



Taxonomic Revision of the Genus *Hedychium* J. König (Zingiberaceae) in Thailand (Part I)

Pornpimon Wongsuwan¹
and Chayan Picheansoonthon^{1,2}

¹ Faculty of Pharmaceutical Sciences, Khon Kaen University,

² The Academy of Science, The Royal Institute of Thailand

Abstract

The genus *Hedychium* J. König (Zingiberaceae) in Thailand is taxonomically revised, result of which 21 species and 6 varieties are enumerated. One taxon, *H. forestii* Diels, is recognized here as one of the four varieties of *H. coronarium* J.König. Key to species and varieties, together with description, ecological data, geographical distributions and illustrations of the first 10 species and 4 varieties (in alphabetical order) are provided. Diagnostic characters of each taxon are also discussed.

Key words: taxonomic revision, Zingiberaceae, *Hedychium* J. König, Thailand

INTRODUCTION

The genus *Hedychium*, established in 1783 by J. König, is one of the ethnobotanically and economically important genera of the family Zingiberaceae. Some crude drugs employed in Thai traditional medicine or ethnomedical prescriptions, e.g. Wan Khing Haeng (ว่านขิงแห้ง), Wan Pad Roi Sanom (ว่านแปดร้อยสนม), Wan Chai Dam (ว่านใจดำ) are rhizomes obtained from members of the genus *Hedychium* J. König, (Zingiberaceae). Several taxa, especially those with showy and fragrant flowers, have or may have horticultural potential. Up to now, over 50 species, distributed mainly from eastern Himalayas to south India, south China and Southeast Asia, are recognized.



Previous attempt to revise the genus in Thailand resulted in an account of 17 species and 1 unknown taxon (Sirirugsa & Larsen 1995). Since then, 2 new species, *Hedychium khaomaenense* Picheans. & Mokkalul and *H. thainum* Mokkalul & Picheans. were added (Picheansoonthon & Mokkalul 2005). Later, Larsen & Larsen (2006) preliminarily listed 22 species for Thailand. However, 24 taxa (22 species and two varieties) were preliminary recognized for Thailand, including a newly-recorded Malaysian taxon, *H. malayanum* Ridl. (Picheansoonthon & Wongsuwan 2008).

Since then, two other new taxa, *Hedychium muanwongyathiae* Picheans. & Wongsuwan and *H. phluangense* Picheans. & Wongsuwan, were added (Picheansoonthon & Wongsuwan 2009). The revision of the genus was concluded with 21 species and 6 varieties (Wongsuwan 2010), of which a new taxon (*H. siamense* Picheans. & Wongsuwan) and a new record (*H. neocarneum* T.L. Wu, K. Larsen & Turland) were further recognized (Picheansoonthon & Wongsuwan 2011). The revision of the genus for Thailand is presented in 2 parts. In this first part a brief historical background, description of the genus, keys to all species and varieties accounted for Thailand, and descriptions of the first 10 species and varieties (arranged in alphabetical order) were presented.

Hedychium J. König

J. König in Retz., Obs. 3: 73. 1783; Roxb., Fl. Ind. ed. 1: 9. 1820; Blume, Enum. Pl. Javae 1: 55. 1827; Roscoe, Monandr. Pl. t. 6: 47. 1828; Lestiboudois in Ann. Sci. Nat. 17: 113. 1829; Wall. In Hook. Kew Gard. Misc. 5: 321. 1853; Horan. Monogr. 24. 1862; Benth. & Hook.f., Gen Pl. 3: 642. 1883; O.G. Peters. In Engler & Prantl, Pflanzenfam. 3(6): 19. 1889; Baker in Hook.f., Fl. Br. Ind. 6: 225. 1894; K. Schum. in Engl., Pflanzenr. 4(46): 40. 1904; Gagnep. in Lecomte, Fl. Gn. I.-C. 6: 70. 1908; Ridl., Fl. Mal. Pen. 4: 241. 1924; Fl. Java 3: 64-67. 1968; T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, Fl. China 24: 370-371. 2000; Holtt. in Gard. Bull. Sing. 13: 72-73. 1950.—*Gandasulium* T. Lestib., Ann. Sci. Nat. Bot. 2(15): 341. 1841.—*Brachyichilum* (R.Br. ex Wall.) Petersen, Bot. Tidsskr. 18: 262. 1893.

Terrestrial, epiphytic or epilithic, perennial herb. *Pseudostems* 0.4-2.4 m high, leaf sheaths greenish or reddish, bladeless sheaths 2-5. *Ligule* oblong, 0.2-5.9 cm long, pubescent or glabrous, apex truncate-emarginate, acute, bilobed



or rounded. *Leaves* lanceolate-oblong or elliptic, base cuneate, apex acute-acuminate or caudate, margin entire to slightly undulate, upper surface glabrous, lower surface glabrous or pubescent. *Inflorescence* a terminal spike, erect, 7.4-52.3 cm, glabrous or pubescent; peduncle 1.7-21.1 cm long; bracts imbricate-elongated to visible rachis or not imbricate, rachis usually visible, apex acute or rounded, glabrous or pubescent, each bract subtending of 1-7(-11) flowers; bracteole, folded or tubular, membranous, glabrous or pubescent, shorter or longer than bract. *Flowers* white, yellowish to golden yellow or reddish, fragrant; calyx tubular, split on one side, apex acute to 3-dented, glabrous or pubescent; corolla tube slender or twisted, glabrous or pubescent, 3-lobed, lobes linear, apex hooded; lateral staminodes linear-oblong, oblanceolate, or elliptic; labellum ovate-elliptic, obovate or suborbicular-orbicular, base attenuate into claw, apex acute or emarginate to deeply divided; filament 0.7-7.4 cm long, shorter or longer than labellum; anther dorsifixed, base divaricate 0.3-1.8 cm long; ovary glabrous or pubescent, 3-loculed, placentation axile, epigynous glands 2; stigma densely ciliate, green. *Fruits* glabrous or pubescent, ellipsoid-oblong or globose. *Seeds* numerous, ellipsoid-oblong or globose, aril orange-reddish.

KEY TO THE SPECIES

1. Bracts imbricate (rarely elongated to visible rachis)
 2. Inflorescences cylindrical or ellipsoid. Lower leaf surface glabrous or hairy along midrib
 3. Anther 0.8-1cm long
 4. Ovary glabrous 10. **H. malayanum**
 4. Ovary densely brownish hairy 16. **H. siamense**
 3. Anther 1.1-1.7 cm long
 5. Flowers yellow, curl-backward 9. **H. longicornutum**
 5. Flowers white, not curl-backward
 6. Labellum elliptic, apex emarginate 6. **H. ellipticum**
 6. Labellum obovate, apex deeply divided at base 8. **H. khaomaenense**
 2. Inflorescences conical-elongated to visible rachis. Lower leaf surface pubescent 5. **H. coronarium**
1. Bracts not imbricate, rachis usually visible
 10. Flowers strictly 1 per bract
 11. Flowers golden yellow 1. **H. aureum**



11. Flowers white-pale yellow
12. Filament longer than labellum 7. **H. gomezianum**
12. Filament shorter than or as long as labellum
13. Labellum lanceolate-oblong
14. Lower leaf surface glabrous 13. **H. pauciflorum**
14. Lower leaf surface tomentose 20. **H. tomentosum**
13. Labellum obovate-elliptic
15. Labellum apex bifid 14. **H. phuluangense**
15. Labellum apex deeply divided at the base 18. **H. spicatum**
10. Flowers more than 1 per bract
17. Anther 3-5 mm long
18. Ligules glabrous. Inflorescences bracts greenish 4. **H. collinum**
18. Ligules villous to pubescent. Inflorescences
bracts reddish 21. **H. villosum**
17. Anther longer than 5 mm long
19. Flowers red 3. **H. coccineum**
19. Flowers white-pale yellow
20. Labellum elliptic, apex bifid 17. **H. speciosum**
20. Labellum obovate, suborbicular-orbicular
21. Filament shorter than or as long as
Labellum 11. **H. muanwongyathiae**
21. Filament longer than labellum
22. Labellum elliptic-oblong or ovate
23. Labellum elliptic-oblong, base
attenuate into 3-4 mm claw 2. **H. biflorum**
23. Labellum ovate, base attenuate
into 0.6-1.4 cm claw 15. **H. roxburghii**
22. Labellum suborbicular-orbicular
24. Filament white 19. **H. stenopetalum**
24. Filament pale salmon red 12. **H. neocarneum**

1. **Hedychium aureum** C. B. Clarke & Mann ex Baker, in J. D. Hooker, Fl. Brit. Ind. 6: 299. 1894 [Type: India: Khasia Hills, alt. 1,700-2,000 m; Clarke & Mann s.n. (CAL)]. Figures 1 and 4A.

Epilithic or epiphytic, perennial herb. *Pseudostems* 0.4-0.8 m high, bladeless sheaths 2-4. *Ligule* small, oblong, 1-3 by 4-5 mm, apex obtuse-

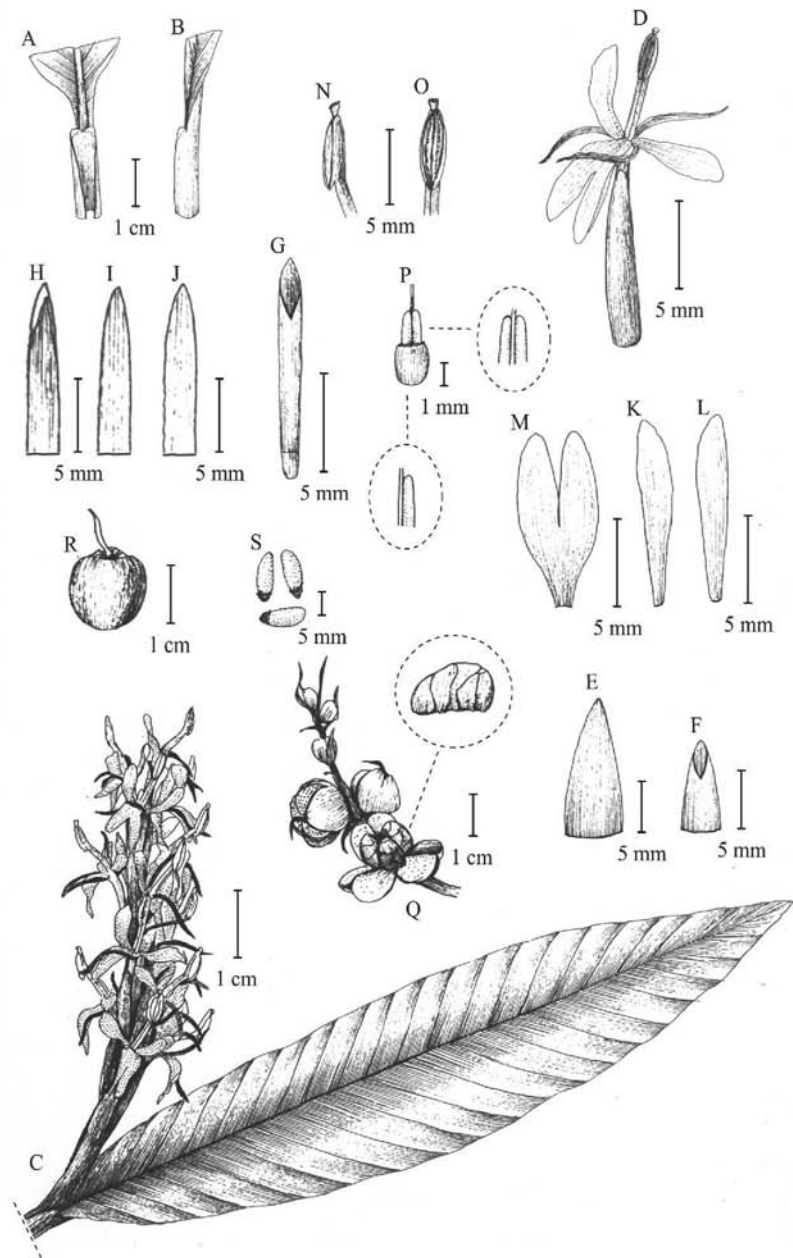


Figure 1. *Hedychium aureum* C. B. Clarke & Mann ex Baker.

A. & B. part of a leaf with a ligule (front and side views). C. a leaf and an inflorescence. D. bract and flower. E. bract; F. bracteole. G. calyx tube and ovary. H. dorsal corolla lobe. I. & J. lateral corolla lobes. K. & L. staminodes. M. labellum. N. & O. anther and stigma (side and front views). P. epigynous glands. Q. infructescence. R. fruit. S. seeds. Drawn by Chalermchoke Boonchit.



shallowly bilobed, glabrous, reddish. *Leaves* sessile or petiolate, 4-8 mm long; blade lanceolate-oblong, 13.1-19.9 by 3.0-3.9 cm, base cuneate, apex acuminate, margin entire-slightly undulate, both surface glabrous. *Inflorescence* a terminal spike, erect, 3.7-5.4 cm long; peduncle 2.2-2.6 cm long, glabrous; bracts folded, lanceolate-oblong, 1.3-1.5 by ca. 0.6 cm, apex acute, glabrous, greenish, each subtending a cincinnus of 1 flower; bracteole tubular, 0.7-0.8 by ca. 0.4 cm, apex acute, membranous, glabrous. *Flowers* golden yellow; calyx tubular, 0.9-1.0 by 0.2-0.3 cm, apex acute, glabrous; corolla tube slender, 0.9-1.2 by 0.2-0.3 cm, 3-lobed, lobes linear ca. 1.0 by 0.2-0.3 cm, apex hooded, reddish; lateral staminodes oblanceolate, 0.8-1.0 by ca. 0.4 cm; labellum ovate, 0.9-1.1 by 0.7-0.8 cm, apex deeply divided; filament ca. 7 mm long, yellow; anther dorsifixed, ca. 5 mm long, base divaricate, yellow; ovary ca. 2 by 2 mm, 3-loculed, placentation axile, glabrous; epigynous glands 2, slender, ca. 2 by 1 mm, yellowish; stigma densely ciliate, yellow. *Fruits* subglobose-globose, 1.1-1.5 by 1.1-1.6 cm, glabrous, greenish. *Seeds* numerous, obovoid-oblong 5-7 by 2-3 mm, cover with reddish aril, globose 0.9-1.3 by 0.7-0.9 cm.

Thailand.—NORTHERN: Chiang Mai [Doi Chiang Dao Wildlife Sanctuary].

Distribution.—India (Khasia Hills).

Ecology.—Lower montane oak forest or upper montane scrub at the altitude of 1,314-2,084 m.

Phenology.—Flowering August-September, fruiting October-November.

Vernacular name.—Wan Pad Roi Sanom (ว่านแปดร้อยสนม), Ta Hoen Kam (ตาเหินคำ).

Note.—One of the small *Hedychium* species with remarkable golden-yellow flowers, 1-flowered bracts, small reddish ligules, and thoroughly glabrous plant.

2. *Hedychium biflorum* Sirirugsa & K. Larsen, Nord. J. Bot. 15: 303, Fig. 1 J-O. 1995 [Type: Thailand: Tak, Khao Pha Wo, alt. ca. 750 m, 23 July 1973, on limestone hill; *Murata et al.* T-16946 (holotype L, isotypes AAU, BKF)]. Figures 2 and 4B.

Epilithic, perennial herb. *Pseudostems* 0.7-1.0 m high, bladeless sheaths 2-3. *Ligule* oblong, 3.4-3.6 by 1.4-1.8 cm, apex rounded or acute, membranous, sparsely hairy, greenish. *Leaves* sessile; blade elliptic-lanceolate, 43.0-48.0 by

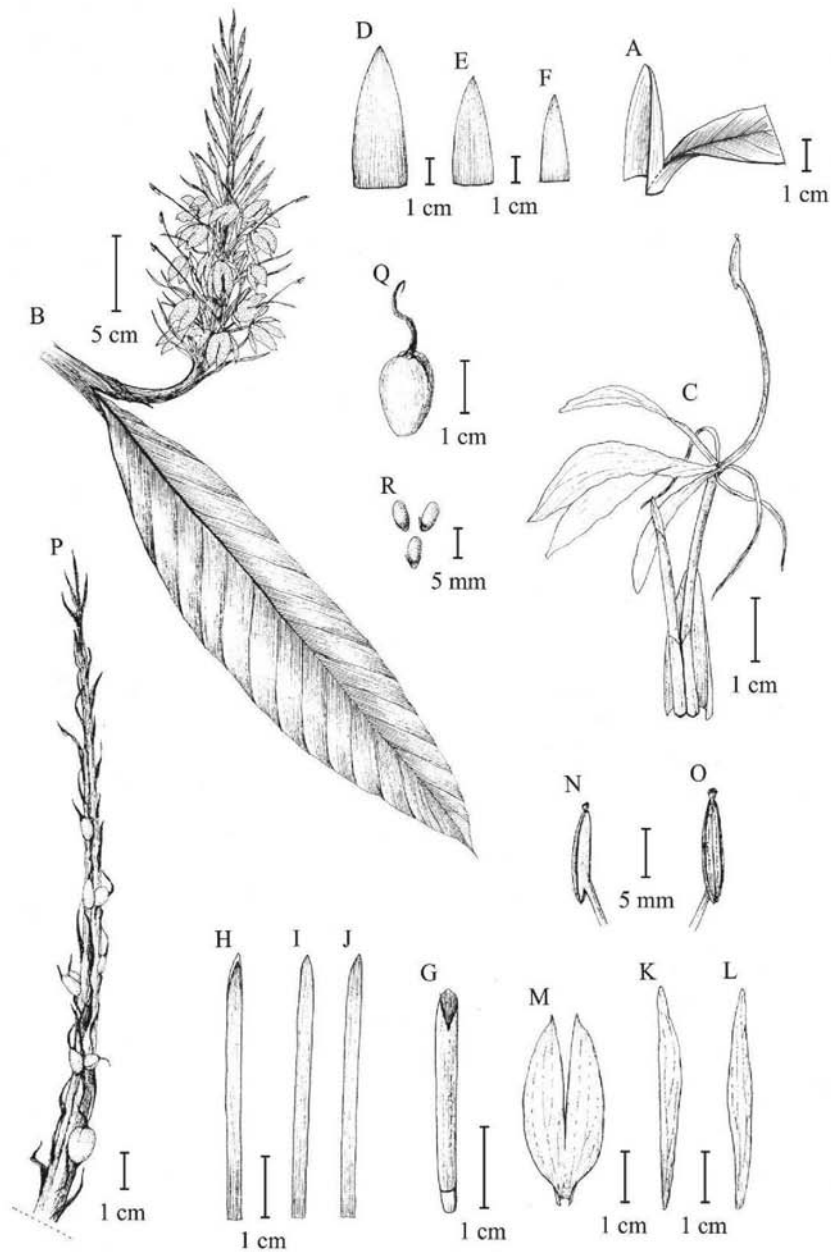


Figure 2. *Hedychium biflorum* Sirirugsa & K. Larsen

A. part of a leaf with a ligule. B. a leaf and an inflorescence. C. bract, bracteole and flowers. D. bract. E. first bracteole. F. second bracteole. G. calyx tube and ovary. H. dorsal corolla lobe. I. & J. lateral corolla lobes. K. & L. staminodes. M. labellum. N. & O. anther and stigma (side and front views). P. infructescence. Q. fruit. R. seeds. Drawn by Chalermchoke Boonchit.



11.7-12.2 cm, base cuneate, apex acuminate, margin undulate, upper surface glabrous, lower surface sparsely pubescent or glabrous. *Inflorescence* a terminal spike, erect, 27.6-46.2 cm long; peduncle 17.8-20.0 cm long, hairy; bracts lax, folded, greenish, triangular, 4.6-6.4 by 1.5-1.9 cm, sparsely hairy, apex acute, each subtending a cincinnus of 2(-4) flowers; first bracteole triangular, 0.6-1.0 by 0.3-0.6 cm, apex acute; second bracteole triangular, 5-7 by 3-5 cm, apex acute. *Flowers* white to pale yellow; calyx tubular, 2.2-2.5 cm long, apex 2-dented; corolla tube slender, 3.1-3.4 by 0.2-0.3 cm, 3-lobed, lobes linear, 3.1-4.2 by ca. 0.2 cm, apex hooded, greenish; lateral staminodes narrowly oblanceolate-oblong, ca. 5.0 by 0.4-0.5 cm; labellum elliptic-oblong, 3.4-3.8 by 1.5-1.6 cm, base attenuate into 3-4 by ca. 3 mm claw, apex deeply divided, 2.0-2.3 cm, white to pale yellow; filament salmon red, ca. 5.3 cm long; anther dorsifixed, 7-9 by 2-3 mm base divaricate, yellowish; ovary 3-4 by 2-3 mm, 3-loculed, placentation

axile, densely hairy; stigma densely ciliate, green. *Fruits* subglobose-oblong, 1.0-1.2 by 0.8-1.1 cm, 3-ridged, pubescent, green. *Seeds* numerous, ellipsoid-orbicular, 5-6 by 2-3 mm, aril reddish orange.

Thailand.—NORTHERN: Tak [Mae Sot, Khao Pha Wo].

Distribution.—Endemic to Thailand.

Ecology.—Lower montane scrub on limestone hill at altitude ca. 750 m.

Phenology.—Flowering June-July, fruiting July-August.

Note.—This species was described in 1994 as a new taxon with 2-flowered bracts, hence the specific epithet “biflorum”. However, further investigation of living specimens from the type locality revealed 2-4 flowers per bract.

3. *Hedychium coccineum* Buch.-Ham. ex Sm. in A. Ress Cycl. 17: 5. 1811 [*Type: Buch. Ham. s.n. (lectotype K)*]; Monandr Pl. t. 58. 1828; Reichb. Fl. Exotic 3. t. 184. 1835; Wall. in Hook. Kew J. Bot. 5: 372. 1853; Horan. Mono. Scitam.: 25. 1862; Baker in Hook.f., Fl. Br. Ind. 6: 231. 1892; K. Schum. in Engl., Pflanzenr. 4(46): 51. 1904; Gagnep. in Lecomte, Fl. Gén. I.-C. 6: 71. 1908; T.L. Wu & K.Larsen in Z.L. Wu & PH. Raven, Fl. China 24: 375. 2000. *Gandasulium angustifolium* (Roxb.) Kuntze, Revis. Gen. Pl. 2: 690. 1891;—*G. coccineum* (Buch.-Ham. ex Sm.) Kuntze, Revis. Gen. Pl. 2: 690.



1891.—*H. angustifolium* Roxb., Fl. Ind. 1: 11. 1820; *H. aurantiacum* Roscoe, Monandr. Pl. Scitam.: t. 61. 1825;—*H. carneum* Y.Y.Qian, Acta Bot. Austro Sin. 9: 48. 1994;—*H. coccineum* var. *angustifolium* (Roxb.) Baker in Hook.f., Fl. Br. Ind. 6: 231. 1892;—*H. coccineum* var. *carneum* (Roscoe) Baker in Hook.f., Fl. Br. Ind. 6: 232. 1892;—*H. coccineum* var. *longifolium* (Roxb.) Baker in Hook.f., Fl. Br. Ind. 6: 231. 1892;—*H. coccineum* var. *roscoei* Wall ex. Baker in Hook.f., Fl. Br. Ind. 6: 231. 1892;—*H. coccineum* var. *squarrosus* Wall ex. Baker in Hook.f., Fl. Br. Ind. 6: 231. 1892;—*H. longifolium* Roscoe, Monandr. Pl. Scitam.: t. 59. 1824;—*H. roscoei* Wall. ex Roscoe, Monandr. Pl. Scitam.: Hedychium verso. 1828;—*H. squarrosus* Buch.-Ham. ex Wall. in Hook. Kew J. Bot. 5: 372. 1853.

Terrestrial, perennial herb. *Pseudostems* 1.2-1.8 m high, leaf sheaths green, bladeless sheaths 2-3. *Ligule* oblong, 2.8-3.0 by 1.4-1.6 cm, apex obtuse to shallowly bilobed or acute, pubescent, green. *Leaves* sessile; blade oblong, 45.0-46.8 by 4.8-5.0 cm, base cuneate, apex acuminate, margin entire, upper surface glabrous, lower surface pubescent. *Inflorescence* a terminal spike, erect, 15.3-32.7 cm long, hairy; peduncle 6.2-14.1 cm long, hairy; bracts lax, folded, green, oblong, 3.0-4.0 by 1.3-1.6 cm, apex obtuse-acute, hairy, each subtending a cincinnus of 3-5 flowers; first bracteole tubular, 1.7-2.3 by 0.4-0.6 cm, apex acute, hairy, green; second bracteole tubular, 1.2-2.3 by 0.4-0.5 cm, apex acute, membranous, hairy, greenish; third bracteole tubular, 1.0-1.9 by ca. 0.4 cm, membranous, hairy, greenish. *Flowers* red; calyx tubular, 2.4-3.1 by 0.3-0.4 cm, apex 2-dented, hairy; corolla tube slender, 3.5-3.6 by 0.2-0.3 cm, 3-lobed, lobes linear, 2.7-3.9 by 0.3-0.5 cm, apex hooded, red; lateral staminodes oblanceolate, 2.1-2.9 by 0.6-0.8 cm, base attenuate into a 0.6-1.0 by 0.2-0.3 cm claw; labellum suborbicular, 2.1-2.6 by 1.7-2.0 cm, base attenuate into a 0.6-1.0 by ca. 3 mm claw, apex deeply divided, 0.8-1.2 cm; filament red, 3.8-5.4 cm long; anther dorsifixed, 0.8-1.0 by 0.3-0.4 cm base divaricate, red; ovary 3-5 by 3-4 mm, 3-loculed, placentation axile, pubescent; epigynous glands 2, slender, 2-4 by 2 mm yellowish; stigma densely ciliate, green. *Fruits* ovoid-oblong, 2.6-3.8 by 2.3-2.5 cm, pubescent, green. *Seeds* numerous, ovoid-oblong, 4-5 by 2-3 mm, aril reddish orange.

Thailand.—NORTHERN: Chiang Rai [Wiang Pa Pao, Ban Khun Lao]; Mae Hong Son [Pai, near Doi Chang; Pang Mapha, Ban Mae Aumong]; Chiang Mai [Doi Suthep; Doi Angkhang; Doi Chiang Dao Wildlife Sanctuary]; Nan [Doi Phu Kha National Park].



Distribution.—Sri Lanka, Nepal, Bhutan, India (Sikkim), China (Southern Yunnan, Guangxi), Myanmar and Laos.

Ecology.—Lower montane pine-oak forest or lower montane scrub, at the altitude of ca. 1,000 m.

Phenology.—Flowering June-August, fruiting July-September.

Vernacular name.—Kha Phai (ข้าวไฟ), Za-ae Zaekaw (เข้เอเข้ก้อ) (Mae Hong Son).

Note.—This species possesses some distinctive characters of non-membranous ligules, oblong leaves and remarkably reddish-orange flowers, and can be readily differentiated from the typical *Hedychium* species bearing membranous ligules and white to yellowish flowers.

4. *Hedychium collinum* Ridl., J. Straits Branch Roy. Asiat. Soc. 32: 103. 1899 [Type: Peninsular Malaysia: Kedah, Kedah peak, alt. 1,300 m, June 1893; *Ridley* s.n. (type K)]; K. Schum. in Engl., Pflanzenr. 4(46): 50. 1904; Ridl., Fl. Mal. Pen. 4: 241. 1924; Holtt. in Gard. Bull. Sing. 13: 75. 1950.—*H. paludosum* M.R.Hend. (syn. nov.), J. Malayan Brach. Roy. Asiat. Soc. 5: 273. 1927; Holtt. in Gard. Bull. Sing. 13: 77. 1950 [Type: Peninsular Malaysia: Pahang, Cameron Highlands, alt. ca. 1,500 m; leg. Henderson S.F.N. 17844]. Figures 3 and 4C.

Terrestrial or lithophytic, perennial herb. *Pseudostems* up to 1.1 m high, bladeless sheaths 2-4. *Ligule* oblong, 1.9-2.5 by 1.4-2.0 cm, apex obtuse-acute or bilobed, membranous, glabrous. *Leaves* sessile or shortly petiolate, 4-6 mm long; blade narrowly elliptic to lanceolate-oblong, 19.2-25.9 by 6.0-6.8 cm, base rounded or cuneate, apex acute-acuminate, margin entire, upper surface glabrous, lower surface glaucous. *Inflorescence* a terminal spike, erect, up to 22.5 cm long, hairy; peduncle ca. 6.6 cm long, hairy; bracts lax, folded, triangular, 2.9-3.5 by 1.4-1.7 cm, pubescent, greenish, each subtending a cincinnus of 3-4 flowers, apex acute; first bracteole greenish, tubular, 2.6-3.0 by 1.3-1.5 cm, apex acute, pubescent; second bracteole tubular, 2.3-2.5 by 1-1.2 cm, apex acute, pubescent; third bracteole, tubular, membranous, 1.8-2.2 by 0.8-0.9 cm, pubescent. *Flowers* white; calyx tubular, 3.4-4.4 by 0.3-0.4 cm, apex acute, hairy; corolla tube slender, 5.2-8.1 by 0.2-0.3 cm, 3-lobed, lobes linear, apex hooded, yellowish, 3.4-3.8 by 0.2-0.3 cm; lateral staminodes oblong, 3.3-3.9 by 0.3-0.5 cm; labellum obovate, 2.6-3.1 by 2.3-2.9 cm, base attenuate into a 3-6 by ca. 4 mm claw, apex deeply cleft, white; filament salmon red, 5.0-6.1 cm long; anther dorsifixed, 3-5 by 3-4 mm, base divaricate, salmon red; stigma densely ciliate, green.

Thailand.—PENINSULAR: Yala [cultivated from plants collected at Khuean Banglang].

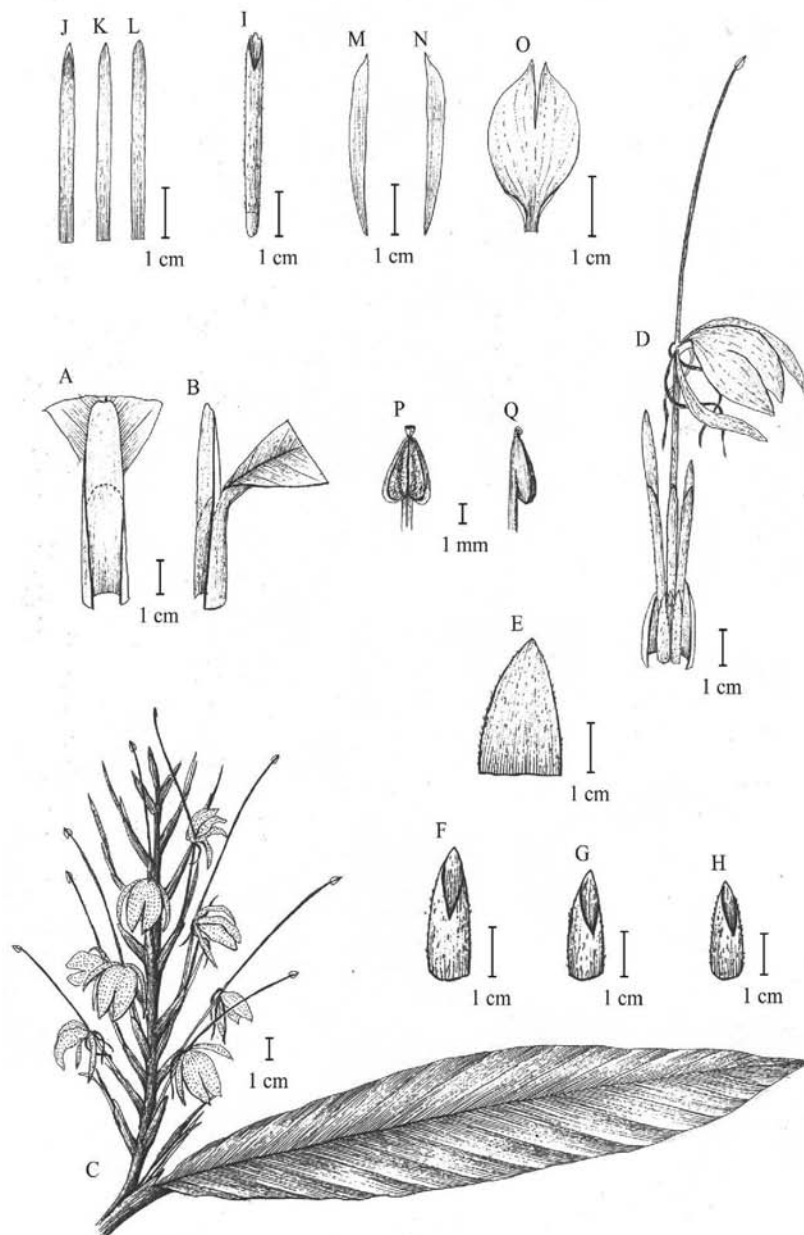


Figure 3. *Hedychium collinum* Ridl.

A. & B. part of a leaf with a ligule (front and side views). C. a leaf and an inflorescence. D. bract, bracteole and flowers. E. bract. F. first bracteole. G. second bracteole. H. third bracteole. I. calyx tube and ovary. J. dorsal corolla lobe. K. & L. lateral corolla lobes. M. & N. staminodes. O. labellum. P. & Q. anther and stigma (front and side views). Drawn by Chalermchoke Boonchit.

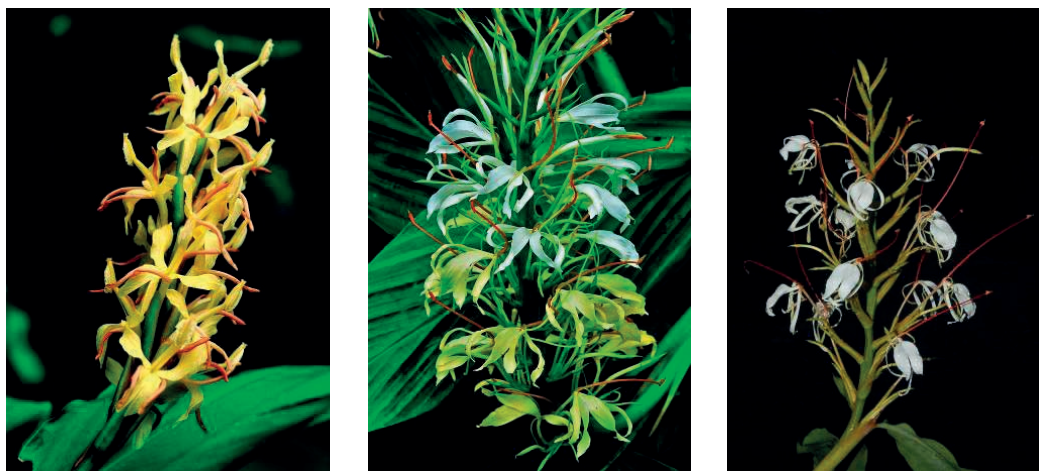


Figure 4.

A. *H. aureum* C. B. Clarke & Mann ex Baker. B. *H. biflorum* Sirirugsa & K. Larsen. C. *H. collinum* Ridl. Photographed by Chayan Picheansoonthon.

Thailand.—PENINSULAR: Yala [cultivated from plants collected at Khuean Banglang].

Distribution.—Peninsular Malaysia.

Ecology.—Tropical evergreen rain forest, at the altitude of ca.1200 m.

Phenology.—Flowering in October.

Vernacular name.—Pud Suea (ปูดเสื่อ).

Note.—This plant can be easily recognized by its hairy bract and calyx tube, a lax inflorescence with 3-4-flowered bracts, and a very small anther (3-5 mm long).

5. *Hedychium coronarium* J. Knig, in Retz., Obs. 3: 73. 1783 [Type: India: Or; *Knig* s.n. (holotype C)]; Smith, Exotic. Bot. 2. t.107. 1805; Roscoe in Trans. Linn. Soc. 8: 343, fig. 6. 1807; Roxb., Fl. Ind. 1. 1:9. 1820; Monandr. Pl. t. 51. 1828; Wall. in Hook. Kew J. Bot. 5:325. 1853; Horan., Monogr.: 24. 1862; Baker in Hook.f., Fl. Br. Ind. 6: 225. 1894; K. Schum. in Engl., Pflanzenr. 4(46): 44. 1904; Gagnep. in Lecomte, Fl. Gn. I.-C. 6: 70. 1908; Holtt. in Gard. Bull. Sing. 13: 72. 1950; Fl. Java 3: 64-65. 1968; T.L. Wu & K. Larsen in Z.L. Wu & PH. Raven, Fl. China 24: 372. 2000.—*Kaempferia hedychium* Lam. Tabl. Encycl. i. 7;—*H. spicatum* Lodd., Bot. Cab. 7: t. 653. 1822;—*H. maximum* Roscoe, Monandr. Pl. Scitam.: t. 52. 1825;—*H. lingulatum* Hassk., Tijdschr.



Natuurl. Gesch. Physiol. 5: 257. 1839;—*H. prophetae* Buch.-Ham. ex Wall., Hooker's J. Bot. Kew Gard. Misc. 5: 325. 1853;—*H. gandasulium* Buch.-Ham. ex Wall., Hooker's J. Bot. Kew Gard. Misc. 5: 325. 1853;—*H. coronarium* var. *maximum* Roscoe, Eichler C.F.P. von Martius & auct. Suc. (eds.) Fl. Bras. 3(3): 37. 1890;—*Gandasulium coronarium* (J. König) Kuntze, Revis. Gen. Pl. 2: 690. 1891;—*G. lingulatum* (Hassk.) Revis. Gen. Pl. 2: 690. 1891;—*Amomum filiforme* Hunter ex Ridl., J. Straits Brach Roy. Asiat. Soc. 53: 60. 1909. Figure 5A.

KEY TO THE VARIETIES

1. Flowers mostly thoroughly white, labellum with pale lemon green patch at base
 2. Bracts usually imbricate var. **coronarium**
 2. Bracts imbricate-elongated to visible rachis var. **forrestii**
1. Flowers white to pale yellow, labellum with dark yellow or yellow-orange patch at base
 3. Labellum with dark yellow patch at base var. **flavescenes**
 3. Labellum with yellow-orange patch at base var. **chrysoleucum**

var. **coronarium**

Terrestrial, perennial herb. *Pseudostems* 0.7-1.3 m high, leaf sheaths reddish, bladeless sheaths 4-5. *Ligule* 3.0-4.7 by 2.3-3.1 cm, apex truncate-emarginate, oblong, membranous, pubescent, greenish. *Leaves* lanceolate-oblong, 34.0-48.1 by 7.2-9 cm, base cuneate, apex acuminate to caudate, margin entire to slightly undulate, upper surface glabrous, lower surface pubescent. *Inflorescence* a terminal spike, erect, 5.3-7.1 cm long, hairy; peduncle 1.7-4.1 cm long, hairy; bracts conical imbricate, obovate, 5.5-6.0 by 3.0-3.8 cm, apex rounded, glabrous except apex and margin hairy, green, each bract subtending of 5-6 flowers; first bracteole, folded, lanceolate, 3.5-3.7 by 1.0-1.2 cm, apex acute, membranous, glabrous except apex hairy, greenish-white; second bracteole, folded, lanceolate, 3.2-3.3 by ca. 0.8 cm, apex acute, membranous, glabrous except apex hairy, greenish-white; third bracteole folded, lanceolate, ca. 3.1 by 0.6-0.7 cm, apex acute, membranous, glabrous except hairy apex, greenish-white; fourth bracteole lanceolate, 3.0-3.1 by 0.6-0.7 cm, apex acute, membranous, glabrous except hairy apex, greenish-white; fifth bracteole triangular, ca. 2.9 by 0.5 cm, apex acute, membranous, glabrous except hairy apex, greenish-white; sixth bracteole tubular, 2.2-2.4 by 0.2-0.3 cm, apex acute, membranous, glabrous except hairy



apex, greenish-white. *Flowers* white, fragrant; calyx tubular, 3.7-4.1 by 0.3-0.4 cm, pubescent, apex 3-dented; corolla tube slender, 6.2-6.8 by ca. 3 cm, 3-lobed, lobes linear, apex hooded, thorn-liked, white, 2.5-2.9 by 0.4-0.5 cm; lateral staminodes oblanceolate to broadly oblong-elliptic, 3.7-4.2 by 1.7-1.9 cm; labellum suborbicular, 4.4-5.0 by 4.6-5.4 cm, base attenuate into ca. 1.0 cm claw, white with pale lemongreen patch at base, apex 2-cleft, 1.8-2.2 cm; filament white, 3.4-3.7 cm long; anther dorsifixed, base divaricate, yellowish, 1.2-1.5 by 0.2-0.3 cm; ovary glabrous or sparsely hairy, 4-5 by 2-3 mm, 3-loculed, placentation axile; epigynous glands 2, slender, ca. 2 mm, long yellowish; stigma densely ciliate, green. *Fruits* ellipsoid-oblong, 2.2-2.6 by 1.8-2.2 cm, green. *Seeds* numerous, elliptic-globose, 6-8 by 4-5 mm, reddish orange.

Thailand.—Cultivated throughout the country.

Distribution.—Widely cultivated throughout tropical countries.

Ecology.—Easily grown in moist areas.

Phenology.—Flowering in rainy season.

Vernacular name.—Maha Hong (มหาหงส์), Salata (สะเลเต) (Northeastern), Ta Hoen (ตาเหิน) (Northern).

Note.—*H. coronarium* is easily recognized by its large white flowers and imbricate bracts. It is widely cultivated as ornamental plants. Its flowers are edible and source of perfume.

var. **chrysoleucum** (Hook.) Baker, in Hook.f., Fl. Br. Ind. 6: 226. 1892.—*H. chrysoleucum* Hook., Bot. Mag. 76: t.4516. 1850;—*H. coronarium* var. γ . Horan., Monogr. 24. 1862;—*H. chrysoleucum* Hook., K. Schum. in Engl., Pflanzenr. 4(46): 46. 1904;—*H. chrysoleucum* Holtt. in Gard. Bull. Sing. 13: 74. 1950;—*H. forrestii* Diels var. *latibracteatum* K. Larsen, Bot. Tidsskr. 61: 74. 1965. Figures 5B and 5C.

Terrestrial, perennial herb. *Pseudostems* up to 1.2 m high, bladeless sheaths 3-4. *Ligule* oblong, 2.8-3.9 by 2.4-3.1 cm, apex rounded-acute or emarginate, membranous, pubescent, greenish. *Leaves* sessile; blade lanceolate-oblong or elliptic, 21.2-27.2 by 5.7-6.0 cm, base cuneate, apex acuminate, margin entire to slightly undulate, upper surface glabrous, lower surface pubescent. *Inflorescence* a terminal spike, erect, 4.5-9.5 cm long; peduncle 3.5-5.6 cm long; bracts conical imbricate-elongate, obovate-oblong, 3.6-4.0 by 1.7-2.3 cm, apex acute, pubescent, green, each bract subtending of 4-5 flowers; first bracteole folded, lanceolate, 2.4-2.5 by 0.7-1.0 cm, apex acute, membranous, pubescent,



greenish-white; second bracteole folded, lanceolate, 0.6-1.0 by 2.2-2.3 cm, apex acute, membranous, pubescent, greenish-white; third bracteole folded, lanceolate, 1.8-2.0 by 0.5-0.9 cm, apex acute, membranous, pubescent, greenish-white; fourth bracteole lanceolate, 1.7-2.0 by 0.4-0.5 cm, apex acute, membranous, pubescent, greenish-white. *Flowers* white with yellow-orange patch at the base, fragrant; calyx tubular, 3.5-3.7 by 0.4-0.5 cm, apex 2-3-dented, pubescent; corolla tube slender, 8.0-8.1 by 0.3-0.4 cm, 3-lobed, lobes linear, 3.7-4.3 by 0.5-0.7 cm, apex hooded, thorn-liked, yellowish; lateral staminodes oblanceolate to broadly oblong-elliptic, 3.0-4.3 by 1.3-2.0 cm; labellum suborbicular, 4.4-5.0 by 4.4-4.5 cm, base attenuate into 1.0-1.1 cm claw, white with yellow-orange patch at base, apex 2-cleft, 0.8-1.9 cm; filament orange, 3.7-4.0 cm long; anther dorsifixed, 1.2-1.4 by 0.3-0.4 cm, base divaricate, yellow-yellowish; ovary pubescent, 5-7 by 4-5 mm, 3-loculed, placentation axile; epigynous glands 2, slender, ca. 5 mm long, yellowish; stigma densely ciliate, green. *Fruits* ellipsoid-oblong, 2.1-2.5 by 1.6-2.1 cm, green. *Seeds* numerous, elliptic to globose, 5-8 by 4-5 mm, reddish orange.

Thailand.—Cultivated.

Distribution.—Cultivated throughout tropical countries.

Ecology.—Easily growing in moist areas.

Phenology.—Flowering in rainy season.

Vernacular name.—Maha Hong (มหาหงส์).

Note.—This variety is easily recognized by its pure white labellum with a yellow-orange patch at the base and conical imbricate-elongate bracts.

var. **flavescens** (Carey ex Roscoe) Baker, in Hook.f., Fl. Br. Ind. 6: 226. 1894 [Type: Himalayas; Wallich s.n.].—*H. flavum* Bot. Mag. T. 2378, non Roscoe;—*H. flavescens* Carey ex Roscoe, Monandr. Pl. Scitam.: t. 50. 1825;—*H. coronarium* var. β . Horan., Monogr. 24. 1862;—*Gandasulium peregrium* (N.E.Br.) Kuntze, Revis. Gen. Pl. 2: 690. 1891;—*H. sulphureum* Wall. ex Baker in Hook.f., Fl. Br. Ind. 6: 225. 1894;—*H. flavescens* Carey ex Roscoe, K. Schum. in Engl., Pflanzenr. 4(46): 46. 1904—*H. subditum* Turrill, Bull. Misc. Inform. Kew 1914: 370. 1914;—*H. coronarium* var. *subditum* (Turrill) Naik, Bull. Bot. Surv. India 3: 71. 1961;—*H. emeiense* Z.Y.Zhu, Acta Bot. Yunnan. 6: 65. 1984;—*H. panzhuum* Z.Y.Zhu, Acta Bot. Yunnan. 6: 63. 1984;—*H. flavescens* Carey ex Roscoe, T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, Fl. China 24: 373. 2000. Figure 5D.



Terrestrial, perennial herb. *Pseudostems* up to 2.5 m high, bladeless sheaths 4-5. *Ligule* oblong, 3.4-4.8 by 2.6-3.3 cm, apex rounded-emarginate, membranous, pubescent, greenish. *Leaves* sessile, blade lanceolate-oblong or elliptic, 41.9-50.5 by 7.5-10.0 cm, base cuneate, apex acuminate to caudate, margin entire to slightly undulate, upper surface glabrous, lower surface pubescent. *Inflorescence* a terminal spike, erect, up to 15 cm long, hairy; peduncle 3.0-4.8 cm long, hairy; bracts conical imbricate, obovate, 5.4-6.1 by 3.8-5.1 cm, apex rounded-acute, pubescent, green, each bract subtending of 5-6 flowers; first bracteole, folded, lanceolate, 2.7-4.1 by 2.0-2.3 cm, apex acute, membranous, pubescent, greenish-white; second bracteole, folded, lanceolate, 2.5-3.2 by 1.4-2.2 cm, apex acute, membranous, pubescent, greenish-white; third bracteole folded, lanceolate, ca. 2.2 by 1.2-1.6 cm, apex acute, membranous, pubescent, greenish-white; fourth bracteole lanceolate, 2.0-2.1 by 0.8-0.9 cm, apex acute, membranous, pubescent, greenish-white; fifth bracteole triangular, 1.1-1.7 by 0.7-1.2 cm, apex acute, membranous, pubescent, greenish-white; sixth bracteole tubular, ca. 1.1 by 0.6 cm, apex acute, membranous, pubescent, greenish-white. *Flowers* yellow, fragrant; calyx tubular, 4.0-4.5 by 0.5-0.6 cm, pubescent, apex 3-dented; corolla tube slender, 7.4-8.7 by 0.3-0.4 cm, 3-lobed, lobes linear, apex hooded, thorn-like, yellow, 4.0-5.1 by 0.6-0.7 cm; lateral staminodes oblanceolate to broadly oblong-elliptic, 4.3-4.5 by 1.7-1.9 cm; labellum suborbicular, 4.0-4.9 by 3.5-3.7 cm, base attenuate into ca. 7 mm claw, white with dark yellow patch at base, apex 2-cleft, 6-7 mm; filament white, 5.4-5.6 cm long; anther dorsifixed, base divaricate, yellowish, 1.1-1.2 by 0.3-0.4 cm; ovary pubescent, 4-5 by 4-5 mm, 3-loculed, placentation axile, epigynous glands 2, slender, yellowish, ca. 5 mm long, stigma green, densely ciliate. *Fruits* not seen.

Thailand.—Cultivated.

Distribution.—Cultivated throughout tropical countries.

Ecology.—Easily growing in moist areas.

Phenology.—Flowering in rainy season.

Vernacular name.—Maha Hong (มหาหงส์), Ta Hoen (ตาเหิน) (Northern).

Note.—This variety is easily recognized by its yellow flowers with a dark yellow patch at the base of the labellum and conical imbricate bracts.

var. **forrestii** (Diels) Pichens. & Wongsuwan, var. nov. —*H. forrestii* Diels, Not. Roy. Bot. Gard. Edinb. 5: 304. 1912 [Type: China: Western Yunnan, Tali-valley, *G. Forrest* 4812]; —*H. forrestii* Diels, T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, Fl. China 24: 375-376. 2000. Figures 5E and 5F.



Terrestrial, perennial herb. *Pseudostems* 1.3-1.7 m high, bladeless sheaths 2-4. *Ligule* oblong, 6.5-7.2 by 3.3-4.0 cm, apex rounded-acute or emarginate, membranous, pubescent, greenish. *Leaves* sessile, blade lanceolate-oblong, 65.0-69.1 by 15.5-17.3 cm, base cuneate, apex acuminate, margin slightly undulate, upper surface glabrous, lower surface pubescent. *Inflorescence* a terminal spike, erect, 18.0-26.7 cm long; peduncle 6.2-7.1 cm long; bracts conical imbricate-elongate to visible rachis, obovate, 5.3-6.8 by 2.5-3.4 cm, apex acute, pubescent, green, each bract subtending of (2-)3-4 flowers; bracteole, tubular, 4.3-4.7 by 1.3-1.6 cm, apex acute, membranous, pubescent, greenish-white; second bracteole, tubular, 4.0-4.5 by 0.9-1.0 cm, apex acute, membranous, pubescent, greenish-white; third bracteole tubular, 3.2-3.9 by 0.7-0.8 cm, apex acute, membranous, pubescent, greenish-white; fourth bracteole tubular, 2.9-3.5 by 0.5-0.6 cm, apex acute, membranous, pubescent, greenish-white. *Flowers* white, fragrant; calyx tubular, 4.5-5.2 by 0.3-0.4 cm, pubescent, apex 2-3-dented; corolla tube slender, 7.3-8.2 by 0.3-0.4 cm, 3-lobed, lobes linear, apex hooded, thorn-liked, white, 4.5-5.0 by 0.4-1.1 cm; lateral staminodes oblanceolate to broadly oblong-elliptic, 3.4-4.5 by 1.7-2.2 cm; labellum suborbicular, 3.5-5.3 by 3.4-5.2 cm, base attenuate into 7-9 mm claw, apex 2-cleft, 0.9-1.3 cm; filament white, 3.0-3.7 cm long; anther dorsifixed, 1.6-1.8 by 0.3-0.4 cm, base divaricate, yellowish; ovary pubescent, 7-8 by 4-5 mm, 3-loculed, placentation axile; epigynous glands 2, slender, ca. 5 mm, long yellowish; stigma densely ciliate, green. *Fruits* ellipsoid-globose or oblong, 2.8-3.5 by 2.1-2.4 cm, green. *Seeds* numerous, ellipsoid-globose, 6-8 by 4-5 mm, reddish orange.

Thailand.—NORTHERN: Mae Hongson [Khun Yuam].

Distribution.—China (Guangxi, Guizhou, Sichuan, Yunnan), Myanmar and Laos.

Ecology.—Open field.

Phenology.—Flowering July-August, fruiting August-September.

Note.—This variety is related to *H. coronarium* var. *coronarium*, but can be easily recognized by its conical imbricate-elongate bracts and/or rachis-visible inflorescences.

6. *Hedychium ellipticum* Buch.-Ham. ex Sm. in Rees, Cyclop 16: 2. 1811 ; Monandr. Pl. t. 55. 1828; Lodding. Bot. Cabin. T. 1881. 1832; Wall. in Kew J. Bot. 5: 327. 1853; Horan. Monogr.: 25. 1862; Baker in Hook.f., Fl. Br. Ind. 6: 228. 1892; K. Schum. in Engl., Pflanzenr. 4: 48. 1904.—*Gandasulium ellipticum* (Buch.-Ham. ex Sm.) Kuntze, Revis. Gen. Pl. 2: 690. 1891; *H. fastigiatum* Volgt, Hort. Suburb. Calcutt.: 570. 1845.



Epilithic, perennial herb. *Pseudostems* 0.5-1.4 m high, bladeless sheaths 2-4. *Ligule* oblong, 1.1-1.2 by 1.2-1.4 cm, apex obtuse-shallowly bilobed, membranous, glabrous or sparsely hairy, reddish. *Leaves* sessile or shortly petiolate 2-4 mm long; blade elliptic, 26.9-27.3 by 8.7-9.4 cm, base cuneate, apex acute, margin entire, both surface glabrous. *Inflorescence* a terminal spike, erect, 6.1-6.6 cm long; peduncle 3.5-5.4 cm long, glabrous; bracts imbricate, folded, oblong, 1.9-2.5 by 0.6-1.0 cm, apex acute, glabrous, green, each subtending a cincinnus of 1 flower; bracteole tubular, 1.1-1.2 by 0.3-0.4 cm, apex acute, membranous, glabrous. Flowers white to pale yellow; calyx tubular, 2.4-3.2 by 0.3-0.4 cm, apex acute to 3-dented, glabrous; corolla tube slender, 5.1-5.2 by 0.2-0.3 cm, 3-lobed, lobes linear 5.1-5.7 by 0.3-0.4 cm, apex

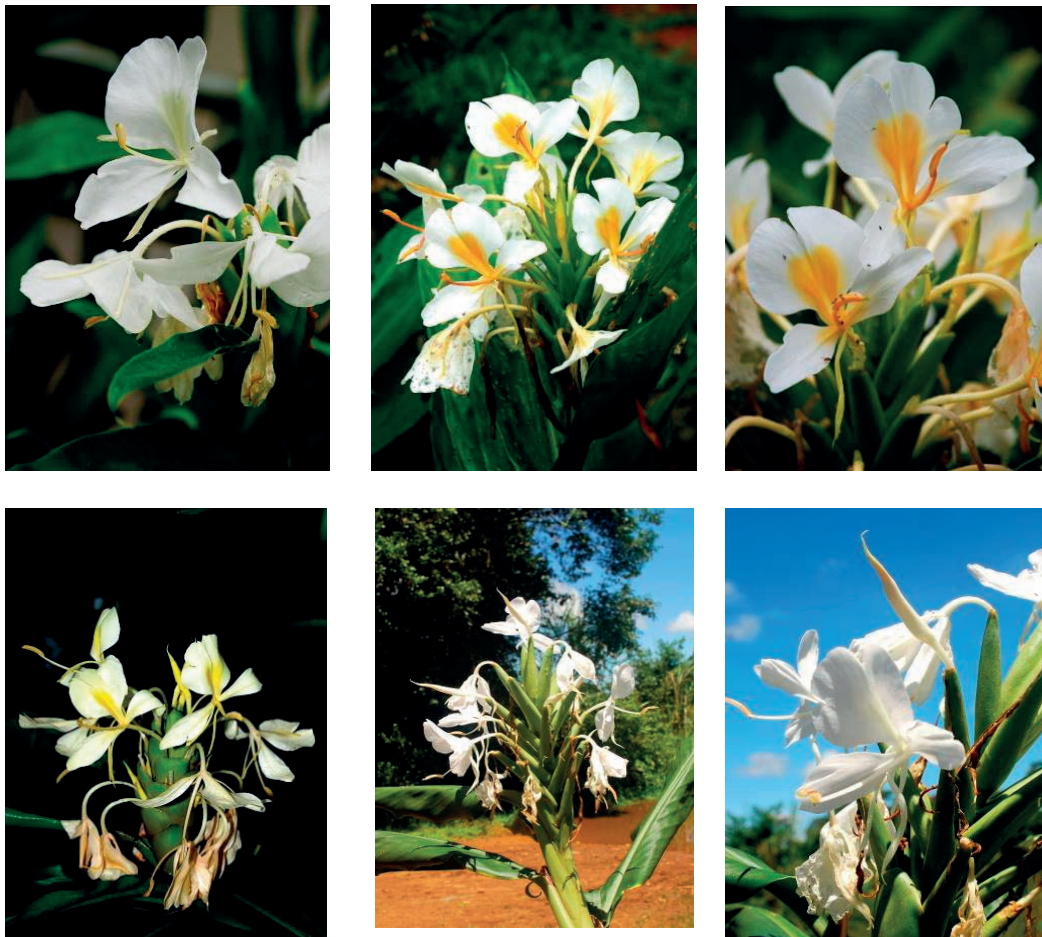


Figure 5.



A. *H. coronarium* J. Knig var. *coronarium* J. König. B. & C. *H. coronarium* J. König var. *chrysoleucum* (Hook.) Baker. D. *H. coronarium* J. König var. *flavescens* (Carey ex Roscoe) Baker. E. & F. *H. coronarium* J. König var. *forrestii* (Diels) Pichens. & Wongsuwan. Photographed by Pornpimon Wongsuwan. hooded, yellowish; lateral staminodes oblanceolate-linear, 2.8-3.5 by 0.2-0.5 cm; labellum lanceolate with two segments, upper part elliptic, 3.4-3.9 by 0.8-1.2 cm, lower part attenuate into a 1.4-1.7 by ca. 0.2 cm claw, apex acute-emarginate; filament 4.1-5.4 cm long, yellowish; anther dorsifixed, 1.3-1.5 by 0.3-0.4 cm, base divaricate, salmon red; ovary 3-4 by 4-5 mm, 3-loculed, placentation axile, glabrous or sparsely hairy; epigynous glands 2, slender, ca. 2 by 1-2 mm yellowish; stigma densely ciliate, green. *Fruits* globose, 0.9-1.3 by 0.8-1.2 cm, glabrous, green. *Seeds* numerus, ellipsoid-globose, 4-5 by ca. 3 mm, aril reddish- orange.

Thailand.—NORTHERN: Chiang Mai [Doi Chiang Dao Wildlife Sanctuary, Den Ya Khat; Doi Angkhang; Mae Rim, Pong Yaeng, Mon Long; Doi Suthep, Ban Mae Sah Mai 12, Huay Mae Nai; Doi Pui]; Nan [Doi Phu Kha National Park, Doi Phu Wae]; Pitsanulok [Phu Hin Rong Kla]; NORTH-EASTERN: Loei [Phu Kradueng National Park; Phu Ruea National Park].

Distribution.—Nepal, Bhutan, India, Myanmar and Laos.

Ecology.—Common in lower montane scrub, at the altitude of 1,000-1,474 m.

Phenology.—Flowering June-August, fruiting July-September.

Vernacular name.—Ta Hoen Wai (ตาคหินไหว).

Note.—This taxon is distributed from the Himalayas to Thailand. It can be easily recognized by its imbricate and glabrous 1-flowered bracts, white lanceolate labellum with acute-emarginate apex and the filament twice as long as the labellum.

7. *Hedychium gomezianum* Wall., [Cat. no. 6543] in Kew J. Bot. 5: 368. 1853 [Type: Myanmar: Tavoy, *Gomez* (lectotype K)]; Horan., Prodr. Mono. Scitam.: 25. 1862; Baker in Hook.f., Fl. Br. Ind. 6: 228. 1894; Schum. in Engl., Pflanzenr. 4(46): 55. 1904.—*Gandasulium gomezianum* (Wall.) Kuntze, Revis. Gen. Pl. 2: 690. 1891.

Epiphytic, perennial herb. *Pseudostems* 0.2-0.9 cm high, leaf sheaths red, bladeless sheaths 3-5. *Ligule* oblong, 3.3-8.3 by 1.1-1.8 cm, apex acute, membranous, pubescences, reddish or greenish. *Leaves* sessile or shortly petiolate,



4-7 mm long; blade lanceolate-oblong, 13.8-37.5 by 4.2-8.8 cm, base cuneate or oblique, apex acute, margin slightly undulate, both surface glabrous, midrib pubescent. *Inflorescence* a terminal spike, erect, 10.4-21.3 cm long; peduncle 2.9-4.4 cm long; bracts lax, folded, greenish, oblong, 1-2.1 by 0.3-0.7 cm, apex acute, pubescent or glabrous, each subtending a cincinnus of 1 flower; bracteole oblong, 0.5-1.5 by 0.3-0.5 cm, apex acute, membranous, pubescence or glabrous, greenish. *Flowers* white, then yellow, fragrant; calyx tubular, 2-2.3 cm by 0.2-0.3 cm, apex acute to 3-dented; corolla tube slender, 2.3-5.1 by ca. 0.2 cm, 3-lobed, lobes linear, 4.5-4.8 by 0.2-0.4 cm apex hooded, yellowish; lateral staminodes narrowly oblanceolate, 3.25-3.8 by 0.2-0.4 cm, base attenuate into a 1.3-1.7 by ca. 0.1 cm claw, apex acute; labellum elliptic, 2.7-3 by 0.9-1.1 cm, base attenuate into a 0.7-1 cm by 2-2.5 mm claw, apex deeply divided, 0.8-1.5 cm; filament 3.2-5.8 cm long, salmon red; anther dorsifixed, 0.9-1.2 by ca. 0.2 cm, base divaricate, yellowish to pale salmon red; ovary pubescent, 2-3 by ca. 2 mm, 3-loculed, placentation axile; epigynous glands 2, slender, 2-3 by ca. 1 mm yellowish; stigma densely ciliate, green. *Fruits* subglobose, 1.2-1.7 by 1.25-1.5 cm, greenish, pubescent. *Seeds* numerous, oblong, 3.5-4 by 1.5-2 mm, aril reddish-orange.

Thailand.—NORTHERN: Tak [Mae Sot]; SOUTH-EASTERN: Chanthaburi; Trat [Ko Chang]; PENINSULAR: Krabi; Ranong [Khleng Naka]; Surat Thani; Trang [Namtok Praan].

Distribution.—Myanmar (Tavoy), Peninsular Malaysia

Ecology.—Tropical evergreen rain forest, at the altitude of ca. 460 m.

Phenology.—Flowering June-August, fruiting July-September.

Vernacular name.—Khing Haeng (ขิงแห้ง)

Note. —This species can be recognized by its 1-flowered bracts and an elliptic labellum with deeply divided apex. Its flowers release a strong fragrance in early evening. It is often cultivated as an ornamental plant.

8. *Hedychium khaomaenense* Pichens. & Mookamul, *Folia malaysiana* 6: 20-22, 26. plates 2, 7-10. 2005. [Type: Thailand: Nakhon Si Thammarat, Yong Waterfall National Park, Khaomaen, N 08 17.560, E 99 39.753, alt. 1,123 m, 23 July 2003; *Pichensoonthon* & *Mookamul* 544 (holotype BKF, paratypes SING, PEK)]

Terrestrial, perennial herb. Pseudostems upto 1.2 m high, bladeless sheaths 2-4. Ligules oblong, 3.1-4.7 by 1.5-2.2 cm, apex unequally bifid, lobes



round, glabrous. *Leaves* subsessile, or shortly petiolate 1.2-1.5 cm long; blades elliptic, 25.6-32.5 by 12.5-17.7 cm, base cuneate, apex acute-acuminate, upper surface glabrous, lower surface hairy along the midrib. *Inflorescence* a terminal spike 12.0-20.5 cm long, peduncle 4.2-5.4 cm long; bracts imbricate, ovate to oblong, 6.4-7.0 by 2.8-3.8 cm, apex acute or obtuse, glabrous, each subtending a cincinnus of 1-2 flowers; first bracteole tubular, 5.5-5.9 by 0.5-0.6 cm, apex acute, glabrous, ribbed; second bracteole 4.9-5.4 by ca. 0.5 cm. *Flower* white to yellow, fragrant; calyx tubular, 8.2-8.8 cm long, apex acute, split on one side, glabrous except ciliate apex; corolla tubular, 13.4-13.8 cm long, glabrous, lobes linear, 6.0-6.2 by 0.2-0.3 cm, apex hooded; staminodes lanceolate, 6.2-6.6 by 1.4-1.6 cm, base attenuate into 1.5-2.1 claw, apex acute; labellum broadly obovate, 5.2-5.4 by 4.1-4.2 cm, base attenuate into 0.5-0.9 cm claw, apex deeply divided, cleft to a depth of 2.5-2.6 cm, apex of the lobes shortly acuminate; filament 5.3-5.4 cm long, yellow, anther dorsifixed, 1.4-1.5 cm long, base divaricate, yellowish; ovary glabrous, 4-7 by ca. 3 mm, 3-loculed, placentation axile; epigynous glands 2, slender, 1-2 by ca. 1 mm yellowish; stigma green, densely ciliate. *Fruit* oblong, 3.2-3.6 by 1.3-1.4 cm, red, crowned with persistent calyx.

Thailand.—PENINSULAR: Nakhon Si Thammarat [Yong Waterfall National Park, Khao Maen; Khao Luang National Park, Lan Trai; Khao Nun National Park].

Distribution.—Endemic to Thailand.

Ecology.—Lower montane rain forest, at the altitude of 1,093-1,237 m.

Phenology.—Flowering July-August, fruiting August-September.

Vernacular name.—Hong Hoen (หงส์เหิน).

Note.—Three species of *Hedychium* in Thailand, *H. cylindricum* var. *siamense*, *H. khaomaenense* and *H. malayanum* possess cylindrical inflorescences. This taxon is, however, can be readily distinguished by its broadly obovate labellum, with deeply divided apex, each lobe with short acuminate apex.

9. *Hedychium longicornutum* Griff. ex Baker, in Hook.f., Fl. Br. Ind. 6: 228. 1894 [Type: Peninsular Malaysia: Malacca; *Griffith*]; Ridl. J. Straits Brch. R. Asiat. Soc. 32: 100. 1899; K. Schum. in Engl., Pflanzenr. 4(46): 55. 1904; Ridl. Fl. Mal. Pen. 4: 242. 1924; Holtt. In Gard. Bull. Sing. 13: 77-78. 1950.—*H. crassifolium* Baker, in Hook.f., Fl. Br. Ind. 6: 228. 1894.—*H. longicornutum* var. *minor* Ridl., Bull. Misc. Inform. Kew. 1926: 88. 1926 [Type: Indonesia: Sumatra, Siberut, 28 September 1924; C. Boden-Kloss 14599 (K)].



Epiphytic, perennial herb. *Pseudostems* up to 0.6 m high, bladeless sheaths 2-3. *Ligule* oblong, 3.1-4.9 by 1.3-1.7 cm, apex acute, membranous, greenish. *Leaves* sessile, blade elliptic-lanceolate, 32.1-36.7 by 7.7-7.8 cm, base cuneate, apex acute, margin slightly undulate, both surfaces glabrous, midrib sparsely hairy. *Inflorescence* a terminal spike, erect, ca. 8.5 cm long; peduncle ca. 4.2 cm long; bracts imbricate, ovate, 2.8-3.0 by 0.9-1.0 cm, apex acute, greenish with brownish hairy, each subtending a cincinnus of 1 flower; bracteole tubular, ca. 1.2 by 0.3 cm, apex acute, membranous, pubescent or glabrous, greenish. *Flowers* yellow to orange; calyx tubular, 2.8-3.1 by ca. 3 cm, apex 2-3-dented, orange; corolla tube curl-backward, 3.5-3.8 by ca. 3 cm, 3-lobed, lobes linear, 5.3-5.8 by 0.4 cm, apex hooded, yellowish; lateral staminodes oblong, 3.7-4.0 by 0.6-0.7 cm, apex acute, curl-backward, margin undulate; labellum, 2.9-3.0 by 0.7-1.1 cm, base attenuate into 0.5 claw, apex deeply divided to the base, 2.4-2.5 cm long, each lobe linear 2.4-3.0 by ca. 0.3 cm, orange; filament 7.7-7.9 cm long, orange; anther dorsified, 1.1-1.2 by 0.2-0.3 cm, base divaricate, yellowish to pale salmon red; ovary pubescent, 4 by ca. 4 mm, 3-loculed, placentation axile; epigynous glands 2, slender, 2-3 by ca. 1 mm, yellowish; stigma densely ciliate, green. *Fruits* subglobose to globose, 0.8-1.2 by 1.0-1.2 cm, pubescent, greenish. *Seeds* numerous, oblong, 6-8 by 3-4 mm aril reddish-orange.

Thailand.—PENINSULAR: Narathiwat and Yala [Hala-Bala Wildlife Sanctuary].

Distribution.—Peninsular Malaysia

Ecology.—Tropical evergreen rain forest and peat swamp forest.

Phenology.—Flowering April-May, fruiting May-June.

Vernacular name.—Pud Duean (ปุดเดือน)

Note.—This taxon can be easily recognized by its 1-flowered bracts, yellow flower, curl-backward staminodes and labella. Roots are used to treat ear-ache. Ground root or the whole plant is a remedy for intestinal worms.

10. *H. malayanum* Ridl. ex Burkill & Holttum, Gard. Bull. Straits Settlements 3: 82. 1923 [Type: Peninsular Malaysia: Pahang, Fraser's Hill, October 1921; *Ferguson-Davie* (holotype K, isotype SING)]; Ridl., Fl. Mal. Pen. 4: 241-242. 1924; C. Picheansoonthon & P. Wongsuwan, J. Royal Inst. Thail. 43(3): 237-252. 2008.



Epiphytic, perennial herb. *Pseudostems* 0.2-0.6 cm high, leaf sheaths green, margin red, bladeless sheaths 2-3. *Ligule* ovate, 5.2-5.6 cm long, apex acute, membranous, sparsely hairy, pale greenish. *Leaves* subsessile or petiolate, 1.5-3.0 cm long; blade elliptic-oblong, 28.0-42.0 by 9.0-12.7 cm, base cuneate, apex acute or shortly acuminate, margin slightly undulate, upper surface glabrous, lower surface hairy along the midrib. *Inflorescence* a terminal spike, erect, 10.3-14.0 cm long, peduncle 7.5-10.5 cm long; bracts imbricate, overlapping, broadly ovate, 4.5-5.0 by 4.7-6.3 cm, apex rounded or acute, margin free to the base, sparsely hairy, green with reddish margin, each subtending a cincinnus of 1-2 flowers; bracteoles tubular, 3.5-4.0 by 1.8-2.4 cm, apex acute, split on one side to a depth of ca. 1.5 cm, hairy, reddish. *Flowers* white; calyx tube slender, 5.5-6.8 cm long, apex acute, glabrous; corolla tube narrow, 9.0-11.5 cm long, 3-lobed, lobe linear, 4.0-4.5 by ca. 0.1 cm; lateral staminodes narrowly lanceolate-oblong, 4.5-5.5 by ca. 0.3 cm; labellum shorter than staminodes, obovate, 3.8-5.1 by 1.0-1.6 cm, deeply divided, base attenuate into a 0.7-2.3 cm claw; filament ca. 5 cm long, anthers dorsifixed, 0.8-1.0 cm long, base divaricate, yellowish; ovary green, glabrous, ca. 3 by 4 mm, 3-loculed, placentation axile; epigynous glands 2, ca. 3 mm long, yellowish; stigma densely ciliate, greenish. *Fruits* broadly ellipsoid to broadly ovoid, 3.5-4.0 by 2.3-2.50cm, trilobe, glabrous, pale reddish/greenish.

Thailand.—PENINSULAR: Yala [Hala Wildlife Sanctuary, Hungus peak].

Distribution.—Peninsular Malaysia (Fraser's Hill – Type, Camaron Highlands)

Ecology.—Tropical evergreen rain forest, at the altitude of ca. 1,200 m.

Phenology.—flowering April-May (recorded cultivated from plants collected on top of Hangus mountain, Changwat Yala and from living specimens in type location), fruiting May-July

Vernacular name.—

Note.—This species can be easily recognized by its large, broad, glabrous, overlapping bracts, long narrow staminodes and ovate-obovate deeply-bilobed labella.

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