat: 676 (6.2)
Ramos: B. Sc. 7044 (36.1), B. Sc. 32756 (+39), B. Sc. 32774 (36.+3); B. Sc. 33445 (39), B. Sc. 41041 (cf. adnot. ad 37)
Ramos & Edaño: B. Sc. 45076 (6.1), B. Sc. 45346 (37), B. Sc. 49089 (+34), B. Sc. 84962 (35)
Rant: 514 (6.1)
Rensch: 1445 (44)
Ridley: 2172 (9), 2173 (+15), 12694 (9), 14431 (15), 14979 (+19); Singapore, Reservoir 1906 (+14), Kuala Temango July 1907 (13), Tebing Tinggi, March 1920 (+13), Kuala Lumpur, Dec. 15 1920 (15)
Robinson, B: B. Sc. 1788 (6.2)
Rutten: 137 (+17), 241 (17), 773 (17)
Scheffer: 17 (24.1)
Schiffner: 2575 (6.1), 2584 (6.2), 2587 (24.1)
Schlechter: 14855 (6.1)
Seimund: 802 (9), 899 (15)
Smith & Wiles: Oct. 92 (42.1)
Soegandiredjo: 308 (24.1)
Spare: 1491 (cf. 13)
Sulit: PNH 6128 (36.3), PNH 8572 (36.1)
Symington: 18181 (6.2)
Teysmann: 1815 (25)
Thorenaar: 229 (24.2)
Ultée: 12 (24.1), 14 (6.1)
Van der Vecht: 3 (6.1)
Van Overbergh: 3749 (36.3)
Van Slooten: 230 (24.1), 324 (6.1), 2203 (17)
Van Steenis: 858 (+16), 1587 (24.1), 5788 (17), 6730 (24.2)
Verboom: 28 (6.2), 30 (6.2), 31 (6.2)
Vorderman: 50 (25)
Walsh: 20 (42.+3)
Warburg: 11276 (36.+2), 13754 (36.3), 17476 (6.1)
Williams: 71 (36.1), 935 (+38)
Winckel: 605 (24.1)
Winkler, Hub.: 2608 (+23)
Wisse: 17 (24.1), 143 (25), 306 (6.1), 331 (24.1)
Wood: 800 (6.1), 865 (6.1)

Wray: 52 (15)

Yapp: 50 (9), 620 (9)

Yates: 1257 (6.2)

Zippelius: 47/2 (42.1), 47/6 (42.+2)

Zollinger: 393 (24.1)

Zwaardemaker: Z 64 (24.2).