FLORAE MALESIANAE PRECURSORES VIII.
THE GENUS CNESTIS (CONNARACEAE) IN INDO-MALAYSIA

by

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The family of Connaraceae has lately been treated in a monograph by G. Schellenberg in Engler's "Das Pflanzenreich" IV, 1938, 127. He divided the family into two subfamilies, *Jollydoroideae* and *Connaroideae*, the first of which, though having some derived characters, was considered the most primitive of the two on the strength of having two seeds in the fruits; in *Connaroideae* the fruits contain a single seed.

The genus *Cnestis* belongs to the *Connaroideae*; it was conceived by Schellenberg as the most primitive genus of this subfamily.

The flowers of *Cnestis* are pentamerous and pentacyclic. Only few or all five of the carpels of the apocarpous ovary do ripen into fruits. Ordinarily only one of the two ovules in a carpel turns into a seed, containing endosperm.

The genus *Cnestis* consists of shrubs and lianes and is mainly African. According to Schellenberg the Indo-Malaysian representatives belong to two species, viz *Cnestis palala* (Lour.) Merrill and *Cnestis diffusa* Blanco.

The dividing of the genus into the sections *Eucnestis* and *Ceratocnestis*, as provided by Schellenberg, primarily rests on the shape of the fruit and secondly on the type of its indumentum. The species of section *Eucnestis* have obtuse, pear-shaped fruits with only few long bristles amongst the short hairy indumentum, whereas in section *Ceratocnestis* the fruits are beaked and covered with numerous long hairs.

The Indo-Malaysian species mentioned above both would belong to the section *Eucnestis*. This section has been subdivided into two subsections, the *Brevipetalae* and *Aequipetalae*, which mainly differ from each other in the proportion of the length of their petals and sepals. In the *Brevipetalae* the petals are about half as long as the sepals; in the *Aequipetalae* the petals are of the same length as the sepals or even a bit longer. The inflorescences of the *Brevipetalae* are said to be terminal or born in the axils of the upper leaves and to have stronger axes than those in the subsection *Aequipetalae* in which the inflorescences would originate in the axils of leaves on older branches. Schellenberg refers the two Indo-Malaysian species *C. palala* and *C. diffusa* to the subsection *Aequipetalae*.

This implies the occurrence in this region of plants with obtuse fruits only and with petals as long as the sepals.

Many of the specimens from Indo-Malaysia examined by us had also been studied by Schellenberg; he has mentioned them in his monograph.

This material, however, turned out to be more heterogeneous than could be expected from Schellenberg's descriptions: *aequipetalae as well as brevipetalae and pear-shaped as well as beaked fruits could be traced.* The remaining material, not seen by Schellenberg, coincides with the former in polymorphy.

The types new to Indo-Malaysia (brevipetalous flowers and beaked fruits) apparently do not belong to species that have already been described from elsewhere. As a result of these findings two main problems arise: 1. how to subdivide the Indo-Malaysian material, and, 2. how to classify it in its relation to the African species of *Cnestis*.

1. Properties and variability of material.

a. Mutual relation of calyx and corolla.

Aequipetalous types: petals as long as sepals or longer (in our material up to 1 mm longer). Area: Malay Peninsula, Andaman Islands, Burma, Siam, Indo-China, Philippines[1]) (fig. 1).

Brevipetalous types: petals shorter than sepals (difference 1 mm minimal, 2.8 mm max.). Area: MP, Sumatra, Borneo, Celebes[2]) (fig. 1).

We may point to the fact that the terms aequi- and brevipetalae have been based here on the length ratio of petals and sepals only. They are not used in the sense of Schellenberg's subsections, which groups are said to show differences also in the structure of their inflorescences.

b. Fruits.

Two forms were found:

1. a beaked form: slightly falcate to lanceolate fruits; the beak, which is somewhat laterally compressed and curved, lies in prolongation of the fruit. Average size of the fruits 2.7 (limits 1.3—4.4) × 1.0 (limits 0.6—1.5) cm. These were found in the regions of A, B, S, IC (fig. 1). In but a few fruits we found the beaked form to be dubious. The presence of obviously beaked fruits on the same specimen, however, may serve as an indication that we can maintain the beaked fruit-shape as a general character.

2. pyriform: obliquely pear-shaped fruits with a rounded or slightly produced apex. These fruits are bigger in size than the beaked ones, 3.8 (3.0—5.0) × 1.9 (1.0—2.8) cm in average. Area: MP, Su, Bo, Ph (fig. 1); we did not see fruiting material from Celebes.

It is quite obvious that the difference in shape of the fruits coincides with a geographic separation. The borderline between both areas runs almost along the northern limit of Malay Peninsula. In Malaysia we find exclusively pear-shaped fruits, both in brevi- and aequipetalae.

[1]) The names of these regions henceforth will be abbreviated to MP, A, B, S, IC and Ph.

[2]) Henceforth Su, Bo, C.

In the herbaria consulted the number of pear-shaped fruits was too small to enable a comparison of fruit-size between brevi- and aequipetalae. However, we get the impression that those of the brevipetalae are biggest. Merrill (1929) said: "the fruits of the Borneo form being much larger than those of the Philippine plants".

On the labels there are only few remarks on fruit colour; pear-shaped

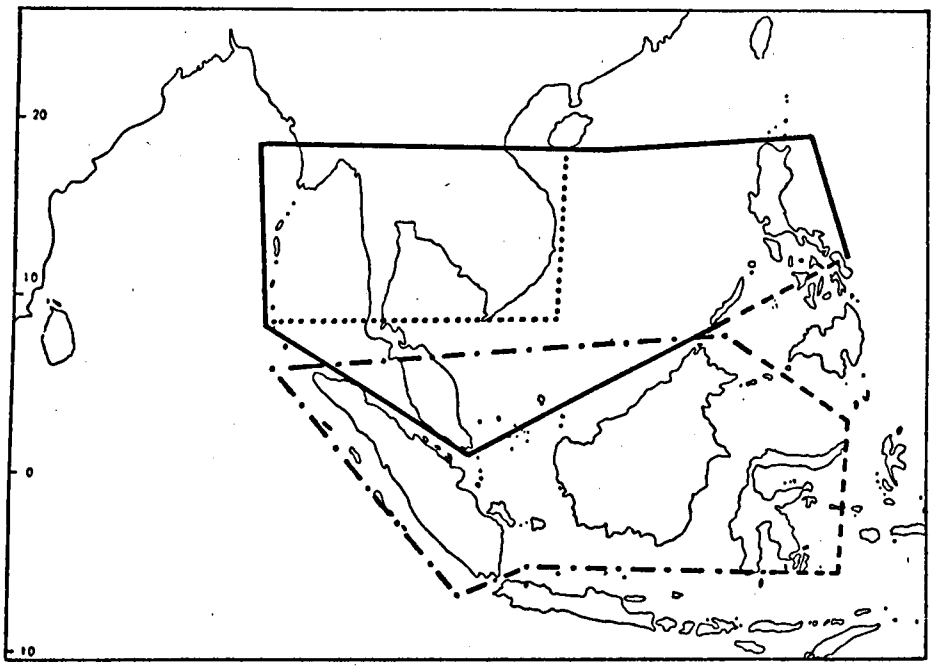

Fig. 1. Distribution of the species of *Cnestis* in Indo-Malaysia. —— Area of *C. palala* (Lour.) Merrill, composed of the areas of distribution of subsp. *palala* (.....) and subsp. *diffusa* (Blanco) Andreas (remaining area of the species). - - - - Area of *Cnestis platantha* Griff. ---- Uncertain borderlines.

fruits are said to be yellow to dark red, whereas beaked fruits would be orange to red.

c. Texture of petals.

Part of the material of A, B, S, IC (16 out of 24 specimens) had fleshy petals, whereas all the other specimens had membranaceous petals.

d. Indumentum of petals.

In the character of hairiness the existence of a cline is remarkable. The percentage of hairy petals shows a decrease from the Philippines via IC, S, B, A to MP in aequipetalae, to reach the lowest value in the brevipetalae of MP, Su, Bo, C (fig. 2). The decreasing tendency in the indu-

mentum of the petals is also apparent in the number of hairs per hairy petal. This number varies between 1 and ca 30. We find that a decrease of the percentage of hairy petals coincides with an increase in frequency of few hairs per hairy petal (fig. 2; few hairs = 1—4; the frequency of 1—4 hairs has been expressed in the percentage of the total number of pilose petals found in the proper region). There is no evidence for a possibly adaptive sense of the gradation in hairiness mentioned above; no probable relation is to be seen e. g. with a geographical or a climato-

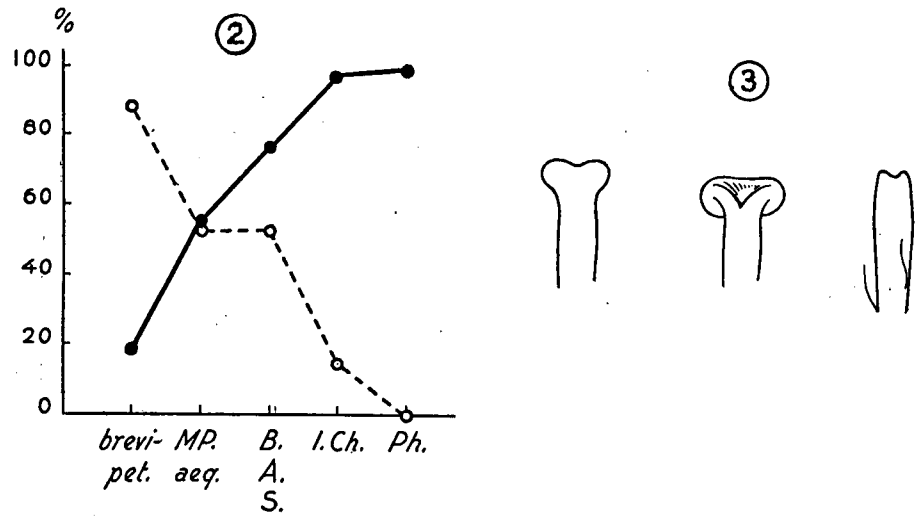

Fig. 2. ●———● Percentage of hairy petals.
o - - - o Petals with only 1—4 hairs, as the percentage of the total number of hairy petals.
Fig. 3. Stigma types a, b and c (from left to right).

logical gradient. On the other hand one hardly can imagine such a gradient having arisen by mere chance. Statistically the differences between the percentages as represented in fig. 2 are, for the greater part, significant.

e. Indumentum of rhachis of inflorescence and of peduncle.

The indumentum is more or less dense and generally composed of bristles and glandular hairs. An exception should again be made for the area of A, B, S and IC, where 11 out of 27 specimens did not bear glandular hairs. The absence of this type of hairs, however, does not coincide with one of the two types of petals mentioned before (under c), which are fleshy or membranaceous. The peduncles tend to show breakage above the bracteoles; in this place the indumentum is more dense than elsewhere.

f. Stamens.

There are two whorls of 5 stamens each. We found the filaments to be free, whereas Schellenberg mentioned their being united at the base as a characteristic of the genus *Cnestis*; he depicted it in his monograph

(p. 31) in *Cnestis ferruginea*. The five outmost stamens are usually longer than the inner ones; mostly the difference is ¼ mm, sometimes ½ mm. In some of the specimens of A, MP and IC the stamens are equal in length. The length of the stamens varies between ½ mm and 4 mm. A frequency distribution is given in table I.

TABLE I.

Length of stamens	⩽1 mm	1¼ mm	1½ mm	2¼ mm	4 mm
brevipet.	9	2	1	2	3
aequipet. MP	5	8	4	—	—
A, B, S, IC	17	3	2	—	—
Ph	—	3	1	1	—

Remarkable features are the occurrence of rather long stamens (4 mm) in 3 specimens of brevipetalae and the occurrence of short stamens in many specimens in the region of A, B, S and IC (⩽1 mm).

The anthers are extrorse, as a result of the bending outward of the upper parts of the filaments. Schellenberg is of a different opinion. In his monograph we find the following description concerning the dehiscence of the anthers as a character common to all Connaraceae: "Die Antheren sind dorsifix, sie kippen bei der Anthese über".

g. Pistil.

The stigmas are of three different types (fig. 3). a. bud-shaped, bilobed; b. funnel-shaped, unilaterally collared; c. not thicker than the style and hardly bilobed. Table II represents the distribution of the three types (a, b, c = type of stigma; number indicates the number of specimens).

TABLE II.

Length of pistil	< 1¾ mm			⩽ 1¾ mm		
	a	b	c	a	b	c
brevipet.	2		3			11
aequipet. MP			11	3		5
A, B, S, IC	6	17	1		2	
Ph	5			2		
Total	13	17	15	5	2	16

Table III illustrates the differences found in length of stamens and pistils.

TABLE III.

	stamens longer (mm)					pistils longer (mm)		
Difference in length	3.25 — 4.25	2.25 — 3.25	1.25 — 2.25	0.25 — 2.25	0	0.25 — 1.25	1.25 — 2.25	2.25 — 3.25
brevipet.	1	2	1	2	0	8	7	1
aequipet. MP				4	0	14	1	
A, B, S, IC				5	9	6	1	
Ph				3	0	2		

There is a wider divergency of differences in length in brevipetalae than in aequipetalae. The plants of A, B, S and IC are different from other types by having stamens and pistils which may be equally long.

When consulting our data obtained on variation in length of styles, we might ask whether they point to heterotristyly or not. This character has been mentioned by Schellenberg as occurring in the whole family of Connaraceae. In A, B, S and IC we could speak of heterotristyly indeed; the absolute differences in length, however, are so small that their functional significance in pollination is rather doubtful. In other parts of the area the term tristyly seems rather arbitrary. As long as more data are not available, we consider the indication of variation in length of styles should be restricted to heterostyly.

It is remarkable that Schellenberg was the first author to speak of hermaphrodite flowers. His predecessors Bentham and Hooker (1862—'67), Kurz (1877), Hooker (1879), Boerlage (1890), King (1897), Lecomte (1908—'23), Ridley (1922) make mention of unisexual or polygamous-dioecious flowers of the genus *Cnestis*. Griffith (1854) did not make special remarks on the sex of the flowers. One gets the impression, however, that he described hermaphrodite flowers. It seems likely that stigma-type c (fig. 3) was considered as being sterile by Bentham and others. According to this opinion their description of male flowers could be understood. As we did not find stamens that could be considered to be sterile, there is no reason to distinguish female flowers either.

h. Leaves.

These are imparipinnate and have numerous jugae. Fig. 4, 5 and 6 respectively illustrate the frequency distribution in length of rhachis, number of pinnae and length of the leaflets. The brevipetalae are striking

by high frequency in long rhachides (30—50 cm). In the aequipetalae of MP, A, B, S and Ph a rhachis length of 15—30 cm is frequent, whereas in the specimens of Indo-China lengths of only 5—15 cm are predominant. Besides, the plants of A, B, S, IC show high frequency in small number of jugae (6—11).

The acceptance in brevipetalae of high frequency for long rhachides and many pinnae appears to be statistically justified, but this is not the case as to long leaflets. As quantitative data on vegetative characters are concerned, one could produce objections against the handling of those characters as diagnostic. However, the difference in vegetative properties

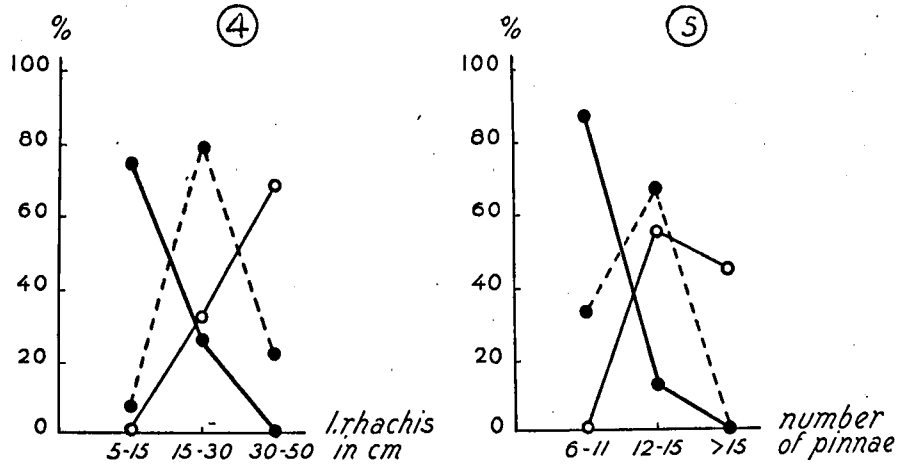

Fig. 4. Length of rhachis of leaves. ●———● Indo-China; ●– – –● Andam., Burma, Siam; almost the same in Mal. Pen. *aequipet.* and Philippines; o———o *Brevipetalae.*

Fig. 5. ●———● Indo-China; almost the same in Andam., Burma, Siam; ●– – –● Philippines and *aequipet.* of Malay Peninsula; o———o *Brevipetalae.*

between a great number of brevipetalae at least on one side and the remaining material on the other is so striking, that we did not hesitate to use it as a co-argument in the discussion on the taxonomic segregation of our *Cnestis* material.

All over the area the shape of the leaflets varies between elliptical and oblong. The apex is acute, more or less acuminate or round. The variability is almost the same in every part of the region; thus its pattern is different from that described by Schellenberg. He mentions an acute leaflet apex as occurring in the Philippines only (*C. diffusa*), whereas in *C. palala* (remaining area) the acute apex should be absent.

The number of secundary nerves has also been used by Schellenberg as a diagnostic character. It varies from 6 to 10 but it should be remarked that the counting of these veins is by no means always easy. We found that in the localities in A, B, S, IC and MP in the aequipetalae the numbers 6—7 are commonest (in 88 % of the total number of specimens). With the aequipetalae of the Philippines and with the brevipetalae the

percentage of 6—7 secundary nerves was found to be 44 % and 45 % respectively. Schellenberg, however, counted 4—6 secundary nerves in *Cnestis palala*, ca 10 in *C. diffusa*.

i. Texture of leaflets.

This varies from chartaceous to coriaceous. We could not corroborate Schellenberg's statement on an exclusive occurrence of a certain texture in a certain region. In many cases it is difficult to designate the texture because of the numerous gradual transitions. It is for this reason that

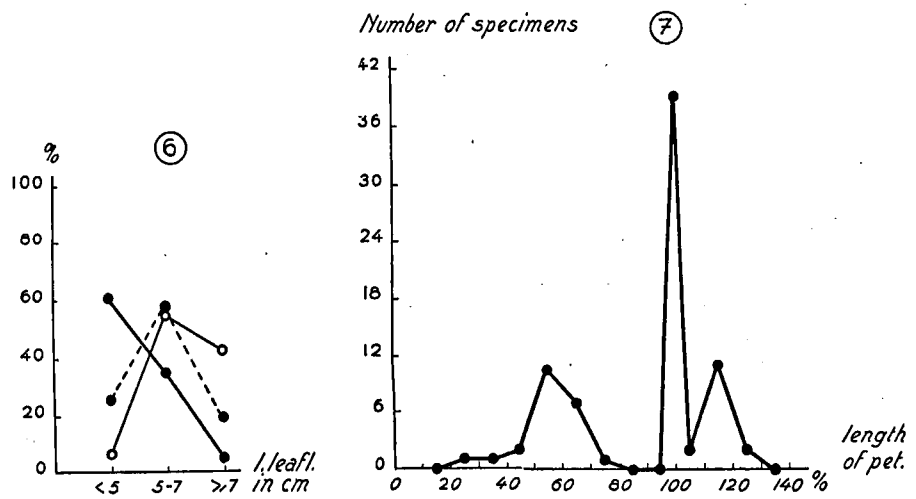

Fig. 6. Length of leaflets. ●———● Indo-China; almost the same in *aequipet.* of Malay Peninsula; ●- - - - ● Philippines; almost the same in Andam., Burma, Siam; o———o *Brevipetalae.*

Fig. 7. Frequency distribution of length ratio of petals and sepals. Petal length expressed as percentage of sepal length.

we rejected the texture of the leaflets as a diagnostic character. At best we can say that the leaflets are rather thin in the Philippines and somewhat thicker in A, B, S, IC and MP.

j. Indumentum of leaflets.

1. Upper side. Sometimes they are glabrous, sometimes hairy on the midrib only; sometimes sparsely hairy all over the surface, a little bit more dense on the midrib. In A, B, S and IC we rather often meet with glabrous or very sparsely hairy leaflets.

2. Lower side. More or less and ± frizzily hairy. Most of the indumentum is localized on the midrib and the edge of a leaflet; in these places the hairs are appressed and directed towards the apex of the leaflet.

In the north-westerly district of the area (A, B, S, IC) the appressed indumentum may also cover the bigger secundary nerves; this phenomenon,

however, need not be accompanied by a denser hairiness of the remaining leaflet-blade.

We cannot follow Schellenberg in his opinion that the indumentum of the lower side of the leaflets in the Philippines is more sparse than in the other regions of the area of distribution.

2. Discussion of taxonomy

We now turn to the question which possibilities for a taxonomic classification are present in the pattern of variability discussed above.

Fig. 7 shows the distribution of frequency concerning the length ratio of petals and sepals as found by us. The length of petals has been expressed in % of sepal length; the numbers have been determined in stretches of 10 % each. The graph shows some striking facts. One is the normal frequency distribution between 20—80 % in a group, already previously distinguished by us as brevipetalae; another striking feature is the unilateral frequency distribution between 100—120 % in the group, previously distinguished as aequipetalae. Moreover, there is the obvious discontinuity between 80 and 100 %. The frequency distribution in the total stretch of 20—120 % herewith is such, that a division into two taxonomically distinguishable groups (aequi- and brevipetalae) is to be considered as justified. We should remark, however, that the possibility of not an absolutely unilateral frequency distribution in the aequipetalae remains on the strength of statistical considerations; for a character, not occurring within a sample of 52 specimens taken at random (number of aequipetalae investigated by us), nevertheless may be present in maximal 15 % of the entire population. (As to the determination of the percentage mentioned, we may refer to a table on sampling limits; Simpson and Roe, 1939). Herewith it is of course necessary to admit the herbarium collection to be representative for the population under discussion.

In our survey on the variability in the material studied it has been indicated that aequi- and brevipetalae show differences in various other points also:

— part of the brevipetalae are more obviously heterostylous (based on greater length of stamens and pistils);

— the indumentum on the petals is less in the brevipetalae, which appears from the percentage of glabrous petals as well as from the number of hairs on any hairy petal;

— as for the properties of the leaves the brevipetalae show higher frequency in bigger sizes and in more numerous jugae.

In these properties, the two groups do overlap more or less evidently, whereas they do not in the relation of lengths of sepals and petals.

However, as has already been mentioned, the discontinuity may be less distinct than we found it in the rather low number of specimens studied. The discontinuity even exists in MP, where the areas of aequi- and brevipetalae overlap (fig. 1). From this fact we conclude to a genetical diversity on the strength of which we gave species rank to both groups.

With respect to the fruit it may be emphasized that difference in shape involves geographic separation. Consequently the differential value of the fruit shape is restricted to the possible distinction of subspecies only. The geographic borderline runs within the area of aequipetalae (fig. 1) so that this species, on the strength of fruit shape, has been subdivided into:

α. subspecies with beaked fruit; A, B, S, IC.

β. „ „ pear-shaped fruit; MP, Ph.

Besides, subsp. α differs from the remaining taxa in its variability of texture of petals, which may be fleshy or membranaceous; further in the shape of the stigmas, which may be of three different types, two of which are also common in the remaining area. The third type means a unilaterally collared funnel-shaped stigma. Subspecies α also differs by the possible absence of glandular hairs on the rhachis of the inflorescence and on the peduncles.

With the brevipetalae the fruits are exclusively pear-shaped. (From Celebes no fruiting specimens have been seen).

It has already been mentioned that our two Indo-Malaysian species of *Cnestis* are not covering those of Schellenberg. For that reason a study of nomenclature became necessary.

The oldest valid name was *Thysanus palala* Lour. (Fl. Cochinch. 1790, 284). It was only later that Merrill related it to *Cnestis* (1922).

Loureiro cited, though with doubt, "Palala secunda?" of Rumphius, Herb. Amb. 1. 2. c. 9. pag. 26 tab. 6 as a synonym. According to Merrill (1935) Loureiro's description was not based on the latter plant, which is now considered to belong to the *Myristicaceae*.

It is regrettable that Loureiro's material could not be located up till now. This is the more regrettable as in his description of the genus he mentions a tetramerous pistil and four drupes in a flower which for the rest is pentamerous, so that there may exist some doubt concerning the real nature of *Thysanus palala* (Merrill 1922, 1935).

From Loureiro's description we cite:

"..... Pist. Germen tetragonum. Styli 4, filiformes, angulis, 4 germinis a latere inserti ..... Peric. Drupae 4, ..."

Merrill supposes Loureiro's description to be based on a faulty observation and he admits that the pistil be pentamerous. Consequently he transferred *Thysanus palala* Lour. (1790) to *Cnestis* Juss. (1789), under the name of *Cnestis palala* (Lour.) Merrill (1922).

"*Thysanus* Lour., long placed in the *Connaraceae* as a genus of doubtful status, is clearly the same as *Cnestis* Jussieu. *Thysanus palala* Lour. I believe to be identical with the rather widely distributed *Cnestis ramiflora* Griff.. *Palala secunda* Rumph. (Herb. Amb. 2: 26 pl. 6), cited by Loureiro as representing his species, and whence he derived his specific name, must be excluded as it represents the Myristicaceous *Horsfieldia sylvestris* Warb. Loureiro's description, however, was based on actual Indo-China specimens, not on *Palala secunda* Rumph. His description of the ovary and styles is not good for *Cnestis*, but I suspect that his data were based on faulty observations". (Merrill, 1935).

When describing Indo-Malaysian *Cnestis* from B, MP, Su, Ph as early as 1909, Merrill still named it *C. diffusa* Blanco. This name dates from

1837. However, when transferring *Thysanus palala* to the genus *Cnestis* and on distinguishing only one species in Malaysia, it is clear that the epithet *palala* possesses priority.

As the neotype of *Cnestis palala* Merrill chose a specimen Clemens 3805, collected in Tourane, Annam. In doing so he fixed the name. And we must follow him as long as we cannot prove the transfer to be incorrect, which only could be judged from Loureiro's original material.

The neotype Clemens 3805 is an aequipetalous specimen belonging to our aequipetalous species which therefore must be called *Cnestis palala* (Lour.) Merrill.

The neotype specimen bears no fruits, it is true, but also on the strength of its having been collected in Annam we consider it to belong to our subspecies with beaked fruits, occurring in the area A, B, S and IC. Since therefore this subspecies includes the neotype of the species it should be called *Cnestis palala* (Lour.) Merrill subsp. *palala*.

The other subspecies of *Cnestis palala* is the one of the Philippines and Malay Peninsula.

The next species published posterior to *Thysanus* (= *Cnestis*) *palala* was a Malaysian species, exactly coming from the region mentioned. Blanco described in Fl. Filip. 1837, p. 386 *Cnestis diffusa* and *C. corniculata*. The latter name, however, is now considered to be a synonym of the first, so that *Cnestis diffusa* Blanco became the name of the Philippine species. Its neotype is Cuming 951 (K).

Though this specimen also does not bear fruits, we nevertheless have classified it in our subspecies of MP and Ph on the strength of its aequipetalous flowers and its native region.

We were free in choosing a name for the subspecies because the transfer from the one species to the other is connected with a change of rank, while on the other hand there is no combination in the subspecies rank either to claim priority.

C. palala and *C. diffusa* mutually differ so little, it is true, that they have been united by Merrill under the name *C. palala* (Lour.) Merrill, but the author did not make mention of a subspecies. However, we have retained the epithet *diffusa* for the subspecies, because it was so well known in Philippine botany for over hundred years, where it covered a certain conception which, in the new situation, may be maintained. And apart from that there is no reason to introduce a new epithet either.

Therefore we named this subspecies (with pear-shaped fruits and occurring in MP and Ph) *Cnestis palala* (Lour.) Merrill subsp. *diffusa* (Blanco) Andreas.

1. Cnestis palala (Lour.) Merrill, J. Str. Br. Roy. As. Soc. no. 85, 1922, 201. — *C. diffusa* Blanco (1837) sensu Merrill, Philip. Journ. Sci. 4, 1909, Bot. 127.

Shrub, often climbing, to ca 10 m high. Young branches mostly crispately tomentose; older branches less hairy to glabrous. Leaves oddly pinnate, with to ca 15 jugae, leaf axis to ca 32 cm long, pilose; middle leaflets ca 3—9.5 cm long, ca 0.4—2.5 cm broad, lower leaflets smaller, all elliptical to lanceolate, with sharp or blunt or sometimes acuminate

apex, rounded or somewhat cordate at base, lateral leaflets oblique, all more or less coriaceous to papery, on the upper side pilose to glabrous, somewhat lustrous, on the lower side tomentose, dull. Inflorescences lateral, racemose, in axils of leaves which very often have already been dropped; axis glandular hairy or hairy. Sepals to ca 4 mm long, oblong to lanceolate, outside densely pilose, glandular or not, inside sparsely appressed-hairy. Petals to ca 5 mm long, as long as the sepals or longer, elliptical to lanceolate, rounded or sharp at the top, whitish to red, membranaceous or fleshy, mostly pilose. Follicle to ca 4 cm long, to ca 1.5 cm broad, falcate, straight and beaked or curved pear-shaped (to ca 4 cm long and ca 1.5 cm broad), pilose, yellow to red. Seed with black seed coat and basal aril.

Neotype: Clemens 3805.

Distribution: See subspecies. Specimens that could not be determined as to subspecies came from Burma (Griffith 1254), Malaya (Griffith 1255) and the Botanic Gardens, Singapore (Kiah, 27-II-1926; Nur 1824).

Subsp. **palala**. — *Thysanus palala* Lour., Fl. Cochinch. 1790, 284, excl. syn. Rumph. — *Thysanus cochinchinensis* DC., Prod. 1825, 91 — *Connarus igneus* Wall. Cat. 8528, nomen — *Cnestis ramiflora* Griff. Notul. 4, 1854, 432 — *Cnestis diffusa* Blanco 1837 sensu Merrill ex parte, Philip. Journ. Sci. 4, 1909, Bot. 127.

Axis of the inflorescence glandulo-pilose or pilose. Petals membranaceous or fleshy. Fruits straight and beaked at the apex.

Neotype: Clemens 3805.

Distribution: Andaman Islands, Burma, Siam, Indo-China.

Subsp. **diffusa** (Blanco) Andreas — *Cnestis diffusa* Blanco, Fl. Filip. 1837, 386 — *C. corniculata* Blanco, l. c. 1837, 386 — *C. polyphylla* Blanco, l. c. ed. 2 (1845) 270 — *C. diffusa* Blanco 1837 sensu Merrill ex parte, Philip. Journ. Sc. 4, 1909, 127 — *Rourea rugosa* (non Planch.) F.-Vill. Nov. App. 1883, 56 — *Connarus ferrugineus* (non Jack) F.-Vill. Nov. App. 1883, 57.

Axis of inflorescence glandular. Petals membranaceous. Fruits curved pear-shaped.

Neotype: Cuming 951.

Distribution: Malay Peninsula, Philippines.

Next we may ask whether any name exists in relation with our brevipetalous species of MP, Su, Bo and C.

After Blanco's publication of *Cnestis diffusa* (1837), Griffith validly published three names in Notul. IV, viz *Cnestis ramiflora, flaminea* and *platantha* on pages 432, 433 and 434 respectively. Schellenberg considered them synonyms of *Cnestis palala*. Griffith's descriptions, however, which for a long time were the best in this genus, do show some mutual differences, at least as far as C. ramiflora and platantha are concerned; the description of his *C. flaminea* is less clear.

We may cite some sentences from the two first mentioned descriptions, namely those that relate to the mutual ratio in length of petals and sepals and of petals and filaments. From these lines we may conclude that Griffith knew aequipetalous as well as brevipetalous plants.

"*Cnestis ramiflora* Gr. ..... Cal. 5-sepalus, sepalis linearib. pubescent. Pet. totidem conforme sed latiore, patentis, apicibus incurvis .....".

"*Cnestis platantha* Gr. ..... Petala alba, lineari-oblonga paullo longiora ..... Filamenta alba, subfiliforma longiora petalis subtriplobrevissim".

This is not only strengthened by the fact that Griffith collected exactly in the area where both forms occur, viz MP, but it has been turned almost into certainty by Griffith's own material. It comprises both aequi- and brevipetalae (Griffith 1255, 1256), so that we can admit Griffith to have distinguished between these two types.

C. flaminea being the most uncertain may be left out of consideration here. In our opinion the description of *C. ramiflora* deserves consideration for Griffith's aequipetalous material; thus the name is a later synonym of *C. palala* (Lour.) Merrill. The name *C. platantha* relates to his brevipetalous material and seems to be the correct name for the brevipetalous species now distinguished by us.

The lectotype is Griffith 1256.

2. Cnestis platantha Griff. Notul. 4, 1854, 434. — *Cnestis diffusa* Blanco 1837 sensu Merrill ex parte, Philip. Journ. Sci. 4, 1909, Bot. 127. — *Cnestis palala* (Lour.) Merrill ex parte, J. Str. Br. Roy. As. Soc. no. 85, 1922, 201. — *Connarus polyphyllus* Miq. Fl. Ind. Bat. Suppl. 1860, 529. — *Rourea dasyphylla* Miq. l. c. 1860, 528. — *Santalodes dasyphyllum* O. Ktze, Rev. Gen. I, 1891, 155.

Shrub, often climbing, to ca 10 m high. Young branches mostly crispately tomentose; older branches less hairy to glabrous. Leaves oddly pinnate, with up to ca 24 jugae, leaf-axis up to ca 50 cm long, pilose; middle leaflets ca 4.5—10.2 cm long, ca 1.5—2.8 cm broad, lower leaflets smaller, all oblong to lanceolate, with rounded to acute apex, rounded or somewhat cordate at base, lateral leaflets oblique, more or less coriaceous to papery, on the upper side pilose to glabrous, somewhat lustrous, on the lower side tomentose, dull. Inflorescences lateral, racemose, in the axils of leaves which very often have already been dropped; axis glandular, hairy. Sepals to ca 5 mm long, lanceolate, outside densely pilose, glandular or not, inside sparsely appressed-hairy. Petals to ca 3 mm long, shorter than the sepals, obovate to lanceolate, with round or acute apex, whitish to red, membranaceous, mostly pilose. Follicle ca 3.5—5 cm long, ca 1.3—2.2 cm broad, curved pear-shaped, pilose, yellow to red. Seed with black seed coat and basal aril.

Lectotype: Griffith 1256 (K).

Distribution: Malay Peninsula, Sumatra, Borneo, Celebes.

Uncertain synonyms: *Cnestis flaminea* Griff. Notul. IV, 1854, 433, tab. 608, fig. 2 — *Connarus foliolosus* Jack ex Wall. Cat. 1828, nr 8529, nomen.

The limitation and rank of some taxa within the genus *Cnestis* as proposed by the present writers are different from those in Schellenberg's system. Consequently our Indo-Malaysian species and subspecies cannot be arranged in accordance with his scheme (see introduction). We do not think it advisable to produce a tentative scheme on the strength of data

on Indo-Malaysian *Cnestis* only. A study of the African species, however, is beyond the scope of the present investigation.

Summary.

A study has been made of the Indo-Malaysian species of *Cnestis*. The mutual length ratio of sepals and petals, — brevi- and aequipetaly —, is the main differentiating character for the species; there are no transitions. The areas of distribution overlap in the Malay Peninsula (fig. 1); brevipetalous types are known from the Malay Peninsula, Sumatra, Borneo and Celebes, aequipetalous types from Burma, Siam, Indo-China and the Andaman Islands, the Malay Peninsula and the Philippines. Fruits are of two different shapes: beaked in aequipetalae of the Andamans, Burma, Siam, and Indo-China, pear-shaped in remaining aequipetalae and in brevipetalae. Leaves tend to be longer and jugae more numerous in brevipetalae than in aequipetalae.

Other characters do not have so clear a separating value, such as texture and indumentum of leaflets, indumentum of inflorescence, texture and indumentum of petals, length of stamens, type and length of pistils, length ratio of stamens and pistils. However, even on the strength of these characters there is some reason to distinguish both groups mentioned above. As to the indumentum of petals there is a remarkable cline in a decreasing sense from the Philippines to continental Asia, the Andamans and the Malay Peninsula and back to the east through the brevipetalae of Malay Peninsula, Sumatra, Borneo and Celebes.

Brevi- and aequipetalae have been considered to represent two species, viz *Cnestis platantha* Griff. and *Cnestis palala* (Lour.) Merrill. The latter one has been divided into two subspecies, viz subsp. *palala* with beaked fruits and subsp. *diffusa* (Blanco) Andreas with pear-shaped fruits. For their area of distribution see fig. 1.

In many respects some plants of the Andamans, Burma, Siam, Indo-China (and the Malay Peninsula) are different from the remaining aequipetalae, but not in a uniform way as to the various characters. Although there are some arguments for a further taxonomic subdivision, we did not think it advisable to introduce such a division at present.

Our classification differs from the division as given by Schellenberg (1938). This was caused by the material on one hand, being more heterogeneous than Schellenberg described it, and, on the other hand, by the fact that some of the diagnostic characters used by him, in our opinion were not fit for use as such. Therefore a revision of Schellenberg's system of the genus Cnestis seems desirable.

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