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Amended description and lectotypification of *Justicia atkinsonii* with a new synonym

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Abstract: Scrutiny of type specimens revealed that, *Justicia atkinsonii* T.Anderson var. *pubescens* P.Rai is found to be conspecific with typical *J. atkinsonii* T.Anderson. A lectotype has also been designated for the name *J. atkinsonii* T. Anderson.

Keywords: *Justicia*, Lectotype, Nomenclature, Sikkim, Variation.

Introduction

Justicia L., one of the most morphologically diverse, pantropic genus belongs to the subtribe Justiciinae in the family Acanthaceae comprises about 700 species (Graham, 1988; Deng *et al.*, 2020 Manzitto-Tripp *et al.*, 2022; Soumya *et al.*, 2023). The genus is represented in India by 70 species and 9 varieties (Arisdason *et al.*, 2020).

Anderson (1867) described *J. atkinsonii* T.Anderson in his comprehensive work "An enumeration of Indian Species of Acanthaceae" based on his own collection from the deep tropical valleys of Sikkim, during his Kanchenjunga expedition and named it after W.S. Atkinson, the then director of Public Instruction in Bengal. The species characterized by presence of an inflorescence of terminal or axillary spikes; ovate or elliptic bracts exceeding the calyx, equally 5-lobed calyx; equal anther-thecae or larger lower thecae with large appendages, hence placed in *Justicia* sect. *Betonica* (Anderson, 1867; Clarke, 1885; Deng *et al.*, 2020). While examining herbarium collections at BSHC, Sikkim, the authors came across a newly described variety, *J. atkinsonii* var. *pubescens* P.Rai which was originally described from Namchi district of Sikkim (Rai, 2022). However, the characters mentioned by Rai (2022) to differentiate the new variety fall well within the range of *J. atkinsonii*. Detailed studies of the type materials of *J. atkinsonii* deposited at CAL also revealed several interesting characters which were not been mentioned in the protologue of the species by Anderson (1867); *J. atkinsonii* is therefore redescribed here with several amendments and a lectotype is chosen in accordance with the Articles 9.3, 9.11 and 9.12 of *Shenzhen Code* (Turland *et al.*, 2018).

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Materials and Methods

Dried flowers from herbarium specimens were treated with 1% Potassium hydroxide (KOH), then dissected and studied under Olympus SZ61 stereo-zoom microscope and Nikon SMZ1500 stereo-zoom microscope following Cunningham (1969) and Peterson (1978). Available literature (Anderson, 1867; Graham, 1988; Deng *et al.*, 2020; Rai, 2022) was also consulted to confirm the identity of the two taxa. Specimens housed at CAL and BSHC were consulted and thoroughly studied. Flowers were dissected under a microscope and described from type material. All the dissected parts were mounted on the same sheets for future study. Digital images of specimens from Smithsonian Institution Herbarium (US) were consulted for comparison.

Taxonomic treatment

Justicia atkinsonii T.Anderson, J. Linn. Soc., Bot. 9: 509. 1867. *emend.* Goswami, Soumya & Dash. *Ecbolium atkinsonii* (T.Anderson) Kuntze, Revis. Gen. Pl. 2: 980. 1891. *Lectotype* (designated here): INDIA, **Sikkim**, "inter vicos Rinchingpong et Yoksun, *T. Anderson* 1066, Herb. Sikkimensis" CAL[CAL0000020209!]; residual syntypes CAL [CAL0000020208!, CAL0000020207!, CAL0000266931!]).])

Justicia atkinsonii T.Anderson var. *pubescens* P.Rai, Pleione 16: 240. 2022. ***syn.nov.*** *Type*: INDIA, **Sikkim**, Namchi, Nandugaon village, N 27°09'47.08", 88°19'29.00" E, 900 m, 07.09.2020, *Pramod Rai* P0191 (holo BSHC [Acc.no. 0301!]). **Figs. 1 & 2**

Subshrubs up to 1 m tall. Stem erect, angular, dichotomously branched; branches green to purplish green, glabrous to puberulous, rooting at lower nodes; internodes *c.* 5.5–6 cm long; nodes swollen. Leaves simple, petiolate; laminae broadly elliptic to ovate, 8–22 × 8.8–9.5 cm, base attenuate, rarely oblique, margins crenate, apex acuminate, chartaceous, puberulous on both surfaces with dense hairs on ribs; veins prominent; petiole 5–7 cm long, greenish, puberulous. Inflorescence axillary and terminal spikes, up to 15 cm long; peduncle 5–10.5 cm long, unbranched, puberulous. Flowers sessile, subtended by one bract and two bracteoles; bracts imbricate, foliaceous, ovate to widely ovate, 1–1.1 × 0.8–0.9 cm, base obtuse, margin entire to subdentate, ciliate, apex cuspidate, obscurely 3–5-nerved, puberulous, greenish with purplish apex; bracteoles 2, equal, 4–6 × 0.5–1 mm, lanceolate, margins ciliate, apex narrowly acute, pubescent, green with purplish tinge. Calyx 5-lobed; lobes equal, lanceolate, *c.* 4 × 0.5 mm, shorter than bracts, margin ciliate, apex narrowly acute, pubescent, green. Corolla bilabiate, creamy white with purple striations on lips, pubescent outside, glabrous inside, throat hairy; tube narrow, *c.* 1.1 cm long; upper lip 2-lobed, oblanceolate, *c.* 5 × 3 mm, margin entire, apex retuse; lower lip 3-lobed, obovate, *c.* 4 × 3 mm, recurved, lobe rounded; rugula enclosing the style, *c.* 12 mm long. Stamens 2, filaments *c.* 4 mm long, slightly curved at apex, whitish, glabrous; anthers 2-lobed; thecae equal, parallel, upper theca lying at an angle to the lower theca, ovoid, *c.* 2 mm long, lower theca spurred at base and upper theca with rudimentary appendage which is less than half the length of the spur, sub dorsifixed, dehiscence longitudinal, yellow. Ovary superior, ovoid, *c.* 1 × 0.5 mm, minutely pilose, bilocular with 4 ovules; style terminal, filiform, *c.* 1.4 cm long, sparsely pubescent up to middle, white, pinkish towards apex; stigma 2-lobed, pink to purplish. Capsule clavate, 1.3–1.5 cm long, 4-seeded, tomentose. Seeds suborbicular, *c.* 3 mm long; testa tuberculate.

Flowering & fruiting: Flowering and fruiting from September to November.

Habitat: Shady places along stream sides in deep tropical valleys between 600–1500 m altitude.

Distribution: INDIA (Sikkim, West Bengal).

Specimens examined: INDIA, **Sikkim**, Runglee (Rongli), 11.10.1877, G. King 5061 (CAL [Acc. No. 342655!]); Namchi, 1878, G. King 2557(CAL [Acc. No. 342638!]); 5000 ft, s.d., S. Kurz 408817 (CAL!). **West Bengal,** Darjeeling, Pomong, 2000 ft, 31.10.1870, *C.B. Clarke* 13634, (US [02881756, 02881757 digital images!]).

Notes on typification: In the protologue of *Justicia atkinsonii*, Anderson (1867) cited the type details as "inter vicos Rinchingpong et Yoksun, n.1066, herb Sikkimensis, T. Anders.v.v." indicating that live specimens were seen by Anderson between Rinchingpong and Yoksun. We traced four sheets at CAL collected by T. Anderson all with the number 1066. However, on one sheet (CAL0000020208), the location is mentioned Rishi to Rinchinpoong, at an altitude of 2500' with the date of collection 01.10.1862. On the second sheet (CAL0000020209), the location is Yuksom, at an elevation of 4500' with the date of collection as 08.10.1862. The third

sheet (CAL0000020207), shows a place named Gassing, (now Geyzing), and the fourth sheet (CAL0000266931), the location is Seminbong (Samdong) to Reachy (Rishi), the last two sheets were not mentioned in the protologue, but both bear the same number in printed herbarium labels of Calcutta Herbarium ("Herb. Hort. Bot. Calcuttensis"). So, all the above-mentioned specimens can be considered as original material according to Art 9.4 (Turland *et al.*, 2018). From the location details available on the four sheets, it is clear, that Anderson collected these specimens during his travel, moving from Seminbong to Rishi (CAL0000266931!) on 30.09.1862 then from Rishi to Rinchingpong (CAL0000020208!) on 01.10.1862 to Yoksun [Yuksom] (CAL0000020209!) on 08.10.1862

Fig. 1. Lectotype of *Justicia atkinsonii* T. Anderson (CAL, barcode CAL0000020209) © Director, Botanical Survey of India, Kolkata.

and to Gassing (CAL0000020207!), which is in between "Rinchingpong and Yoksun" at an unknown date. In the Flora of Pan Himalaya, Deng (2020) cited the type of *Justicia atkinsonii* as "Type: [Sikkim & Darjiling] India, Sikkim, "inter vicos Rinchingpong et Yoksun", T. Anderson herb. Sikkimensis 1066 (K)". Following a comprehensive investigation and in-person contact with the curator, we confirmed that no *Justicia atkinsonii* specimens collected by T.Anderson are kept at the Kew Herbarium. The specimen collected from "Yoksun" with barcode CAL0000020209 is selected here as the lectotype in accordance to Article 9.3, 9.11 and 9.12 (Turland *et al.*, 2018) which is in best preserved state among the syntypes and it better represents the taxon in terms of morphological characters. Moreover, among the syntypes, the authors did a first- hand study of the herbarium specimen and its floral parts from the sheet with barcode CAL0000020209 which was used for redescribing the taxon with amendments.

Status of *Justicia atkinsonii* var. *pubescens*

Rai (2022) described a new variety, *Justicia atkinsonii* var. *pubescens* P.Rai distinguishing it from typical *J. atkinsonii* by its puberulent (*vs.* glabrous) adaxial leaf surfaces, entire bracts (*vs.* subdentate), and pubescent and mixed pilose to puberulent abaxial and adaxial surface of the bracts, respectively (*vs* sparsely hairy on both surface) as well as a sparsely pilose (*vs.* glabrous) style.

In our study of the morphological variation in *J. atkinsonii*, we observed that all the variations mentioned by Rai fall well within the range of the type. Our examination of type materials revealed that both leaf surfaces of *Justicia atkinsonii* are puberulent, the margins of the bracts are subdentate and puberulous on both surfaces, and the style is sparsely pubescent in its lower half. Anderson (1867) did not mention any distinguishing reproductive structures for this taxon.

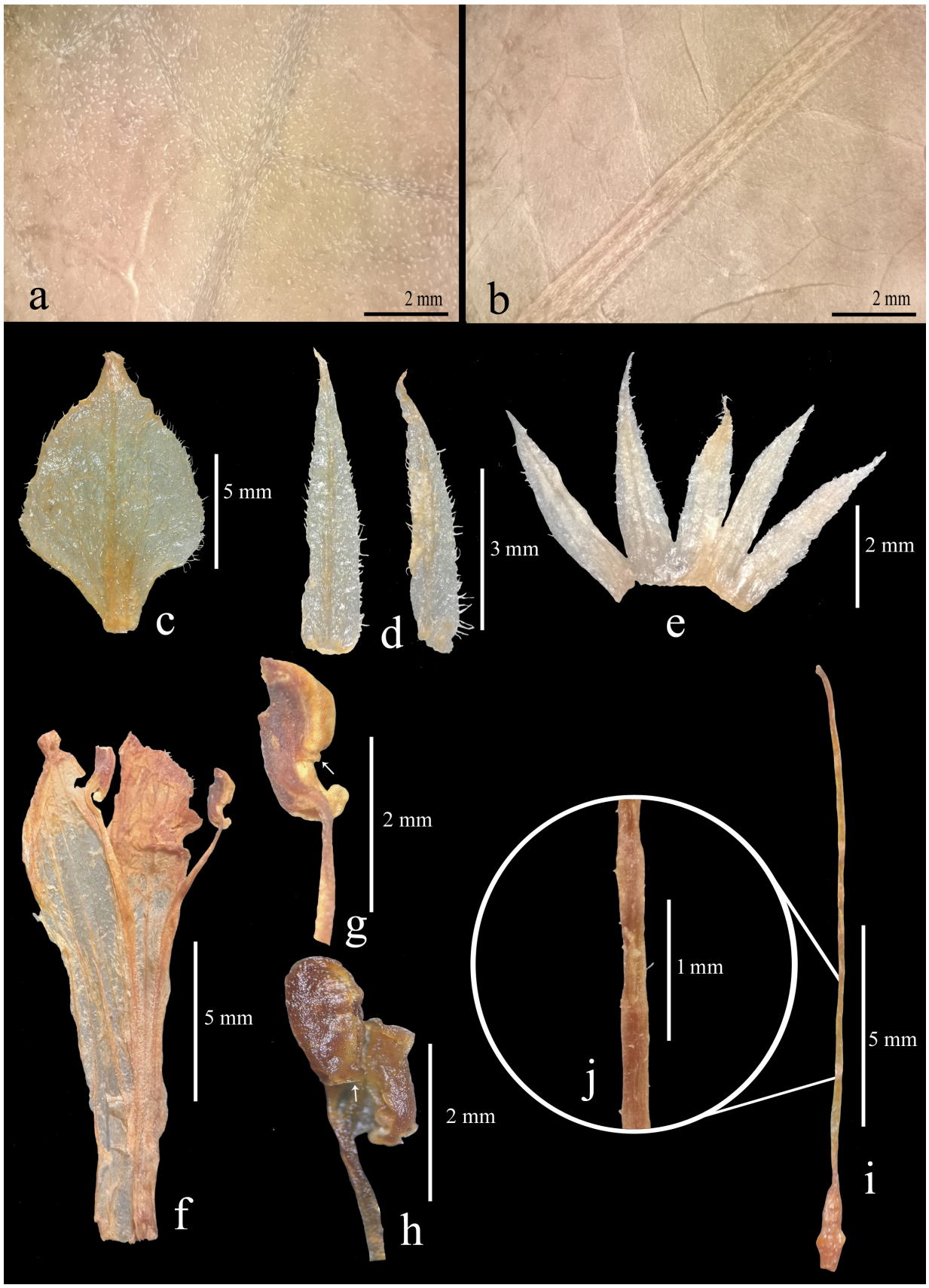

Fig. 2. *Justicia atkinsonii* T.Anderson. **a**. Adaxial surface of leaf, **b**. Abaxial surface of leaf; **c**. Bract; **d**. Bracteoles; **e**. Calyx–split open; **f**. Corolla–split open; **g** & **h**. Anther with part of filament (arrows representing rudimentary appendage in upper theca); **i**. Gynoecium; **j**. Surface of style.

Rai (2022) did not demonstrate that *J. atkinsonii* var. *pubescens* differed from typical *J. atkinsonii* in any features except for the sparsely pilose style in the newly described variety compared to the supposed glabrous style of typical *J. atkinsonii*. This clearly indicates that the distinguishing characters mentioned by Rai (2022) do not delineate a new taxon.

Consultation of multiple herbarium specimens deposited at BSHC, CAL, and US also indicates that the distribution range of the species is between 600 m to 1500 m. Therefore, we conclude that there are no substantial differences between these two taxa, and *J. atkinsonii* var. *pubescens* is hereby reduced to a new heterotypic synonym of *J. atkinsonii* T. Anderson.

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