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SHORT COMMUNICATION

FIRST RECORDS OF TWO GINGER *LILYS HEDYCHUM* (ZINGIBERACEAE) SPECIES FROM THE WESTERN GHATS, INDIA

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FIRST RECORDS OF TWO GINGER LILYS *HEDYCHIMUM* (ZINGIBERACEAE) SPECIES FROM THE WESTERN GHATS, INDIA

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Abstract: *Hedychium forrestii* Diels and *H. spicatum* Sm. (Zingiberaceae) are new distribution records from the Western Ghats, India, extending their range up to southern India. Detailed taxonomic descriptions are provided for the species along with photographs.

Keywords: *Hedychium forrestii*, *H. spicatum*, *H. cernuum*, labellum, southern India, Western Ghats.

Hedychium J. Koenig includes approximately 97 species with the centre of diversity in Southeast Asia. The diversity centres are the high altitude humid climatic zones in India, China, Vietnam, Indonesia, Myanmar and Malaysia. Forty-five taxa are reported from India and are primarily distributed in the northeast region (Thomas et al. 2015; World Checklist of Selected Plant Families 2016). Among the 45 taxa, only five [*Hedychium coronarium* J. Koenig, *H. flavescens* Carey ex Roscoe, *H. cernuum* Wight (= *H. venustum* Wight), *H. forrestii* var. *palaniense* Sanoj & M. Sabu and *H. matthewii* S. Thomas, B. Mani & S.J. Britto] are known from the Western Ghats, which is a biodiversity centre in southern India (Thomas et al. 2015).

During field surveys across different geographic and climatic zones in the Western Ghats, which is one of the

renowned hotspots, the authors collected interesting specimens such as *Hedychium forrestii* Diels and *H. spicatum* Sm. from Sholayar, and Idukki and Periyavarai regions, respectively. As a result, the present work establishes two new distribution records of *Hedychium* from southern India in general and Western Ghats in particular.

Hedychium forrestii Diels

Notes Roy. Bot. Gard. Edinburgh 5: 304. 1912 (Images 1 & 3)

Type: China, Yunnan, Dali Valley, July 1906, Forrest 00211031 (Royal Botanic Garden Edinburgh, E!).

Rhizomatous perennial herbs; rhizome 3–3.8 cm in diameter, aromatic, covered by brown scales. Leafy shoots: 90–160 cm long, robust, semi-slanting, with 14–16 leaves; leaf sheath green, pubescent externally; ligule 2.8–4.6 × 1.8–2.2 cm, oblong, pubescent on the outer surface, pale green when young, papery brown on older shoots, apex entire; lamina sessile, 26–48 × 6–10.5 cm, narrowly elliptic, glabrous above, sparsely hairy below, base cuneate, apex caudate, twisted. Inflorescence: 16–24 cm long, lax, cylindrical, erect, composed of 22–41

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Image 1. *Hedychium forrestii* Diels. A - Habit; B - Inflorescence; C - Single flower; D - Bract (d_1), bracteole (d_2) and calyx tube (d_3); E - Corolla-floral tube (e_1), dorsal lobe (e_3) and lateral lobes (e_2 & e_4); F - Lateral staminodes (f_1 & f_3), labellum (f_2) stamen (f_4) and pistil (f_5).

bracts; rachis green, pubescent; bracts 4.8–5.1 × 1.8–2.1 cm, lanceolate-ovate, lax, green, leathery, pubescent on the outer surface, involute, cincinnus two- to four-flowered; bracteoles 1.6–2.0 × 1.4–1.6 cm, ovate, pale green, pubescent externally, apex two lobed, non-tubular. Flowers: 12.4–13.2 cm long, white, slightly fragrant, spreading; calyx 3.7–4.1 cm long, tubular, shorter than bract, pale green, pubescent externally, unilaterally split up to 0.9–1.2 cm, shortly two-three toothed at apex; floral tube 6.5–6.8 cm long, white, glabrous externally, inner with dense and fine hairs throughout, apical end c. 3 mm diameter; corolla lobes linear, white, margins inflexed, drooping from flower, dorsal corolla lobe 4.6–4.9 × c. 0.5 cm, apex mucronate, c.4 mm, lateral corolla lobes 4.1–4.4 × c. 0.5 cm, mucro absent; lateral

staminodes 3.3–3.6 × 1.1–1.3 cm, oblanceolate-ovate, white, reflexed back; labellum orbicular, pale yellow blotch at centre, 3.5–3.8 cm long with distinct basal claw c. 5 mm long, claw 3–4 mm wide, white, apex 3.2–3.5 × 3.4–3.7 cm, orbicular, emarginated with incision 6–7 mm; stamens 5.3–5.5 cm long, white, exceeding the labellum; filament 4.1–4.4 × c. 0.15 cm, white, glabrous, straight, attached c. 3 mm above the base of dorsal side of the anther; anther 1.3–1.4 × c. 0.20 cm, linear, creamy white, connective white, glabrous, connate, anther suture pale orange; ovary c. 4 × 3 mm, pale green, puberulous, trilocular, ovules many, placentation axile; style filiform, white, pubescent towards apex; stigma c. 1 mm wide, green, densely pubescent, ostiole round, facing forward; epigynous glands two, 3–4 × 1–2 mm,

oblong, yellow. Fruits: loculicidal capsule, 3–3.4 × c. 1.5 cm, terete; seeds red, glabrous, brown when dry, aril red, lacerate.

Flowering and fruiting: August–November.

Habitat: It grows on thin soil over exposed wet rocks in evergreen montane forests at an elevation of 950–1,200 m.

Distribution: China, Laos, Myanmar, Thailand, northern Vietnam, India and Nepal. In India it is reported only from the east Khasi Hills and Jaintia Hills, districts of Meghalaya. Presently it is recorded for the first time from the Western Ghats in Idukki and Thrissur (Sholayar) districts of Kerala.

Specimens examined: China: 1908 Cavalerie 00211021 (E!); 1912 Forrest 00211015 (E!); Forrest 000574525 (The Natural History Museum London, BM!). Nepal: 1821 Wallich 000574704 (BM!). India: 5463, southern India, Western Ghats, Kerala, Sholayar, coll. Sasidaran (University of Calicut Kerala, CALI!); 65146, 10.30154444 N & 76.75944444 E, 15.viii.2013, coll. Thomas and Britto (Rapinat herbarium Tiruchirapalli, RHT!); 66461 (RHT), Sholayar 10.30154444 N & 76.75944444 E, 02.ix.2014, coll. Thomas and Britto; 70106, Kerala, Idukki 07.ii.1981, coll. Nair (Madras Herbarium Coimbatore, MH!); 65490 (RHT), Idukki, 9.81603889 N & 77.02777778 E, 28.vii.2013, coll. Thomas and Britto.

Hedychium spicatum Sm.

A. Rees, Cycl. 17: 8. 1811 (Images 2 & 4)

Type: Nepal, 1806, Buchanan Cat. No.8/27 (Linnean Society of London, LINN-HS!) (probably type collection).

Homotypic synonym (Govaerts 2004): *Gandasulium spicatum* (Sm.) Kuntze, Revis. Gen. Pl. 2: 690 (1891).

Heterotypic synonym (Govaerts 2004): *Hedychium acuminatum* Roscoe, Monandr. Pl. Scitam.: t. 47 (1824); *Hedychium trilobum* Wall. ex Roscoe, Monandr. Pl. Scitam.: t. 48 (1826); *Hedychium flavescens* Lodd. ex Lindl., J. Hort. Soc. London 7: 281 (1852), nom. illeg.; *Hedychium album* Buch.-Ham. ex Wall., Hooker's J. Bot. Kew Gard. Misc. 5: 325 (1853); *Hedychium sieboldii* Wall., Hooker's J. Bot. Kew Gard. Misc. 5: 371 (1853); *Hedychium spicatum* var. *acuminatum* (Roscoe) Wall., Hooker's J. Bot. Kew Gard. Misc. 5: 328 (1853); *Hedychium spicatum* var. *trilobum* (Wall. ex Roscoe) Wall., Hooker's J. Bot. Kew Gard. Misc. 5: 328 (1853); *Hedychium tavoyanum* Horan., Prodr. Monogr. Scitam.: 26 (1862); *Gandasulium sieboldii* (Wall.) Kuntze, Revis. Gen. Pl. 2: 690 (1891); *Hedychium spicatum* var. *khasianum* C.B. Clarke ex Baker in J. D. Hooker, Fl. Brit. India 6: 227 (1892).

Rhizomatous perennial herbs; rhizome 3.2–3.6 cm in diameter, creamy white internally, aromatic, covered

with brown scales. Leafy shoots: 95–112 cm long, green, pink tinged, slender, slanting, with 10–12 leaves; leaf sheath green, pink tinged, pubescent externally, margin membranous; ligule 1.4–1.5 × 1.3–1.5 cm, widely elliptic-orbicular, pink tinged when young, papery brown on older shoots, pubescent externally, apex entire; lamina sessile, 31.7–37.5 × 9.7–10.8 cm, narrowly elliptic to lanceolate, green, glabrous above, pubescent below, base cuneate, apex long caudate, twisted. Inflorescence: 12–32 cm, lax, erect, composed of 16–62 bracts; rachis green, glabrous; bracts 2.6–4.7 × 0.9–1.5 cm, subulate, lax, green, involute, coriaceous, glabrous, apex hairy, cincinnus strictly 1-flowered; bracteoles 1.8–2.2 × c. 1.0 cm, tubular, pale yellow, glabrous, apex hairy, bilobed. Flowers: 10.6–12 cm long, spreading, slightly fragrant; calyx 3.4–3.6 cm long, tubular, glabrous, pale green, unilaterally split up to 6–7 mm, shortly three-lobed at apex; floral tube 5.3–5.6 cm long, pale yellow, red tinged towards apical end, outer surface glabrous, pubescent internally; corolla lobes linear, yellow, red tinged towards base, drooping from flower, margins inflexed, dorsal corolla lobe 3.8–4.4 × c. 0.5 cm, apex mucronate c.3mm, lateral corolla lobes 3.6–4.2 × c. 0.4 cm, mucro absent; lateral staminodes 4.6–5.1 × c. 0.3 cm, linear, creamy white, red tinged towards base, glabrous, apex retuse; labellum obovate, 4.9–5.4 cm long with distinct basal claw 9–12 mm long, claw 3–5 mm wide, pale red, apex 3.8–4.3 × 1.1–1.7 cm, obovate, creamy white, red tinged towards claw, deeply clefted with 2–3.7 cm incision; lobes narrowly acute to acute; stamen 3.2–3.6 cm long, red, shorter than labellum, bend at above the middle; filament 2.1–2.3 × c. 0.15 cm, red, glabrous, bend at apex, attached c. 2mm above the base of dorsal side of the anther; anther 13–14 × c. 2 mm, thecae red, straight, tuft of cilia present along the anther suture, minutely spurred at base, connective red, glabrous, emarginated with incision 3–8 mm; ovary 4–5 × c. 2 mm, pale green, glabrous, trilobular, ovules many, placentation axile; style filiform, pale yellow, glabrous; stigma c. 2mm wide, yellow, pubescent throughout, protruding from the centre of the anther, ostiole round, facing forward; epigynous glands two, 3–4 × 1–2 mm, oblong, yellow, bifid. Fruits: loculicidal capsule, 1.3–1.6 × 1–1.5 cm, sub-globose, glabrous; seeds 5–6 × c. 4 mm, clavate, red, base yellow, aril red, lacerate.

Flowering and fruiting: June–September.

Habitat: Moist and shady places under shola forests at an altitude of 1,500–1,600 m.

Distribution: It is largely distributed in northern India, Nepal, Bhutan, Myanmar, China and northern Thailand. It shows an extensive distribution in the

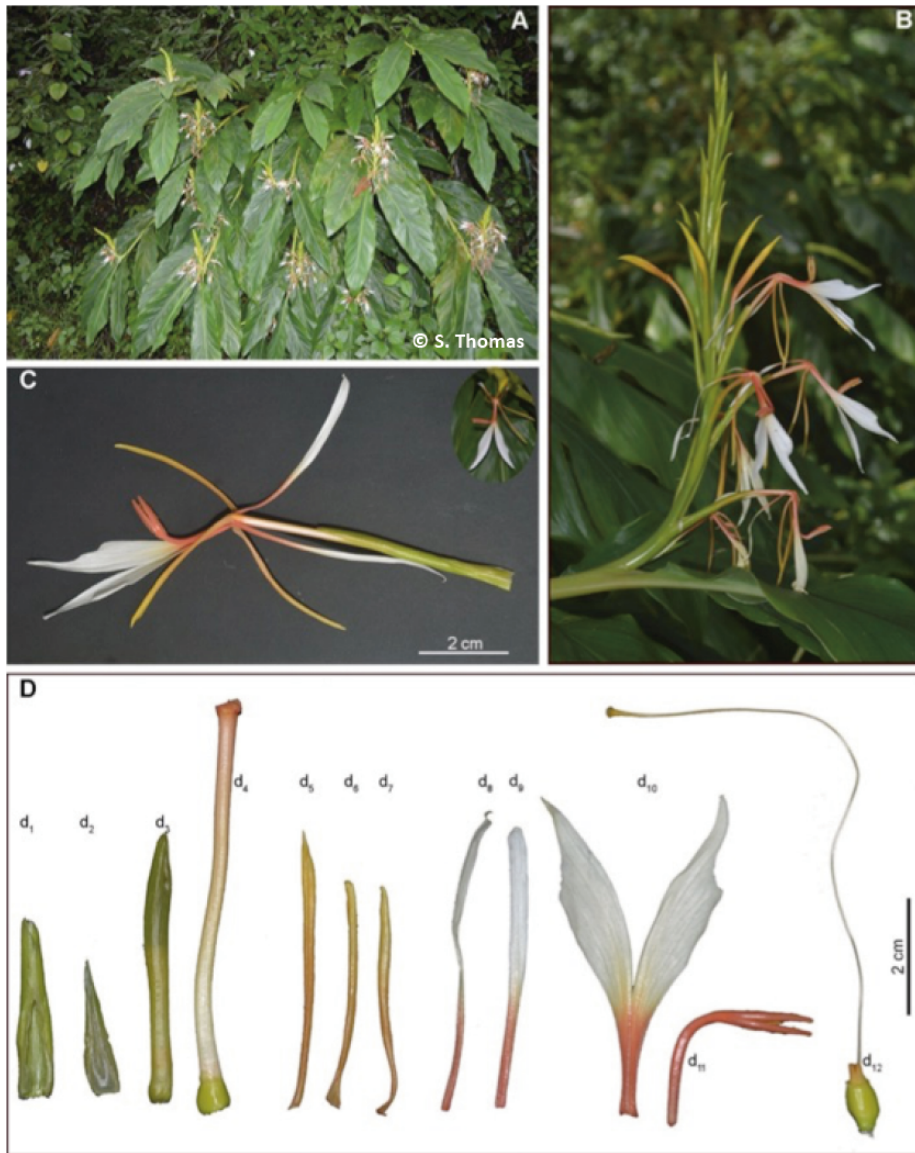


Image 2. *Hedychium spicatum* Sm.

A - Habit; B - Inflorescence; C - Single flower (inset: dorsal view); D - Floral parts: bract (d₁), bracteole (d₂), calyx tube (d₃), floral tube (d₄), dorsal corolla lobe (d₅), lateral corolla lobes (d₆₋₇), lateral staminodes (d₈₋₉), labellum (d₁₀), stamen (d₁₁) and pistil (d₁₂).

eastern Himalaya. Presently, it is recorded for the first time from the Western Ghats.

Specimens examined: Nepal: 1819, Wallich 000574705 (BM!); 1819, Wallich 000574708 (BM!). INDIA: Sikkim, 1887, Hooker 72407 (MH!); Khasia, 1887, Hooker 72408 (MH!); Meghalaya, Shillong, 03.viii.1885, Clarke 000574460 (BM!); 65121 (RHT!), southern India, Western Ghats, Kerala, Munnar, 10.11299167 N & 77.05805556 E, 16.vii.2012, coll. Thomas and Britto; 65122 (RHT!), Munnar, 10.11299167 N & 77.05805556 E, 03.vii.2013, coll. Thomas and Britto; 655015 (RHT!), Munnar, 10.11299167 N & 77.05805556 E, 15.vii.2014, coll. Thomas and Britto; 67225 (RHT!), Munnar, 10.11299167 N & 77.05805556 E, 28.vii.2015, coll. Thomas and Britto.

Notes: The present study enumerated two distributional records of *Hedychium* from the Western Ghats of India, such as *H. spicatum* Sm. and *H. forrestii* Diels. While analysing the various herbaria in India and abroad, we could not find any specimen identified as *H. forrestii* Diels from south India and there may not be any records in the literature for the occurrence of this taxon from the same geographical region. We could however distinguish herbarium specimens of *H. forrestii* from Sholayar (CALI!) and Idukki (MH!) and found that it had been misidentified as *H. flavescens* and *H. coronarium*, respectively. In the present study, we collected *H. forrestii* Diels from Sholayar and Idukki, which are the two moist and humid climatic regions of the Western Ghats, India. *H. forrestii* illustrated here showed slight

Table 1. Diagnostic morphological characters of *Hedychium forrestii* Diels and *H. forrestii* var. *palaniense* Sanoj & Sabu.

Characters	<i>H. forrestii</i> Diels (southern India)	† <i>H. forrestii</i> Diels (northeastern India)	† <i>H. forrestii</i> var. <i>palaniense</i>
Leafy shoot	90–160 cm high	100–200 cm high,	108–110 cm high
Leaves	14–16 in number	12–18 in number	10–13 in number
Ligule	2.8–4.6 × 1.8–2.2 cm, oblong	3–5.2 × 2–2.3 cm, oblong	4–4.7 × c. 2 cm, ovate
Lamina	26–48 × 6–10.5 cm, narrowly elliptic	34–55 × 6–13.3 cm, elliptic-lanceolate	38.8–43 × 8.5–7.7 cm, elliptic
Inflorescence	16–24 cm, lax	15–27.6 cm long, moderately lax	16.5–23.2 cm long, lax
Bracts	4.8–5.1 × 1.8–2.1 cm, lanceolate-ovate	4.8–5 × 2.5–2.7 cm, obovate	4.5–4.7 × 1.8–2 cm, lanceolate
Cincinnus	2–4-flowered	2–5-flowered	c. 3-flowered
Bracteoles	1.6–2.0 × 1.4–1.6 cm, ovate	3–3.7 × 2.1–2.3 cm, ovate	2.1–2.8 × 1.2–2 cm, ovate
Flower	12.4–13.2 cm long	10–12.2 cm long	15–15.2 cm long
Calyx	3.7–4.1 cm long, tubular, shorter than bracts	4.2–4.3 cm long, shorter than bracts	4.8–5.1 cm long, equal or slightly longer than bracts
Floral tube	6.5–6.8 cm long	5–7.1 cm long	9.2–9.4 cm long
Corolla lobes	linear, white; dorsal lobe 4.6–4.9 × c. 0.5 cm, apex mucronate c. 4 mm; lateral lobes 4.1–4.4 × c. 0.5 cm, mucro absent	oblanceolate, white; dorsal lobe 4.7–4.8 × c. 0.6 cm, apex mucronate 5–6 mm; lateral lobes 4.2–4.3 × c. 0.5 cm, mucro absent	oblong, white, dorsal lobe 4.8–5 × c. 0.65 cm, apex mucronate 3.5–4 mm; lateral lobes 4.5–4.7 × c. 0.65 cm, mucro absent
Lateral staminodes	3.3–3.6 × 1.1–1.3 cm, oblanceolate-ovate	3.4–3.7 × 0.8–1.4 cm, elliptic-oblanceolate	4.1–4.4 × 1.9–2 cm, elliptic
Labellum	3.5–3.8 × 3.4–3.7 cm, orbicular, apex 6–7 mm shallowly emarginated	3.5–3.8 × 3.1–3.5 cm, widely ovate-orbicular, apex 1.2–1.7 cm deeply emarginated	4.3–4.6 × 4–4.2 cm, widely depressed ovate, apex 1.9–2.1 cm deeply emarginated
Stamen	5.3–5.5 cm long, exceeding the labellum; filament 4.1–4.4 cm long; anther 1.3–1.4 × c. 0.20 cm, linear	5–5.5 cm long, longer than labellum; filament 4–4.5 cm long; anther 1.1–1.3 × c. 0.25 cm, oblong	5.6–6 cm long, longer than labellum; filament 4.4–4.5 cm long; anther 1.3–1.4 × c. 3 cm, elliptic
Ovary	c. 4 × 3 mm	4.5–5 × 3–3.5 mm	4–4.5 × 3.5–4 mm

† Sanoj et al. 2010

differences from the type specimens especially by its sparsely pubescent lamina, large floral parts and 2–4 flowered cincinnus (Shu 2000). Moreover, recently a new variety of *H. forrestii* such as *H. forrestii* var. *palaniense* Sanoj & Sabu was reported from the Palani hills of the Western Ghats, India (Sanoj et al. 2010). The specimen described here, however, is allied to *H. forrestii* Diels than var. *palaniense* Sanoj & Sabu (Table 1).

Hedychium spicatum is common in the northeastern region of India, whereas this may be the first valid report of *H. spicatum* from the Western Ghats. While searching

**Image 3.** Scanned herbarium specimen of *Hedychium forrestii* Diels.

the major herbaria in India and digital herbaria abroad we found that there was no specimen similar to *H. spicatum* described here from southern India. *H. cernuum* Wight (= *H. venustum* Wight), the sister species of *H. spicatum*, is widely distributed in the Western Ghats (Thomas et al. 2015). Occasionally, *H. cernuum* is misidentified as *H. spicatum* from the Western Ghats (Sabu 2000). Whereas, further studies revealed that those specimens differ from *H. spicatum* and resemble *H. cernuum* in all features. *H. spicatum* could easily be distinguished from *H. cernuum* by its pink tinged and slender leafy shoot, comparatively small flowers, strictly 1-flowered cincinnii, sessile leaves, narrow labellum, shorter and bend stamen and spurred thecae. The green leafy shoot, 1–3 flowered cincinnii, broad labellum, long and arching stamen (equal or slightly shorter than labellum), non-spurred thecae are the diagnostic features of *H. cernuum*.

Previous studies showed that *H. spicatum* showed its distribution in China, Assam, Nepal, eastern Himalaya, Vietnam, Myanmar and Thailand (Govaerts 2004). The present study reveals the extent of occurrence of *H. spicatum* in southern India. *H. spicatum* with similar morpho-forms, as the type specimen (Linn.), from



Image 4. Scanned herbarium specimen of *Hedychium spicatum* Sm.

different localities and variants of type specimen were treated as separate taxa such as varieties, species and even genus (Govaerts 2004). R. Govaerts (2004), however, treated those epithets as synonyms of *H. spicatum* Sm. Likewise, *H. spicatum* described here shows similarity with *H. spicatum* var. *acuminatum* (Roscoe) Wall. in characteristics such as the shape of the labellum and length and shape of the stamen. We, however, treated it as *H. spicatum* Sm.

Finally, it is concluded that the present study established two new distribution records for the flora of the Western Ghats and to southern India.

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-- Sonam Tobgay, Thinley Wangdi & Kumbu Dorji, Pp. 10956–10958

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