

A NEW SPECIES OF *MEIOGYNE* (ANNONACEAE) FROM THE EASTERN HIMALAYAS OF NORTHEAST INDIA

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The genus *Meiogyne* is distributed throughout South and Southeast Asia and includes approximately 33 described taxa. A new species, *Meiogyne arunachalensis*, is here described from the state of Arunachal Pradesh, India. This is the third species from India and the first from the Eastern Himalayan and Northeast Indian region. This species shows morphological similarity with *Meiogyne maxiflora*, a species distributed in Thailand, but it differs in a number of vegetative and reproductive characters. *Meiogyne arunachalensis* is the largest species of the genus described so far in terms of tree height and girth of the tree trunk. Detailed colour photographs are provided to highlight its morphological distinctness and facilitate identification in the field.

Keywords. Arunachal Pradesh, Eastern Himalayas, India, *Meiogyne*, new species

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Introduction

The genus *Meiogyne* Miq. (Annonaceae) consists of understory and middle-storey trees, found primarily in tropical lowland and lower montane wet forests. The genus is distributed in South India, South-Central China, Southeast Asia, Australia, Melanesia and Western Polynesia (van Heusden, 1994, 1996; Thomas *et al.*, 2012). Two characters distinguish *Meiogyne* from other genera within the family: (i) longitudinally grooved or verrucose and corrugated outgrowths on the basal part of the adaxial surface of the inner petals; and (ii) apical prolongations on the connectives of the inner whorl of stamens (van Heusden, 1994; Thomas *et al.*, 2012). The first taxonomic revision of *Meiogyne* was carried out by van Heusden (1994) and recognised nine species. Based on molecular data, other genera of Annonaceae have been subsumed within *Meiogyne* (Thomas *et al.*, 2012; Xue *et al.*, 2014; Turner & Utteridge, 2015; Xue *et al.*, 2017). This, coupled with new field and herbarium discoveries, has contributed to a significant increase in the size of the genus, which currently includes approximately 33 species (van Heusden, 1996; Johnson *et al.*, 2019; Xue *et al.*, 2021).

In India, *Meiogyne* is represented by two species, *M. pannosa* (Dalzell) J.Sinclair and *M. ramarowii* (Dunn) Gandhi, both of which are restricted in distribution to the wet forests of the Western Ghats in South India (Turner, 2015). The geographically closest known distribution record of the genus to the Western Ghats is from Chiang Rai province in Thailand, near the Myanmar border, which is represented by *Meiogyne chiangraiensis* Chalermglin & M.F.Liu. Seven more species have been reported from Peninsular Thailand

(Johnson *et al.*, 2019) and two additional species from China, namely *Meiogyne oligocarpa* B.Xue & Y.H.Tan and *M. hainanensis* (Merr.) Bân, which are endemic to the Yunnan and Hainan province, respectively. However, so far, there are no reports of this genus from Northeastern India and Myanmar, which together comprise the junction of the Eastern Himalayan and Indo-Burmese biodiversity hotspots.

Materials and methods

During a recent biodiversity expedition to the Adi Hills of Arunachal Pradesh, a part of the Eastern Himalayan biogeographical zone, a large tree of *Meiogyne* was observed. It showed morphological characters similar to *Meiogyne maxiflora* D.M.Johnson & Chalermglin, a species recently described from Southwestern Thailand (Johnson *et al.*, 2019). However, detailed investigation of vegetative and reproductive characters and comparison with the existing literature on the genus from China, Myanmar and Thailand revealed a number of morphological differences from all its Indo-Burmese congeners. It is therefore described here as a species new to science. This is the first record of the genus from Northeast India and the Eastern Himalayan biodiversity hotspot.

Species description

Meiogyne arunachalensis N.V.Page, sp. nov.

Meiogyne arunachalensis is morphologically similar to *M. maxiflora* D.M.Johnson & Chalermglin in size, shape and texture of leaves; position of the inflorescence; and shape and texture of monocarps. *Meiogyne arunachalensis* is a larger tree, reaching up to 30 m in height with girth exceeding 200 cm (vs height up to 20 m and girth up to 125 cm in *M. maxiflora*), size of the flowers – outer petals up to 6 cm long (vs outer petals up to 3.5 cm long), corrugated patch 1/3 of the inner petal (vs 1/8 of the inner petal), number of carpels 15–18 (vs 4–6), number of seeds 5 in one row (vs 11 in two rows). – Type: India, Arunachal Pradesh, East Siang District, Mebo Taluk, near Sirem (Seram) Village, 28°01'12"N, 95°27'48"E, 144 m, 1 viii 2018, N.V. Page 22202 (holotype BSD; isotypes DD, WII). Figures 1, 2, 3.

Tree to 30 m tall, with conical profile, girth at breast height to 200 cm, branches more or less horizontal or slightly sloping with drooping leaves; bark brown with horizontal segments formed due to lenticels. Twigs densely brown fulvous pubescent, gradually becoming glabrous with maturity. Leaves chartaceous, shiny, dark green adaxially and abaxially, drying olive-green, oblong-elliptic, 18–32 × 5.5–8.5 cm, base obtuse, apex acuminate, acumen 1.4 cm long, glabrous adaxially, densely fulvous pubescent with erect brown hair abaxially; midrib channelled and glabrous adaxially, raised and fulvous pubescent abaxially, secondary nerves 19–24 on either side, more or less parallel but curving gradually towards leaf margin, plane and glabrous adaxially, raised and fulvous tomentose abaxially, tertiary venation



Figure 1. Habit of *Meiogyne arunachalensis* N.V.Page, sp. nov. A, Canopy profile; B, bark texture and pattern of branching from the main trunk; C, outer canopy showing the horizontal to gently sloping nature of branches and the drooping nature of leaves. Photographs: Navendu Page.

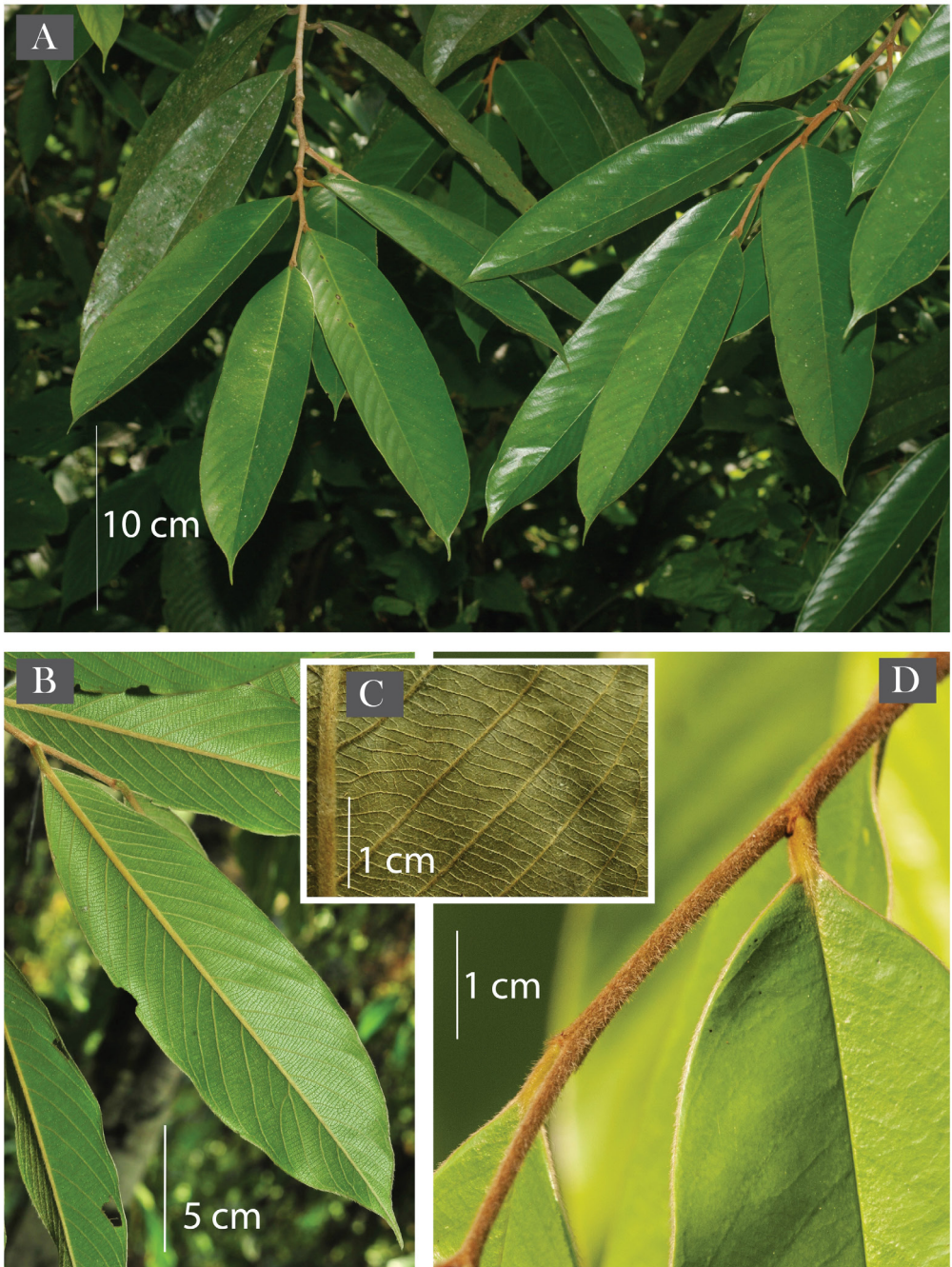


Figure 2. Vegetative characters of *Meiogyne arunachalensis* N.V.Page, sp. nov. A, Adaxial surface of leaves; B, abaxial surface of leaves; C, nature of secondary and tertiary veins on the abaxial surface; D, young branch with fulvous pubescent indumentum. Photographs: Navendu Page.

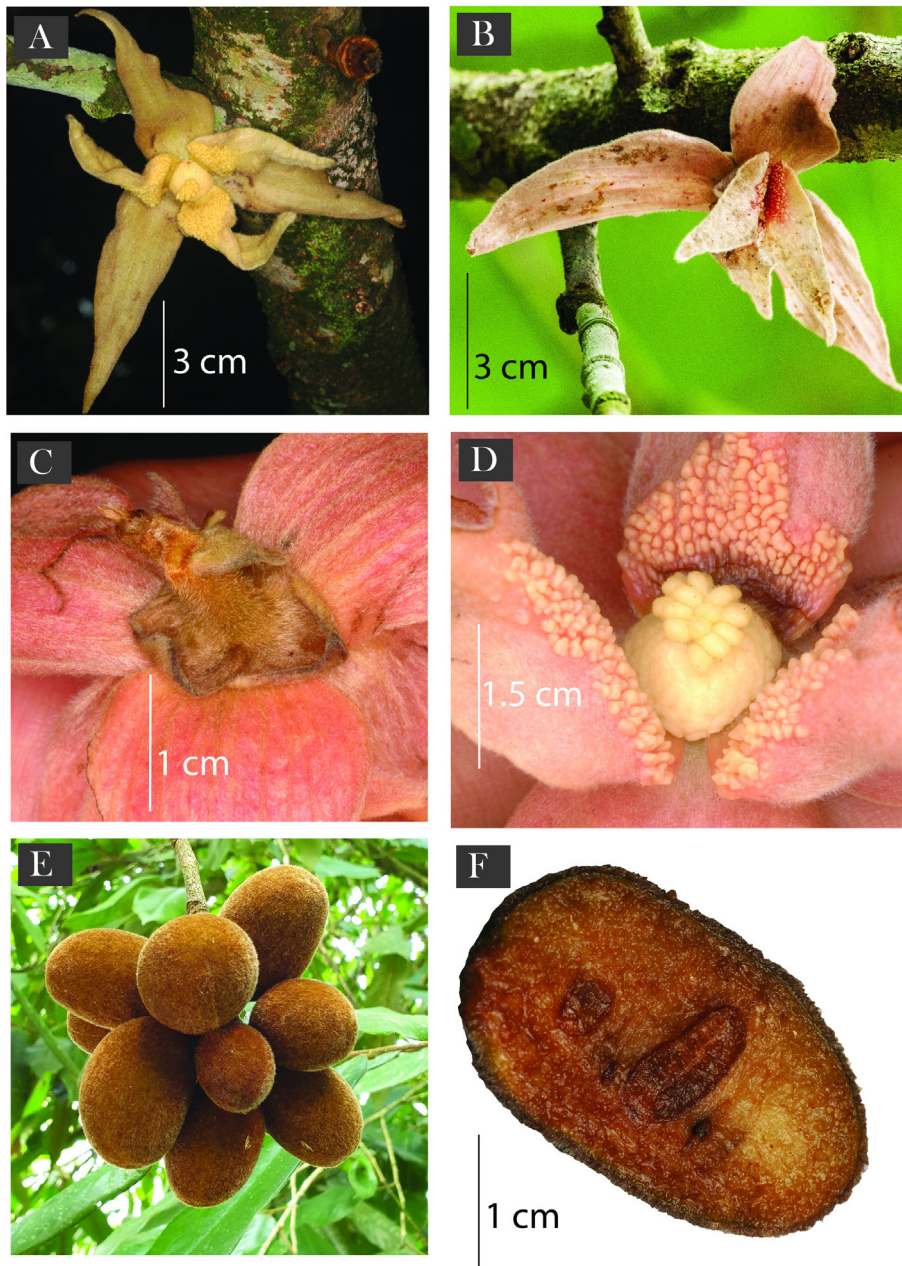


Figure 3. Reproductive characters of *Meiogyne arunachalensis* N.V.Page, sp. nov. A, Flower at early anthesis; B, flower at late anthesis; C, pedicel, bracts and sepals; D, stamens and carpels surrounded by corrugated patch on the adaxial surface of inner petals; E, fruit with ovoid or ellipsoid monocarps; F, longitudinal section of a young monocarp, showing uniseriate arrangement of seeds. Photographs: Navendu Page.

distinct, raised and sparsely pilose abaxially, percurrent; petiole 0.5–0.7 cm long, fulvous pubescent. *Inflorescences* ramiflorous from old branches or axils of fallen leaves, 1-flowered; pedicels 0.8–1.2 cm long, densely fulvous hirsute, with one bract on the proximal half of the pedicel. *Sepals* connate, deltoid, 5–7 × 5–7 mm, densely fulvous pubescent, apex acute, reflexed, margins revolute, brown pubescent abaxially. *Petals* pale yellow turning pink with age *in vivo*, lanceolate; outer petals lanceolate, spreading at anthesis, 5–6 × 1.2–1.6 cm in the middle, apex acute to attenuate, densely silky pubescent with appressed hair up to 2 mm long on adaxial and abaxial surface; inner petal lanceolate, erect or spreading at anthesis, 4–5 × 1–1.3 cm in the middle, apex acute, with a corrugated patch on proximal 1/3 of adaxial surface, densely silky pubescent with appressed hair up to 2 mm long on adaxial and abaxial surface, corrugated patch glabrous. *Stamens* wedge-shaped c.2–2.5 mm long, anther connectives flat, glabrous. *Carpels* 15–18, ovaries c.2.5 mm long, stigmas ellipsoid, c.2 mm long, sparsely setose. *Torus* c.6–7 mm in diameter. *Fruit* of 5–12 monocarps borne on pedicels 1.5 cm long. *Monocarps* sessile, oblong, ovoid or ellipsoid 3–3.5 × 1.5–2 cm, densely covered with short erect brown hair, apex and base rounded. *Seeds* up to 5 per monocarp, in a single row, oblong (young), mature seeds not seen.

Distribution. This species has so far been recorded in the East Siang district as well as the Changlang district in Namdapha National Park of Arunachal Pradesh. It is likely that it may also occur in the intervening districts of Lower Dibang Valley and Lohit, and also in northern parts of Myanmar in areas neighbouring Namdapha National Park.

Habitat and ecology. Low elevation, wet forests between 140 m and 600 m. Observed growing in the remnant patches of forests in the plains along the banks of the River Brahmaputra. This species also occurs in the foothills of the Eastern Himalayas, on the slopes along stream courses and in the primary wet forests. This species is not common anywhere; its occurrence can be classified as rather uncommon or rare. Flowering from September to November and fruiting from November to April.

Etymology. The specific epithet refers to the state of Arunachal Pradesh, where the species is described from and hitherto geographically restricted to.

Proposed IUCN conservation category. The species is currently known from fewer than five locations. Following IUCN guidelines, the area of occupancy (AOO) is estimated to be 20 km². Additionally, continuing decline in the AOO is inferred based on field observations, especially in the plains along the banks of Brahmaputra, where the habitat of this species is declining due to logging and other anthropogenic activities. This species is therefore provisionally assessed as Endangered (B2a,b) until more information on its population and distribution range becomes available.

Notes. The [Table](#) summarises the differences between *Meiogyne arunachalensis* and *M. maxiflora*.

Table. Key characters that distinguish *Meiogyne arunachalensis* N.V.Page, sp. nov. from its morphologically closely related species *M. maxiflora*

Character	<i>M. arunachalensis</i>	<i>M. maxiflora</i>
Tree height	Up to 30 m	Up to 20 m
Outer petal dimensions	5–6 × 1.2–1.6 cm	3–3.5 × 0.5–0.6 cm
Inner petal dimensions	4–5 × 1–1.3 cm	2.6–2.7 × 0.45–0.5 cm
Inner petal shape	Lanceolate	Linear
Relative size of corrugated patch	1/3 of petal length	1/8 of petal length
Petal colour	Light yellow to pink	Cream coloured to light yellow
No. of carpels	15–18	4–6
No. of seeds	5 in one row	11 in two rows

Additional specimens examined. INDIA. Arunachal Pradesh: East Siang District, Paasighat, on the way to Rengging, 28°05'44.2"N, 95°16'50.8"E, 275 m, 5 xi 2020, N.V. Page 22203 (WII).

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References

- Johnson DM, Liu MF, Saunders RMK, Chalermglin P, Chaowasku T. 2019. A revision of *Meiogyne* (Annonaceae) in Thailand, with descriptions of four new species. *Thai Forest Bulletin (Botany)*. 47(1):91–107. <https://doi.org/10.20531/tfb.2019.47.1.13>.
- Thomas DC, Surveswaran S, Xue B, Sankowsky G, Mols JB, Kessler PJA, Saunders RMK. 2012. Molecular phylogenetics and historical biogeography of the *Meiogyne–Fitzalania* clade (Annonaceae): generic paraphyly and late Miocene–Pliocene diversification in Australasia and the Pacific. *Taxon*. 61(3):559–575. <https://doi.org/10.1002/tax.613006>.

- Turner IM. 2015. A conspectus of Indo-Burmese Annonaceae. *Nordic Journal of Botany*. 33(3):257–299. <https://doi.org/10.1111/njb.00689>.
- Turner IM, Utteridge TMA. 2015. A new species and a new combination in *Meiogyne* (Annonaceae) of New Guinea. *Contributions to the Flora of Mt Jaya, XXI*. *Kew Bulletin*. 70:27. <https://doi.org/10.1007/s12225-015-9577-6>.
- van Heusden ECH. 1994. Revision of *Meiogyne* (Annonaceae). *Blumea*. 38:487–511.
- van Heusden, ECH. 1996. The genus *Meiogyne* (Annonaceae) in New Caledonia: four new combinations. *Adansonia*. 18:75–83.
- Xue B, Thomas DC, Chaowasku T, Johnson DM, Saunders RMK. 2014. Molecular phylogenetic support for the taxonomic merger of *Fitzalania* and *Meiogyne* (Annonaceae): new nomenclatural combinations under the conserved name *Meiogyne*. *Systematic Botany*. 39(2):396–404. <https://doi.org/10.1600/036364414X680825>.
- Xue B, Liu MF, Saunders RMK. 2017. The nomenclatural demise of *Oncodostigma* (Annonaceae): the remaining species transferred to *Meiogyne*. *Phytotaxa*. 309(3):297–298. <https://doi.org/10.11646/phytotaxa.309.3.15>.
- Xue B, Shao Y, Xiao C, Liu M, Li Y, Tan Y. 2021. *Meiogyneoligocarpa* (Annonaceae), a new species from Yunnan, China. *PeerJ*. 9:e10999. <https://doi.org/10.7717/peerj.10999>.