A revision of the genus Dehaasia (Lauraceae) in the Indo-Burmese region

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Abstract

A taxonomic revision of the genus Dehaasia Blume is presented for the Indo-Burmese region. Four species are recognized, keyed out and treated with references, type citations, synonymy, flowering and fruiting periods, local names and use, habitat, distribution and the specimens examined. Dehaasia rangamattensis is synonymized under D. kurzii. The report of D. firma from the Andaman Islands is based on a misidentified specimen of D. kurzii. The names Dictyodaphne candolleana (basionym of D. candolleana), D. kurzii, D. rangamattensis and Laurus incrassata (basionym of D. incrassata) are lectotypified. In addition, lectotypification of Cryptocarya cuneata (basionym of D. cuneata), native to Malesia, is appended because the species has often been mistaken for D. candolleana.

Keywords

Taxonomy; lectotypification; misidentification; India; Myanmar

Introduction

The genus Dehaasia Blume comprises about 35 accepted species distributed from China, Northeast India and Southeast Asia to New Guinea (1). The generic name is orthographically conserved against Hassia Blume (2). The genus is characterized by the alternate, pinninnervated leaves, paniculate cymose inflorescences, trimerous bisexual flowers, semipersistent unequal tepals, nine bilocular stamens, the fruits usually subtended by swollen or thickened and sometimes coloured pedicels. It is closely related to Alseodaphne Nees, differing only in the 2-locular rather than 4-locular anthers (3, 4). Hooker (5) revised Dehaasia in erstwhile British India and accepted four species of which three species were shown to be distributed in the Indo-Burmese region. Kostermans (3) presented a synopsis of Dehaasia and accepted 35 species. He (6) eventually described D. assamica from Meghalaya, India. Subsequently Mathew and Lakshminarasimhan (7) reported the occurrence of the Malesian D. fimra Blume from the Andaman Islands. Gangopadhyay (8) described two new species from the area, one from Bangladesh (D. rangamattensis M.Gangop.) and the other presumably from Arunchal Pradesh, India (D. arunachalensis M.Gangop.). He also reported the occurrence of the Malesian species D. incrassata (Jack) Kosterm. in the Nicobar Islands, India. Pandey and Diwakar (9) enumerated the occurrence of 5 species of Dehaasia in the Andaman and Nicobar Islands while Chakrabarty et al. (10) recorded four species in these Islands.

The present revision of Dehaasia in the Indo-Burmese region recog-
nizes four species in the area. A number of confusions and misidentifications have been clarified here and it is hoped that this presentation will be helpful in the accurate identification of the taxa occurring in the region. Five names are also lectotypified.

Materials and Methods

The present investigation was carried out based on the study of literature and available herbarium specimens housed at CAL, G, K, L, MICH, P, PBL and U. Of these, the specimens at CAL and PBL were studied physically whereas the materials of all other herbaria were studied through online resources. The descriptions were prepared based on dried materials except for the flowers, which were expanded by soaking in water for dissection and then measured under an Olympus SZ-61 stereomicroscope. The systematic treatment contains generic nomenclature, citation of type and description. The key to the species is then presented. Detailed nomenclature, typifications and descriptions are provided for each species. The vernacular names and uses, if any, flowering and fruiting periods and distribution of each taxon treated are indicated. Selected specimens examined during the present revision are also cited.

Systematic treatment

Dehaasia Blume in Nees, Syst. Laur. 372. 30 Oct–5 Nov. 1836 (“Hassia”), orth. cons.; Werff in Blumea 46(1): 136. 2001; Hook.f., Fl. Brit. India 5: 125. 1886; Fijrid. et al. in Blumea 65(2): 168. 2020.

Lectotype [designated by Kostermans (11)]: Dehaasia microcarpa Blume [= Dehaasia incrassata (Jack) Kosterm. (Laurus incrassata Jack)].

= Cyanodaphne Blume, Mus. Bot. 1(21): 333. 1851.

Lectotype [designated by Kostermans (11)]: Cyanodaphne cuneata (Blume) Blume (Cryptocarya cuneata Blume) [= Dehaasia cuneata (Blume) Blume].

Shrubs or trees; twigs usually greyish, with prominent leaf scars; terminal buds not perulate. Leaves alternate, crowded near apices of branches, often glaucous beneath, entire, penninerved; petioles channelled above. Inflorescences axillary and subterminal, slender, paniculate-cymose, pedunculate, repeatedly branched; ultimately flowers arranged in dichasia; lateral flowers of dichasia opposite; axis pubescent to glabrous. Flowers: trimerous, bisexual, distinctly stalked; tepals 6, unequal, the outer 3 usually smaller than the inner 3, deciduous or persistent; stamens 9, triseriate; anthers 2-locular, first and second whorls introrse, third whorl extrorse and biglandular (on filaments); ovary sessile; style short or long; stigma simple or peltate. Fruits with thin mesocarp, seated unprotected on pedicels; fruiting pedicels usually thickened and coloured.

Key to the species

1a. Leaf buds (and young shoots) tomentellous ……………
…………………………………………………………………………………D. assamica

b. Leaf buds (and young shoots) sparsely puberulous to glabrous……………………………………………………2

2a. Leaves rounded to obtuse or sometimes apiculate or occasionally acuminate (acumen up to 10 mm long) at apex; fruits globose or sometimes ovoid, 1.5–3 cm long ……………………………………………………D. candolleana

b. Leaves apiculate to acuminate at apex; fruits ellipsoid-oblong to cylindric-oblong, 2–4.5 cm long ………………………………………………………………………3

3a. Leaves cuneate to cuneate-attenuate at base, often glaucous beneath; midrib impressed above; tertiary nerves scalariform-retticate; reticulations of minor nervules often very prominent; fruiting pedicels 0.5–3.5 cm long ……………………………………………………D. kurzii

b. Leaves acute to cuneate at base, not glaucous beneath; midrib flat to slightly raised above; tertiary nerves scalariform; reticulations of minor nervules inconspicuous; fruiting pedicels 3–5 cm long ………………………………………………………………………D. incrassata

Enumeration of taxa

Dehaasia assamica Kosterm. in Adansonia, n.s. 17(1): 91. 1977.

Type

INDIA. Meghalaya, Garo hills, Near Nokrek, 3 August 1950, Thakur Rup Chand 2778 (holotype L0036306, image!, Fig. 1; isotype MIC1104545, image!).

Fig. 1. Holotype of Dehaasia assamica Kosterm. Available at: https://data.biodiversitydata.nl/naturalis/specimen/L%20%200036306
? = Dehaasia arunachalensis M.Gangop. in Bull. Bot. Surv. India 48: 124. 2006.

**Type**

Collection details not available (holotype Arunachal Pradesh Forest Research Institute, Itanagar herbarium) – n.v.

Trees (stature unknown); young shoots brown tomentellous; branchlets blackish, terete, glabrous. Leaves narrowly oblong, elliptic-oblong to oblong-ob lanceolate, 9–25 × 2–6.5 cm, acute to cuneate at base, obtuse and apiculate at apex, chartaceous, glabrous, blackish above when dry, pale brown beneath, not glaucous; midrib impressed above, raised beneath; lateral nerves 8–12 pairs, arcuate, flat and prominent above, raised beneath; tertiary nerves faint above, prominent beneath, scalariform; reticulations of minor nervules faint above, prominent beneath; petioles 1–1.5 cm long, glabrous. Flowers: not seen. Infructescences paniculate, ca 13 cm long. Fruits globose, 1.5–2 cm in diameter; fruiting pedicels slightly thickened, 1–1.3 cm long.

**Fruiting**

July–August.

**Habitat**

Occurring at about 1300 m altitude.

**Distribution**

India (Meghalaya) – endemic.

**Specimens examined**

Known from the type collections only.

**Notes**

Dehaasia assamica was described by Kostermans (6) based on the single specimen of Thakur Rup Chand 2778 from Garo hills, Near Nokrek which was housed at L. A duplicate of this collection is now found to be housed at MICH. Therefore, the specimen at L bearing annotation by Kostermans is the holotype and its duplicate at MICH is the isotype. The above description is based on the study of the images of the type and protologue. Dehaasia arunachalensis was described based on a specimen devoid of any herbarium label. From the description and the drawing, it is evident that this is a synonym of *D. assamica*, and perhaps conspecific, apparently differing only in the somewhat stiffer texture of the leaves. However, as we could not examine the type, it is indicated here as a synonym with a question mark to draw attention of the future workers because occurrence of the species is quite expected in Arunachal Pradesh and the stiffer texture of the leaves may eventually found to be individual variations of a single species only.

Dehaasia candolleana (Meisn.) Kosterm. in Bot. Jahrb. Syst. 93(3): 431. 1973; Chakrab. et al. in Ramakrishna et al., Recent Trends Biodivers. Andaman & Nicobar Isl. 186. 2010, p.p. – Dictyodaphne candolleana Mein. in DC., Prodr. 151(1): 80. 1864. – Endiandra candolleana (Meisn.) Kurz, Forest Fl. Burma 2: 295. 1877.

**Lectotype** (designated here): MYANMAR. Tavoy, 2 December 1827, Wallich 566 (G-DC barcode G00692819 sheet 01, NY00355111, images!).

Alseodaphne grandis sensu Kurz, Forest Fl. Burma 2: 293. 1877, p.p., non Nees, 1831 [Kurz 981 (CAL)].

Dehaasia kurzii King ex Hook.f., Fl. Brit. India 5: 125. 1886, p.p. [Andaman specimens].

Dehaasia cuneata sensu Hook.f., Fl. Brit. India 5: 125. 1886, p.p., quaod syn. Dictyodaphne candolleana, non (Blume) Kurz, 1837.

Dehaasia elongata sensu Hook.f., Fl. Brit. India 5: 126. 1886, non Blume, 1837 [King’s collector s.n. (CAL)].

Trees, 5–20 m high; young shoots sparsely pubescent to glabrous; branchlets greyish or brownish, terete, glabrous. Leaves cuneate-obovate to orbicular-ovobate or occasionally obovate-oblong to oblong-lanceolate or oblong-elliptic, 10–34 × 4–13 cm, cuneate to cuneate-attenuate at base, sometimes decurrent into petioles, rounded to obtuse or sometimes apiculate or occasionally acuminate (acumen 10 mm long) at apex, chartaceous to thinly coriaceous, glabrous, greenish-brown or blackish or chocolate-brown to dark brown above (often glossy) when dry, pale brown, chocolate-brown and often glaucous or glaucescent beneath; midrib sunken or impressed above, raised beneath; lateral nerves slender, 6–12 pairs, straight or arching uniformly, flat and prominent above, raised beneath; tertiary nerves prominent to obscure above, stubby.
prominent to faint beneath, scalariform to percurrent; nerves finely reticulate, prominent to obscure above and beneath; petioles 1–4 cm long. **Panicles** terminal and axillary, 5–16 cm long, glabrous. **Flowers:** pedicels 2–5 mm long; outer tepals deltoid to suborbicular, 0.5–1 × 0.8–1.8 mm; inner tepals broadly ovate to suborbicular, ca 2.5 × 2.3 mm; stamens ca 2.5 mm long; ovary globose, ca 1.5 mm in diameter; style ca 1 mm long. **Fruits** globose or sometimes broadly ovoid, 1.5–3 cm long, 1.5–2.5 cm in diameter, smooth; fruiting pedicels 0.3–1.8 cm long, thickened, fleshy.

**Flowering & fruiting**
January–October.

**Local name**
Burmese: Kyoeokyurthe.

**Habitat**
Scattered in coastal to inland forests up to 200 m altitude in the Andaman Islands and up to 500 m in Myanmar.

**Distribution**
India (Andaman Islands), Myanmar and Thailand.

**Specimens examined**
INDIA. Andaman and Nicobar Islands: Andaman Islands, without precise locality, 9 August 1884, *King’s collector* 108 (CAL0000033733 – syntype of D. kurzii); *ibid.*, 1884, *King’s collector* s.n. (CAL – identified in pencil as Dehaasia kurzii King in King’s own handwriting) – syntype of D. kurzii; *ibid.*, 1884, *King’s collector* s.n. (CAL herb. acc. nos. 551535, 551536, 551537, 551538, 551539, 551540, 551541, 551542, 551543, 551544, 551545, 551546). South Andaman Island, without locality, 8 March 1901, *Heining 382* (CAL). Mount Harriet, s.d., *King’s collector* 68 (CAL). Anikhet, 11 August 1894, *King’s collector* s.n. (CAL). Balughat, 16 July 1892, *King’s collector* s.n. (CAL); *ibid.,* 7 July 1894, *King’s collector* s.n. (CAL). Near east coast of Port Blair, 14 March 1891, *King s.n.* (CAL). MYANMAR. Tenasserim [and Andamans], *Helfer Kew Distrib. No. 4270* (U.1359249); *ibid.,* *Brandis s.n.* (CAL); *ibid.,* Htwetwa, 4 December 1904, *collection’s name illegibile* 445 (CAL herb. acc. no. 551554). Amherst, 11 April 1849, *Palloncr 754* (L.1797148); *ibid.,* 17 September 1827, *Wallrich 2594 C* (CAL, K001116522). Tavoy, 28 April 1921, *Russell 158* (CAL); *ibid.,* s.d., *Russell 158* (CAL); *ibid.,* Boya hill, June 1901, *Mokim 380* (CAL). Pegu, Touqueqhat, s.d., *Kurz 381* (CAL herb. acc. no. 551532). Martaban, s.d., *Kurz 981* (CAL).

**Notes**
Meissner (12) described *Dictyodaphne candollea* from Myanmar and cited “Wallrich in herb. Birman. N. 566, 1610” in the protologue. Kostermans (3) cited two specimens as the type, which was therefore not an effective lectotypification as per Art. 9.3 (2). There are two type specimens at G-DC in fruiting and the better one is designated here as the lectotype. Kochummen (13), while reporting the species from Malaysia, reported the fruits to be ellipsoid. *Dehaasia kurzii*, when described, was a mixture of two species and the Andamans collections cited in the protologue belong here. These specimens (syntypes of D. kurzii) are identified by King in his own handwriting.

**Dehaasia incrassata** (Jack) Kosterm. in J. Sci. Res. (Jakarta) 1: 91. 1952; Backer & Bakh.f., Fl. Java 1: 131. 1964; M.Gangop. in Bull. Bot. Surv. India 48: 152. 2006; Chakrab. et al. in Ramakrishna et al., Recent Trends Biodivers. Andaman & Nicobar Isl. 187. 2010; Fijrid. *et al.* in Blumea 65(2): 171. 2020. – *Laurus incrassata* Jack, Malayan Misc. 2(7): 33. 1822 (incrassatus). – *Machilus incrassata* (Jack) Nees in Wall., Pl. Asiatic. Rav. 2: 70. 1831 (incrassatus). – *Haasia incrassata* (Jack) Nees, Syst. Laur. 376. 1836. – *Persea incrassata* (Jack) Nees, Syst. Laur. 127. 1836.

**Lectotype** (designated here): [icon] Machilus tertia species media in Rumphius, Herb. Amboin. 3: 70, t. 41.1743, Fig. 3. = Haasia microcarpa Blume in Nees, Syst. Laur. 373. 1836. –

**Fig. 3. Lectotype of Laurus incrassata Jack.**

**Dehaasia microcarpa** Blume, Rumphia 1: 162, t. 44. 1837; Hook. f., Fl. Brit. India 5: 126. 1886.

**Lectotype** (designated by Kostermans (3)): INDONESIA. Java, Bantam, Tijitorep, s.coll. (possibly Hasskär) s.n. (L0036319, image!). Additional original material: INDONESIA. Java, without precise locality, *Blume s.n.* (L0926338, image!); Java, Lebak, *Blume s.n.* (L0926346, image!). Java, without precise locality, *von Hasselt s.n.* (L0926345, im-
age!

= Dehaasia media Blume, Rumphia 1: 163. t. 45. 1837.

Lectotype [designated by Fijridiyanto et al. (14)]: INDONESIA. Moluccas, Ambon, s.d., s.coll. s.n. (L0036322, image); isolecotypes L0036323, L0036324, images!).

Dehaasia candelleana sensu B.K. Sinha, Fl. Great Nicobar Isl. 365. 1999, non (Meisn.) Kosterm., 1973.

Tree, 5–20 m high; bark light brown; young shoots sparsely puberulous to glabrous; branchlets greyish, terete, glabrous. Leaves oblong-elliptic (or narrowly so) to obovate, 11–23 (–34) × 4–9 (–11) cm, acute or cuneate at base and sometimes slightly decurrent into petioles, acuminate (acumen 5–20 mm long, mostly acute) at apex, chartaceous to thinly coriaceous, glabrous; branchlets greyish, te- rete, glabrous. Panicles 4–10 cm (ca 15 cm in fruiting) long; axis sparsely puberulous to glabrous. Flowers: pedicels 2.5–4 mm long; outer tepals deltoid to suborbicular, ca 1 × 1.5 mm; inner tepals wide ovate to suborbicular, 2–3 × 1.8–2.5 mm, glabrous; stamens ca 2.5 mm long; ovary ovoid, ca 1 mm long; style ca 1.5 mm long. Fruits oblong-ellipsoid, ca 3.5 × 2 cm, rounded at apex; fruiting pedicels fleshy, 3–5 cm long, red when fresh.

Flowering & fruiting
March–October.

Habitat
Common on the edges of forests or inland forests up to 200 m altitude.

Distribution
India (Nicobar Islands), Thailand and throughout Malesia.

Specimens examined
INDIA. Andaman and Nicobar Islands: Katchal Island, Way to Jula, 13 August 1974, P.Chakraborty 2068 (CAL, PBL); West Bay, Delhi village, 14 June 1977, P.Chakraborty 6038 (CAL, PBL); Great Nicobar Island: 27 km on North-South Road, 7 March 1980, Dwivedi 7916 (CAL, PBL); 40 km on East-West Road, 24 September 1980, Hore 8201 (CAL, PBL); Laful forest, 10 May 1981, Dwivedi 8530 (CAL, PBL); ibid., 4 June 1981, Hore 8728 (CAL, PBL).

Notes
Jack (15) described Laurus incrassata based on his collections from Natal, Bencoolen in Sumatra and cited “Machilus medius. Rumph: Amb: 111. p. 70. T. 41”. Thus, the Rumphius drawing cited by Jack also belongs to original materials. As most of Jack’s collections were destroyed by fire during transit to Europe (1, 16, 17), we designate here the Rumphius drawing as lectotype in the absence of herbarium specimens collected by Jack. The neotype of Laurus incrassata designated by Fijridiyanto et al. (14) becomes redundant herewith as per Art. 9.19 (2). Further, the lectotypification of Hassia microcarpa by Fijridiyanto et al. (14) is also superfluous because of an earlier effective lectotypification (3). However, in case of D. media, Kostermans (3) cited a specimen and drawing as the type which is not an effective lectotypification.

Dehaasia kurzii King ex Hook.f., Fl. Brit. India 5: 125. 1886; C.E. Parkinson, Forest Fl. Andaman Isl. 228. 1923.

Lectotype [first-step, designated by Kostermans (3)]: MYANMAR. Tenasserim, Helfer Kew Distrib. No. 4272 (BO, CAL, K, P); second-step (designated here): MYANMAR.
Typification of Cryptocarya cuneata

**Dehaasia cuneata** (Blume) Blume, Rumphia 1: 164. 1837; Fijird. et al. in Blumea 65(2): 171. 2020. – *Cryptocarya cuneata* Blume, Bijdr. Fl. Ned. Ind., Pt. 11: 558. 1826. – *Haasia cuneata* (Blume) Blume in Nees, Syst. Laur. 378. 1836. – *Cyanodaphne cuneata* (Blume) Blume, Mus. Bot. 1: 334. 1851.

**Lectotype** (designated here): INDONESIA. Java [Nusa Kambang], s.d., *Blume s.n.* (L0036313, image!, Fig. 5). Additional original material: INDONESIA. Java, Nusa Kambang, s.d., CAL0000033950). The lectotype bears pencil drawings of flowers by Hooker. The remaining syntypes of *D. kurzii* from the Andaman Islands, India represent *D. candolleana*. Thus, *D. kurzii*, when described, was a mixed assemblage and the present lectotypification narrows it to a single element, enabling unambiguous use of the name. In the case of *D. rangamattensis*, Gangapadhyay (8) cited “J.S. Gamble 7969 (CAL)” as the holotype in the protologue. This collection, Gamble 7969, consists of two duplicates at CAL and these two specimens are syntype under Art. 40.2 Ex. 3 (2). Therefore, we designate here one of the sheets (CAL0000033951) as the lectotype. The report of *D. firma* by Mathew & Lakshminarasimhan (7) is based on a specimen of *D. kurzii*.

**Fig. 5.** Lectotype of *Cryptocarya cuneata* Blume. Available at: https://data.biodiversitydata.nl/naturalis/specimen/L%20%200036313
Notes
The protologue of Cryptocarya cuneata cites the locality as “In sylvis Insulae Nusae Kambangae” (18). Kostermans (3) cited the type as “Typus: BLUME, Java, Nusakambangan, fl. (L).” Fijridiyanto et al. (14) cited the type as “Type: Blume s.n. (holo L0036313; iso L00336315), [Indonesia] Java, Nusa Kambangan.” It may, however, be mentioned that there are two specimens at L from Nusa Kambang, Java, collected by Blume (L0036315, L0926399), which may be regarded as the uncited original material of the name (Art. 9.4) (2). The third specimen (L0036313, image!) although not bearing the specific locality, was identified by Blume in his own handwriting as “Cryptocarya cu- neata Bl.” Thus this specimen is also the original material of the name. All these specimens bear annotations by Kostermans. As these specimens do not represent a single gathering, the citation by Kostermans (3) cannot be accepted as the first-step lectotypification as per Art. 9.17 and 9.19 (2). Hence, the best flowering specimen out of these three is designated here as lectotype of C. cuneata.

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Authors contributions
All authors have equally contributed in the planning the research and preparation of the manuscript.

Compliance with ethical standards
Conflict of interest: The authors declared that they have no conflict of interest.
Ethical issues: None.

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