

NOTES ON *HEDYCHIMUM* KOENIG, INCLUDING FOUR NEW SPECIES
FROM KHASI & JAINTIA HILLS, ASSAM

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ABSTRACT

Four new species of *Hedychium* Koenig : *H. calcaratum*, *H. dekianum*, *H. gracillimum* and *H. rubrum* are described from K. & J. Hills, Assam with analytical illustrations. Critical additional descriptive notes are also included in respect of a few other species.

INTRODUCTION

A critical study of the accumulated *Zingiberaceae* collections in the Kanjilal Herbarium, Botanical Survey of India, Shillong, was undertaken to draft an account of that family for a projected work to complete the earlier volumes of the Flora of Assam (Kanjilal *et al.*). During this, we discovered that notwithstanding a recent study from the same herbarium (Naik and Panigrahi, Bull. Bot. Surv. India 3: 67-73, 1961), *Hedychium* Koenig, with numerous species in this area, posed several confusions and that our knowledge of it appeared to be unsatisfactory. These notes have been now compiled after a detailed study of authentic material and connected literature in the Central National Herbarium, Calcutta, supplemented by recent collections and observations in the natural habitat and on documented live plants in the experimental garden at 'Woodlands', Shillong. In the following account, only the relevant material pertaining to our presented observations has been cited and does not reflect the bulk of material examined in the two herbaria. The study has revealed the presence of four distinct, hitherto undescribed, species which are now described.

Hedychium calcaratum A. S. Rao et D. M. Verma
spec. nov.

Affine *Hedychium stenopetalum* Lodd. a quo differt spicis brevioribus; bracteis unifloris; corollae tubo multo bracteis longiore; labio minore et stamine; staminodiis minoribus et latioribus.

Rhizoma repens. *Caulis* ca 1 m altus. *Folia* sessilia, lanceolata, 20-32 cm longa, 3-5.5 cm lata, subcaudata, glabra in pagina superiore, adpresse pilosa in inferiore; ligula 1-2 cm longa, pubescens. *Spica* 8-10 cm longa; rachis glabra; bracteae ca 10-15,

lanceolatae, arcte convolutae, 3.3-4 cm longae, ca 1 cm latae, glabrae, marginibus scariosis, acutae, uniflorae; bracteola lanceolata, ca 2 cm longa. *Flores* albi; calyx tubularis, bracteas excedens 5-10 mm, puberulus, 3-dentatus, ad latus divisus; corollae tubus 5.7-6 cm longus; laciniae linearis, subaequales, ca 3.2 cm longae, crispatae; staminodia lateraliter oblique spathulata, ca 1.5 cm longa, ca .5 cm lata; labium obovatum, ca 2.2 cm longum, ca 1.5 cm latum, breviter unguiculatum, bilobum, sinu ca 1.2 cm alto; stamen ca 1.8 cm longius labio; filamentum ca 3.2 cm longum; anthera linearis, ca 1 cm, lutea; ovarium ellipsoideum, ca 3 mm longum, glabrum; stigma turbinatum, ca 1 mm latum, pilosum (Figs. 1-3).

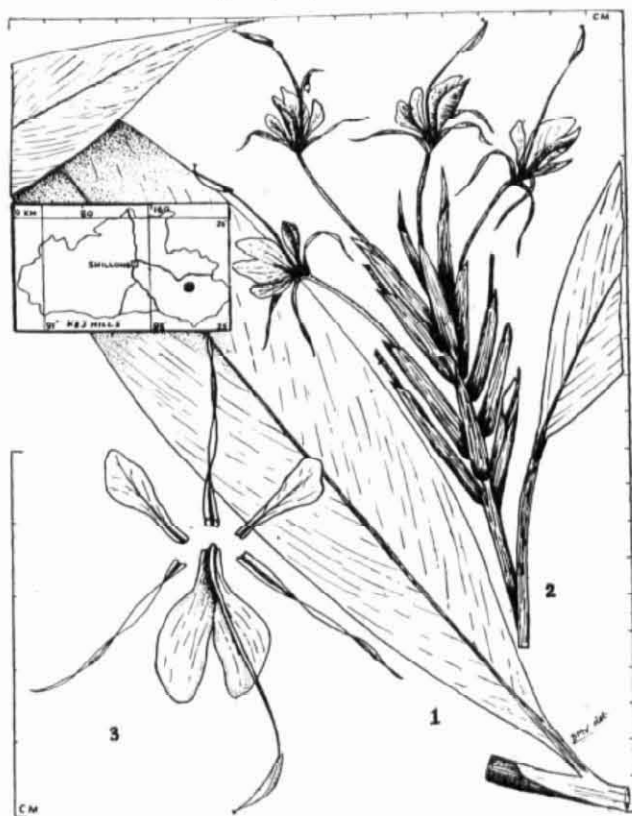
Holotypus G. K. *Deka* 10134A, in K. et J. collibus, Assam, 22.7.1957 (CAL); isotypi G. K. *Deka* 10134 B-C (ASSAM).

Hedychium calcaratum A. S. Rao and D. M. Verma
spec. nov.

Allied to *Hedychium stenopetalum* Lodd. but differs in its shorter spikes; 1-flowered bracts; corolla tube much longer than the bracts; smaller lip and stamen; smaller and broader staminodes.

Rhizome creeping. *Stem* ca 1 m high. *Leaves* sessile, lanceolate, 20-32 cm long, 3-5.5 cm broad, subcaudate, upper surface glabrous, lower surface appressed hairy; ligule 1-2 cm long, pubescent. *Spike* 8-10 cm long; rachis glabrous; bracts ca 10-15, lanceolate, closely convolute, 3.3-4 cm long, ca 1 cm broad, glabrous, scarious margined, acute, 1-flowered; bracteole lanceolate, ca 2 cm long. *Flowers* white; calyx tubular, exceeding the bracts by 5-10 mm, puberulus, 3-toothed, split on one side; corolla tube 5.7-6 cm long; lobes linear, subequal, ca 3-2 cm long, curled; lateral staminodes

obliquely spatulate, ca 1.5 cm long, ca .5 cm broad; lip obovate, ca 2.2 cm long, ca 1.5 cm broad, shortly clawed, bilobed, sinus ca 1.2 cm deep; stamen ca 1.8 cm longer than the lip; filament ca 3.2 cm long; anther linear, ca 1 cm, yellow; ovary ellipsoid, ca 3 mm long, glabrous; stigma turbinate, ca 1 mm broad, hairy. (Figs. 1-3).



Hedychium calcaratum A. S. Rao & D. M. Verma sp. nov.
Figs. 1-3: 1. Leaf. 2. Spike. 3. Corolla lobes, staminodes, lip and stamen (G. K. Deka 10134A). Inset map indicates Type locality ⊕.

Holotype G. K. Deka 10134A, Jowai-Bodorpur Road, 96 km from Shillong, K. & J. Hills, Assam, 22.7.1957 (CAL); isotypes G. K. Deka 10134 B-C (ASSAM).

Naik and Panigrahi (Bull. Bot. Surv. India 3: 72, 1961) have cited this collection, evidently because of its superficial resemblance, under *Hedychium spicatum* Hamilt. ex Smith which clearly is not by its stamen being longer than the lip.

Hedychium coronarium Koenig in Retz. Obs. 3: 73, 1783.

Baker (Hook. f. Fl. Brit. Ind. 6: 225-26, 1892) has confused *H. coronarium* Koen. with *H. maximum*

Rosc. (Monadr. Pl. pl. 52. 1824-29) when he states for the former "filament red" and distinguishes the latter (reduced to a variety of the former) as "leafy stem taller than in the type, flowers pure white, larger, staminodes 1.8-2.5 cm broad, lip 5-6.2 cm broad". The original plate of *H. maximum* Rosc. clearly shows filament to be red and by this character Schumann (in Engl. Pflzenrch. 20: 41, 1904) distinguishes it from the other. But Turrill (Kew Bull. 1914) again stresses on the flower size distinction, also stating that the native country of *H. maximum* Rosc. is not known. Over the last four years we have observed live populations of *H. coronarium* Koen. throughout their flowering time in Khasi Hills and have confirmed that the filament in this species is always white and the flower sizes are quite variable, covering the size range of *H. maximum* Rosc. Incidentally, Naik & Panigrahi's report (l.c. 71) of *H. coronarium* var. *maximum* (Rosc.) Baker, on Deka 22629, from Shillong, having large flowers, lacks the vital filament colour data in particular, though recording "flowers white", is extremely doubtful and we think it more likely to be *H. coronarium* Koen. only. In view of the earlier noted confusions we record a few of our observations on *H. coronarium* Koen., in Shillong. (1) Plants are 1-2 m high, (2) Flowers are borne in cincinni within bracts (primary bracts) and from each upto 9 flowers have been observed to open in succession, (3) Bracts are 4-9 cm long and 2.5-6 cm broad, (4) Corolla tube exceeds the bracts by 3-6 cm, (5) Corolla segments are 3.5-6 cm long, (6) Staminodes are 4.5-5 cm long and 1.8-3.4 cm broad with entire or notched apex, (7) Lip is 5-6.5 cm long, equally broad, always white with a faint yellow blotch at base and (8) Stamen 3.5 mm shorter than the lip.

Specimens cited: ASSAM: K. & J. Hills—Shillong, 'Woodlands', Verma 34598, 35611, 35671; Gauhati-Shillong Road, 57 km, G. K. Deka 22629 (ASSAM).

During a plant exploration in Jowai area a vigorous clump of 10-12 stems of a *Hedychium* with the characteristic facies of *H. coronarium* Koen. and so recorded for convenience in the herbarium (Umjasaiw-Mysyngnat, N. P. Balakrishnan 47143, 26.8.1968), in field observations as well as on subsequent critical study, showed strong indication of introgression towards *H. wardii* Fischer, being possibly a product of back-crossing between the two species. This was evidenced by stumpy stamens

very much shorter than the broad lip, a character which is in between the long filamentous stamens of *H. coronarium* Koen. and the non-filamentous stamens of *H. wardii* Fisch. The occurrence of both of its suspected parents in its immediate vicinity lends further support to the above conjecture.

Hedychium coronarium Koen. var. **urophyllum** (Lodd.) Baker l.c. 226. *H. urophyllum* Lodd. Bot. Cab. pl. 1785. 1833.

Turrill (l.c.) states "the lip entire or with only a slightly bilobed or undulating margins". In the numerous plant populations that we have observed in Shillong, we found the lip to be always distinctly bilobed, the sinus 5-10 mm deep.

Specimens cited: ASSAM: K. & J. Hills—Shillong, 'Woodlands', Verma 37054; Jowai, A. S. Rao 35692 (ASSAM).

Hedychium dekianum A. S. Rao et D. M. Verma spec. nov.

Accedit ad *Hedychium coronarium* Koenig, a quo tamen differt spicis laxis; bracteis arcte convolutis; stamine labium excedente; capsula oblongo-cylindrica.

Rhizoma tuberosum, implicatum, squamosum, pallide roseum extus, album intus, molliter aromaticum; segmenta ovoidea vel subglobosa, ca 3 cm; radices robustae. *Caulis* 1.2-2 m altus, ad basin vaginatus. *Folia* nonnulla, sessilia, lanceolata vel oblongo-lanceolata, 30-50 cm longa, 5.5-13 cm lata, subcaudata, glabra in pagina superiore, adpresse sericeo-pilosa in inferiore; ligula membranacea, 1-4 cm longa, villosa, rosea, biloba. *Spica* 10-17 cm longa; rachis villosa; bracteae ca 25-35, oblongae, arcte convolutae, 4-6 cm longae, 1.5-2 cm latae, pubescentes, marginibus scariosis, acutae vel obtusae, singulae includentes 3-9 flores successive operindos; bracteolae ovato-oblongae, 3-3.5 cm longae, 1-1.7 cm latae, pubescentes. *Flores*, labio excepto, albi, fragrantis; calyx membranaceus, tubularis, paulo bracteis brevior vel longior, pubescens, tridentatus, alte ad unum latus fissus; corollae tubus bracteis excedit 1.2-2.3 cm; laciniae linearis, subaequales, 3.5-4.7 cm longae, varie crispatae; staminodia lateralia spathulata, 2.5-3.7 cm longa, 1-1.6 cm lata; labio suborbiculari, albo, macula ornato ampla lutea ad basin, 3-3.7 cm longo, 2.3-3.4 cm lato, breviter unguiculato, bilobo, sinu 1.5-2 cm alto; stamen 1-2 cm labio longius; filamentum 3.2-4.5 cm longum; anthera linearis, 1-1.2 cm; ovarium

ellipsoideum, ca 4 mm longum, villosum; stigma turbinatum, viride, pilosum. *Capsula* oblongo-cy-



Hedychium dekianum A. S. Rao & D. M. Verma sp. nov.
Figs. 1-3: 1. Leaf and spike. 2. Corolla lobes, staminodes, lip and stamen. 3. Capsule (G. K. Deka 35605A). Map indicates Type T ⊕ & other localities ⊕.

lindrica, subtrigona, sparse pilosa, 4-6 cm longa, ca 1.5 cm diam., bracteas aequans vel superans per 1 cm; valvulae pallide luteo-virides extus, aurantiae intus; semina cum arillo subglobosa, nitenter rubra, ca 4 mm (Figs. 1-3).

Holotypus G. K. Deka 35605A, in itinere a Khliehriat ad Jowai, K. et J. collibus, Assam, 15.7.1966 (CAL). Isotypi G. K. Deka 35605B-E (ASSAM). Paratypi G. K. Deka 37306A-D, 23.10.1967; N. P. Balakrishnan 46119A-D, Jowai, Ummulong, 16.8.1968; N. P. Balakrishnan 46882, Jorain-Jowai, 20.8.1968; N. P. Balakrishnan 46934A-E, Garampani-Raliang, 21.8.1968 (ASSAM).

Hedychium dekianum A. S. Rao & D. M. Verma spec. nov.

Allied to *Hedychium coronarium* Koenig but differs in its lax spikes; closely convolute bracts; stamen exceeding the lip; oblong-cylindric capsule.

Rhizome tuberous, tangled, scaly, pale pink outside, white inside, faintly aromatic; segments ovoid to subglobose, *ca* 3 cm; roots stout. *Stem* 1.2-2 m high, base sheathed. *Leaves* several, sessile, lanceolate to oblong-lanceolate, 30-50 cm long, 5.5-13 cm broad, subcaudate, upper surface glabrous, lower surface appressed silky hairy; ligule membranous, 1-4 cm long, villous, pinkish, bilobed. *Spike* 10-17 cm long; rachis villous; bracts *ca* 25-35, oblong, closely convolute, 4-6 cm long, 1.5-2 cm broad, pubescent, scarious-margined, acute-obtuse, each bract enclosing 3-9 successively opening flowers; bracteole ovate-oblong, 3-3.5 cm long, 1-1.7 cm broad, pubescent. *Flowers*, except lip, white, fragrant; calyx membranous, tubular, slightly shorter or longer than the bracts, pubescent, 3-toothed, deeply split on one side; corolla tube exceeding the bracts by 1.2-2.3 cm; lobes linear, subequal, 3.5-4.7 cm long, variously curled; lateral staminodes spatulate, 2.5-3.7 cm long, 1-1.6 cm broad; lip suborbicular, white with a large pale yellow blotch at base, 3-3.7 cm long, 2.3-3.4 cm broad, shortly clawed, bilobed, sinus 1.5-2 cm deep; stamen 1-2 cm longer than the lip; filament 3.2-4.5 cm long; anther linear, 1-1.2 cm; ovary ellipsoid, *ca* 4 mm long, villous; stigma turbinate, green, hairy. *Capsule*, oblong-cylindric, subtrigonal, sparsely hairy, 4-6 cm long, *ca* 1.5 cm across, equal to or exceeding the bracts by *ca* 1 cm; valves pale yellow-green outside, orange inside; seeds with aril subglobose, bright red, *ca* 4 mm (Figs. 1-3).

Holotype G. K. Deka 35605A, Khliehriat Road from Jowai, K. & J. Hills, Assam, 15.7.1966 (CAL). Isotypes G. K. Deka 35605 B-E (ASSAM). Paratypes G. K. Deka 37306 A-D, frts., 23.10.1967; N. P. Balakrishnan 46119 A-D, Ummulong, Jowai, 16.8.1968; N. P. Balakrishnan 46882, Jorain-Jowai, 20.8.1968; N. P. Balakrishnan 46934 A-E, Garampani-Raliang, Jowai, 21.8.1968 (ASSAM).

Hedychium ellipticum Ham. ex J. E. Smith in Rees, Cyclop. 17. n. 2, 1811.

The lip is described as emarginate and this is true in the normal flowers. In a few abnormal ones however it was found to be deeply divided, sometimes almost to the base, in still others it appeared 3-notched because of an additional tooth in the sinus.

Specimen cited: ASSAM: K. & J. Hills—Shilong, 'Woodlands', Verma 35601 (ASSAM).

Hedychium elwesii Baker in Hook. f. Fl. Brit. Ind. 6: 226, 1892.

This was described on a solitary collection of *Elwes* from Bishop Falls in Shillong (Khasi & Jaintia Hills). Baker (*l.c.*) states "Flowers bright yellow; staminodes linear, resembling the corolla segments in size and shape; filament bright red, anther 8 mm". Turrill (Kew Bull. 1914) figures what he considered a flower of this species from a specimen in Herb. Kew, collected by C. B. Clarke in the Khasi Hills in which he shows "corolla lobes linear, *ca* 3-3.5 cm long, *ca* 5 mm broad; staminodes spatulate, 3.8 cm long, 1.8 cm broad; anther 1.7 cm long". While we have not seen either *Elwes* collection or *Clarke* collection figured by Turrill above, by a reference to the original description it is obviously clear that Turrill's figure does not correspond with what was originally described by Baker as *H. elwesii*. Even in the absence of any additional specimens and without access to the authentic collection, Naik (Bull. Bot. Surv. India 3: 71, 1961) reduced it to a variety of *H. coronarium* Koen., partly relying on an earlier reported chromosome count ($2n=66$, Gregory in J. Linn. Soc. Bot. 50: 380, 1936) which itself is of doubtful validity in the absence of a vouchered specimen. Any definitive decision and the identity of *H. elwesii* needs comprehensive collections (preferably from the type locality) and critical study.

Hedychium gracile Roxb. Hort. Beng. 1814; Pl. Cor. 3: 48. pl. 251. 1820; Fl. Ind. 1: 14. 1820.

Roxb. (*l.c.*) describes it as "Leaves lanceolate. Spike terminal, open. Flowers solitary, scattered; segments of the bifid, sessile lip semi-lanceolar, the other five segments of the corolla linear. This is a slender sp., about 3' high, a native of the mountains of north-east border of Bengal. Flowers rainy season. Its solitary flowered spikes of white corolla with their scarlet filament and its lanceolar leaves distinguish it from *H. angustifolium*. Khasee name, Kattia Laphya". Such a brief description and his pencil sketch of a solitary flower (*l.c.*) which is very roughly drawn (as compared to his other plates) clearly indicates that he described and illustrated the species on sufficiently distinctive but poor material. The measurements in his sketch are (1) Bract *ca* 12 mm long, (2) Calyx *ca* 10 mm long, exceeding the bract by *ca* 1 mm, (3) Corolla tube *ca* 27 mm long, lobes *ca* 20 mm long, (4) Staminodes *ca* 10 mm long, (5) Lip *ca* 10 mm long.

(6) Filament *ca* 23 mm long. Roscoe later described and illustrated another closely allied species *H. glaucum* in Monandr. Pl. pl. 53. 1824-29 which he considered to differ from *H. gracile* Roxb. in its aequilateral leaves, broader towards the base and filament twice the length of the lip. His plate shows (1) Bract *ca* 14 mm long, (2) Calyx *ca* 18 mm long, exceeding the bract by *ca* 6 mm, (3) Corolla tube *ca* 20 mm long, lobes *ca* 25-30 mm long, (4) Stamines *ca* 18-20 mm long, (5) Lip *ca* 18 mm long, (6) Filament *ca* 35 mm long. Hooker f. (in Curtis, Bot. Mag. pl. 6638. 1882) considered *H. glaucum* Rosc. as synonymous to *H. gracile* Roxb. Baker (Hook. f. Fl. Brit. Ind. 6: 229. 1892) again considered it to be distinct on its being more robust and with larger floral parts but reduced it to a variety of the latter. Schumann (in Engl. Pflzenrch. 20: 44 and 56-57. 1904) again raised it to a specific level on almost the same basis, as shown by his key.

Folia minora ad 13 cm longa, 3 cm lata,
flores minores (calyx 10 mm longus) 32. *H. gracile*
Folia majora ad 25 cm longa et 6 cm lata,
flores majores (calyx 18 mm longus) 33. *H. glaucum*

An opportunity for detailed observations of two populations of what was clearly plants of *H. gracile* Roxb. with small, white to creamy flowers, linear stamens and long red filaments presented itself during a recent plant exploration in the Jaintia Hills, with following variations: (1) Plants 30-80 cm high, (2) Leaves lanceolate or oblong, equilateral or aequilateral, 11-25 cm long, 3-8 cm broad, *ca* 2.2 to 6-times longer than broad, (3) Bracts 15-24 mm long, (4) Calyx 14-20 mm long, equalling or exceeding the bracts by upto 10 mm, (5) Corolla tube 22-37 mm long, lobes 27-32 mm long, (6) Stamines 13-20 mm long, (7) Lip 15-21 mm long and (8) Filament 27-33 mm long.

The range of variations presented by above populations easily bridged the descriptions of two extremes of the same species under *H. gracile* Roxb. and *H. glaucum* Rosc., indicating that the two are conspecific.

Specimens cited: ASSAM: K. & J. Hills—Jowai-Jorain, N. P. Balakrishnan 46121; Garampani-Raliang, N. P. Balakrishnan 46932 (ASSAM).

Naik and Panigrahi (Bull. Bot. Surv. India 3: 72, 1961) have cited G. K. Deka 23085, apparently on its superficial resemblance, under this species which clearly it is not by its leaves being glabrous, very long corolla tube and spathulate stamens. This belongs to a new species described below.

Hedychium gracillimum A. S. Rao et D. M. Verma spec. nov.

Affine *Hedychium gracile* Roxb. a quo tamen differt foliis glabris; corollae tubo multo longiore bracteis; staminodiis spathulatis; filamentis albis vel luteolis.

Rhizoma repens, squamosum, albus intus, molli-ter aromaticum; segmenta ellipsoidea, 2-2.5 cm longa; radices robustae, albae intus. *Caulis* 25-60 cm altus. *Folia* 5-7; petioli 2-6 mm longi; lamina lanceolata vel oblongo-lanceolata, 9-22 cm longa, 2-5.5 cm lata, subcaudato-acuminata, glabra; ligula 3-7 mm longa, truncata vel leviter bifida, glabra, rubescens; vaginarum margines rubri. *Spica* 5-11 cm longa; rachis glabra; bractae *ca* 12-40, ovato-oblongae, convolutae, 9-15 mm longae, 3-5 mm latae, glabrae, marginibus scariosis, acutae vel obtusae, uniflorae; bracteola membranacea, ovato-lanceolata, 5-7 mm longa. *Flores*, antheris exclusis, albi vel luteoli ad maturitatem; calyx tubularis, 10-17 mm longus, bracteam excedens 3-5 mm, 3-dentatus, ad latus divisus; corollae tubus suberectus vel horizontalis, 30-38 mm longus; laciniae lineares, subaequales, 20-29 mm longae, *ca* 1.5 mm latae, crispae; staminodia lateralis spathulata, 13-15 mm longa, 2-4 mm lata; labium oblongum, 13-15 mm longum, 4-5 mm latum, unguiculatum, bilobum, sinu 1.5-3 mm alto; stamen labio longius 22-26 mm; filamentum 28-31 mm longum; anthera linearis, *ca* 10 mm, aurantiaca; ovarium subglobosum, *ca* 2 mm, glabrum vel interdum pilosum; stigma turbinatum, *ca* 1 mm latum, viride, pilosum (Figs. 1-2).

Holotypus D. M. Verma 35650 lectus in horto experimentalis ad 'Woodlands', Shillong, K. et J. collibus, Assam, 1.7.1967 (CAL). Paratypi D. M. Verma 35603, 12.7.1966; 35672, 21.8.1967; 35687 A-E, 13.6.1968 ex eodem horto; G. K. Deka s.n. (acc. num. 148, 24.5.1951; 149 et 150, 7.6.1956); 23085 A-B, 16.5.1950; R. S. Rao 2688 A-B, 3.6.1956 e loco Cherrapunji in K. et J. collibus (ASSAM).

Hedychium gracillimum A. S. Rao & D. M. Verma spec. nov.

Allied to *Hedychium gracile* Roxb. but differs in its glabrous leaves; corolla tube much longer than the bracts; spathulate stamens; white or yellowish filaments.

Rhizome creeping, scaly, whitish inside, faintly aromatic; segments ellipsoid, 2-2.5 cm long; roots stout, white inside. *Stem* 25-60 cm high. *Leaves*

5-7; petiole 2-6 mm long; lamina lanceolate or oblong-lanceolate, 9-22 cm long, 2-5.5 cm broad, subcaudate-acuminate, glabrous; ligule 3-7 mm long, truncate or shallowly bifid, glabrous, reddish; sheath



Hedychium gracillimum A. S. Rao & D. M. Verma sp. nov.
Figs. 1-2: 1. Habit. 2. Corolla lobes, staminodes, lip and stamen (D. M. Verma 35650). Inset map indicates Type T ⊕ & another locality ⊕.

margins red. *Spike* 5-11 cm long; rachis glabrous; bracts *ca* 12-40, ovate-oblong, convolute, 9-15 mm long, 3-5 mm broad, glabrous, scarious margined, acute or obtuse, 1-flowered; bracteole membranous, ovate-lanceolate, 5-7 mm long. *Flowers*, except anthers, white or yellowish with age; calyx tubular, 10-17 mm long, exceeding the bracts by 3-5 mm, 3-toothed, split on one side; corolla tube suberect or horizontal, 30-38 mm long; lobes linear, subequal, 20-29 mm long, *ca* 1.5 mm broad, curled; lateral staminodes spatulate, 13-15 mm long, 2-4 mm broad; lip oblong, 13-15 mm long, 4-5 mm broad, clawed, bilobed, sinus 1.5-3 mm deep; stamen 22-26 mm longer than the lip; filament 28-31 mm long; anther linear, *ca* 10 mm, orange-red; ovary subglobose, *ca* 2 mm, glabrous or sometimes hairy; stigma turbinate, *ca* 1 mm broad, green, hairy. (Figs. 1-2).

Holotype D. M. Verma 35650, Experimental Garden, Botanical Survey of India, 'Woodlands', Shillong, K. & J. Hills, Assam, 1.7.1967, introduced from Pynursla, K. & J. Hills (CAL). Paratypes D. M. Verma 35603, 12.7.1966; 35672 (frts.), 21.8.1967; 35687 A-E, 13.6.1968; 'Woodlands', Shillong; G. K. Deka s.n. (acc. nos. 148, 24.5.1951; 149 & 150, 7.6.1956); 23085 A-B 16.5.1950; R. S. Rao 2688 A-B, 3.6.1956; all from Cherrapunjee, K. & J. Hills (ASSAM).

Hedychium griffithianum Wall. in Kew Journ. 5: 369. 1853; Baker in Hook. f. Fl. Brit. Ind. 6: 229. 1892; Schum. in Engl. Pflzenrch. 20: 58. 1904.

This is a little known species described on *Griffith* 5660 and *Hook. f. & Thom.* collections from Khasi Hills. While Baker (*l.c.*) and Schumann (*l.c.*) maintained it as distinct, in a recent treatment of *Hedychium* Koenig, Naik and Panigrahi (in Bull. bot. Surv. India 3: 70 & 72. 1961) have merged it with *H. venustum* Wt. (Icon. 2012) from an unknown type locality in South India (Wight states "This figure is taken from a dried specimen, the station of which is not recorded, but I think Coorg-". Expl. to plates). *H. griffithianum* Wall. belonging to section *Macrostemium* Horan. (stamen longer than the lip) is further characterized by subsessile leaves, erect spike, white or yellowish flowers with bright red stamen while *H. venustum* Wt. belonging to section *Gandasulium* Horan. (stamen shorter than the lip) was described as having long petioled leaves and drooping spikes (*vide* fig., left corner), lacking any flower colour data, but Baker (*l.c.*), Schumann (*l.c.*) and Fischer (in Gamble Fl. Mad. 3: 1038, reptd. ed. 1957) recording as white. Naik and Panigrahi's decision to merge the two was based on their earlier expressed view in discussion part (*l.c.* 70) that "the relative length of the stamen and the lip is a variable character within a species, particularly in *H. venustum* Wt., which shows the stamen as shorter than, as long as or slightly longer than the lip" The cited specimens *U. Kanjilal* 7732; *Deka* 13188; *De* 21092; *Bor* 19651; *Panigrahi* 16729 have been re-examined by us and live plants from some of their collection localities also studied. All these with white-yellowish flowers, orange-red at mouth and red, curved stamens, always shorter than the lip, proves that the material at their disposal did not belong to either of the two species but to *H. spicatum* var. *acuminatum* (Rosc.) Wall. The identification of these was further con-

firmed by comparing with the original coloured plate 47 of Rosc. in his *Monandr.* Pl. 1824-29.



Hedychium venustum Wt., adapted from Wt. Icon. Pl. 2012 (Reptd. ed., J. Cramer, 1963). Flower traced as such; the leaf & spike in silhouette.

Hedychium griffithianum Wall.

Figs. 1-3 : 1. Leaf. 2. Spike. 3. Flower (*Balakrishnan* 46931). Map indicates localities ⊕.

The disparate geographical distribution of *H. venustum* Wt. and *H. griffithianum* Wall., the former in the hills of W. Ghats and the latter in K. & J. Hills, with their respective morphological differences, particularly the stamen length as compared to lip (hitherto considered to be of sectional value in *Hedychium* Koen.) is in our opinion, sufficient ground to maintain them as two distinct species. During a plant exploration in K. & J. Hills, four populations of *H. griffithianum* Wall. were located and studied, with reference to the original description and authentic collection of *Hook. f. & Thom.* Notwithstanding an unfortunate damage to the stamen in that specimen, our present collections clearly agree in all the morphological features with *Hook. f. & Thom.* specimen. Based upon these fresh collections, a detailed description with illustration is now furnished, of this poorly known species.

Rhizome creeping, pale brown outside, creamy white inside, faintly aromatic; segments ovoid, 2-4 cm long; roots stout. *Stem* .5-1 m high. *Leaves* subsessile, oblong-lanceolate, 15-35 cm long, 4-8 cm broad, caudate-acuminate, glabrous or hairy along midrib beneath, surfaces somewhat glandular; ligule 4-10 mm long, bilobed, pinkish. *Spike* erect, 8-20 cm long; bracts *ca* 15-35, oblong, closely convolute, 1.5-2.7 cm long, .5-.8 cm broad, 1-flowered, scarious margined; bracteole .8-1.3 cm long. *Flowers* sparsely glandular, usually fragrant; calyx membranous, 2-4 cm long, exceeding the bracts by .8-1.2 cm, creamy white; corolla whitish, turning yellow with age; tube 3-5.5 cm long, exceeding the bracts by 1.6-2.8 cm; lobes 3-4 cm long; lateral staminodes linear or very narrowly oblanceolate, 3-4.3 cm long, .3-.7 cm broad, obtuse, white turning creamy with age, pinkish towards base; lip white turning creamy with age, pinkish towards base. oblanceolate, 2.7-4.1 cm long, 1.1-2.2 cm broad, clawed, bilobed, sinus 1.2-1.6 cm deep; stamen pink-red, exceeding the lip by .7-1.2 cm; filament 3-4 cm long; anther 1-1.3 cm long; ovary subglobose, *ca* 3 mm, hairy (Figs. 1-3).

Specimens cited: ASSAM: K. & J. Hills.—Jowai-Jorain, N. P. *Balakrishnan* 46883; Raliang-Garampani, N. P. *Balakrishnan* 46931, 46933; Nongbah-Nartiang, N. P. *Balakrishnan* 47111 (ASSAM); without precise loc. *Hook. f. & Thom.* (CAL).

Hedychium marginatum Clarke in J. Linn. Soc. (Bot.) 25: 75. Pl. 31. 1889.

The bracts are described as having a pale horny margin and a tuft of hairs at the tip. However, a suite of Clarke's specimens, all under *Clarke* 41513 at Calcutta herbarium show a variability in these being scarious margined allthrough or with apical tufts of hairs, this probably depends on age, as we have also observed in a few other species of *Hedychium*.

Specimens cited: NAGALAND: Kohima, C. B. *Clarke* 41513 (CAL); G. K. *Deka* 19654 (ASSAM).

Hedychium rubrum A. S. Rao et D. M. Verma, spec. nov.

Affine *Hedychium coccineo* Buch.-Ham. ex J. E. Smith a quo differt foliis lanceolatis; spicis brevioribus; staminidiis et labium majoribus; stamine brevior.

Rhizoma repens, squamosum, album intus, non

aromaticum; laciniae ovoideae subcylindricae, ca 4 cm longae, ca 3 cm crassae; radices robustae. *Caulis* .5-1.2 m altus. *Folia* sessilia, lanceolata, 17-32 cm longa, 3-6.2 cm lata, subcaudata, pagina superiore glabra, inferiore vero pilosa secus nervum medium, primo purpurascens; ligula 1.3-2 cm longa, integra, pubescens, roseo-viridis. *Spica* 6-14 cm longa; rachis villosa; bracteae 10-18, oblongae, arcte convolutae, 3.5-4.7 cm longae, 1.5-2 cm latae, pubescentes, purpureo-virides, acutae, biflorae, marginibus scariosis, ad maturitatem dividendis in fimbrias fibrarum; bracteola membranacea, rosea. *Calyx* tubularis, 2.4-2.8 cm longus, 3-dentatus, divisus ad latus, pubescens, pallide roseus; corolla rosea vel rubra, basi albescenti et apicibus luteolis; tubus bracteis aequilongus; lobi lineares, 3.5-3.8 cm longi, ca 5 mm lati, crispatis; staminodia lateralia oblique spathulata rubra, paulo labio breviora, ca 8 mm lata, apice rotundo; labium suborbiculare, rubrum, 3-3.5 cm longum, 3-3.7 cm latum, breviter unguiculatum, alte bilobum; filamentum 4.3-4.7 cm longum, rubrum; anthera linearis, ca 1 cm longa, rubra; ovarium subglobosum, ca 2 mm, villosum; stigma turbinatum, pilosum, viride. *Capsula* subglobosa vel late ovoidea, subtrigona, 1.5-2 cm; valvulae pubescentes, roseo-rubrae extus, aurantiacae intus; semina cum arillo subglobosa, nitenter rubra, ca 5 mm (Figs. a-c).

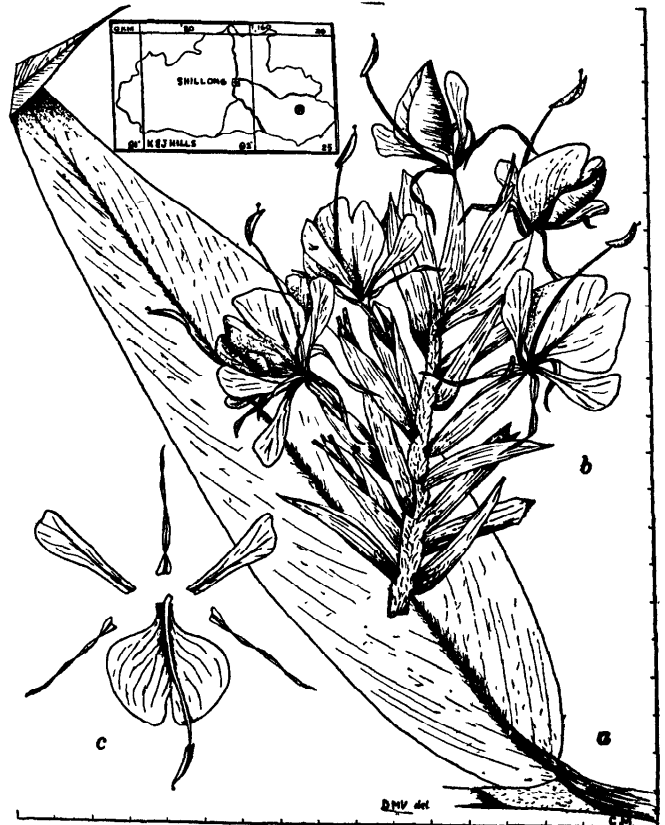
Holotypus *D. M. Verma* 34599A in horto experimentalis ad Shillong, K. et J. Collibus, Assam die 12-8-1965 (CAL); isotypi *D. M. Verma* 34599B-I (ASSAM). Paratypi *G. K. Deka* 10135 A-D, lectus in Assam, K. et J. Collibus in itinere a Jowai ad Bodarpur die 22-7-1957; *V. N. Naik* s.n. (acc. no. 26923) die 16.9.1961; *A. S. Rao* 35695 A-B die 1.8.1968; *D. M. Verma* 37068 A-B die 28.9.1965 in horto experimentalis ad Shillong (ASSAM).

Hedychium rubrum A. S. Rao & D. M. Verma, spec. nov.

Allied to *Hedychium coccineum* Buch.-Ham. ex J. E. Smith but differs in its lanceolate leaves; shorter spikes; larger staminodes and lip; shorter stamen.

Rhizome creeping, scaly, white inside, non-aromatic; segments ovoid-subcylindric, ca 4 cm long, ca 3 cm thick; roots stout. *Stem* .5-1.2 m high. *Leaves* sessile, lanceolate, 17-32 cm long, 3-6.2 cm broad, subcaudate, upper surface glabrous, lower surface hairy along midrib, purplish when young; ligule 1.3-2 cm long, entire, pubescent,

pinkish-green. *Spike* 6-14 cm long; rachis villosa; bracts 10-18, oblong, closely convolute, 3.5-4.7 cm long, 1.5-2 cm broad, pubescent, purplish-green, acute, 2-flowered, margins scariosus, breaking up



Hedychium rubrum A. S. Rao & D. M. Verma sp. nov.
Figs. a-c: (a) Leaf. (b) Spike. (c) Corolla lobes, staminodes, lip and stamen (*D. M. Verma* 34599A). Inset map indicates Type locality ⊕.

with age into fibres; bracteole membranous, pink. *Calyx* tubular, 2.4-2.8 cm long, 3-toothed, split on one side, pubescent, pale pink; corolla pink to red with whitish base and yellowish tips; tube equalling the bracts; lobes linear, 3.5-3.8 cm long, ca 5 mm broad, curled; lateral staminodes obliquely spathulate, red, slightly shorter than the lip, ca 8 mm broad, apex rounded; lip suborbicular, red, 3-3.5 cm long, 3-3.7 cm broad, shortly clawed, deeply bilobed; filament 4.3-4.7 cm long, red; anther linear, ca 1 cm long, red; ovary subglobose, ca 2 mm, villous; stigma turbinate, hairy, green. *Capsule* subglobose or broadly ovoid, subtrigonal, 1.5-2 cm; valves pubescent, pink-red outside, orange inside; seeds with aril subglobose, bright red, ca 5 mm. (Figs. a-c).

Holotype *D. M. Verma* 34599A, experimental

garden, Botanical Survey of India, 'Woodlands', Shillong, K. & J. Hills, Assam, 12.8.1965 (CAL), as ascertained from G. K. Deka the propagules were from the same material as G. K. Deka 10135; isotypes D. M. Verma 34599 B-I (ASSAM). Paratypes G. K. Deka 10135 A-D, Jowai-Bodarpur Road, 96 km from Shillong, K. & J. Hills, 22.7.1957; V. N. Naik s.n. (acc. no. 26923), 16.9.1961; A. S. Rao 35695 A-B, 1.8.1968; D. M. Verma 37068 A-B, frts., 28.9.1965, all from 'Woodlands', Shillong (ASSAM).

Hedychium wardii C. E. C. Fischer in Kew Bull. 1936: 283. 1936.

This species was described on a solitary herbarium specimen, *Kingdonward* 8463 from Delei valley, Lohit, NEFA and appears to have never been reported again. This is the only *Hedychium* in which the filament is absent. During re-examination of specimens in Assam herbarium we discovered that it was already collected in 1914 from Barapani (U. N. Kanjilal 7751) but remained misidentified to *H. elwesii* Baker. During recent plant explorations in K. & J. Hills, we spotted several populations of this species, enabling us to draw the following detailed description, based on live material.

Rhizome stout, pink, aromatic. *Stem* .7-1.5 m high. *Leaves* sessile, oblong-lanceolate, 30-50 cm long, 5.5-9 cm broad, caudate acuminate, appressed hairy beneath; ligule 3-10 mm long, hairy; sheaths pubescent. *Spike* compact, cone-like, 8-20 cm long,

3-5 cm wide; peduncle villous; bracts obovate-oblong, 4-5 cm long, 3.5-4.5 cm broad, rounded or apiculate, hairy, scarious margined, lower flatly imbricating, upper sometimes rather convolute, each enclosing 3-5 successively opening flowers; bracteole oblong, ca 4 cm, hairy. *Flowers* white, fragrant; calyx 2.7-3.1 cm long, hairy; corolla tube 6.5-7.5 cm, exceeding the bracts by 3-4.5 cm; lobes linear, 2-3 cm long, curled; lateral staminodes spatulate, 1.8-2.5 cm long, 1-1.6 cm broad, glossy at base; lip sub-orbicular, shortly clawed, 2.2-3 cm long, 2.5-3.2 cm broad, little glossy at base, bilobed, sinus ca 5 mm deep; stamens sessile or subsessile; anther linear, 8-10 mm, creamy; ovary oblong, ca 5 mm, villous.

Specimens cited: ASSAM: K. & J. Hills—Barapani, A. S. Rao 35697; U. N. Kanjilal 7751. Jowai, Nongryngkoh, N. P. Balakrishnan 46985. Umjaisaiw-Mysyngnat, N. P. Balakrishnan 47145 (ASSAM).

Incidentally, Haines (Bot. Bihar & Orissa 3: 1189, Reptd. ed. 1961) mentions under *H. coronarium* Koen. "in the Jalpaiguri plant the filament was practically obsolete". We have not seen these plants but it appears that these may also be *H. wardii* Fischer or a hybrid (see notes under *H. coronarium* Koen.)

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