

A PRELIMINARY SURVEY  
OF THE RUELLIINAE (ACANTHACEAE)  
OF THE MALAY ARCHIPELAGO AND  
NEW GUINEA

BY

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In the first-named author's "Materials for a Monograph of the *Strobilanthinae* (*Acanthaceae*)" (in Verh. d. Ned. Akad. v. Wet., Afd. Nat., 2e Sect. XLI, n° 1, 1944, pp. 12—16 and 30) the *Ruellieae* have been defined as that tribe of the *Acanthoideae* in which a contorted or, more rarely, quincunxial or decussate aestivation of the corolla lobes is linked with a particular kind of pollen grains. The latter, namely, are always instructed with pores and either globose or ellipsoidal; the globose ones, moreover, are provided either with three fissures (*Blechinae*) or with a relief which sometimes (*Hydrophilinae* and a few *Strobilanthinae*) consists of equidistant bands, and sometimes (*Ruellinae* and some of the *Strobilanthinae*) of evenly distributed alveoles, spinules or granules, whereas the ellipsoidal ones are decorated either with equidistant bands (*Petalidiinae* and the bulk of the *Strobilanthinae*) or, more rarely, with alveoles (*Barleriinae*). In this delimitation the tribe comprises all *Acanthoideae* with contorted, quincunxial or decussate aestivation of the corolla lobes with the exception of the *Whitfieldieae* and *Trichanthereae*, whose pollen grains are lenticular with on each side a single germ pore, and the *Lepidagathideae*, whose pollen grains are doleiform, i.e. truncate at the poles, and differ moreover from those of the *Ruellieae* in their small size and in the presence of three fissures which on each side are accompanied by a series of rather flat protuberances.

As a large part of the genera belonging to the *Ruellieae* are still imperfectly known, a fully satisfactory subdivision of this tribe can not yet be given. LINDAU's tribes *Hygrophileae*, *Petalidieae*, *Strobilantheae* and *Barlerieae* have provisionally been retained as subtribes, each of them, however, in a more or less strongly modified delimitation; the genus *Blechum* [P.Br.] Juss., for instance, could not be kept in the *Petalidiinae*, but was on account of its racemose inflorescence and peculiar pollen removed to a subtribe of its own; several of LINDAU's *Strobilantheae* on the other hand had to be transferred to the *Petalidiinae*, and *Lepidagathis* Willd. and its nearest allies were conveyed from the *Barlerieae* to a new tribe *Lepidagathideae*. The *Haselhoffieae*, which LINDAU regarded as near allies of the *Strobilantheae*, were on account of the absence of cystoliths, the monotheous anthers and the absence of germ pores in the pollen grains transferred to the *Acantheae*, where they form a new subtribe *Haselhoffiinae* (l.c. p. 12). The bulk of the remaining genera is provisionally brought together in the *Ruellinae*. Roughly speaking the latter may be said to comprise LINDAU's *Louteridieae* and *Ruellieae*, the *Ruellieae* however with the exception of *Whitfieldia* Hook. and *Stylarthropus* Baill., which have been removed to a new tribe *Whitfieldieae*, and of *Physacanthus* Benth., which was recognized by CLARKE (in Fl. Trop. Afr. V, p. 57, 1900) as identical with *Haselhofia* Lindau and belongs therefore to the *Acantheae*.

The following key may serve to give some insight into the principal differences between the subtribes of the *Ruellieae*.

**Key to the Subtribes of the *Ruellieae*.**

Aestivation of the corolla lobes contorted. Stamens united in pairs or in a single group.

Stamens united in a single group. Style retained against the wall of the corolla by two rows or bundles of hairs. Anticous stigma lobe laterally flattened. *Strobilanthinae*

Stamens usually united in pairs, rarely (*Hygrophilinae*) in a single group. Style not retained against the corolla by rows or bundles of hairs. Anticous stigma lobe never laterally flattened.

Pollen grains ellipsoidal and banded; the three germ pores in the middle of bands which at that place are distinctly dilated.

*Petalidiinae*

Pollen grains globose and provided either with three fissures or with a relief consisting of alveoles or bands; if banded, then the germ pores always between the bands.

Pollen grains with three fissures but otherwise without any relief. Corolla limb subactinomorphous. Inflorescences terminal and racemose. *Blechiniae*

Pollen grains banded, alveolate, echinulate or granulate.

Pollen grains banded and provided with four germ pores. Corolla bilabiate. Inflorescences axillary and dichasial; sometimes combined in a terminal panicle.

*Hygrophilinae*

Pollen grains alveolate, echinulate or granulate, 3-porous or sparsiporous. Corolla limb usually subactinomorphous. Inflorescences varying both in position and in structure. *Ruellinae*

Aestivation of the corolla lobes quincunxial or, if the two upper ones are united, decussate; the lower lobe always inside. Stamens free.

*Barleriinae*.

A fuller account is given in the following diagnoses. As the *Strobilanthinae* are so far the only subtribe which has been studied in some detail, the information, however, is still far from complete.

*Strobilanthinae*. Inflorescences always terminal and racemose. Corolla with a subactinomorphous limb. Stamens united in a single group. Pollen grains provided with 2, 3 or 5 equatorial pores and either ellipsoidal or globose, the ellipsoidal ones always banded, the globose ones either banded, echinulate or granulate, rarely with a faint reticulation, the banded grains always with the germ pores between the bands. Style retained against the wall of the corolla throat by two rows or bundles of hairs. Anticous stigma lobe laterally flattened; posticus one rudimentary. Ovary ecious with one to several ovules. Capsule usually stipitate. — Asia and Oceania —

*Petalidiinae*. Inflorescences usually axillary and cymose, the cymes sometimes united in a terminal panicle, never racemose. Corolla with a subactinomorphous limb. Stamens united in pairs. Pollen grains ellipsoidal and banded, three of the bands in the middle dilated and containing a germ pore. Style not retained against the wall of the corolla by rows or bundles of hairs. Anticous stigma lobe dorsiventrally flattened; posticus one rudimentary. Ovary cells with two to several ovules. Capsule usually stipitate. — Mainly African, with a few representatives in America and Asia; one (*Sautiera* Decne) as far to the east as Timor. —

*Blechinae*. Inflorescences terminal and racemose. Corolla with a subactinomorphous limb. Stamens united in pairs. Pollen grains globose, with three fissures containing the germ pores, but otherwise without any relief. Style not retained against the wall of the corolla by rows or bundles of hairs. Anticous stigma lobe dorsiventrally flattened; posticus one rudimentary. Ovary cells with three to several ovules. Capsule shortly stipitate. Seeds imbricate. — America; one species spread as a weed in other tropical countries. —

*Hydrophilinae*. Inflorescences axillary and cymose; sometimes combined in a terminal panicle. Corolla bilabiate. Stamens united in a single group. Pollen grains globose and banded; the four germ pores between the bands. Style not retained against the wall of the corolla by rows or bundles of hairs. Anticous stigma lobe filiform; the posticus one short or rudimentary. Ovary cells with several ovules. Capsule cylindrical — Pantropical. —

*Ruellia*inae. Flowers axillary or in axillary or terminal, cymose or racemose inflorescences. Corolla usually with a subactinomorphous limb, rarely slightly zygomorphous. Stamens united in pairs. Pollen grains globose, alveolate, echinulate or granulate, either with three equatorial germ pores or sparsiporous. Style not retained against the wall of the corolla by rows or bundles of hairs. Anticous stigma lobe dorsiventrally flattened; posticus one usually rudimentary, but sometimes nearly as large as the anticous one. Ovary cells with two to several ovules. Capsule cylindrical or clavate. — Pantropical —

*Barteriinae*. Flowers, as a rule, axillary or in axillary cymes, rarely in a terminal spike. Corolla either 5-lobed, and then with quincunxial aestivation of the lobes, or by the fusion of the two upper ones, 4-lobed, and the lobes decussate; the lower lobe always inside. Stamens free. Pollen grains globose or ellipsoidal, alveolate, 3-porous. Style not retained against the wall of the corolla by rows or bundles of hairs. Stigma lobes either very unequal, the anticous one filiform and the posticus one rudimentary, or both subequal and then short and more or less cohering. Capsule estipitate. — Pantropical —

It will be noted that the distinction between the *Petalidiinae*, *Blechinae* and *Ruellia* rests merely on differences in the structure of the pollen, and as no classification can be considered sufficiently established so long as it is based on differences in one character only, these subtribes must be regarded as provisional: their recognition rests on the assumption that a critical use of the pollen characters would lead to satisfactory results, an assumption which finds support in the circumstance that these characters have on the whole in the family *Acanthaceae* proved reliable guides in the elaboration of a natural classification. They are, however, not to be used indiscriminately, for they are not all of equal importance: of the various kinds of pollen found in the subtribe *Strobilanthoninae*, the globose one covered with minute spines or with granules, for instance, is also met with in the *Ruellia* and even in other tribes, and is therefore taxonomically of less importance than e.g. the ellipsoidal form decorated with septate bands, which is confined to that subtribe.

In the *Ruellia* as defined above, two forms of pollen grains are met with, which at first sight look more different than those found in the various genera of the *Strobilanthoninae*, namely grains provided with three equatorial germ pores and sparsiporous ones, i.e. grains provided with a larger number of pores, which are evenly distributed over the whole surface. However, as some of the species which NEES brought together in his genus *Dipteracanthus*, are provided with pollen of the first, and some with pollen of the second kind, the value of this difference is apparently insufficient for a subdivision of this subtribe. On the other hand, as it is correlated in NEES's genus with other differences, it was considered important enough to justify the splitting of the genus (v. infra).

The view that the sparsiporous type of pollen is but of secondary importance, finds support in the fact that this kind of pollen is occasionally met with in two other tribes, namely in the *Odontonemeae* and in the *Justicieae*. In the first-named tribe pollen grains of this kind are found in the type species of *Asystasiella* Lindau, a genus nearly related to *Asystasia* Bl., and in some species of *Pseuderanthemum* Radlk., which HALLIER (in Ann. Jard. Bot. Buitenz. XV, p. 26, 1898) on account of this character, the entirely white corolla and the presence of sterile anthers at the top of the staminodia, referred to a subgenus *Acanthoconis*, but which might well be regarded as generically distinct. In the *Justicieae* they occur in *Oreothrysus* Lindau and in *Ancylacanthus* Lindau: the latter was referred by its author to the *Barlerieae*, but the structure both of the corolla and of the testa make it quite clear that it belongs to the *Justicieae*. That the pollen grain described and figured by LINDAU, should have been a contamination, as the first-named author suggested in the work quoted above (p. 16), appears in view of the presence of similar pollen grains in the related genus *Oreothrysus*, an untenable supposition.

Pollen grains of the same kind as those of the *Petalidiinae* and of the

*Hygrophilinae*, have never been found outside the *Ruellieae*, and these two types are therefore to be regarded as characters of great taxonomic importance. Those of the *Blechinae* are of a type that is often met with in plants belonging to other families, but as they are in the *Acanthaceae* apparently confined to this group, their type may nevertheless be regarded as taxonomically significant.

The *Ruellinae* show their principal development in America; in Africa too they are not uncommon; in Asia, Australia and Oceania they are, however, but poorly represented. Since ANDERSON's work on the African and Asiatic *Acanthaceae* (in Journ. Linn. Soc. VII, 1865 and IX, 1867) and BENTHAM's revision of the genera in BENTHAM and HOOKER's "Genera Plantarum" it has been customary to include most of the species in the genus *Ruellia* L., which in this delimitation is a rather unnatural conglomeration of unwieldy size. NEES had distinguished in this group a fairly large number of genera, of which the majority were well defined and will have to be revived. It is, however, not our intention to deal in this paper with all these genera: we will confine ourselves to the Asiatic ones and to the few American species which have become naturalized in the islands of the Malay Archipelago.

In recent publications the endemic *Ruellinae* of the Malay Archipelago have been referred to the genera *Eranthemum* L., *Ruellia* L. and *Aporuellia* Clarke, but formerly the Malesian and New-Guinean species now brought together in *Ruellia* had been referred to the genera *Dipteracanthus* Nees and *Leptosiphonium* F. v. Müll., which are here revived. The genus *Aporuellia* can not be maintained, as the type species has been shown to belong to *Dipteracanthus*; some of the other species, however, are but distantly related to this one, and are referred to a new genus *Pararuellia* Brem. For a species described by VALETON under the name *Ruellia scabifolia* a new genus *Nothoruellia* Brem. is created.

The introduced species belong to the genera *Ruellia* L., *Arrhostoxylum* Nees and *Stephanophysum* Pohl.

#### Key to the Genera of the *Ruellinae* represented in the Malay Archipelago and New Guinea.

Four fertile stamens. Ovary cells with three to several ovules.

Flowers in lax axillary cymes; the cymes sometimes combined in a large terminal panicle. Bracteoles always shorter than the calyx. Pollen grains always 3-porous. — Species introduced from America —

Corolla with an infundibuliform or but slightly widened throat and large spreading lobes. Seeds entirely covered with hairs.

Corolla with a wide infundibuliform throat. Capsule cylindrical.

1. *Ruellia* [Plum.] L. emend. Brem.

Corolla throat hardly distinguishable from the tube. Capsule clavate.

2. *Arrhostoxylum* Nees

Corolla with a campanulate throat and short erect lobes. Seeds with a zone of hairs along the margin but otherwise glabrous.

3. *Stephanophysum* Pohl

Flowers never in lax axillary cymes; sometimes in cymose fascicles, but then the fascicles arranged in a spike. Pollen grains either 3-porous or sparsiporous. — Endemic species —

Flowers either all axillary, or in axillary triads, or terminal and axillary. Bracteoles longer than the calyx.

Flowers all axillary, not rarely two or three superposed, or in axillary triads. Pollen grains sparsiporous.

4. *Dipteracanthus* Nees emend. Brem.

Flowers terminal and axillary. Pollen grains insufficiently known.

5. *Nothoruellia* Brem. n. gen.

Flowers in spiciform or racemiform inflorescences; the spiciform ones sometimes with flower fascicles instead of single flowers in the axils of the bracts. Bracteoles always shorter than the calyx.

Leaves subrosulate. Corolla tube not longer than the campanulate throat. Inner stamens longer than the outer ones; anthers papilioniform, i.e. with a wide, at both ends deeply incised connective. Ovary cells with 6—10 ovules.

6. *Pararuellia* Brem. n. gen.

Stems with well-developed internodes, erect. Corolla tube narrow and much longer than the but slightly widened throat. Inner stamens shorter than the outer ones; anthers with a narrow connective, not incised at the top. Ovary cells with 10—20 ovules.

7. *Leptosiphonium* F. v. Müll.

Two fertile stamens and two small staminodes. Ovary cells with two ovules. — Endemic species —

8. *Eranthemum* L. emend. Radlk.

1. *Ruellia* [Plum.] L. emend. Brem.

**Ruellia** [Plum., Nov. Gen. p. 12, 1703; L., Gen. Pl. ed. 1, p. 41, 1735] L., Spec. Pl. ed. 1, p. 634, 1753, p.p.; id., Gen. Pl. ed. 5, p. 702, 1754, p.p.; — *Cryptiacanthus* Nees in Linnaea XVI, p. 298, 1842; id. in Mart., Fl. Bras. IX, p. 38, 1847; id. in DC., Prodr. XI, p. 101 et 197, 1847, p.p.

Herbae erectae vel ascendentes. Folia petiolata; lamina margine undulata vel crenato-crispata. Inflorescentiae axillares, dichasiales, raro aliquae ad florem singulum redactae. Bracteae angustae. Flores pedicellati. Calyx fere ad basin 5-partitus, lobis subaequalibus. Corolla tubo tereti faucibus subaequilongo, faucibus late infundibuliformibus vel subcampanulatis, paulum incurvatis, lobis aequalibus subpatentibus, faucibus subaequilongis. Stamina

inclusa, didynamia, exteriora longiora; filamenta glabra; antherae oblongae, basi emarginatae, thecis patentibus. Granula pollinis globosa, alveolata, 3-pora. Staminodium impar parvum vel nullum. Torus discoideus. Ovarium utroque loculo ovulis 4—12. Stylus glaber vel hirtellus. Stigmatis lobus posticus rudimentarius, anticus dorsiventraliter applanatus. Capsula fusiformis vel subcylindrica, numquam distincte stipitata, seminibus 8—24, retinaculis truncatis vel 3-dentatis. Semina ubique pilis mucosis vestita.

Distributum speciebus minime 5 a parte australi Civitatum Foederatarum Americae Septentrionalis usque ad Argentinam.

Lectotypus: *R. tuberosa* L. (cf. HITCHCOCK et GREEN in Intern. Rules of Bot. Nomencl. 3rd ed., p. 142, 1935).

Of the eight species quoted by LINNÉ in the first edition of his "Species Plantarum", to wit *strepens*, *clandestina*, *paniculata*, *tuberosa*, *biflora*, *crispa*, *ringens* and *antipoda*, the first five are American and the three last Asiatic. Of the five American species the first four belong to the *Ruelliae*, the fifth to the *Petalidiinae*; the first of the three Asiatic species belongs to the *Strobilanthoniae*, the second to the *Hygrophilinae*, whereas the third is a *Scrophulariacea*. Of the four species belonging to the *Ruelliae* the first was referred by NEES to *Dipteranthus*, but as this name, as I will show further on, should be restricted to a group of paleotropic species provided with sparsiporous pollen and a subringent corolla, this species will have to be removed to a new genus. The third species apparently belongs to the genus *Aphragmia* Nees, which differs from *Ruellia* as defined above in the sessile flowers, the unequal calyx lobes and the few-ovuled ovary cells. The second and fourth species therefore are the only ones which are left in the genus *Ruellia*, and these two are conspecific, *R. clandestina* L. being founded on a specimen of *R. tuberosa* L. with cleistogamous flowers. *R. tuberosa*, the plant on which the genus was founded by PLUMIER, and of which afterwards a good description was given by DILLENIUS in his "Hortus Elthamensis", has now officially been accepted as the type species of the genus.

In our delimitation the genus *Ruellia* comprises the four species dealt with by LEONARD in Journ. Washington Acad. of Sc. XVII, p. 509—520, 1927, to wit *R. tuberosa* L., *R. intermedia* Leonard, *R. nudiflora* (Engelm. et Gray) Urban and *R. lorentziana* Griseb., and also *R. malacosperma* Greenm. and perhaps some more. Its main characters are the lax axillary cymes, the pedicellate flowers, the 5-partite calyx with its long subequal lobes, the widely infundibuliform or subcampanulate corolla throat of about the same length as the tube and as the lobes, the included, distinctly didynamous stamens, the fusiform or subcylindrical several-seeded capsule, and the presence of mucous hairs not only along the margin of the seeds, but also on the flat sides. The species are all American, and four of the five are found in the drier parts of Mexico and Central America; *R. lorentziana* however was collected in the inner parts of Argentina. *R.*

*tuberosa* has been introduced in some other tropical regions, where it behaves as a weed.

*Ruellia* as defined above, coincides with *Cryphiacanthus* Nees in its original delimitation: *Cr. barbadensis* Nees, the type species, is even conspecific with *Ruellia tuberosa* L. In his monograph of the family in the "Prodromus" NEES widened the scope of this genus by the inclusion of a number of non-American species. The latter, however, have but little in common with the American ones. *Ruellia* sensu Nees, on the other hand, is an entirely different genus, for it contains none of the species enumerated by LINNÉ in the first edition of his "Species Plantarum", but coincides almost entirely with *Hemigraphis* Nees emend. T. And.

The nearest allies of *Ruellia* sensu nostro, are probably *Aphragmia* Nees<sup>1)</sup> and *Arrhostoxylum* Nees, which it resembles not only in the structure of the pollen grains, which in all three are triporous and alveolate, but also in the nature of the inflorescences and in the presence of mucous hairs, not only along the margin, but also in the flat sides of the seeds. It differs from both in the larger number of ovules in the ovary cells and in the fusiform or cylindrical shape of the capsule, from *Aphragmia* moreover in the narrow bracts, pedicellate flowers and subequal calyx lobes, and from *Arrhostoxylum* in the widely infundibuliform or subcampanulate corolla throat. The pollen grains of the three genera too are not completely identical, for those of *Aphragmia* are distinctly smaller than those of the

<sup>1)</sup> *Aphragmia* Nees in Lindl., Intr. Nat. Syst. Bot. ed. 2, p. 444, 1836, nomen; id. in Endl., Gen. Pl. p. 699, 1839, descr.; *Dipteracanthus* Nees subgenus *Aphragmia* Nees in Mart., Fl. Bras. IX, p. 44, 1847; *Dipteracanthus* Nees series *Paniculati* Nees in DC., Prodr. XI, p. 140, 1847, p.p.; *Ruellia* spec. auctorum recentiorum.

Genus *Ruellinarum* generi *Ruelliae* ipso inflorescentiis dichasialibus axillaribus, corollae forma, testa ubique pilis mucosis vestita similis, sed bracteis foliaceis, floribus sessilibus, calycis lobis inaequalibus, pollinis granulis minoribus, ovario pauci-ovulato, capsula clavata ab eo recedens.

Herbae erectae. Folia petiolata. Inflorescentiae axillares, dichasiales, multiflorae. Bracteae plus minusve foliaceae. Flores sessiles. Calyx fere ad basin 5-partitus, lobis angustis inaequalibus. Corolla tubo faucibus subaequilongo, faucibus infundibuliformibus, lobis aequalibus subpatentibus. Stamina inclusa, didynamia, exteriora longiora; antherae oblongae, basi emarginatae, thecis patentibus. Granula pollinis globosa, alveolata, 3-pora, pro subtribu minora. Staminodium impar nullum. Torus discoideus. Ovarium utroque loculo ovis 2—4. Stylus hirtellus. Stigmatis lobus posticus antico multo brevior, uterque dorsiventraliter applanatus. Capsula clavata, seminibus 2—8 instructa, retinaculis hamatis. Semina ubique pilis mucosis vestita.

Distributum speciebus paucis in America Tropicali et Subtropicali.

Species typica: *A. inundata* (H.B.K.) Brem. n. comb. (*Ruellia inundata* H.B.K., Nov. Gen. et Sp. II, p. 239, 1817; syn. *A. Haenkei* Nees, Pl. Hartweg. p. 122, 1839; *Dipteracanthus Haenkei* (Nees) Nees in DC., Prodr. XI, p. 141, 1847; — *Ruellia albicaulis* Bertero ex Spreng., Syst. II, p. 822, 1825).

*A. floribunda* (Hook.) Brem. n. comb. (*Ruellia floribunda* Hook., Bot. Misc. II, p. 236, 1831; syn. *A. rotundifolia* Nees in Benth., Bot. of the Sulph. p. 146, 1846; *Dipteracanthus rotundifolius* (Nees) Nees in DC., Prodr. XI, p. 141, 1847).

two other genera, and the alveoles are both in *Aphragmia* and in *Arrhostoxylum* less numerous, but larger and deeper than in *Ruellia*.

*Ruellia tuberosa* L., a native of the West Indies, has become firmly established in various parts of Java. It grows in waste places, along roads, under hedges etc., usually below the altitude of 150 m, and shows a predilection for the drier parts (cf. BACKER, Onkruidfl. v. d. Suikerrietgr. v. Java, p. 652, 1931).

## 2. *Arrhostoxylum* Nees.

*Arrhostoxylum* Nees in Mart., Fl. Bras. IX, p. 57, 1847; id. in DC., Prodr. XI, p. 101 et 209, 1847, syn. *Scorodoxylum* Nees excl.; *Ruellia* spec. auctorum recentiorum.

Herbae ascendentes. Folia breviter petiolata; lamina margine integra vel crenata. Inflorescentiae axillares, dichasiales, longe pedunculatae, patenties; ramuli infimi interdum foliis parvis suffulti, alii ut flores bracteis angustis. Flores breviter pedicellati. Calyx subaequaliter 5-partitus, lobis angustis. Corolla subhypocrateriformis, faucibus tamen paulum inflatis, lobis subaequalibus patentissimis, superioribus duobus interdum usque ad medium connatis. Stamina inclusa vel breviter exserta; exteriora interioribus vix longiora; filamenta altius connata, glabra vel hirtella; antherae oblongae, basi sagittatae, thecis patentibus. Granula pollinis globosa, alveolata, 3-pora. Staminodium impar nullum. Torus discoideus. Ovarium utroque loculo ovalis 3—6. Stylus plus minusve hirtellus. Stigmatis lobus posticus antico multo brevior; lobus anticus dorsiventraliter applanatus. Capsula distincte unguiculata, utroque loculo seminibus 3—6, retinaculis apice emarginatis. Semina ubique pilis mucosis vestita.

Distributum speciebus pluribus in America Tropicali.

Species typica: *A. glabrum* Nees in Mart., Fl. Bras. IX, p. 58, Tab. 6, 1847.

By their spreading inflorescences and subhypocrateriform corolla the species of *Arrhostoxylum* differ at first sight conspicuously from those of *Ruellia*, but it can nevertheless not be doubted that the two genera are nearly related. The difference between the capsules of *Arrhostoxylum* with their always distinct and not rarely fairly long solid stipe and the nearly cylindrical capsules of *Ruellia tuberosa* with their large number of seeds, is very marked, but that between them and the few-seeded capsules of *R. nudiflora*, which are contracted at the base, but not solid, is much less conspicuous. Of more importance, perhaps, is a difference in the relief of the pollen grains, the alveoles of *Ruellia* being smaller, less deep and more regular in outline than those of *Arrhostoxylum*.

In his monograph of the family in the "Prodromus" NEES referred to this genus a species which he had described the year before under the name *Scorodoxylum hartwegianum* as the type of a new genus. If these two genera really should be united, the name *Arrhostoxylum*, of course, should be given up in favour of the older *Scorodoxylum*, but as the calyx

lobes of *Sc. hartwegianum* Nees have been described as short and lanceolate, it seems to me that the identity of the two genera is by no means sufficiently established, and for the moment I prefer therefore to keep them apart.

Some of the species which were brought together in the genus *Stemonacanthus* Nees, come very near to *Arrhostoxylum*. *Stemonacanthus*, however, can hardly be regarded as a natural genus: in *St. macrophyllus* (Vahl) Nees and its nearest allies the inflorescences are axillary and the calyx segments united for more than half their length, whereas in *St. humboldtianus* Nees and some other species the inflorescences are terminal and the calyx 5-partite. If the genus is split, the name should be retained for *St. humboldtianus* and its allies, for this name was published as a nomen nudum in 1846 in BENTH., Bot. Voy. Sulph. p. 145, whereas the other names appeared for the first time in 1847 in MART., Fl. Bras. IX, p. 53 and in DC., Prodr. XI, p. 205. The affinity between *St. humboldtianus* and the *Arrhostoxylum* species, however, is but remote. *St. salvifolius* Nees, figured in MART., Fl. Bras. IX, Tab. 4, is a species of dubious position, which might perhaps be removed to *Arrhostoxylum* itself.

Two species of *Arrhostoxylum* have been found in Java as garden escapes. They are:

1. ***Arrhostoxylum costatum*** Nees in Mart., Fl. Bras. IX, p. 61, 1847; id. in DC., Prodr. XI, p. 214, 1847; *Ruellia costata* (Nees) Hiern in Kjoeb. Vidensk. Meddel. p. 76, 1877—78.

2. ***Arrhostoxylum elegans*** (Poir.) Brem. n. comb.; *Ruellia elegans* Poir., Encycl. Suppl. IV, p. 727, 1816, n. nom. (non *R. elegans* Hook. in bot. Mag. LXII, Tab. 3389, 1835, quae est *Hemigraphis crossandra* (Steud.) Brem.); *R. formosa* Andr., Bot. Repos. X, Tab. 610, 1810; Ait., Hort. Kew. IV, p. 58, 1812; Bot. Mag. XXXIV, Tab. 1400, 1811; Bailey, Stand. Cycl. Hort. III, fig. 3510, 1937, nom. illeg. (non *R. formosa* Humb. et Bonpl., Pl. Aeq. I, p. 169, Tab. 48, 1805); *Arrhostoxylum formosum* (Andr.) Nees comb. illeg. in Mart., Fl. Bras. IX, p. 62, 1847; id. in DC., Prodr. XI, p. 215, 1847.

#### Key to the *Arrhostoxylum* species naturalized in Java.

Shoots obtusely quadrangular, in the grooves at first villous, soon entirely glabrescent. Leaves lanceolate, at the base gradually attenuate and almost imperceptibly passing in the petiole, on the upper side with a few rather weak appressed bristles. Peduncle subalate and like the branchlets of the inflorescence glabrous. Upper corolla lobes free.

##### 1. *A. costatum* Nees

Shoots sharply quadrangular, at first densely hirsute, afterwards glabrescent. Leaves ovate to ovate-lanceolate, at the base suddenly contracted, on the upper side sprinkled with stiff apressed bristles. Peduncle sharply

quadrangular and like the branchlets of the inflorescence glandular hirtellous. Upper corolla lobes halfway united.

2. *A. elegans* (Poir.) Brem.

*A. costatum* was collected by BAKHUIZEN V. D. BRINK near Sukabumi, at an altitude of 600 m, where it grew along the roadside in fairly large numbers; *A. elegans* by BOERLAGE at Tjipaku near Buitenzorg. Both species are natives of Brazil; *A. costatum* is often met with in our conservatories under the wrong name *Ruellia rosea*.

3. *Stephanophysum* Pohl.

*Stephanophysum* Pohl, Pl. Bras. II, p. 83, 1831; Endl., Gen. Pl. p. 700, 1839; Nees in Mart., Fl. Bras. IX, p. 49, 1847; id in DC., Prodr. XI, p. 101 et 201, 1847; *Ruellia* spec. auctorum recentiorum.

Herbae erectae, ramosae. Folia petiolata. Inflorescentiae axillares, plurimque oppositae, longe pedunculatae, dichasiales vel florum centralium abortu pseudo-dichotomae. Bracteae angustae. Calyx usque ad basin 5-partitus, lobis filiformibus. Corolla rubra, tubo faucibus multo breviore, faucibus campanulatis, lobis brevibus erectis. Stamina inclusa, subaequidlonga; filamenta glabra; antherae oblongae, basi sagittatae, thecis patentibus. Granula pollinis globosa, alveolata, 3-pora. Staminodium nullum. Torus discoideus. Ovarium utroque loculo ovulis pluribus. Stylus hirtellus. Stigmatis lobus posticus antico dimidio brevior, uterque dorsiventraliter applanatus. Capsula breviter unguiculata, ab medio seminifera, seminibus utroque loculo 3—7, retinaculis hamatis facie interna canaliculatis, apice bidentatis. Semina ad marginem pilis mucosis instructa, ceterum glabra.

Distributum speciebus paucis in America Tropicali.

Species typica: *St. longifolium* Pohl.

*Stephanophysum* belongs to the group of genera provided with 3-porous pollen grains and long-pedunculate axillary cymes. It differs from the other genera of this group, e.g. from *Ruellia*, *Aphragmia* and *Arrhostoxy-lum*, in the filiform calyx lobes, the shape of the corolla with its short tube, campanulate throat and short erect lobes, and the absence of mucous hairs on the flat sides of the seeds. *St. cordifolium* Nees and some other species with alternate inflorescences and very large flowers, should probably be transferred to a genus of their own, but this is a matter for further study.

The type species is often cultivated: in Europe and North America as a stove plant, and in tropical countries in the open. In Java it often escapes from cultivation. KUNTZE was apparently the first to collect it, but he did not recognize it, and described it under the name *Echinacanthus dichotomus* as a new endemic species (cf. BACKER in Brittonia III, p. 85, 1938).

1. *Stephanophysum longifolium* Pohl, Pl. Bras. II, p. 85, Tab. 156, 1831; Nees in Mart., Fl. Bras. IX, p. 50, 1847; id. in DC., Prodr. XI,

p. 203, 1847; *Ruellia longifolia* (Pohl) Griseb. ex Lindau in Engl. u. Prantl, Nat. Pflanzenfam. IV, 3 b, p. 311, 1895, n. comb. illeg.; non *R. longifolia* Rich. in Acta Soc. Hist. Nat. Par. I, p. 110, 1782; nec *R. longifolia* Roth, Nov. Pl. Sp. p. 306, 1821; nec *R. longifolia* Roxb., Fl. Ind. ed. Carey III, p. 50, 1832; nec *R. longifolia* T. And. in Journ. Linn. Soc. IX, p. 460, 1867; *R. amoena* Nees ex Jackson, Index Kewensis IV, p. 759, 1894, n. nom. illeg.; Backer in Ann. Jard. Bot. Buitenz. Ser. 2, Suppl. 3, p. 412, 1909; Koorders, Exkursionsfl. v. Java III, p. 220, 1912; Boldingh, Zakflora no 435, 1916; Dakkus, Bull. Jard. Bot. Buitenz. Ser. 3, Suppl. 1, p. 254, 1930; non *R. amoena* Sessé et Moç., Pl. Novae Hisp. ed. 1, p. 100, 1889; ed. 2, p. 93, 1893; *R. graecizans* Backer in Brittonia III, p. 85, 1938, n. nom.; — *Echinacanthus dichotomus* O.Ktz, Rev. Gen. Pl., p. 489, 1891; Lindau in Engl. u. Prantl, Nat. Pflanzenfam. IV, 3 b, p. 302, 1895; Boerl., Handl. Fl. Ned. Ind. II, 2, p. 657, 1899; Koorders, Exkursionsfl. v. Java III, p. 214, 1912.

Habitat Brasiliam; in Java culta et haud raro ex hortis evasa et assuefacta.

#### 4. *Dipteracanthus* Nees emend. Brem.

**Dipteracanthus** Nees in Wall., Pl. As. Rar. III, p. 75 et 81, 1812; id. in DC., Prodr. XI, p. 100 et 115, 1847, p.p.; Miq., Fl. Ind. Bat. II, p. 782, 1858; *Ruellia* L. spec. T. And. in Journ. Linn. Soc. VII, p. 24 et 112, 1864; id. in op. cit. IX, p. 460, 1867; Benth. in Benth. et Hook.f., Gen. Pl. II, 2, p. 1077, 1876; *Ruellia* L. sect. *Dipteracanthus* (Nees) Clarke in Hook.f., Fl. Brit. Ind. IV, p. 411, 1884; Lindau in Engl. u. Prantl, Nat. Pflanzenfam. IV, 3 b, p. 309, 1895, p.p.; Boerl., Handl. Fl. Ned. Ind. II, 2, p. 630 et 657, 1899, *R. napifera* Zoll. excl.

Herbae graciles, e basi repente vel decumbente ascendententes. Folia breviter petiolata, lamina lanceolata, ovato-oblonga vel oblonga. Flores in axillis foliorum plerumque solitarii vel usque ad tres superpositi, interdum in triades singulas vel superpositas dispositi, sessiles vel breviter pedicellati. Bracteolae foliaceae, calyce longiores. Calyx subaequaliter 5-partitus, lobis anguste triangularibus. Corolla alba vel violacea, tubo cylindrico faucibus breviore, faucibus campanulatis, subringentibus, lobis subaequalibus ovato-orbicularibus, patentibus. Stamina super fauci basin inserta, inclusa, subdidynamia; filamenta staminum exteriorum quam interiorum paulo longiora; antherae linearis-oblongae, basi sagittatae, connectivo interdum apice in appendicem subquadratam producto, thecis patentibus. Granula pollinis globosa, semper sparsipora, nunc alveolata, nunc tuberculata. Staminodium impar nullum. Torus discoidus. Ovarium utroque loculo ovoidalis 3—8; stylus totus dense hirtellus vel apicem versus glabrescens, basi incrassatus; stigmatis lobus posticus rudimentarius, anticus dorsiven-traliter applanatus. Capsula unguiculata, utroque loculo seminibus 3—8; retinacula hamata validiora, apice bidentata. Semina lenticularia margine

incrassata et ibi pilis mucosis vestita, lateribus glabris vel sparse pilosis.

Distributum speciebus pluribus in partibus calidioribus Africæ Orientalis, Asiae et Australiae.

Typus generis: *D. prostratus* (Poir.) Nees.

NEES united in his genus *Dipteracanthus* all *Ruellia* with axillary flowers and distinctly unguiculate capsules, but the genus is here restricted to those species which, in addition to these characters, are provided with large foliaceous bracteoles, a subringent corolla and sparsiporous pollen. The American species therefore are excluded.

Among the genera provisionally referred to the *Ruellia*inæ, so far three were known to possess sparsiporous pollen, namely *Louteridium* Wats., *Acanthopale* Clarke and *Stenoschista* Brem. (cf. BREMEKAMP in Bot. Jahrb. LXXIII, p. 126, 1943), but none of them shows a near affinity to *Dipteracanthus*. Recently, however, we have found this kind of pollen in some Australian plants which DOMIN, at the instigation of CLARKE, referred to the genus *Aporuellia* Clarke. This genus can not be maintained, for the type species, *A. axillaris* Clarke, proved to be a *Dipteracanthus* species nearly allied to, and perhaps even identical with *D. ventricosus* Nees; the pollen grains of the second species, *A. sumatrensis* Clarke, are not covered with minute prickles or papillæ, as they ought to have been according to the generic description, but alveolate: as this plant differs moreover in its subrosulate habit and terminal spiciform inflorescence from the type, it is here removed to a new genus *Pararuellia*. From *Pararuellia* the Australian species differ in the axillary flowers and in the sparsiporous pollen, from *Dipteracanthus* in the estipitate capsules: although doubtless nearly related to the latter, it seems better to refer them to a new genus. The Australian species which DOMIN left in the genus *Ruellia*, probably belong to *Dipteracanthus* itself, but as we have not yet found an opportunity to study these species, we are unable to express a definite opinion.

A remarkable phenomenon in the genus *Dipteracanthus* is the variability in the relief of the pollen grains: the latter are in some species alveolate, and in others tuberculate: in the latter the walls of the alveoles are suppressed, but the pillars by which the alveoles are strengthened at the corners, are left. In other respects the differences between these species are so small that they are often difficult to distinguish: the Philippine *D. lanceolatus* Nees with tuberculate pollen, for instance, has often been confused with *D. repens* (L.) Hassk., whose pollen is alveolate. CLARKE's attempt to bring the species with tuberculate pollen grains together in a genus of their own, was therefore doomed to failure.

#### Key to the better known Malesian species of *Dipteracanthus*.

Capsules pubescent.

Leaves ovate or ovate-oblong. Pollen grains alveolate. Ovary cells with 7—8 ovules. — Wide-spread —

1. *D. prostratus* (Poir.) Nees

Leaves lanceolate or linear-lanceolate. Pollen grains tuberculate.  
Ovary cells with 2—4 ovules. — Luzon —

4. *D. lanceolatus* Nees

Capsules glabrous.

Leaves with the exception of the lower ones, lanceolate or linear-lanceolate. Flowers always solitary in the axils of the leaves. Connective retuse. Pollen grains alveolate. Ovary cells with 5—6 ovules. — Indo-China and Malay Archipelago —

2. *D. repens* (L.) Hassk.

Leaves ovate-oblong or, sometimes, oblong. Flowers usually superposed. Connective produced in a subquadrate appendix. Pollen grains tuberculate. Ovary cells with 3—4 ovules. — Java and perhaps Malay Peninsula and Borneo —

3. *D. ventricosus* Nees.

1. *Dipteracanthus prostratus* (Poir.) Nees in Wall., Pl. As. Rar. III, p. 81, 1832; id. in DC., Prodr. XI, p. 124, 1847; *Ruellia prostrata* Poir. in Lam., Encycl. VI, p. 349, 1804; T. And. in Journ. Linn. Soc. VII, p. 24, 1864; Clarke in Hook.f., Fl. Brit. Ind. IV, p. 411, 1884; id. in Thiselton Dyer, Fl. Trop. Afr. V, p. 46, 1899; id. in Journ. As. Soc. Beng. LXXIV, p. 628, 1908; Koorders, Exkursionsfl. v. Java III, p. 220, 1912; Ridl., Fl. Mal. Pen. II, p. 361, 1923; Backer, Onkruidfl. Suikerrietgr. p. 653, 1931; — *Ruellia repens* L. apud Bl., Bijdr. Fl. Ned. Ind. p. 794, 1826, p.p.; — *Dipteracanthus dejectus* Nees in Wall., Pl. As. Rar. III, p. 82, 1832; id. in DC., Prodr. XI, p. 125, 1847; Miq., Fl. Ind. Bat. II, p. 783, 1858; *Ruellia prostata* Poir. var. *dejecta* (Nees) Clarke in Hook.f., Fl. Brit. Ind. IV, p. 412, 1884; Boerl., Handl. Fl. Ned. Ind. II, 2, p. 658, 1899; — *Dipteracanthus lanceolatus* Nees in errore apud Hassk., Pl. Jav. Rar. p. 500, 1848, non Nees in Wall., Pl. As. Rar. III, p. 82, 1832; — anne *Ruellia philippinensis* Elm. in Leafl. Philipp. Bot. V, p. 1690, 1913, adhuc incertum.

Herba plerumque valde ramosa. Caulis ramique obtuse quadrangulares, internodiis usque ad 11 cm longis, primum bisulcatis compositi, primum parce pilosi, mox glabrescentes, ad nodos tamen rima persistente setorum ciliati. Folia in petiolum canaliculatum, 0.5—2.5 cm longum, supra pubescens, marginibus ciliatum contracta; lamina ovata vel ovato-oblonga, magnitudine valde variabilis, nunc 1.5—2.0 cm longa et 8—12 mm lata, nunc usque ad 8 cm longa et 4.2 cm lata, apice plerumque acuminata, rarius acuta, basi ad petiolum subito contracta, margine integra, discolor, supra setis sparsa, subtus costa nervisque sparse hirtella, cystolithis utrimque numerosis et praesertim supra conspicuis, nervis utroque latere costae 4—5. Flores in axillis foliorum semper solitarii, ad nodos nunc oppositi, nunc singuli, subsessiles. Bracteolae in petiolum circ. 2 mm longum contractae; lamina lanceolata vel ovato-lanceolata, 10—15 mm longa et 2.5—6 mm lata, post anthesin paulum accrescens, apice acuta vel acuminata, nervis

utroque latere costae 3—4; ceterum ut folia. Calyx 6—8 mm longus, tubo 1—1.5 mm, lobis e basi triangulari filiformibus, 5—6.5 mm longis, extus praesertim apicem versus dense hirtellis. Corolla albida vel dilute violacea, 2—3 cm longa, tubo 4—6 mm, faucibus 10—15 mm, lobis 6—9 mm longis, faucibus lobisque extus pubescentibus. Stamina filamentis glabris, exterioribus 6—8 mm, interioribus 3—4 mm longis; antherae 2 mm longae, apice in appendicem subquadratam, utroque latere marginatam productae. Granula pollinis alveolata, 50—53  $\mu$  diam. Ovarium dense puberulo-pubescentis, utroque loculo ovoidis 7—8. Stylus basi dense hirtellus, apicem versus glabrescens. Capsula circ. 18 mm longa, pilis basiscopis dense pubescentis. Semina utroque loculo 7—8, 2.5—3 mm diam., lateribus albidis brevissime pilosis.

Habitat Africam Orientalem, Indiam, Peninsulam Malayanam, Javam, Insulas Moluccanas.

Java. Batavia Res.: Batavia, on the cemetery, BLUME s.n. L; ibidem, in the old town, RAAP 425 L; without precise locality, PIEPERS s.n. L; Weltevreden, JUNGHUHN 52 L et U (quoted by NEES under *D. dejectus* Nees); hills to the south of Batavia, coll. ign. s.n. L; Res. Buitenzorg: Buitenzorg, alt. 250 m, BAKHUIZEN V. D. BRINK 2260 L; Res. Bodjonegoro: Tuban, DORGELO 3070 PAS; s.l. ZOLLINGER 482 L (capsules 12 mm long!).

Moluccas. Ceram: Hatumete, alt. 0 m, KORNASSI (Exped. RUTTEN) 644 U; Ambon: Saparua, REINWARDT s.n. L.

BACKER l.c. states that the palate is marked with two light violet stripes and that the corollas are shed in the early hours of the morning.

The difference between *D. prostratus* and *D. dejectus* has been described in such vague terms that it seems impossible to maintain the latter even as a variety. JUNGHUHN 52 in the Leiden and Utrecht herbaria, which according to NEES belongs to *D. dejectus*, is doubtless conspecific with the Javanese specimens quoted by NEES under *D. prostratus*.

ZOLLINGER 482 in the Herbier Delessert is quoted by NEES under his *D. lanceolatus*, which includes *D. repens*, and by HOCHREUTINER (in Candollea V, p. 230, 1934) under *Ruellia repens* L., which is *D. repens* (L.) Hassk., but the specimen in the Leiden herbarium has densely pubescent capsules and belongs therefore either to *D. prostratus* or, as its capsules are rather small, to an as yet undescribed species. It is not necessary, however, that the specimens in Genève and in Leiden are conspecific: that specimens distributed by ZOLLINGER under the same number, belong to different species, is not uncommon (see the remark on ZOLLINGER 2443 under *Pararuellia napifera*).

The type specimen of *D. prostratus* was collected in the Indian Peninsula. The Indian specimens which were available to me, were provided with larger flowers and fruits and with somewhat smaller pollen grains (47  $\mu$  diam.): it is possible therefore that the Indian and Malesian specimens represent distinct species. As the number of specimens which we

could study, was very restricted, and as the differences are but small, it seems advisable to treat them for the moment as one. African specimens were not available to us.

The distribution of *D. prostratus* in the Malay Archipelago is rather anomalous: so far it is known from Java and the Moluccas only. It is not impossible, however, that *Ruellia philippinensis* Elm. may prove conspecific; the specimen on which it was based, was collected in the island Palawan.

Two specimens collected in Java show in their vegetative characters a striking resemblance to *D. prostratus*, but are provided with glabrous capsules. The first was collected on the G. Geger (coll ign. H. Bog. 1744), the second on the G. Hijang (v. DILLEWIJN s.n. PAS); the specimen of the G. Geger is more densely hairy than *D. prostratus*. As in neither of them flowers are present, it is impossible to express a definite opinion on their identity.

2. *Dipteracanthus repens* (L.) Hassk. in v. d. Hoeve en de Vriese, Tijdschr. Nat. Gesch. X, p. 129, 1843; *Ruellia repens* L., Mant. ed. prim. p. 89, 1767; Burm.f., Fl. Ind., p. 135, 1768, quoad descript., anne Tab. XLI, fig. 1, incertum; L., Mant. ed. alt. p. 515, 1771; non Houttuyn, Nat. Hist. IIe deel, 9e stuk, p. 579, Tab. LIX, fig. 3, 1778; Blume, Bijdr. Fl. Ned. Ind. p. 794, 1826, p.p.; Clarke in Hook.f., Fl. Brit. Ind. IV, p. 412, 1884; Boerl., Handl. Fl. Ned. Ind. II, 2, p. 657, 1899; Clarke in Journ. As. Soc. Beng. LXXIV, p. 629, 1908; Koorders, Exkursionsfl. v. Java III, p. 220, 1912; Ridl., Fl. Mal. Pen. II, p. 564, 1923; Backer, Onkruidfl. Suikerrietgr. p. 654, 1931; Hochreutiner in Candollea V, p. 229, 1934; — *Dipteracanthus lanceolatus* Nees in Wall., Pl. As. Rar. III, p. 82, 1832 et in DC., Prodr. XI, p. 124, 1847, quoad specimina javanica, haud quoad typum in insula Luzon lectum; non Hassk., Cat. Hort. Bog. ed. 2, p. 148, 1844, nomen, nec id., Pl. Jav. Rar. p. 500, 1848, quae sunt *D. prostratus* (Poir.) Nees; Miq., Fl. Ind. Bat. II, p. 782, 1858, minime quoad specimen Klein-hofianum; — *D. angustifolius* Hassk., Pl. Jav. Rar. p. 504, 1848; — *Justicia moretiana* Burm.f., Fl. Ind. p. 10, 1768 (*Moretiana* Rumph., Herb. Amb. VI, p. 53, Tab. 23, fig. 1), non *Adhatoda moretiana* (Burm.f.) Miq., Fl. Ind. Bat. II, p. 830, 1858, quae est *Justicia gendarussa* Burm.f.

Herba plerumque ramosa, rarius suberecta et simplex. Caulis ramique obtuse quadrangulares, internodiis usque ad 9 cm longis, primum bisulcatis compositi, subglabri, ad nodos rima setorum fugaciter ciliati. Folia petiolo canaliculato, 3—12 mm longo, supra pubescente, marginibus ciliato munita; lamina foliorum inferiorum plerumque paucorum ovato-lanceolata, usque ad 6.5 cm longa et 2.2 cm lata, foliorum aliorum angustior, supremorum haud raro linearis et usque ad novies longior quam latior; foliorum omnium apice basique acuta vel basi sensim in petiolum contracta, margine integra, discolor, supra setis sparsa, subtus costa densius, nervis sparse hirtello-pubescentia, rarius utrimque subglabra, cystolithis parvis et numerosis

praesertim supra conspicuis, nervis utroque latere costae 5—7. Flores in axillis foliorum solitarii, ad nodos oppositi, breviter pedicellati. Pedicellus 0.4—1.0 mm longus. Bracteolae in petiolum 2—3 mm longum contractae; lamina ovato-lanceolata vel saepius ovata, 10—16 mm longa et 5—8 mm lata, apice acuta, nervis utroque latere costae 3; ceterum ut folia. Calyx circ. 5 mm longus, tubo 1.5 mm, lobis 3.5 mm longis, margine parce ciliolatis, ceterum glabris. Corolla plerumque violacea, interdum tamen alba, 2—2.5 cm longa, tubo 5—6 mm, faucibus 12—14 mm, lobis 3—5 mm longis, faucibus lobisque extus pubescentibus. Stamina filamentis glabris, exterioribus 4—5 mm, interioribus 2.5—3 mm longis; antherae 1.2 mm longae, connectivo non producto, apice retuso et quasi bidentato. Granula pollinis alveolata, 45  $\mu$  diam. Ovarium glabrum, utroque loculo ovoidis 5—6. Stylus basi dense hirtellus, apicem versus glabrescens. Capsula circ. 15 mm longa, glabra. Semina utroque loculo 4—6, 2.0—2.5 mm diam., lateribus albidis brevissime pilosis.

Habitat Indo-Chinam et Archipelagum Malayanum.

Sumatra. West Coast Res.: G. Singalang, KORTHALS 542a L; East Coast Gouvt: Sibolangit, alt. 500 m, LOERZING 5497 L et U.

Java. Batavia Res.: Krawang, KORTHALS s.n. L; Buitenzorg Res.: Depok, alt. 90 m, BAKHUIZEN V. D. BRINK JR 162 U; Buitenzorg, alt. 250 m, SCHIFFNER 2596, 2600, 2607, 2613 L; Priangan Res.: s.l., KOORDERS 41572 L; Banjumas Res.: Banjumas, KIEVITS 3165 PAS; Malang Res.: Malang, alt. 400 m, GROENHART 141 U; Java, s.l., BLUME 919 L (*Ruellia ciliata* Bl. ined.); id. 981 L (*R. campanulata* Bl. ined.).

Celebes. Menado, FORSTEN 50 L.

Moluccas. Ternate, FORSTEN s.n. L; Ambon, REINWARDT 1396 L; ibid., ROBINSON Pl. Rumph. Amb. 101 L.

Lesser Sunda Islands. Sumbawa, s.l., COLFS 238 L (leaves very small).

Philippines. Mindanao, Distr. Davao, Mt Apo, Todaya, ELMER 11053 L.

According to HASSKARL l.c. the palate is marked with three converging stripes, and BACKER l.c. mentions the presence of a dark violet patch on the median lobe, from where three dark violet stripes descend into the throat (in *D. prostratus* there are but two stripes, and these are not dark but light violet). Occasionally entirely white flowers are met with. Of this species too the flowers are shed in the early hours of the morning.

The type of *D. repens* is a specimen collected by KLEINHOF in the neighbourhood of Batavia. The identity between BURMANN's *Ruellia repens* and Linné's species has been denied by CLARKE and his followers, but it seems to me that this attitude is not sufficiently justified, for BURMANN's description contains nothing which points to another species. Moreover, both BURMANN and LINNÉ obtained their specimens from KLEINHOF, LINNÉ probably through the intermediary of BURMANN. Whether the lat-

ter's figure represents this species, or, as HOCHREUTINER (in *Candollea* V, p. 229, 1934) supposes, a species of *Hygrophila*, is difficult to decide. The large size of the bracteoles points to a species of *Dipteracanthus*, although they seem to be too narrow for *D. repens*. As the figure, however, is so primitive that it certainly is of no value whatever for the recognition of the species, it seems better to leave the question undecided. That RUMPHIUS's figure of *Moretiana* represents this species, need not be doubted. BURMANN's *Justicia moretiana* was founded on the description and figure given by RUMPHIUS, and the specimens in his herbarium are, as HOCHREUTINER l.c. informs us, typical *Dipteracanthus repens*. The plant figured by HOUTTUYN under the name *Ruellia repens* probably belongs to another family.

The var. *erectus* Nees in DC., Prodr. XI, p. 124, 1847, and the var. *linearis* Clarke in Journ. As. Soc. Beng. LXXIV, p. 659, 1908, are mere habitat forms, and therefore of no value.

In British North Borneo (Sandahan, ELMER 20049 L et U) and in Ceram (south of Wahai, KORNASSI 99 L et U) specimens were collected which differ from *D. repens* in the arrangement of the flowers in triads, or sometimes in superposed triads, in the larger size of the bracts and bracteoles, and in the slightly larger size of the pollen grains ( $50 \mu$ ). Their exact position could not yet be determined.

*D. repens* resembles *D. prostratus* in the relief of the pollen grains, but is easily distinguishable from that species by the narrowness of the leaves, the but slightly ciliolate calyx, the retuse connective of the anther, the smaller size of the pollen grains, the glabrous ovary and capsule and the smaller number of ovules. The points of difference with *D. ventricosus* are given in the key. From *D. lanceolatus* it differs both in the relief of the pollen grains and in the absence of hairs on the ovary and capsule.

3. *Dipteracanthus ventricosus* Nees in DC., Prodr. XI, p. 126, 1847; *Ruellia treubiana* Lindau in Engl. u. Prantl, Nat. Pflanzenfam. IV, 3 b, p. 310, 1895 n. nom.; Hochreutiner in *Candollea* V, p. 229, 1934; — annae *Aporuellia axillaris* Clarke in Journ. As. Soc. Beng. LXXIV, p. 650, 1908; Ridl., Fl. Mal. Pen. II, p. 564, 1923, cum qua *Acanthopale malasica* Clarke op. cit. p. 659 et Ridl. op. cit. p. 576 fide Imlay in Kew Bull. 1939, p. 112 identica est, et *Aporuellia borneensis* S. Moore in Journ. Linn. Soc. XLII, p. 119, 1914, adhuc incertum.

Herba ramosa. Caulis ramique obtuse quadrangulares, internodiis 2—8 cm longis, primum quadrisulcatis compositi, primum dense appresse pubescentes, deinde glabrescentes. Folia petiolo 1.5—6 mm longo, dense appresse pubescente munita; lamina ovato-oblonga vel rarius oblonga, 2—5 cm longa et 1.3—2.6 cm lata, apice subobtusa, basi acuta vel subcontracta, margine subintegra, undulata, apice subobtusa, basi acuta vel subcontracta, margine subintegra undulata, discolor, supra setulis paucis sparsa, costa appresse puberula, subtus praesertim costa nervisque breviter pubescens, margine

parce ciliolata, utrimque cystolithis dense lineolata, nervis utroque latere costae 3—5. Flores in axilles foliorum plerumque duo superpositi, subsessiles. Bracteolae linear-lanceolatae, 12—15 mm longae et 2.5—3 mm latae, in petiolum 2—3 mm longum contractae, 1-nerviae vel indistincte penninerviae, subacute et margine densius ciliolatae, ceterum ut folia. Calyx 6 mm longus, segmentis carinatis et carina marginibusque apicem versus ciliolatis. Corolla alba, 2.6 cm longa, tubo 7—8 mm, faucibus 12—13 mm, lobis 6—8 mm longis, faucibus lobisque extus pubescentibus. Stamina filamentis glabris, exterioribus 4.5 mm, interioribus 3 mm longis; antherae 2 mm longae, connectivo apice in processum subquadratum producto. Granula pollinis tuberculata, 50  $\mu$  diam. Ovarium glabrum, utroque loculo ovoidis 3—4. Stylus dense hirtellus. Capsula glabra, 12 mm longa. Semina plerumque 4—6, 4 mm diam., lateribus luteolis glabris.

Habitat Javam et forsitan Peninsulam Malayanam et terram Borneensem. Java. Res. Buitenzorg: G. Tjibodas, alt. 250 m, BAKHUIZEN V. D. BRINK JR 738 U; ibidem, alt. 320 m, RAAP 283 L; Tjiomas near Buitenzorg, alt. 250 m, BAKHUIZEN V. D. BRINK JR 316 U; Res. Banjumas: Nusa Kam-bangan, AMDJAH 170 L.

NEES l.c. distinguished a var. *major*, represented by ZOLLINGER 988, and a var. *minor*, based on ZOLLINGER 483. HOCHREUTINER l.c. refers a specimen collected by himself near Tjampea to the last-named variety. In the specimens quoted above we observed no differences which would have justified the distinction of varieties.

Neither of *Aporuellia axillaris* Clarke nor of *A. borneensis* S. Moore material was available to us, but according to the descriptions they must be either conspecific with the Javanese plants described above or at least nearly related to them. The leaves of *A. axillaris* are described as 3.25 in. long and 1.5 in. wide, and are therefore larger than those of the Javanese plants; the bracteoles (in the description they are called bracts) are said to be oblong, and the corolla is described as blue; of the capsules no particulars are given. The leaves of *A. borneensis* are stated to be 5—8 cm long and 2.5—3.5 cm wide, and there are said to be up to six flowers in the axils of the leaves (they are therefore probably arranged in the same way as in the specimen collected by ELMER near Sandahan, of which mention was made in the remarks attached to the description of *D. repens*: i.e. in superposed triads); the corolla is but 16.5—22.5 mm long; and the seeds are described as glabrous, but this is doubtless a mistake, for completely glabrous seeds are unknown in the *Ruellinae*.

*Aporuellia axillaris* is one of the two species whose descriptions accompany the generic diagnosis of CLARKE's genus *Aporuellia*, which was separated from *Ruellia* sensu T. And. on account of the tuberculate instead of alveolate pollen. As the pollen grains of the other species, *A. sumatrensis* Clarke, proved to be alveolate, it is clear that the inclusion of this species in the genus *Aporuellia*, was a mistake: *A. axillaris*, therefore, must

be regarded as the type. A. careful comparison of the descriptions given above of *Dipteracanthus prostratus*, *D. repens* and *D. ventricosus*, of which the latter, as stated above, is either identical with or at least closely related to *Aporuellia axillaris*, shows that the differences between these plants are rather insignificant, and it therefore does not seem justifiable to refer them to different genera. *Aporuellia sumatrensis*, on the other hand, differs in its subrosulate habit, its terminal spiciform inflorescences, its long inner stamens, its butterfly-shaped anthers and its 3-porous pollen grains so considerably from the *Dipteracanthus* species that it certainly can not be considered a near ally. It is transferred below to an new genus *Pararuellia* Brem.

*Acanthopale malasica* Clarke was identified by IMLAY in Kew Bull. 1939, p. 112, with *Aporuellia axillaris*, but as he gives no explanation of the discrepancies between the descriptions of the two species, this identification can not be accepted without reserve. Especially the axillary spikes which CLARKE ascribes to *Acanthopale malasica*, are a serious obstacle: either CLARKE's description or IMLAY's identification must be wrong.

*Dipteracanthus ventricosus* differs from *D. prostratus* and *D. repens* in the superposed flowers and in the tuberculate pollen, from the first moreover in the glabrous capsules and from the second in the much wider, subobtuse leaves and in the appendiculate anthers. In the relief of the pollen grains and in the few-seeded capsules it resembles the Philippine *D. lanceolatus*, from which, however, it differs conspicuously in the wider leaves and in the glabrous ovary and capsule.

4. *Dipteracanthus lanceolatus* Nees in Wall., Pl. As. Rar. III, p. 82, 1832 et in DC., Prodr. XI, p. 124, 1847, quoad typum in insula Luzon lectum; non Hassk., Cat. Hort. Bog. ed. 2, p. 148, 1844, nomen, nec id., Pl. Jav. Rar. p. 500, 1848, quae sunt *D. prostratus* (Poir.) Nees, nec Miq., Fl. Ind. Bat. II, p. 782, 1858, quae minime pro parte est *D. repens* (L.) Hassk.

Habitat insulam Filippinam Luzon dictam.

This species was based on a specimen collected by HAENKE in Luzon. NEES himself was of opinion that it might be identical with "Ruellia repens", Linn. Mant. p. 89, Burm. Fl. Ind. p. 135 (excl. icon). Blume Bijdr. p. 794?", but as he was not fully convinced of the identity of the Luzonian and Javan specimens, he dropped LINNÉ's name: „misso tamen nomine, ut debui, in re tam incerta". The Luzon plant, however, is quite distinct from the Javan one described by LINNÉ and BURMANN, for its capsules are stated to be pubescent and to contain, as a rule, but four seeds: „capsula pubescente subtetrasperma", whereas those of the Javan plants are glabrous and provided with a larger number of seeds. I have not seen the specimen collected by HAENKE, but other specimens collected in Luzon, and distributed by the Bureau of Science, Manilla, under the name *Ruellia repens* L. (ROBINSON and RAMOS B.Sc. 11861 L; ROBINSON B.Sc. 9609 L; SER-

VIÑAS B.Sc. 16892 L), were all provided with pubescent few-seeded capsules, and differed moreover from *Dipteracanthus repens* in the tuberculate instead of alveolate pollen. In this respect the Luzon species resembles *D. ventricosus*. The seeds of *D. lanceolatus* resemble those of *D. repens*, for they are on the flat sides covered with short mucous hairs. The pollen grains are 47  $\mu$  in diam.

*Ruellia luzoniensis* Merr. in Philipp. Journ. of Sc. XXX, p. 426, 1926, is said to resemble „luxuriant forms of *R. repens*”, and it is probable, therefore, that this plant too will prove to belong to *Dipteracanthus*.

LINDAU described in FEDDE's Repertorium XIII, p. 552, 1815, a *Ruellia (Dipteracanthus) dissoluta*, based on two specimens collected by WARBURG in the southern part of Celebes. As he says that there are but two stamens, this species can not belong to *Dipteracanthus*, and as the seeds are described as „globulis radiosis obtecta”, it can not even belong to the *Ruellieae*. LINDAU was probably lead astray by the globose pollen grains. We suppose that it will belong either to the *Justicieae*, where globose pollen grains have been found in the New-Guinean genera *Oreothrysus* LINDAU and *Ancylacanthus* Lindau, or else to the *Odontonemeae*, where they are known to occur in *Pseuderanthemum* Radlk. subg. *Acanthoconis* Hall.f. and in the type species of *Asystasiella* Lindau, but as the description is very unsatisfactory, and as the specimens on which it was founded, are lost, its identity will be difficult to establish.

##### 5. *Nothoruellia* Brem. nov. gen.

**Nothoruellia** Brem. n. gen. *Ruellinarum*, ramificatione pseudo-dichotoma, floribus terminalibus et interdum insuper axillaribus a generibus aliis subtribus huius distinguendum.

Planta herbacea, pseudo-dichotome ramificata, radicibus fusiformibus instructa. Folia petiolata; lamina margine repando-denticulata. Flores terminales et interdum insuper axillares, pedicellati, bibracteolati. Bracteolae calyce multo longiores, foliaceae. Calyx ultra medium fissus, lobis aequalibus. Corolla tubo faucibus paulo longiore, faucibus infundibuliformibus, lobis rotundatis, patentibus. Stamina basi fauci inserta, inclusa, subaequalia; filamenta glabra; antherae linearis-oblongae, basi sagittatae. Granula pollinis alveolata, ceterum adhuc imperfecte nota. Staminodium impar nullum. Torus discoideus. Ovarium utroque loculo ovulis 8; stylus hirtellus; stigmatis lobus posticus rudimentarius, lobus anticus dorsiventraliter applanatus. Capsula unguiculata dicta, 16-seminalis. Semina nondum visa.

Genus adhuc monotypicum in Nova Guinea endemicum.

Species unica: *N. scabrifolia* (Val.) Brem. n. comb. (*Ruellia* Val.).

As the only specimen which we could study, had no capsules, and as its pollen was badly preserved, the position of this genus is difficult to determine. The large size of the bracteoles remind one of *Dipteracanthus*,

but the terminal flowers give the genus a rather isolated position in the subtribe. The pollen is probably triporous, but we are not quite sure of this. If it were definitively proved to be so, this might be adduced as an argument in favour of a nearer affinity to *Pararuellia* Brem. and *Leptosiphonium* F. v. Müll.

1. *Nothoruellia scabrifolia* (Val.) Brem. n. comb.; *Ruellia scabrifolia* Val. in Bull. Dép. Agric. Indes Néerl. № 10, p. 59. 1907.

Herba valde ramosa, circ. 20 cm alta. Caulis ramique obtuse quadrangulares, primum quadrisulcati, subglabri. Folia petiolo parce piloso, 2—4 mm longo munita; lamina oblonga, foliorum inferiorum usque ad 10 cm longa et 4.5 cm lata, foliorum superiorum 2—5 cm longa et 1.0—2.2 cm lata, omnium subobtusa, basi acuta vel subcontracta, margine repando-denticulata, supra parce hispidula et cystolithis dense lineolata, subtus costa nervisque ut margine dense hispidula, nervis utroque latere costae 4—8. Flores terminales vel ad apicem ramorum congesti, casu quo flores axillares haud raro superpositi. Pedicellus 0.5 mm longus. Bracteolae 15—20 mm longae et 6—10 mm latae, margine ut folia repando-denticulatae, nervis utroque latere costae 3, apice pedicelli insertae. Calyx hyalinus, 7 mm longus, segmentis carinatis, acutis, apice callosis, margine vix distincte ciliolatis. Corolla 4.5 cm longa, tubo 2 cm, faucibus 1.7 cm, lobis 0.8 cm longis. Stamina filamentis 12 mm longis, antheris 3 mm longis, apice subacutis. Ovarium glabrum. Stylus 3.5 cm longus. Capsula 18 mm longa dicta.

Habitat Novam Guineam.

New Guinea. River Digul near Merauke, KOCH s.n. L, exemplum typi.

The specimen in the Leiden herbarium is in a rather bad condition, and my description therefore far from complete. The original one given by VALETON, contains several mistakes, mainly with regard to the arrangement of the flowers. Whether the specimens collected by TEYSMANN in Sumba and Buru, and quoted l.c. by VALETON, were rightly referred to this species, seems doubtful. VALETON mentions that they were identified by HALLIER as "*Hemigraphis napiformis*", which probably is an orthographic error for "*H. napifera*". The latter is the name given by HALLIER to *Ruellia napifera* Zoll., a species which is transferred below to the genus *Pararuellia*. It is known to occur in the Lesser Sunda Islands, and is replaced in the Moluccas by another species of the same genus, *P. flagelliformis* (Roxb.) Brem. n. comb. (*Ruellia* Roxb.), of which various specimens in the Leiden Herbarium were identified by HALLIER as "*Hemigraphis napifera*". Although *P. napifera* and *P. flagelliformis* differ conspicuously from *Nothoruellia scabrifolia* in their subrosulate habit and spiciform inflorescences, it is in view of the bad condition of the specimens not entirely excluded that VALETON may have confused them. At any rate we feel bound to postpone the acceptance of VALETON's identifications until we have seen TEYSMANN's specimens.

6. **Pararuellia** Brem. nov. gen.

**Pararuellia** Brem. n. gen. *Ruellia* Clarke in Journ. As. Soc. Beng. LXXIV, p. 649, 1908, p.p. sed haud quoad typum qui ad genus *Dipteracanthum* Nees emend. Brem. pertinet; a generibus aliis *Ruellia* inflorescentiis terminalibus spiciformibus, staminibus interioribus quam exterioribus longioribus, antheris papilioniformibus distinguendum.

Herbae subrosulares, caule sympodiali, parte annotina obtuse quadrangulari, parte defoliata tereti et crassiore, decumbente et ad nodos radices fibrosas validiores emittente. Folia in petiolum satis longum contracta; lamina apice obtusa, margine obsolete crenata et crispata. Inflorescentia terminalis sed mox a ramulo axillari repulsa, spiciformis, longe pedunculata, pedunculo rachideque acute quadrangularibus, simplex vel ex axillis infimis ramificata, floribus in axillis bractearum nunc solitariis, nunc in fascicula dichasialia congestis. Bracteolae calyce breviores. Calyx aequaliter 5-fidus, lobis triangularibus acutis. Corolla alba, tubo cylindrico calyce longiore, faucibus subaequilongo, faucibus campanulatis, lobis aequalibus apice rotundatis vel retusis, subpatentibus. Stamina basi faucium inserta, interiora supra exteriora; filamenta glabra, exteriorum quam interiorum breviora; antherae papilioniformes, i.e. connectivo latiore apice basique retuso, thecis patentibus. Granula pollinis globosta, alveolata, poris aequatorialibus tribus instructa. Staminodium nullum. Torus discoideus parvus. Ovarium cylindricum, glabrum, utroque loculo ovulis uniserialiter dispositis 6—8. Stylus hirtellus. Stigmatis lobe posticus nunc rudimentarius, nunc bene evolutus, lobo antico tamen brevior; lobe anticus dorsiventraliter applanatus. Capsula cylindrica, valvulis ambobus fissuris tribus instructis, e basi seminiferis, retinaculis hamatis acutis, parvis, seminibus utroque loculo 6—8. Semina lenticularia parva, ubique pilis annulatis obtecta.

Distributum speciebus adhuc certe notis 5 in Indo-China et Archipelago Malayano.

Typus generis: *P. sumatrensis* (Clarke) Brem. n. comb. (*Aporuellia* Clarke).

## Index Specierum.

- flagelliformis** (Roxb.) Brem. n. comb.; *Ruellia flagelliformis* Roxb. Fl. Ind. ed. Carey III, p. 47, 1832 — Insulis Moluccanis —
- Loweii** (S. Moore) Brem. n. comb.; *Ruellia Loweii* S. Moore in Journ. of Bot. LXV, p. 13, 1927 — Annamia —
- napifera** (Zoll.) Brem. n. comb.; *Ruellia napifera* Zoll. in Nat. en Geenesk. Arch. II, p. 553, 1845 — Java Orientali, Insulis Sundaicis Minoribus —
- nudispica** (Clarke) Brem. n. comb.; *Ruellia* (?) *nudispica* Clarke in Philipp. Journ. of Sc. I, Suppl. p. 248, 1906 — Palawan —
- Poilanei** (R. Ben.) Brem. n. comb.; *Ruellia Poilanei* R. Ben. in Bull. Mus. Paris, 1927, p. 106 — Annamia — anne *P. Loweii* identica?

\**sumatrensis* (Clarke) Brem. n. comb.; *Aporuellia sumatrensis* Clarke in Journ. As. Soc. Beng. LXXIV, 2, p. 650, 1908 — Sumatra —  
*sumatrensis* (Clarke) Brem. var. *Ridleyi* (Clarke) Brem. n. comb.; *Aporuellia sumatrensis* Clarke var. *Ridleyi* Clarke l.c. — Peninsula Malayana —

Index Specierum in Genere *Aporuellia* nuncupatarum.

- acaulis* (R.Br.) Domin in Biblioth. Bot. LXXXIX, p. 1157, 1929 (*Ruellia* R.Br.) = species ad genus novum removenda — Australia —  
*australis* (Cavan.) Domin op cit. p. 1156 (*Ruellia* Cavan.) = species ad genus idem ut *A. acaulis* removenda — Australia —  
\**axillaris* Clarke in Journ. As. Soc. Beng. LXXIV, 2, p. 650, 1908 = *Dipteracanthus ventricosus* vel species ei valde affinis — Peninsula Malayana —  
*borneensis* S. Moore in Journ. Linn. Soc., Bot. XLIII, p. 119, 1914 = *Dipteracanthus ventricosus* vel species ei valde affinis — Borneo —  
*Guppyi* (Hemsl.) Clarke ex S. Moore in Journ. of Bot. LII, p. 295, 1914 (*Ruellia* Hemsl.) = *Leptosiphonium Guppyi* (Hemsl.) Brem. n. comb. — Insulis Solomonis —  
*napifera* (Zoll.) Brem. in Verh. Ned. Akad. v. Wet., Afd. Nat., 2e Sect. XLI, n° 1, p. 113, 1944 (*Ruellia* Zoll.) = *Pararuellia napifera* (Zoll.) Brem. n. comb. — Java Orientali et Insulis Sundaicis Minoribus —  
*papuana* S. Moore in Trans. Linn. Soc., Bot. IX, p. 132, 1916 = *Leptosiphonium papuanum* (S. Moore) Brem. n. comb. — Nova Guinea —  
*pumilio* (R.Br.) Domin in Biblioth. Bot. LXXXIX, p. 1156, 1929 (*Ruellia* R.Br.) = species ad genus idem ut *A. acaulis* removenda — Australia —  
*spiciflora* (F. v. Müll.) Domin l.c. (*Ruellia* F. v. Müll) = species ad genus aliud removenda — Australia —  
*sumatrensis* Clarke in Journ. As. Soc. Beng. LXXIV, 2, p. 650, 1908 = *Pararuellia sumatrensis* (Clarke) Brem. n. comb. — Sumatra —  
*sumatrensis* Clarke var. *Ridleyi* Clarke l.c. = *Pararuellia sumatrensis* (Clarke) Brem. var. *Ridleyi* (Clarke) Brem. n. comb. — Peninsula Malayana —  
*versicolor* S. Moore in Journ. of Bot. LII, p. 295, 1914 = *Leptosiphonium versicolor* (S. Moore) Brem. n. comb. — Nova Guinea —

Appendix: Species sub nomine generico *Ruellia* nuncupatae fide CLARKE (in Journ. As. Soc. Beng. LXXIV, p. 650, 1908) ad *Aporuelliam* removendae.

- flagelliformis* Roxb., Fl. Ind. ed. Carey III, p. 47, 1832 = *Pararuellia flagelliformis* (Roxb.) Brem. n. comb. — Insulis Moluccanis —  
*trichotoma* Nees ni DC., Prodr. XI, p. 149, 1847 = *Championella japonica* (Thunb.) Brem. in Verh. Ned. Akad. v. Wet., Afd. Nat., 2e Sect. XLI, n° 1, p. 150, 1944 — Japonia —

Key to the *Pararuellia* Species of the Malay Archipelago.

Bracts on the axis of the spiciform inflorescence, with the exception of the lower ones, cordate-orbicular, ovate-orbicular or ovate; flowers always in fascicles.

Leaves on both sides scabrid, and on the midrib and nerves beneath fulvous-pubescent. Bracts on the axis of the spiciform inflorescence,

with the exception of the lower ones, ovate. Filaments of the inner stamens 2 mm long. — Sumatra and Malay Peninsula —

1. *P. sumatrensis* (Clarke) Brem.

Leaves either on both sides scabridulous or scabridulous above and subglabrous beneath; midrib and nerves not fulvous-pubescent. Bracts on the axis of the spiciform inflorescence cordate- or ovate-orbicular. Filaments of the inner stamens 5 mm long. — Moluccas —

2. *P. flagelliformis* (Roxb.) Brem.

Bracts all or with the exception of the lower ones triangular; flowers either all solitary in the axils of the bracts or the lower ones in pairs or triads.

Leaves obovate, all or the majority more than 5 cm wide. Peduncle more than 5 cm long; spike usually with more than 7 pairs of bracts. — Palawan —

3. *P. nudispica* (Clarke) Brem.

Leaves oblanceolate to spatulate, all or the majority less than 4.5 cm wide. Peduncle less than 5 cm long; spike with 4—7 pairs of bracts.

— East Java and Lesser Sunda Islands —

4. *P. napifera* (Zoll.) Brem.

1. ***Pararuellia sumatrensis*** (Clarke) Brem. n. comb.; *Aporuellia sumatrensis* Clarke in Journ. As. Soc. Beng. LXXIV, 2, p. 650, 1908; Ridl., Fl. Mal. Pen. II, p. 564, 1923.

Folia sensim in petiolum canaliculatum, puberulum, 2—5 cm longum contracta; lamina oblanceolata vel oblonga, 6—12 cm longa et 1.8—3.2 cm lata, utrimque scabrida, subtus insuper costa nervisque fulvo-pubescentes, discolor, sicc. supra saturate olivaceo-brunnea, subtus dilute brunnea, cystolithis interdum supra conspicuis, saepius utrimque vix distinguendis, nervis utroque latere costae 8—10. Inflorescentia plerumque simplex, 12—25 cm longa, pedunculo rachideque scabridulis, opacis, pedunculo 6—17 cm longo, rachide plerumque ex internodiis 3—4 composita. Flores in axillis bractearum fasciculati; fasciculi infimi foliis magnitudine redactis, ovato-oblongis, breviter petiolatis suffulti; alii bracteis ovatis, 12—5 mm longis et 10—3 mm latis, sessilibus, apice subacute, nervis utroque latere costae 2—4 instructis, ad anthesin saepe deciduis muniti. Fasciculi pluriflori; bracteae florum lateralium et bracteolae florum ultimorum triangulares, 2 mm longae, extus puberulae. Calyx circ. 5 mm longus, extus dense pubescens. Corolla 18 mm longa, tubo 7 mm, faucibus 6 mm, lobis 5 mm longis. Stamina exteriora filamentis 1.1 mm longis; interiora 2 mm supra exteriora inserta, filamentis 2 mm longis instructa; plicae in tubo decurrentes 1.5 mm longae; antherae 1 mm longae lataeque. Granula pollinis 35—38  $\mu$  diam. Ovarium utroque loculo ovoides 6. Stigmatis lobus posticus rudimentarius, lobus anticus 0.4 mm longus. Capsula circ. 1.5 cm longa, seminibus utroque loculo 6. Semina ovata, 2 mm alta et 1.5 mm lata.

Habitat Sumatram et forsitan Peninsulam Malayanam (cf. infra: var. *Ridleyi*).

S u m a t r a. Res. Palembang: R. Musi, Lampas, alt. 200 m, FORBES 2636 L, exemplum typi; R. Musi, s.l., id. 2644a L.

**Pararuellia sumatrensis** (Clarke) Brem. var. **Ridleyi** (Clarke) Brem. n. comb.; *Aporuellia sumatrensis* Clarke var. *Ridleyi* Clarke in Journ. As. Soc. Beng. LXXIV, p. 650, 1908; Ridl., Fl. Mal. Pen. II, p. 564, 1923.

Habitat Peninsulam Malayanam.

The differences by which this variety is said to recede from the type, are described in rather vague terms, and its taxonomical position, therefore, can not be said to be definitely settled. Like *P. napifera* it grows on "lime-stone rocks".

*P. sumatrensis* is in size more or less intermediate between *P. flagelliformis* and *P. napifera*. From the latter it is easily distinguishable by the fascicled flowers, the ovate bracts and the very short stamens; from *P. flagelliformis* by the characters given in the key.

2. **Pararuellia flagelliformis** (Roxb.) Brem. n. comb.; *Ruellia flagelliformis* Roxb., Fl. Ind. ed. Carey III, p. 47, 1832; Nees in DC., Prodr. XI, p. 153, 1847; Miq., Fl. Ind. Bat. II, p. 791, 1858; Clarke in Journ. As. Soc. Beng. LXXIV, p. 650, 1908 in adnotatione ad genus *Aporuelliam*; Val. in Ic. Bogor. III, p. 131, Tab. 253, 1908; Lemée, Dict. Plant. Phan. I, p. 347, 1929, sub *Aporuellia*; vix Benoist in Lecomte, Fl. Gén. Indo-Chine IV, p. 649, 1935.

Folia in petiolum canaliculatum, puberulum vel scabridulum, 4—7 cm longum contracta; lamina oblonga vel obovata, 8—15 cm longa et 2.6—6.2 cm lata, supra setulis minimis scabridula, subtus scabridula vel subglabra, sicc. fuscescens, cystolithis supra conspicuis, subtus numerosis sed difficiliter distinguendis, nervis utroque latere costae 8—12. Inflorescentia simplex vel ramosa, 20—40 cm longa, pedunculo rachideque parce puberulis, opacis, pedunculo 9—20 cm longo, rachide internodiis plerumque 4—5 composita. Flores in axillis bractearum fasciculati; ramuli inflorescentiarum ramosarum et fasciculi infimi inflorescentiarum simplicium foliis magnitudine redactis, ovatis vel ovato-oblongis, breviter petiolatis suffulti, fasciculi alii bracteis ovato- vel cordato-orbicularibus, 1.5—2 cm longis latisque, nervis utroque latere costae 3 instructis, apice obtusis, sessilibus, ad anthesin saepe deciduis muniti. Fasciculi pluriflori; bracteae florum lateralium et bracteolae florum ultimorum triangulares, 2—2.5 mm longae, extus puberulae. Calyx 4—7 mm longus, extus dense puberulus. Corolla 18—21 mm longa, tubo 9—10 mm, faucibus 5—6 mm, lobis late retusis, vix patentibus 4—5 mm longis. Stamina exteriora filamentis 2.5 mm longis; interiora 2 mm supra exteriora inserta, filamentis 5 mm longis instructa; plicae in tubo decurrentes 3 mm longae; antherae 1 mm longae lataeque. Granula pollinis 36—40  $\mu$  diam. Ovarium utroque loculo ovulis 6—8. Stigmatis lobus posticus rudimentarius, lobus anticus 0.7 mm longus. Capsula 12—22

mm longa, seminibus utroque loculo 6—8. Semina orbicularia, 2 mm diam. Inflorescentia post anthesin saepius decumbens et radicibus ad nodos emissionis prolifera.

Habitat Insulas Moluccanas.

Moluccas. Buru: Pulu Uky. TEYSMANN H.B. 1820 L et U; s.l., DE VRIESE s.n. L; Ambon: s.l., ROBINSON 1790 L; Haruku: s.l. REINWARDT 1436 L; Ceram: West coast, Tandjong Aiputih, alt. 0 m, KORNASSI (Exped. RUTTEN) 1209 L et U.

KOORDERS 15822, collected in the northern part of Celebes, and quoted by KOORDERS himself (in Meded. 's Lands Plantent. XIX, p. 555, 1898) under the name *Hemigraphis napifera* (Zoll.) Hall.f. (sphalm. *rapifera*) and by VALETON (in Ic. Bogor. III, p. 131, 1908) as *Ruellia flagelliformis*, is probably a species nearly related to the latter. The material in the Leiden herbarium, however, is too incomplete to allow a definite conclusion. The *R. flagelliformis* mentioned by BENOIST in the Flore Générale de l'Indo-Chine, is probably also a distinct species, for its bracts are said to be less than 1.5 cm long, whereas they ought to be at least 1.5 cm; the two Chinese species whose names are quoted in its synonymy, are hardly congeneric, for the leaves of the first, *Ebermaiera concinna* Hance are said to be "supra aspero-punctata", which makes it probable that this plant really is a *Staurogyne* (syn.: *Ebermaiera*), and the stamens of the other, *Hemigraphis drymophila* Diels, are described as equal in length, the two upper ones being exserted, whereas they should be unequal and all included.

*P. flagelliformis* is doubtless nearly related to *P. sumatrensis*, from which it can be distinguished by the characters given in the key, and also by its more vigorous habit.

3. **Pararuellia nudispica** (Clarke) Brem. n. comb; *Ruellia* (?) *nudispica* Clarke in Philipp. Journ. Sc. I, Suppl. p. 248, 1906; *Gymnostachyum nudispicum* (Clarke) Elm., Leafl. Philop. Bot. V, p. 1700, 1913; *Ruellia nudispica* (Clarke) Merr., Enum. Philipp. Pl. III, p. 476, 1923; *Staurogyne nudispica* (Clarke) Brem. in Verh. Ned. Akad. v. Wet., Afd. Natuurk. 2e Sect. XLI, p. 113, 1944.

Folia in petiolum pubescentem et insuper pilis longioribus sparse hirsutum, supra sulcatum, 1—5 cm longum contracta; lamina obovata, 10—15 cm longa et 4.7—6.5 cm lata, margine plana et integra vel obscure crenulata, supra setulis minimis scabridula, subtus praesertim costa nervisque scabridulo-puberula, supra viridule maculata, sicc. plerumque olivacea, cystolithis nunc utraque facie conspicuis, nunc inconspicuis, nervis utroque latere costae plerumque 8. Inflorescentia simplex, 7—30 cm longa, pedunculo rachideque badiis, scabridulo-puberulis vel subhirtellis, pedunculo 5—15 cm longo, rachide ex internodiis 6—11 composita. Flores in axillis bractearum plerumque solitarii, raro aliqui in dyades vel triades dispositi. Bracteae omnes anguste triangulares, badiæ, extus puberulo-pubescentes,

margine vix conspicue ciliolatae, 2—5 mm longae. Bracteolae bracteis similiores. Calyx 6—6.5 mm longus, badius, extus puberulus, lobis margine vix conspicue ciliolatis. Corolla 12—20 mm longa, tubo faucibus subaequionglo, faucibus limboque violaceis. Stamina matura nondum visa; antherae 1.5 mm longae. Granula pollinis 40  $\mu$  diam. Ovarium utroque loculo ovoidis 8—10. Capsula 2 cm longa, seminibus 16—20.

Habitat insulam Palawan dictam.

Palawan: BERMEJOS 288, typus, n.v.; ELMER 12794 U et L; MERRILL 9429 L.

The data regarding the corolla and the capsule and the lower limit of the dimensions of the other parts have been taken from CLARKE's description, which evidently was based on a rather poor specimen.

*P. nudispica* looks at first sight very different from *P. napifera*, but apart from the difference in size there are but few characters in which the two species really differ: the leaves of *R. nudispica* are broader and the margin is flat, not crisp. It is not impossible that there is some difference in the length of the filaments: I found them in *P. nudispica* very short, but as the flower which I could investigate was not fully mature, there is as yet no certainty with regard to this point.

The specimen which I studied four years ago (ELMER 12794 U) had no flowers and as it did not show any cystoliths, it seemed to me that it could not belong either to the *Ruelliae* or to *Gymnostachyum*. On account of the divergent anther cells mentioned in CLARKE's description, I referred it to *Staurogyne*. Afterwards, however, I found in the Leiden herbarium a specimen collected by MERRILL in which the cystoliths were not only visible, but even very conspicuous. In this specimen too a flower bud was present, which enabled me to study the pollen grains and the shape of the anthers, and now its near affinity to *P. napifera* could easily be established: in fact, as stated above, the two species differ in minor points only.

In the paper quoted above two more species referred by ELMER to *Gymnostachyum*, namely *G. subcordatum* and *G. palawanense*, were transferred by me to *Staurogyne*. This too proved a mistake: as ELMER's descriptions show, and as a study of the pollen characters has confirmed, both species belong to *Gymnostachyum*.

4. **Pararuellia napifera** (Zoll.) Brem. n. comb.; *Ruellia napifera* Zoll. in Nat. en Geneesk. Arch. II, p. 553, 1845; Hassk. in Flora XXX, p. 599, 1847<sup>1)</sup>; Walpers, Ann. Bot. Syst. I, p. 540, 1849; Miq., Fl. Ind. Bat. II, p. 785, 1858; Boerl., Handl. Fl. Ned. Ind. II, 2, p. 658, 1899; Val. in Ic. Bogor. III, p. 135, Tab. 254, 1908; Koorders, Exkursionsfl. v. Java III, p. 220, 1912; *Hemigraphis napifera* (Zoll.) Hall.f. ex Koorders in Meded.

<sup>1)</sup> HASSKARL suggests that "napifera" is a misprint for "scapifera", which indeed would have been a more suitable name, as the "radicibus apicem versus incrassatis" of ZOLLINGER's description are teratological (cf. VALETON l.c.).

's Lands Plantent. XIX, p. 555, 1898 (*sphalm. rapifera*) quoad typum, haud quoad specimen citatum quod ad *P. flagelliformem* accedit; *Apo-ruellia napifera* (Zoll.) Brem. in Verh. Ned. Akad. v. Wet., Afd. Nat., 2e Sect. XLI, n° 1, p. 113 et 139, 1944; — *Staurogyne javanica* Lindau in Fedde, Repert. XIII, p. 550, 1915.

Folia sensim in petiolum pubescentem et insuper pilis longioribus sparse hirsutum, supra bisulcatum, 1—4 cm longum contracta; lamina spathulata, oblanceolata vel obovata, 3—16 cm longa et 1—5 cm lata, margine crenulata et crispa, supra setulis minimis scabridula, subtus praesertim costa nervis venulis scabridulo-pubescentis, sicc. plerumque olivacea, cystolithis supra conspicuis, nervis utroque latere costae 6—7. Inflorescentia simplex, 6—15 cm longa, pedunculo rachideque hirtellis, pedunculo 3—5 cm longo, rachide ex internodiis 4—7 composita. Flores in axillis bractearum plerumque solitarii, raro aliqui in triades dispositi; infimi interdum foliis suborbicularibus, 1 cm longis latisque, nervis utroque latere costae 2 suffulti, plerumque tamen flores omnes bracteis triangularibus, extus pubescentibus, margine ciliolatis, 2.5—4.5 mm longis instructi. Bracteolae bracteis similiores. Calyx 4—5 mm longus, extus pubescens, lobis margine ciliolatis. Corolla 20 mm longa, tubo 7 mm, faucibus 8 mm, lobis ovato-orbicularibus patentibus 4 mm longis. Stamina exteriora filamentis 6 mm longis; interiora 0.5 mm supra exteriora inserta, filamentis 8 mm longis; plicae in tubo decurrentes 5—6 mm longae; antherae 2 mm longae et 1 mm latae. Granula pollinis 40—45  $\mu$  diam. Ovarium utroque loculo ovoidalis 7—8. Stigmatis lobus posticus antico paulo brevior; anticus 0.8 mm longus. Capsula 18 mm longa, seminibus utroque loculo 7—8. Semina orbicularia, 2.5 mm diam.

Habitat Javam Orientalem et Insulas Sundaicas Minores.

**E a s t J a v a.** Res. Kediri: Blitar, WARBURG 4154 BD (type of *Staurogyne javanica* Lindau) n.v.; Res. Besuki: G. Watangan near Puger, alt 5 m, BACKER 36975 PAS ("in fissures of the limestone cliffs"); East Java, s.l., ZOLLINGER 2394, typus n.v. "G. Ikan", ZOLLINGER 2443 L. (this number is the same as that of the type of *Odontostigma subacaule* Zoll., the description of which leaves no doubt that it was based on a species of *Gymnostachyum*).

**S u m b a w a:** Susi, COLFS 123 L.

**F l o r e s:** on the road between Ruteng and Reo, alt. 150 m, POSTHUMUS 3375 L; Bay of Bari, WEBER s.n. L.

**W e t a r:** Ilmedo, alt. 0—50 m, ELBERT 4686 L ("corall lime and clay").

In Hort. Bog. cult. sub. XI B (XIV) 79.

The description of *Staurogyne javanica* Lindau shows plainly that this plant can not belong to *Staurogyne*, for its leaves are said to be provided with cystoliths, and the seeds are hairy and moreover too large for this genus: it agrees on the contrary in every respect with the species described above. Apart from the specimen collected by WARBURG on which the description was based, a specimen collected by ZOLLINGER is quoted. Its

number is given as 2396, but I suppose that this is an error, and that in reality 2394 is meant, which is the number of the type of *P. napifera*.

### 7. *Leptosiphonium* F. v. Müll.

*Leptosiphonium* F. v. Müll., Descr. notes Papuan Plants VII, p. 32, 1886; *Ruellia* L. sect. *Leptosiphonium* (F. v. Müll.) Lindau in Engl. u. Prantl, Nat. Pflanzenfam. IV 3 b, p. 309, 1895, specie africana exclusa.

Herbae simplices vel parce ramosae, caule sympodiali erecto. Folia petiolata, lamina apice acuminata. Inflorescentia terminalis sed jam ad anthesin in positionem lateralem coacta, racemi- vel spiciformis. Bracteae bracteolaeque angustae, calyce multo breviores. Calyx fere ad basin 5-partitus, lobis longis et angustis, acutissime exsertibus. Corolla plerumque luteola, lutea vel aurantiaca, raro alba vel dilute violacea, hypocrateriformis; tubus angustus et longissimus apicem versus in fauces infundibuliformes breves et incurvatos ampliatus; lobi subaequales elliptici vel obovati, apice rotundati, patentissimi. Stamina basi faucium inserta in plicas usque ad medium tubum descendentes decurrentia; exteriora interioribus paulo longiora; antherae suberectae linearis-oblongae, basi sagittatae, apice obtusae, thecis patentibus. Granula pollinis globosa alveolata, reticulo in quibusdam locis incrassato et producto, incrassationibus interdum caruncula fimbriatis, probabiliter tripunctata. Staminodium nullum. Ovarium cylindricum, utroque loculo ovoidalis 10—20. Stigmatis lobus posticus quam anticus dimidio brevior; uterque dorsiventraliter applanatus. Capsula cylindrica, e basi seminifera. Semina nondum visa.

Distributum speciebus alhuc certe notis 10 in Nova Guinea et insulis vicinis.

Typus generis: *L. Stricklandii* F. v. Müll.

### Index Specierum.

- aruense* (S. Moore) Brem. n. comb.; *Ruellia aruensis* S. Moore in Journ. of Bot. XVI, p. 134, 1878 — Insulis Aruanis —
- Forbesii* (S. Moore) Brem. n. comb.; *Ruellia Forbesii* S. Moore in Journ. of Bot. LII, p. 294, 1914 — Nova Guinea Austro-orientali —
- garckeanaum* (K. Sch.) Brem. n. comb.; *Ruellia garckeana* K. Sch. in Bot. Jahrb. IX, p. 218, 1888 — Nova Guinea Arcto-orientali —
- gloeocalyx* (K. Sch.) Brem. n. comb.; *Ruellia gloeocalyx* K. Sch. in K. Sch. u. Lauterbach, Nachtr. Fl. Deutsch. Schutzgeb. Südsee, p. 386, 1905 — Nova Guinea Arcto-orientali —
- Guppyi* (Hemsl.) Brem. n. comb.; *Ruellia Guppyi* Hemsl. in Journ. Linn. Soc. XXX, p. 214, 1894; *Aporuellia Guppyi* (Hemsl.) Clarke ex S. Moore in Journ. of Bot. LII, p. 295, 1914 — Insulis Solomonis —
- papuanum* (S. Moore) Brem. n. comb.; *Aporuellia papuana* S. Moore in Trans. Linn. Soc., Bot. IX, p. 132, 1916 — Nova Guinea Austro-orientali —
- potamoxenos* (K. Sch.) Brem. n. comb.; *Ruellia potamoxenos* K. Sch. in K. Sch. u. Lauterbach, Nachtr. Fl. Deutsch. Schutzgeb. Südsee,

- p. 387, 1905; *Ruellia aruensis* S. Moore apud K. Sch. u. Hollrung, Fl. Kais. Wilhemsl. et in K. Sch. u. Lauterbach, Fl. Deutsch. Schutzgeb. Südsee, p. 544, 1900, quoad specimina novo-guineënsia, a typo foliis majoribus, pilosioribus, caulis villosis diversa — Nova Guinea Arcto-orientali —
- \**Stricklandii* F. v. Müll., Descr. notes Papuan Plants VII, p. 32, 1886 — Nova Guinea Austro-orientali —
- versicolor* (S. Moore) Brem. n. comb.; *Aporuellia versicolor* S. Moore in Journ. of Bot. LII, p. 295, 1914 — Nova Guinea Austro-orientali —
- vestitum* (Engl.) Brem. n. comb.; *Ruellia vestita* Engl. in Bot. Jahrb. VII, p. 471, 1886 — Nova Guinea Occidentali —

The only species which we could study, were *L. Forbesii* and *L. versicolor*, but we have little doubt that all the *Ruelliinae* of New Guinea and the islands in the vicinity of the latter will belong either to *Nothoruellia* or to this genus.

The flowers of *L. vestitum* have been described as white, and those of *L. papuanum* as light violet, whereas those of the other species show various shades of yellow, but in other respects there is nothing in the characters of these two plants, which would prevent their inclusion in this genus. The identity of *Ruellia aruensis* S. Moore var. *glabrisepala* K. Sch. in Bot. Jahrb. IX, p. 218, 1888, is not quite sure. The specimen from the Solomon Islands is probably conspecific with *Leptosiphonium Guppyi*, but whether the New Guinean specimens belong to the same species or to a variety of *L. potamoxenos* or to an as yet undescribed species can not be made out before material of these species becomes available.

*Leptosiphonium* and *Pararuellia* resemble each other in the terminal inflorescences and the many-seeded capsules, but differ considerably in the form of the corolla. The corolla of *Nothoruellia* is more or less intermediate between those of the two other genera, but this genus differs conspicuously from them in the arrangement of the flowers.

The African *Ruellia amabilis* S. Moore, which Lindau, because of its longtubed flowers, placed in the vicinity of the *Leptosiphonium* species, has few-seeded capsules provided with a solid stipe, and belongs therefore to another circle of affinity.

#### 8. *Eranthemum* L. emend. Radlk.

**Eranthemum** (L., Fl. Zeyl. p. 6, 1747; Dassaw, Nova Gen. Pl. Zeyl., App. L., Fl. Zeyl. p. 3); L., Sp. Pl. ed. 1, p. 9, 1753; id., Gen. Pl. ed. 5, p. 9, 1754; R.Br., Prodr. Fl. Nov. Holl. p. 476, 1810, p.p.; Nees in Wall., Pl. As. Rar. III, p. 76 et 106, p.p.; id. in DC., Prodr. XI, p. 425, p.p. et p. 445, § 1 a, 1847; Radlk. in Sitzungsber. d. K. Bayr. Acad. XIII, p. 285, 1883; Lindau in Engl. u. Prantl, Nat. Pflanzenfam. IV 3 b, p. 311, 1895; Dalla Torre u. Harms, Gen. Siph. p. 482, 1905; Lemée, Dict. Pl. Phan. II, p. 897, 1930; — *Daedalacanthus* T. And. in Thwaites, Enum. Pl. Zeyl. p. 229, 1860 et auctorum aliorum qui de flora indica tractaverunt.

Suffrutices vel herbae erectae robustiores. Folia petiolata, lamina lanceolata vel elliptica, utroque extremo contracta, margine integra, repanda vel crenata. Inflorescentiae terminales et interdum insuper axillares, spiciformes. Bracteae magnae, calyce multo longiores, penninerviae. Bracteolae plerumque calyce breviores. Calyx aequaliter 5-lobus, 5-fidus vel 5-partitus, lobis acutis, plerumque anguste triangularibus. Corolla azurea vel rosea, hypocrateriformis, tubo longo et angusto, in fauces plerumque breves, anguste infundibuliformes sensim dilatato, lobis subaequalibus suborbicularibus vel obovatis, patentissimis. Stamina paulum infra orem inserta; exteriora fertilia, in plicas fere ad basin tubi decurrentia, inclusa vel exserta; interiora ad staminodia clavata vel filiformia redacta; antherae oblongae, thecis patentibus. Granula pollinis globosa, alveolata, 3-pora, alveolis medio plerumque tuberculo notatis. Staminodium impar parvum vel nullum. Torus discoideus. Ovarium utroque loculo ovlis 2. Stylus glaber vel hirtellus. Stigmatis lobus posticus antico multo brevior, uterque dorsiven-traliter applanatus. Capsula unguiculata, acuta, utroque loculo seminibus 2; retinacula validiora. Semina tota pilis mucosis obtecta.

Distributum speciebus pluribus Ceylania, Peninsula Indica, India Septentrionali, Indo-China, China Australi, Sumatra, Java et forsitan Insulis Sundaicis Minoribus.

Typus generis: *E. capense* L.

The type of *E. capense* L. is a specimen in HERMANN's herbarium in the British Museum. According to TRIMEN (in Journ. Linn. Soc. XXIV, p. 133, 1888) it is conspecific with *Daedalacanthus montanus* T. AND. He adds: "In spite of LINNÆUS's specific name, this is not a South-African plant. He confuses it with another plant of HERMANN's, and gives the habitat as 'in Aethiopia.' What TRIMEN meant when he said: 'He confuses it with another plant of HERMANN's', is not clear, but one thing is quite certain, namely that LINNÉ himself had no definite opinion with regard to the position of this genus, for he referred afterwards to the same genus two South-African species which since then have been removed to *Agathelpis* Chois., a genus belonging to the Scrophulariaceae, Selagineae. At any rate it appears to be firmly established that *E. capense* L. is conspecific with *Daedalacanthus montanus* T. AND. and with *Eranthemum fastigiatum* (Lam.) SPRENG., and that the epithet *capense* should be accepted as the legitimate name for this species.

The genus *Eranthemum* appears to be confined to Tropical Asia. According to CLARKE (in Fl. Trop. Afr. V, p. 69, 1899) it should be considered identical with *Lankesteria* Lindl., but although I have not yet found an opportunity to study the latter genus myself, I feel no hesitation in declaring CLARKE's opinion unfounded: the flowers of the *Lankesteria* species are not rosy or blue but orange, the stamens are hardly decurrent, the pollen is not globose, but ellipsoidal, and the stigma is described as sub-

capitate and didymous. Notwithstanding the similarity in habit, this genus therefore can hardly be considered a near ally of *Eranthemum*.

The *Eranthemum* species are distributed from Ceylon through India to South China and Indo-China to Sumatra and Java, and perhaps to the Lesser Sunda Islands. In the latter one species has been found as far eastwards as Pulu Alor, but it is not certain whether it is endemic in those parts, or perhaps cultivated. Curiously enough no species are known from the Malay Peninsula: at least the genus is not mentioned in RIDLEY's "Flora". In Bot. Mag. 3rd Ser. XXXIX, Tab. 6686, 1883, *E. macrophyllum* Nees is said to occur in the drier forests of the upper part of the Malay Peninsula, from where its area extends northwards into Burma, but with this upper part of the Peninsula probably Tenasserim is meant.

The species are on the whole very similar, and therefore difficult to classify. The western species have exserted, the eastern ones with the exception of *E. macrophyllum* Nees included stamens. In *E. tubiflorum* (T. And.) Radlk. ex Lindau, *E. Griffithii* (T. And.) Brem. n. comb. (*Daedalacanthus* T. And.) and *E. splendens* (T. And.) Brem. n. comb. (*Daedalacanthus* T. And.), three species occurring in the Himalayas, the throat is distinctly wider than the tube and about as long as the latter; and in the other western species it is at least more conspicuous than in the eastern ones. Among the latter *E. macrophyllum* Nees is easily recognizable by its exserted stamens, and my new *E. sumatranum* by its remote, entirely glabrous, ovate-elliptic bracts.

Several species of *Eranthemum* have been described from the Malay Archipelago, but the majority, and among them even species like *E. sumatrense* Ridl. and *E. ovatifolium* Ridl., of which the names were published as late as 1923 and 1926, belong to *Pseuderanthemum* Radlk. The only true representative of the genus are *E. viscidum* Bl. and the nearly related *E. salaccense* Bl., here reduced to varietal rank, and further a new species described below under the name *E. sumatranum* Brem.

#### Key to the endemic species and varieties of *Eranthemum* of the Malay Archipelago.

Spikes with numerous pairs of bracts; the latter overlapping, linear, linear-oblong or obovate, and on both sides covered with capitate and ecapitate hairs. — Java and perhaps the Lesser Sunda Islands —

##### 1. *E. viscidum* Bl. sensu lato

Bracts linear-oblong or obovate, 12—15 mm long and 3—6 mm wide.

Upper leaves linear-lanceolate to lanceolate-elliptic, not more than 12 cm long.

Underside of the leaves with puberulous midrib and nerves, but otherwise glabrous. — Java, and perhaps Sumba —

var. *blumeanum* Brem. n. nom.

Underside of the leaves, especially on the midrib and nerves, pubescent. — Java —

var. *pubescens* Hochr.

Upper leaves linear, 12—17 cm long and 1.7—2.9 cm wide. — West Java —  
var. *linearifolium* Hochr.

Bracts linear, 15 mm long and 1.5 mm wide. — Java, and perhaps P. Alor —  
var. *angustibracteatum* Brem. n. var.

Spikes usually with two pairs of bracts; the latter remote, ovate-elliptic or rhomboid, entirely glabrous. — Sumatra —

2. *E. sumatranaum* Brem. n. spec.

1. ***Eranthemum viscidum*** Bl., Bijdr. Fl. Ned. Ind. p. 792, 1826; Nees in DC., Prodr. XI, p. 447, 1847; Miq., Fl. Ind. Bat. II, p. 834, 1858; Koorders, Exkursionsfl. v. Java III, p. 220, 1912; *Daedalacanthus viscidus* (Bl.) T. And. in Journ. Agr. Hort. Soc. Ind. New Ser. I, p. 274, 1868; Boerl., Handl. Fl. Ned. Ind. II, 2, p. 658, 1899.

Habitat Javam et forsitan Insulas Sundaicas Minores.

Species haec solvenda est in varietates quattuor:

a. ***Eranthemum viscidum*** Bl. var. ***blumeanum*** Brem. n. nom.; *E. viscidum* Bl. var. *genuinum* Hochr. in Candollea V, p. 231, 1934.

Herba erecta, circ. 50 cm alta, caule primum quadricostato, glabro vel subglabro, 2—4 mm diam. Folia in petiolum canaliculatum, subtus puberulum, 8—20 mm longum contracta; lamina forma variabilis, plerumque lanceolata vel linearis-lanceolata, interdum tamen lanceolata-elliptica, 6—18 cm longa et 1.2—6 cm lata, apice subcaudata, basi acuta, margine integra vel subrepanda, supra glabra, subtus costa densius, nervis parce puberula, supra cystolithis parvis dense lineolata, sicc. supra saturate, subtus dilute brunea, nervis utroque latere costae 7—10, venulis paucis. Spicae terminales et axillares, pedunculatae, elongatae, bracteis dense imbricatae. Pedunculus 1—4 cm longus, pilis capitatis dense obtectus. Spica 4—11 cm longa, rachide pilis capitatis dense vestita. Bracteae linearis-oblongae vel obovatae, 12—15 mm longae et 3—6 mm latae, apice subobtusae, utrimque sed praesertim subtus pilis capitatis et ecapitatis dense pubescentes, margine praesertim basin versus pilis sparsis ciliatae, nervis utroque latere costae 4; bracteae infimae interdum alliis longiores. Bracteolae lineares, 6 mm longae et 1.1 mm latae, acutae, subtus pilis capitatis vestitae, 1-nerviae. Calyx aequaliter 5-fidus, 6.5 mm longus, extus pilis capitatis, vestitus. Corolla azurea, tubo cum faucibus 3.5 cm longo, 0.8—1.0 mm diam., ore usque ad 1.5 mm dilatato, extus apicem versus pubescente, ceterum glabro, lobis extus intusque glabris, obovatis, 6—9 mm longis et 5—7 mm latis. Stamina inclusa; filamenta 1 mm longa, glabra; antherae linearis-oblongae 2.8 mm longae, thecis basi acutis. Granula pollinis 60  $\mu$  diam. Staminodia 0.5 mm supra stamina inserta, 0.2 mm longa. Ovarium 2.5 mm altum, pilis capitatis dense vestitum. Stylus tubo aequilongus, apicem versus pilis capitatis ceterum pilis ecapitatis parce et breviter hirtellus. Stigma lineare, 1 mm longum, lobo postico toto suppresso. Capsula 12 mm longa, pilis capitatis parce vestita.

Habitat Javam et forsitan Insulas Sundaicas Minores.

Java. Res. Batavia: Batavia, Pegansaän, alt. 10 m. BACKER 32528 L; Meester Cornelis, id. 32529 L; Pondok Salam near Purwakarta, alt. 100 m, BAKHUIZEN v. d. BRINK 4261 L; Res. Buitenzorg: G. Tjibodas near Tjampea, BAKHUIZEN v. d. BRINK JR 740 U; Zandbaai, Tjisodong near Tjiloa, alt. 10 m, DOCTERS v. LEEUWEN 12689 L; Tjisarua, RAAP 854 L; Sukabumi, G. Kate, BACKER 15071 L; Tjibeber near Tjidadap, alt. 750 m. BAKHUIZEN v. d. BRINK 1939 L; Tjisokan near Tjidadap, alt. 800 m, id. 631 L; Res. Besuki: G. Idjen, Pantjur, KOORDERS 28482 L; Java, s.l. BLUME s.n. L, typus.

Sumba: Kemala wateh, TEYSMANN H.B. 8860 L; Koreta, id. H.B. 8861 L.

Whether the specimens collected in East Java and in Sumba were wild or cultivated, is uncertain (v. *infra*).

b. ***Eranthemum viscidum*** Bl. var. ***pubescens*** Hochr. in *Candollea* V, p. 231, 1934.

Varietas foliis subtus praesertim costa nervisque pubescentibus, bracteis densius ciliatis a typo recedens.

Java. Res. Cheribon: above Kadipaten, alt. 250 m. in teak forest, HOCHREUTINER 2514 G, typus var. n.v.; G. Tjerimai, alt. 700 m, BACKER 4859 L.

c. ***Eranthemum viscidum*** Bl. var. ***linearifolium*** Hochr. l.c.; var. foliis linear-lanceolatis longissime acuminatis Bl. l.c.

Varietas foliis superioribus linearibus, 12—17 cm longis et 1.7—2.9 cm latis, bracteis 17 mm longis et 6 mm latis a typo recedens.

Habitat Javam.

Java. Res. Buitenzorg: Lawang Tretes, REINWARDT s.n. L, typus var.

d. ***Eranthemum viscidum*** Bl. var. ***angustibracteatum*** Brem. n. var.; anne *E. salaccense* Bl., Bijdr., Fl. Ned. Ind. p. 792, 1826, incertum; certe tamen *E. salaccense* Bl. apud Nees in DC., Prodr. XI, p. 448, 1847; Miq., Fl. Ind. Bat. II, p. 835, 1858; *Daedalacanthus salaccensis* (Bl.) T. And. in Journ. Agr. Hort. Soc. Ind. New Ser. I, p. 274, 1868; Boerl., Handl. Fl. Ned. Ind. II, 2, p. 658, 1899.

Varietas bracteis linearibus, 15 mm longis et 1.5 mm latis, vix ciliatis a typo recedens.

Habitat Javam et forsitan insulam Alor dictam.

Java. Gouvt. Surakarta: Prambanan, JUNGHUHN 199 L., typus var.; Res. Malang: Lawang, KARSTEN 98 a L.

P. Alor. s.l., BOUMAN-HOUTMAN 155 L.

The specimen collected in P. Alor may have been a cultivated one (v. *infra*).

The distribution of this species is rather puzzling: it might perhaps be explained by assuming that it is endemic in West and Central Java, and that the specimens collected in East Java and in the Lesser Sunda Islands

were obtained from cultivated plants or from plants escaped from cultivation.

The identity of *E. salaccense* Bl. is uncertain. BLUME's type specimen, collected on G. Salak, appears to be lost, and his description is unsatisfactory: the flowers should be subverticillate, which they are never in this genus, but on the other hand the plant is said to be allied to *E. strictum*, which is doubtless a true *Eranthemum*, and the corolla is described as azure, which is by no means a common colour outside this genus. The description given by NEES, is based on JUNGHUHN's Prambanan specimen, which was identified by JUNGHUHN himself as *E. salaccense* Bl., but on what grounds this identification rests, is not clear: it is possible that it was compared with the type, but this is not at all certain.

*E. viscidum* resembles *E. tetragonum* Nees and *E. strictum* Colebr., especially the Chittagong specimens of the latter, which differ from the type, a plant found in Assam, by the erect, ciliate bracts and by the pubescence of the midrib and nerves on the underside of the leaves, and may represent a distinct species. The bracts of the var. *angustibracteatum* of *E. viscidum* are exactly similar in shape to those of these Chittagong plants, but they lack the long cilia of the latter, and the leaves are on the midrib beneath merely puberulous.

2. ***Eranthemum sumatranum* Brem. n. spec.; typus: PRINGO ATMODJO 503 L.**

Herba erecta, circ. 40 cm alta. Caulis glaber, primum quadricostatus, 1.2 mm diam., deinde teres et usque ad 1.9 mm diam. Folia in petiolum canaliculatum, 3—10 mm longum, subtus puberulum contracta; lamina ovato-lanceolata vel lanceolata, 5—9 cm longa et 2—3 cm lata, apicem versus sensim attenuata sed apice ipso obtusa, basi acuta vel in foliis supremis rotundata, supra glabra, subtus costa puberula, utrimque cystolithis parvis lineolata, sicc. supra olivacea, subtus dilute viridis, nervis utroque latere costae 5—6, venulis paucis. Spicae terminales et axillares, paniculatae. Pedunculus glaber, 2—6 cm longus, acute quadrangularis et quadricostatus. Bracteae plerumque 2-parae, remotae, haud raro tamen uno pari bractearum sterilium, aliis multo minorum praecessae, Bracteae fertiles ovato-ellipticae vel rhomboideae, 2.2—2.5 cm longae et 1.0—1.2 cm latae, apice subobtusae, basi acutae, planae, glaberrimae, nervis utroque latere costae 4—5. Bracteolae lineares, 6 mm longae, vix conspicue puberulae. Calyx 5 mm altus, lobis 1.2 mm longis, extus puberulus. Corolla colore ignoto, extus praesertim tubo puberulo-pubescent, tubo cum faucibus 2.5 cm longo, intus glabro, lobis obovatis, 5 mm longis et 4 mm latis, margine ciliatis. Stamina inclusa; antherae subsessiles, 3 mm longae, apiculatae, thecis basi muticis. Granula pollinis 53  $\mu$  diam. Staminodia 0.5 mm supra stamina inserta, 0.2 mm longa. Ovarium 2 mm altum, glabrum. Stylus apicem versus puberulo-hirtellus. Capsula glabra, 14 mm longa.

Habitat Sumatram.

Sumatra. Country of the Bataks. Deleng Si Kuta Maru, Bt Pok-pok, PRINGO ATMODJO (Exped. v. DAALEN 1904) 503 L, typus.

The exact position of the locality where this apparently rare plant was collected, is unknown to me, but it is said to be in the country of the Bataks.

*E. sumatranum* differs from all other species of this genus by the few-flowered inflorescences with their remote pairs of perfectly glabrous, flat bracts, and by the comparatively long calyx tube.

