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A revision of the genus *Julostylis* Thwaites (Malvaceae) with a new species from India

A. K. Pradeep and V. V. Sivarajan

Department of Botany, University of Calicut, Kerala, 673 635, India

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Abstract. The Indo-Sri Lankan genus, *Julostylis* Thw. is revised. Originally considered as monotypic, this genus has three species, including *J. ampumalensis*, a new species described here. *Julostylis angustifolia* is distributed in Sri Lanka and along the Western Ghats in Southern India, but *J. polyandra* and *J. ampumalensis* are found only in the Western Ghats. Critical studies of these three species have

1. Flowers in large panicles; staminal column 5-dentate
or 5-armed at apex

ceae. But the fruit of *Nayariophyton* is indehiscent while that of *Dicellostyles* separates into 2 indehiscent

3. Flowers unisexual; staminal column 5-armed; fruit loculicidally dehiscent *Kydia*
3. Flowers bisexual; staminal column 5-dentate; fruit indehiscent *Julostylis*

The affinities and tribal classification of these genera have been rather controversial. Bentham and Hooker (1862) recognised 4 tribes in the Malvaceae viz. Malveae, Ureneae, Hibisceae, and Bombaceae, and placed *Kydia* in Malveae subtribe Abutileae along with genera such as *Abutilon* and *Modiola*, while assigning *Julostylis* and *Dicellostyles* (and *Nayariophyton* by implication) to Hibisceae. Masters (1874) followed Bentham and Hooker in the tribal classification and in the placement of *Dicellostyles* and *Julostylis* in the Hibisceae, but transferred *Kydia* to Bombaceae, now treated as a separate family based mainly on its free or shortly connate stamens, two or many thecous anthers, and smooth pollen grains. Schumann (1890) treated Malvaceae as distinct from Bombacaceae and recognised 4 tribes in the former, Malopeae, Malveae, Ureneae, and Hibisceae, but retained *Kydia* in Malveae and placed the other genera in Hibisceae, as was done by Bentham and Hooker. Edlin (1935), however, transferred the entire Hibisceae and *Kydia* to the Bombacaceae, which is far-fetched. Kearney (1951), Borsum (1966), and Hutchinson (1967) preferred to follow Schumann (1890) in the tribal classification of the family, with some modifications, and Hutchinson kept all these genera under Hibisceae. This was also done by Paul and Nayar (1988). Most recently Fryxell (1975, 1988) recognised 5 tribes in the Malvaceae, based mainly on the nature of the staminal column, the number of

These characters point to the fact that these four genera are not as closely related as they have been thought to be. In the light of this the tribal classification of the Malvaceae might require substantial changes. Fryxell (1988) himself has expressed doubts about the finality of his tribal classification: "In view of our still incomplete and developing understanding of these plants, these generic alliances are presented only tentatively not as a formal taxonomic interpretation", which amply illustrates the state of tribal classification in the Malvaceae. We do not, however, propose to attempt such a classification here, as this paper deals only with a single genus, *Julostylis*.

Julostylis was considered to be monotypic (with only *J. angustifolia*) and endemic to Sri Lanka (Trimen, 1893; Masters, 1874; Paul, 1988) but recently this species has been reported in the Western Ghats of Kerala in South India (Ramamurthy and Rajan, 1985). Unfortunately, Paul and Nayar (1988), in their revision of Indian Malvaceae, did not take note of this.

Later, Ravi and Anilkumar (1990) discovered and described a new species, *J. polyandra* from Travancore Hills in Kerala. There is no doubt that its place is in *Julostylis* rather than in any of the other genera mentioned above, but it does differ from the original description of the species, mainly in having 17-20 stamens.

During our explorations on the Western Ghats in Kerala, we have collected *J. angustifolia* from Kozhikode, Malappuram, Thrissur, and Idukki districts and have collected *J. polyandra* from Thiruvananthapuram, Kollam, and Pathanamthitta districts. This reveals that these two species have a much wider distribution

Table 1. Diagrammatic representation of diagnostic characters of the tribes of *Malvaceae*, as recognised by Fryxell (1988)

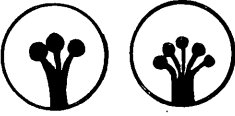











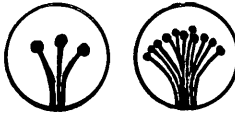























TRIBES	STYLES & STIGMA	APEX OF STAMINAL COLUMN	MATURE FRUIT C. S.	GOSSYPOL GLANDS
GOSSYPIEAE				
HIBISCEAE				
MALVAVISCEAE				
MALVEAE				
DECASCHISTIEAE				

Table 2. Diagrammatic representation of generic relationships and tribal affinities of *Julostylis*, *Kydia*, *Nayariophyton*, and *Dicellostyles*

GENERA	STYLES & STIGMA	APEX OF STAMINAL COLUMN	MATURE FRUIT C. S.	GOSSYPOL GLANDS
<i>Julostylis</i>				
<i>Kydia</i>				
<i>Nayariophyton</i>				
<i>Dicellostyles</i>				

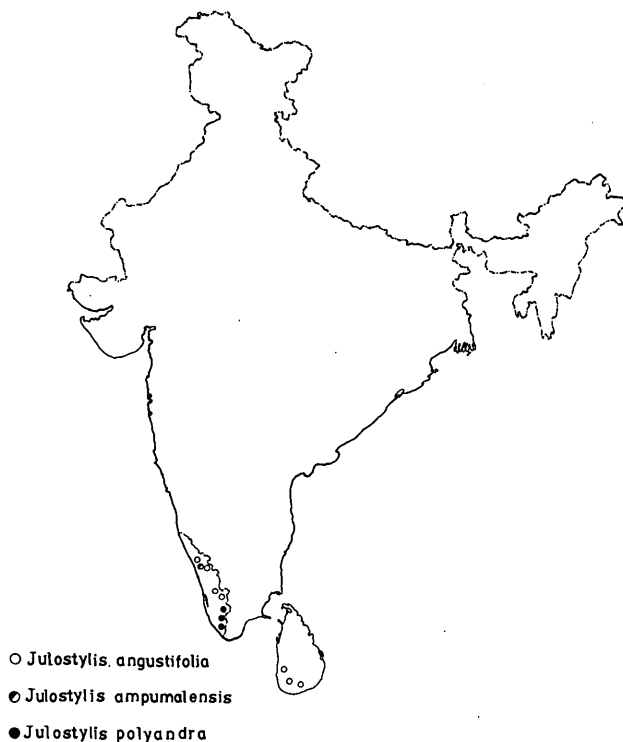


Fig. 1. Distribution map of *Julostylis* in India and Ceylon.

Systematic Treatment

Julostylis Thwaites, Enum. Pl. Zey. 30. 1858; *Kydia angustifolia* Arn., Nov. Act. 18: 1. 322. 1836. -Type species: *Julostylic angustifolia* (Arn.) Thwaites

Medium sized trees invested with stellate indumentum. Leaves alternate, petiolate; lamina ovate to lanceolate, simple to angled or lobed with abaxial foliar nectaries, margins entire or coarsely serrate. Flowers 1-2 cm in diameter, borne in axillary and terminal panicles, sometimes in condensed racemes. Involucellar bracts 4-5, stellately pubescent, accrescent. Calyx 0.5 - 1 cm long, 5-lobed, the lobes divided to the middle, ovate-triangular. Corolla yellow with a reddish or purplish centre; petals 5, 0.7-2 cm long. Staminal column 3.5 - 6 mm long, staminiferous towards middle, 5-toothed at apex, glabrous or glandular hairy; anthers 10-20. Ovary bilocular, rarely 3-locular; ovules 2 per locule, one usually abortive; stylar branches as many as carpels (2-3), exceeding androecium; stigmas peltate. Fruit subglobose, 4 - 9

mm in diameter, indehiscent, densely stellate tomentose, 2-3 celled, completely enclosed within accrescent calyces. Seeds solitary in each locule, reniform, concentrically striated, brownish-black to black when mature.

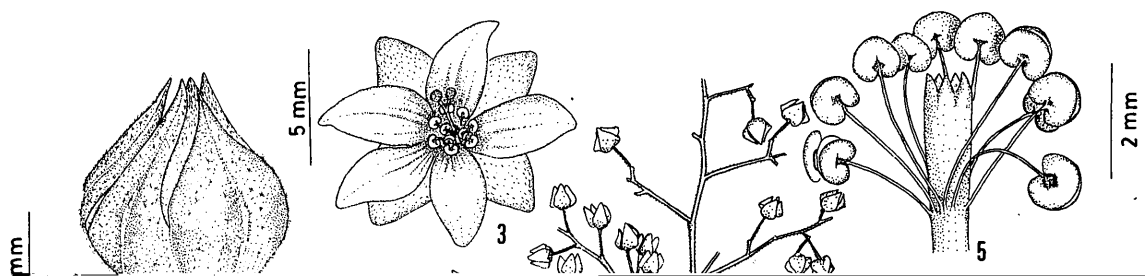
The genus is distributed from the southern part of Sri Lanka to the Western Ghats of Kerala, in Peninsular India. It commonly occurs in semi-evergreen and moist deciduous forests of the Ghats.

Key to Species

1. Stamens 10 in each flower; involucellar bracts longer than sepals
 2. Leaves lanceolate, simple, basally 3-nerved; involucellar bracts ovate, acute or subobtuse *J. angustifolia*
 2. Leaves broadly suborbicular to ovate, simple or apically 3-angled or lobed, basally 5-nerved; involucellar bracts elliptic-obtuse *J. ampumalensis*
1. Stamens 17-20 in each flower; involucellar bracts as long as sepals *J. polyandra*

Julostylis angustifolia (Arn.) Thwaites, Enum. 30. 1858; Masters in Hook. f., Fl. Brit. India. 1: 133. 1874; Bedd. Icon. t. 280. 1874; Trim., Handb. Fl. Ceylon 1: 149. 1895; Ramam. & Rajan, J. Econ. Tax. Bot. 7: 728, 1985. - *Kydia angustifolia* Arn., Nov. Act. 18, 1: 322. 1836. Type: Ceylon, South of the Island CP, 1146 (PDA) (Fig. 2)

Medium sized tree to 20 m tall; branches slender, terete; young branches, peduncle and pedicel stellately rusty-tomentose. Leaf blades 6-19 × 2-7 cm, lanceolate, rounded or truncate at base, acute to acuminate at apex, prominently 3-nerved at base, lateral nerves 4-5 pairs, margins subentire, densely stellate-tomentose beneath; sparsely stellate-pubescent to glabrate above; petioles 1 cm long, stellately tomentose. Stipules 4 mm long, linear, minutely pubescent, caducous. Flowers pedicellate in large terminal and axillary, pendulous panicles. Pedicels up to 7 mm long, slender. Involucellar bracts 4, longer than calyx, 8.5 × 6 mm, connate at base, broadly ovate, acute or subobtuse at apex, densely stellate-tomentose outside and sericeous inside, accrescent, nerves obscure outside, slightly raised within towards base. Calyx 5-lobed,



8 mm in diameter, divided to the middle, accrescent; the lobes 6×3 mm, much smaller than the involucellar bracts, densely pubescent with minute stellate hairs. Corolla yellow with a reddish centre; petals 5, obovate, connate at base, 7×3 mm, minutely stellate-hairy externally and on margins towards base. Staminal column 3.5 mm long, 5-toothed at apex, glabrous, stamiferous towards middle; anthers 10, 0.5 mm in diameter; filaments slender, 2.5 mm long, sparsely pubescent. Ovary ovoid, 2-3 locular, ovules 1-2 per locule, usually one abortive. Styles 7 mm long, much exceeding androecium, 2(-3) branched towards apices, each branch 2 mm long. Stigma 1.5 mm in diameter, peltate, minutely rugose. Fruit 4 mm in diameter, indehiscent, compressed-subglobose with a short beak at apex, completely enclosed within accrescent calyx, densely pubescent with minute stellate and simple hairs. Seeds reniform, 3.5×2.5 mm, concentrically striated, brownish-black when mature.

Distribution: Sri Lanka and the Western Ghats in India.

Note: *Julostylis angustifolia* occurs in semideciduous forests and disturbed habitats, generally below 500 m along the foothills of the Western Ghats of Kerala. It flowers from November to January. This species is unique in having basally triple-nerved, lanceolate leaves with a linear nectary (rather obscure in dried herbarium specimens) at the base of the midrib beneath.

Specimens examined. INDIA: Kerala. Idukki Dt.: Valara R. F. Ramamurthy & Rajan 749798, 74967; Mamalakandam, Bhargavan 90100 (MH). Malappuram Dt.: Ampumala, Pradeep 44980, 44976, Babu 38352 (CALI). Kozhikode Dt.: Jeerakappara, Pradeep 5343 (CALI). Thrissur Dt.: Athirappally, Ramanurthy 75593 (MH). SRI LANKA: CP 1146 (PERAD).

Julostylis ampumalensis Pradeep et Sivarajan sp. nov.

-Type: India, Kerala, Malappuram Dt., Koombara, Ampumala, 20 Jan 1992, Pradeep 44981 (holo, MH; iso, CALI). (Fig. 3)

Julostylis angustifolia et *J. polyandra* connexa a foliis basi 5-nervatis late ovatis apicaliter 3-lobatis, lobis involucellorum elliptico-obtusis manifeste reticulatis calyce multo longioribus, staminum colum-

na subapicaliter antheris 10 praedita facile distinguibilis.

Small trees to 15 m tall; branches slender, terete; young branches, peduncle and pedicel stellately rusty tomentose. Leaf blades 6-16 \times 4-11 cm, broadly ovate, shallowly 3-lobed towards apices, rounded or truncate at base, the lobes ovate-triangular, sinuses rounded, margins subentire to serrulate-wavy, 5-nerved at base, with a single ovate-elliptic nectary near base of the midrib beneath, lateral nerves 2-3 pairs, densely stellately rusty tomentose. Petioles 2-3 cm long. Stipules 5 mm long, equal, linear, minutely stellate hairy, caducous. Flowers pedicellate in axillary and terminal panicles. Pedicel up to 1 cm long. Involucellar bracts 5, 10-13 \times 5-6 mm, elliptic-obtuse, connate at base, prominently nerved, nerves raised outside, minutely stellate hairy, accrescent. Calyx 5-parted, 5 mm long, divided to above the middle, the lobes 6.5 \times 2.5 mm, ovate-acute, much smaller than involucellar bracts, accrescent. Corolla 1 cm in diameter, yellow with a purple centre; petals 5, 8 \times 4 mm, narrowly obovate, connate at base, minutely simple hairy on margins and base. Staminal column 4 mm long, yellow, glabrous, 5-toothed at apex, stamiferous towards middle; anthers 10, 1.2 mm in diameter; filaments 2 mm long, slender, minutely pubescent. Ovary 2-3 locular, ovules one per locule. Style 8 mm long, slender, dilated and densely hirsute towards apices, 2-3 branched, each branch 2 mm long. Stigma peltate, 0.6 mm in diameter, rugose. Fruit 5 mm in diameter, subglobose with an obscure beak at apex, densely stellate tomentose, completely enclosed within accrescent calyx, indehiscent. Seeds 3 \times 2 mm, reniform, concentrically striated, black when mature.

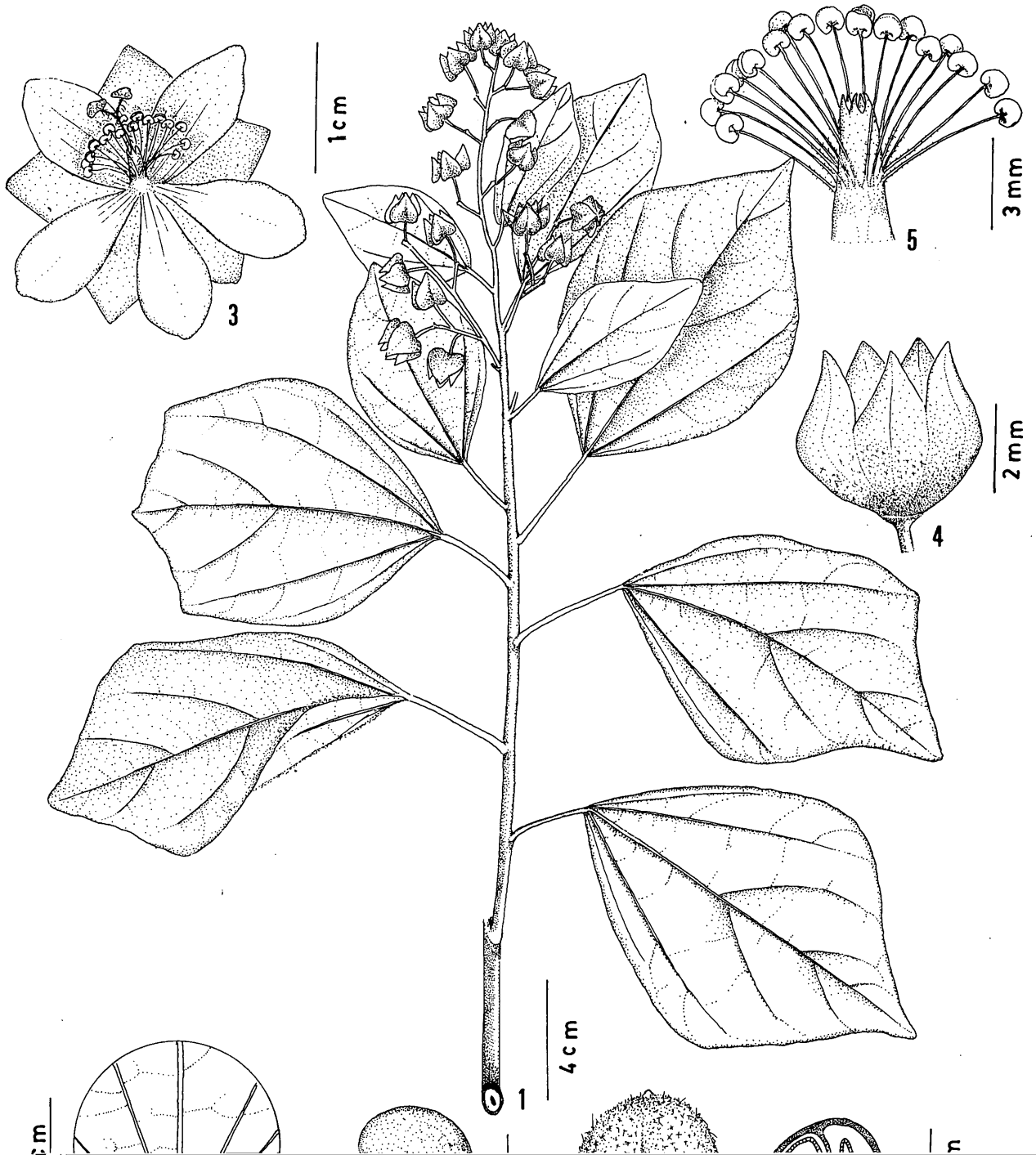
Allied to *J. angustifolia* and *J. polyandra*, *J. ampumalensis*, can easily be distinguished by its basally 5-nerved, broadly ovate, apically three lobed leaves, elliptic-obtuse, prominently reticulate involucellar bracts much exceeding calyx, and staminal column bearing ten anthers subapically.

Distribution: Found only in W. Ghats in Kerala.

Note: *J. ampumalensis* grows in semideciduous forests on the Western Ghats of Kerala, generally below 500 m. It flowers principally from November to January.

Julostylis polyandra Ravi et Anil Kumar, J. Bombay





nat. Hist. Soc. 87: 260. 1990.—Type: India, Kerala, Ravi 2475 (MH, CALI). (Fig. 4)

Medium sized trees to 20 m tall; branches stout, terete; young branches stellately rusty tomentose. Leaf blades 8-20 × 4-10 cm, broadly ovate to rhomboid, weakly 3-angular or occasionally 3-lobed towards apices, truncate or cuneate at base, prominently 5-nerved at base, lateral nerves 3-4 pairs, minutely stellate-puberulent on both surfaces, with 1-3 prominent nectaries on principal nerves beneath, margins subentire. Petioles 1-7 cm long, minutely stellate tomentose. Stipules 3 mm long, linear, stellate pubescent, caducous. Flowers shortly pedicellate, aggregated apically in compact racemes or panicles. Pedicels up to 1.5 cm long, sometimes sessile, minutely stellate pubescent. Involucellar bracts 5, 9 × 8 mm, ovate-triangular, acute to subobtuse at apex, subcordate at base, glabrescent, occasionally with few scattered minute stellate hairs, accrescent. Calyx 5-lobed, 1 cm long, divided to the middle; the lobes 6 × 4 mm, ovate-triangular, as long as the involucellar bracts, minutely stellate tomentose externally and simple hairy internally. Corolla 2 cm in diameter, yellow with a purple centre; petals 5, 2 × 1 cm, narrowly obovate, connate at base, minutely stellate pubescent externally. Staminal column 6 mm long, stamiferous towards middle, 5-toothed at apex, minutely glandular hairy; the filaments slender, 6 mm long, sparsely pubescent, anthers 17-20, 1 mm in diameter. Ovary ovoid, 2-locular, ovules two per locule, one usually abortive. Style 1.5 cm long, slender, exceeding androecium, 2-

density of the indumentum.

Specimens examined. INDIA: Kerala, Thiruvananthapuram Dt.: Ponmudi, *Prabhakaran 1513*, *Sreedharan Nambiar 113*, *Premavally 1315*, *Pradeep 5109*, *Raveendran 313* (CALI). Pathanamthitta Dt.: Kakki, *Pandurangan 79289* (MH). Quion Dt.: *Ravi 2475A* (MH).

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Julostylis Thwaites (錦葵科)之分類訂正，並報導印度產之一新種

A. K. Pradeep and V. V. Sivarajan

Department of Botany, University of Calicut, Kerala, 673 635, India

本文對印度與錫蘭產的 *Julostylis* Thw. 屬植物進行分類訂正。起初本屬被視為單型屬，目前則認為有三種，包括本文所發表之一新種，*J. ampumalensis*。 *Julostylis angustifolia* 分布於斯里蘭卡及南印的 Western Ghats; *J. polyandra* 及 *J. ampumalensis* 則僅分布於 Western Ghats。本文對此三種植物詳加研究，修訂此屬植物原始記載，製作人為簡索表，對特徵詳加描述，並提供植物繪圖及有關之註解。