



Taxonomy of *Andrographis rothii*: A stenoendemic species from the southern Western Ghats, Tamil Nadu, India with notes on lectotypification and identity of *A. lobelioides* var. *composita* (Acanthaceae)

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Abstract

The taxonomy of *Andrographis rothii* C.B. Clarke is discussed here with a detailed description, illustrations, colour photographs and distribution map. Besides, the name *A. lobelioides* (Wall. ex Nees) Wight var. *composita* C.B. Clarke is lectotypified and relegated to a heterotypic synonym of *A. rothii*.

Keywords: Acanthaceae, *Andrographis rothii*, stenoendemic, heterotypic synonym, lectotype, Tamil Nadu

Introduction

Recent taxonomic studies on certain plant families and genera in India suggested that there are many unjustifiable accepted varieties in *The Flora of British India* and too many species described in the recent years are based on inadequate knowledge of variation, misidentifications and ignorance of critical observation and detailed study (Arisdason & Daniel, 2010; Dey & Prasanna, 2010; Shendage & Yadav, 2010; Dessai & Janarthnam, 2011; Gangopadhyay, 2011; Martins & Chaudhary, 2011; Prasad & Simpson, 2013; Kumar *et al.*, 2014; Gnanasekaran *et al.*, 2015). Thus, there is a need of more critical revision and monograph on different families and genera in India to ascertain the distinctiveness of many species and infra-specific taxa.

The present paper is a part of the study on the systematics of *Andrographis* Wall. ex Nees (Acanthaceae) in India, where the taxonomy of *A. rothii* is discussed in detail with complete description, illustrations (Fig. 1), colour photographs (Fig. 2), and distribution map (Fig. 3). Besides, the name *A. lobelioides* var. *composita* is lectotypified and relegated to a heterotypic synonym of *A. rothii*.

Andrographis rothii C.B. Clarke in Hook.f., Fl. Brit. India 4: 506. 1884; Gamble, Fl. Madras: 1050. 1924;

Ahmedullah & M.P. Nayar, Endemic Pl. Ind. Reg.: 146. 1986; Kumari in A.N. Henry *et al.*, Fl. Tamil Nadu 2: 140. 1987; Vajr. *et al.* in J. Econ. Taxon. Bot. 10: 284. 1987; Karthik. *et al.*, Fl. Pl. India – Dicotyl. 1: 3. 2009; T.S. Nayar *et al.*, Fl. Pl. Western Ghats 1: 14. 2014.

Figs. 1, 2

Type: INDIA, **Tamil Nadu**, Tirunelveli district, Courtallum, April? 1835, R. Wight 675 (Holotypus, K, K000545924, image!).

Fig. 2g

Andrographis lobelioides (Wall. ex Nees) Wight var. *composita* C.B. Clarke in Hook.f., Fl. Brit. India 4: 505. 1884; Kumari in A.N. Henry *et al.*, Fl. Tamil Nadu 2: 139. 1987; Karthik. *et al.*, Fl. Pl. India – Dicotyl. 1: 3. 2009; T.S. Nayar *et al.*, Fl. Pl. Western Ghats 1: 13. 2014, **syn. nov.**

Lectotype (designated here): INDIA, **Tamil Nadu**, Tirunelveli district, Courtallum hills, R.H. Beddome s.n. (BM, BM001050046!).

Fig. 2h

Andrographis lobelioides sensu K.K.N. Nair & M.P. Nayar, Fl. Courtallum 2: 288. 1987, non (Wall. ex Nees) Wight, 1850.

Decumbent herbs, up to 80 cm high; rootstock very thick. Stems subterete to indistinctly 4-angled, densely glandular-pubescent throughout. Leaves ovate to elliptic or orbicular, 0.5–3 × 0.3–1.5

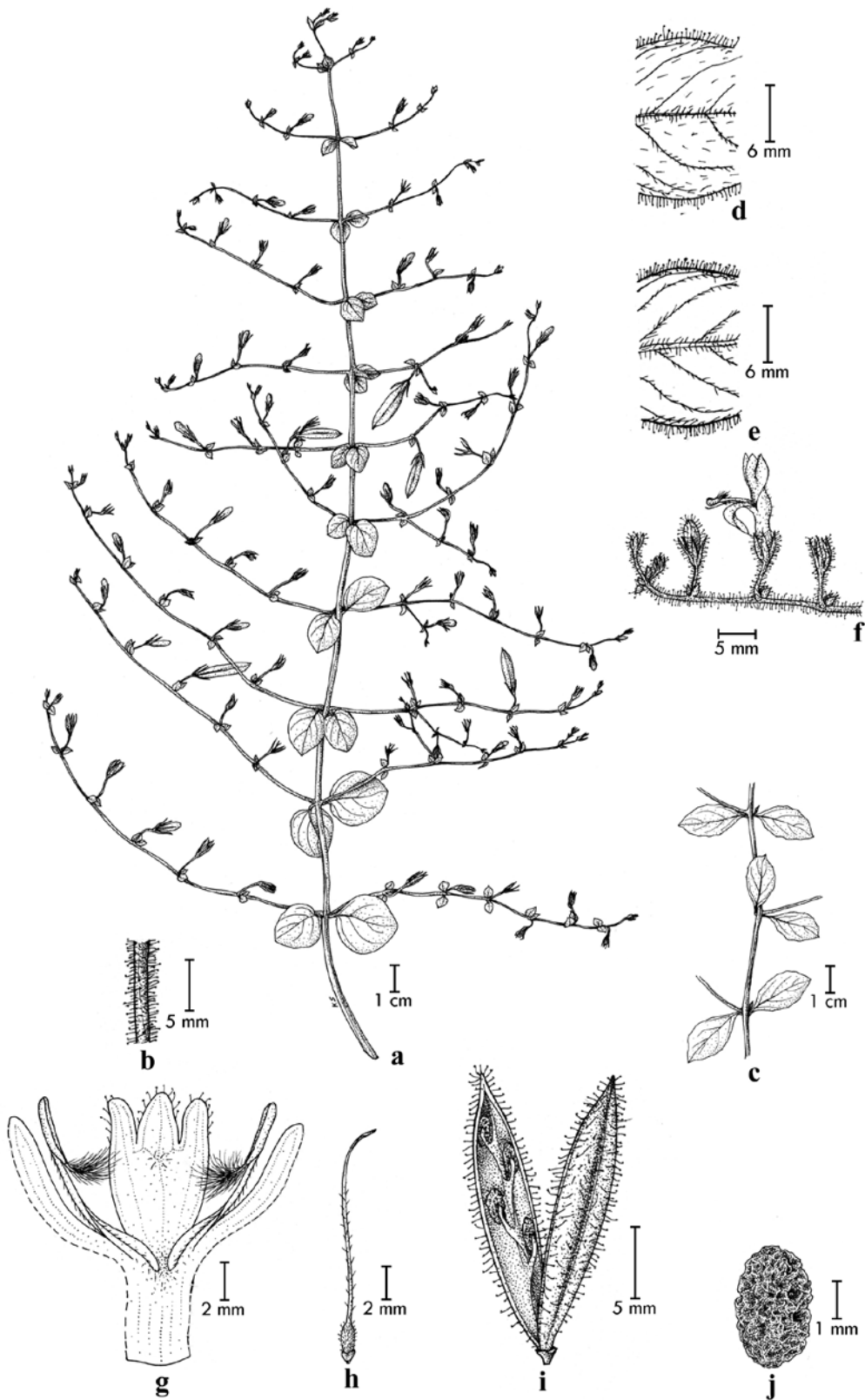


Fig. 1. *Andrographis rothii* C.B. Clarke: **a.** Habit; **b.** Detail of stem indumentum; **c.** Portion of branch with elliptic leaves; **d & e.** Leaf – Adaxial and Abaxial surfaces; **f.** Detail of inflorescence rachis indumentum; **g.** Corolla split opened; **h.** Carpel; **i.** Fruit; **j.** Seed. (*R.H. Beddome s.n.*, BM, BM001050046 (**a**); *G. Gnanasekaran* 126908 (**b–j**), MH).

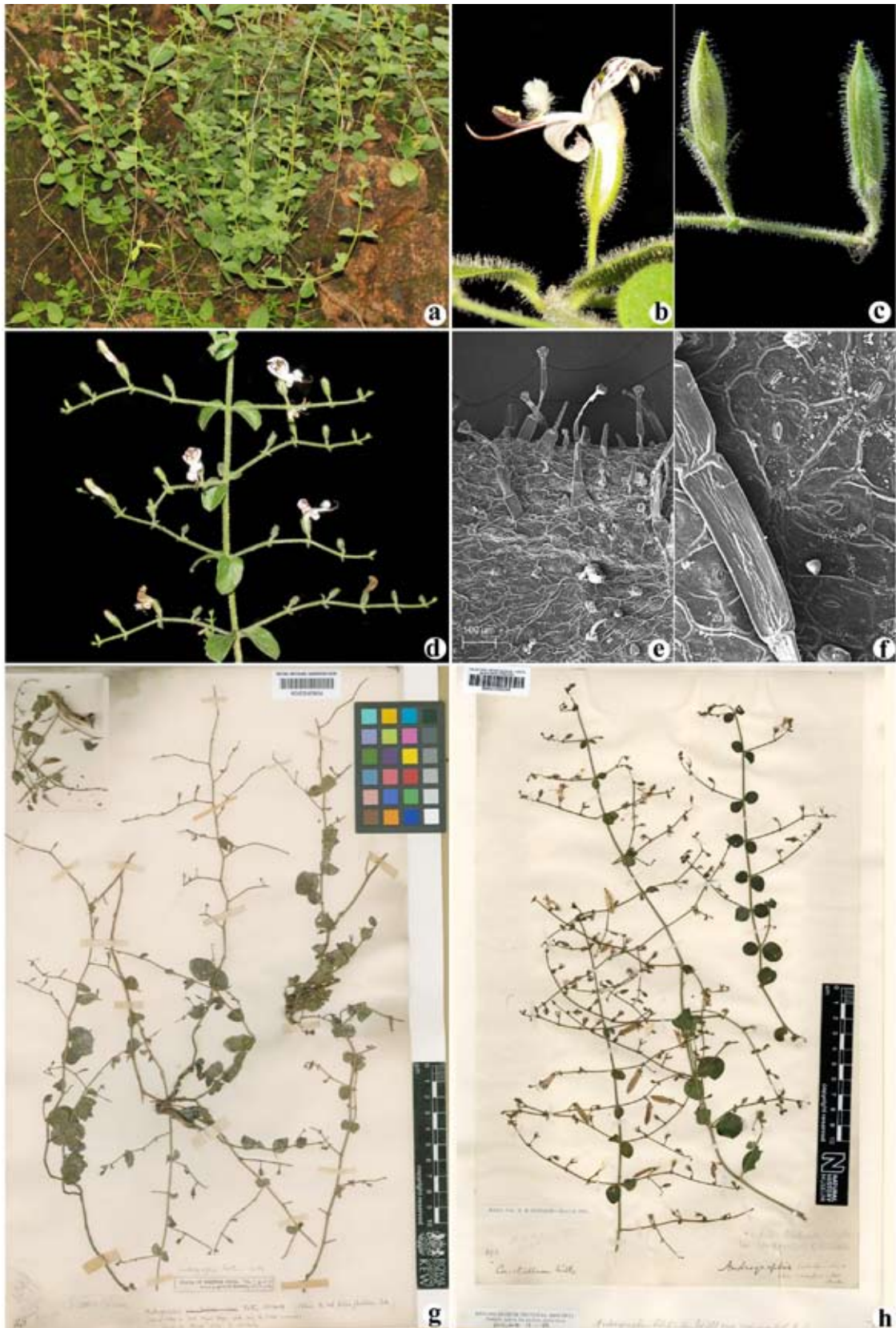


Fig. 2. *Andrographis rothii* C.B. Clarke: **a.** Habit; **b.** Flower; **c.** Fruits; **d.** Flowering twig; **e** & **f.** SEM micrographs of adaxial and abaxial surfaces of leaf; **g.** Holotype (*R. Wight* 675, K, K000545924); **h.** Lectotype of *A. lobelioides* var. *composita* C.B. Clarke (*R.H. Beddome s.n.*, BM, BM001050046).

cm, attenuate or obtuse at base, undulate and glandular-hairy at margins, acute or obtuse at apex; midrib conspicuous beneath; lateral veins 3–5 pairs, glandular-pubescent on both sides; petioles absent, or to 3 mm long, glandular-pubescent. Inflorescence a raceme, axillary, at times branched, 5–15 cm long; rachis 4-angled, densely glandular-pubescent; flowers distantly arranged (interstices 1–2 cm long); peduncles 2–3 cm long, densely glandular-pubescent; pedicels slender, 3–6 mm long, glandular-hirsute. Bracts 2, ovate, elliptic or rotund, 1.5–5 × 0.5–2.5 mm, hairy at margins, acute at apex, foliaceous, glandular-pubescent on both sides, green. Bracteoles 2, subulate, 0.5–0.8 × 0.1–0.3 mm, entire at margins, acute at apex, glandular-hairy above, glabrous beneath, green. Calyx 5-lobed; lobes subequal, linear, 4.5–5 × 0.3–0.6 mm, hairy at margins, acute-acuminate at apex, glandular-pubescent above, antrorsely strigulose beneath. Corolla 2-lipped, 1.3–1.5 cm across, white with yellow shade; tube slightly ventricose, 5.5–7 × 1.5–2.5 mm, glandular-hirsute; upper lip spatulate-oblong, entire at margins,

minutely 2-lobed at apex (0.5–0.8 mm long), 6.5–8.5 × 2.5–3.2 mm, glabrous inside, glandular-hirsute outside, 6-veined; lower lip 3-lobed, entire at margins, obtuse at apex, 7–8 × 5.5–6.5 mm, glabrous inside except at centre of middle lobe, glandular-hirsute outside, dark purple-striped with yellow eye spots; middle lobe narrowly ovate, 3.5–4.3 × 2–2.5 mm, minutely hairy at centre, 3-veined; lateral lobes oblong, 4–4.5 × 1.6–2 mm, 3-veined. Stamens 2, exserted, adnate to base of ventricose portion of corolla tube; filaments 5.5–7.5 mm long, distinctly dilated at base, retrorsely pilose, strigose at attachment; anthers linear, 3.5–4 × 0.5–0.8 mm, woolly at base, deep purple. Ovary oblongoid, 1–1.3 × 0.6–0.8 mm, glandular-hairy; ovules 3 or 4 in each cell; style 14–16 mm long, antrorsely bristled-hairy, brownish; stigma linear, green. Capsules linear-oblong, 13–16 × 3–4 mm, mucronate to apiculate, compressed at right angles to septum with a median longitudinal groove, densely glandular-hairy except in groove, brown, 6–8-seeded. Seeds narrowly ellipsoid-obovoid, 2.6–3 × 1.5–1.6 mm, oblique at base, obtuse at apex,

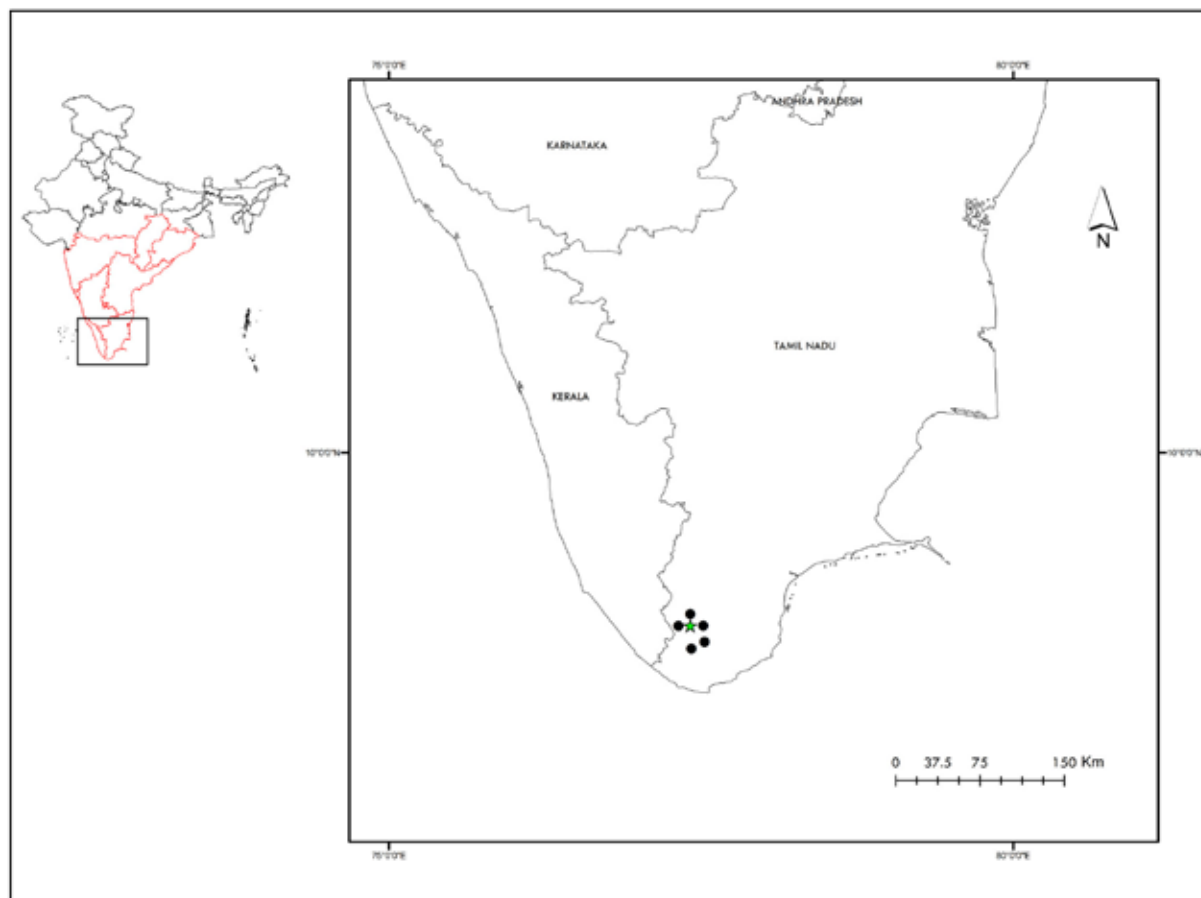


Fig. 3. Distribution of *Andrographis rothii* C.B. Clarke (☆– Fresh collection and ● Herbarium collections).

very hard, lacunosus (deeply pitted), echinate, yellowish-brown.

Flowering & Fruiting: October–April.

Habitat: Dry deciduous forests, at elevation between 250 and 400 m.

Distribution: India, Tamil Nadu (Tirunelveli district). Endemic. **Fig. 3**

Rao (1914) reported this species in his *Flowering Plants of Travancore* without precise authentication. However none of the later workers (Sasidharan, 2004; Nayar *et al.*, 2006, 2014) including the present study confirmed its occurrence in Kerala.

Conservation Status: *Andrographis rothii* is assessed here as 'Endangered' [EN (B1ab(iii)+B2ab(iii))] using IUCN Red List Categories and Criteria Version 3.1 (IUCN, 2012). The species is very poorly represented in national and international herbaria by less than 10 collections and all of them have been collected from the Western Ghats of Tirunelveli district in Tamil Nadu. However, the present field observations show that the species is fairly very common in the foot hills of Kalakkad Mundanthurai Tiger Reserve (KMTR) but loss of natural habitat owing to fragmentation and invasive alien species have been identified as major risk factors.

Inter-relationship: *A. rothii* has very often been mistakenly identified as *A. serpyllifolia* (Vahl) Wight because of its close morphological similarities in their habit and leaves but it can be distinguished from the latter by many other distinct characters (Table 1).

Specimens examined: INDIA. **Tamil Nadu**, Tirunelveli district, Tirunelveli plains, s.dat., *R.H. Beddome s.n.* (K, K000545926, image!); Courtallum, April 1835, *R. Wight* 675 (CAL, E, E00435357, image!); Palamcottah, December 1835, *R. Wight* 798 (E, E00435356, image!); Palamcottah, ? 1835, *R. Wight? s.n.* (CAL); Ambasamudram, 27.05.1899, *C.A. Barber* 339 (MH); Kalakad hills, 700–1000 ft (c. 300 m), 07.02.1916, *C.E.C. Fischer* 3872 (FRC, K, K000545925, image!); Tirukarangudi, 16.09.1916, *Anonymous* 13120 (MH); Mundanthorai, 09.02.1921, *Anonymous* 6787 (MH); Near Tiger falls, 333 m, 04.03.1958, *K.M. Sebastine* 5515 (MH); Kalakkadu R.F., 250 m, 12.11.1962, *J. Joseph* 15244 (MH); Mundanthurai, 200 m, 02.03.1994, *S.P. Subramani* 171 (FRLH); KMTR, above Manimuthar dam, 350 m, 18.12.2013, *G. Gnanasekaran* 126907, 126908 (MH); Peninsular India Orientalis, s.dat., *R. Wight* 2248 (L, L0833668).

Note: Clarke (1884) described *A. rothii* based on a material collected by Robert Wight (*R. Wight* 675) housed at Wight's herbarium in K. Clarke (l.c.) stated that this specimen was "found loose in Wight's herbarium, marked simply *Erianthera*" in the protologue. During the present study, three specimens of *R. Wight* 675 were traced from CAL, E and K. Of these three specimens of *R. Wight* 675, the specimen housed at Wight's herbarium in K alone has the type status since Clarke (l.c.) mentioned explicitly in the protologue only as Wight (Herb. Propr. No. 675) and the other two specimens do not even deserve the status of type as there is no indication that they were seen or studied by the original author. Therefore, the specimen, *R. Wight* 675 available at K (K000545924) is considered here as the holotype of the name *A. rothii* (Fig. 2g).

Table 1. Differentiating characters between *Andrographis rothii* and *A. serpyllifolia*

Characters	<i>A. rothii</i>	<i>A. serpyllifolia</i>
Habit	Decumbent herb	Trailing herb
Inflorescence	Racemose, at times branched, up to 15 cm long	Solitary to 2-flowered or a short raceme, not branched, less than 5 cm long
Calyx lobes	4.5–5 mm long, one-fourth of fruit	5–8 mm long, three-fourths or as long as fruit
Corolla	Lower lobe with distinct yellow blotches on purple band	Lower lobe without yellow blotches
Anthers	Over 3 mm long	Less than 2.5 mm long
Capsule	Linear-oblong, densely glandular-hairy throughout	Ellipsoid, glandular-hairy only towards apex

Lectotypification and identity of *Andrographis lobelioides* var. *composita*

The name *A. lobelioides* var. *composita* is lectotypified here according to Article 9.2 of ICN (McNeill *et al.*, 2012) and the photograph of the designated specimen is provided (Fig. 2h). Clarke (1884) described this variety based on two collections of R.H. Beddome from Courtallum hills (BM, BM001050046) and Tinnevely (K, K000545926) in Tamil Nadu and therefore both these specimens are considered as syntypes. Of these, the specimen collected from Courtallum hills (BM001050046) is designated here to serve as the lectotype for this name since it has the annotation of name with author's original handwriting and also matches very well with the description.

Further, the scrutiny of the type (*R.H. Beddome s.n.*, BM001050046) and the description of *A. lobelioides* var. *composita* provided in the original publication (Clarke, 1884) unambiguously match with the holotype (K000545924) and other specimens of *A. rothii*. Therefore, *A. lobelioides* var. *composita* is relegated here as a heterotypic synonym of *A. rothii*.

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Literature Cited

Arisdason, W. & P. Daniel 2010. *Syzygium chandrasekharanii* Chandrab. & V. Chandras., a synonym of *Syzygium fergusonii* (Trimen) Gamble (Myrtaceae). *Indian J. Forest.* **33**: 221–224.

Clarke, C.B. 1884. Acanthaceae. In: Hooker, J.D. (Ed.), *The Flora of British India*. Vol. 4. L. Reeve & Co., London. pp. 387–558.

Dessai, J.R.N. & M.K. Janarthanam 2011. The genus *Impatiens* (Balsaminaceae) in the northern and parts of Central Western Ghats. *Rheedea* **21**: 23–80.

Dey, S. & P.V. Prasanna 2010. The tribe *Rhynchosporeae* (Cyperaceae) in India. *Rheedea* **20**: 1–19.

Gangopadhyay, M. 2011. Notes on the nomenclature of the family Lauraceae from India. *Nelumbo* **53**: 213–216.

Gnanasekaran, G., Rajakullayiswamy, K. & G.V.S. Murthy 2015. *Andrographis nallamalayana*, a heterotypic synonym of a little-known endemic species *A. beddomei* (Acanthaceae). *Rheedea* **25**: 47–53.

IUCN, 2012. *IUCN Red List Categories and Criteria: Version 3.1*. Second Edition. IUCN, Species Survival Commission, Gland, Switzerland and Cambridge, UK.

Kumar, A., Venu, P. & Y.V. Rao 2014. Rediscovery of *Typhonium inopinatum* (Araceae) from India with notes on the identity of *T. khandwaense*. *Rheedea* **24**: 120–123.

Martins, L. & L.B. Chaudhary 2011. Taxonomic notes on *Tricholepis raghavendraya* (Asteraceae – Cardueae). *Rheedea* **21**: 106–107.

McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & N.J. Turland 2012. International Code of Nomenclature for Algae, Fungi, and Plants (Melbourne Code). *Regnum Veg.* Vol. 154. Koeltz Scientific Books, Koenigstein.

Nayar, T.S., Beegam, R.A., Mohanan, N. & G. Rajkumar 2006. *Flowering Plants of Kerala: Handbook*. Tropical Botanic Garden and Research Institute, Thiruvananthapuram.

Nayar, T.S., Beegam, R.A. & A. Sibi 2014. *Flowering Plants of the Western Ghats, India*. 2 Vols. Jawaharlal Nehru Tropical Botanic Garden and Research Institute, Thiruvananthapuram.

Prasad, V.P. & D.A. Simpson 2013. *Pycnus flavidus* (Cyperaceae) – a highly variable species in India. *Rheedea* **23**: 7–9.

Rao, R.M. 1914. *Flowering Plants of Travancore*. Govt. Press, Trivandrum.

Sasidharan, N. 2004. *Biodiversity Documentation for Kerala. Part 6: Flowering Plants*. Kerala Forest Research Institute, Peechi.

Shendage, S.M. & S.R. Yadav 2010. Revision of the Genus *Barleria* (Acanthaceae) in India. *Rheedea* **20**: 81–130.

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