

Garcinia cambogioides, the correct name for *G. morella* (Clusiaceae), its taxonomy, typification and notes on the status of *G. pictoria*

Shameer P.S.¹ & N. Mohanan^{1&2*}

¹Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Palode, Thiruvananthapuram, Kerala – 695 562, India.

²M S Swaminathan Research Foundation, Wayanad, Kerala – 673 577, India.

*E-mail: nmohanan59@gmail.com

Abstract: The priority of the name *Garcinia cambogioides* (Murray) Headland over *G. morella* (Gaertn.) Desr. is established. Further, *G. pictoria* Roxb. is reduced as a variety under *G. cambogioides* as var. *pictoria* (Roxb.) P.S.Shameer & N.Mohanan. Typification of the name *G. cambogioides* is also done, in accordance with the latest nomenclature code.

Keywords: Clusiaceae, *Garcinia*, India, Taxonomy, Typification.

Introduction

The genus *Garcinia* L. (Clusiaceae), with c. 250 species of trees and shrubs, has a pantropical distribution with species richness in Southeast Asia, Indian subcontinent and Tropical Africa (Rogers & Sweeney, 2007; Shameer *et al.*, 2016). The genus is represented in India by 31 species and 5 varieties (Maheshwari, 1964; Shameer *et al.*, 2016, 2017), distributed mainly in the three centres of diversity, Northeast India, the Western Ghats and Andaman and Nicobar Islands.

During the taxonomic studies on the genus *Garcinia* in India, we came across a nomenclatural ambiguity in the species *G. morella* (Gaertn.) Desr., which is resolved here. Taxonomic uncertainty has also been observed in *Garcinia pictoria* Roxb. While some authors (Wight, 1839; Choisy, 1851; Planchon & Triana, 1860; Vesque, 1893) consider *G. pictoria* as

a distinct species, many others (Anderson, 1874; Dunn, 1915) consider it as synonymous to *G. morella*, and also elucidated the close relationship between both species.

Nomenclature

In all hitherto literature (Anderson, 1874; Dunn, 1915; Maheshwari, 1964; Saldanha & Nicolson, 1976; Dassanayake & Fosberg, 1980; Singh, 1993; Arisdason & Daniel, 2005) and databases of plant names (The Plant List, World Flora Online), *G. morella* (Gaertn.) Desr. is treated as correct name of the taxon, and names such as *G. cambogioides* (Murray) Headland, *G. gutta* Wight, *Stalagmitis cambogioides* Murray, and *Hebradendron cambogioides* (Murray) Graham are treated as synonyms under *G. morella*.

On perusal of protologues of these names, we found that the combination *G. cambogioides* (Murray) Headland (1856) was based on the name *Stalagmitis cambogioides* Murray (1789), whereas *G. morella* (Gaertn.) Desr. (1792) was based on *Mangostana morella* Gaertn. (1790). After detailed studies and consultation with nomenclatural experts, we conclude that the priority of the epithet *cambogioides* starts from *Stalagmitis cambogioides* (Murray, 1789), whereas that of *morella* starts from *Mangostana morella* (Gaertner, 1790). Therefore, nomenclatural change is effected for the taxon as *G. cambogioides* Headland and the name *G. morella* is synonymised, since the former has priority over the latter as per the Code (Thurland *et al.*, 2018).

Status of *Garcinia pictoria*

Roxburgh (1832) described the species *G. pictoria*, based on a collection by Samuel Dyer from Wayanad district, Kerala. Wight (1839), Choisy (1851), Vesque (1893) and Planchon and Triana (1860) followed Roxburgh in recognising the species as a distinct one, whereas Anderson (1874) and Dunn (1915) considered it as synonymous to *G. morella*. Maheshwari (1964) treated it as a distinct species, with a note that “the species is closely allied to *G. morella* and scarcely distinguishable except by the female flowers”. Singh (1993) also considered it distinct, but commented that “this species is

closely allied to *G. morella*, under which it is sometimes sunk”. Arisdason and Daniel (2005) followed Roxburgh and Maheshwari (1964) for inclusion of *G. pictoria* in their treatment. Headland (1856), who made the combination *G. cambogioides* had treated *G. pictoria* as a distinct species, with the help of illustrations of both species (Fig. 1).

During the present study, we collected specimens of *G. pictoria* from the type locality Wayanad and compared it with *G. cambogioides* (= *G. morella*). Except for the difference in number and structure of staminal mass, staminodes and stigmatic lobes (Fig. 2), both species are similar in all other

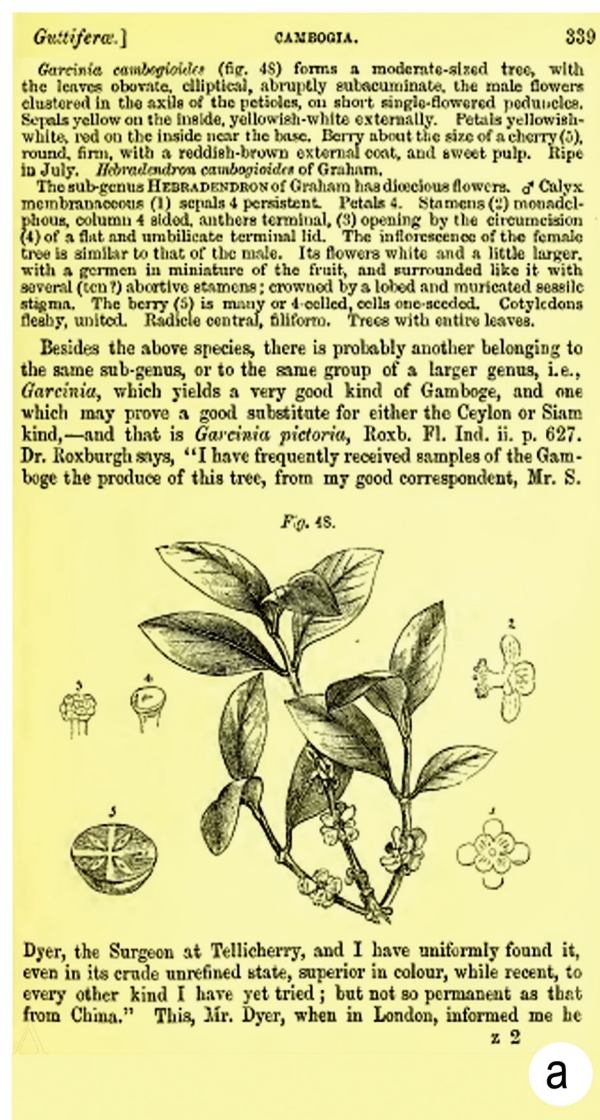


Fig. 1. a. Protologue of *Garcinia cambogioides* (Murray) Headland; b. *Garcinia pictoria* Roxb. Reproduced with permission.

characters such as habit, texture of bark, colour of exudate, size and shape of leaves, flowers, fruits and seeds. Considering these, *G. pictoria* is reduced as a variety under *G. cambogioides*, rather than merging with it.

Taxonomy and typification

Garcinia cambogioides (Murray) Headland, Man. Mater. Med. Therap. ed. 3: 339, f. 48. 1856. *Stalagmitis cambogioides* Murray, Commentat. Soc. Regiae Sci. Gott. 9: 173. 1789; G. Don, Gen. Syst. 1: 621. 1831. *Lectotype* (first-step designated by Maheshwari, 1964; second-step designated here): SRI LANKA, *s.d.*, Hermann 195 (BM [BM000621661 digital image!]).

Garcinia morella (Gaertn.) Desr. in Lam., Encycl. 3: 701. 1792; T. Anderson in Hook.f., Fl. Brit. India 1: 204. 1874; Dunn in Gamble, Fl. Madras: 74. 1915; Maheshw., Bull. Bot. Surv. India 6: 135. 1964; N.P. Singh in B.D. Sharma & Sanjappa, Fl. India 3: 119. 1993. *Mangostana morella* Gaertn., Fruct. Sem. Pl. 2: 106, t. 101. 1790.

Hebradendron cambogioides (Murray) Graham, Compan. Bot. Mag. 2: 199, t. 27. 1836.

Garcinia gutta Wight, Ill. Ind. Bot. 1: 126. 1840.

Dioecious, evergreen trees, up to 18 m tall; bark brownish-grey or brown to dark brown, smooth; blaze deep yellow; exudation deep yellow or orange-yellow, sticky; branches spreading with pendulous tips; branchlets quadrangular, glabrous. Leaves opposite, elliptic, ovate or obovate, 10–15 × 4–8 cm, acute or cuneate at base, revolute and wavy at margins, obtuse to shortly obtuse-acuminate at apex, coriaceous, glabrous; midrib raised on both sides, more conspicuous below; lateral veins 8–12 pairs on either side of midrib, inconspicuous; exudate canals inconspicuous on both surfaces; petioles 8–10 mm, with longitudinal ridges, glabrous, adaxially ligulate at the base. Male flowers tetramerous, axillary or on axils of fallen leaves, fascicled, *c.* 3-flowered, 1–1.2 × 5–10 mm, sessile or shortly pedicelled (4–6 mm), stout; sepals free, orbicular or elliptic, convex, 4–6 × 2–4 mm

(inner pair comparatively larger), coriaceous; petals free, white to pink, suborbicular, 5–8 × 4–6 mm, membranous, glabrous; stamens *c.* 25, in a central tetragonous mass; filaments short, obconic, free at apex; anthers red, orbicular, flattened, peltate, plurilocular, dehiscence circumscissile or transverse; rudimentary pistil absent. Female flowers tetramerous, axillary, solitary, *c.* 1 × 0.5 mm, sessile; sepals free, orbicular, convex, *c.* 5 mm, all equal, coriaceous, glabrous, margins membraneous; petals free, ovate, 5–6 × 3–5 mm, glabrous, pink; staminodes 12–14, fascicled, each fascicle with 3–5 staminodes and arranged in a ring round the ovary; filaments slender, split, glabrous; ovary subglobose, glabrous, 4-locular; stigma peltate, serrately many-lobed, coronate, tubercled, persistent. Berries subglobose, rarely globose, 2.5–3 × 2–3 cm, smooth, yellow with reddish tinge, contains much yellow resins, crowned by 4, round, confluent papillate stigma. Seeds 3 or 4, ovoid-reniform, *c.* 1.5 cm long, laterally compressed, muricate, dark brown.

Key to the varieties

1. Stamens *c.* 25, in a tetragonous mass; staminodes 12–14; filaments connate into 3–5 bundles round the ovary; stigma serrately many-lobed var. *cambogioides*
1. Stamens 35–40, in a subglobose mass; staminodes *c.* 20; filaments connate into an entire sheath round the ovary; stigma roughly 4-lobed var. *pictoria*

Garcinia cambogioides (Murray) Headland var. *cambogioides* Fig. 3

Flowering & fruiting: Flowering from November to December; fruiting from July to August.

Habitat: Evergreen and semi-evergreen forests, up to 1100 m, commonly found on stream sides.

Distribution: Sri Lanka, Bangladesh and India.

Specimens examined: INDIA, Arunachal Pradesh, East Siang district, Pasighat, 05.03.1912, I.H. Burkill 36754 (CAL). Karnataka, Chikkamagaluru district, Kemmengunda, 1425 m, 01.12.1983, K.V. Asha 1299 (CALI); Saingeri, 850 m, 09.11.1983,

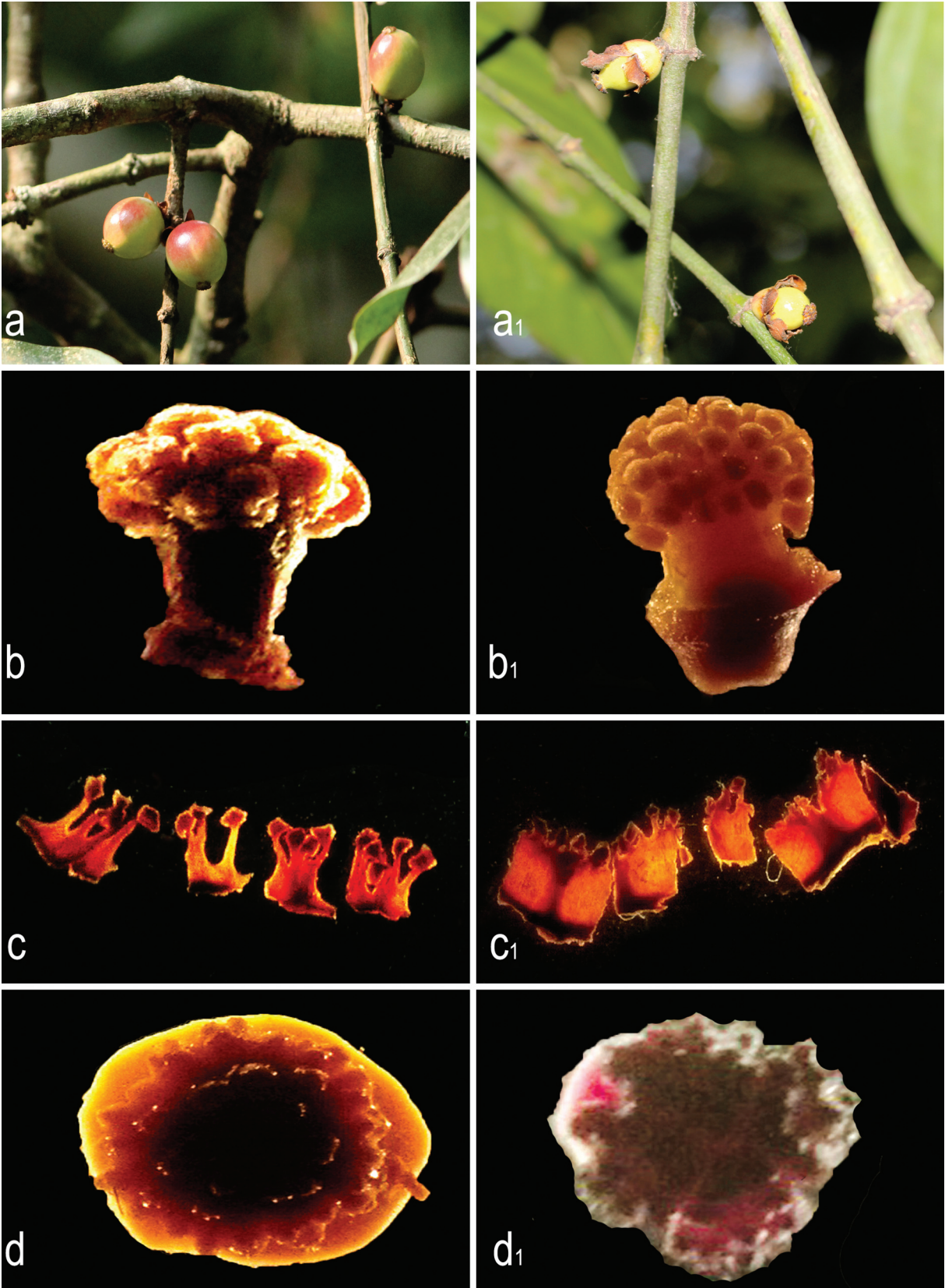


Fig. 2. Morphological differences between the two varieties of *Garcinia cambogioides* (Murray) Headland. **a–d:** *G. cambogioides* (Murray) Headland var. *cambogioides*. **a.** Fruits; **b.** Staminal mass; **c.** Staminodes; **d.** Stigma (cross section). **a1–d1:** *G. cambogioides* var. *pictoria* (Roxb.) P.S. Shameer & N. Mohanan. **a1.** Immature fruits; **b1.** Staminal mass; **c1.** Staminodes; **d1.** Stigma (cross section) (photos by P.S. Shameer).



Fig. 3. Lectotype of *Garcinia cambogioides* (Murray) Headland (BM000621661) © The Natural History Museum (BM). Reproduced with permission.

V.A. Vasantha 1040 (CALI); Horanadu R.F., near Jain temple area, 27.02.1984, *E. Vajravelu* 77872 (MH); Shimoga district, Agumbe, 850 m, 28.11.1983, *M.S. Francis* 1040 (CALI); *ibid.*, *K. Shanthi* 1041 (CALI). **Kerala**, Kollam district, Kulathupuzha (Colaturpolay), 23.01.1896, *T.F. Bourdillon* 734 (FRC); Kulathupuzha, Aripa, 150 m, 03.08.1981, *N. Sasidharan* 1470 (KFRI); Naduvannorkadavu near Choodal bridge, 02.06.1964, *K.N. Subramanian* 1548 (FRC); Malappuram district, Thalichola, 10.04.1982, *Philip Mathew* 28439 (CALI); Karuvarakundu, 16.06.1982, *Philip Mathew* 33368 (CALI); Nilambur, Nadukani, 525 m, 14.02.1985, *N. Sasidharan* 3342 (KFRI); Palakkad district, way to Silent Valley Dam, 28.06.1976, *P. Bhargavan* 47238 (MH); Mukkali forest, 05.11.1976, *E. Vajravelu* 48852 (MH); Silent Valley, R.F. above Dam site 09.04.1978, *N.C. Nair* 56703 (MH); Way to Aruvampara Estate, 24.04.1980, *V.J. Nair* 67281

(MH); Dam site to Valiyaparathode, 05.12.1980, *N.C. Nair* 69118 (MH); Attappady, Manthampotti, +500 m, 15.11.1985, *N. Sasidharan* 3615 (KFRI); Silent Valley National Park, MPCA, 08.03.2003, *C. Kunhikannan & N. Venkatasubramanian* 14833 (FRC); Silent Valley, Wallakkadavu, 02.02.1994, *Jomy Augustine* 13193 (KFRI); *ibid.*, 18.11.2014, *P.S. Shameer* 79660 (TBGT); *ibid.*, 16.12.2014, *P.S. Shameer* 79665 (TBGT); Thirussur district, Chalakkudy, Palapitty range, 24.02.1982, *K.N. Subramanian* 7974 (FRC); Chalakkudy, Kodakkalthodu, Palapitty range, 24.02.1982, *K.N. Subramanian* 7989 (FRC); Peechi, Vengappara, +425 m, 19.12.1988, *N. Sasidharan* 5045 (KFRI); Thiruvananthapuram district, Bonacord, 29.05.1989, *N. Mohanan* 8416 (TBGT); Attayar, 02.03.1991, *N. Mohanan* 10564 (TBGT); Chemmunjii Hills, 22.01.2014, *P.S. Shameer* 79610 (TBGT); Wayanad district, Kambamala, Begur Range, 06.05.1983, *N. Venkatasubramanian* 9370 (FRC). **Tamil Nadu**, Coimbatore district, Iyyerpadi, 20.02.1901, *C.A. Barber* 3831 (MH); Anamalais, 28.10.1901, *C.A. Barber* 3874 (MH); Udumanparai, Anamalais, 03.05.1903, *C.A. Barber* 5760 (MH); Thirunelveli district., Kannikatty, 19.03.1917, *s.coll.* 14653 (MH). **SRI LANKA**, *s.loc.*, *s.d.*, *s.coll.* 60488 (MH); *s.loc.*, March 1883, *s.coll.* 60489 (MH).

Typification: Murray (1789), Gaertner (1790), Desrousseaux (1792), Graham (1836), Wight (1839) and Headland (1856) did not cite any specimens. Maheshwari (1964) cited 'Type: *Hermann*, Ceylon (BM)'. Headland (1856) also mentioned the name of Hermann, and that the plant was first made known from Ceylon by him in 1670. On perusal of BM collections we found two specimens of *Hermann* 195 (BM000621661 and BM00621719 digital images!) and could not determine which among the two is mentioned by Maheshwari as the type. As per Art. 9.17 of the nomenclature code (Turland *et al.*, 2018), Maheshwari's typification could be considered as first-step lectotypification and need narrowing down to a single one of these specimens by subsequent lectotypification. Hence we designate *Hermann* 195 (BM000621661) as lectotype (second-step), for *Garcinia cambogioides*

and the other (BM00621719) consequently as isolectotype.

***Garcinia cambogioides* (Murray) Headland var. *pictoria* (Roxb.) P.S.Shameer & N.Mohan, comb. nov.**

Fig. 4

Garcinia pictoria Roxb., Fl. Ind. 2: 627. 1832; Wight, Icon. Pl. Ind. Orient. 1(6–8): t. 102. 1839; Choisy, Mem. Soc. Phys. Geneve 12: 417. 1851; Headland, Man. Mater. Med. Therap., ed. 3: 340, f. 49. 1856; Planch. & Triana, Ann. Sci. Nat. Bot. ser. 4, 14: 355. 1860; Drury, Indian Fl. 1: 141. 1864; Bedd., Fl. Sylv. S. India 7–14: tt. 86–87. 1871; Pierre, Fl. Forest. Cochinch. 32: t. 85B. 1883; Vesque in A.D.C., Monogr. Phan. 8: 476. 1893; Gamble, Man. Ind. Timb. 55. 1902; Brandis, Indian Trees 53. 1906; Sealy, Kew Bull. 11(2): 341. 1956; Mabb., Taxon 26(5–6): 529. 1977. *Hebradendron pictorium*

(Roxb.) Royle, Man. Mater. Med. 305. 1847. *Type*: INDIA, **Kerala**, Wayanad, *s.d.*, Samuel Dyer *s.n.* (holo BM [BM000611609 digital image!]).

Evergreen trees, up to 20 m tall, with conical crown. Leaves elliptic-ovate, 8–10 × 3–5 cm, acute or attenuate at base, entire at margins, acute at apex. lateral veins conspicuous, *c.* 20 pairs on either side of midrib. Male flowers axillary, solitary. Female flowers axillary. Fruits oblongoid or subglobose, 3–5 × 1.5–2 cm, smooth, reddish when ripe, crowned by 4-lobed, confluent verrucose, tubercled stigma. Seeds oblong-reniform.

Flowering & fruiting: Flowering from November to December; fruiting from May to June.

Habitat: In evergreen forests, above 900 m; on stream side.

Distribution: Endemic to southern Western Ghats.

Specimens examined: INDIA, **Karnataka**, Uttara Kannada district (North Kanara), 02.01.1892, *s.coll.* 2662 (CAL). **Kerala**, Wayanad district, Puthoorvayal, Manikunnu Mala, 25.07.2012, P.S. Shameer 86640 (TBGT); Kuruva Island, 20.11.2014, P.S. Shameer 79656, 79657 (TBGT).

Typification: Roxburgh while describing *G. pictoria* (1832) acknowledged the help of Samuel Dyer, a surgeon at Tellicherry (in Kannur district of Kerala), who had collected the specimen and provided it for study. Maheshwari (1964) mentioned 'Type locality: Wynaad, Western Ghats (ex Roxb.)' but no specimen was cited. We could locate one relevant specimen at BM, collected from Waynad by Samuel Dyer (BM000611609 digital image!). Since this is the only specimen available, this could probably be the holotype.

Acknowledgements

Authors are thankful to the Kerala Forest Department for financial support and assistance in the field and University of Kerala for providing financial support as fellowship for Ph.D. Scholars. Thanks are due to Dr. K.N. Gandhi (Harvard University) and Dr. Subir Bandhopadya (CAL),



Fig. 4. Holotype of *Garcinia cambogioides* var. *pictoria* (Roxb.) P.S.Shameer & N.Mohan (BM000611609) © The Natural History Museum (BM). Reproduced with permission.

nomenclatural experts for their valuable advises in nomenclature. We thank the Director, JNTBGRI, for constant encouragements and facilities provided and the curators of Herbaria BM, CAL, K, KFRI, MH and TBGT for providing permission for access to their collections.

Literature Cited

- ANDERSON T. 1874. Guttiferae. In: HOOKER J.D. (ed.), *The flora of British India*. Volume 1. L. Reeve & Co., London. pp. 259–278.
- ARISDASON W. & P. DANIEL 2005. Guttiferae (Clusiaceae). In: DANIEL P. (ed.), *The Flora of Kerala*. Volume 1. Ranunculaceae – Connaraceae. Botanical Survey of India, Kolkata. pp. 328–353.
- CHOISY J.D. 1851. Description des Guttifères de l'Inde. *Mémoires de la Société de Physique et d'Histoire Naturelle de Genève* 12: 381–440.
- DASSANAYAKE M.D. & F.R. FOSBERG 1980. *A revised handbook to the flora of Ceylon*, Volume 1. Oxford & IBH Publishing Company, New Delhi.
- DESROUSSEAU L.A.J. 1792. In: LAMARCK J. (ed.), *Encyclopédie Méthodique, Botanique*. Volume 3. Panckoucke, Paris. p. 701, t. 405, f. 2.
- DUNN S.T. 1915. Guttiferae. In: GAMBLE J.S. (ed.), *Flora of the Presidency of Madras*. Volume 1. Adlard & Sons Ltd., London. pp. 71–77.
- GAERTNER J. 1790. *De Fructibus et Seminibus Plantarum*. Volume 2. G.H. Schramm, Tubingen.
- GRAHAM R. 1836. Remarks on the gamboge tree of Ceylon, and the character of *Hebradendron*, a new genus of Guttiferae, and that to which the tree belongs. *Companion to the Botanical Magazine* 2(19): 193–200.
- HEADLAND F.W. 1856. Medicinal plants, from Ranunculaceae to fungi. In: ROYLE J.F. (ed.), *A manual of materia medica and therapeutics*. Third edition. J. Churchill, London. pp. 266–698.
- MAHESHWARI J.K. 1964. Taxonomic study of Indian Guttiferae III. The genus *Garcinia* L. *s.l.* *Bulletin of the Botanical Survey of India* 6: 107–135.
- MURRAY A.J. 1789. *Commentatio de arboribus gummi-guttae fundentibus. Commentationes Societatis Regiae Scientiarum Gottingensis. Gottingae* 9: 169–184.
- PLANCHON, J.É. & J.J. TRIANA 1860 Mémoire sur la famille des Guttifères. *Annales des Sciences Naturelles (Botany)*, Series 14: 226–367.
- ROGERS Z.S. & P.W. SWEENEY 2007. Two distinctive new species of Malagasy *Garcinia* (Clusiaceae). *Systematic Botany* 32: 772–779. <https://doi.org/10.1043/07-22.1>
- ROXBURGH W. 1832. *Flora Indica, or descriptions of Indian plants*. W. Thacker & Co., Kolkata.
- SALDANHA, C.J. & D.H. NICOLSON 1976. *Flora of Hassan District, Karnataka, India*. Amerind Publishers, New Delhi.
- SHAMEER P.S., RAMESHKUMAR K.B. & N. MOHANAN 2016. Diversity of *Garcinia* species in the Western Ghats. In: RAMESHKUMAR K.B. (eds.), *Diversity of Garcinia species in the Western Ghats: phytochemical perspective*. Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram. pp. 1–18.
- SHAMEER P.S., SABU T. & N. MOHANAN 2017. *Garcinia gamblei*, a new species from the southern Western Ghats, India. *Phytotaxa* 297(1): 71–76. <https://doi.org/10.11646/phytotaxa.297.1.7>
- SINGH N.P. 1993. Clusiaceae (Guttiferae *nom. alt.*) In: SHARMA B.D. & N.P. BALAKRISHNAN (eds.), *Flora of India*. Volume 3. Botanical Survey of India, Kolkata. pp. 86–151.
- TURLAND N.J., WIERSEMA J.H., BARRIE F.R., GREUTER W., HAWKSWORTH D.L., HERENDEEN P.S., KNAPP S., KUSBER W.H., LI D.Z., MARHOLD K., MAY T.W., MCNEILL J., MONRO A.M., PRADO J., PRICE M.J. & G.F. SMITH (eds.) 2018. *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. Regnum Vegetabile 159. Koeltz Botanical Books, Glashütten. <https://doi.org/10.12705/Code.2018>.
- VESQUE J. 1893. Guttiferae. In: CANDOLLE C. (ed.), *Monographiae Phanerogamarum*. Volume 8. Sumptibus G. Masson, Paris. pp. 1–669.
- WIGHT R. 1839. *Icones Plantarum Indiae Orientalis*. Volume 1(6). J.B. Pharoah, Madras.