FLORAE MALESIANAE PRECURSORES XXXIV
NOTES ON SOME GENERA OF CELASTRACEAE IN MALAYSIA

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There is a great diversity of opinion regarding the interpretation of the genera and some species in the former *Hippocrateaceae*. If one reads the comprehensive and detailed revision of the New World *Hippocrateaceae* by A. C. Smith (Brittonia 3, 1940, 341—555), one may have an impression of it. For example, A. C. Smith in his monotypic genus *Hemiangium*, under *H. excelsum*, has united species which were recognized as belonging to three different genera by Miers; he has also limited *Hippocratea* L. to a single species, *H. volubilis* L., and placed more than 40 names of species and varieties in the synonymy of it.

A detailed review of the history and generic delimitation of the family *Hippocrateaceae* has already ably been summarized and discussed by A. C. Smith in the above mentioned publication. I shall make only a brief account of those works which contain genera, species, or discussions related to the Malaysian flora.

I am in favour of the principle employed by A. C. Smith (l.c.) as to the treatment of the genus *Salacia* L. He divided this genus into nine species-groups, some of which, according to him, are very distinct and could conveniently be treated as genera, but such genera would not be based on fundamental characters.

In the genus *Hippocratea* in the large sense, *i.e.* all the species with capsular fruits divergently separating into three follicle-like parts, there are two distinct groups which will be treated in the Flora Malesiana as *Loeseneriella* A. C. Sm. and *Reissantia* N. Hallé respectively. In the group bearing drupaceous fruits, the genus *Salacicratea* Loes. will be reduced to *Salacia* L. As for the Malaysian species of *Salacia*, I cannot divide them into satisfactory, coherent, subgeneric groups.

As compared with the delimitation of some other genera, e.g. *Euonymus* and *Maytenus*, the generic limits in the former *Hippocrateaceae* accepted in the recent revisions and floras, are rather narrow. With more material available and when the African groups will be revised, the accumulation of new information about pollen grains, wood structure, seed germination *etc.* may help us to gain a better understanding of the generic limits in this family as a whole.

THE HIPPOCRATEA-GROUP

According to A. C. Smith (l.c.), *Hippocratea* L. is a monotypic genus occurring only in the American tropics; its diagnostic characters are: 1) petals transversely barbellate within, 2) disk annular-pulvinate, cylindric or truncate-conical, puberulent, 3) anthers dehiscing by horizontal clefts, and 4) the inflorescences often with short branchlets arising from the dichotomies. A. C. Smith has also emended the New World genus *Pristimera* Miers; it is characterized by small flowers and an inconspicuous disk.

In 1941, while working on the Old World *Hippocrateaceae*, A. C. Smith (Amer.

J. Bot. 28. pp. 438—443) established the genus *Loeseneriella* to include some of the former *Hippocratea* species in that area. The new genus is characterized by: 1) inflorescences dichotomously branched throughout and free of supplementary branchlets in the dichotomies, 2) petals glabrous or pilose on the upper half within, and 3) disk glabrous or distally strigose. The Malaysian *Hippocratea macrantha* Korth. was selected as the type species. At the same time the generic name *Pristimera* Miers was applied to the Old World flora and the species *Hippocratea indica* Willd. transferred to it. In 1945, in his "Notes on Hippocrateaceae in southeastern Asia" (J. Arn. Arb. 26, 169—179) seven species were added to *Loeseneriella* and four to *Pristimera*.

In 1958, N. Hallé (Bull. Mus. Hist. Nat. Paris 30, pp. 464—471), while engaged in a monographical study of the western African representatives of *Hippocrateaceae*, described two new genera, one of them being *Reissantia*. He then transferred *Hippocratea indica* Willd. to *Reissantia*. Unfortunately he did not cite the basionym and the original literature; hence, according to the Code (1961) Art. 33, the combination was not validly published until in a later publication of 1962 as indicated below. The result of his study was first published in mimeograph-form in 1958 and then in 1962 in Mém. Inst. Fr. Afr. Noire *n.* 64, pp. 1—245. N. Hallé has also used the characters of pollen grains, seed germination, and wood structure for generic delimitation.

R. Wilczek (Fl. Congo Belg. et Ruanda-Urundi 9, 1960, 133—232) and N. Hallé (l.c., in 1962) have retained two African species in *Hippocratea* and applied the generic name *Loeseneriella* A. C. Sm. also to the African flora. Since R. Wilczek and N. Hallé have almost the same concept regarding the generic delimitation of the *Hippocrateaceae*, I shall, for convenience, quote chiefly the work of N. Hallé in the following discussion.

N. Hallé (l.c., in 1962) redefined the genus *Hippocratea*, which is, according to him, characterized by: 1) pollen grains composed of 4 tetrads, 2) caoutchouc (rubber) present, and 3) cymes with supplementary branchlets in the dichotomy. The conspicuous character of pollen grains has not been found in any of the Malaysian species, so there is no *Hippocratea* (*sensu* N. Hallé) in Malaysia.

The genus *Loeseneriella* has also been emended by N. Hallé (l.c., in 1962). He stated that its important characters are: 1) wood with anomalous structure of the deeply lobed type, 2) petals not cucullate in bud, subfleshy or fleshy, subvalvate or valvate, 3) plants without caoutchouc, 4) pollen simple, 5) seed with cotyledons united, and 6) hypogeal germination. He erroneously indicated *Loeseneriella africana* (Willd.) R. Wilczek as the type species. There are four species in Malaysia belonging here:

1. **Loeseneriella macrantha** (Korth.) A. C. Sm., the type species.

2. **Loeseneriella sogerensis** (Bak. *f.*) A. C. Sm.

3. **Loeseneriella pauciflora** (DC.) A. C. Sm.

4. **Loeseneriella cumingii** (Laws.) Ding Hou, *comb. nov.* — *Hippocratea cumingii* Laws. in Hook. *f.* Fl. Brit. Ind. 1 (1875) 624.

N. Hallé stated (l.c., in 1962) that his genus *Reissantia*, restricted to the Old World, is homogeneous and should not be confused with the genus *Pristimera* Miers as interpreted by A. C. Smith in 1941. He said that the American species of *Pristimera* always have more than two ovules in each cell and the inflorescences without supplementary branches. In addition to the characters mentioned by him, I have observed that in the seeds of a few American species of *Pristimera* available, the cotyledons are united. There

are four species in Malaysia, which are more closely allied to the African *Reissantia* than to the American *Pristimera* because of the inflorescences with supplementary branchlets and the separate cotyledons, although in three of the four species there are 4—8 ovules (not constantly 2) in each cell.

1. **Reissantia indica** (Willd.) N. Hallé.

2. **Reissantia cassinoides** (DC.) Ding Hou, *comb. nov.* — *Hippocratea? cassinoides* DC. Prodr. 1 (1824) 569.

3. **Reissantia ferruginea** (King) Ding Hou, *comb. nov.* — *Hippocratea ferruginea* King, J. As. Soc. Beng. 65, ii (1896) 357.

4. **Reissantia grahamii** (Wight) Ding Hou, *comb. nov.* — *Hippocratea grahamii* Wight, Ill. Ind. Bot. (1839) 134; Icon. Pl. Ind. Or. 2 (1840) t. 380.

SALACICRATEA AND SALACIA

All the Malaysian species of the former *Hippocrateaceae* with drupaceous fruits were referred to the genus *Salacia* L., until 1910 when Loesener (Nova Guinea 8, p. 281) described a new genus, *Salacicratea*, with one species, *S. papuana*, from New Guinea.

According to Loesener (l.c.), *Salacicratea* has cymose inflorescences like *Hippocratea*, but globose indehiscent fruits and seeds with massive cotyledons similar to those of *Salacia*. Loesener stated that the calyptra-like calyx, which transversely and irregularly splits near the base, is characteristic of *Salacicratea* and quite different from the deeply 5-lobed calyces in *Salacia* and *Hippocratea*. Since then a few species of *Salacia* have been transferred to *Salacicratea* and several new ones added. Up till now, eleven species have been published and most of them occur in Malaysia.

A. C. Smith (Amer. J. Bot. 28, 1941, 44) pointed out that in addition to the calyptra-like calyx, in *Salacicratea* "the anther locules dehisce by distinct vertical clefts, a character of rare occurrence in the family". He also stated that "the generic status of the group is beyond reasonable question".

I have examined the available material of both *Salacia* and *Salacicratea* for the characters which have been used, and such which might possibly be helpful for generic interpretation and delimitation. The calyptra-like calyx of *Salacicratea* is actually lobed or open at the apex; the lobes or opening can be observed especially on a longitudinal section of the calyx under the binocular. The vertically dehiscent anthers are also found in several *Salacia* species, e.g. in *S. oblongifolia* Bl. and *S. leucoclada* Ridl.; the transversely dehiscent ones occur in *Salacicratea* as well, e.g. in *S. diandra* (Miq.) A. C. Sm.

Moreover, there are two other interesting Malaysian species transitional in a way between *Salacia* and *Salacicratea*. In *Salacia wenzelii* Merr. the young flower-buds are similar to those of *Salacicratea*. The fascicled flowers are borne sometimes on the very short densely bracteolate brachyblasts or peduncles, as is usually the case in *Salacia*, and the anthers are transversely dehiscent. In *Salacia diandra* forma *lanceolata* Miq. the calyx entirely envelops the other floral parts when young, just like in *Salacicratea*. The apex of the calyx is irregularly 3—5-lobed. Gradually the floral parts protrude from the calyx; meanwhile the calyx splits irregularly longitudinally and remains attached at the base of the flower. At first glance, the calyces of the mature flowers are quite similar to those of *Salacia*. Judging from the 2—4-branched cymes, the calyx at young stage, and the slightly obliquely dehiscing anthers, this species could be placed in *Salacicratea*, but not so for the structure of the calyx.

Furthermore, there is an Australian species, *Salacicratea disepala* C. T. White. It is a typical *Salacicratea* species except for the initially calyptriform calyx which later splits longitudinally into two equal, orbicular, persistent lobes. White (Proc. R. Soc. Queensl. 55, 1944, 62) stated that this species is extremely interesting as it provides a connection between *Salacia* and *Salacicratea*. The type specimen is *Blake 15188* from Queensland. I first saw a duplicate of it in the Kew Herbarium. Recently I have the holotype and another specimen (*N. Michael s.n.*), also from Queensland, cited the original description, kindly on loan from Brisbane. The two-lobed calyx is characteristic and constant in the specimens examined.

Loesener (in E. & P. Pfl.Fam. ed. 2, 20b, 1942, 226) was aware of the difficulty to find a sharp distinction between the two genera when he stated that, according to the habit and structure of the inflorescence, *Salacia korthalsiana* Miq. is a transition to the genus *Salacicratea*. If he had examined the Malaysian species known to us today, he might not have described the new genus *Salacicratea* at all.

For the reasons mentioned above and because of the general similarity of the species of those two genera, I have concluded that it is impossible to maintain *Salacicratea* Loes. as distinct from *Salacia* L.

Dr N. K. B. Robson of the British Museum (Nat. Hist.) and I have examined the type specimen of *Salacia chinensis* L., the type species of the genus *Salacia*, in the Linnean Herbarium, London, and have confirmed that it is a true *Salacia*. We will publish a joint paper to discuss this in detail.

There are 29 species of *Salacia* occurring in Malaysia; among them, there are three new species; furthermore four new combinations and one new name appear necessary.

Salacia intermedia Ding Hou, *stat. et nom. nov.* — *Salacia diandra* Miq. forma *lanceolata* Miq. Ann. Mus. Bot. Lugd.-Bat. 4 (1869) 151, *non Salacia lanceolata* T. & B., 1863.

Salacia kraemeri (Loes.) Ding Hou, *comb. nov.* — *Salacia diandra* Miq. Ann. Mus. Bot. Lugd.-Bat. 4 (1869) 151, *non* Thwaites 1858. — *Salacicratea kraemeri* Loes. Bot. Jahrb. 63 (1930) 275.

Salacia ledermannii (Loes. *ex* Harms) Ding Hou, *comb. nov.* — *Salacicratea ledermannii* Loes. [in E. & P. Pfl.Fam. ed. 2, 20b (1942) 216.] *ex* Harms, Notizbl. Berl.-Dahl. 15 (1942) 676.

Salacia papuana (Loes.) Ding Hou, *comb. nov.* — *Salacicratea papuana* Loes. Nova Guinea 8 (1910) 281, t. 65.

Salacia venosa Ding Hou, *nom. nov.* — *Hiptage lawsonii* Elmer, Leafl. Philip. Bot. 8 (1915) 2751, *non Salacia lawsoni* King, 1896.

Salacia longipedicellata Ding Hou, *sp. nov.*

Frutex scandens, ramulis teretibus. Folia chartacea vel subcoriacea, elliptico-oblonga, 15—24 × 6—10 cm, subintegra vel subcrenulata, basi cuneata vel obtusa, apice acuminata, nervis 6—9 paribus; petioli 8—10 mm longi. Flores virides, axillares, fasciculati, pedicellis 1⅛—2 cm longis. Calycis lobi suborbiculares, 2—2¼ mm longi, leviter erosuli. Petala subcoriacea, suborbicularia vel late obovata, undulata, 4—6 × 4—6 mm. Discus carnosus complanatus suborbicularis, 3½—4½ mm diam. Stamina 3, c. 2 mm longa. Ovarium triloculare, loculis 2-ovulatis.

BORNEO. W. Kutai, hilly conutry forest, climber, flowers green, alt. 150 m, November 10, 1925, *F. H. Endert 4743 (type* L; *isotypes* BO, K); Sepilok Forest Reserve, 15 miles W of Sandakan, *c.* 10 m alt., May 1, 1955, *G. H. S. Wood & C. Charington SAN 15491* (BO, KEP, L, SING).

The two collections cited above are very well preserved and homogeneous. The species is quite closely allied to *Salacia grandiflora* Kurz and *S. castaneifolia* Ridl. in having rather large, fascicled flowers, fleshy, flat disks and two ovules in each cell. It can be distinguished from *S. grandiflora* by the longer pedicels, the suborbicular petals with the basal parts contracted and not overlapping one another when spreading in anthesis, and by the disk with its marginal part almost as thick as the disk proper and sometimes slightly bending downward. It differs from *S. castaneifolia* by the terete branchlets, more or less entire or slightly crenulate leaves, longer pedicels, and larger flowers.

Salacia blepharophora Ding Hou, *sp. nov.*

Frutex scandens, ramulis verrucosis. Folia subcoriacea, elliptica vel elliptico-oblonga, rarissime obovato-oblonga, subintegra, 4—13 × 2—5 cm, basi cuneata, apice obtusa, acuta, vel breviter acuminata, nervis 4—8 paribus; petioli 5—7 mm longi. Inflorescentiae paniculato-cymosae, axillares, 1—2 cm longae, parviflorae, sessiles vel pedunculo 3 mm longo; pedicelli c. ½ mm longi. Calycis lobi triangulares, acuti, ½—¾ mm longi. Colleterae fimbriatae, basin versus in bracteas et calyces intus insertae. Petala late oblonga, rarissime late elliptica, integra vel leviter erosula, 2—2⅔ × 1½—1⅔ mm, obtusa. Discus carnosus, complanatus, annulatus, c. 2 mm diam. Stamina 3, c. ½ mm longa. Ovarium triloculare, loculis 2-ovulatis.

CELEBES. Central part: Matana Lake, low liana, in thicket along the lake, alt. 400 m, November 18, 1929, *G. Kjellberg 2810 (type* BO).

The present species is closely allied to *S. cymosa* Elmer of Palawan and *S. subalternifolia* Merr. & Perry of New Guinea in the verricose branchlets, paniculate-cymose inflorescences, and fleshy, flat, round disk. It is characterized by the acute calyx lobes separated from each other at least in open flowers, and by the fimbriate colleters attached on the inner side and protruding from the margins. The specific epithet refers to these conspicuous colleters.

Salacia marginata Ding Hou, *sp. nov.*

Frutex scandens. Folia coriacea, ovata, ovato- vel elliptico-oblonga, raro obovato-oblonga, 9—19 × 5—8½ cm, integra, basi obtusa vel cuneata, apice acuta, nervis 6—9 paribus; petioli 1¼—2 cm longi. Flores virides, axillares, fasciculati, pedicellis 2½—4 mm longis. Calycis lobi triangulares, 2—3 mm longi, rotundati, breviter fimbriati. Petala subcoriacea, oblonga vel oblongo-elliptica, 6 × 4 mm, obtusa, margine scariosa subflava. Discus magnus carnosus complanatus, c. 5 mm diam., 5-lobatus. Stamina 3, c. 2 mm longa. Ovarium triloculare, loculis 4—5-ovulatis.

PHILIPPINES. Palawan: Victoria Mt, Panacan, vine 5 m high, rocky slope near bank of Karaniogan river, alt. 100 m, May 13, 1950, *M. D. Sulit PNH 12370 (type* L; *isotype* A), Bacuñgan, Puerto Princesa, along river in forest, sea level, March 24, 1947, *G. E. Edaño PHN 173* (A, L).

This species is very closely related to *S. cymosa* Elmer differing from it by the fascicled, larger flowers, triangular calyx lobes, ± oblong petals with a prominent yellowish margin, and the disk without a rim-like margin. It is also closely allied to *S. castaneifolia*

Ridl., but can be easily distinguished from it by terete branchlets, entire leaves, larger flowers, and ± oblong or oblong-elliptic petals.

The Australian *Salacicratea disepala* C. T. White has also to be placed in *Salacia:* **Salacia disepala** (C. T. White) Ding Hou, *comb. nov.* (basionym: *Salacicratea disepala* C. T. White, Proc. R. Soc. Queensl. 55, 1944, 61).

TAXONOMIC STATUS OF THE GENUS SIPHONODON

There is no unanimous opinion regarding the position of the genus *Siphonodon* since Griffith (Calc. J. Nat. Hist. 4, 1844, 246—256, t. 14) published it. In his opinion, it appears to agree sufficiently well in character with *Ilicineae* [= *Aquifoliaceae*], and to have many points in common with *Celastraceae*, with which it agrees entirely in habit. He observed a tube terminating in five small teeth surrounding the central column of the pistil. The generic name is composed of "siphon" = tube and "odous" = dent or tooth. In the specific description, he considered the style as "canaliformis" with its apex dilated and 5-toothed, the central column as stigma, and the ovary many-celled and each cell 1-ovuled.

In 1859, Hooker *f.* (Trans. Linn. Soc. Lond. 22, 133—139, t. 26) made a detailed, morphological study of the ovary especially with reference to the subject of its placentation. He stated that the ovary may be regarded as consisting of a whorl of five connate carpels adnate to a central fleshy axis or torus; the torus or central column, being produced into a styliform body with a capitate or stigma-like head, is covered with a cuticle as are the adjacent walls and external surface of the annulus. Each carpel bears two ovules on each of the ten marginal placentae, making twenty ovules in all. The five teeth, each double, are the stigmata, formed by the terminations of the confluent placental margins of the adjacent carpels. He expressed that the structure as described by him suggests a different view of the affinities than those which had doubtfully been adopted by Griffith; but in the absence of ripe seeds, he did not offer a positive alternative. Later Hooker *f.* (in Bentham and Hooker *f.* Gen. Pl. 1, 1860, 370) placed *Siphonodon* at the end of Tribe *Hippocrateae* as an anomalous genus.

Loesener (in E. & P. Pfl.Fam. 3, 5, 1892, 222) treated *Siphonodon* as an anomalous genus of the *Celastraceae*. Pierre (For. Fl. Cochinch. 19, 1893, *sub* t. 312A, in text), basing himself on anatomical characters of the leaves, thought this genus appeared well as a member of the *Celastraceae* subfamily *Celastroideae*.

Since then this genus has been placed either in *Hippocrateaceae* or *Celastraceae*, or excluded from both and raised to the rank of an independent family, depending on the interpretation of the floral characters, but not much work has been done regarding the floral morphology. I am not going to review all the different opinions suggested by botanists as to the interpretation of the central column, style, and stigmata. I shall only make a short account of the views expressed by botanists concerning the taxonomic status.

Lecomte (Bull. Mus. Hist. Nat. Paris, 32, 1926, 95) described a new genus, *Capusia*, in *Ochnaceae;* he interpreted the central column in the flower of his genus as a gynobasic style; this new genus has subsequently rightly been reduced to *Siphonodon* by Merrill (J. Arn. Arb. 21, 1940, 21) and Gagnepain (Bull. Soc. Bot. Fr. 8, 1940, 268—272) respectively. Gagnepain (l.c.) suggested that it probably may constitute a new family because of an apical cavity in the pistil.

In 1947, Croizat (Lilloa 13, 1947, 41 & 43) proposed a new subfamily, *Siphonodonoideae*,

in the *Celastraceae;* according to him, this subfamily is characterized by the central column being sterile and the functional carpels surrounding it.

In 1951, Gagnepain and Tardieu (Not. Syst. 14, 102) proposed a new family, *Siphonodontaceae*. Erdtmann (Bot. Notis. 1954, 78) stated that the morphological characters of the pollen support the establishment of the new family (cf. also Erdtmann, Pollen Morph. & Taxon. Angiosperm. 1952, p. 105, fig. 52B & p. 409).

Later Hutchinson (Fam. Fl. Pl. ed. 2, 1, 1960, 325—326, fig. 186) also treated *Siphonodon* as a distinct family, closely related to *Hippocrateaceae*, still within the *Celastrales*. In adopting the name *Capusiaceae* for the new family, he may have overlooked the publication of Gagnepain and Tardieu mentioned above.

Dr D. R. Metcalfe of the Jodrell Laboratory, Kew, in a letter addressed to Dr van Steenis on March 13, 1961, expressed that the wood structure is not very helpful in determining the correct taxonomic status of *Siphonodon;* he examined the wood of two *Siphonodon* species and they both differ to a certain extent from most of the *Celastraceae* in their slide collection. He said: "This at first sight might be taken to indicate that *Siphonodon* should be excluded from the family. The difficulty arises, however, that the wood structure of the family as a whole is rather heterogeneous, and, if *Siphonodon* is to be excluded certain other genera such as *Microtropis*, *Kurrimia* [= *Bhesa*], and *Tripterygium* could with equal justice be excluded as well". He stated that on the whole to treat it as a subfamily of the *Celastraceae* as was done by Croizat seems to be a reasonable way of dealing with the problem.

On a request of Dr van Steenis concerning the taxonomic affinities of *Siphonodon*, Dr H. E. Dadswell, C.S.I.R.O., South Melbourne, Australia, made a critical examination of some twenty-one genera of *Celastraceae*. The result of it has been incorporated in a stencilled paper prepared for the Wood Anatomy and Taxonomy Symposium of the Tenth Pan Pacific Congress (cf. H. D. Ingle & H. E. Dadswell, The anatomy of the secondary xylom of south west Pacific tree species as an aid to their taxonomy, 1961, pp. 6—8 & 10). They stated: "the genus *Siphonodon* is matched in structure only by *Schaefferia* of Mexico and Central America, in lacking parenchyma and possessing septate fibres in place of fibre tracheids, a structure paralleled more closely by genera of the *Flacourtiaceae* than by any other genus of the *Celastraceae*". According to them, "If, however, morphological differences exist between *Siphonodon* and the *Flacourtiaceae*, it would seem that a separate family for this interesting genus, where it would not be lost sight of, would serve best the interests of future taxonomists".

From what has been recorded above, it is quite clear that there is no agreement concerning the taxonomic position or status of *Siphonodon*. The chief difficulty lies in the interpretation of the floral structure, especially of the central column, style, and stigmata. A study of the floral morphology is urgently needed in order to know the proper taxonomic position of the genus. Whatever its position will be, whether it will be included in the *Celastraceae*, or elevated to family rank, its relationship to *Celastraceae (sensu lat.)* cannot be denied.

In having an apical hollow, *Siphonodon* matches only *Brassiantha* A. C. Smith of the former *Hippocrateaceae*. From the habit and the external morphological characters, specimens of *Siphonodon* can easily be referred to *Celastraceae*. Since the family *Hippocrateaceae* is incorporated in *Celastraceae* in the Flora Malesiana, the genus *Siphonodon* is tentatively also treated as a member of the latter family.

There are about seven species distributed from south-eastern Asia through Malaysia to Australia. In Malaysia, in addition to the commonly known species, *Siphonodon celastrineus* Griff., there is a new species found in New Guinea as described below.

Siphonodon peltatus Ding Hou, *sp. nov.*

A *S. celastrineo* Griff., cui affinis, calycis lobis magnis circiter 4 mm diam., petalis valde majoribus, staminibus plus minusve liberis, columna centrali apice peltata differt.

NEW GUINEA. Lala river, tree *c.* 27 m tall, in forest, alt. *c.* 1650 m, December 20, 1935, *C. E. Carr 13908 (type* L; *isotypes* BM, K, SING).

This new species is characterized by calyx lobes larger than the petals, stamens usually ± free, and by the central column terminating in a peltate apex which covers the tips of the anthers. So far I have not seen any fruiting specimen of it.