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*HEDYCHIUM FORRESTII* (ZINGIBERACEAE)  
WITH A NEW SYNONYMY AND A VARIETY FROM INDIA

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ABSTRACT

*Hedychium dekianum* is reduced to a new synonym of *H. forrestii*. It is a new extended distributional record of the Chinese species for India. Yet, another new variety ***H. forrestii* var. *palaniense*** Sanoj & M. Sabu, var. nov. is described from Western Ghats, South India. Key to the varieties, detailed descriptions, illustrations, and relevant notes are also provided.

RESUMEN

*Hedychium dekianum* se reduce a un nuevo sinónimo de *H. forrestii*. Es una nueva cita que extiende la distribución de la especie china por la India. Además, se describe una nueva variedad ***H. forrestii* var. *palaniense*** Sanoj & M. Sabu, var. nov. de Western Ghats, South India. Se aporta una clave de variedades, descripciones detalladas, ilustraciones y notas relevantes.

INTRODUCTION

*Hedychium*, commonly called as “ginger lily” or “butterfly lily,” produces one of the most beautiful and fragrant flowers in the family Zingiberaceae. Though the flowers are short lived, many flowers are produced in succession on an inflorescence for a longer period. The genus was established by Koenig in 1783, based on the species *H. coronarium* Koenig. It includes about 80 species and are mainly distributed in India, South China, and southeast Asia (Sirirugsa & Larsen 1995). This is the largest genus of the family in India with about 43 taxa, and are mainly distributed in northeastern states with 16 endemics (Jain & Prakash 1995), of which only 4 are represented in South India.

As part of a revision of *Hedychium* in India, the authors collected specimens of *H. dekianum* A.S. Rao & D.M. Verma on the way to Dauki from Jowai, (near to the type locality) Meghalaya. This taxon was compared with the closely related taxa like *H. coronarium*, *H. forrestii*, *H. stenopetalum*, and *H. larsenii*. Detailed studies have revealed that it is conspecific with *H. forrestii*. Since *H. forrestii* has priority over *H. dekianum*, the latter is reduced as a synonym of *H. forrestii*.

Subsequently, we could collect an interesting specimen from Palani hills of South India which differs from other South Indian taxa. The authors also observed one collection of the above taxon at MH and two at E, from the same locality. On comparison with *H. forrestii*, it is turned out to be a new variety and is described here as *H. forrestii* var. *palaniense*. *Hedychium forrestii* var. *latebracteatum* Larsen is the another variety described by Larsen (1965) on the basis of a Tonkin collection from Vietnam (*Poilane 12791* P, image ! ) with a relatively condensed spike and apically truncate bracts. He distinguished it from the type species in “*bracteis latis, apice rotundate obtusis, axem dense congestis plane obtegentibus, floribus flavis.*” This taxon is excluded in this paper due to lack of sufficient data and its distribution is restricted to only Vietnam. But a key to the varieties of *H. forrestii*, including *H. forrestii* var. *latebracteatum* is also provided.

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## TAXONOMIC TREATMENT

KEY TO THE VARIETIES OF *HEDYCHIUM FORRESTII*

1. Flowers yellow \_\_\_\_\_ var. **latebracteatum**
1. Flowers white.
  2. Flower 15–15.2 cm long; corolla tube 9.2–9.4 cm long; calyx equal or slightly longer than bracts \_\_\_\_\_ var. **palaniense**
  2. Flower 10–12.2 cm long; corolla tube 5–7.1 cm long; calyx shorter than bracts \_\_\_\_\_ var. **forrestii**

**1. *Hedychium forrestii* var. *palaniense*** Sanoj & M. Sabu, var. nov. (**Figs. 1, 2D**). TYPE: INDIA. TAMIL NADU. Dindigul Dt.: Perumal Malai, Palani Hills, on the way to Kodaikanal from Palani, 1380 m, 20 Aug 2005, E. Sanoj 86151 (HOLOTYPE: CALI, ISOTYPE: CAL, MH).

A varietate typica floribus et corollae tubo longioribus (9.2–9.4 mm), calycibus bracteis aequilongis vel parum longioribus differt.

Perennial rhizomatous herbs. **Rhizome** 2.7–3 cm wide, creamy yellow internally, slightly aromatic. **Leafy shoot** 108–110 cm high, erect, robust. **Leaves** 10–13 in number, spreading, sessile; sheath margins white, membranous, translucent, sparsely pubescent; ligule 4–4.7 × ca. 2 cm, ovate, single lobed, white, pubescent externally, glabrous towards margins, membranous, translucent, papery, closely appressed with the stem; lamina 38.8–43 × 8.5–7.7 cm, elliptic, dark green and glabrous above, pale green and puberulent below, hairyness increases towards tip; margin undulate, membranous, translucent, white tinged, non-ciliate; tip long caudate, twisted; base cuneate; midrib pubescent below. **Inflorescence** 16.5–23.2 cm long, cylindrical, lax, erect. **Bracts** 4.5–4.7 × 1.8–2 cm, lanceolate, green, glabrous, pubescent towards tip, coriaceous, non-imbricating, convolute; margin non-ciliate, translucent, membranous, white; tip rounded, cinninnus ca. 3-flowered. **Bracteoles** 2.1–2.8 × 1.2–2 cm, outer one tubular, inner ones nontubular, translucent, slightly 2 or 3 lobed at tip, pale green, white towards base, glabrous, pubescent towards tip, leathery; margin ciliate at tip. **Flower** 15–15.2 cm long, white, 4–6 -flowers opens at a time, ascending, slightly fragrant. **Calyx** 4.8–5.1 cm long, 4.5–5 mm wide at mouth, pale green, pubescent externally, sparse towards base, membranous, translucent, upper half inflated, lower half closely appressed to corolla tube, unilaterally split upto 1.1–1.4 cm, 3-toothed at tip. **Corolla tube** 9.2–9.4 cm long, ca. 4 mm wide at mouth, white, glabrous externally, downwardly directed hairy internally, glabrous towards base, bend to one side at centre. **Corolla lobes** oblong, white, pale greenish yellow tinged towards tip, membranous, early decaying at base, drooping from flower, glabrous, margins rolled inside, slightly coiled like an expanded spring; dorsal lobe 4.8–5 cm × ca. 6.5 mm, 3.5–4 mm long beaked at tip, surface with small raised processes; lateral lobes 4.5–4.7 cm × ca. 6.5 mm, non-beaked at tip. **Lateral staminodes** 4.1–4.4 × 1.9–2 cm, elliptic, white, spreading on flower, reflexed back, margin undulate. **Labellum** 4.3–4.6 × 4–4.2 cm, widely depressed ovate, white, pale yellow tinge at centre and towards base, spreading on flower, reflexed back on upper half, base cordate, abruptly clawed at base; claw 6.5–7 mm wide; tip 1.9–2.1 cm deeply emarginated; margin undulate, lobes rounded at tip. **Stamen** 5.6–6 cm long, longer than labellum, bend at tip, white with orange anther openings. **Filament** 4.4–4.5 cm long, ca. 2 mm wide at base, white, bend to one side at tip. **Anther** 1.3–1.4 × ca. 3 cm, elliptic, split opens from top to bottom, attached with the filament at 2.5–3 mm above from base, thecae at an angle of ca. 45° with the filament axis; anther suture pale red; connective white, glabrous, non-crested, tip truncate. **Ovary** 4–4.5 × 3.5–4 mm, barrel-shaped, pale green, pubescent externally, trilocular, ovules many, placentation axile. **Style** filiform, white, glabrous, pubescent towards tip, broadens and yellowish-green tinged towards stigma. **Stigma** ca. 2.5 mm wide, yellowish-green, cup-shaped, slanting with a depression at center, pubescent, hairs hook-like, bulbous based, ca. 1.5 mm exserted the anther. **Epigynous glands** two, 2.5–3 mm long, oblong, yellow. **Fruits** 3.5–4 × ca. 3 cm, loculicidal capsule, ovate, three-angled, glabrous, trilocular, surface smooth; fruit wall green externally, orange internally, completely split and reflexed back on dehiscence. **Seeds** ca. 4.5 × 3 mm, red, grey when dry, yellow at base, compactly arranged on column. **Aril** red, yellow when dry, lacerate, basal.

*Notes.*—*Hedychium forrestii* var. *palaniense* is allied to *H. forrestii*, but differs in having longer flower and corolla tube (9.2–9.4 cm) and calyx equal or slightly longer than bracts.

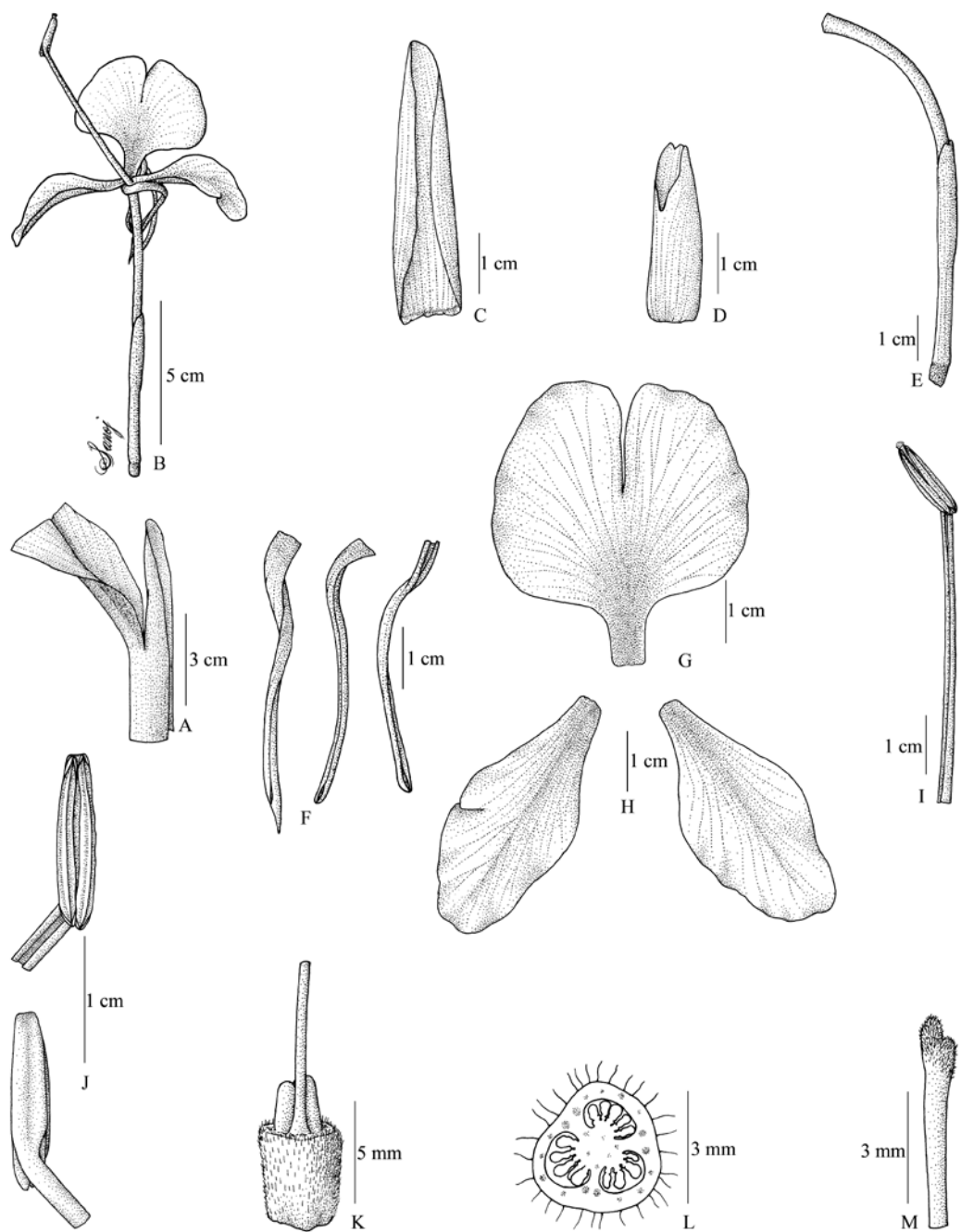


FIG. 1. *Hedychium forrestii* var. *palaniense*. A. Ligule with leaf base. B. Single flower. C. Bract. D. Bracteole. E. Corolla tube with calyx and ovary. F. Corolla lobes. G. Labellum. H. Lateral staminodes (left, right). I. Stamen. J. Anther, front view (above) and back view (below). K. Ovary with epigynous glands and base of style. L. Cross section of ovary. M. Stigma with a part of style.

**Distribution and ecology.**—*Hedychium forrestii* var. *palaniense* is known only from four localities of Palani Hills, Tamil Nadu at an altitude of 1300–1600 m. It grows as patches of 15–20 mature individuals in grassy slopes and open rock cliffs. It is assessed here as Critically Endangered (CR) (CR1ab(i,ii)+ 2ab(i,ii); D) according to IUCN guidelines (IUCN 2001, IUCN Standards and Petitions Subcommittee 2010).

**Flowering and fruiting.**—July through October.

**Etymology.**—The varietal epithet has been derived from the type locality, i.e., ‘Palani Hills’, from where the variety has been described.

Additional specimens examined: **INDIA. Tamil Nadu. Nilgiris Dt.:** Kailas Pillai Estate to Sirur (near Ebanad), 6 Sep 1970, 1450 m, G.V. Subba Rao 36524 (MH). **Dindigul Dt.:** Anna, Kodaikanal, Palani Ghat Road between Perumal Malai and Vadakavunchi, 1500 m, 23 Sep 1986, K.M. Matthew, M. Charles & N. Rajendran 46992 (E), Palani Ghat Road, below Perumal Peak (Rajamani Estate), 1600 m, 26 Aug 1987, K.M. Matthew & N. Rajendran 46992 (E).

**2. *Hedychium forrestii*** Diels, Notes Roy. Bot. Gard. Edinburgh 5:304. 1912. (**Fig. 2A**). TYPE: CHINA. YUNNAN: Dali valley, 25°40'N, G. Forrest 4812 (E!).

*Hedychium dekianum* A.S. Rao & D.M. Verma, Bull. Bot. Surv. India 11(1&2):122. 1969 syn. nov.; 14(1–4):129. 1972; N.P. Balakr., Fl. Jowai Vicinity, Meghalaya 2:527. 1983; Karthik, et al., Fl. Indicae Enum. Monocot. 294. 1989. (Fig. 2B, C) TYPE: INDIA: Meghalaya, East Khasi Hills Dt.: Shillong, Woodlands (introduced from Khliehriat road from Jowai), 15 Jul 1966, G.K. Deka 35605 (HOLOTYPE: CALI; ISOTYPE: ASSAM!).

Perennial rhizomatous herbs. **Rhizome** 3.3–3.6 cm wide, creamy white internally, aromatic, covered by brown scales. **Leafy shoot** 100–200 cm high, erect, robust. **Leaves** 12–18 in number, 12–16.2 cm apart, sessile, spreading; sheath ca. 3.5 cm wide, green, margins pink, membranous, translucent, pubescent; ligule 3–5.2 × 2–2.3 cm, oblong, single lobed, slightly notched at tip, pale green, sericeous externally, membranous, translucent, papery, closely appressed to the stem; lamina 34–55 × 6–13.3 cm, elliptic-lanceolate, dark green and glabrous above (pink tinged in lower leaves), pale green and appressed silky hairy below; margin highly undulate, membranous, translucent, pink tinged, non-ciliate, folded back; tip long caudate, twisted, bend down; base oblique; midrib pink tinged below towards base. **Inflorescence** 15–27.6 cm long, cylindrical, erect, moderately lax; peduncle green, pubescent. **Bracts** 4.8–5 × 2.5–2.7 cm, obovate, green, pubescent, dense towards tip and margins, leathery, convolute; margin non-ciliate, translucent, membranous, white; tip rounded; cincinnus 2–5 -flowered. **Bracteoles** 3–3.7 × 2.1–2.3 cm, ovate, green, pubescent, outer one tubular, inner ones non-tubular; margin membranous, translucent, non-ciliate. **Flower** 10–12.2 cm long, white, spreading, 10–13 flowers opens at a time, ascending, slightly fragrant. **Calyx** 4.2–4.3 cm long, shorter than bracts, 3.5–4 mm wide at mouth, white with pale yellow tinge, pubescent externally, membranous, translucent, upper half inflated, lower half closely appressed to corolla tube, unilaterally split upto 1.2–1.3 cm, 3-toothed at tip. **Corolla tube** 5–7.1 cm long, ca. 3.5 mm wide at mouth, white, glabrous externally, downwardly directed hairy internally, glabrous towards base, erect or slightly bend towards tip. **Corolla lobes** oblanceolate, white, pale green tinged towards tip, membranous, early decaying at base, drooping from flower, glabrous, margins rolled inside, slightly coiled like an expanded spring; dorsal lobe 4.7–4.8 × ca. 0.6 cm, 5–6 mm long beaked at tip; lateral lobes 4.2–4.3 × ca. 0.5 cm, non-beaked at tip. **Lateral staminodes** 3.4–3.7 × 0.8–1.4 cm, elliptic-oblanceolate, white, spreading on flower, reflexed back, tip obtuse, margin undulate. **Labellum** 3.5–3.8 × 3.1–3.5 cm, widely ovate-orbicular, white, pale yellow tinge at centre and claw, spreading on flower, reflexed back on upper half, abruptly clawed at base; claw 6–8 mm wide; tip 1.2–1.7 cm deeply emarginated; margin undulate; lobes tip obtuse. **Stamen** 5–5.5 cm long, longer than labellum. **Filament** 4–4.5 cm long, ca. 2 mm wide at base, white, erect. **Anther** 1.1–1.3 × ca. 0.25 cm, oblong, creamy white, split opens from top to bottom, attached with the filament at ca. 2.5 mm above from base, thecae parallel with the filament axis; connective white, glabrous, non-crested, slightly notched, tip truncate. **Ovary** 4.5–5 × 3–3.5 mm, barrel-shaped, pale green, densely pubescent, trilobular, ovules many, placentation axile. **Style** filiform, white, glabrous, pubescent towards tip, broadens and green tinged towards stigma. **Stigma** green, cup-shaped, slanting with a depression at center, densely pubescent, hairs hook-like, bulbous based, 1–1.5 mm exserted from the anther. **Epigynous glands** two, 3–3.5 mm long, oblong, bright yellow. **Fruits** 4–6 × ca. 1.5 cm, oblong-cylindrical.



FIG. 2. A. *Hedychium forrestii*. Type specimen (G. Forrest 4812), reproduced with kind permission from Botanic Garden Edinburgh. B. *Hedychium dekanium*. Type specimen (G.K. Deka 35605). C. *Hedychium forrestii* (E. Sanoj & T. Rajesh Kumar 94905), photo by E. Sanoj. D. *Hedychium forrestii* var. *palaniense*. Type specimen (E. Sanoj 86151).

*Notes.*—*Hedychium forrestii* was originally described by Diels in 1912, based on a collection by Forrest (holotype: *G. Forrest* 4812, E!) from Tali valley in Western Yunnan. He distinguished this species from *H. coronarium* Koenig by its “narrower spreading bracts, the narrower segments of the corolla and broader staminodes.” However, he admitted that, he was not able to study some of the floral details of this species. Diels’ diagnosis of this species was rather short and was based on a specimen with a single upper leaf and an inflorescence. Later, while describing the new variety from Vietnam (var. *latebracteatum*), Larsen (1965) elaborated on the description of *H. forrestii* based on his studies at Kew, Paris, and Edinburgh.

In the meanwhile, Rao and Verma (1969) apparently being unaware of the description of *H. forrestii*, described yet another species, *Hedychium dekianum* from Jowai, Assam (presently in Meghalaya), based on a collection by Deka (*G.K. Deka* 35605 A). The authors compared their new species with *H. coronarium* and distinguished it by its “lax spikes; closely convolute bracts; stamen exceeding the lip and oblong-cylindric capsule.”

During the course of revision of the genus in India, we were able to collect and study a large number of specimens of *Hedychium* from the entire Northeast India. Our studies on *H. dekianum* based on the types and live specimens have indicated that Indian specimens differ from *H. forrestii* in the white color of the filament and creamy white anther, whereas it is salmon pink and crimson respectively in *H. forrestii*, which is mentioned only in one of the collections of *G. Forrest* 8478 (K!). As the differences between these taxa are not sufficient to recognize them even as varieties, *H. dekianum* is reduced to a synonym of *H. forrestii*.

*Distribution and ecology.*—Distributed in Yunnan and Guizhou provinces of China, India, northern Thailand, Myanmar, and Vietnam. In India it is restricted to the districts, East Khasi Hills and Jaintia Hills of Meghalaya. It is a robust herbaceous plant growing in populations of 3–5 plants in open and moist forest lands.

*Hedychium forrestii* is facing a very high risk of extinction in the wild. Hence we categorize it as Endangered (EN) (CR11ab(i,ii,iv)+ 2ab(i,ii,iv) as per IUCN guidelines (IUCN 2001, IUCN Standards and Petitions Subcommittee 2010).

*Flowering and fruiting.*—July through October

Additional specimens examined: **CHINA. Yunnan:** Hocking valley, 1910, 7000 ft, 26°30', *G. Forrest* 6529 (E, K); Sen district, 1900–1922, *J. Cavalerie* 7538 (E), *J. Cavalerie* 3660 (E); Shweli valley, 5000 ft, 25° N, Jun 1912, *G. Forrest* 8478 (K, E); Tengyueh valley, 25° N, 6000 ft, Jun 1912, *G. Forrest* 8428 (E); near Tengyueh, 5500–6500 ft, Jul 1924, *G. Forrest* 24761 (E, K); Lava land W of Tengyueh, 25° N, 5000 ft, Jul 1912, *G. Forrest* 8686 (E). **INDIA.** Meghalaya. East Khasi Hills Dt.: Shillong, Woodlands, 20 Aug 1970, *D.M. Verma* 34198 (ASSAM). Jaintia Hill Dt.: Khliehriat road from Jowai, 23 Oct 1967, *G.K. Deka* 37306 A (ASSAM); 5 mi before Jowai, 16 Aug 1968, *N.P. Balakrishnan* 46119 B, D, 46934 E, (ASSAM); Jowai-Jorain, 20 Aug 1968, *N.P. Balakrishnan* 46882 (ASSAM); Way to Dauki from Jowai, N 25°09.769' E 092°23.383', 473 m, 16 Aug 2007, *E. Sanoj & T. Rajesh Kumar* 94905 (CALI). **MYANMAR.** Maymyo Plateau, 3500 ft, Sep 1908, *J.H. Lack* (E).

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