

On the Sonerileae of Asia.

BY

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With Map, Plate XVII.
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WHEN working out the Melastomaceae of Borneo with the intention of giving an enumeration of them to include a considerable number of new species which the Kew Herbarium received recently from Dr. G. D. Havi-land of Sarawak, and to show their geographical and phylo-genetic relations to those of the remainder of Malaya and of Asia in a general way, I met with various difficulties, which arose partly from the artificial arrangement of the species of *Sonerila* in Cogniaux's monograph of Melastomaceae, and partly from what appeared to me a sometimes very narrow and not always uniform view of the conception of the species. But with this reservation, nobody can more appreciate M. Cogniaux's elaborate work than I do. Any comparative study, however, be it for phytogeographical purposes or for the object of eliciting the phylogenetic relations of a large number of more or less closely-allied species, must be very difficult, if not valueless in its results, if merely based on an arrangement which has chiefly the determination of species for its object. Such a one does not spare us the trouble of reworking the larger genera for all questions which concern the natural relationship of their species. Much could be done, I think, in this direction by keeping separate what is required for mere naming, and for comparative studies of the kind

indicated. The former might find its best place in a clavis which serves exclusively practical purposes, and may be as artificial as these require; but the latter ought to prevail exclusively in the arrangement and the sequence of the described species. Thus not only the scientific value of such monographs would be highly increased and much trouble spared to those who subsequently take up the same order or a part of it for any special study, but it would likewise be to the benefit of those who use it for determination, as all the more closely allied forms would be kept together, which is quite impossible in an artificial arrangement. It was in compliance with this want of a more natural arrangement of the Sonerileae for my special object that the present paper originated.

There are ninety-eight species of Sonerileae described in Cogniaux's monograph, to which I add the twenty species of *Vepricella*, which I consider to belong to this tribe, not to Oxysporeae. I further add seven new species, which were not taken up by Cogniaux or appear as varieties with him. Thus the number of Sonerileae known at present would be 125. As forty-two, or about one quarter, are African, only eighty-three come into consideration in this paper. They are all limited to tropical Asia, with the exception of *S. papuana*, Cogn., which is a native of Western New Guinea.

The Asiatic Sonerileae, as described in Cogniaux's monograph, belong to the genera *Sonerila* with seventy-two, *Sarcopyramis* with one, *Phyllagathis* with two, and *Brittenia* with one species. *Brittenia* was described first in this monograph; the other genera are admitted generally and even by H. Baillon, who inclines otherwise to rather a wholesale reduction of genera in Melastomaceae. I may premise here that I shall establish in this paper a fifth and a sixth genus on *S. Fordii*, Oliv., and on *S. peperomiifolia*, Oliv., species enumerated by Cogniaux in a special section, *Anomala*. With this exception, the limitation of the genera of the Asiatic Sonerileae does not need any discussion, and I can proceed forthwith to the classification of the species of *Sonerila* itself. These

appear in Cogniaux's monograph under four sections:—*Genuinae*, *Sonerilopsis*, *Oxycentria*, *Anomalae*. *Sonerilopsis* comprises three, *Oxycentria* one, *Anomalae* three species. Of these, each of the species of *Anomalae* belongs, in my opinion, to a different genus; *Oxycentria* is known only from a description by Miquel, and is very doubtful; *Sonerilopsis* forms a very natural division, whilst *Genuinae* consist of rather heterogeneous elements which point at least to two different lines of descent. The greatest complication is exhibited within the section *Genuinae*, and especially in their first sub-division, which is characterised as 'caulescentes; folia consimilia, in eodem jugo subaequalia,' and comprises forty-five species. In discussing them I shall not follow the sequence of Cogniaux's monograph, but dispose them in the arrangement which appears to me the most natural.

SONERILA, Roxb.

Distrib.: Western Ghats, from Bombay southwards; Central and South-west Ceylon; Chota Nagpore; tropical and sub-tropical Himalaya from Kumaon eastwards; from the Khasia Mountains and Assam eastwards to South China, and throughout the Eastern peninsula; Malayan Archipelago to New Guinea and the Philippines.

1. **Group of *S. zeylanica*.** Central and South-west Ceylon; the most southern part of the Western Peninsula; Borneo.

1. *S. zeylanica*, W. et Arn. (Syn. *S. pumila*, Thw., *rostrata*, Thw., *cordifolia*, Cogn., *rhombifolia*, Thw., *glaberrima*, Arn., *affinis*, Arn.), Central and South-west Ceylon; Borneo.

S. zeylanica was originally established by Wight and Arnott on specimens from Ceylon. Two years later Arnott described two more species in Hooker, Comp. Bot. Mag. 307: *S. affinis* and *S. glaberrima*. To these were added *S. rhombifolia*, *rostrata*, and *pumila* by Thwaites, in Enum. Plant. Zeyl. 109 (1859), and *S. cordifolia* by Cogniaux in his monograph, all found in Ceylon. Of these seven species, only *S. zeylanica*, *affinis*, and *rhombifolia* were admitted by C. B. Clarke in Hooker, Flora of British India, II. 530. Cogniaux, how-

ever, in his monograph enumerates all seven as distinct species, and puts them even into different sub-divisions. After a careful examination of the material in the Kew Herbarium, which includes all the type-specimens but one, I have come to the conclusion that all these species should be reduced to *one* species.

S. affinis was established on specimens collected by Col. Walker. They are perhaps a little more robust than those which were named by Wight and Arnott *S. zeylanica*, and their anthers are more attenuate. There are no other differences whatever. It was the shape of the anthers which evidently induced Thwaites, Clarke, and Cogniaux to follow Arnott's view concerning these two species. I, however, find differences in the shape and length of the anthers of the same amplitude within what is considered to be typical *S. zeylanica*. In fact, both species represent one unbroken series of forms varying with anthers 4-4.5 mm. long and produced into a slightly curved beak, to anthers not more than 1.5 mm. long, cordate-ovate and more or less obtuse. The specimens with smaller anthers are generally weaker, but some plants of this form, raised at Kew from seeds sent by Thwaites, maintained their short obtuse anthers, notwithstanding the luxuriant development of the vegetative parts. Both forms grow evidently together, as appears from the localities indicated on the labels. The species next described was *S. glaberrima*, Arn. I have not seen the type-specimen of it which is preserved in Delessert's Herbarium in Geneva. But Thwaites identifies it with his *S. rostrata*, whilst Cogniaux brings it close to *S. rhombifolia*. These two species were brought into different divisions by Thwaites on account of the shape of the leaves, which he says are asymmetric in the former and symmetric in the latter. This, however, is no reliable character. Symmetric leaves occur in *S. rostrata*, as well as in *S. affinis* and *S. zeylanica*, and on the other hand *S. rhombifolia* has also occasionally some asymmetric leaves, just like those which prevail in *S. rostrata*. In fact, the difference of both of them is limited to the more robust habit and the larger leaves in

S. rhombifolia. The venation of the leaves, their texture and serrature, the shape, size and colour of the flowers are exactly the same, so that I am disposed to consider them as mere individual variations, the more, as the type specimens are derived mostly from the same place, Hinidoon. Thus also *S. glaberrima* evidently belongs to the same species. Next *S. pumila* follows as a new species in Thwaites' enumeration. It is merely a dwarf form of the typical *S. zeylanica*, and was found in the more elevated parts of Ceylon. Clarke made it a variety of *S. zeylanica*, but I should not go even so far, but consider it as a form which might be derived anywhere from the typical *S. zeylanica*, when this is exposed to unfavourable conditions of growth. Cogniaux re-established it as a species apparently on account of the supposed smoothness of the seeds. But smooth and glandular-dotted seeds may be found in the same capsule. The last member of this difficult set is *S. cordifolia*, Cogn. It was named originally *S. zeylanica*, W. et A., *forma cordifolia* by Thwaites in sched., and indeed it is nothing but a rather flaccid form from the Singhe Rajah Forest, probably from a very shady place. The leaves are more rounded at the base, and sometimes even cordate, but the same may be observed occasionally in typical *S. zeylanica*. The anthers are of the short acute type.

For these reasons I bring the whole set of these hardly distinguishable forms into one species, *S. zeylanica*, and maintain only the most marked ones as varieties, viz.:

(a) v. *vulgaris*, Stapf: anthers short, acute or obtuse, not over 3 mm. long, leaves with distinct more or less spreading serrature (Syn. *S. pumila*, Thw., *S. cordifolia*, Cogn., *S. zeylanica*, W. et A. *sensu strictiore*).

(β) v. *affinis*, Stapf: anthers more attenuate or rostrate, 3.5–7.5 mm. long, leaves with usually distinct, very spreading serrature (Syn. *S. affinis*, Arn., *S. rhombifolia*, Thw.).

All the localities hitherto known for *S. zeylanica* in this broad sense are limited to the centre and the South-west of Ceylon, in elevations from 600–1800 m. It is the more remarkable that this plant was recently found by G. D. Havi-

land near Quop in Sarawak, and in a form which is absolutely identical with that which was described by Thwaites as *S. pumila*.

2. *S. Brunonis*, W. et Arn. Central Ceylon; Tinnevely Distr.

3. *S. wightiana*, Arn. (Syn. *S. wightiana*, *sensu strictiore*; *S. arnottiana*, Thw.; *S. tomentella*, Thw.; *S. hookeriana*, Arn.) Central Ceylon; Western Peninsula, northwards as far as the Anamally Hills.

Whilst the formation of hairs is either entirely suppressed or limited to a few small scattered bristles on the leaves in *S. zeylanica*, it assumes a far more intensive development in a very closely allied set which otherwise differs but very little. The difference is indeed so trifling that further investigation on the spot may prove the existence of an uninterrupted connexion between this hairy set and that of *S. zeylanica*. The former, which I comprise under the name of *S. wightiana*, Arn., is closely linked to *S. zeylanica* by a form which was called *S. tomentella* by Thwaites, and only differs by the almost tomentose covering on the stem, the petioles along the nerves on the back of the leaves, on the pedicels and on the calyx. But whilst there is—at least as far as our knowledge goes at present—a distinct though slight gap between *S. tomentella* and *S. zeylanica*, the former runs completely away into a still more tomentose form, with more robust habit and a stem more or less woody at the base, *S. wightiana*, Arn., and passing this stage arrives finally at the extreme development of trichomes in *S. hookeriana*, Arn. *S. tomentella* was collected in the Saffragam District (Thwaites, C.P. 2616), *S. wightiana* and *S. hookeriana* both on Adam's Peak (Thwaites, C.P. 3907; resp. 426, 173), all within the area of *S. zeylanica*. From the same locality, Adam's Peak, another species was described as *S. arnottiana* by Thwaites. The type-specimens of it are represented on three sheets in the Kew Herbarium (Thwaites, C.P. 2615). They are identical with those of *S. tomentella*. These specimens vary remarkably in the thickness of the tomentum, and one or two plants are almost glabrescent. These forms, however

do not link this set closer to *S. zeylanica*. They show rather a tendency to branch off in a different direction which is marked by the enlargement of the capsules, which at the same time become comparatively narrower. This glabrescent form from Adam's Peak, which was not separated by Thwaites, approaches very near to *S. tenella* Bedd. or *S. arnottiana*, v. *tenella*, C. B. Clarke in Hook. Fl. Br. Ind. III. 2. 532, if it is not identical, and this again seems to be the same as *S. Brunonis*, W. et Arn., as C. B. Clarke has already pointed out. If I do not sink this latter species into *S. wightiana*, it is because the material of it preserved in the Kew Herbarium is rather poor, and because the capsules differ more in the direction indicated above than those of any other form of this set. Beddome's *S. tenella* was collected in the Anamally Hills, *S. Brunonis* near Courtallam, in the Tinnevely District, and on Adam's Peak. Thus *S. wightiana*, *sensu latiore*, with its numerous but quite inseparable forms, appears within the area of *S. zeylanica*, and linked rather closely to it; but it extends in a slightly modified form to the Southern part of the Western Ghats. This is the case with a still more modified and perhaps specifically distinct form, *S. Brunonis*, which may for the present still stand as a species.

4. *S. hirsutula*, Arn. Central Ceylon.

This is a rather well-marked species, closely allied to *S. wightiana*, but stouter, very hairy and with larger very hirsute leaves, much larger flowers and longer, more acuminate or rostrate anthers.

5. *S. Clarkei*, Bedd. Tinnevely Distr.

It approaches, like the former, very near to *S. wightiana*, but it differs by its leaves which are more narrowed into the base, by its larger flowers, and by its longer, rostrate anthers, which resemble those of *S. hirsutula*.

These four species (2-5) exhibit a very remarkable parallelism with regard to the shape of the anthers when compared with the varieties of S. zeylanica. They correspond in S. Brunonis and S. wightiana, where they are 2-3.5 mm. long, with those of S. zeylanica v. vulgaris: and in S. hirsutula

and *S. Clarkei*, where they attain 6–7 mm., with those of the variety *affinis*.

II. Group of *S. Gardneri*. Central and South-west Ceylon.

The species of this group are small, more or less woody undershrubs with sessile or subsessile leaves with 3–7 basal nerves and short comparatively broad capsules. The tendency to forms with short and long anthers is also here very obvious, another parallel to the two series in the *zeylanica*-group.

1. *S. Gardneri*, Thw. Central Ceylon, 1500 m.

It is distinguished by very short petioles, broadly ovate leaves, a tomentum exactly like that in *S. wightiana*, and short anthers, and particularly by its *broad, ellipsoid capsules*. There is a variety *firma*, Triana, with sessile leaves which approaches closely the following species.

2. *S. robusta*, Arn. Central Province, 1800–2100 m.

3. *S. Harveyi*, Thw. Central Province, 1800 m.

S. robusta has capsules more like those of *S. wightiana*, and the anthers are long and rostrate (5–6 mm.). The hairiness of the stem, the foliage, and the inflorescence, is subject to great variation, and it is sometimes almost suppressed (v. *glabricaulis*, Thw.). *S. Harveyi* is very similar, but it has short anthers (3.5–4 mm.), and it is still more glabrous. Further investigation will probably prove it to be a slight variety of *S. robusta*, to which it stands in an analogous relation as *S. zeylanica* v. *vulgaris* to v. *affinis*.

4. *S. lanceolata*, Thw. South-west Ceylon, 300 m.

It is the most aberrant form of the group, quite glabrous with sessile lanceolate indistinctly crenate leaves and almost obconical capsules more like those of *S. Brunonis*.

The group is separated from that of *S. zeylanica* by a very distinct gap; its members, however, are (with the exception of *S. lanceolata*) in the closest relationship to each other. *They show tendencies in their variation quite parallel to those which become evident in the first group*, and they inhabit also the same area.

III. Group of *S. versicolor*. South-west Ceylon; Western Ghats northwards to the Nilgherries.

Whilst in all species mentioned hitherto the lateral nerves

part from the middle nerve at the very base of the leaf, or nearly so, the venation assumes a different character in this group, which otherwise approaches that of *S. zeylanica*, particularly the peninsular species *S. Brunonis* and *S. Clarkei*. The lateral nerves branch off higher up, the leaves becoming thus 3-7-plo-nerved, and even penninerved (in *S. versicolor*).

1. *S. versicolor*, Wight (*S. axillaris*, Wight). Nilgherries. A very well-marked species much resembling *S. Brunonis*, but with penninerved leaves. *S. axillaris*, Wight, was derived from the same locality as *S. versicolor*, the Sispara Ghat in the Nilgherries, and is identical with it.

2. *S. travancorica*, Bedd. Travancore, 1300 m.

3. *S. elegans*, Wight. Nilgherries.

S. travancorica differs from *S. Clarkei*, to which it is linked nearest, in the nervation and size of the leaves; habit, tomentum, size and shape of the flowers, anthers and capsules being exactly the same. If we imagine a leaf of *S. Clarkei* much increased in the lower part, and that part provided with the vascular bundles necessary for its nutrition and its mechanical strength, we should get a leaf like that of *S. travancorica*. This species was separated from *S. elegans* chiefly on account of its supposed eglandular tomentum, but there are glandular hairs of exactly the same form also in *S. elegans*, and both species are extremely closely allied, if altogether separable.

4. *S. pilosula*, Thw. South-west Ceylon, 300-600 m.

The *versicolor*-group is represented in Ceylon by *S. pilosula*, a species very near to *S. elegans* and *S. travancorica* as far as foliage and flowers are concerned, but evidently of a much more flaccid habit and a somewhat different tomentum. From *S. versicolor* it differs in the 5-7-plo-nerved (not penninerved) leaves.

The species forming this group are closely allied to each other. The nearest affinity outside the group is to *S. Clarkei* and *S. Brunonis* on the side of the *zeylanica*-group and to *S. speciosa* in the following group. Their anthers are long acuminate or rostrate, like those of *S. Clarkei*. They are

smallest in *S. versicolor* (5 mm.), larger in *S. pilosula* (6 m.), and still larger in *S. elegans* and *S. travancorica* (6–8 mm.).

IV. **Group of *S. speciosa*.** Western Ghats, northwards to Mysore.

This comprises three species distinguished by their robust habit, large flowers, and by the venation of the leaves which are 3–7-nerved, not 3–7-plo-nerved as in the former group.

1. *S. speciosa*, Zenk. Western Ghats from Courtallam to Mysore.

It is a very well-marked species, nearest allied to *S. elegans*.

2. *S. grandiflora*, R. Br. Nilgherries.

The most distinct form of the whole series as far as the habit is concerned. It is an almost shrubby plant with perfectly glabrous, subcoriaceous leaves.

3. *S. Bensonii*, Hook. f. Malabar Ghats (precise locality unknown).

It is nearer to *S. speciosa* than to *S. grandiflora*, but differs from all species hitherto mentioned by the number of the stamens, both whorls being developed. The great importance of this species for the phylogensis of *Sonerila* will be discussed later on. I wish here only to accent its affinity to *S. speciosa* and *S. grandiflora*, which is so great that it would appear to me quite unnatural to separate it and to make it a group by itself.

The mutual affinities of these first four groups may be expressed thus: the group of *S. zeylanica* is linked on one side to that of *S. Gardneri*, both exhibiting a parallel divergence in their staminal structure, and to that of *S. versicolor* in another direction, and by means of that group to a still more different set, the *speciosa*-group, which has its most aberrant type in *S. Bensonii*. In these two groups, however, no remarkable differentiation in the staminal structure exists, this being uniform and corresponding with the set of the long anthers in group I and group II. All the species of these four groups are limited to Ceylon and the Southern half of the

Western Ghats with the exception of *S. zeylanica* which occurs also in Borneo. Thus it intrudes into the area of another group of close affinity although of, at least for the present, sufficiently marked character. This is the:—

V. Group of *S. tenuifolia*. From Malacca and Sumatra to Borneo.

1. *S. tenuifolia*, Bl. From Malacca and Sumatra to Borneo. *S. tenuifolia* is exceedingly like *S. zeylanica* v. *affinis* in habit, and differs chiefly in the more campanulate (instead of obconic) shape of the calyx and the short capsule. The anthers are acute, but neither acuminate nor rostrate, and about 4 mm. long, being thus intermediate between those of the two varieties of *S. zeylanica*. The species was found in Borneo at Sarawak by Hullett and Haviland and on Kinibalu, at 1800 m. by Low. It is, in contradiction to *S. zeylanica*, remarkably uniform.

This group is represented by several species, but we know yet very little of them, and it is only with reluctance that I link to it several of the Malayan species which I know only from description.

2. *S. laeviuscula*, Zoll. & Mor. Java, Celebes.

3. *S. biflora*, Zoll. & Mor. Java, Billiton.

4. *S. Impatiens*, Becc. Sarawak.

5. *S. purpurascens*, Becc. Sarawak.

6. *S. triflora*, Cogn. Sarawak.

S. Impatiens, *purpurascens*, *laeviuscula*, and *biflora* were placed near *S. rhombifolia*, and seem, as far as I can judge from the descriptions, to form a link closely attaching the *zeylanica*-Group, whilst *S. triflora* appears almost identical with *S. tenuifolia*.

7. *S. insignis*, Bl. Sumatra. This species, which was put nearest to *S. speciosa* by Cogn., belongs, as far as I can deduce from the description, probably to the *tenuifolia*-group.

The affinity of this group and the first is in any case so great that I expect both will appear one when more complete material is to hand.

VI. Group of *S. maculata*. From Nepal to South China and southwards to Sumatra.

In *S. pilosula* a link is given which connects the western group of *S. versicolor* with an eastern one of very great range of distribution, of which *S. maculata* may be considered the type.

1. *S. maculata*, Roxb. From Nepal and the Khasia Mountains to Upper Assam.

The difference between it and *S. pilosula*, Thw., is limited to the presence of glandular hairs, the coarser serrature of the leaves, and the generally stouter habit in the former.

2. *S. brandisiana*, Kurz. Thounggyen River, Amherst District.

This species was referred by Clarke and Cogniaux to *S. maculata*, but it differs really more from it than very many of the species which were admitted by these authors do from each other. The stem is short, fleshy, and rather densely covered with the large scars of the fallen leaves. These are broadly lanceolate, with a much more attenuate or almost decurrent base. It is nearer allied to *S. picta*, or *S. margaritacea*, than to *S. maculata*.

3. *S. picta*, Korth. Sumatra to Mergui.

A well marked species.

4. *S. rivularis*, Cogn. Tonkin.

Nearest allied to *S. picta*, but differing by a taller habit, longer petioles, comparatively shorter leaves and a little larger flowers.

5. *S. cantonensis*, Stapf, Prov. of Canton.

Herba monocarpica, 5–15 cm. alta, simplex vel fere a basi parce ramosa. Caulis nigrescens setulis patulis inferne laxe, superne dense vestitus. Folia symmetrica aequalia, petiolo setuloso-hirsuto, 5–10 mm. longo suffulta, ovata acuta, basi cuneata vel subrotundata, argute serrata, supra subglabra, infra setulis in nervis aspersa, nervis secundariis utrinque 2 in parte tertia infima ortis, 3–4.5 cm. longa, 1.5–2 cm. lata. Cymae distincte et bifarie circinnatae pedunculo 1–2 cm. longo

suffultae, demum quidem glaberrimae. Flores ignoti. Capsula obconica 5–7 cm. longa, leviter obtuseque costata, laevissima, pedicello aequilongo suffulta.

In monte Jing ti Shan, West River, Prov. Canton, C. Ford.

Closely allied to *S. rivularis*, but much smaller, and with a different tomentum.

6. *S. margaritacea*, Lindl. Moulmein?

This species is known only from cultivated specimens. The seeds from which they were raised were probably sent from Moulmein by Lobb.

7. *S. Parishii*, Stapf. Moulmein and Amherst District. (Syn. *S. picta* v. *Lobbii*, Clarke.)

Herba monocarpica, 2–2.5 dm. alta, simplex vel parce fere a basi ramosa. Caulis plus minusve dense tomento rufo vestitus. Folia symmetrica, subaequalia petiolo adpresse tomentello, 1–3 cm. longo suffulta ovata, acuta vel subacuminata, basi cuneata, argute serrata, supra setulis paucis aspersa, infra secundum nervos tomentella, nervis secundariis utrinque e dimidio inferiori ortis, 2.5–8 cm. longa 1.5–7 cm. lata. Cymae terminales pedunculo 2–3 cm. longo suffultae, sub anthesi umbellatim contractae, deinde in circinnos singulos protractae, tenuiter glanduloso-tomentellae. Pedicelli 4–6 mm. longi. Calyx primo subtubulosus, mox dilatatus obovatus vel obconicus, glabrescens vel tenuiter tomentellus, 5–7 mm. longus, dentibus triangularibus parvis. Petala ovata, acuta, 6–7 mm. longa. Stamina 3, antheris rostrato-acuminatis, 6–7 mm. longis. Capsula (immatura) angulato-obovato, 5–7 mm. longa, costis tenuibus 3.

Moulmein District: Mount Moolyet, 2100 m., Parish; high forests on the Thounggyen River, Lobb.

S. Parishii differs from *S. picta* by the more slender habit, longer petioles, the much coarser serrature of the leaves, the more ovoid and shorter calyx. A state of it with smaller leaves, collected on the Thounggyen River by Lobb, was called *S. picta* v. *Lobbii* by C. B. Clarke.

8. *S. secunda*, R. Br. Tavoy, Moulmein.

Closely allied to *S. maculata*, from which it differs only by

the shorter petioles and very slender peduncles and pedicels. Cogniaux describes it as having 'folia valde asymmetrica,' but that may be a slip, as they are hardly asymmetric at all, particularly in the type-specimens of Wallich (4094).

VII. **Group of *S. linearis*.** South-west Ceylon; Chota Nagpore; Kumaon to South China and the Philippines, southwards to Penang.

1. *S. linearis*, Hook. f. Moulmein, 900 m.

2. *S. Guneratnei*, Trim. South-west Ceylon.

These two are characterised by very narrow one-nerved leaves, an almost ovoid calyx, and slender, sub-cylindric capsules. They are annuals with a thin, somewhat wiry stem. The former was found on Mount Gerai in Moulmein, the latter was discovered by Trimen in the Pasdun Corle in Ceylon. Both species resemble each other in so high a degree that they are, in my opinion, undistinguishable. It is true, Cogniaux attributes to *S. linearis* opposite, and to *S. Guneratnei* alternate leaves. But I find the leaves in both as a rule in whorls of four, but sometimes of three, and sometimes they are opposite. If I keep them separate for the present, it is solely because the fruit of *S. Guneratnei* is not known, and it might be that it constitutes a differential character.

3. *S. angustata*, Triana. South-west Ceylon.

The leaves are broader than in *S. Guneratnei*, but still lanceolate, with coarse crenations and a distinct middle nerve besides two very faint side ones. The flowers are not known, but the capsules diverge very clearly from the *linearis*-type towards that of the *zeylanica*-group. It was indeed named first *S. rhombifolia* v. *angustata* by Thwaites *in sched.*

3. *S. erecta*, Jack. Penang to Moulmein.

Whilst *S. Guneratnei*, and still more *S. angustata*, point to a close affinity with the *zeylanica*-group from Ceylon, we find in this and the following species types, the evolution of which lies in a different direction, and ends, if I may say so, blind, without links towards any other group. *S. erecta* is distinctly different from *S. linearis*, but its close affinity is still clear

enough. It has the same almost wiry stem, and the same shortly pedicelled slender capsules. The leaves are mostly opposite, but there occur also whorls of four. They are broader, more finely serrate, and have distinct side nerves on each side. Besides, the whole plant is more or less hairy, the stem particularly along two opposite commissural lines, the leaves on both sides. The species was removed very far from *S. linearis* by Cogniaux in his arrangement, on account of the anthers being shorter. They are indeed 4–4.5 mm. in *S. linearis*, and 2.5 mm. in *S. erecta*, and besides, they are more acuminate in the former. But we have seen of what little importance this character is in other groups. It really cannot have much weight when compared with the connecting characters.

4. *S. stricta*, Hook. f. Moulmein.

This plant is in a similar relation to *S. linearis* as *S. erecta*. It has generally broader leaves, but sometimes they become almost as narrow as those of *S. linearis*, and assume then a very similar nervation. They are not whorled, but opposite. The plant is much smaller and more slender. The inflorescence and the capsules are quite the same; the flowers, however, are smaller, and the anthers shorter (2 mm.), acute, acuminate or rather obtuse. The plant has fine bristly hairs and is puberulous along the commissural lines of the stem.

5. *S. tenera*, Royle (*S. brachyandra*, Naud.). Garhwal eastwards to South China and the Philippines; Chota Nagpore.

With *S. stricta* a plant was combined as a variety by C. B. Clarke which certainly is most closely allied to it, but differs by broader, very indistinctly serrate leaves, a less strict habit, and shorter, more obtuse anthers. It was called *S. stricta*, v. *burmanica*, and founded on specimens from the Khasia mountains. But this plant is absolutely identical with Royle's *S. tenera*, which was found first in Kumaon and near Dehra Dun. It was also collected by C. B. Clarke in Chota Nagpore, and it extends over Manipur and Burma to Hong-Kong, and re-appears in the Philippines, where Gaudichaud collected it near Manila. These specimens from the

Philippines were described by Naudin as *S. brachyandra*. I have not seen the Philippine plant itself, but the figure given by Naudin (Ann. sc. nat. 3 sér. XV. t. 18. f. 2), leaves no doubt whatever about its identity with *S. tenera*.

VIII. **Group of *S. squarrosa*.** Khasia Mountains.

It comprises two very aberrant and very well-defined species.

1. *S. squarrosa*, Wall. Khasia Mountains. It has a short, branched stem, which evidently hides in moss. The stem is covered with the scars of the fallen leaves in the lower two-thirds, and with a dense foliage in the upper third. At the base of the lanceolate leaves, brown pointed bristles rise, one on each side, like stipules. Otherwise the plant is quite glabrous. The flowers are arranged in axillary (sometimes apparently terminal) cymes, or these are reduced to a single flower. Calyx, petals, and anthers are similar to those of *S. linearis*, but the capsule is more like that of *S. zeylanica*. The pedicels, however, are in the mature state thicker and very distinctly articulate at the base.

2. *S. arguta*, R. Br. Khasia Mountains. The leaves are very similar to those of *S. squarrosa*, but more membranaceous. They are arranged and accompanied by bristles at their base, as in the former species. The stem is thinner and more fragile, and hides also in moss. The inflorescence is always reduced to a single flower. The peduncle, however, bears still 1–2 of those minute bracts which support the flowers in the cymes of *S. squarrosa*. The calyx is narrower, as in *S. squarrosa*, but besides, there is hardly any difference in the flowers of the two species. But the capsule differs more. It is but faintly ribbed, much elongated, and has a thinner pericarp.

IX. **Group of *S. scapigera*.** South-west Ceylon. Western Ghats, from the South to Bombay. From Malacca to the Khasia Mountains and to Sikkim.

This group consists chiefly of scapigerous forms, which diverge remarkably from those mentioned hitherto. But there are some species, west and east of the Bay of Bengal, in which

the formation of the 'scapus' is but indicated, not perfect, and these are the nearest links towards the remainder of *Sonerila*. It is a very remarkable fact that the species forming this group constitute two series which exhibit a striking parallelism, one beginning in Ceylon with a caulescent type, and extending in scapigerous forms to Bombay, and the other starting from Malacca, also with a caulescent species, and reaching in scapigerous types to Sikkim. I shall follow both series separately.

a. Western series.

1. *S. pedunculosa*, Thw. South-west Ceylon.

The reduction of the stem is imperfect. The leaves, however, show a distinct tendency towards crowding above the ground. But these clusters of leaves are connected by generally long hypogaeous or epigaeous weak and flaccid internodes which root sometimes. The leaves are more or less penninerved. The inflorescences are supported by slender and simple, generally long, peduncles. The flowers resemble those of *S. zeylanica*, and are not particularly characteristic. The capsules, however, are short, indistinctly ribbed, and they have a thin pericarp, and exhibit after the seed-scattering a very peculiar appearance, evidently in consequence of their anatomical structure.

2. *S. Rheedii*, W. et Arn. Travancore to North Canara. C. B. Clarke and Cogniaux brought this species to *S. Wallichii*, Benn. The specimen of Wallich's herbarium (4076), named *S. Rheedii*, and quoted by Wight and Arnott under *S. Rheedii*, undoubtedly belongs to *S. Wallichii*; but the authors meant the plant figured by Rheede in the Hortus Malabaricus. This, however, is not a stemless plant. It agrees exactly with the specimens collected by Johnston at Cochin, by Wight at Quillon and by Talbot in Curwar in North Canara. It has a short erect or succumbent fleshy stem, with leaves very much like those of *S. pedunculosa*, but with a more distinctly pinnate nervation and longer, more rostrate anthers. The capsules agree with those in *S. pedunculosa*. The shortening of the stem, and in consequence the crowding of the

leaves above the ground, is sometimes as evident as in *S. pedunculosa*.

3. *S. Wallichii*, Benn. Anamally and Baba Badun Hills, above 900 m.

4. *S. scapigera*, Dalz. Baba Badun Hills to the Bombay Ghats. In *S. Wallichii* the stem is reduced to a very short rhizome which is rather thick and covered with fibrils. The leaves, few in number and often very unequal in size, rise from the rhizome as true 'radical' leaves, and with them the scapelike peduncle. They are long petioled, always more or less cordate, and exhibit sometimes even a tendency towards becoming peltate. The nervation is similar to that in *S. Rheedii*; three nerves spring from the base on each side of the middle nerve, whilst another pair and 3-5 alternate nerves spring higher up. It is the type of the nervation which was meant by Benthham (Bennet et Brown, Pl. rar. Jav. p. 215) under the term 'heteroneura.' But sometimes the first two are alternate or, on the other hand, some of the upper ones opposite. *S. scapigera* differs by smaller leaves, generally longer anthers and the narrower white margin of the capsules. The anthers vary from 3.5 to 6.5 mm. in length, against 3 mm. in *S. Wallichii*. There is, however, but scant material of *S. Wallichii* before me, and future investigation may possibly prove the latter to be only a large-leaved variety of *S. scapigera*.

5. *S. rotundifolia*, Bedd. Anamally Hills.

This species is also closely allied to *S. scapigera*. It has a very small and short rhizome from which the leaves and the peduncle spring, the former being orbicular-ovate and purplish beneath and very similar to those of *S. scapigera*. Also the inflorescence is the same, but more reduced, often to a single flower. The anthers are smaller (2.5-3.5 mm.) and not rostrate.

β. Eastern series.

6. *S. Griffithii*, C. B. Clarke. Malacca.

It is a caulescent form, like *S. pedunculosa* and *S. Rheedii*, found growing with mosses in dripping places on rocks on

Mt. Ophir. It seems to form a short and thick rhizome from which thin often very long branches spring which creep in or upon the moss or the soft ground. Their internodes are sometimes 2–3 cm. long and bear small leaves which soon disappear leaving scars, from the callous margins of which tender rootlets spring occasionally. Towards the end of these branches the internodes become suddenly shortened and consequently the leaves crowd just as in *S. pedunculosa*, whilst the axis ends with a long-peduncled inflorescence. This consists of a cyme which is reduced sometimes to a single flower. The flowers are as in *S. rotundifolia*, but the anthers are rostrate, 3–4 mm. long. The capsules differ more. They are distinctly ribbed and destitute of the characteristic white margin of the allied western species.

7. *S. nudiscapa*, Kurz. Mergui Archipelago; Tenasserim.

The stem is reduced to a very small and short rhizome from which the leaves and 1–3 peduncles spring. The leaves are few, very thin, and show the same venation as those of *S. Griffithii*. The flowers are smaller, the anthers not rostrate, 2.5–3 mm. long, the capsules as in the former, but almost sessile and with faint ribs and a thinner pericarp.

8. *S. amabilis*, Kurz. Tropical Himalaya of Sikkim, to 1200 m.

Very closely allied to *S. nudiscapa*. C. B. Clarke says in a note to a specimen collected in the Rungbee Valley, near Darjeeling, it has a bulbous root. This material is not sufficient to come to a decisive opinion, but from Treutler's specimens it appears quite clear, that these tubers are part of the stem, in fact tubershaped rhizomes. There is, for instance, one specimen with three such tubers, each about 2.5–3 mm. in diameter, in connexion. They are joined by a very short internode. The first and second bear root fibrils, the third besides them a single leaf, whilst the next internode ends with a cluster of 'radical' leaves and two peduncles.

9. *S. khasiana*, C. B. Clarke. Khasia mountains, 900–1500 m.

The rhizome emits short creeping or succumbent branches with 2–3 pairs of leaves above the ground and a terminal inflorescence which overtops, more or less, the leaves. The rhizome is much shortened and tuberlike, or it consists of a few tubers which are connected by slender internodes. The stem near the nodes is covered with reddish spreading bristles like those of *S. squarrosa* and *S. arguta*. The leaves are of the type of *S. Griffithii*. The flowers are rather larger than in this species, the anthers 4.5–5 mm. long and acuminate, the capsules ovoid-ellipsoid with a thin pericarp and rather faint ribs.

10. *S. violaeifolia*, Hook. f. Moulmein.

A much stouter plant than any of the former. The innovations are, as far as the material allows us to conclude, of the same character as in *S. khasiana*. The leaves are crowded at the ends of the branches of the rhizome. They are larger, and of a firmer texture than in the remainder of the group, but of the same type. The inflorescence is cymose, first umbel-shaped, but afterwards circinoid in consequence of the lengthening of the sympodium. Flowers and capsules are as in *S. khasiana*.

In all the species mentioned hitherto the leaves are destitute of transversal venation. The tertiary nerves are faint, sometimes hardly visible, and rise at acute angles from the middle and the secondary nerves. They are curved towards the apex and branch into an exceedingly tender network of venules. Only in *S. secunda*, *maculata*, and *picta*, the outer two or three secondary nerves are more or less distinctly joined by nervules which diverge at more obtuse angles, thus approaching slightly the typically transversal nervation of the following species.

X. Group of *S. obliqua*. (Subgen. *Sonerilopsis*, Miq.)
Malayan Peninsula from Perak to Singapore; Sumatra, Borneo.

1. *S. obliqua*, Korth. Area of the group.
2. *S. teysmanniana*, Miq. Sumatra.

The species constituting this group are distinguished by the presence of six stamens. In *S. obliqua* three are of a different shape and colour. Both kinds seem to be fertile, but the pollen in the yellow and smaller anthers is not isodiametric in a wet state, but decidedly shorter in two directions, the axes being 15 : 10 : 10, instead of 15 : 15 : 15. The larger and purple stamens are episepalous and thus correspond with the one series present in the three-staminal *Sonerilas*. The plant is an erect, but rather flaccid and somewhat succulent annual, and inhabits wet rocks and dense shady forests. The leaves are often very asymmetric and those of one pair very unequal in size. They are thinly membranaceous and often become patched like those of the *maculata*-group. They have 2-3 side nerves entering the blade at the very base and connected with each other and with the middle nerve by distinct transversal nerves which diverge at an angle of 70-90° and run straight or with a slight flexure to the next outer nerve. The axillary inflorescence consists of moderately long-peduncled circinoid cymes. The capsules are sessile with six obtuse ribs in the upper two-thirds and of the shape of short inverted pyramids. They are not unlike those of *S. maculata*, but shorter. *S. teysmanniana* appears from the description to be exceedingly near *S. obliqua*.

3. *S. junghuhniana*, Miq. Sumatra.

It is said to have less unequal leaves and anthers, and these are all yellow and sagittate at the base.

XI. Group of *S. moluccana*. From Penang throughout the Malayan Archipelago to Western New Guinea.

It is distinguished by very unequal leaves, one of each pair being much reduced, by a usually dense strigillose tomentum and short subsessile capsules which are generally bullate-rugose. The larger leaves are mostly more or less asymmetric and sometimes contracted above the base, and the larger half is often produced into a rounded auricle which overlaps the petiole.

1. *S. moluccana*, Roxb. Malayan Peninsula, south of Penang, Sumatra, Java, Billiton, Borneo.

2. *S. beccariana*, Cogn. Sarawak.
3. *S. velutina*, Cogn. Sarawak.
4. *S. borneensis*, Cogn. Sarawak.
5. *S. hirtella*, Cogn. Sarawak.

S. moluccana is monocarpic with a short rooting stem and rather crowded leaves. The small ones are often only a few millimeters in diameter and early deciduous. There occurs in Sumatra, Java, and South Borneo, a variety which is distinguished by a much scantier and shorter tomentum on the stem and the petioles, and, at least in the Borneo specimens, almost glabrous leaves. It was called *S. begoniaefolia* v. *pilosula* by Triana (Trans. Linn. Soc. xxviii. 77). I call it *S. moluccana* v. *pilosula*. Very near to *S. moluccana* come: *S. beccariana*, Cogn., chiefly differing by narrower stronger leaves and distinctly pedicelled flowers and capsules; *S. velutina*, Cogn. with a softer and shorter tomentum; then *S. borneensis*, Cogn. and *S. hirtella*, Cogn. The latter two, of which I saw only *S. borneensis*, are evidently very closely allied, and I doubt very much whether they can be separated specifically. They approach at the same time also very closely to *S. beccariana*, and I should not be surprised if these four Sarawak species should prove in future to belong to one multifarious set of inextricable forms.

6. *S. parviflora*, Cogn. Sarawak.

Unknown to me. It has unequal but symmetrical leaves.

7. *S. heterophylla*, Jack. Sumatra, Java.
8. *S. tuberculifera*, Cogn. Sumatra.

The narrow-leaved Sonerilas of this group are represented in Sumatra and Java by a similar form, but with conspicuously sinuate-dentate leaves and very short axillary cymes which often are reduced to fascicles or clusters of two to five flowers. This is *S. heterophylla*, from which *S. tuberculifera* differs only by shorter and broader leaves. It is probably nothing but a state or variety of *S. heterophylla*.

9. *S. integrifolia*, Stapf. Perak.

Herba erecta. Caulis nigrescens, breviter et adpresse strigillosus. Folia valde inaequalia; majora subsessilia oblique

obovato-oblonga, breviter acuminata, basi brevissime cordata *marginè integerrimo*, 10–12 cm. longa, 3–5 cm. lata, supra glaberrima, infra in nervis adpresse setulosa, nervis secundariis duobus basilaribus in latere exteriori, uno subbasilari et uno altius orto in latere interiori, minora minima, decidua. Circini pedunculati axillares, strigillosi. Flores ignoti. Capsulae sessiles vel sub-sessiles, breviter turbinatae, bullato-tuberculatae, 5 mm. longae. Perak, C. Curtis (1302). Well characterised by its entire leaves.

10. *S. papuana*, Cogn. Western New Guinea. Only known to me from description.

All these specimens are closely allied and form a very natural group. But I find it very difficult to link them to any of the previous groups.

XII. Group of *S. magnifica* (Subgen. *Oxycentria*, Miq.). West Sumatra.

1. *S. magnifica*, Miq.

The only species, known from a description of Miquel. It is a very aberrant form, or perhaps no *Sonerila* at all. It has six anthers with an acute spur at the back, and a narrow paniced inflorescence with short contracted branches.

S. Helferi, C. B. Clarke. Tenasserim.

The specimen representing this species is in too imperfect a state to ascertain its natural position in the genus.

Two species which differ very remarkably were brought to the genus *Sonerila* by Oliver, although with some reluctance. Cogniaux referred them to his section, *Anomalae*, but they are no more *Sonerila* than, for instance, *Sarcopyramis* or *Phyllagathis*. They have *tetramerous* flowers and two whorls of inappendiculate stamens, the outer of which are longer and purplish. Both were found in Southern China in the province of Canton, *S. Fordii* on the Lo Fau Shan (at 930 m.) and *S. peperomiifolia*, above Ookaisa, near the summit of the Mausan Mountains, at 690 m. They are by no means closely allied, but belong, in my opinion, to two different new genera which occupy a position at *Sonerileae* similar to that of *Sarcopyramis* and *Phyllagathis*. I call them *Fordiophyton* and

Gymnagathis, and treat them in connexion with *Sarcopyramis* and *Phyllagathis*.

FORDIOPHYTON, Stapf.

Flores tetrameri. Calycis parce pilosuli tubus *obpyramidatus*, lobi 4 *decidui membranacei majusculi*. Petala ovata. Stamina 8, *inaequalia*; antherae dimorphae, exteriorum staminum *e basi biloba* longe lineares apice uniporosae, interiorum 3-7-plo breviores, ovato-oblongae, omnes inappendiculatae. Ovarium semiadnatum, 4-loculare, vertice exsculptum, marginibus membranaceis coronatum. Stylus filiformis, stigmatе incrassato. Capsula ignota.

Herbae erectae, habitu *Sarcopyramidis*, simplices, inflorescentiis exceptis glabrae carnosulae, caule tetragono. Folia petiolata, ovata, serrulata, 5-7 nervia. Flores majusculi, albidii vel rosei, bracteati, in cymis valde contractis primo capituliformibus, demum circinatim expansis, solitariis vel cymose vel subracemose aggregatis dispositi.

Distr.—South China.

1. *F. cantonense*, Stapf. (Syn. *Sonerila Fordii*, Oliv.; Cogn. Mel. 516.) Lo Fau Shan, prov. of Canton.

2. *F. Faberi*, Stapf. South West China.

Circa 3 dm. alta. Folia *oblonga*, unius paris subinaequalia, 8-12 cm. longa, 2-3 cm. lata, acuminata, *basi rotundata*, tenuiter serrulata, *venulis transversalibus vix conspicuis*, petiolo 1.5-4 cm. longo. Inflorescentiae terminales et in ramulis axillaribus dichasicae, ramis deinde in circinos excrescentibus. Calyx tenuiter membranaceus, tubo 10-12 mm. longo, lobis ovatis *acutis 4 mm. longis* roseis. Petala saturate rosea, 8-10 mm. longa. Stamina majora antheris 12 mm. longis *lobis basilaribus acutis*, minora antheris vix 4 mm. longis. Capsula ignota.

Mt. Omei, prov. of Sechuan, 1050 m., E. Faber.

The more important differences from *F. cantonense* are given in italics.

SARCOPYRAMIS, Wall.

This is a very well-marked genus, which approaches nearest to *Fordiophyton*. It is monotypic and so well defined that it never has been questioned.

1. *S. nepalensis*, Wall. Nepal, Sikkim (800—2700 m.); Khasia Mountains, Silhet, Manipur, Mishmi Hills.

GYMNAGATHIS, Stapf.

Flores tetrameri. Calycis glaberrimi *tubus turbinato-campulatus, dentes breves, late triangulares*. Petala ovata, obtusa, plerumque mucronulata. *Stamina* 8, *inaequalia*; antherae dimorphae, exteriorum staminum *e basi breviter decurrente* longe lineares, apice uniporosae, interiorum 3-plo breviores, lineari-oblongae, omnes inappendiculatae. Ovarium semiadnatum, 4-loculare, vertice exsculptum, margine membranaceo quadri-lobulato coronatum. Stylus filiformis, stigmate incrassato. Capsula brevis, obpyramidata, tenuiter 8-costata, laevis, valvulis late rotundatis dehiscens. Semina ignota.

Herba *acaulis*, rhizomate brevi crasso. Folia longe petiolata, *crassiuscula*, late ovata vel subcordata, integra, 7–9-nervia. Flores albi roseo-suffusi, majusculi, in cymis saepe ad florem unicum reductis longe pedunculatis solitariis vel subracemose aggregatis dispositi.

Distr. South China.

1. *G. peperomiifolia*, Stapf (Syn. *S. peperomiifolia*, Oliv.; Cogn. Melast. 516). Mausan Mountains, Prov. of Canton.

PHYLLAGATHIS, Blume.

Distr. From Tenasserim to Sumatra; China, Tonkin, Borneo.

A well-defined genus with tetramerous (rarely trimerous?) flowers, having two equal whorls of stamens and winged calyx-teeth; plurinerved leaves with very distinct transversal venation; and contracted capituliform or umbel-shaped cymes. Cogniaux says in his diagnosis of the genus, 'Folia opposita vel *terminali solitario*.' Their leaves are typically always opposite, but in *P. rotundifolia* one leaf of the uppermost pair is suppressed as a rule, leaving at its place only a small naked bud, or no trace at all. Then the leaf appears terminal, bearing the peduncle laterally at the base of its petiole, which seems to continue the axis.

1. *Ph. rotundifolia*, Bl. From Tenasserim to Sumatra.

2. *Ph. gymnantha*, Korth. South-east Borneo.

3. *Ph. tonkinensis*, Stapf (Syn. *S. tonkinensis*, Cogn. Mel. 1184). Tonkin.

This plant has all the characters of a true *Phyllagathis*, but for the calyx-teeth not being bristly. They have the characteristic dorsal wing though it is a little smaller than in the other species, and exactly the same anthers and similar capsules as *Ph. rotundifolia*.

There is very probably another *Phyllagathis* in South China. Unfortunately the specimen in the Kew Herbarium has only ripe capsules, no flowers. It has a short creeping stem with a rufous tomentum, long petioled almost orbicular-cordate leaves, and long peduncled umbel-shaped cymes. It seems to come near *Ph. tonkinensis*. It was collected by R. Swinhoe in the interior of the province of Fokien.

There is no doubt that *Ph. rotundifolia* is much more remote from *Ph. tonkinensis* and *Ph. gymnantha* than these are from each other, so that two groups can be distinguished within the genus, one in Sumatra and the Malayan Peninsula and the other in Borneo, Tonkin, and South China.

BRITTENIA, Cogn.

Distr. Sarawak.

I know this genus only from the description and a tracing of a leaf, which I owe to the kindness of M. Cogniaux. It exhibits evidently the habit of *Phyllagathis* which it resembles in the venation of the leaves, the inflorescence and the winged calyx-teeth. But the flowers are *penta-merous*; the ten stamens are equal, and the anthers have an appendix in front and a long spur at the back. The fruit is not known. But I suspect that a specimen with ripe capsules, sent by Dr. G. D. Haviland from Sarawak, should be referred to *Brittenia*. The leaves exhibit exactly the same venation as Cogniaux's tracing shows, and the capsules are 5-merous, arranged in an umbel-shaped cyme which is supported by a long peduncle. It is true G. D. Haviland states on the label 'stamens 8, blue.' Unfortunately he did

not send any flowers, and I suppose he had a flowering specimen of a *Phyllagathis* before him, when he wrote down these remarks. This error is the more probable as the specimen he sent very much resembles *Phyllagathis* in habit, and the capsules of that specimen are without exception pentamerous. Only in a few cases one valve is distinctly smaller, but not quite suppressed.

1. *B. subacaulis*, Cogn. Sarawak.

Before I try to draw any conclusions from the facts here stated it will be useful to summarise the main points. I think I cannot do it better than by means of a scheme, given at the end of this paper, which expresses in a concise way the arrangement which I think best represents the natural differentiation of the Asiatic Sonerileae. I do not pretend to give a table showing the descent of these genera and species. This would be far more than I can possibly prove. It is nothing more than a short transcription of the rather long exposition I have been compelled to give. If there result from it in the end any suggestions as to the phylogensis of the Sonerileae they will be the more valuable as they are derived solely from facts.

In order to simplify the scheme I have divided it into two parts. One part shows the arrangement of the species of *Sonerila*, the other of the remainder of the Asiatic Sonerileae. The species are arranged within the groups so as to indicate roughly their greater or lesser affinity. Double lines mean that the species thus connected form probably one uninterrupted series of forms: single lines, that the affinity is very close although there is a distinct gap between them: whilst the names of species which occupy a more isolated position are not linked at all. Thus the attention of botanists who intend to study the subject further, and particularly of those who are in a position to pursue it on the spot, will be drawn immediately to the more critical and questionable species. The lines connecting the groups show in a similar way the degree of affinity and the direction in which they approach

each other most. Where the mutual approximation is doubtful the line is stippled.

The more important facts which we may grasp from this scheme may be stated thus:

1. The species of *Sonerila* group round eleven types. The number at present known is 61, of which 10, however, are in so close a relationship to other species that it is very probable that they will be reduced, with further material.

2. The species belonging to one group are closely or very closely allied, or they assume a comparatively isolated position: but their affinity to at least one of the other species of the group is greater than towards any species of any other group.

3. The species of one group cannot be arranged as a rule in a linear series, but they are linked variously to each other.

4. One or several species of one group show a closer affinity to another group, whilst the remainder diverge more or less from this line of connection, thus forming the blind terminations of the ramification of the group.

5. The groups are connected to each other in an analogous way.

6. The groups of *S. linearis*, *squarrosa*, *scapigera*, and *maculata* converge towards a line which is occupied by the groups of *S. zeylanica*, *tenuifolia*, *Gardneri*, *versicolor*, and *speciosa*.

7. The groups of *S. obliqua* and *S. moluccana* approach each other more than any other group, but they hold an isolated position within the genus.

8. Within the groups of the *zeylanica-speciosa* line we find a species in which both whorls of stamens are developed, *S. Bensonii*; and the same is the case in the two or three species of the *obliqua*-group to which *S. moluccana* and its allied are linked.

9. In all other *Sonerileae* besides *Sonerila*, both staminal whorls are developed.

From these facts we may, without losing ourselves in too uncertain speculations, draw a few conclusions with regard to the phylogenesis of these *Sonerileae*.

1. Thus the 3-staminal *Sonerileae* appear as the reduced offspring of forms with two penta-, tetra- and trimerous staminal whorls. *Brittenia*, *Phyllagathis*, *Gymnagathis*, *Fordiophyton*, and *Sarcopyramis* are still at this earlier stage of evolution. In *Sonerila* it is preserved only in *S. Bensonii* and in the species of the *obliqua*-group.

2. The *Sonerilas* belong to two different lines of descent which have diverged from a common stock probably in very remote times. One line may be traced back to an origin which is indicated at present by *S. Bensonii*, or the *speciosa*-group; the other may be supposed to have started from a type near to or identical with the *obliqua*-group.

3. Therefore the subgeneric name *Genuinae*, should be applied to the first set; *Sonerilopsis* to the rest, viz. the groups of *S. obliqua* and *S. moluccana*. Of these two, *Sonerilopsis* is decidedly nearer to the old type, which is represented by the genera *Brittenia*, *Phyllagathis*, *Gymnagathis*, *Sarcopyramis* and *Fordiophyton*, with which it has the characteristic nervation of the leaves in common.

These deductions are supported in a very remarkable way by the geographical distribution of the Asiatic *Sonerileae*. The list at the end of this paper shows this more clearly. In this list Nos. 1–49 comprise the *Sonerila* § *Genuinae*, 50–71 the *Sonerila* § *Sonerilopsis* and the remaining genera. Out of the 49 *Genuinae*, twenty-three are found in Ceylon and the Western Ghats, and only ten in the Malayan Archipelago and the Malayan Peninsula, and these belong [all but three] to the *tenuifolia*-group, which is so closely allied to the western *zeylanica*-group, and one is *S. zeylanica* itself.

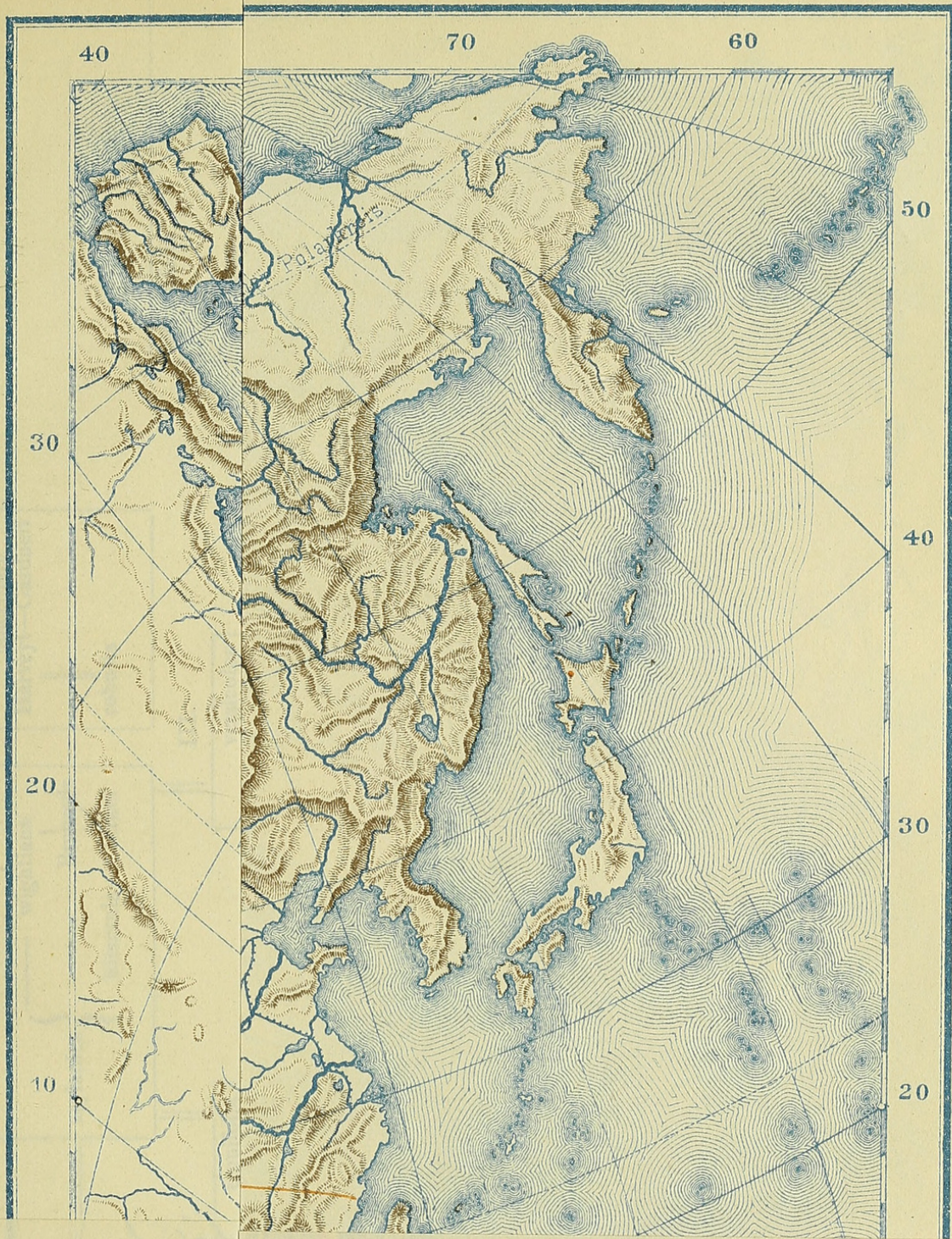
The groups of *S. linearis* and of *S. scapigera* are also represented by a few species in Ceylon and the Western Ghats, whilst that of *S. maculata* approaches, partly at least, *S. pilosula*, again a Ceylon species. On the other hand

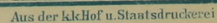
there are no close relations between these groups and § *Sonerilopsis*.

Not a single species of the subgenus *Sonerilopsis*, or of the genera *Brittenia*, *Phyllagathis*, *Gymnagathis*, *Sarcopyramis*, and *Fordiophyton*, is found in the Western Peninsula or in Ceylon. *Sarcopyramis* and *Fordiophyton* almost meet in South-West China, and we may look there for their centre of evolution, whilst *Gymnagathis* and *Phyllagathis* meet in South-East China, and *Phyllagathis*, *Brittenia* and § *Sonerilopsis* in the Malayan Archipelago. Probably they sprang from the old continent in which China and Malaya joined each other, a connection which is indicated likewise by numerous zoo- and phyto-geographical and even geological facts. In an analogous way we may assume a centre of evolution for the § *Genuinae* either in Ceylon and the Southern Ghats, or in a hypothetical connection of land which probably has existed between this part of India and Malaya. But this centre is evidently much younger and must probably also be traced back in the last instance to this Sino-malayan continent.

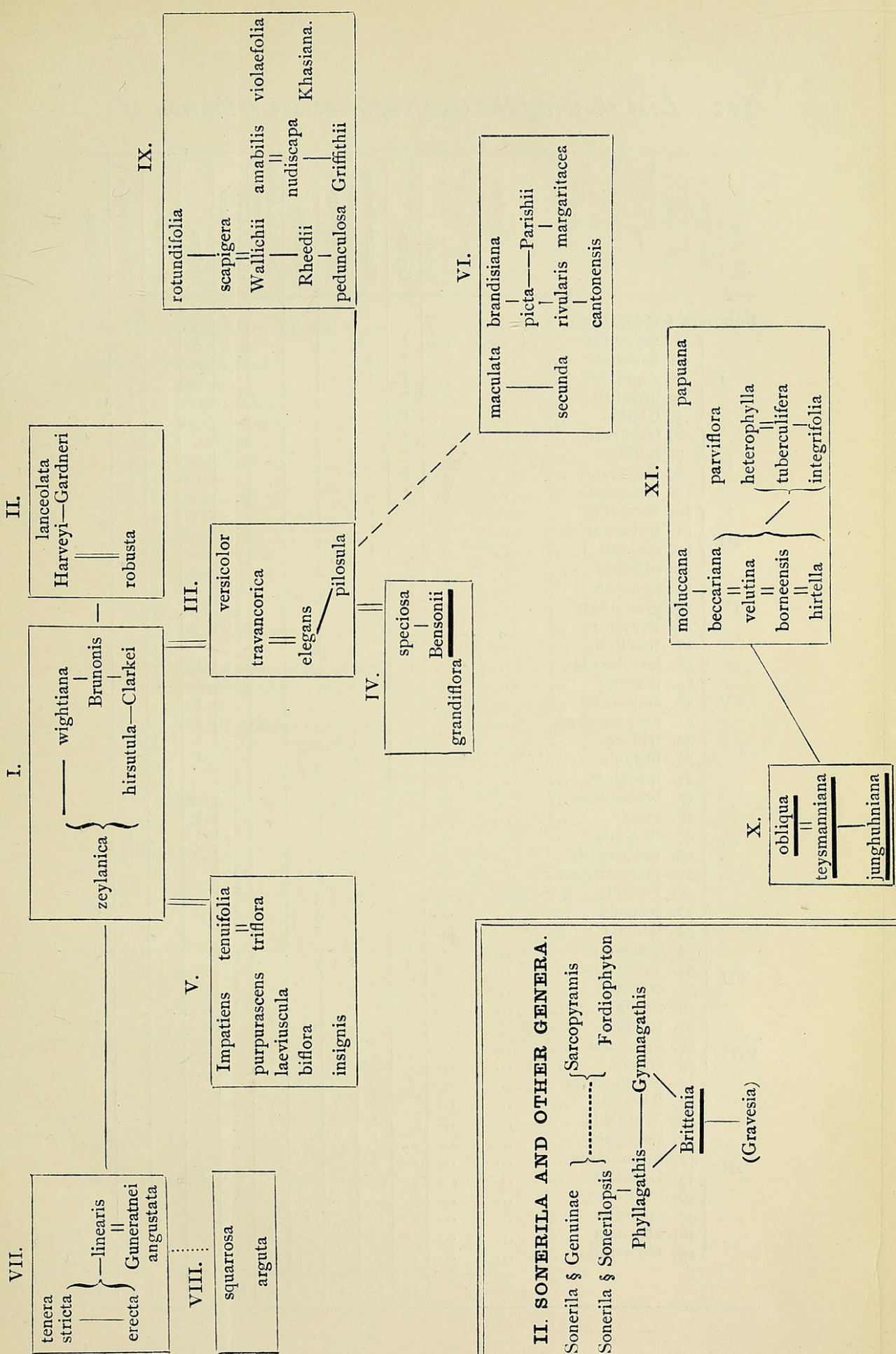
It is not my intention to take into consideration the relations which exist between the Asian and the African Sonerileae. But I must point to the very significant fact that the only connection which exists between them lies through Madagascar, and that the Asian Sonerilas are linked to the African ones by way of their oldest and least reduced type—the pentamerous *Brittenia*,—which is linked closely to the likewise pentamerous *Gravesia* of Madagascar.

Thus the Asiatic Sonerilas may be finally regarded as true Sino-malayan types, and as a typical instance with which the distribution of numerous larger or smaller groups of plants of similar origin may be paralleled.

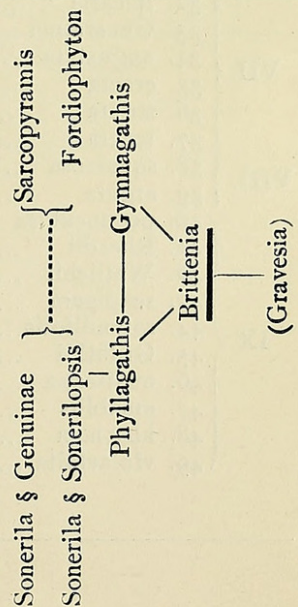




I. SONERILA.



II. SONERILA AND OTHER GENERA.



322 *List showing the Geographical Distribution of*

					Ceylon.	Western Penins.	Chota Nagpore.	Himalaya.	Khasia to Assam and Burmah.	Moulmein to Tenasserim.	Malaya.	New Guinea.	China, Tonkin.	Philippines.
Sonerila § Genuinae.														
I.	{	1. zeylanica	...	...	I						I			
		2. Brunonis	...	...	I	I								
		3. wightiana	...	...	I	I								
		4. hirsutula	...	...	I									
		5. Clarkei	...	...	I									
II.	{	6. Gardneri	...	...	I									
		7. robusta	...	...	I									
		8. Harveyi	...	...	I									
III.	{	9. lanceolata	...	...	I									
		10. versicolor	...	...		I								
		11. travancorica	...	...		I								
		12. elegans	...	...		I								
IV.	{	13. pilosula	...	...	I									
		14. speciosa	...	...		I								
		15. grandiflora	...	...		I								
V.	{	16. Bensonii	...	...		I								
		17. tenuifolia	...	...								I		
		18. laeviuscula	...	...								I		
		19. biflora	...	...								I		
		20. Impatiens	...	...								I		
		21. purpurascens	...	...								I		
		22. triflora	...	...								I		
VI.	{	23. insignis	...	...							I			
		24. maculata	...	...				I	I					
		25. brandisiana	...	...						I				
		26. picta	...	...						I	I			
		27. rivularis	...	...									I	
		28. cantonensis	...	...									I	
		29. margaritacea	...	...						I				
		30. Parishii	...	...						I	I			
		31. secunda	...	...						I	I			
		32. linearis	...	...						I				
VII.	{	33. Guneratnei	...	...	I									
		34. angustata	...	...	I									
		35. erecta	...	...						I				
		36. stricta	...	...						I				
VIII.	{	37. tenera	...	...			I	I	I				I	I
		38. squarrosa	...	...					I					
		39. arguta	...	...					I					
		40. pedunculosa	...	...	I									
		41. Rheedii	...	...		I								
IX.	{	42. Wallichii	...	...		I								
		43. scapigera	...	...		I								
		44. rotundifolia	...	...		I								
		45. Griffithii	...	...								I		
		46. nudiscapa	...	...							I			
		47. amabilis	...	...				I						
		48. khasiana	...	...					I					
		49. violaeifolia	...	...						I				
					13	12	1	3	5	10	10	-	3	1

				Ceylon.	Western Penins.	Chota Nagpore.	Himalaya.	Khasia to Assam and Burmah.	Moulmein to Tenasserim.	Malaya.	New Guinea.	China Tonkin.	Philippines.
Sonerila § Genuinae. Total ...				13	12	1	3	5	10	10	—	3	1
Sonerila § Sonerilopsis.				23									
X.	{	50. obliqua ...	...							1			
		51. teysmanniana ...	...							1			
		52. junghuhniana ...	...							1			
		53. moluccana ...	...							1			
		54. beccariana ...	...							1			
XI.	{	55. velutina ...	...							1			
		56. borneensis ...	...							1			
		57. hirtella ...	...							1			
		58. parviflora ...	...							1			
		59. heterophylla ...	...							1			
		60. tuberculifera ...	...							1			
		61. integrifolia ...	...							1			
		62. papuana ...	...								1		
		63. <i>Fordiophyton</i> cantonense										1	
		64. „ <i>Faberi</i> ...					1	1				1	
		65. <i>Sarcopyramis</i> nepalensis .											
		66. <i>Gymnagathis</i> peperomii- folia ...	...									1	
		67. <i>Phyllagathis</i> rotundifolia .							1	1			
		68. „ <i>gymnantha</i> .								1		1	
		69. „ <i>tonkinensis</i> .										1	
		70. „ <i>sp.</i>							1			
		71. <i>Brittenia</i> subacaulis ...											
				—	—	—	1	1	1	15	1	5	—
				13	12	1	4	6	11	25	1	8	1
				23									



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