KEW BULLETIN (2015) 70: 20
DOI 10.1007/S12225-015-9572-Y

ISSN: 0075-5974 (print)
ISSN: 1874-933X (electronic)

Cyphostemma auriculatum (Roxb.) P. Singh & B. V. Shetty (Vitaceae): typification and a new generic record confirmed for Thailand

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Summary. The presence of the predominantly Indian *Cyphostemma auriculatum* (Roxb.) P. Singh & B. V. Shetty is confirmed for Thailand. An updated generic key for the Vitaceae of Thailand is included. Full typification is undertaken and presented together with an illustration of the lectotype, a description and a distribution map of the species in Thailand.

Key Words. Asia, morphology, nomenclature, taxonomy.

Introduction

The genus *Cyphostemma* (Planch.) Alston (Vitaceae) comprises c. 200 species and is distributed mainly in Africa and Madagascar (Descoings 1960; Wen 2007) with very few species extending eastwards to India, Sri Lanka and Myanmar. It was first considered as a section of *Cissus* by Planchon (1887) and was subsequently raised to generic level by Alston (1931). Later on, Suessenguth (1953) placed it back into *Cissus* and Descoings (1960) once again gave it back its generic status. Several phylogenetic studies (Ingrouille *et al.* 2002; Soejima & Wen 2006; Wen *et al.* 2007; Trias-Blasi *et al.* 2012; Lu *et al.* 2013) have reported a group containing *Cayratia*, *Tetrastigma* and *Cyphostemma* species. Within this group, *Tetrastigma* and *Cyphostemma* are consistently monophyletic, while *Cayratia* is always paraphyletic.

Cyphostemma auriculatum (Roxb.) P. Singh & B. V. Shetty has been reported in Bangladesh, Bhutan, India, Myanmar and Sri Lanka (Singh & Shetty 1986; Long & Rae, 1991; Shetty & Singh 2000). Latiff (2001) indicated that *C. auriculatum* could occur in Thailand but this report had never been confirmed until now. During the preparation of the account of Thai *Cayratia* for the *Flora of Thailand* the first author came across a few undetermined *Cayratia* specimens. Upon examination, it was determined that they belonged to the genus *Cyphostemma*, because they presented lageniform flowers with a constriction in the middle, and a floral disc with 4 free glands, both of which are distinguishing characters for this genus. The presence of falcate stipules, 5-foliolate and digitate leaves, and glabrous berries further identified them as *C. auriculatum*. The generic placement of another newly collected specimen from Thailand (*Trias-Blasi* 45) matching the description of this species was also confirmed using molecular techniques (Trias-Blasi *et al.* 2012). This is the first record of the genus and species in Thailand, which is likely its easternmost distribution limit. With the addition of *Cyphostemma*, our studies (Trias-Blasi *et al.* 2009, 2010, 2011, 2014; Trias-Blasi 2010; Kochaiphat *et al.* 2014) suggest that Thailand currently comprises some 10 genera of Vitaceae (an updated generic key is presented below) and c. 74 Vitaceae species.

Key to genera of Vitaceae in Thailand

1. Petals united; forming a calyptra (hood structure) and dropping off as a unit at anthesis; leaves simple ..... **Vitis**
1. Petals free; leaves simple or compound 2
2. Stigma generally 4-lobed, longer than the style; petals 4 ..... **Tetrastigma**
2. Stigma not 4-lobed (unlobed), shorter than the style; petals 4 – 5 (– 6) 3

Accepted for publication 15 April 2015. Published online 5 May 2015

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3. Inflorescence forming a leaf-like lamina; lamellate flowers partially immersed in the lamina . . . . . **Pterisanthes**
3. Inflorescence not forming a leaf-like lamina 4
4. Inflorescence associated with a tendril . . . . . **Ampelocissus**
4. Inflorescence not associated with a tendril 5
5. Tendrils 3 – 12-branched with adhesive discs at the end of each tip; floral disc inconspicuous . . . . . **Parthenocissus**
5. Tendrils unbranched to 2 – 3-branched, usually without adhesive discs at the tip; floral disc conspicuous 6
6. Inflorescence axillary or terminal 7
6. Inflorescence leaf-opposed 9
7. Flowers lageniform, constricted at the middle; floral disc of 4 free glands . . . . . **Cyphostemma**
7. Flowers globose to ovoid, with no constriction; floral disc without 4 free glands, entire 8
8. Inflorescence cymose, generally axillary; adaxial side of the seeds convex; endosperm T- or N-shaped in cross-section; flowers never arranged in fascicles . . . . . **Cayratia**
8. Inflorescence racemose, often terminal; abaxial side of the seeds furrowed; endosperm M-shaped in cross-section with many lateral ingrowths; in *N. spicifera* (only Thai species) inflorescence with pedicellate as well as subsessile flowers arranged in fascicles . . . . . **Nothocissus**
9. Flowers 5-merous; leaves in *A. cantoniensis* (only Thai species) pinnately compound; endosperm T-shaped in cross-section . . . . . **Ampelopsis**
9. Flowers 4-merous; leaves in Thai *Cissus* generally simple with one species palmately compound; endosperm M-shaped in cross-section . . . . . **Cissus**

Taxonomic treatment

Cyphostemma auriculatum (*Roxb.*) *P. Singh & B. V. Shetty* (1986: 596); Shetty & Singh (2000: 297). Type: Roxburgh *Flora Indica* illustration in Kew, number 1788 (lectotype K!, designated here).

Cissus auriculata Roxb. (Roxburgh 1820: 430); Candolle (1824: 632); Planchon (1887: 565).

Vitis auriculata (Roxb.) Wall. (Wallich 1828 – 1849: 206); (Lawson 1875: 658).

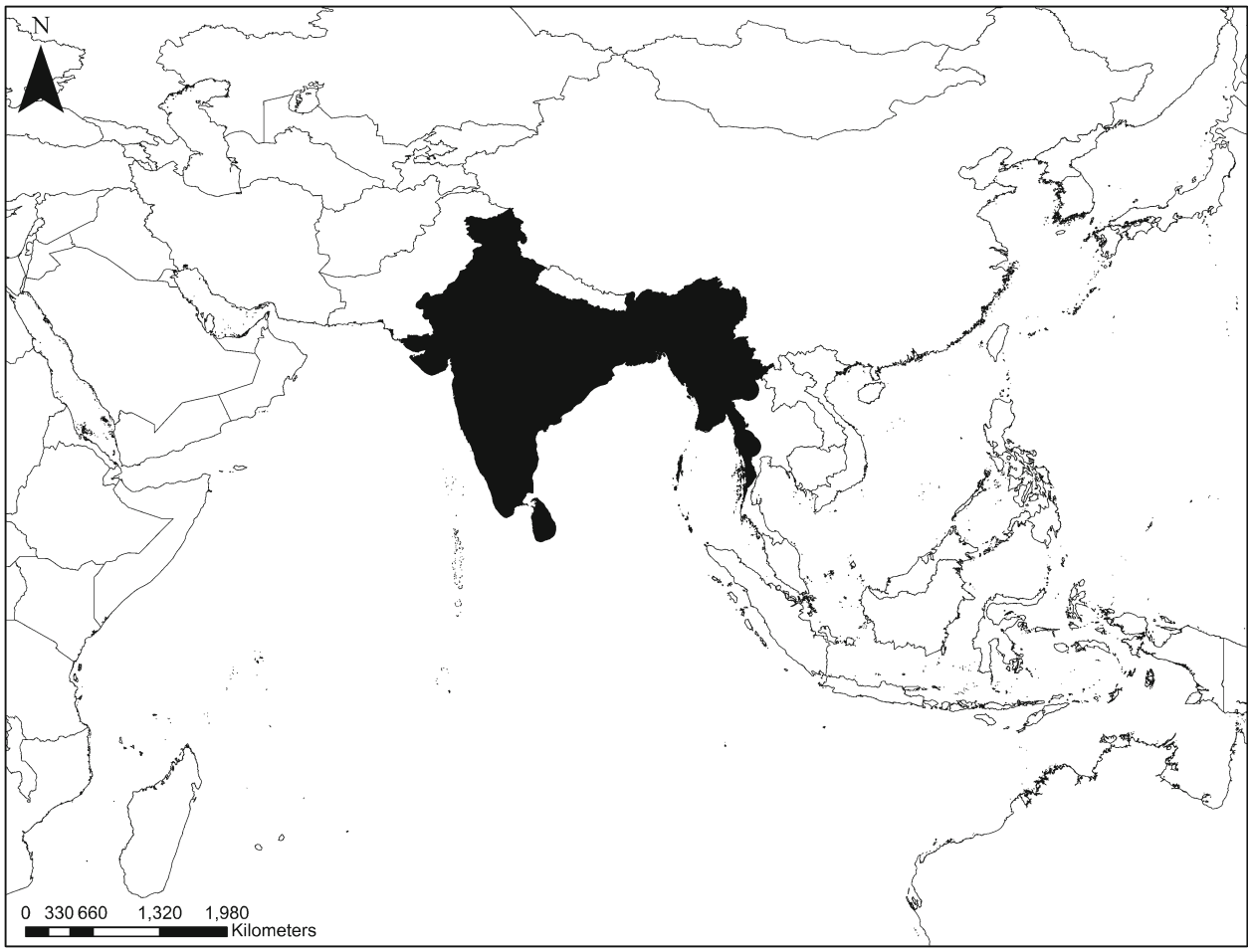
Cayratia auriculata (Roxb.) Gamble (1918: 237); Suessenguth (1953: 281).

Large woody climber. *Stem* cylindrical, older stems to 11 cm diam., spongy and cracked, sometimes verrucose and lenticellate, younger stems ridged, hairy with soft pubescent hairs to 0.5 mm long, sometimes glabrescent; tendril 2-furcate, robust, leaf-opposed, cylindrical, straight stalk 7 – 11 cm × 3 – 5 mm, then coiling and bifurcating 7 – 16 cm, glabrous to pubescent. *Leaves* compound, 5-foliolate, digitate, alternate; petiole 5 – 13 cm × 2 – 4 mm, indumentum as in young stem, petiolules 0.5 – 2.5 cm × 1 – 1.5 mm, indumentum as on stem; stipules falcate; leaflet blade obovate, elliptic to ovate, lateral-most leaflets smallest becoming larger with the central leaflet being the largest, 3 – 13 × 2 – 8 cm, base cuneate, margin serrate, apex acute or shortly acuminate; adaxial and abaxial sides hairy with soft pubescent hairs becoming glabrescent with some hairs concentrated on veins; veins protruding on the abaxial side, 1 main basal vein, 5 – 7 pairs of secondary veins. *Inflorescences* ramified, axillary, sometimes pseudo-terminal, mostly dividing dichotomously, corymbose, lax, 10 – 25 cm; peduncle 10 – 15 cm × 4 – 6 mm, pubescent, upper axis densely puberulent, pedicel 3 – 5 mm long, densely puberulent. Buds lageniform, constricted at the middle, 2.5 – 4 mm long. *Calyx* cupuliform, entire, margin sinuate, 0. 5 × 2 – 2.5 mm, densely puberulent. *Corolla* petals 4, ovate to oblong, constricted at the middle, 3 – 5 × 1.5 – 2 mm, apex cucullate, slightly corniculate outside, densely puberulent. *Stamens* 4; filaments filiform, 2.5 mm long; anthers orbicular, medifixed, 0.5 mm long. *Ovary* 1.5 – 2 mm across, puberulent; disc of 4 separate glands, almost covering the ovary. *Style* slender, filiform, 0.75 – 1.25 mm long; stigma inconspicuous. *Fruits* berry, globose, 1 – 1.7 cm diam., glabrous, base attenuate. *Seeds* 1, oblong- obovoid, 8 – 10 × 5 – 6 mm, adaxial side with linear groove, abaxial with a crest, endosperm M-shaped in cross-section. Fig 1.

DISTRIBUTION. Bangladesh, Bhutan, India, Myanmar, Sri Lanka, Thailand. Map 1.

SPECIMENS EXAMINED. BANGLADESH. Chittagong, *Hooker & Thomson* (K). **INDIA.** Rajmahal, Ganges R., 1820, *Wallich* 6031a (K-W (K001122856)); Irrawaddy R. [Ayeyarwady R.], Yenangheum [Yenangyaung], 1825, *Wallich* 6031b (K-W (K001122857)); Prome [Pyay], 1826, *Wallich* 6031c (K-W (K001122858)). Konkan Division: Bombay, *Dalzell* s.n. (K); Coucan, Hooker s.n. (K); Devikop-Dharwan (illeg.), *Sedgwick & Bell* 5917 (K). **THAILAND.** Chiang Mai Prov.: Doi Chiang Dao animal sanctuary, SE Side, above Ban Yang Pong Luang, 28 April 1990, *Maxwell* 90-461 (A, L). Kanchanaburi Prov.: Erawan National Park, Steps up to Phrathat Cave, 17 March 2007, *Trias-Blasi* 45 (K, TCD); Song Thaw, 2 Feb. 1962, *Larsen* 9513 (L); Mae Hong Son Prov.: Doi Mah Geu, Geut Chang subdistr., above Gu Gahp Stream; W of Mae Dtaman, 6

Fig. 1. *Cyphostemma auriculatum*. Roxburgh *Flora Indica* drawing number 1788 held at Kew. William Roxburgh Collection — Royal Botanic Gardens, Kew. Reproduced with the kind permission of the Director and the Board of Trustees, Royal Botanic Gardens, Kew.



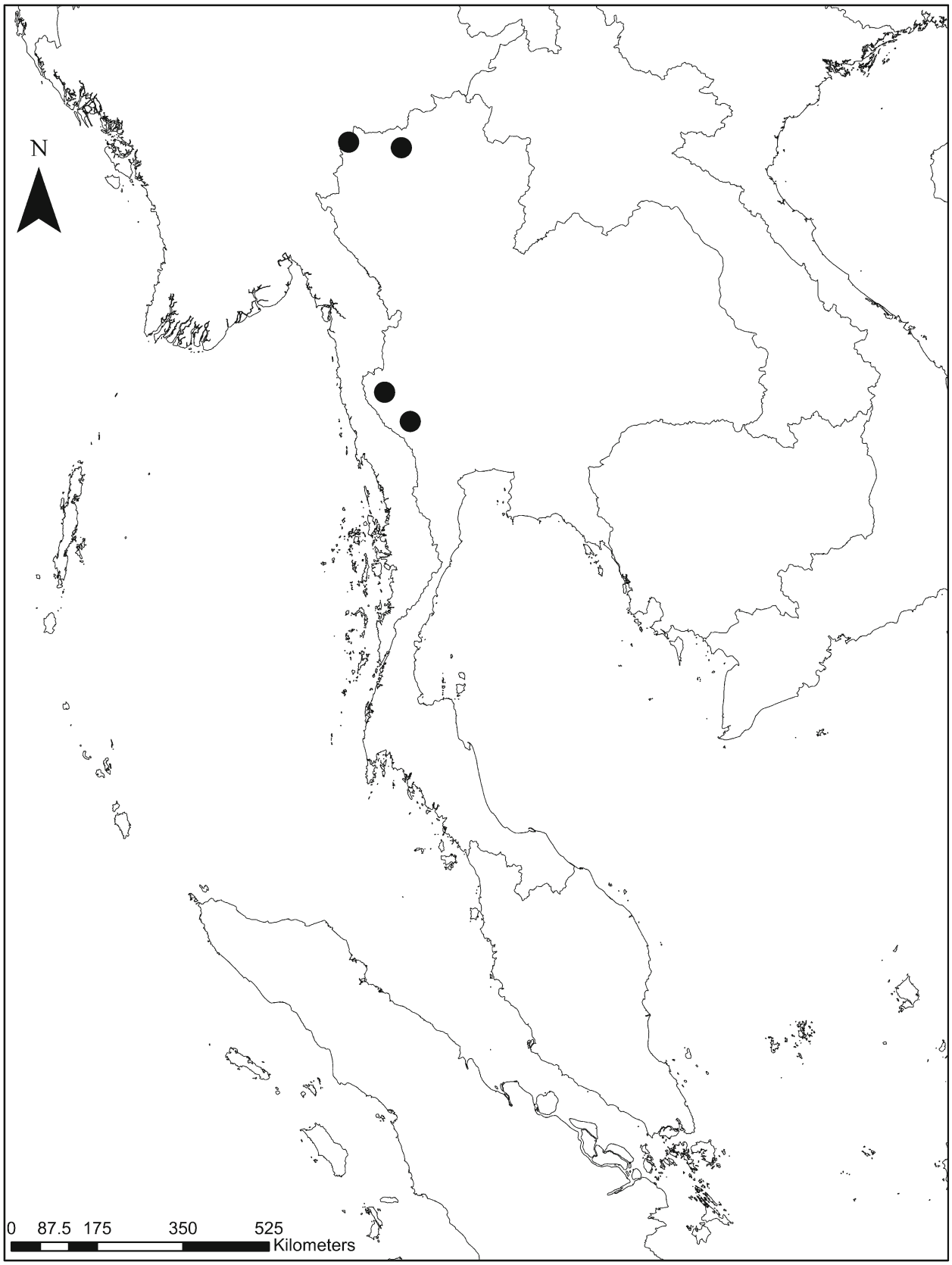
Map 1. Distribution map of *Cyphostemma auriculatum* (black shaded area represents distribution).

March 1997, *Maxwell* 97-209 (A, CMU); Doi Sahng Liang, S side at Doi Mah Geu, near Pah Dang (Musoe) Village E side of Gu Gahp Stream Valley, Gout Chang subdistr., 29 May 1997, *Maxwell* 97-560 (A, BKF, CMU). Map 2.

HABITAT. Mixed deciduous forests and degraded fire-prone areas; alt. 600 – 1100 m.

CONSERVATION STATUS. According to the literature (Shetty & Singh 2000) this species occurs in several areas in India, as well as other Asian countries (see distribution section above). However, comprehensive specimen data is required before an accurate global conservation assessment can be made; thus we recommend treating this species as Data Deficient (DD) (IUCN 2001) for the time being.

In Thailand, it is only known from four populations, represented by 10 herbarium specimens (Map 2). Using GeoCAT (Bachman *et al.* 2011; http://geocat.kew.org/), extent of occurrence (EOO) was calculated to be as 39,150 km^2 and area of occupancy (AOO) 16 km^2 based on the standard cell width of 2 km. The distribution of the Thai populations is disjunct, with most specimens distributed in the northwesternmost parts (Chiang Mai and Mae Hong Son provinces) and the remaining two in the western province of Kanchanaburi (Map 2). This species may occur in intermediate localities with the same vegetation type (i.e. Tak and western Kamphaeng Phet, Nakhon Sawan, and Uthai Thani provinces (Parnell *et al.* 2003: Fig. 6)), but there is no current evidence of this. Further supporting the suggestion above that this species might occur in intermediate localities is the fact that analyses have shown that well-forested Thailand provinces such as Chiang Mai, Mae Hong Son and Tak have been poorly collected (Parnell *et al.* 2003: Fig. 5). Thai collections are relatively recent, the latest was made by the first author in 2007. With an AOO of 16 km^2 this species could meet criterion EN B2 and VU D2. However, the data available do not suggest immediate threats to this taxon, there are no observed declines or extreme fluctuations, and it has a wide distribution (high EOO). Nevertheless, more data are required, so a preliminary regional assessment of Data Deficient (DD) based on the criteria of IUCN (2001), is indicated.



Map 2. Distribution map of the specimens of *Cyphostemma auriculatum* in Thailand (black dots represent specimens).

PHENOLOGY. flowering: Feb. – March; fruiting: April – May.

TYPIFICATION NOTES. The basionym of this species, *Cissus auriculata*, was originally published in Roxburgh (1820: 430) with a note that indicates it is "A native of Mysore (India), from thence sent to the Botanic Garden in 1802, by Mr. B. Heyne, where it flowers and ripens its fruits through the whole year". Roxburgh based his names on cultivated material from Calcutta Botanic Garden (Sealy 1956; Forman 1997), but his specimens were mostly distributed to several European herbaria, six of which are thought to have the largest collections of his specimens (BM, BR, E, G, K and LIV (Forman 1997)). Forman (1997) did not mention *C. auriculatum* in his list of original Roxburgh specimens and although the authors have searched the majority of the herbaria known to hold the largest numbers of Roxburgh material (BM, E, G, K and LIV), it has not been possible to locate any specimen that could be considered to be original. Both Sealy (1956) and Sanjappa *et al.* (1991) indicate there are original *Flora Indica* illustrations for the species both at K and CAL. According to Forman (1997) these illustrations were made under Roxburgh's direct supervision and can be considered original material. Thus, a lectotype can be selected from either illustration — we have chosen that in Kew (illustration number 1788 (Fig. 1)).

Acknowledgements

This work was supported by a Trinity College Postgraduate Award, the Trinity College Postgraduate Travel Fund, Synthesys (European Union-Funded Integrated Infrastructure Initiative Grant), the Davis Expedition Fund, the IAPT Research Grants Program in Plant Systematics, the William Dickson Travelling Fund, the TRF/BIOTEC Special Program for Biodiversity Research and Training Grant and the Trinity College Dublin Botany Department. The authors are grateful to the staff and students at the Department of Botany in Trinity College Dublin and especially to Drs Caroline Byrne and Atchara Teerawatananon. The authors are also grateful to the staff in A, AAU, ABD, BK, BKF, BM, C, CMU, E, G, K, KKU, L, LINN, LIV, P, PSU, QBG, SING, TCD and UPS for their help and for the loan of or access to specimens. Thanks to Prof. Dr Peter C. Van Welzen for his helpful suggestions. Thanks to Heather Lindon (K) for nomenclatural help and Steven Bachman (K) for conservation assessment help. Thank you to the Illustrations team at K and in particular to Julia Buckley for providing the illustration included in this paper. Thank you to the Director and the Board of Trustees, Royal Botanic Gardens, Kew for allowing the reproduction of the Roxburgh illustration.

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